SBC-490

Full-size 486 PCI/ISA-bus CPU Card
with SVGA interface

Acknowledgements

Packing list

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

- 1 SBC-490 CPU card

- 1 6-pin mini-DIN dual outlet adapter for keyboard and PS/2 mouse

- 1 hard disk drive (IDE) interface cable (40 pin)

- 1 floppy disk drive interface cable (34 pin)

- 1 parallel port adapter (26 pin) and COM2 adapter (9 pin) kit

- 1 utility disk (Flash BIOS program, Watchdog for Windows Library, and Demo Program)

- 4 utility disks with SVGA utility programs

- 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.

Contents

General Information

This chapter gives background information on the SBC-490.

Sections include:

• Card specifications

• Board layout

Introduction

The SBC-490 is an all-in-one single board 486 computer that includes an **on-board SVGA controller, with PCI-bus and ISA-bus support**. It packs all the functions of an industrial computer with display capabilities on a single full-size card. The SBC-490 is fully PC/AT compatible, so your software will run without modifications.

The SBC-490 is excellent for display-intensive applications. The on-board PCI-bus SVGA controller uses the Trident TGUI9440GUi chipset with the local PCI-bus to enable 32-bit graphic throughput at up to 33 MHz. Also built in is a **standard Feature Connector**.

In addition, the SBC-490 features a high speed PCI-bus IDE controller, which connects up to four IDE devices, including large hard disks, CD-ROM drives, tape backup drives or other IDE devices. It supports (through ATA PIO) mode 3 and mode 4 hard disks, enabling transfer rates of over 11 MB/sec. 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.

On-board features also include two high-speed RS-232 serial ports with 16C550 UARTs, one bidirectional SPP/EPP/ECP parallel port and one floppy drive controller. In addition to the 486's 8 KB of on-chip cache memory, the SBC-490 comes with an extra 128 KB or 512 KB of second level memory on-board.

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-490 supports 5V EDO DRAM. It also provides four 72-pin SIMM (Single In-line Memory Module) sockets for its on-board system DRAM. These sockets give you the flexibility to configure your system from 1 MB to 128 MB of DRAM using the most economical combination of SIMMs. For optimal power management, the SBC-490 also supports the "Green" function.

Features

- Accepts Intel, AMD, Cyrix or other 486-compatible processors, including the P24T Pentium Overdrive processor

- Fully PC/AT-compatible PCI/ISA-bus CPU card

- On-board 32-bit PCI-bus SVGA controller

- Built-in fast PCI enhanced IDE controller; supports four IDE devices (large hard disks, CD-ROM, tape backup, etc.)

- Up to 128 MB of on-board DRAM

- Supports 5 V EDO DRAM

- Two high-speed serial RS-232 ports (16C550 UARTs with 16-byte FIFO); IRQ3, 4, 10, 11 can be individually selected

- One enhanced bidirectional parallel port; supports SPP/EPP/ECP

- Watchdog timer (15 steps, 2 seconds per step)

- On-board keyboard and PS/2 mouse connector

- Connectors for PC/104 module expansion

- "Green" function; supports power management

- On-board feature connector

- Supports Flash BIOS, and BIOS can be upgraded easily

Specifications

- **CPU**: 80486SX/DX/DX2/DX4-25/33/40/50/66/75/100/120 MHz, AMD/ Cyrix 5x86-100/120/133 MHz or Pentium Overdrive processor

- **Bus interface**: ISA (PC/AT) and PCI bus

- **Data bus**: 32 bit

- **Processing ability**: 32 bit

- **Chipset**: ALI/1489/1487

- **RAM memory**: 1 MB to 128 MB. Uses four 72-pin SIMM sockets

- **L2 Cache memory size**: 128/256/512 KB 2nd level cache memory

- **Shadow RAM memory**: Supports system and video BIOS shadow memory

- **Display controller**: SVGA, PCI-bus, Trident TGUI9440GUI chipset with 1 MB standard video memory, upgradable to 2 MB. Provides 32-bit graphic throughput. Supports resolutions up to 1280 x 1024 in 256 colors, 1024 x 768 in 64K colors, 800 x 600 in 64K colors, or 640 x 480 in 16.8 million colors

- **Feature connector:** 26-pin header

- **Enhanced IDE hard disk drive interface:** Fast PCI bus. Supports up to four enhanced IDE hard disk drives or other IDE devices.

- **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)

- **Bidirectional parallel port**: Configurable to LPT1, LPT2, LPT3 or disabled. Supports SPP/EPP/ECP standards

- **Serial ports**: Two serial RS-232 ports; use 16C550 UARTs with 16-byte FIFO buffer. Supports speeds up to 115 Kbps. Ports can be individually configured from COM1 to COM4 or disabled.

- **Flash BIOS**: SST 29EE010 Flash memory on board. BIOS can be upgraded easily.

- **Watchdog timer**: Can generate a system reset, NMI or IRQ15. The time interval is software selectable from 2 to 32 seconds (15 steps, 2 seconds per step).

- **PC/104**: 104-pin connector for a 16-bit bus
- **DMA channels**: 7
- **Interrupt levels**: 15
- **Keyboard or PS/2 mouse connector**: A 6-pin mini DIN keyboard connector is located on the mounting bracket for easy access to the keyboard and PS/2 mouse.
- **Bus speed**: 8 MHz (up to 12 MHz) for ISA bus; 20/25/33 MHz for PCI bus (dependent on CPU clock speed)
- **System performance**: 325 MHz with a 80486 DX4-100 (Landmark V2.0)
- **Max. power requirements**: +5 V @ 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); a cooling fan is needed for DX4-100, 5x86 and P24T CPUs.
- **Board size**: 13.3" (L) x 4.8" (W) (338 mm x 122 mm)
- **Board weight**: 1.2 lbs (0.5 kg)

Board layout

Card dimensions
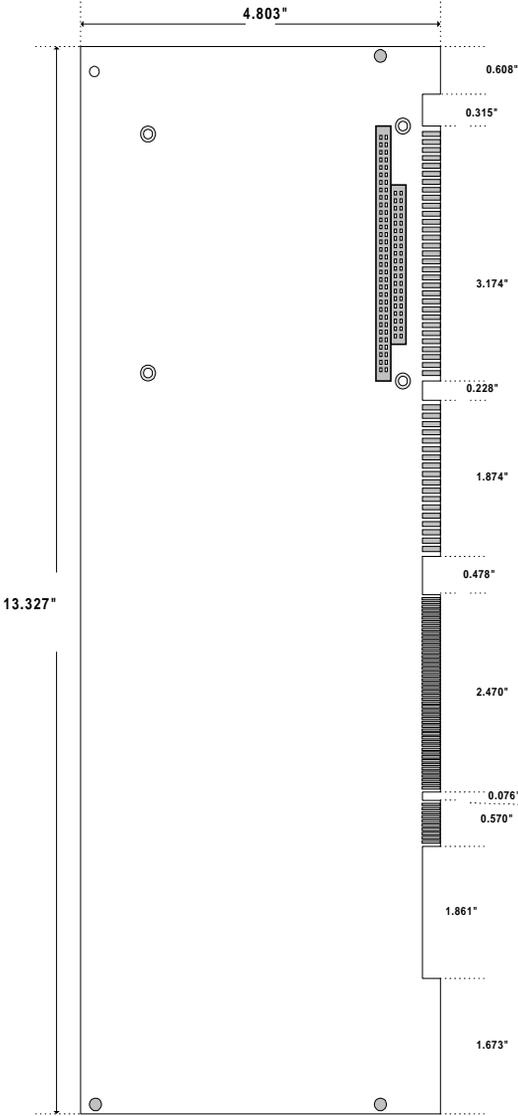
Installation

This chapter describes how to set up the SBC-490 hardware, including instructions on setting jumpers and connecting peripherals, switches and indicators. Be sure to read all safety precautions before you begin the installation procedure.

Jumpers and connectors

Connectors on the board link it to external devices such as hard disk drives, 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
JP1,7	CPU voltage select
JP2	Secondary IDE LED
JP3	Primary IDE LED
JP4, 5, 6	On-board VGA enabled/disabled
JP8, 9, 10	CPU type select
JP11	Flash BIOS protect
JP12	Cache size select
JP13, 14	CPU clock select
JP15	Clear CMOS
JP16	Watchdog timer interrupt select
JP17	Reserve for IR CON
JP18	RS-232 port IRQ select
Primary IDE	1st enhanced IDE connector
Secondary IDE	2nd enhanced IDE connector
Floppy Disk	FDD connector
Printer	Parallel port connector
Feature Connector	VGA feature connector
Power Con	Power connector
KB CON	External keyboard connector
VGA	VGA connector
KB/PS2 Mouse	Keyboard and/or PS/2 mouse connector
COMA	Serial port 1 connector
COMB	Serial port 2 connector

Locating jumpers and connectors

POWER CON

COMA

VGA KB/PS2 MOUSE

JP17, JP18

KB CON

PRINTER COMB

FEATURE CONNECTOR

PC/104 MODULE CONNECTOR

FLOPPY DISK

SMC® FDC37C665

AMIKEY™-2

AWARD AWARD SOFTWARE INC

ODIN OEC12C887

CPU FAN PRIMARY IDE

JP15 JP11

ALI M1487

JP4, JP5, JP6

Trident TGUI9440AGi

SECONDARY IDE

JP16

IDE LED (JP2, JP3)

CPU VCC (JP1, JP7)

CPU CLK (JP13, JP14)

CPU TYPE (JP8, JP9, JP10)

ALI M1489

TB LED

EXT-SPK

TB SW

SMI OUT

32K8 CACHE RAM

JP12

SMI SW

KEY-LOCK

RESET

SIMM SOCKETS

SBC 490 486SX/DX/DX2/DX4 CPU CARD Rev. B1

Setting jumpers

You configure your card to match the needs of your applications 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 may connect either pins 1 and 2 or 2 and 3.
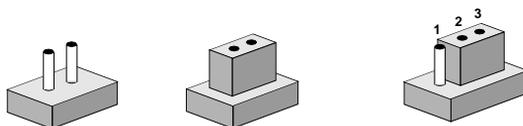
Open	**Closed**	**Closed 2-3**

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 applications, contact your local distributor or sales representative before you make any changes.

