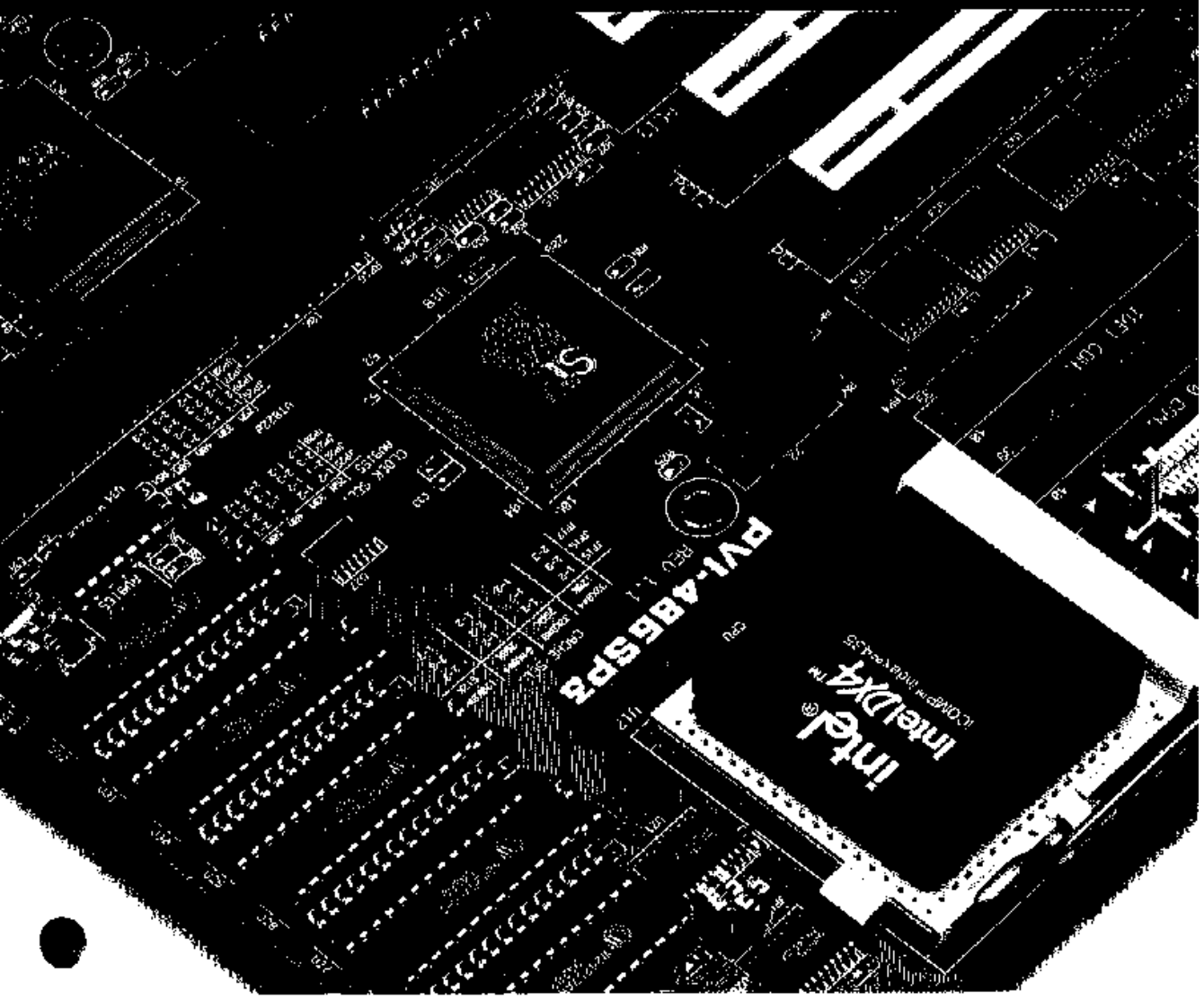
PVI-486SP3

PCI-Bus, VL Bus & ISA Bus Mainboard
With 32-bit Local Bus IDE Controller



USER'S MANUAL

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PVI-486SP3 User's Manual Rev 1.4
Related Mainboard : PVI-486SP3 P.C.B. Rev 1.2 and up
Related Bios : #401A0-0201 or up (Shown as Power On Boot up Screen Top-Left Corner)
Date : 1995 March, ASUSTeK COMPUTER INC.

Table of Contents

Feature Guide

This manual explains how to use this system mainboard and install upgrades. It has an overview of the design and features of the board and provides useful information if you want to change the configuration of the board, or a system it is installed in.

How The Manual Is Organized

This manual is divided into four chapters:

Feature Guide – an overview of the board features

Upgrade Guide – upgrades for the board or system

Software Guide – the Setup Utility and other software & firmware

Technical Summary – technical reference

The manual assumes that your mainboard is already installed in a computer system, so we've organized the contents to reflect this. The first chapter introduces the mainboard's features and shows where things are on the board in case you want to install an upgrade.

Chapter 2 explains how to install upgrades.

Chapter 3 explains the Award BIOS Setup Utility, SCSI BIOS and the Flash Memory Writer BIOS update utility.

Chapter 4 lists settings and specifications and has instructions for adding cache memory and the optional SCSI interface card.

Since we are assuming that your mainboard is already installed in a system, it was most likely set up by your system dealer according to the design specifications of your computer. This could mean that your mainboard's current settings are not the same as the defaults shown in this manual. Your system manual may have additional information on how the mainboard should be set up.

If you want to change the existing configuration, consult all of your system documentation. Also be certain that opening up and working on the system yourself won't violate your system warranty. Most system vendors do allow you to open the system to install expansion cards or additional peripheral equipment.

This manual provides all the information you need to upgrade or change the setup of the board. If you don't feel confident of your ability to work on the computer yourself, ask your dealer or a qualified technician to do it for you.

Main Features

The PVI-486SP3 has many performance and system features integrated onto the mainboard, including the following:

- Supports most 486-type CPUs including Pentium OverDrive CPUs and SL Enhanced versions, both 5-volt and 3.3-volt, from Intel and other CPUs from AMD and Cyrix. CPUs install in a 'Socket 3' ZIF (Zero Insertion Force) socket.
- On-board voltage regulator for low-voltage CPUs.
- Uses 72-pin DRAM modules in multiple configurations up to 128MB, for flexible and economical upgrades.
- High-performance write-back "Level 2" external static RAM cache in three size options: 128KB, 256KB and 512KB.
- Four 16-bit ISA slots (one is also a VESA Local Bus slot) and three 32-bit PCI expansion slots, with one shared slot position. The PCI slots are Bus Master capable.
- "Green" power management features controlled via the BIOS Setup utility.
- On-board 'Multi-I/O' using the SMC 37C665GT Super Multi-I/O chip: 2 serial ports, 16550 Fast UART compatible; 1 parallel port with EPP and ECP capabilities; all configurable as primary or secondary COM and LPT ports; a floppy disk drive connector which supports drives up to 2.88MB.
- System BIOS support for Enhanced IDE including up to four IDE hard disks or other IDE devices, and support for hard disks larger than 528MB and up to 8.4GB.
- On-board Local Bus IDE controller with two connectors supports four IDE devices in two channels at faster data transfer rates and has direct support for large hard disk drives and other Enhanced IDE devices.
- Auto detection of installed IDE hard disk drives with an auto-detection utility built into the system BIOS.
- On-board NCR SCSI BIOS firmware supports the optional PCI SC-200 SCSI controller card to connect up to seven internal or external SCSI devices.
- On-board multi-year battery support to maintain system configuration information.
- Support floppy disk with the Flash Memory Writer BIOS update utility and Enhanced IDE software drivers for DOS, Windows, Netware, Windows NT and OS/2.

