

**SBC-350A**

Half-size All-In-One  
386SX-40 CPU Card



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## Hardware Configuration

This chapter gives background information on the SBC-350A. It then shows you how to configure the card to match your application and prepare it for installation into your PC.

Sections include:

- Card specifications
- Locating components
- Safety precautions
- Configuration – Jumper settings

# Introduction

---

The half-size SBC-350A comes equipped with a 80386SX-40 CPU. Also included on-board are two serial RS-232 ports, a bi-directional parallel port, an IDE hard disk drive interface, a floppy disk controller and a watchdog timer. The watchdog timer ensures that the CPU will be reset if it stops due to a program or EMI problem, allowing the SBC-350A to be used in stand-alone systems or in unattended environments. The SBC-350A's industrial-grade construction ensures continuous, reliable operation in harsh industrial environments at temperatures up to 140°F (60°C).

We designed the SBC-350A with SBC (Single Board Computer) applications in mind. It also incorporates a connector for PC/104 modules (Flat-panel/CRT VGA controller or Flash/RAM/ROM disk).

Built using CMOS technology, the SBC-350A consumes very little power. Its four SIMM (Single In-line Memory Module) DRAM sockets accept 256 KB, 1 MB or 4 MB SIMM modules for total on-board memory of 1 to 16 MB.

You can also use this 4-layer CPU card to transform any system into a 16-bit 386 compatible computer, its all-in-one configuration freeing-up valuable expansion slots. Its highly compact form and numerous features make it an ideal cost/performance solution for high-end commercial and industrial applications where high CPU speed and low mean-time-to-repair are critical.



# Specifications

---

## ► **System**

- **CPU:** 80386SX-40 MHz, 80486SLC-33 MHz
- **Bus interface:** ISA (PC/AT) bus
- **System performance:**  
51.9 MHz with an 80386SX-40 MHz CPU
- **Data bus:** 16 bit
- **DMA channels:** 7
- **Interrupt levels:** 15
- **Processing ability:** 32 bit
- **Bus speed:** 8 MHz
- **Chipset:** ALI M1217-40
- **Real-time clock/calendar:**  
Uses Dallas DS-12887 RTC or equivalent chip and quartz oscillator, powered by a lithium battery for 10 years of data retention

## ► **Memory**

- **RAM memory:** 1 MB to 16 MB  
Uses 256Kx9 (SIMM-256-7), 1Mx9 (SIMM-1000-7) or 4Mx9 (SIMM-4000-7) SIMMs with access time of 70 nsec. or less
- **Shadow RAM memory:** Support for system and video BIOS of up to 256 KB in 32 KB blocks

## ► **I/O**

- **IDE hard disk drive interface:** Supports up to two IDE (AT bus) hard disk drives. Can be enabled/disabled
- **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 MB and 2.88 MB). Can be enabled/disabled

- **Bi-directional parallel port:** Configurable to LPT1, LPT2, LPT3 or disabled. Standard female DB-25 connector provided
- **Serial ports:** Dual RS-232 serial ports with 16C550 compatible UARTs (16-byte FIFO for speeds up to 115 Kbps). Ports can be individually configured as COM1, COM2 or disabled

#### ► **Industrial features**

- **Watchdog timer:**  
The timeout interval is software programmable and can be set between 2 to 30 sec.. Your program uses hex 043 and 443 to control the watchdog and set the timeout period
- **PC/104 Expansion:**  
A 64- and 40-pin, 16-bit bus connector for optional PC/104 modules such as a Flash/RAM/ROM disk module and/or Flat-panel/CRT VGA module
- **Keyboard connectors:** A 6-pin mini-DIN keyboard connector is located on the mounting bracket for easy access. An external keyboard adapter is also included. An on-board keyboard pin header connector is also available.

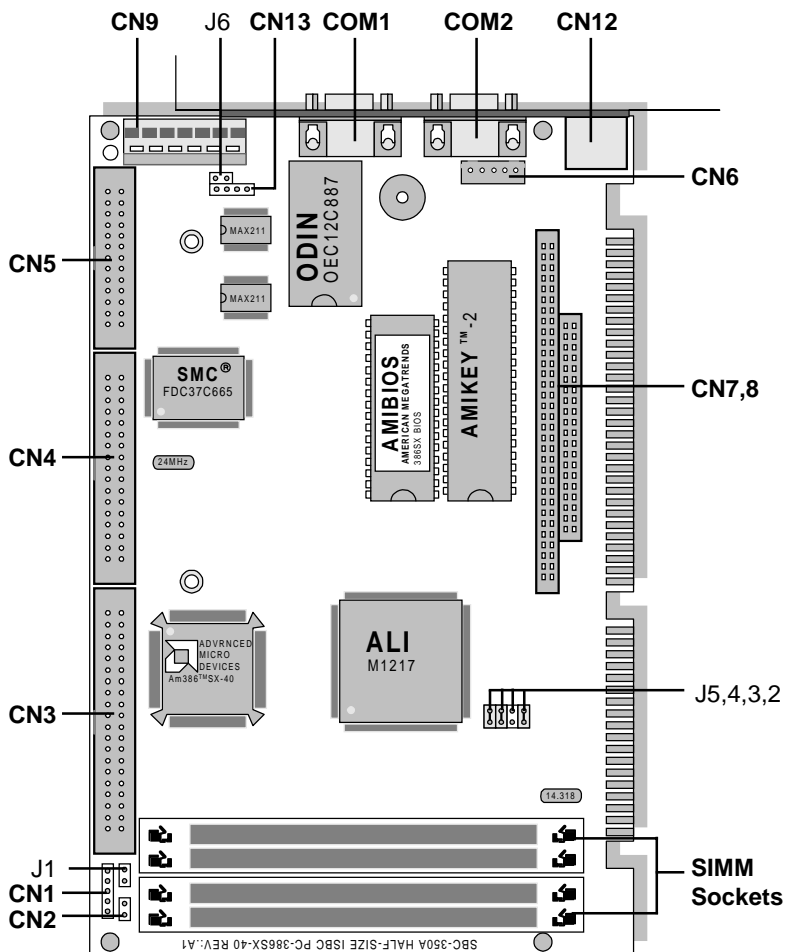
#### ► **General**

- **Max power required:** + 5 V @ 1.2 A
- **Power supply voltage:** +5 V (4.75 V to 5.25 V), +12 V, -12 V
- **Operating temperature:** 32 to 140°F (0 to 60°C)
- **Size:** 7.3" (L) x 4.8" (W) (185 mm x 122 mm)
- **Weight:** 0.55 lbs. (250g)
- **EMI:** Pending
- **MTBF:** Pending