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

Safety precautions

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

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

Installing the CPU

The SBC-490 CPU card supports most 486 CPUs, as well as the P24T Pentium OverDrive processor. The system's performance depends on the CPU you choose. You can install or upgrade the CPU in the board's ZIF 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. Pull the lever on the side of the ZIF socket out a little and raise it up as far as it will go.

2. Lift the CPU out.

Installing the CPU

1. Make sure the ZIF socket lever is up as far as it can go. The Pin 1 position is at the arm corner.

2. Match Pin 1 on the CPU with the Pin 1 position on the ZIF socket. The pins on the three inner rings of the CPU should be aligned with the holes on the ZIF socket.

3. Insert the CPU. If it does not go in easily, lift the lever higher.

4. Press the lever down. The sliding plate will move forward to position the CPU. You will feel some resistance in the lever as the CPU is secured into place. When the CPU is properly installed, the lever will snap into place at the side of the ZIF socket.

When you install a new CPU, you 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.**

CPU type select (JP8, JP9, JP10)

JP8, JP9, and JP10 must be set to match the CPU type. The chart below shows the proper jumper setting for their respective CPU.

CPU Type select (JP8, JP9, JP10)

Intel P24T	AMD/Intel DX4-100 Intel P24D Intel DX2-66 AMD DE2-66	AMD DX5-133/ AMD DX2-66(WB) (default)	Intel 486SX
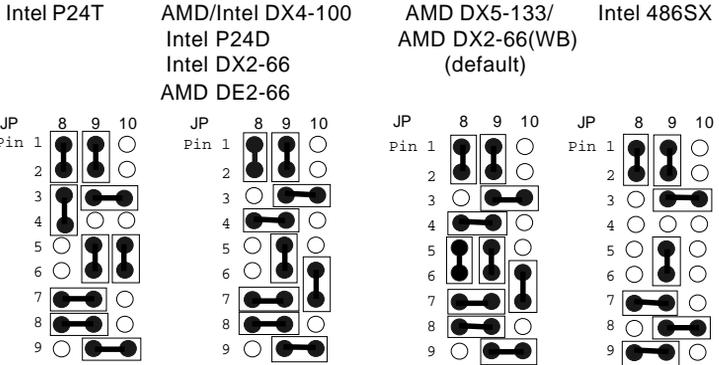
Cyrix/IBM/ST 5x86 , DX4 Series	Cyrix/IBM/ST/TI DX2 Series	AMD DX2-66(WT)
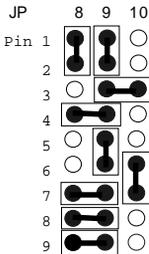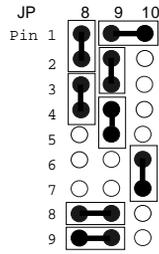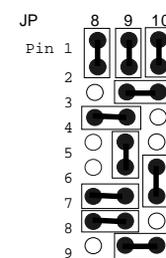
CPU Vcc select (JP1, JP7)

JP1 and JP7 must be set to match the CPU type. The chart below shows the proper jumper settings for their respective V_{cc}.

CPU Vcc select (JP1, JP7)					
	5.0 V	**3.3 V**	**3.45 V**	**3.6 V**	**4.0 V**
JP1					
JP7					

CPU clock select (JP13, JP14)

JP13 and JP14 is used to synchronize the CPU clock with the CPU type. Set the CPU clock according to the base CPU speed.

CPU clock select (JP13, JP14)			
25 MHz	**33 MHz**	**40 MHz**	**50MHz**
A B C	A B C	A B C	A B C
JP13			
JP14			

Installing DRAM (SIMMs)

The SBC-490 CPU card provides four 72-pin SIMM (Single In-line Memory Module) sockets and supports between 1 MB to 128 MB of FP RAM or EDO RAM.

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.

SIMM Module Installation Table

Modules Type	Total Modules	SIMM 1	SIMM 2	SIMM 3	SIMM 4
Single Bank SIMM Module	1	S			
	1		S		
	1			S	
	1				S
	2	S	S		
	2	S		S	
	2	S			S
	2		S	S	
	2		S		S
	2			S	S
	3	S	S	S	
	3	S	S		S
	3	S		S	S
	3		S	S	S
	4	S	S	S	S
Double Bank SIMM Module	1	D			
	1		D		
	1			D	
	1				D
	2	D	D		
	2			D	D
Mixed Single Bank and Double Bank SIMM Modules	2	D	S		
	2	D			S
	2	S	D		
	2		D	S	
	3	D	S		S
	3	S	D	S	

S: Single Bank SIMM Module
D: Double Bank SIMM Module

Selecting cache memory size

The SBC-490 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 consist 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 KB x 8	four 32 KB x 8 SRAMs
256 KB	one 32 KB x 8	four 64 KB x 8 SRAMs
512 KB	one 32 KB x 8	four 128 KB x 8 SRAMs

Cache memory select (JP12)

When the cache size changes, you must make sure that JP12 is set to match the new cache memory size. The following chart shows the proper jumper setting for each cache configuration:

Cache memory select (JP12)		
128 KB	**256 KB**	**512 KB**
1 ○ ○ 2 3 ○ ○ 4	1 ●—● 2 3 ○ ○ 4	1 ●—● 2 3 ●—● 4

IDE hard drive connections

You can attach four Enhanced Integrated Device Electronics (IDE) hard disk drives to the SBC-490's internal controller. The card comes with a 40-pin flat-cable piggyback cable. This cable has three identical 40-pin flat-cable 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 SECOND-ARY IDE conector 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 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.

Pin assignments

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

IDE Connector			
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

IDE LED (JP2, JP3)

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

IDE LED pin assignments (JP2, JP3)	
Pin	**Function**
1	-R/W IDE
2	Pull high

Floppy drive connections

You can attach up to two floppy disks to the SBC-490'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-490 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 FLOPPY DISK connector 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 FLOPPY DISK connector:

FLOPPY DISK Connector

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

Parallel port

Normally, the parallel port is used to connect the card to a printer. The SBC-490 includes an on-board parallel port, accessed through a 26-pin flat-cable connector, PRINTER 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 the PRINTER connector 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 connector.

Pin assignments

PRINTER Connector

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

Power supply connections

Power supply connector

In single-board-computer (non-passive-backplane) applications you will need to connect power directly to the SBC-490 board using the connector labeled POWER CON. This connector is fully compatible with the standard PC power supply connector. See the following table for its pin assignments:

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

CPU fan power connector

For some harsh environments or demanding applications, you need to install a CPU cooling fan on the CPU to keep it from overheating. The SBC-490 provides a cooling fan connector labeled CPU FAN. The following table lists the pin assignments.

CPU fan power connector	
Pin	**Function**
1	+12 V
2	GND
3	GND
4	+5 V

Display connections

The SBC-490 CPU card's SVGA connector (labeled VGA) with PCI bus supports monochrome display as well as high resolution color displays. In addition, the card also features a Feature connector, which allows you to plug in other external display devices. The following table lists their pin assignments.

Feature connector		VGA connector	
Pin	Function	Pin	Function
1	C0	1	Red video
2	C1 (Blue)	2	Green video
3	C2 (Green)	3	Blue video
4	C3 (Red)	4	Not used
5	C4 (2nd Green)	5	GND
6	C5 (2nd Blue)	6	Red return (GND)
7	C6 (2nd Red)	7	Green return GND)
8	C7	8	Blue return (GND)
9	DAC clock	9	Key (no pin)
10	Blank	10	Sync return (GND)
11	Horizontal sync	11	Monitor ID(not used)
12	Vertical sync	12	Monitor ID
13	Ground	13	Horizontal sync
14	Ground	14	Vertical sync
15	Ground	15	Not used
16	Ground		
17	SIV (Select Internal Video)		
18	SIS (Select Internal Sync)		
19	SICLK (Select Internal Clock)		
20	N.C.		
21	Ground		
22	Ground		
23	Ground		
24	Ground		
25	N.C.		
26	N.C.		