Static Electricity Precautions

Under the right conditions, static electricity will build up. If you touch the mainboard or other sensitive components, the build-up will discharge into the components and circuitry. Computer components are sensitive to damage from static electric discharge. They can be damaged or destroyed if the discharge is powerful enough. Static build-up is most likely to occur in dryer and cooler conditions, but it is always important to be cautious.

To protect the mainboard and other components against damage from static electric discharge, you should follow some basic precautions whenever you handle them:

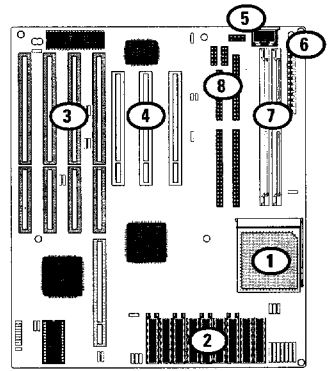
1. Use a grounding wrist strap. The strap will have an 'alligator' clip at the end of a shielded wire lead. Clip it to a grounded object. Any static electricity will then harmlessly discharge through the strap. Put on and connect the strap *before* you handle the components.
2. Use an anti-static pad. Put any components on the pad whenever you work on them outside the computer. If you don't have a pad, put the components on the anti-static bag they came in.

Both the wrist strap and pad are inexpensive and are generally available from computer supply companies.

Mainboard Layout

The diagram on the next page shows the location of important components on the mainboard. There are other small diagrams later in the manual that point out the location of the topic being explained.

PVI-486SP3 Layout



1. CPU in ZIF Socket 3
2. L2 external cache sockets
3. ISA (VL) bus expansion slots
4. PCI bus expansion slots
5. Keyboard connector
6. 5V power connector
7. SIMM memory banks
8. I/O connectors

Using Your Mainboard

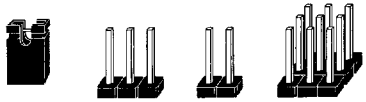
In addition to the operating instructions in your system manual, there are a few additional things specific to the mainboard you will need to know. These have to do with the hardware settings on the mainboard and the system configuration record.

Hardware Settings

There are a number of hardware settings on the board. They specify configuration options for various features. The settings are made using something called a 'jumper'. A jumper is a set of two or more metal pins in a plastic base attached to the mainboard. A plastic jumper 'cap' with a metal plate inside fits over two pins to create an electrical contact between them. The contact establishes a hardware setting.

Some jumpers have two pins, others have three or more. The jumpers are sometimes combined into sets called jumper 'blocks', where all the jumpers in the block must be set together to establish a hardware setting. The next figures show how this looks.

Jumpers and caps



Jumper cap **3-pin jumper** **2-pin jumper** **Jumper block**

Setting options for most jumpers are printed on the board in a stylized bird's-eye view, with which pins to connect for each setting marked by a bar connecting two pins. For example, if a jumper has three pins, connecting, or 'shorting', the first and second pins creates one setting and shorting the second and third pins creates another. The same type of diagrams are used in this manual. The jumpers are always shown from the same point of view as shown in the whole-board diagram in this chapter. The next figures show what the manual diagrams look like and what they represent.

Jumper diagrams

Jumpers are shown like this

Jumper caps like this

Jumper settings like this

Jumpers in a 'block'

Some jumpers are oriented vertically; if the pin position needs to be shown, Pin 1 is marked.

The System Configuration Record

All personal computers use a BIOS (Basic Input Output System) as the basic software that tells the computer how to function. In order for the BIOS to function, there has to be a record of the computer's hardware and configuration settings for it to refer to. This record is created by using a software program that is permanently stored in the BIOS ROM chip on the mainboard. The program is called the Setup Utility.

The system configuration record the utility creates is also stored on the mainboard. Unlike the utility program, the record is not recorded permanently. The memory it gets stored in must be maintained by battery power when the computer is turned off. If battery support fails, the record will be lost and you will have to recreate it.

When you buy your computer, the system configuration record will already be set. The settings will be optimized for your computer hardware and may vary from the basic defaults. You should run the Setup Utility when you first use your computer. Write down the settings. There is an explanation of how to run the Setup Utility in Chapter 3.

Important:

In some circumstances it is possible the configuration record may be corrupted or lost. If this happens, your computer will not work properly the next time you turn it on. This is not a serious problem. To fix it, run the Setup Utility and re-enter your configuration from your written record. When you restart the computer, it will work normally.

System IRQs

Later in the manual you'll see something called an "IRQ" mentioned several times. If you're not familiar with these, this is a short explanation of what they are and why you may need to know about them if you upgrade your system.

An IRQ, or interrupt request, is the process whereby an input or output device tells the CPU to temporarily interrupt whatever it is doing and immediately process something from the source of the interrupt. When finished the CPU goes back to what it was already processing. This happens very quickly. There are 16 IRQs, IRQ 0 through IRQ 15, in the ISA bus design. Devices that need an IRQ line to operate sometimes must have the use of that line exclusively.

Many expansion cards require the use of an IRQ line to operate, for example, network interface cards and sound cards. When you install a card that uses an IRQ, it will have a default IRQ setting that you might need to change if that IRQ is already in use and cannot be shared. There are different ways of setting an IRQ assignment, with jumpers being the most common.

Both the ISA bus and the PCI bus use the same set of system IRQs. For the PCI bus there is an additional consideration. On the PCI bus, you must assign an IRQ to the PCI slot you will install an IRQ-using card in. There are two methods of generating an IRQ on the PCI bus, level-triggering (level-sensitive) and edge-triggering. Most PCI expansion cards use the level-triggered design. Some very few cards may use the edge-triggered design instead. The mainboard design therefore provides the means to set the IRQ assignment for a PCI slot for either type of card. This is explained in detail in Chapters 2 & 3.

BIOS-Supported Enhanced IDE Features

The BIOS has several feature enhancements for IDE hard disk drives and support for other IDE devices.

The original IDE implementation was limited to two hard disk drives with relatively slower data transfer rates. While this solution is simple and reliable, it has some limitations that have become more significant as the performance level of other system components and overall system performance have increased dramatically with the advent of new microprocessor, expansion bus and operating system technologies.

In response to these demands, the IDE specification has been updated to increase its capabilities and provide improved performance. Together these are referred to as 'Enhanced IDE'. Enhanced IDE features comprise the following:

- Support for IDE hard disk drives larger than the former 528MB limit imposed by various technical factors.
- Support for IDE devices other than hard disk drives, including IDE Tape Backup and CD-ROM drives.
- Support for two IDE channels with two devices per channel, allowing the use of four IDE devices in one system.
- Support for faster data transfer rates, particularly with IDE controllers that have a PCI local bus interface.

This mainboard supports the use of these new features. The features work with the on-board Local Bus IDE controller which has two connectors built onto the board. With this controller you can use one or both connectors to connect up to four IDE devices.

Large IDE Hard Disks

For IDE hard disk drives, the BIOS provides three modes to support both normal IDE hard disks and also drives larger than 528MB:

Normal – for IDE drives smaller than 528MB

Large – for drives larger than 528MB that do not use LBA. These can only be used with the MS-DOS operating system.

LBA – for drives larger than 528MB and up to 8.4 GB (GigaBytes) that use Logic Block Addressing mode.