## Locating components

---

This section identifies the location of the card's major components. It also includes a list of the function of each of the card jumpers. The figure on the following page gives an overall view of the card.



**SBC-350A PCB Layout**

## Jumpers and connectors

Connectors on the board link it to external devices such as hard disk drives, a keyboard or PC/104 modules. In addition, the board has a number of jumpers which you use to configure it for your application.

The table below lists the function of each of the board jumpers and connectors. Later sections in this chapter give instructions on setting jumpers and detailed information on each jumper setting. Chapter 3 gives instructions for connecting external devices to your card.

Jumpers and Connectors		
Number	Function	Page
J1	Reset switch	19
J2,3,4,5	CPU clock and AT clock select	8
J6	Display type - mono, color	8
CN1	Power LED and Keylock	19
CN2	Hard disk driver activity LED	19
CN3	HDD connector	17
CN4	FDD connector	16
CN5	Parallel/printer connector	18
CN6	Keyboard connector	18
CN7/8	PC/104 expansion connector	43
CN9	SBC Power connector	20
CN10	COM1, RS-232 serial port	20
CN11	COM2, RS-232 serial port	20
CN12	Keyboard connector (6-pin mini DIN)	18
CN13	External speaker connector	21

## SIMM memory modules

On the left end of the card (away from the mounting bracket) are the four SIMM (Single In-line Memory Module) sockets which hold the card's DRAM memory. If you ordered DRAM SIMMs along with your card, the SIMMs may already be installed. If not, you should install them as described in Appendix B.

## Safety precautions

---

Follow these simple precautions to protect yourself from harm and your PC from damage.

1. To avoid electric shock always disconnect the power from your PC chassis before you work on it. Don't touch any components of the CPU card or other cards while the PC is on.
2. Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.
3. Always ground yourself to remove any static charge before you touch your CPU card. Be particularly careful not to touch the chip connectors. Modern integrated electronic devices, especially CPUs and memory chips, are extremely sensitive to static electric discharges and fields. Keep the card in its anti-static packaging when it is not installed in the PC and place it on a static dissipative mat when you are working on it. Wear a grounding wrist strap for continuous protection.

## Jumper settings

---

This section tells how to set the jumpers to configure your card. It gives the card default configuration and your options for each jumper. After you set the jumpers and install the card, you will also need to run the BIOS Setup program (discussed in Chapter 5) to configure the serial port addresses, floppy/hard disk drive types and system operating parameters. Connections, such as hard-disk cables, appear in Chapter 3.

### Card default settings

We set the card's jumpers at the factory for the most popular configuration. If this configuration matches your needs, you may not need to change the jumpers at all. The default configuration is as follows:

- CPU clock: 33 MHz. (J2, J3, J4, J5)
- Color display is attached (J6)

## How to set 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.

You may find pair of needle-nose pliers useful for setting the 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.

## CPU clock and AT clock select (J2, J3, J4, J5)

J2, J3, J4, and J5 are used to adjust the CPU clock and AT clock. Set the CPU clock according to the base CPU speed. The default setting is 33 MHz.

CPU clock and AT clock select (J2, J3, J4, J5)

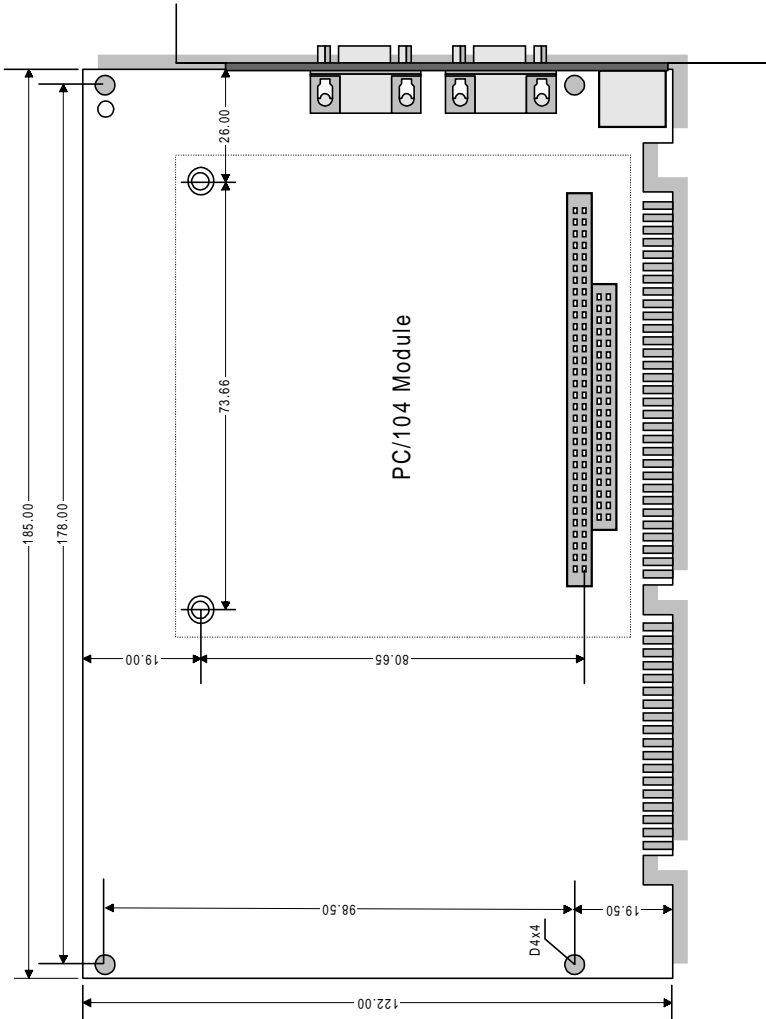
	J2	J3	J4	J5
40 MHz	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>
33 MHz	<input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	<input checked="" type="radio"/> <input type="radio"/>	<input checked="" type="radio"/> <input type="radio"/>
25 MHz	<input type="radio"/> <input type="radio"/>	<input checked="" type="radio"/> <input type="radio"/>	<input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>
20 MHz	<input checked="" type="radio"/> <input type="radio"/>	<input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	<input checked="" type="radio"/> <input type="radio"/>