On-Board VGA Settings (JP4, JP5, JP6)

You can disable the on-board VGA by setting JP4, JP5 and JP6.

JP4, JP5, JP6: On-board VGA Settings		
	DISABLE VGA	**ENABLED VGA**
JP4	○ ○	●—●
JP5	○ ○	●—●
JP6	○ ○	●—●

Keyboard and PS/2 mouse connectors

The SBC-490 board provides two keyboard connectors. A 5-pin connector (KB CON) supports passive backplane applications. A second 6-pin mini-DIN connector (KB/PS2 MOUSE) 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 DIN connector for the keyboard.

Keyboard connector	
Pin	**Function**
1	K.B. clock
2	K.B. data
3	N.C.
4	GND
5	+5 V$_{DC}$

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

Serial ports

The SBC-490 offers two RS-232 serial ports. You can select the address for each port or disable it, using the BIOS Peripheral Setup program.

The card mounting bracket holds the serial port connector for the one port, and the parallel port and serial port adapter kit (supplied with the card) holds the connector for the other port. This lets you connect and disconnect cable after you install the card. The DB-9 connector on the top of the bracket is the first RS-232 port, COMA. The DB-9 connector on the adapter kit is the second serial port, COMB. The following sections tell how to make RS-232 connections.

RS-232 connections (COMA, COMB)

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

Serial ports IRQ select (JP18)

You can select the serial ports' IRQs by setting JP18 as follows:

JP18: RS-232 PORT IRQ SELECT:

COMA	COMB	JP18 setting
IRQ3	IRQ4	
IRQ4	IRQ3	
IRQ11	IRQ10	
IRQ10	IRQ11	
IRQ4	IRQ10	
IRQ4	IRQ11	
IRQ3	IRQ10	
IRQ3	IRQ11	
IRQ11	IRQ3	
IRQ11	IRQ4	
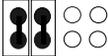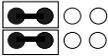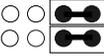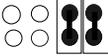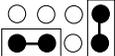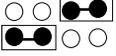
IRQ10	IRQ3	

IRQ10	IRQ4	
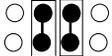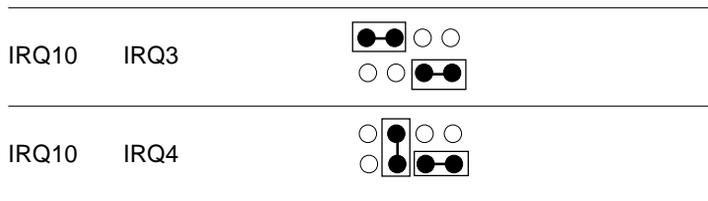
Watchdog timer setup

Watchdog timer time-out signal select (JP16)

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

JP16: WATCHDOG TIMER INTERRUPT SELECT		
Disabled **1-2: RESET**	**5-6: IRQ15**	**3-4: NMI**
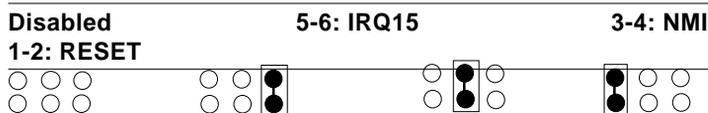
Watchdog timer programming

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.

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) any random value. This will in turn disable the watchdog timer.

The watchdog timer-out interval can be set at 16 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
14~16	8	30~32	0

Flash BIOS Protect (JP11)

You can set the JP11 to protect BIOS write-enable. The configuration is as follows:

JP11: FLASH BIOS PROTECT

Write Protect	Write Enabled
○ ○	●━●

Clear CMOS (JP15)

You can clear the CMOS data by setting JP15.

JP15: CLEAR CMOS

PROTECT	CLEAR CMOS
○ ○	●━●

External Switches and LEDs

Power LED and keylock

You can connect an LED to indicate when the CPU card is on. Pin 1 of connector labeled KEYLOCK 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	
Pin	**Function**
1	LED Power (+5 V)
2	No Connector
3	Ground
4	Keyboard lock
5	Ground

External speaker

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

External speaker	
Pin	**Function**
1	Vcc
2	Speaker output
3	Buzzer in
4	Speaker output

Reset switch

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 RESET connector.

Reset switch	
Pin	Function
1	Ground
2	Reset

Turbo LED

You can connect an LED indicator across the jumper labeled TB LED to indicate when the CPU is in Turbo mode. Marks on the circuit board indicate LED polarity (the pin on the left is positive). When the CPU powers down upon switching to green mode, the Turbo LED begins to blink.

Turbo LED	
Pin	Function
1	Turbo
2	Ground

Turbo switch

You can connect a switch across the pins of jumper labeled TB SW 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 pin assignments			
Pin	Function	Low speed	High Speed
1	- Deturbo	●●	○ ○
2	Pull low		

AMI WinBIOS Setup

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

General information

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

Starting WinBIOS setup

As POST executes, the following appears;

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

Press <DEL> to run WinBIOS setup.

WinBIOS main menu

The WinBIOS setup screen appears as follows:
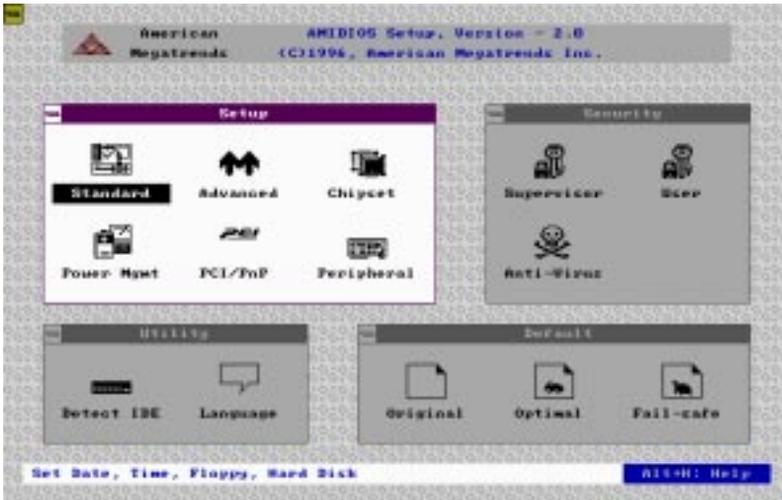
Using a mouse with WinBIOS setup

WinBIOS 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 WinBIOS setup

WinBIOS 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 WinBIOS 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.

Setup

Standard Setup

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

The Standard Setup screen appears:
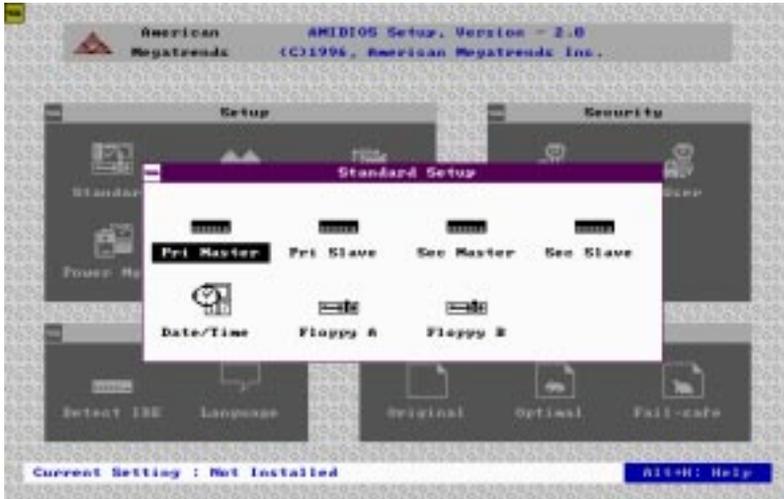
Pri Master, Pri Slave, Sec Master and Sec Slave

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.**

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 5¼", 1.2 MB 5¼", 720 KB 3½", 1.44 MB 3½", and/or 2.88 MB 3½". The settings have not been pre-installed.

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 heards),

- WP(starting write precompensation cylinder),

- Sec (number of sectors),

- Size (drive capacity).

Advanced Setup

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

The Advanced Setup options described in this section are the standard options as shown on the following screen.

```
  American          AMIBIOS Setup, Version - 2.0
  Megatrends        (C)1996, American Megatrends Inc.

           Setup                        Security

                Advanced Setup

   Quick Boot             : Disabled
   BootUp Sequence        : C:,A:,CDROM        User
   BootUp CPU Speed       : Low
   BootUp Num-Lock        : Off
   Turbo Switch           : Disabled
   Floppy Drive Swap      : Disabled
   Floppy Drive Seek      : Disabled
   Mouse Support          : Disabled
   Typematic Rate         : Slow
   System Keyboard        : Absent

  Detect IDE    Language      Original    Optimal    Fail-safe

 Set Advanced Features                          Alt+H: Help
```

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.

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 WINBIOS 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 WINBIOS 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.

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*, *CGA40, CGA80, EGA/VGA,* or *Absent. The Optimal and Fail-Safe default settings are EGA/VGA..*

Display Device:
This option allows user to select display device. The settings are CRT, LCD, and Both. The Fail-Safe default setting is Both.