Other IDE Devices

Enhanced IDE allows the use of IDE devices other than hard disks. Two devices that previously required non-standard or adapted interfaces and are now available as standard IDE devices are Tape Backup and CD-ROM drives. These will now be able to take advantage of the ease of installation, lower cost and in some cases superior performance of Enhanced IDE, putting an end to the system configuration complications created by their earlier interfaces.

To use IDE devices other than hard disks with this mainboard you may need to install a device driver in your system software configuration. Refer to the documentation that comes with any device you will install for instructions about this and any otther installation requirements.

Dual IDE Channel Support

You can connect up to four IDE peripheral devices to the on-board Local Bus IDE controller. With Enhanced IDE you can connect two devices to each connector. All devices are categorized the same way IDE hard disks have been in the past, with the first device per channel set as the "Master" device and the second as the "Slave" device.

Faster Data Transfer

Enhanced IDE includes a scheme to support a significant increase in the rate of data transfer from the IDE device to the rest of the system compared to the previous standard. One aspect of this scheme is support for the Mode 3 timing scheme. If you use both the on-board controller and hard disks that support Mode 3 operation you can increase the data transfer rate up to as much as 11MB per second.

Power Conservation

This mainboard incorporates the power conservation technology, which you can set up in the BIOS Setup Utility, where the Power Management Setup section controls the board's power management scheme. The power management features include hard disk and video controls. For more information see the section on Power Management Setup in Chapter 3.

SCSI BIOS Firmware & The Optional SC-200 Controller Card

This mainboard has on-board NCR SCSI firmware recorded in the BIOS flash ROM chip that supports the NCR 53C810 PCI Fast SCSI-2 controller. There is an optional SCSI controller card, the SC-200 that uses this firmware. The NCR SCSI controller is a full 32-bit PCI DMA bus master and supports the ASPI and CAM standards.

You can connect a chain of up to seven devices to the SCSI interface. The SC-200 SCSI interface card provides both internal and external connectors. There are details on this card and how to connect SCSI devices to it at the end of Chapter 4.

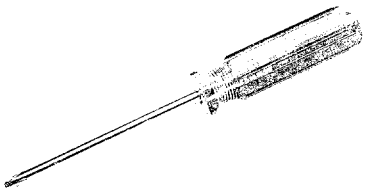
Two floppy disks with support drivers come with the SC-200 card. There is detailed information about the drivers in "ReadMe" files on the disks. There is more information about these disks in the section on "SCSI BIOS & Drivers" in Chapter 3.

Upgrade Guide

This section explains how to install options on your mainboard. It covers the most likely and technically accessible upgrades you might want to do, including adding expansion cards, increasing system memory, changing the CPU chip and adding IDE hard disks.

Installing upgrades will either improve the performance of your computer, or add some additional capabilities to it. You can install upgrades yourself, or have your dealer or a qualified computer technician do it for you.

It is also possible to increase the size of the Level 2 cache, but since this is a much more technically demanding upgrade that you are both less likely to undertake and in most cases would probably require at least partially disassembling your system, the technical reference information about it is in Chapter 4. It is probably best to have a qualified technician perform the upgrade for you if you want to upgrade the cache.



Installing Expansion Cards

There many ISA, VL-Bus and PCI expansion cards you can install in your system to expand its capabilities. Any card you get will come with instructions on how to configure and install it. For your reference, we have included a brief decsription here of how to install a card in your system case. This is followed by an explanation of this mainboard's requirements for installing expansion cards that use an interrupt request line (IRQ). Please review the IRQ information carefully if you are installing this type of card. If you're more familiar with this topic, there is a chart-based synopsis of the required procedures at the end of this section.

Installation Procedure

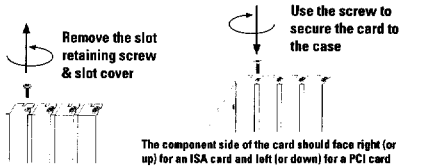
Expansion cards often require pre-installation configuration and sometimes post-installation software setup. Check your card documentation for instructions on this. Once you have configured an expansion card you want to install, the installation procedure is fairly simple. Your system manual should have instructions for installing expansion cards specific to the design of your system case. The procedure here covers the basics for your reference.

Before you start, always make sure the computer is turned off. You should also make sure to observe standard static electricity discharge precautions. You can damage your expansion card, the mainboard, or both by not being careful about this.

The basic procedure for installing expansion cards is the same for all three types. The components on ISA and VL-Bus cards will face to the right as you view the computer from the front. PCI card components face to the left. Please note that PCI Slot 3 and the combined ISA/VL-Bus slot share the same mounting bracket position, so you can only use one of these slots, not both.

The basic procedure is as follows:

1. Open the system case to gain access to the expansion slots.
2. Remove the slot-cover corresponding to the slot you want plan to use. Put the slot-cover retaining screw aside and store the slot cover in case you need it later.
3. Remove the card from its protective packaging if you haven't already.
4. Align the card's slot connectors to the slot. Keep the card at a 90° angle to the mainboard. Insert the card into the slot by pressing it firmly downward. If there is a lot of resistance, make sure the slot connectors are lined up correctly. PCI cards require very little pressure to insert.
5. Attach the card's mounting bracket to the case using the slot cover screw you put aside in Step 2.
6. Close the case, turn on the computer and check to see if the card is working properly, and do any software set up required.



Assigning System IRQs for Expansion Cards

Both the ISA and PCI buses may need to use IRQs. You must configure any IRQ assignments so that the system can know which bus is using a particular IRQ. You must assign IRQs correctly, or the mainboard will not work properly.

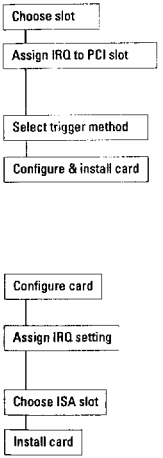
As mentioned in Chapter 1, there are 16 IRQs available. In an ISA design, some of them are already in use by standard parts of the system such as the keyboard or mouse. Drawing from the unused group of System IRQs, you can assign an IRQ to either bus. Since both bus designs use IRQs, we differentiate them by referring to the IRQs assigned to the ISA bus as ISA IRQs and to the PCI bus as PCI IRQs. There is an IRQ reference chart in Chapter 4.

The two bus designs deal with IRQs differently. In the ISA bus, the IRQs are available to every slot and you define which IRQ is in use by configuring the IRQ number on the expansion card you want to install. You can then install the card in any available slot.

In the PCI design you assign an IRQ to a PCI slot rather than doing it on a card. For PCI cards, you only need to set something called the "INT" assignment. Since all the PCI slots on this mainboard use "INTA#", you only need to make sure that any PCI card you install is set to INT A. For PCI cards that use an IRQ, you can assign IRQs by using the BIOS Setup Utility. See the section on PCI SLot Configuration in Chapter 3.

You do not need to assign a System IRQ to a PCI slot unless you install a card in it that needs an IRQ. The default IRQs for the PCI slots will not be used if there is no card installed in the slot and the IRQ routing method is not set to 'Level/Forced'. If you don't assign a System IRQ to a PCI slot in the Setup Utility, the unused IRQs are available to the ISA bus.

Installing Expansion Cards That Use An IRQ



Example PCI installation procedure:

1. Choose a slot to use -
   e.g. PCI Slot 1 - fixed INT A#
2. Assign a System IRQ to Slot 1
   In the BIOS Setup program's PCI Configuration Setup use the default IRQ or choose another.
3. In the BIOS Setup program's PCI Configuration Setup select level- or edge-trigger.
4. Configure the card you will install in PCI Slot 1 to use INT A and install it.