## Display type (J6)

This jumper sets the display adapter type attached to your card. If you are using a monochrome LCD or EL screen which uses a CGA, EGA, VGA or other color display adapter, set J6 to color.

Monochrome      Closed  
Color              Open (default)

# Card Dimensions



Unit = mm





# CHAPTER 2

## **Installation**

This chapter gives a general procedure for installing your CPU card into an PC chassis with an AT-compatible passive backplane. For specific instructions, consult the user's manual for your chassis.

# Initial Inspection

---

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

- 1 SBC-350A CPU card
- 1 6-pin mini-DIN keyboard adapter
- 1 Hard disk drive (IDE) interface cable (40 pin)
- 1 Floppy disk drive interface cable (34 pin)
- 1 Parallel port adapter (26 pin) kit
- 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.

We carefully inspected the SBC-350A mechanically and electrically before we shipped it. It should be free of marks and scratches and in perfect working order on receipt.

As you unpack the SBC-350A, check it for signs of shipping damage (damaged box, scratches, dents, etc.). If it is damaged or it fails to meet specifications, notify our service department or your local sales representative immediately. Also notify the carrier. Retain the shipping carton and packing material for inspection by the carrier. After inspection we will make arrangements to repair or replace the unit.

**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 in a static-dissipative surface or static-shielded bag when they are not in the chassis.*

Before you begin installation, double check the jumper settings for the card (described in Chapter 1). This could save you a lot of troubleshooting time later. If you are not sure about the proper setting, contact your local distributor or sales representative.

Install your CPU card as follows:

1. Remove power from the chassis and disconnect all power cords. Follow all power-down procedures outlined in your chassis user's manual.
2. Remove the chassis cover, then detach the card hold-down bracket. This bracket stretches across the top of each circuit card to hold it securely in place.
3. Locate a free slot in the chassis. You can use any 16-bit (double connector) slot. We suggest that you leave the maximum amount of space between boards to improve cooling.
4. You may need to remove a block-off cover at the end of the slot. Unscrew the cover and save the screw for use in Step 6.
5. Align the card square with the card-end guide slot and parallel to the connector. Slide the card carefully into the connector.
6. Make sure the card is completely seated in the connector. Screw the card I/O bracket to the case.

After you have installed the CPU card, you will need to attach the connecting cables as described in the following chapter. When you are finished installing the CPU card, replace the card hold-down bracket you removed in Step 2, replace the chassis cover and power-up your system.

Dimensions for SBC (Single Board Computer) installation appear on page 9.



CHAPTER  
**3**

## **Connecting peripherals**

This chapter tells how to connect peripherals, switches and indicators to the SBC-350A board. You can access most of the connectors from at the top of the board while it is installed in the chassis. If you have a number of cards installed, or your chassis is very tight, you may need to partially remove the card to make all the connections. When everything is done, finish installing the card as described in Chapter 2.

## SBC-350A Card Connectors

The following table lists the connectors on the SBC-350A. See Chapter 1 for help locating the connectors.

SBC-350A Connectors		
Component	Label	Page
Reset switch connector	J1	19
Power LED and Keylock	CN1	19
HDD LED connector	CN2	19
HDD (IDE) connector	CN3	17
FDD connector	CN4	16
Parallel port	CN5	18
Keyboard connector	CN6	18
PC/104 expansion connector	CN7/8	43
SBC power connector	CN9	20
COM1 RS-232 serial port	CN10	20
COM2 RS-232 serial port	CN11	20
Keyboard connector (6-pin mini DIN)	CN12	18
External speaker connector	CN13	21

The following sections tell how to make each connection. In most cases you will simply need to connect a standard cable.

### Floppy drive connections (CN4)

You can attach up to two floppy disk drives to the SBC-350A'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 card comes with a 34-pin daisy-chain drive connector cable. On one end of the cable is a 34-pin flat-cable connector. On the other end are two sets of floppy disk drive connectors. 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). You can use only one connector in each 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.

Attach the single 34-pin flat-cable connector to CN4 on the CPU card. For help finding the connector, see Chapter 1. Wire number 1 on the cable is red or blue, the other wires are gray. Make sure that the red wire corresponds to pin one on the connector (on the right side).

Connect the A: floppy drive to the connector set on the other end of the cable. If you are connecting a 5.25" floppy drive, line up the slot in the printed-circuit-board (golden fingers) with the blocked-off part of the cable connector.

If you are connecting a 3.5" floppy drive, you may have trouble determining which pin is number one. Look for a number printed on the circuit board indicating pin number one. Also, the connector on the floppy drive connector may have a slot. When the slot is up, pin number one should be on the right. Check the documentation that came with the drive for more information.

Next, if you desire, connect the B: floppy drive to the connectors in the middle of the cable as described above.

## **IDE hard drive connections (CN3)**

You can attach two IDE (Integrated Device Electronics) hard disk drives to the SBC-350A internal controller. The card comes with a 40-pin flat-cable piggyback cable. This cable has three identical 40-pin flat-cable connectors.