Password Check:

This option enables password checking every time the computer is powered on or every time WINBIOS Setup is executed. If *Always* is chosen, a user password prompt appears every time the computer is turned on. If *Setup* is chosen, the password prompt appears if WINBIOS is executed. The Optimal and Power-On 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*.

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.
WriteThru	Use the write-through 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 Ebable 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.

C000,16 KB Shadow	D000,16KB Shadow
C400,16 KB Shadow	D400,16KB Shadow
C800,16 KB Shadow	D800,16KB Shadow
CC00,16 KB Shadow	DC00,16KB Shadow
	E000,64KB 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 usb. The settings are:

Setting	Description
Shadow	The contents of *C*0000h - C3FFFh are written to the same address in system memory (RAM) for faster execution.
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.

Chipset Setup

The WinBIOS Setup options deccribed in this section are selected by choosing the Chipset icon from the WinBIOS setup main menu,shown below.
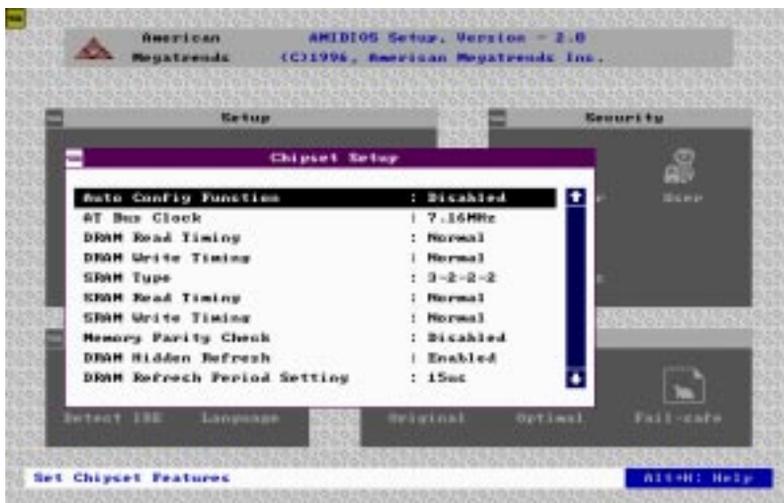
The following is an option list offered by Chipset Setup

Chipset setup options	
Function	**Options**
Auto Configuration Function	Disabled/Enabled
AT Bus Clock	7.16
	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

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
Cx5x86 Linear Wrapped Mode	Disabled
	Enabled
System Hidden Refresh	15 ms
	30 ms
	60 ms
	120 ms

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 WinBIOS 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.*
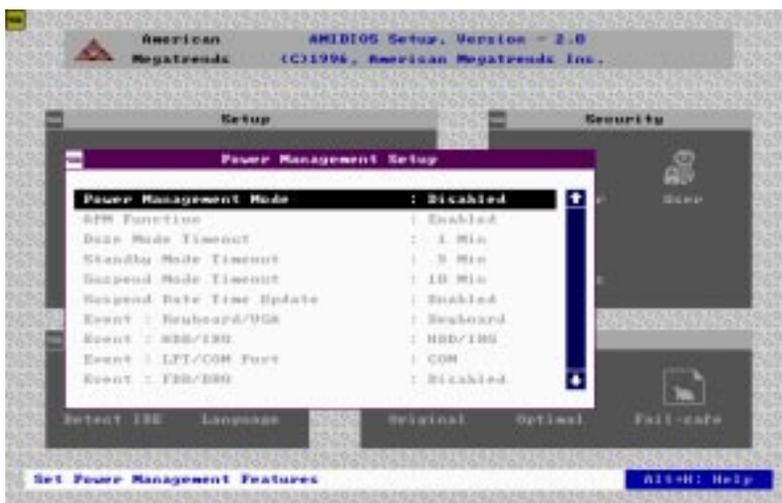
PCI/PnP Setup

PCI/PnP Setup options are displayed by choosing the PCI/PnP Setup icon from the WINBIOS Setup main menu. All PCI/PnP Setup options are described in this section.
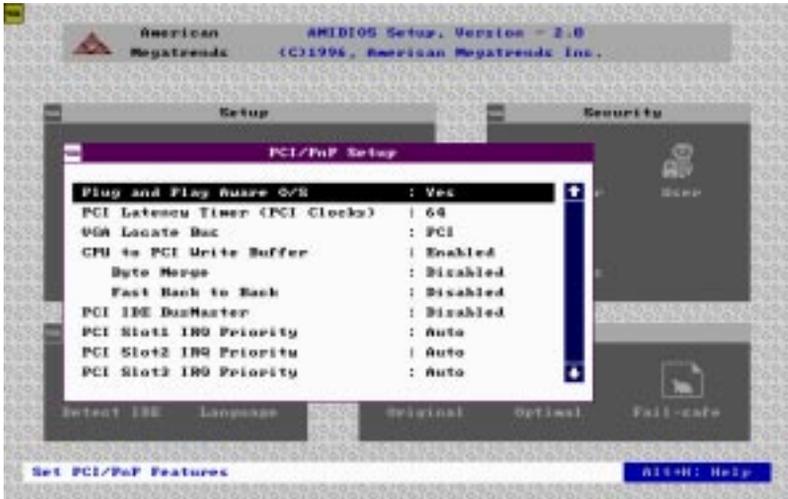
Plug and Play Aware OS

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*.

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.

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 card is installed. If an offboard PCI IDE controller is used, the onboard IDE controller on the motherboard is automatically disabled. The settings are *Disabled*, *Auto*, *Slot1*, *Slot2*, *Slot3*, or *Slot4*.

If *Auto* is selected, AMIBIOS automatically determines the correct setting for this option. The Optionmal and Fail-Safe default settings are *Auto*.

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

This option sets PCI slot IRQ priority.

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

IRQ3
IRQ4
IRQ5
IRQ7
IRQ9
IRQ10
IRQ11
IRQ12
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*.

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*.

Peripheral Setup

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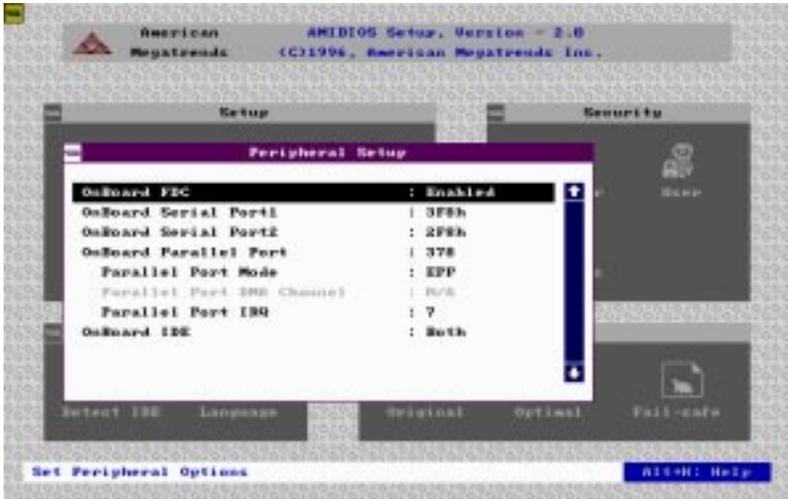
Onboard FDC

This option enables the floppy drive controller on the mother-board. 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*.

Onboard Serial Port2

This option enables serial port 2 on the motherboard and speci-
fies 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, 378, 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 trans 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 approx imately 2.5 Mbs. ECP provides symmetric bidirectional communlations.

Parallel Port DMA Channel

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

The settings are *Disabled, DMA, CH (channel) 0, DMA CH 1,* or *DMA CH3.*

Parallel Port IRQ

IRQ7 us 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.*

Utility

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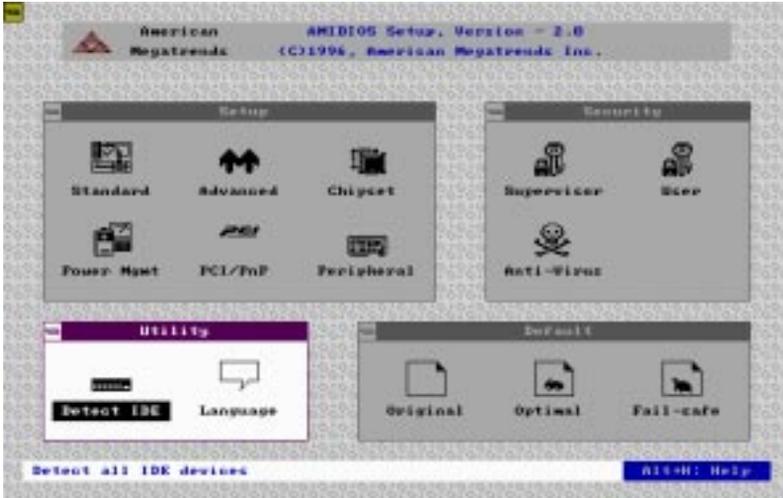
Detect IDE:
If drive C: is an IDE drive, the hard disk drive parameters for drive
C: are automatically detected and reported to the Hard Disk Drive
C: screen in Standard Setup, so you can easily configure drive C:.
Drive D and CD-ROM could also be automatically detected and
reported to screen if drvie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

Language:
If this feature is enabled, you can select WINBIOS. Setup
message is in different languages. The default setting is *English*.