Example ISA or VL-Bus procedure:

1. Configure the expansion card and select the ISA IRQ it will use.
   e.g. IRQ 5
2. Don't assign IRQ 5 to a PCI slot in the BIOS Setup program's PCI Configuration Setup
3. Choose an ISA slot to use -
   e.g. ISA Slot 4
4. Install the card in ISA Slot 4

Upgrading System Memory

This section explains how to install more system memory. There are instructions on how to configure and install memory and an explanation of the technical specifications required.

System DRAM is the main source of data for the CPU. Data remains stored in DRAM as long as the system is turned on, and is lost when you turn it off. The Level 2 cache memory is Static RAM (SRAM), which is faster than DRAM memory. When the CPU looks for data, it first searches the cache. If the information is not there, the search continues in the DRAM. With this design, the CPU looks in the fastest source of data first, which lets it operate as fast as possible.

The DRAM subsystem uses memory chips permanently mounted on small circuit boards to form "SIMMs" (Single In-line Memory Modules). The memory chips have a speed rating that is measured in nanoseconds (ns). This mainboard requires fast page mode DRAM with a speed of at least 70ns.

This mainboard can use 72-pin SIMMs in seven sizes: 1MB, 2MB, 4MB, 8MB, 16MB, 32MB and 64MB (megabytes). Depending on the combination of modules you use, you can install between 1MB and 128MB. The 32–bit modules used for this board come with memory chips on either one or both sides of the module.

Configuring System Memory

If you want to add system memory, use the configuration options and specifications shown in this section.

Memory Combinations

You can configure the system memory in a variety of ways, using different combinations of SIMM modules. You can use any combination of modules as long as they are the same speed. You can install a single module in either socket without regard to socket order.

The only restrictions are:

- **Both modules must be the same speed.**
- **Required Memory Specifications:**

Module Size: 1MB, 2MB, 4MB, 8MB, 16MB, 32MB or 64MB

DRAM Mode: Fast Page Mode

DRAM Speed: 70ns (or faster)

RAS access time [Trac]: 60ns - 70ns

CAS access time [Tcac]: 10ns - 25ns

Parity: Either parity or non-parity

Installing SIMMs

To install SIMMs follow these instructions:

1. The modules will only insert in a socket in one orientation. An orientation cut-out will prevent you from inserting them the wrong way. See the figures at right.
2. Press the module edge connector into the socket at a moderate angle to the board. See the figures below.
3. Press the module forward onto the socket's vertical posts, so that the alignment pins at the top of each post go into the circular holes at each end of the module.
4. The module should click into place, as the retaining clips at each end of the socket snap behind the module to secure it.
5. Repeat this procedure for each module you install.

Installing a Memory Module

Insert the SIMM into the socket at an angle.

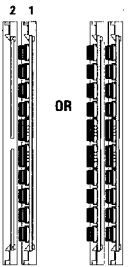
Press it forward onto the positioning pins.

The retaining clips should fit over the edge and hold the SIMM in place.

Module Sockets & Orientation

SIMMs have a cut-out at one end that matches an extension on one of the vertical posts of each socket.

Put orientation cut-out at this end.



Modules may have chips on one or both sides.

Updating the Flash BIOS

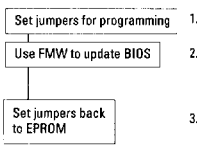
This mainboard has two BIOS ROM chip options. It can use either of two programmable 'flash' EPROM chips, 5-volt or 12-volt, either of which you can update when BIOS upgrades are available.

Jumpers JP32&33 enable programming for the voltage of the BIOS ROM chip installed. With programming enabled, you use the Flash Memory Writer utility to update the BIOS. The jumper settings are in Chapter 4 and intructions for the FMW utility are in Chapter 3.

Note: When you finish programming, always set the JP32&33 back to the default EPROM setting which disables programming and is also for Normal Read of either voltage flash chip.

The following example illustrates this procedure for a 12-volt flash ROM chip.

BIOS Update Procedure for 12-volt EPROM



1. Set JP32&33 to the voltage of the installed ROM chip (e.g. 12V).
2. Refer to Chapter 3 for instructions on using the Flash Memory Writer Utility to install a new BIOS file in the flash chip.
3. When you have successfully installed the new BIOS, set JP32&33 back to the EPROM setting to disable programming.

Installing A CPU Upgrade

If you want to improve your system performance, you can install an upgrade CPU in the ZIF socket. You must first remove the existing CPU, and then set the CPU selection jumpers for the new CPU. Be sure to follow static electricity precautions very carefully. The CPU is one of the most expensive parts of your system and can be damaged or destroyed by static electric discharge.

There are several jumpers you need to set when changing the CPU. The jumpers settings define these specifications:

CPU Type – the kind of CPU is installed

External Clock Speed – the external operation speed. This is also the speed the VL and PCI bus will operate at.

Intel DX4™ Internal Clock Speed – the number by which the external clock speed is multiplied, the result of which is the internal clock speed.

You must have all of this information ready before you can install a CPU upgrade. Remember that the chip speed will be listed according to the faster internal clock speed. The chart below shows some examples:

CPU	*Internal Speed*	*External Speed*
486DX-33 (or SX)	33MHz	33MHz
486DX2-50 (or SX2)	50MHz	25MHz
486DX2-66	66MHz	33MHz
486DX4-75	75MHz	25MHz
486DX4-100	100MHz	33MHz

To check what jumper settings are required to upgrade the CPU, refer to the Jumper Setting Summary in Chapter 4. Make sure to take full precautions against static electric discharge before you work on the board. To install an upgrade CPU first do as follows:

1. Identify the existing external clock speed setting on the board.

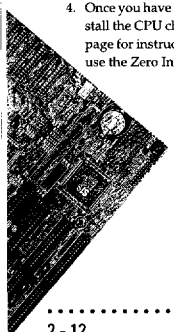
   The external clock speed is set by jumpers JP26, JP27 and JP28, the options are 25MHz, 33MHz, 40MHz and 50MHz.

2. Identify the external clock speed of the CPU you will install.

   If the external clock speed is the same as the mainboard's existing setting, proceed. If it is different, change the JP26-28 setting to the required speed.

3. Identify the CPU type and check what the required jumper settings for JP18 through JP24 are for that type. If you are installing any intelDX4 or a Cyrix DX2-V CPU you will also need to set JP7 for the correct voltage.

4. Once you have made any required jumper settings, you can install the CPU chip in the Socket 3 ZIF socket. Refer to the next page for instructions on this if you're not familiar with how to use the Zero Insertion Force socket.



Installing a CPU in the ZIF Socket

1. Make sure the ZIF socket lever is up. To raise the lever, pull it out to the side a little and raise it as far as it will go. Pin 1 is at the arm corner.

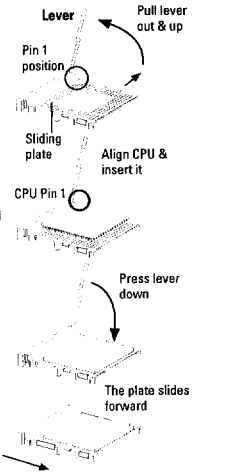
2. Align the CPU and socket Pin 1 corners. The pins on the bottom should align with the inner 3 rings of holes in the socket — unless you are installing Pentium technology.

3. Place the CPU in the socket. It should insert easily. If it doesn't, pull the lever up a little more.

4. Press the lever down. The plate will slide forward. You will feel some resistance as the pressure starts to secure the CPU in the socket. This is normal and won't damage the CPU.