Wire number 1 on the cable is red or blue, the other wires are gray. Connect one end to connector CN3 on the CPU card. Make sure that the red wire corresponds to pin one on the connector (on the right side). See Chapter 1 for help finding the connector.

Unlike floppy drives, IDE hard drives can connect in either position 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 use just one drive, you should set it as the master. See the documentation that came with your drive for more information.

Connect the first hard drive to the other end of the cable. Wire one on the cable should also connect to pin one on the hard drive connector. You may have difficulty determining the pin number. Look for a number printed on the drive circuit board. Also, the connector on the floppy drive connector may have a slot. When the slot is up, pin number one should be on the right. Check the documentation that came with the drive for more information.

Connect a second drive as described above.

## **Parallel Port (CN5)**

You would normally use the parallel port to connect the card to a printer. The SBC-350A includes an on-board bi-directional parallel port, accessed through a 26-pin flat-cable connector, CN5. 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. The bracket installs at the end of an empty slot in your chassis, giving you access to the connector.

To install the bracket find an empty slot in your chassis. Unscrew the plate that covers the end of the slot. Screw in the bracket in place of the plate. Next, attach the flat-cable connector to connector CN5 on the CPU card. Wire one of the cable is red or blue, the other wires are gray. Make sure that wire one connects to pin one of CN5. Pin one is on the right side of CN5. For help finding the connector, see the figure on page 5.

## **Keyboard connectors (CN6, CN12)**

The SBC-350A board provides two keyboard connectors. A 5-pin connector (CN6) supports passive backplane applications. A second 6-pin mini-DIN connector (CN12) on the card mounting bracket supports single-board-computer applications. The card comes with an adapter to convert from the 6-pin mini-DIN connector to a standard DIN connector.



# External switches and indicators

---

Next you may want to install external switches to monitor and control your CPU card. These features are completely optional — install them only if you need them.

## Reset switch (J1)

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. Install the switch so that it closes the two pins of J1.

## Power LED and keylock (CN1)

You can connect an LED to indicate when the CPU card is on. Pin 1 of CN1 supplies power to the LED and Pin 3 is the ground. For help finding CN1 see the figure on page 5.

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 of CN1. The pin assignments for CN1 appear in the following table:

---

Power LED and Keylock (CN1)

---

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

---

## Hard disk drive LED (CN2)

You can connect a LED to connector CN2 to indicate when the HDD is active. Marks on the circuit board indicate LED polarity (the pin on the left is positive).

## SBC power connector (CN9)

In single-board-computer (non-passive-backplane) applications you will need to connect power directly to the SBC-350A board using connector CN9. This connector is fully compatible with the standard PC power supply connector (P8). Refer to the following table for CN9's pin assignments.

---

SBC Power Connector (CN9)

---

Pin no.	Function	Pin no.	Function
1	Power good	4	-12 V <sub>DC</sub>
2	+5 V <sub>DC</sub>	5	GND
3	+12 V <sub>DC</sub>	6	GND

---

## Serial Ports

---

The SBC-350A offers two RS-232 16C550 compatible serial ports. These ports let you connect to serial devices (mouse, printers, modems etc.) or a communication network.

You can select the address for each port or disable it through the BIOS Advanced Setup program, covered in Chapter 5. The following are the options for both ports:

---

Serial Port Setup Options

---

Port		Address options		
COM1	Disable	3F8	3E8	2F8
COM2	Disable	2F8	2E8	3F8

---

The card mounting bracket holds the serial port connectors. This lets you connect and disconnect cables after you install the card. The DB-9 connector on the top of the bracket is the COM1 RS-232 port. The second DB-9 connector is the COM2 RS-232 port. The following section tells how to make RS-232 connections.

## RS-232 connections (CN10, CN11)

Different devices implement the RS-232 standard in different ways. If you are having problems with a serial device, be sure to check the pin assignments for the connector. The following table shows the pin assignments for the card's RS-232 port:

---

RS-232 Connector Pin Assignment	
Pin no.	Signal
1	DCD
2	RX
3	TX
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

---

## External speaker connector (CN13)

---

If the SBC-350A is installed into an enclosure, an external speaker can be connected to CN13.

---

External Speaker Connector (CN13)	
Pin no.	Signal
1	+5 V
2	Speaker out
3	Speaker out
4	Speaker out

---

Now that you have made all the required external connections, you can close up your chassis (as described in Chapter 2). If you are installing any other cards, do it now. You can then power up your system as described in the next chapter.



## Power-up

After you have set the jumpers (Chapter 1), installed SIMMs (Appendix B), installed the card (Chapter 2) and made all external connections (Chapter 3), you are ready to power-up your system.

# Startup Procedure

---

Follow the startup procedure outlined in the manual for your chassis.

When you start your system, the BIOS will test the hardware and check the system configuration against the values stored in its CMOS memory.

Since this is the first time you are starting up, the BIOS will display an error message stating that the configuration does not match the stored values. You should then run the BIOS setup program as described in Chapter 5.

If the BIOS hardware diagnostic tests fail, you may see an error message on the screen describing the problem. If the BIOS found a problem early in the tests, you will need to determine the BIOS POST (Power On Self Test) results by counting beeps or using a POST card.

The most common source of problems is incorrect jumper settings. Double check your settings (Chapter 1) and restart the system.

There are three methods you can use to restart your system after it is turned on:

1. Switch the power off, then on again
2. Reboot the system. Using the keyboard, simultaneously press the CTL, ALT and DEL keys
3. Depress the optional reset switch

Use of each of these methods will erase data from the system RAM memory. If you can, save any data stored in memory to a hard or floppy disk before you reset your system.