Security

The following icons appear in this section:
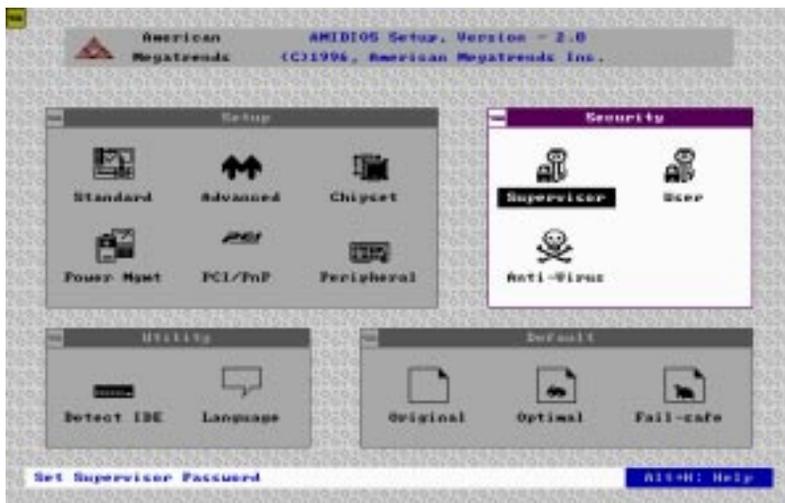
Two Levels of Passwords

Both the Supervisor and the User icons configure password support. If you use both, the Supervisor password must be t If this feature is enabled, you can select WINBIOS. Setup message is in different languages. The default settings is *English*.

The system can be configured so that all users must enter a password every time the system boots or when WINBIOS Setup is executed, using either or both the Supervisor password or User .

The following screen appears when you select the password icon
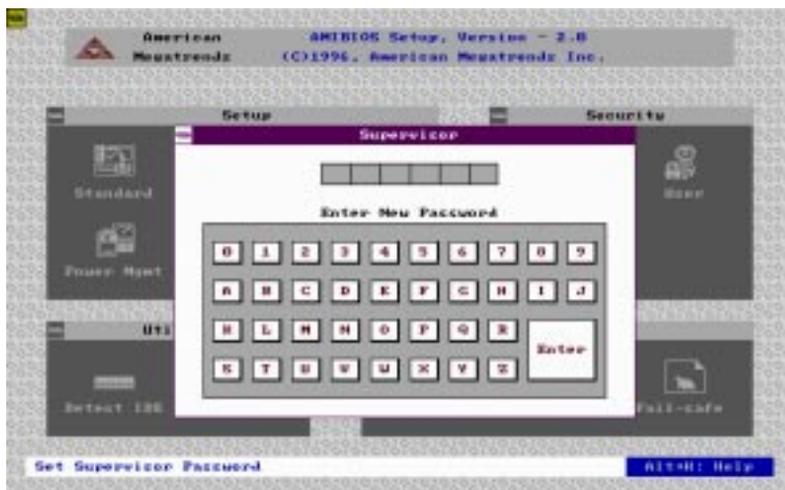
You can enter a password by:

☐ 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 WinBIOS.

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.

Changing a password

1. Select the Supervisor or User icon from the Security section of the WinBIOS 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 WinBIOS setup Main Menu. The password is stored in CMOS RAM after WinBIOS 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 WinBIOS Setup main menu. WinBIOS 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)? _
```

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 WinBIOS 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 WinBIOS Setup when you first begin this WinBIOS Setup session.

Optimal

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

Fail-Safe

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

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

Exiting WinBIOS

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

The following screen appears:

```
┌─────────────────────────────────────────┐
│ ▬           Exit Setup                    │
├───────────────────────────────────────────┤
│                                           │
│   ┌─────────────────────────────────────┐ │
│   │ Save changes and Exit               │ │
│   │                                     │ │
│   └─────────────────────────────────────┘ │
│                                           │
│   ┌─────────────────────────────────────┐ │
│   │ Do not save changes and Exit        │ │
│   │                                     │ │
│   └─────────────────────────────────────┘ │
│                                           │
│   ┌─────────────────────────────────────┐ │
│   │ Continue                            │ │
│   │                                     │ │
│   └─────────────────────────────────────┘ │
│                                           │
└───────────────────────────────────────────┘
```
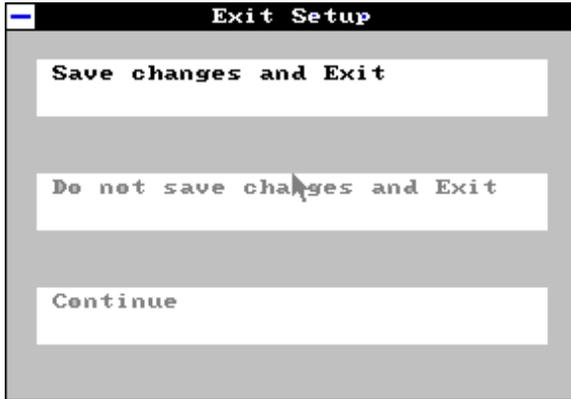
Select the option you desire, and the system will continue its boot up sequence.

User's Note

This is a temporary AMI WinBIOS set-up manual for our new BIOS version 2.x. These insert pages will update the old jumper setting and replace the chapter 3 of this attached manual. We are sorry for this inconvenience and thanks for your attention.

SVGA Setup

The SBC-490 features an on-board VGA interface. This chapter provides information about:

• SVGA installation
• Display utilities and drivers
• Software installation

SVGA driver installation

Installing from Windows 3.1

The graphic installation program (TINSTALL) supports a simple 6 step installation procedure for the display driver setup program, the power management program and the UNinstall program.

To use TINSTALL, follow the 6 steps below:

1. Ensure that MS Windows 3.1 is up and running properly, using the standard VGA driver.

2. Select the Program Manager.

3. Select RUN from the FILE menu on the menu bar.

5. Insert the Windows 3.1 driver disk and type `A:TINSTALL` (if the display driver disk is in the B drive, type in `B:TINSTALL` instead), as shown below, and then press <ENTER>.
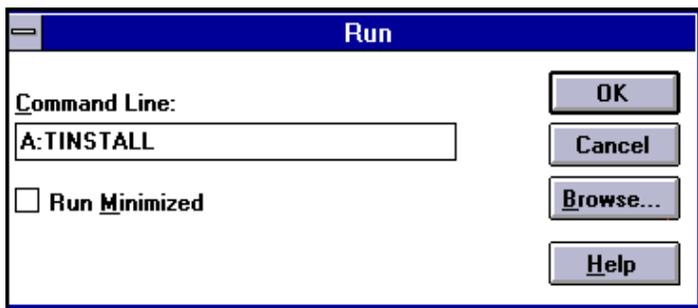
6. A menu will appear, presenting a choice of **Express** or **Custom Installation**.

Express Installation

Express Installation automatically copies the display drivers into the TRIDENT.AGI directory and the Utility files into the TRIDENT.UTL directory. Once all files are copied, a program group called DISPLAY DRIVER AND UTILITIES will be created.

Custom Installation

Custom Installation allows control over where files are stored and in what program group the icons are placed. The first dialog box shows the default directory to which the display drivers will be copied.

To change the directory name:

1. Delete the default name.

2. Enter the desired directory name.

3. Once the desired directory name is selected, continue the installation procedure by selecting **Continue**, or by pressing <ENTER>.

The next dialog box displays a summary of where files are stored.

4. Select **Continue** to copy the driver and utility files.

When all files are copied, the program will present a choice of program groups where the icons will be created. Create a new group to place the utility icons or select from pre-existing groups (e.g. Main, Applications, Accessories, etc.).

Tinstall icons

The Tinstall program creates three icons:

a. Screen Control (Used to configure display drivers)

b. DPMS (Used for power management configurations)

c. UNinstall (Used to delete the installed TRIDENT drivers)

NOTE: Different "display driver set" versions cannot be installed to the same directory name.

"Display driver sets" of the same version number (e.g. UA6.0) will replace the existing one.
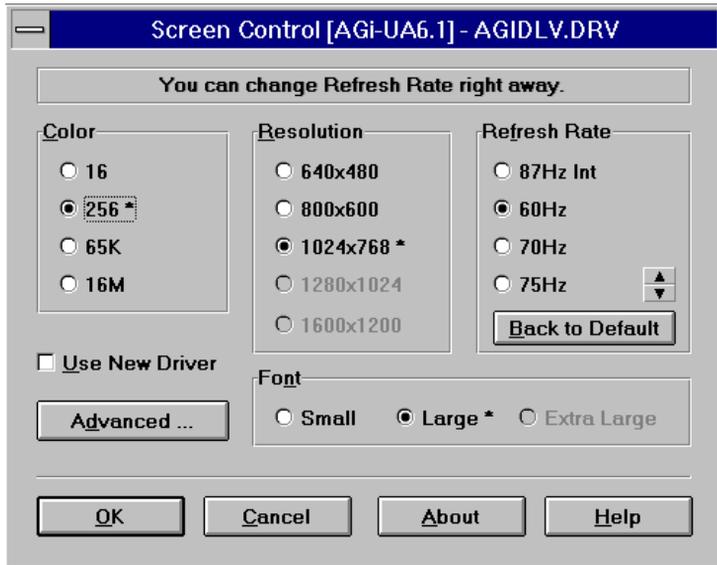
Screen Control

The Screen Control panel contains controls for setting screen resolution, color depth, font size, refresh rates. Not all combinations of screen resolution, color depth, font size and refresh rate are attainable.

Color depths of 16, 256, 64K, or 16.7M colors can be selected by clicking next to the desired option. Color depth determines the number of colors that may be simultaneously displayed on the screen. The selected color depth determines the possible resolutions.

Screen resolutions of 640x480, 800x600, 1024x768, 1280x1024, or 1600x1200 can be selected by clicking next to the available options. The virtual screen size is automatically adjusted to be at least as large as the selected screen resolution.

Available refresh rates are dependent on the selected color depth and resolution. The "Back to Default" option is used to reset the refresh rate to the factory default value.

To open Screen Control, double click on its icon. The following figure shows the Screen Control interface:

Screen Control [AGi-UA6.1] - AGIDLV.DRV

You can change Refresh Rate right away.

Color
- ○ 16
- ● 256 *
- ○ 65K
- ○ 16M

☐ Use New Driver

[Advanced ...]

Resolution
- ○ 640x480
- ○ 800x600
- ● 1024x768 *
- ○ 1280x1024
- ○ 1600x1200

Font
- ○ Small   ● Large *   ○ Extra Large

Refresh Rate
- ○ 87Hz Int
- ● 60Hz
- ○ 70Hz
- ○ 75Hz

[Back to Default]

[OK] [Cancel] [About] [Help]

Configuring the Display Driver

1. Select the color depth first. If the current driver does not support the selected color depth, then Windows will have to be restarted.

2. Select the resolution.

3. Select the font size (if available as an option).

4. Select the refresh rate.

5. Click on OK. If the current driver does not support the selected configuration, Windows will have to be restarted.

Note: Hot Key Control should be enabled before going into advanced setup. There is no virtual screen support for 16 colors. 1280x1024 is only available for 16 colors.

Advanced features (Virtual Screen Control)

Virtual Screen Control

Standard display resolutions are 640x480, 800x600, 1024x768, 1280x1024. The amount of display memory used depends on the selected resolution and color depth. A substantial amount of display memory is left unused for lower resolutions. The Virtual Screen features take advantage of this unused memory by "expanding" the display area into the off-screen area.

Virtual Screen Control allows the user to make effective use of a display screen larger than the standard 640x480, 800x600 or 1024x768, and the standard resolution is the center of the screen. The user can "pan" around the larger Virtual Screen area by the use of a standard mouse or a set of "HOT KEYS." For example, it is possible to select a resolution of 640x480 and set the Virtual Screen size to 800 x 600. Thus, the 640 x 480 screen sits at the center of a 800 x 600 matrix, and the user can "pan" through the entire 800x600 matrix in a 640x480 window, as shown below.

Panning allows traversing a larger screen through a smaller window.

VIRTUAL SCREEN AREA   ACTUAL DISPLAY AREA

The advanced features can be accessed by pressing <ALT> + D or by clicking on the **Advanced...** button on the Screen Control interface. This opens up an extension of the Main Panel that presents the following features:

1. **Hot Key** selection, which allows you to set up predefined key strokes for specific virtual screen related actions.

2. **Turn On** virtual screen, which allows the use of the predefined virtual screen sizes. The predefined virtual screen sizes are selected by clicking next to available options. The sizes of the available predefined virtual screens are dependent on the selected color depth and resolution.

3. **Customize** virtual screen area, which opens up a new screen titled Virtual Screen Advanced Settings:

Virtual Screen Advanced Settings

- **Freeze Screen**: Disables the panning feature, giving the illusion of a frozen screen but keeping other virtual screen functions available. Hot key functions are available for this feature.

- **Linear Frame Buffer Address**: The Linear Addressing driver automatically detects the system's memory size and sets the frame buffer to an unused area above the system memory. The Linear Frame Buffer Address setting is useful in avoiding conflicts with Windows applications, which use the same linear frame buffer address as the Display Driver. Addresses between 18 and 63 MB can be selected. If there is no conflict, the default setting is highly recommended.

- **Border Space:** The Border Space option is used to set up a border (thickness measured in pixels) within the displayable area. The border is used as a marker for panning the screen, i.e. when the cursor hits against this border, screen panning occurs as shown below:
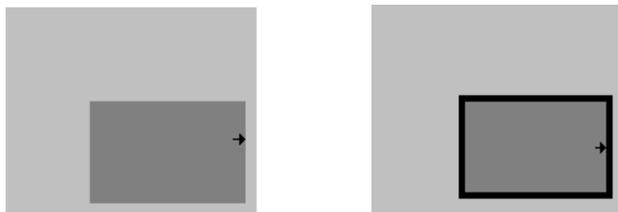
→ mouse cursor

■ border

- **Pan Set Hot Key:** Hot keys can be set up to pan the virtual screen left, right, up and down. The feature has to be enabled by clicking on the **Enable** box before hot keys can be selected.

Once all selections are made, click on **OK** or press <ALT> + O to exit the advanced setup.

DPMS (Display Power Management Signaling)

The POWER MANAGEMENT program is designed for energy-saving monitors that conform to the VESA Display Power Management Signaling (DPMS) standard.

WARNING: THE USE OF THIS PROGRAM IS NOT RE-COMMENDED FOR MONITORS THAT DO NOT SUPPORT THE VESA DPMS STANDARD.

The program offers three power-down modes:

1. Standby (minimum power savings)

2. Suspend (substantial power savings)

3. Off state (maximum power savings)
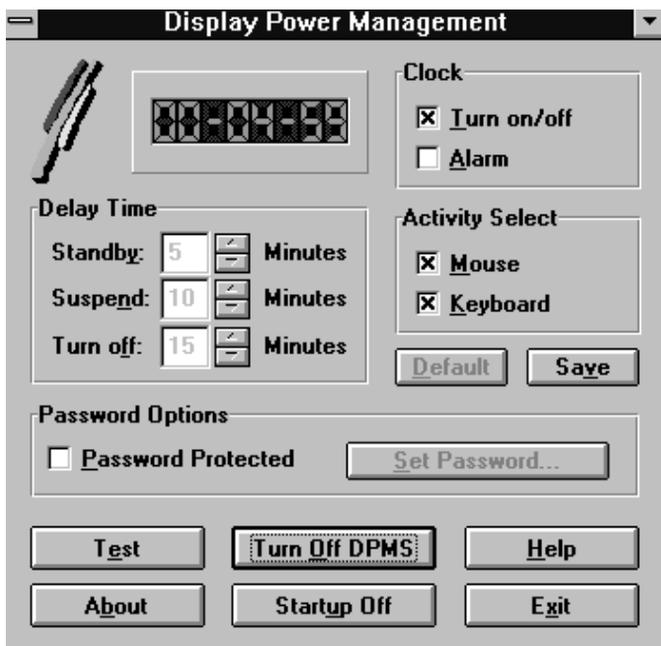
The program monitors for mouse and/or keyboard activity. When activity is not detected for a specified delay period (controlled by the Delay Time parameter), the program signals the TGUI9440AGi to enter the selected power-down modes.

The Display Power Management program offers several options to customize the DPMS operation.

Delay Time

The delay time to enter each mode can be set by entering the value (in minutes) in the Delay Time parameters. Values can be entered by either clicking on the count-up or count-down button, or by clicking on the number, deleting it, and typing in the desired time in minutes, as shown below.
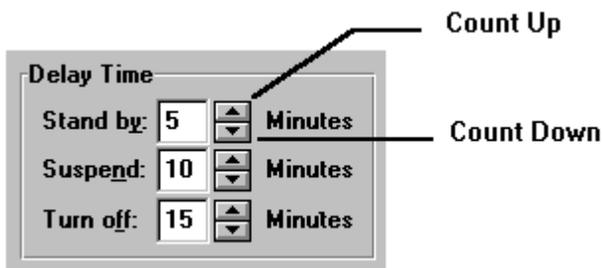
Activity Select

The Activity Select option selects which activity the program senses in order to restore the display to the monitor. For example, if both mouse and keyboard are selected, then either activity will re-establish the powered down signals.