   When the CPU is installed, the lever should snap into place at the side of the socket.

Note: To remove a CPU, pull the lever out to the side a little and raise it as far as it will go. Lift out the CPU chip.



Software Guide

This chapter explains the Setup Utility for the Award BIOS, the SCSI BIOS and drivers, and the system BIOS flash memory update utility.

Award BIOS Setup

All computer mainboards of this type have a 'Setup' utility program stored in the BIOS ROM that is used to create a record of the system configuration and settings. If you received your mainboard installed as part of a system, the proper entries have probably already been made. If so, you might want to call up the Setup Utility, as described later, to take a look at them, and perhaps record them for future reference, particularly the hard disk specifications.

If you are installing the board or reconfiguring your system, you'll need to enter new setup information. This section explains how to use the program and make the appropriate entries.

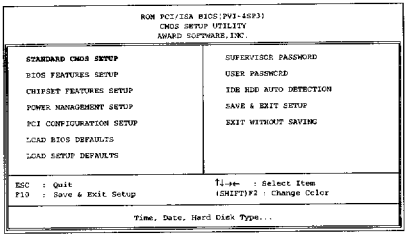
The Setup Utility is stored in the BIOS ROM. When you turn the computer on, a screen message appears to give you an opportunity to call up the Setup Utility. It displays during the POST (Power On Self Test). If you don't have a chance to respond, reset the system by simultaneously typing the <Ctrl>, <Alt> and <Delete> keys, or by pushing the 'Reset' button on the system cabinet. You can also restart by turning the system OFF then ON.

This message will then reappear:

TO ENTER SETUP BEFORE BOOT PRESS CTRL - ALT - ESC OR DEL KEY

After you press the <Del> key the main program screen will appear, displaying the following choices.

Main Program Screen



This screen provides access to the utility's various functions.

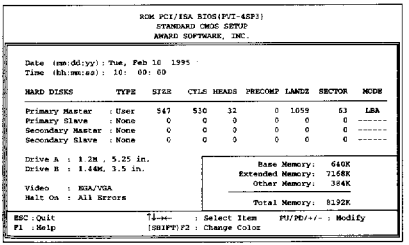
Note: The 'BIOS Defaults' are minimized settings for troubleshooting. Use the 'Setup Defaults' to load optimized defaults for regular use. If you choose defaults at this level, it modifies all applicable settings.

A section at the bottom of the screen explains the controls for this screen. Use the arrow keys to move between items, <Shift>+<F2> to change the color scheme of the display and <Esc> to exit the utility. If you want to save changes, press the <F10> key to save the changes you made and exit the utility. Another section at the bottom of the screen displays a brief explanation of the item highlighted in the list.

Standard CMOS Setup

"STANDARD CMOS SETUP" records some basic system hardware information and sets the system clock and error handling. If your mainboard is already installed in a working system you will not need to do this. If the configuration record which gets stored in the CMOS memory on the board is lost or corrupted, or if you change your system hardware configuration, you will need to recreate the record. The configuration record can be lost or corrupted if the onboard battery that maintains it weakens or fails.

Standard CMOS Setup Screen



"STANDARD CMOS SETUP" displays a screen with a list of entries. Follow the on-screen instructions to move around the screen. Instructions at the bottom of the screen list the controls for this screen. Use the arrow keys to move between fields, and the <Page Up> ('PU'), <Page Down> ('PD') or plus and minus keys to change the option shown in the selected field. Pressing <Shift>+<F2> changes the color scheme of the display, and <Esc> exits this level and returns to the main screen.

Modifiable fields appear in a different color. If you need information about what changes to make, press the <F1> key. The help menu will then give you information on the item highlighted. The display of available memory at the lower right-hand side of the screen functions automatically.

Date & Time

The first two lines on the screen are the date and time settings for the system clock. You can correct them if they are wrong.

Hard Drive Type

You must enter the specifications of certain types of hard disk drive if they are installed in your system. MFM, ESDI and IDE hard disks all need to have their specifications recorded here.

If you have one or more SCSI hard disks installed in your system, you do not need to enter their specifications here. SCSI drives operate using device drivers and are not supported directly by any current PC BIOS. If your mainboard has the SCSI controller card option, and you will use it, see the SCSI instructions that follow later in this section. If you have some other SCSI controller, follow the instructions that came with it on how to install any required SCSI driver.

The are four hard disks listed **"Primary Master"**, **"Primary Slave"** **"Secondary Master"** and **"Secondary Slave"**. For each IDE channel, the first device is the 'master' and the second device the 'slave'. Note that these refer to the physical drive (think of them as 'Drive 1' and 'Drive 2' etc.), not to any logical drives or partitions you might create under an operating system such as MS-DOS. You can install only two MFM or ESDI hard disks, which require a separate controller card, as **"Primary Master"** or **"Primary Slave"**. If you use the on-board Local Bus IDE controller which supports Enhanced IDE features, you can install four IDE hard disk drives.

To enter the specifications for an MFM or ESDI hard disk drive, you must first select a 'type'. You can select the "User" option and enter the specifications yourself manually or there are 46 pre-defined drive specifications which you can look through to see if the specifications for your drive are assigned a type number. Do this by using the <Page Up> or <Page Down> key to change the option listed after the drive letter.

For an IDE hard drive, you should use the auto-detection utility described later to enter the drive specifications automatically. If you want to do this, leave the drive set to "None". You can enter the specifications yourself manually by using the User option if you want to.

There are six categories of information you must enter: "Cyls." (number of cylinders), "Heads" (number of read/write heads), "Precomp" (write precompensation), "LandZone" (landing zone), "Sectors" (number of sectors) and "Mode". The size entry is automatically determined by the other entries. The hard disk vendor's or system manufacturer's documentation should provide you with the drive specifications. If you have an IDE drive, unless your drive is already formatted with specifications different from those detected by the auto-detection utility, the easiest thing to do is use the auto-detection feature to enter the drive specifications.

Mode Setting For Hard Disk Drives Larger Than 528MB

The last of the specification entries, Mode, requires additional explanation. The Mode settings are for IDE hard disks only. You can ignore this item for MFM and ESDI drives. There are three entries you can select from in the Mode field, "Normal", "Large" and "LBA".

Set Mode to the Normal setting for IDE hard disk drives smaller than 528MB. Use the LBA setting for drives over 528MB that use Logical Block Addressing mode to allow larger IDE hard disks. The Large setting is for drives over 528MB that do not use the LBA mode. This type of drive can only be used with MS-DOS and is uncommon. The majority of IDE drives over 528MB use the LBA mode.

Note: Entering incorrect drive specifications will result in a hard disk drive functioning improperly or not at all.

Floppy Disk Drives

The next two lines record the types of floppy disk drive present. The five options for drives A and B are:

360KB, 5.25 in.

1.2MB, 5.25 in.

720KB, 3.5 in.

1.44MB, 3.5 in.

2.88MB, 3.5 in.

None

Highlight the listing after each drive name and select the appropriate entry.

Video Display Types

"**Video**" refers to the type of video display card your system has. The five options are:

EGA/VGA

Mono (for Hercules or MDA)

CGA 40

CGA 80

You should select the setting that matches your video display card. If you have a VGA or any higher resolution card, choose the EGA/VGA setting.

Error Handling

The last line "**Halt On**" controls whether the system stops in case of an error. The options are:

All Errors

No Errors

All, But Keyboard

All, But Diskette

All, But Disk/Key

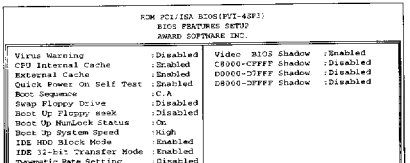
For most purposes, we suggest that you leave the setting on the default, "**All Errors**", unless you know why you want to use a different setting.