# CHAPTER 5

## **BIOS diagnostics and SETUP**

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

# POST (Power On Self Tests)

---

Whenever you start up your system, the CPU card runs a series of programs stored in an on-board ROM chip. These programs are divided into two stages:

## System test and initialization

These routines test and initialize board hardware. If the routines encounter an error in during the tests, you will either hear a few short beeps or see an error message on the screen. There are two kinds of errors: fatal and non-fatal. The system can usually continue the boot up sequence with non-fatal errors. Non-fatal error messages usually appear on the screen along with the following instructions:

```
press <F1> to RESUME
```

Write down the message and press the F1 key to continue the bootup sequence. Non-fatal error messages appear in Appendix E.

If the routines encounter a fatal error, they will stop the tests and output a message indicating which test failed. If the fatal error comes before the screen device initializes, the card will indicate the error code through a series of beeps.

## System configuration verification

These routines check the current system configuration against the values stored in the card's CMOS memory. If they don't match, the program outputs an error message. You will then need to run the BIOS setup program to set the configuration information in memory.

There are three situations in which you will need to change the CMOS settings:

1. You are starting your system for the first time
2. You have changed the hardware attached to your system



3. The CMOS memory has lost power and the configuration information has been erased.

The SBC-350A's CMOS memory has integral lithium battery backup. The battery backup should last ten years in normal service, but when it finally runs down, you will need to replace the complete unit. Contact your sales representative or distributor for details.

## Running the setup program

---

Normally, the only routine visible on the screen will be the memory test. The following figure shows the screen as it appears while the tests are occurring.

```
AMI BIOS(c) 1993 American Megatrends Inc.,
xxxxxxx KB OK
Hit <DEL>, If you want to run SETUP
(c)American Megatrends Inc.,
xx-xxxx-xxxxxxx-xxxxxxx-xxxxxx-xxxx
```

### Power On Self Tests

A line of reference codes appears at the bottom left of the screen. These codes identify the options installed in the AMI BIOS. If you have a problem with your system, make a note of these codes before you contact your dealer for technical support.

To “freeze” the screen so that you can write down the codes, power-on the system and hold down a key on the keyboard. This will cause a “Keyboard Error” message to appear on the screen and the system will wait for you to press the <F1> key. After you copy down the line, you can then press <F1> to continue the boot procedure. After the POST routines are complete, the following message appears:

```
Hit <DEL>, If you want to run SETUP
```

Press the <DEL> key to access the BIOS setup program. The following screen will then appear.

## BIOS Setup Main Menu

You use the following keys to control the BIOS SETUP program:

**ESC:** Exit to previous screen

**ARROW KEYS:** Moves the cursor to highlight the desired configuration option

**PAGEUP/PAGEDOWN/CTRL-PAGEUP/CTRL-PAGE-DOWN:**

Cycles through the configuration options for the highlighted feature. If there are less than ten available options, the Ctrl-PageUp and Ctrl-PageDown keys function the same as the PageUp and PageDown keys.

**F1:** Displays a help screen for selected feature.

**F2/F3:** Changes background and foreground colors.

**F5:** Retrieves the values which were resident when the current setup session was started. These values will be CMOS values if the CMOS was uncorrupted at the start of the session, or they will be the BIOS Setup default values.

**F6:** Loads all features in the Advanced CMOS Setup with the BIOS Setup defaults.

**F7:** Loads all features in the Advanced CMOS Setup with the Power-On defaults (the values in the CMOS when the system was started).

**F10:** Saves all changed made to Setup and exits program.

## Standard CMOS Setup

Standard CMOS setup configures options that most users will need to change. Highlight **Standard CMOS Setup** in the main screen and press <ENTER>.

A warning message appears (shown below) whenever you select either Standard CMOS Setup, Advanced CMOS Setup or Advanced Chipset Setup from the main screen. Simply press any key to continue or ESC to abort.

Improper Use of Setup may Cause Problems!!  
 If System Hangs,.....Enter Setup by pressing  
 the <DEL> key  
 Do any of the following After Entering Setup  
 (i) Alter Option to make System Work  
 (ii) Load BIOS Setup Defaults  
 (iii) Load Power-On Defaults  
 Hit <ESC> to Stop now, Any other Key to  
 continue

### BIOS Setup Warning Message

The following screen will then appear:

BIOS Setup Program - Standard CMOS SETUP (C) 1993, American Megatrends Inc., All Rights Reserved																																																														
Date (mn / date / year): Tue, Jan 01 1991 Time (hour / min / sec): 09:39:06 Daylight Saving: Disabled	Base memory: 640KB Ext. memory: 0KB																																																													
Hard disk C: type: 47= USER TYPE Hard disk D: type:Not Installed Floppy drive A: :1.2MB, 51/4" Floppy drive B: :Not Installed Primary display :Monochrome Keyboard :Installed	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Cyln</th> <th>Head</th> <th>WPCom</th> <th>LZone</th> <th>Sect</th> <th>Size</th> </tr> </thead> <tbody> <tr> <td>642</td> <td>8</td> <td>0</td> <td>0</td> <td>17</td> <td>43MB</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Sun</th> <th>Mon</th> <th>Tue</th> <th>Wed</th> <th>Thu</th> <th>Fri</th> <th>Sat</th> </tr> </thead> <tbody> <tr> <td>30</td> <td>31</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>6</td> <td>7</td> <td>8</td> <td>9</td> <td>10</td> <td>11</td> <td>12</td> </tr> <tr> <td>13</td> <td>14</td> <td>15</td> <td>16</td> <td>17</td> <td>18</td> <td>19</td> </tr> <tr> <td>20</td> <td>21</td> <td>22</td> <td>23</td> <td>24</td> <td>25</td> <td>26</td> </tr> <tr> <td>27</td> <td>28</td> <td>29</td> <td>30</td> <td>31</td> <td>1</td> <td>2</td> </tr> <tr> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>9</td> </tr> </tbody> </table>	Cyln	Head	WPCom	LZone	Sect	Size	642	8	0	0	17	43MB	Sun	Mon	Tue	Wed	Thu	Fri	Sat	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9
Cyln	Head	WPCom	LZone	Sect	Size																																																									
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>           Month: Jan, Feb,.....Dec            Date : 01, 02, 03.....31            Year : 1901, 1902.....2099         </td> </tr> </table>		Month: Jan, Feb,.....Dec Date : 01, 02, 03.....31 Year : 1901, 1902.....2099																																																												
Month: Jan, Feb,.....Dec Date : 01, 02, 03.....31 Year : 1901, 1902.....2099																																																														
Esc = Exit,    - @ - = Select, F2/F3 = Color, PgUp/PgDn = Modify																																																														

This screen lets you set following features:

#### Date:

System date. A prompt box at the lower left corner of the screen gives the range of allowable values.