Clock

Turning on the clock enables the digital count down display. If the Alarm option is enabled, then the last 5 seconds of countdown to Standby mode is synchronized with beeps from the PC speaker.

Password Option

The Password Option sets up a password to get back onto the screen.

- A password is set up by first clicking on the box marked PASSWORD PROTECTED or by pressing <ALT> + P (this is confirmed by the presence of an "X" in the box).

- Press <ALT> + S or click on the box marked SET PASSWORD.

- Type in the selected password (twice) and select OK, or press <ENTER>.

Startup On/Off

This option installs the Display Power Management program onto the Windows Startup file, so that DPMS is active upon entering Windows.

Default

The default button sets all parameters back to the factory default values.

Test

The test feature is used to give a demonstration of the DPMS power down function.

Save

This feature is used to save all the current settings. Once all settings are selected, the program is activated by pressing <ALT> + O or by clicking on the box marked **Turn On DPMS**.

Display driver Uninstallation

The UNinstall program enables the user to safely delete specific display drivers or an entire display driver set.

To remove an entire Display Driver Set, complete the following steps:

1. Using the arrow keys or mouse, select the Display Driver Set that is to be removed (the set to be deleted should be highlighted).

2. Once the desired Driver Set is selected, simply select the **Delete** button or press <ENTER>.

NOTE: *The UNinstall program will not permit the deletion of a Display Driver set that is currently being used.*

To remove an individual driver from a Display Driver Set, complete the following steps:

1. Using the arrow keys or mouse, select the Display Driver Set that is to be removed (the set to be deleted should be highlighted).

2. Once the desired Driver Set is selected, click on the **Enter** button. This will pull up a list of available display drivers.

3. Select the display driver to be deleted by using the mouse or the up/down arrow keys to scroll through the list.

4. Click on the **Delete** button or press <ALT> + D to delete the selected display driver.

Microsoft Windows NT

Installation

1. Run the Microsoft Windows NT Setup program located in the Main group of Program Manager.

2. Select **Change System Settings** from the Options pulldown menu.

3. Select **Other** from the display options.

4. Microsoft Windows NT 3.1 will prompt you for the correct path where the Trident drivers are located. Enter the path "**X**:\TVGAUTIL\NTDRV\NT31\" where **X** is the drive where Microsoft Windows NT 3.1 drivers have been installed.

5. A list of all Trident drivers will appear. Select the resolution and color depth desired.

6. Restart Microsoft Windows NT. The desired Trident driver will then be in effect.

NOTE: *If you select a color depth or resolution that is not supported by your card, NT will substitute 640x480 in 256 colors for the display.*

Microsoft Windows NT 3.5 Installation

1. Run the Microsoft Windows NT display Setup program located in the Control Panel of the Main group.

2. Select **Change Display Type...** button from the Display Settings options.

3. Select **Change...** button from the Display Type options.

4. Select **Other...** button from the Select Device options.

5. Microsoft Windows NT 3.5 will prompt you for the correct path where the Trident drivers are located. Enter the path "**X:**\TVGAUTIL\NTDRV\NT3.5\" where **X** is the drive where Microsoft Windows NT 3.5 drivers have been installed.

6. A list of all Trident drivers will appear. Select the resolution and color depth desired.

7. Restart Microsoft Windows NT. The desired Trident driver will then be in effect.

NOTE: *If you select a color depth or resolution that is not supported by your card, NT will substitute 640x480 in 256 colors for the display.*

Microsoft Windows NT4.0

Procedure to install display drivers:

1. Open Windows NT 4.0.

2. Click the START button (lower left hand corner of the screen).

3. Click on SETTINGS.

4. Click on CONTROL PANEL.

5. Double click on the DISPLAY icon.

6. Click the SETTINGS tab.

7. Click DISPLAY TYPE.

8. Click the CHANGE button under ADAPTER TYPE.

9. Click the button HAVE DISK.

10. Type the path to where the drivers are located (example A:\).

11. Click OK.

12. You will see one driver listed "Trident Video Accelerator" . Click OK to select it.

13. Click YES to continue.

14. Click OK to continue.

15. Click the CLOSE buttons.

16. Click YES when prompted to restart NT 4.0.

Microsoft Windows 95

Procedure to install display drivers:

1. Go to Windows 95.

2. Click the Windows 95 Start button.

3. Select Settings.

4. Select Control Panel.

5. Double click the Display Icon.

6. Click the Settings tab.

7. Click on Change Display Type...

8. Under "Adapter Type", click Change.

9. Click Have Disk...

10. Type the path to where the drivers are located, and click O.K.

    (example: A:\ if the driver files are located in the A drive)

11. Click O.K. There should only be one compatible driver listed. If you see more than one driver listed, select "Trident 9440 Linear Accelerated for PCI".

12. Click Close.

13. Click Apply.

14. Click Yes to restart your Windows 95.

OS/2

Procedure to install display drivers:

This Trident OS/2 Display Drivers utility supports the following resolutions with OS/2:

> 640x480x256
> 800x600x256
> 1024x768x256
> 1280x1024x256 (2M)
> 640x480x65K
> 800x600x65K   (2M)
> 1024x768x65k (2M,)
> 640x480x16.7M

This utility includes Trident OS/2 Display Drivers installation and Trident OS/2 Display Drivers setting.

Installation Procedure

1. Insert Trident OS/2 Display Drivers diskette in Drive A.

    From the OS/2 Desktop: Open the OS/2 System folder, double-click on the Drives object, and then double-click on drive A. When the drive A folder opens, double-click on INSTALL.EXE. You can also click on the floppy drive object from Launch Pad, and then double-click on INSTALL.EXE.

    From the OS/2 Command Line: Open OS/2 System folder, double-click on Command Prompts, and double-click on either OS/2 Window or OS/2 Full Screen. Then, at the command line, go to drive A and type: INSTALL.EXE and press Enter.

2. The first page of the installation program's window is Screen Resolution selection page.

    •Select the resolution and color depth.

3. The second page is Monitor Model selection page.

    • Click on Monitor tab to go to this page.
    • Point to and click on the down arrow button to show a list of monitor models.
    • Select the monitor model. If you cannot find your monitor's model, select "Default".

4. The third page is Refresh Rate selection page.
   • Click on Refresh tab to go to this page.
   • The refresh rates displayed are the recommended refresh rate for each resolution by your monitor manufacturer.
   • You can change the refresh rates by clicking on down arrow button to select the refresh rates for corresponding resolution.

5. The fourth page is Frame Buffer Address selection page (Vesa Local Bus Adapter only).
   • Click Desktop tab to go to this page.
   • Point to and click the down arrow button to show a list of available frame buffer address (in unit of MBytes).

6. After the selections, click on the Install button to complete the installation.

7. Reboot OS/2 to have this installation take effect.

Display Drivers Setting Procedure

1. Double-click on the Trident folder, and then double-click Display Setting object.

2. To change resolution and/or color depth
   • Click Screen tab.
   • Select the resolution and color depth.
   • Click Set button.

3. To change refresh rate
   • Click Refresh tab.
   • Point to and click down arrow button.
   • Select the refresh rate.
   • Click Set button to take effect.
   • If you don't want the selected refresh rate, click Undo button or press 'U' key to return to previous refresh rate.

4. To change frame buffer address (Vesa Local Bus Adapter only)
   • Click Desktop tab.
   • Point to and click the down arrow button to show a list of available frame buffer address (in unit of MBytes).
   • Click Set button.

5. Virtual Screen Support
   • Click Screen tab
   • Click Virtual Screen On button to enable Virtual Screen.
   • Click again to disable Virtual Screen.
   • Select the resolution and color depth.
   • Click Set button.
   • If Virtual Screen is on, the selected width and height are smaller than current screen width and height, and the selected color depth is same as current color depth, it will dynamically change the resolution.

   If you have selected to change resolution and/or frame buffer address, you must reboot OS/2 to have the changes take effect.

Note:
   If you decide to change your hardware system configuration, such as upgrading video memory or system memory, you should
   • Change resolution to 640x480x16(VGA).
   • Change hardware configuration.
   • Reinstall Trident OS/2 Display Drivers.

   You can add or delete monitor models by modifying TMONITOR.INF file in this utility diskette.

   The format of each line in this file is:
   • The monitor model and company name inside two double quote marks.
   • Four recommended refresh rates data for 640x480, 800x600,   1024x768, and 1280x1024 resolutions.
   • Four maximum supported refresh rates data for 640x480, 800x600,1024x768, and 1280x1024 resolutions. If some resolutions are not supported, put "0" in it.

If you add a line

   FrameBufferAddress=xxx

where xxx is frame buffer address in unit of MBytes into TR_AGI.INF file, display drivers will set frame buffer to this address.

Utilities installation

The Utility Installation program is used to install and retrieve instructions on:
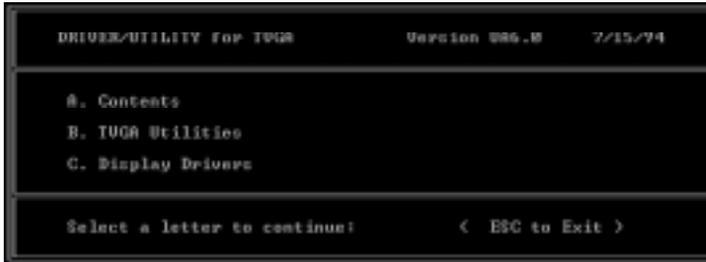
a)   Utility programs.

b)   Non-Windows applications display drivers.

The Utility installation program is run by executing the following steps:

1.   Insert the DOS utility driver disk in the floppy drive.

2.   Type `C:\DOS\README` at the floppy drive prompt.

3.   A numbered list of available destination drives will be displayed on the screen. Select the destination drive by typing in the corresponding number, e.g. to select drive C, type in `1`, as shown below.