When you have made your selections, exit to the main program screen by pressing the <Esc> key.

BIOS Features Setup

"BIOS FEATURES SETUP" is a list of system configuration options. Some entries are defaults required by the mainboard's design. Others will improve your system's performance if enabled, or let you set up some system features according to your preference.

BIOS Features Setup Screen



A section at the lower right of the screen explains how to navigate and make changes. The controls are the same as for the Standard CMOS Setup.

If you need information about what changes to make, highlight an entry and press the <F1> key. A pop-up help menu will display information about the highlighted item. Press the <F5> key to recall the last set of values saved for this page. Pressing the <F6> key loads the BIOS default values for this page and <F7> loads the Setup default values.

The following explains the options for each entry and indicates the default settings (Setup Defaults) for this screen.

Virus Protection

The "**Virus Warning**" default setting is "Disabled". This feature protects the boot sector and partition table of your hard disk. Any attempt to write to them will halt the system and cause a warning message to appear. If this happens, you can either allow the operation to continue or stop it and use an anti-virus utility on a virus-free bootable floppy disk to reboot and investigate your system.

Cache Control

The "**CPU Internal Cache**" and "**External Cache**" default settings are "Enabled". These settings enable CPU's 'Level 1' built-in cache and the 'Level 2' secondary cache. The BIOS Default settings will disable the L2 cache. Leave both enabled unless you are troubleshooting a problem.

Boot Up Features

The "**Quick Power On Self Test**" default setting is "Enabled". This speeds up the Power On Self Test (POST) by skipping some items that are normally checked during the full POST. If your system is functioning normally, you can use this feature to speed the boot up process.

The "**Boot Sequence**" default setting is "C:, A:"; the other option is "A:, C:". The setting determines where the computer looks first for an operating system, the hard disk or the floppy drive.

The "**Swap Floppy Drive**" default setting is "Disabled". When enabled, the BIOS will swap floppy drive assignments so that Drive A will function as Drive B: and Drive B: as Drive A: under DOS.

The "**Boot Up Floppy Seek**" default setting is "Disabled". When enabled, the BIOS will check if there is a 360KB floppy disk drive installed. Don't change this unless there is a 360KB drive installed.

The default "**Boot Up NumLock Status**" setting is "On". When the computer boots, the numbers on the numeric keypad of an IBM-compatible extended keyboard will be active. If you turn this off the keypad cursor controls will be active.

"**Boot Up System Speed**" sets the CPU speed at boot up. The default setting is "High".

IDE Modes

The "**IDE HDD Block Mode**" default setting is "Enabled". This feature enhances hard disk performance by making multi-sector transfers instead of one sector per transfer. Most IDE drives, except very early designs, can use this feature. If you are going to use the driver software for the on-board IDE controller, disable this feature.

The "**IDE 32-bit Transfer Mode**" default setting is "Enabled". This feature allows 32-bit data transfer between the system and the IDE hard disks if the hard disk controller supports 32-bit transfer. The on-board Local Bus IDE controller supports 32-bit transfer, so if you use it, you can enable this feature to improve performance.

Keyboard Interface

The "**Typematic Rate Setting**" default setting is "Disabled". If enabled, you can set the typematic controls that follow.

The "**Typematic Rate (Char/Sec)**" controls the speed at which the system registers repeated keystrokes. The choices range from 6 to 30 characters per second (default is 6).

The "**Typematic Delay (Msec)**" controls the time between the display of the first and second characters. There are four delay rate choices: 250ms, 500ms, 750ms and 1000ms (default is 250ms).

Password Control

The "**Security Option**" controls the Password Setting in the main screen. The default setting is "System", uses the User Password feature every time you boot up. The other setting is "Setup". This will allow the system to boot, and use the Supervisor Password *only* to protect the Setup Utility settings from being tampered with. You create a password by using the Supervisor or User Password command from the main screen as explained later in this section.

Shadow Controls

An unlisted default autiomatically copies the system BIOS into the system DRAM to improve performance.

The default setting for the "**Video BIOS Shadow**" is "Enabled". This copies the video display card BIOS into system DRAM to improve performance.

The next ten lines, "**C8000-CFFFF Shadow**" to "**D8000-DFFFF Shadow**" are for shadowing other expansion card ROMs. The default setting for these areas is "Disabled". If you have other expansion cards with ROMs on them, you will need to know which addresses the ROMs use to shadow them specifically. If you don't know and cannot find out, you can enable all of the ROM shadow settings. This ensures that any ROMs present will be shadowed. It will also reduce the memory available between 640KB and 1024KB.

After you have made your selections in BIOS Features Setup, press the <Esc> key to go back to the main screen. The next item is Chipset Features Setup.

Chipset Features Setup

This screen controls the settings for the board's chip set. The controls for this screen are the same as for the previous screen.

Chipset Features Screen

```
                ROM PCI/ISA BIOS(PVI-4SP3)
              CHIPSET FEATURES SETUP
              AWARD SOFTWARE INC.

Auto Configuration          : Enabled      Onboard FDC Controller    : Enabled
Cache Burst Read Cycle      : 2-1-1-1      Onboard FDC Swap A & B    : No Swap
Cache Write Cycle           : 2 CCLK       Onboard Serial Port 1     : COM1
DRAM Speed                  : Faster       Onboard Serial Port 2     : COM2
DRAM CAS Precharge Time     : 1 CCLK       CGM3 & COM4 Address       : 338H,23EH
DRAM Write Cycle Post       : 1 WS         Onboard Parallel Port     : 278H
DRAM Write CAS Pulse        : 1 CCLK       Parallel Port Mode        : Normal
ISA Bus Clock               : 1/4 PCLK
CPU Internal Cache          : AUTO         Video BIOS Cacheable      : Disabled
External Cache              : Write Back   Slow DRAM Refresh (1:4)   : Disabled
CPU to PCI Post Write       : Enabled      Allocate Memory Hole      : Disabled
CPU to PCI Burst Write      : Enabled        Hole Start Address      : FC00000
PCI Burst To Main Memory    : Enabled
16-bit I/O Recovry Time     : 5 BUSCLK
8-bit I/O Recovry Time      : 8 BUSCLK     ESC : Quit          ↑↓→← :Select Item
Onboard Local Bus IDE       : Enabled      F1  : Help          PU/PD/+/-  : Modify
IDE 0 Master Mode           : Auto         F5  : Old Values  (SHIFT)F2  : Color
IDE 0 Slave Mode            : Auto         F6  : Load BIOS Defaults
IDE 1 Master Mode           : Auto         F7  : Load Setup Defaults
IDE 1 Slave Mode            : Auto
```

All the entries on the left side of the screen are optimal settings for this mainboard that are defined by the Auto Configuration feature, which configures the settings based on the CPU clock speed. Some of the settings are fixed under auto-configuration, others can still be changed. Generally, you should not change the settings unless you know what you are doing. The exception to these are the CPU Internal Cache setting, which you can set to either Write Back or Write Through if you know which protocol the CPU internal cache is (although the Auto setting will do this automatically) and the IDE Mode settings.

Onboard Local Bus IDE Settings

The default setting for **"Onboard Local Bus IDE "** is "Enable". This enables both the Primary and Secondary IDE channels for the onboard Local Bus IDE controller. If you are not using the on-board IDE feature, you can set this entry to "Disable" to free IRQ 14 & 15, which the on-board IDE controller uses when enabled.