#### Time:

System clock. Hour first, minute then second. Uses 24 hour clock format (for PM numbers add 12 to the hour: you would enter 4:30 p. m. as 16:30:00)

**Daylight Savings:** Disabled or Enabled

**Hard Disk C: and Hard Disk D:**

The BIOS supports 46 standard hard disk sizes and layouts. If your hard disk matches one of these types (shown below), highlight the number blank (for the appropriate drive, C: or D:) and press <PgDn> until the correct number appears. If the BIOS does not support your hard disk, select disk type 47 and enter each of the specifications into the blank (e. g. number of cyln.). You can get these numbers from a label on your disk drive or from the documentation that came with the drive. After you have set up drive C:, you can then set up drive D:. If you have no drive D:, select Not Installed.

---

Hard Disk Types

---

Type Size	Cyln	Head	WPcomp	LZone	Sect	
1	306	4	128	305	17	10 MB
2	615	4	300	615	17	20 MB
3	615	6	300	615	17	31 MB
4	940	8	512	940	17	62 MB
5	940	6	512	940	17	47 MB
6	615	4	65535	615	17	20 MB
7	462	8	256	511	17	31 MB
8	733	5	65535	733	17	30 MB
9	900	15	65535	981	17	112 MB
10	820	3	65535	828	17	20 MB
11	855	5	65535	855	17	35 MB
12	855	7	65535	855	17	50 MB
13	306	8	128	319	17	20 MB
14	733	7	65535	733	17	43 MB
16	612	4	0	663	17	20 MB
17	977	5	300	977	17	41 MB
18	977	7	65535	977	17	57 MB
19	1024	7	512	1023	17	60 MB
20	733	5	300	732	17	30 MB
21	733	7	300	732	17	43 MB
22	733	5	300	733	17	30 MB

---

23	306	4	0	336	17	10 MB
----	-----	---	---	-----	----	-------

Type Size	Cyln	Head	WPcomp	LZone	Sect	
24	925	7	0	925	17	54 MB
25	925	9	65535	925	17	69 MB
26	754	7	754	754	17	44 MB
27	754	11	65535	754	17	69 MB
28	699	7	256	699	17	41 MB
29	823	10	65535	823	17	68 MB
30	918	7	918	918	17	53 MB
31	1024	11	65535	1024	17	94 MB
32	1024	15	65535	1024	17	128 MB
33	1024	5	1024	1024	17	43 MB
34	612	2	128	612	17	10 MB
35	1024	9	65535	1024	17	77 MB
36	1024	8	512	1024	17	68 MB
37	615	8	128	615	17	41 MB
38	987	3	987	987	17	25 MB
39	987	7	987	987	17	57 MB
40	820	6	820	820	17	41 MB
41	977	5	977	977	17	41 MB
42	981	5	981	981	17	41 MB
43	830	7	512	830	17	48 MB
44	830	10	65535	830	17	69 MB
45	917	15	65535	918	17	114 MB
46	1224	15	65535	1223	17	152 MB
47	user type					

Note that the user definition entry (47) lets you a test on a disk drive not defined in ROM. The USER definition entry is valid only during the period that the test is performed.

The following chart shows the meaning of each of the hard disk parameters:

---

#### Hard disk parameters

**Type:** This is the number designation for a drive with certain identification parameters.

**Cyln:** This is number of cylinders found in the specified drive type.

---

**Heads:** This is the number of heads found in the specified drive type.

---

**WPcom:** WPcom is the read delay circuitry which takes into account the timing differences between the inner and outer edges of the surface of the disk platter. The number designates the starting cylinder of the signal.

---

**L-Zone:** LZone is the landing zones of the heads. This number determines the cylinder location where the heads will normally park when the system is shut down.

---

**Sectors:** The number of sectors per track

---

**Size:** This is the formatted capacity of the drive based on the following formula:  
(# of heads) x (# of cylinders) x (# of sectors) x  
(512 bytes/sec.)

---

### **Floppy Drive A: and Floppy Drive B:**

The BIOS supports any combination of 3.5" (720 KB 1.44 MB and 2.88MB) and 5.25" (360 KB and 1.2 MB) floppy disks. If you have no floppy disk installed, select Not Installed.

### **Primary Display:**

Select the type of display you have connected. Options are: Monochrome, Color 40x25, VGA/PGA/EGA, Color 80x25 and Not Installed. You might use the Not installed option for a network file server.

### **Keyboard:**

Options are Installed or Not Installed.

**Note:** If you are running your system on a non-dedicated file server, and you do not want the AMI BIOS to report any keyboard, video or floppy disk drive errors during POST, set the AMI BIOS Keyboard, Primary display and floppy disk features to "Not Installed."

## **Advanced CMOS Setup**

Advanced CMOS Setup controls system settings. Adjusting these parameters may improve system performance, but make a note of the original settings before you make any changes. Some combinations of settings may cause your system to crash or become

unreliable.

From the main menu highlight the Advanced CMOS Setup option and press <ENTER>. Press any key to clear the warning screen.

## Features

The following chart lists card settings which you can change in Advanced CMOS Setup. It lists the default value for each setting. This screen has several help screens, accessed by pressing the <F1> key, which display setting options.