```
DRIVER/UTILITY for TVGA              Version UA6.0   7/15/94

At least 2MB of hard disk space is required for installation.
   1. Drive C:,          2. Drive D:,          3. Drive E:

   Select a number ( 1, 2, 3 ) to continue:   ( ESC to Exit )
```

4.   Files and subdirectories will be expanded into the newly created directory **TVGAUTIL**. A new menu will then be displayed on the screen, showing a list of on-line instructions:

```
DRIVER/UTILITY for TVGA          Version 086.0     7/15/94

  A. Contents

  B. TVGA Utilities

  C. Display Drivers


  Select a letter to continue:        <  ESC to Exit >
```

5. Selecting **A** will display the contents of all drivers in the list.

6. Selecting **B** will display instructions on the available utility programs.

7. Selecting **C** will display instructions on how to install display drivers for non-Windows applications.

Utilities summary

SVM. EXE
SVM is a menu-driven program designed to select and test all video modes available to the adapter.

How To Use SVM
The SVM program can be executed in either of two ways: by calling up the menu and selecting from the menu choices, or by entering the desired mode directly with a specific command line.

How To Use SVM From The Menu
1. Switch directory to "X:\TVGAUTIL\UTILITY" where **X** is the drive where the Trident Utility and DOS Application drivers have been installed .

2. Type SVM to pull up the menu. You will see the screen on the following page.

The top bar shows the available color depths. Move through the options with the right/left arrow keys.

The program provides all the different resolutions supported by the chip under each color depth. These resolutions are traversed by the up/down arrow keys.

The graphics adapter can be tested for each resolution/ mode by first highlighting the selection by use of the arrow keys, then pressing the F5 key.

The graphics adapter can be run at a selected mode by first selecting the mode, and then pressing <ENTER>.

How to Use SVM From The Command Line

The SVM program may be used to select a mode directly from the command line following two simple steps:

1. Switch directory to "X:\TVGAUTIL\UTILITY" where **X** is the drive where the Trident Utility and DOS Application drivers have been installed.

2. Type in: SVM [mode number]<ENTER>.

For example, to run the graphics adapter in mode 62H, the command for item 2 above would be:

```
SVM 62 <ENTER>
```

SMONITOR

SMONITOR is designed to set the monitor group and the monitor type:

```
Usage: SMONITOR <GROUP|OPTION>
```

Set Monitor Group

The graphics extended modes set by the graphics card's BIOS are sorted into six groups categorized by the monitor's refresh rate. The group setting as below:

Resolution	Group							
	0	1	2	3	4	5	6	7
640X400	70	70	70	70	70	70	70	70
640x480	60	60	75	85	95	95	95	95
800x600	56	60	75	75	85	85	95	95
1024x768	87i	87i	60	70	75	85	95	95
1280x1024	87i	87i	87i	87i	60	60	60	60
1600x1200	87i	87i	87i	87i	87i	87i	87i	87i

OPTION:
    C   SET COLOR MONITOR
    M   SET MONOCHROME MONITOR

The default group number is 4.

If you want set the monitor group, type:

```
SMONITOR GROUP
```

where GROUP is one of the group number listed above.

Set Monitor Color

Switches between color and monochrome display. Some monitors (most notably Samsung monitors manufactured before 2/8/91) do not adhere to the standard IBM pinout definitions, which causes the VGA card to boot up in monochrome instead of color. This utility may be used to correct the problem.

To set the monitor as color, type: SMONITOR C

or type: SMONITOR M

to set monochrome monitor.

Tmonitor

The Tmonitor program allows the adjustment of CRTC display parameters so that images are optimally sized and centered on the screen. Adjustable parameters include:

• Horizontal size and position.

• Vertical size and position.

• Pixel frequency.

The program is started from the DOS prompt by typing Tmonitor from the C:\TVGAUTIL\UTILITY directory.

The first section of the program is used to define a given name for the adjustments to be made.
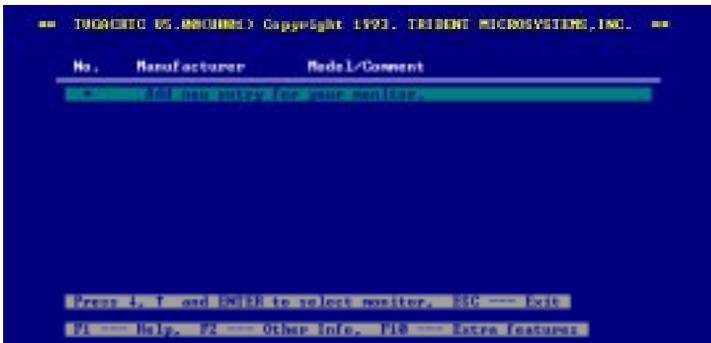
1. Press <ENTER> to add a new monitor entry and type in the name of the manufacturer, followed by <ENTER> keystroke. The program will allow any name to be typed in.

2. Type in the associated comments for the monitor settings and press <ENTER>.

3. A mode table will be displayed, presenting all the adjustable modes as shown below:

4. This table is traversed through the use of the up/down arrow keys. The mode highlighted is the selected mode for adjustment.

5. Select the mode to be adjusted and press <ENTER>.

6. Select the desired pixel rate by scrolling the list using the up/down arrow keys, followed by pressing <ENTER> twice.

7. The screen alignment test pattern will then be displayed. The up/down arrow keys are used to adjust the vertical positioning of the screen. The left/right arrow keys are used for horizontal alignment of the screen. The Home/End keys are used for horizontal screen sizing and the Page Up/Down keys are used for vertical screen sizing. Once the screen position and size is adjusted, press <ENTER>, followed by the <ESC> keystroke.

8. To save the settings, type Y and press <ENTER>. The program will then modify the **Config.sys** file.

9. At this point press <ESC> and reboot the system to enable the parameter changes.

Software drivers installation

After selecting Drivers from the Main Menu in Program Manager, you will be presented with a list of possible drivers to install. Select the driver(s) you wish to install. A version list will be given for the given application. Choose the appropriate version for the application. Once you have selected the driver, the installation program will provide you with further instructions. For details on installing each available driver, refer to the README.TXT file on the provided Utiltiy disk.

The following is a list of drivers supported by the SBC-490.

•	AutoCAD	• Autoshade
•	VersaCAD	• GEM Desktop
•	Lotus	• MS Windows™
•	MS Word	• OS/2 Presentation
Manager		
•	Symphony	• Ventura
•	WordPerfect	• SCO
•	Quattro Pro	• VESA BIOS Extension
(for VESA		

standard SVGA drivers)

A

Watchdog Timer Demo Program

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

DOS Demo Program

```c
#include<stdio.h> #include<dos.h> #include<conio> #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(15,12);printf("Now
                             disable watchdog timer!");
                             outportb (0x80,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();
        }
}
```

Installing PC/104 Modules

This appendix gives instructions for installing PC/104 module.

Installing PC/104 modules

The SBC-490'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-490 is a quick and simple operation. The following steps show how to mount the PC/104 modules:

Step1   Remove the SBC-490 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-490 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-490). 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.
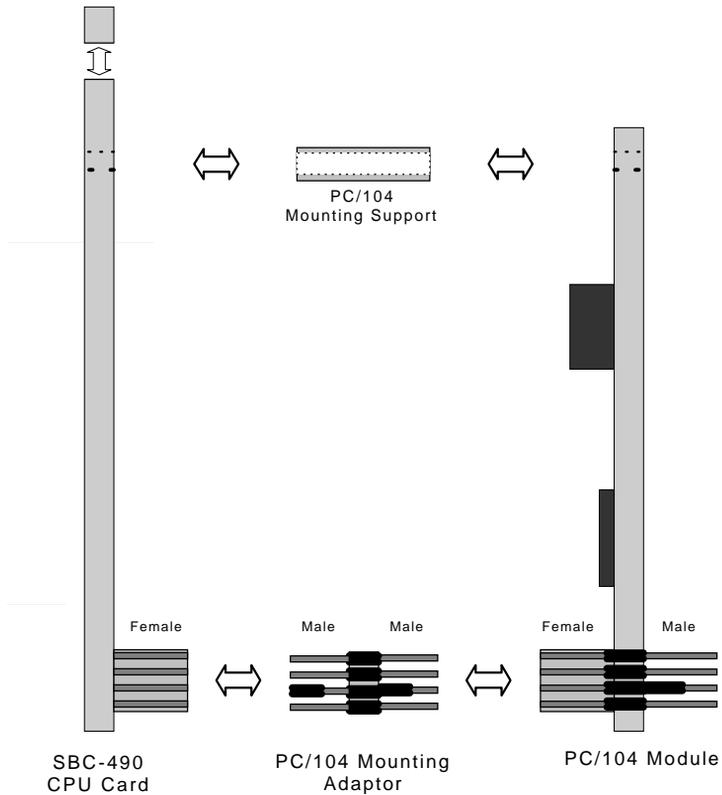
PC/104 Module Mounting Diagram

Step4   Mount the PC/104 module onto the CPU card. Do this
         by pressing the module firmly but carefully onto the
         mounting connectors.

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

PC/104 module dimensions (inches ±5 %)