IDE Mode Settings

The default settings for the **"IDE 0 Master Mode", "IDE 0 Slave Mode", "IDE 1 Master Mode"** and **"IDE 1 Slave Mode"** are "Auto". With this setting, the BIOS will automatically determine the optimum IDE drive mode for the installed drives and set the IDE wait state for both IDE 0, the Primary channel, and IDE 1, the Secondary channel. You can set the mode here manually to Mode 0, 1, 2, 3 or 4, but we do not recommend doing this because your drives may not work properly if you use the wrong setting.

Controller Settings

The default setting for the **"Onboard FDC Controller"** is "Enabled". This setting allows you to connect your floppy disk drives to the onboard "Floppy" connector instead of a separate controller card. Choose the "Disabled" setting if you want to use a separate controller card.

The default setting for the **"Onboard FDC Swap A: B:"** is "No Swap". If you want to reverse the drive letter assignments of your floppy disk drives you can set this to **"Swap AB"** and the swap will be controlled in hardware. This works separately from the BIOS Features floppy disk swap feature. It is functionally the same as physically changing the floppy disk drive cable connector positions.

Serial Ports

"Onboard Serial Port 1" and **"Onboard Serial Port 2"** control the the mainboard's two on-board serial ports. The options are:

COM1	address is 3F8H	(Onboard Serial Port 1 default)
COM2	address is 2F8H	(Onboard Serial Port 2 default)
COM3	default address is 338H	
COM4	default address is 238H	
Disabled	turns off the on-board ports	

Make sure both ports have different COM assignments.

The options for the **"COM3 & COM4 Address"** line are:

3E8H, 2E8H

2E8H, 2E0H

220H, 228H

338H, 238H Default setting

In a normal system configuration, it should be unnecessary to change these defaults.

Parallel Port

The options for **"Onboard Parallel Port"** are:

378H

3BCH

278H Default setting

378H

Disabled

This line controls the on-board parallel port. If you use an I/O card with a parallel port, make sure the addresses don't conflict. IBM PC-compatible computers can have three parallel ports.

Parallel Port Mode

The options for **"Onboard LPT Port Mode"** are:

Normal Default setting

EPP

ECP

ECP&EPP

If you have a parallel interface peripheral device that uses one of the paralell port enhancements listed, set this line for the enhanced mode your peripheral supports.

Don't change the rest of the settings on this screen with the exceptions that if you install SIMMs that use Slow Refresh DRAM, you can Enable **"Slow DRAM Refresh (1:4)"**, and if your operating environment requires the use of the Memory Hole feature you can use it according to its requirements.

When you are done with this section, press the <Esc> key to go back to the main screen.

Power Management Setup

Power Management Setup controls the mainboard's "green" features. The features shut down the video display and hard disk to save energy.

The Power Management Setup Screen

```
                ROM PCI/ISA BIOS (PVI-4SP3)
                POWER MANAGEMENT SETUP
                AWARD SOFTWARE INC.

Power Management      : User Define        IRQ3  (COM 2)         : Enable
Video Off Option      : Susp,Stdby->Off    IRQ4  (COM 1)         : Enable
Video Off Method      : V/H SYNC+Blank     IRQ5  (LPT 2)         : Enable
Suspend Switch        : Enable             IRQ6  (Floppy Disk)   : Enable
Doze Speed (div by)   : 8                  IRQ7  (LPT 1)         : Enable
Stdby Speed(div by)   : 32                 IRQ8  (RTC Alarm)     : Disable
                                           IRQ9  (IRQ2 Redir)    : Enable
        ** PM Timers **                    IRQ10 (Reserved)      : Enable
HDD Power Down        : Disable            IRQ11 (Reserved)      : Enable
Doze Mode             : Disable            IRQ12 (PS/2 Mouse)    : Enable
Standby Mode          : Disable            IRQ13 (Coprocessor)   : Enable
Suspend Mode          : Disable            IRQ14 (Hard Disk)     : Enable
                                           IRQ15 (Reserved)      : Enable
        ** PM Events **
COM Ports Activity    : Enable             ESC : Quit      ↑↓→← :Select Item
HDD Ports Activity    : Enable             F1  : Help      PU/PD/+/-  : Modify
PCI Master Activity   : Disable            F5  : Old Values  (SHIFT)F2  : Color
DMA Ports Activity    : Disable            F6  : Load BIOS Defaults
LPT Ports Activity    : Disable            F7  : Load Setup Defaults
VGA Activity          : Disable
```

Power Management

"**Power Management**" is the master control for the power saving modes, Display Turn off and HDD Power Down that together form the hardware power conservation scheme. There are four settings:

Max Saving	Sets the power conservation options to maximize power saving by putting the system into power saving mode after a brief period of system inactivity.
Min Saving	Another set of power saving assignments which activate each after a moderate period of system inactivity.
Disable	Turns off all power saving
User Defined	The default – allows you to set power saving options according to your requirements.

Max Saving

The "Max Saving" defaults are are "10sec" and "20sec".

Min Saving

The "Min Saving" defaults are "40Min" and "40 Min".

Video Off

The "**Video Off Option**" default is "Susp,Stby-> Off". This line defines when the video off features activate. The next line sets how.

The "**Video Off Method**" default is "V/H SYNC+Blank". The DPMS (Display Power Management System) setting allows the BIOS to control the video display card if it has the DPMS feature. If your video display card supports "green" features you can use one of these settings. If not, set this line to the "Blank Screen" setting. When power management blanks the monitor screen, the default setting saves more power by turning off the CRT's vertical and horizontal scanning. With non-green monitors it blanks the screen but doesn't stop CRT scanning.

Note: "Screen Saver" software does not work with this feature. Screen savers are to prevent burning in a static image on the CRT while the monitor is on. A screen saver cannot display while the monitor is shut down to save both energy and the screen.

Suspend Switch

The "**Suspend Switch**" default is "Enable". This enables the SMI connector on the mainboard. The SMI connector connects to the lead from a Suspend switch mounted on the system case.

Doze & Standby Speeds

The next two lines set the speed the CPU will operate at during each mode. The number indicates what the normal CPU speed is divided by.

PM Timers

The next lines control the time-out settings for the Power Management scheme. The features are **"HDD Power Down"**, which puts the hard disk into its lowest power consumption mode, and the Doze, Standby and Suspend system inactivation modes.

The system automatically recovers from any power saving mode when there is system activity, as, for example, when you type any key, or when there is an IRQ wake-up event such as moving the mouse or a modem ring.

"HDD Power Down" shuts down any IDE hard disk drives in the system if they are not accessed for the specified period. The time settings range from "1 Min" to "20 Min", or "Disable".

HDD Power Down does not affect SCSI hard disks.

The **"Doze Mode"**, **"Standby Mode"** and **"Suspend Mode"** lines set the period of time after which each of these modes activate.

PM Events

If there is any activity from any part of the the system listed in this group while the system is suspended, the system will wake up if that item is Enabled. You can set IRQs 3-15 individually in the list at the right of the screen.

Note: Normally, a Microsoft serial mouse or compatible will use either COM1 (IRQ4) or COM2 (IRQ3) and a PS/2-type mouse will use IRQ12. If you know which IRQ your mouse is using, you can make sure the Wake-up Event for that IRQ is turned on here and the system will wake up when you move the mouse or click a button.