---

Help Screen Options	
Feature	Available options
Type Rate Programming	Disabled (default) Enabled
Type Rate Delay (msec)	250, 500 (default), 750, 1000
Type Rate (Chars/sec)	6, 8, 10, 12, 15 (default), 20, 24, 30
Above 1MB Memory Test	Disabled (default) Enabled
Memory Test Tick Sound	Enabled (default) Disabled
Memory Parity Error Check	Enabled (default) Disabled
Hit <DEL> Message Display	Enabled (default) Disabled
Hard Disk Type 47 RAM Area	0:300 (default) DOS 1KB
This setting determines where in memory the hard disk information is stored when you select hard disk type 47. If you disable BIOS Shadow RAM, the Hard Disk Type 47 parameter table will use regular RAM. There are two options, 0:300 (lower system RAM) and DOS 1 KB (the top 1KB of 640 KB base memory).	
Wait for <F1> if Any Error	Enabled (default) Disabled
System Bootup Num Lock	On (default) Off

---





	Enabled
IDE Controller	Enabled (default) Disabled
Floppy Controller	Enabled (default) Disabled

After you have made your configurations changes, press <ESC> to return to the main menu.

## Advanced CHIPSET Setup

Advanced CHIPSET Setup controls the ALI-1217-40 chipset's configuration registers. Adjusting these parameters may improve system performance. Should you make any changes, make sure you note the original settings for future reference. Certain combinations of system settings can cause conflicts and may result in a system crash or unreliable operation.

From the main menu, highlight the Advanced CHIPSET Setup option, and press <ENTER>. Press any key to clear the warning screen.

### Features

The following chart lists card settings which you can change in Advanced CHIPSET Setup. It lists the default value for each setting. This screen has several help screens, accessed by pressing the <F1> key, which display setting options.

#### Help Screen Options

Feature	Available options
Burst Memory Access Wait	Disable (default) Enable
Memory Access Wait Time	Disable (default) Enable
RAS Time Out	Disable Enable (default)
CAS Precharge Time Wait	Disable (default) Enable
RAS Active Time Wait	Disable (default) Enable
Fast RAS Precharge Time	Disable (default)

	Enable
16-bit ISA Cycle Insert Wait	0 w/s (default) 1 w/s
Slow Refresh	Disable Enable (default)
Refresh Type	CAS/RAS (default) RAS only
IO Recovery	Disable (default) Enable
On Chip I/O Recovery	Disable (default) Enable
I/O Recover Period Define ns/step	0 (default) ....3750ns, 250 ns/step

### Auto Configuration with BIOS Defaults

This main menu option loads the system default values stored in the BIOS ROM at the factory.

### Auto Configuration with Power-On Defaults

This main menu option loads the settings stored in the CMOS memory when you turned on your system. If your system behaves erratically, you can use this feature to check for incorrect settings.

### Auto Detect Hard Disk

This option simplifies the hard disk drive configuration by automatically configuring the system to your HDD

### Hard Disk Utility

This option lets you perform low-level hard disk drive preparation before you use the DOS FDISK or FORMAT utilities. All of its functions are destructive to existing data on the disk drive.

Most IDE hard drives come preformatted from the factory, so you will probably only need these utilities if your hard disk develops bad sectors or ages and needs to have the formatting information refreshed.

### Write to CMOS and Exit/Do not Exit

After you have made your configuration changes, select **Write to CMOS and Exit**. If you decide you want to abandon the changes you have made, select **Do not Write to CMOS and Exit**.

## **Programming the watchdog timer**

The SBC-350A is equipped with a 15 level watchdog timer that resets the CPU if processing comes to a standstill for whatever reason. The time-out interval is software programmable for periods of 2 to 30 seconds. This feature ensures system reliability in industrial stand-alone and unmanned environments.

## Introduction

To utilize the watchdog timer, you must write a program which writes to I/O port address 443 (hex) at regular intervals. The first time your program writes to the port, it enables the watchdog timer and sets the time-out interval. After that your program must write to the port at time intervals less than the time-out interval, otherwise the watchdog timer will activate and reset the CPU. When you want to disable the watchdog timer, your program should write I/O port 043 (hex).

If CPU processing comes to a standstill because of EMI or a software bug, your program's signals to I/O port address 443 to the timer will be interrupted. The timer will then automatically reset the CPU and data processing will continue normally.

## Programming

You must write your program so that it 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  $\pm 5\%$ , 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.

- Step1      Write to I/O port 443 (Hex) and designate a time-out interval. This will enable the watchdog and set-up it's time-out interval
- Step2      Write to I/O port 043 (Hex) and any random value. This will in turn disable the watchdog timer.

The watchdog's time-out interval can be set at 15 levels between 2 and 30 seconds. The following table shows the Hex values for the appropriate time-out intervals:

---

### Watchdog Timer Delay Values

---

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

---

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

```
#include<stdio.h> #include<dos.h> #include <conio.h> #include
<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(15,11);printf("Now disable
                watchdog timer!");
                outportb(0x43,dog);
                break;
            case '3': /* Disable Watchdog timer & return to
                DOS */
                outportb(0x43,dog);
                return;
            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();
    }
}
}

```

APPENDIX  
**B**

## **Upgrading**

This appendix gives instructions for increasing the capabilities of your CPU card. It covers:

- DRAM memory installation (SIMMs)
- CPU upgrading
- Installing PC/104 modules

## Installing DRAM (SIMMs)

---

You can install anywhere from 1 MB to 16 MB of on-board DRAM memory using 256 KBx9, 1 MBx9 or 4 MBx9 SIMMs (Single In-line Memory Modules). Access time should be 70 ns or less.

Memory installs in one bank composed of four SIMM sockets. See the figure on page 5 for help identifying the banks. You must fill all four sockets, and all SIMMs must be of the same capacity, i. e. you cannot mix 256 KB SIMMs with 1 MB SIMMs. The following table shows the memory size for different SIMM capacities:

<b>System memory size</b>	<b>SIMM size and number</b>
1 MB	256 KB x 4 pcs
4 MB	1 MB x 4 pcs
16 MB	4 MB x 4 pcs

The procedure for installing SIMMs appears below. Please follow these steps carefully.

1. Locate the CPU card's memory banks, shown in the figure on page 5.
2. Install the SIMM cards. Install each SIMM so that its chips face away from the CPU and its gold pins point down into the SIMM socket.
3. Slip each SIMM into a socket at a 45 degree angle and carefully fit the bottom of the card against the connectors.
4. Gently push the SIMM into a perpendicular position until the clips on the ends of the SIMM sockets snap into place.
5. Check to ensure that each SIMM is correctly seated and all connector contacts touch. The SIMM should not move around in its socket.



## CPU upgrading

---

This section tells how to upgrade the card's CPU. You can upgrade your SBC-350A to a higher powered 486SLC-33 CPU at any time. Simply remove the old 386SX CPU, install the new 486SLC-33 CPU and short/open the appropriate solder pads for the CPU type and speed.

1. Disconnect power from the chassis and remove the CPU card. Follow the instructions in the user's manual for your chassis. You will also need to disconnect everything you connected in Chapter 3, Connections.
2. If you are upgrading the CPU, remove any existing CPU from the card. (See Chapter 1 for help locating the CPU position.)
3. Solder the new CPU onto the SBC-350A. Follow the instructions that came with the CPU.
4. Using a soldering iron, not too hot!, solder the pads CP1, CP2, CP3, CP6 and CP7 open or closed. These pads will be open/closed depending on the type of CPU installed. The following table refers:

---

CP Configurations					
CPU Type	CP1	CP2	CP3	CP6	CP7
386SX-40	Open	Open	Open	Open	Short
486SLC-33		Short	Short	Short	Short
Open					

---

5. Reinstall the CPU card according to the instructions in Chapter 2.

## Installing PC/104 modules

---

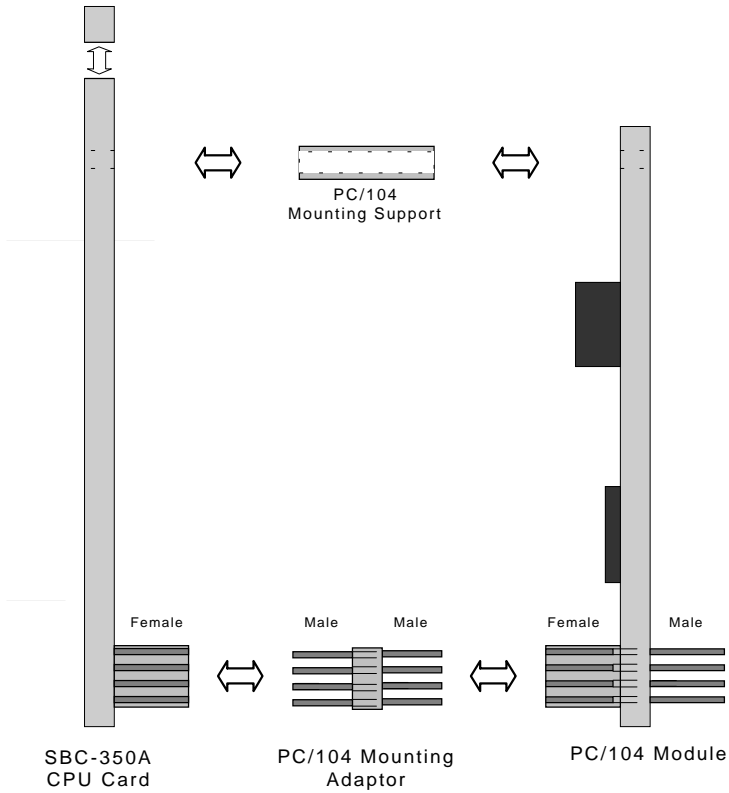
The SBC-350A's PC/104 connectors give you the flexibility to attach PC/104 expansion modules. These modules perform the functions of traditional plug-in expansion cards, but save space and

valuable slots. Modules include:

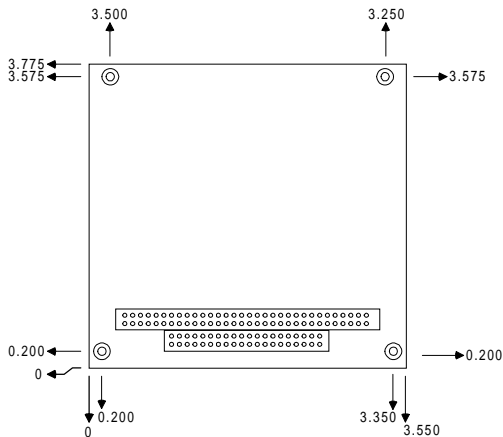
- **PCM-3510** Super VGA Module
- **PCM-3520** Flat-panel/CRT VGA Module
- **PCM-3410** Super I/O Module
- **PCM-3810** Solid-state Disk Module
- **PCM-3110** PCMCIA Module
- **PCM-3111** Secondary PCMCIA Module
- **PCM-3610** Isolated RS-232 and RS-422/485 Module
- **PCM-3640** Four port RS-232 Module
- **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-350A is a quick and simple operation. The following steps show how to mount the PC/104 modules:

- Step1 Remove the SBC-350A from your system paying particular attention to the safety instructions already mentioned above.
- Step2 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.
- Step3 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-350A and the PC/104 module are both "female". For this reason you need to plug-in a "male-male" adapter connector (included with the SBC-350A). 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.
- Step4 Mount the PC/104 module onto the CPU card. Do this by pressing the module firmly but carefully onto the mounting connectors.



**PC/104 Module Mounting Diagram**



Step5 Secure the PC/104 module onto the CPU card using the four mounting spacers and screws.



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