IRQ3 to IRQ15 Individual Settings

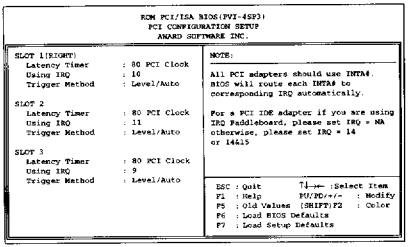
You can set IRQs 3-15 individually. Activity from any enabled IRQ will wake up the system if the "IRQ1-15 Activity" item in PM Events is enabled.

When you are done here, press the <Esc> key to go back to the main screen.

PCI Configuration Setup

This screen configures the PCI Bus slots. All the slots use INTA#. If you install a card , you should set the card to INTA#.

PCI Configuration Setup Screen



Each PCI Slot has three option fields:

The first field is the **"Latency Timer"** setting. Do not change the "80 PCI Clock" setting. The default enables maximum performance.

The **"Using IRQ"** field assigns a system IRQ to a PCI slot. An "NA" (Not Assigned) setting means no IRQ is assigned to that slot. The default IRQ settings are:

Slot 1: 10

Slot 2: 11

Slot 3: 9

You can change the default to another setting. If you do, make sure that you do not choose an IRQ already in use.

Note:

1. If you install a PCI Enhanced IDE controller card that is set to use both IDE channels, you must set the IRQ to the "14&15" option. This does not apply to the on-board PCI IDE controller which, if enabled, automatically uses these two IRQs. For an IDE card that only uses one channel, set the IRQ to "14".
2. If you install a PCI IDE controller card that uses an IRQ 'Paddleboard', you must set the IRQ to "NA".

The third field, **"Trigger Method"**, selects how IRQs are routed. It assigns, or 'routes' the IRQ listed in the previous line to the slot using one of two 'trigger' methods, Level trigger, or Edge trigger. Most PCI cards use the Level trigger method. Level triggering is handled two ways. The default, "Level/Auto", can detect if an installed card uses an IRQ, and if not, leaves the selected IRQ free for other use. The alternative is "Level/Forced". In some cases, a card you install may not be completely compliant with the PCI autodetection specification that allows "Level/Auto" to automatically determine if a PCI expansion card uses an IRQ. If you install a card and it does not seem to be working properly, try changing this setting to 'Level/Forced'. This will assign the IRQ indicated in the previous line to the slot, and therefore the card, even if the card's IRQ use can not be determined. That IRQ is then unavailable for other use.

If you have a card that uses Edge triggering set this line to use "Edge /Auto" and the BIOS will automatically handle IRQ routing.

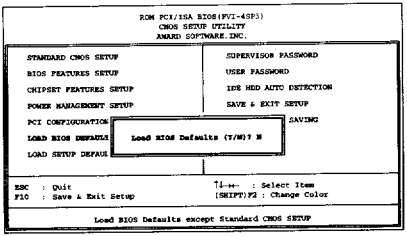
When you're finished making settings for this screen, press the <Esc> key to go back to the main screen.

Load BIOS Defaults

"LOAD BIOS DEFAULTS" loads the troubleshooting default values permanently recorded in the BIOS ROM. These settings are non-optimal and turn off all high performance features.

The Standard CMOS Setup screen is not affected. To use this feature, highlight it on the main screen and press <Enter>. A line will appear asking if you want to load the BIOS default values. Press the <Y> key and then <Enter>. The default settings will load. Press <N> if you don't want to proceed.

Load BIOS Defaults Screen

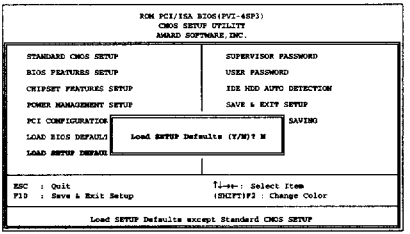


Load Setup Defaults

The "LOAD SETUP DEFAULTS" option loads optimized settings from the BIOS ROM. Use this option to load default settings for normal use.

The Setup Defaults default settings do not affect the Standard CMOS Setup screen. To use the Setup Defaults, highlight the entry on the main screen and press <Enter>. A line will appear asking if you want to load the Setup default values. Press the <Y> key and then press <Enter>. The Setup Defaults will load. Press <N> if you don't want to proceed.

Load Setup Defaults Screen

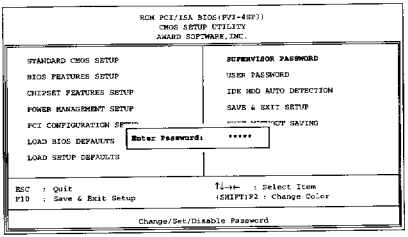


Setting Supervisor & User Passwords

The "SUPERVISOR PASSWORD" and "USER PASSWORD" options set passwords. The Supervisor Password is for system and Setup Utility access. The User Password is for the system only. The mainboard ships with no passwords. To create a password, highlight the type you want and press the <Enter> key. At the prompt, type your password. The password is case sensitive, and can be up to 8 alphanumeric characters. Press <Enter> after you have finished typing in the password. At the next prompt, confirm the new password by re-typing it and pressing <Enter> again. When you're done, the screen automatically reverts to the main screen. Remember, when you use this feature, the "Security Option" line in BIOS FEATURES SETUP will determine when entering the password will be required.

To disable either password, press the <Enter> key instead of entering a new password when the "Enter Password" dialog box appears. A message confirms the password has been disabled.

Password Setting



IDE HDD Auto Detection

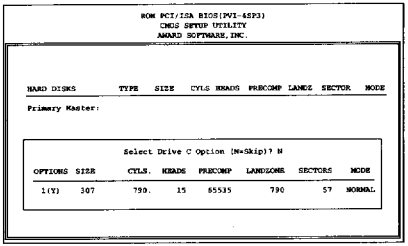
If your system has an IDE hard drive, you can use this utility to detect its parameters and enter them into the Standard CMOS Setup automatically.

This utility will detect as many as four IDE drives if your system configuration supports that many. In sequence, a set of parameters for each drive will appear in the box. To accept the entries displayed press the Y key, to skip to the next drive, press the N key. If you accept the values, the parameters will appear listed beside the drive letter on the screen and the next letter, without parameters will appear and the program will attempt to detect parameters for the next drive. If you press the N key to skip rather than accept a set of parameters, zeros are entered after that drive letter.

Remember, if you use another IDE controller that does not have Enhanced IDE support for four devices, you can only install two IDE hard disk drives. Your IDE controller must support Enhanced IDE features in order to use Drive E: and Drive F:. The on-board Local Bus IDE controller supports Enhanced IDE and has two connectors that support a total of four IDE d· vices. If you want to use another controller that supports four drives you must disable the on-board IDE controller in the Chipset Features Setup screen.

When you are finished, any entries you accepted are automatically entered on the line for that drive in the Standard CMOS Setup. Any entries you skipped are ignored and nothing is entered for that drive in Standard CMOS Setup.

IDE HDD Auto Detection Screen



Note: If you are setting up a hard disk that supports LBA mode, three lines will appear in the parameter box. Choose the line that lists LBA for an LBA drive. Do not choose Large or Normal.

Important!: This utility will only detect one set of parameters for an IDE hard drive. Some IDE drives can use more than one set. This is not a problem if the drive is new and there is nothing on it. If the hard disk drive is already fully formatted when you install it, and different parameters than those detected here were used, you will have to enter them manually.

If the parameters listed don't match the ones used when the drive was formatted, the drive won't be readable. If the auto-detected parameters displayed do not match the ones that should be used for your drive, do not accept them. Press the <N> key to reject the values and enter the correct ones manually from the Standard CMOS Setup screen.

Save And Exit Setup

The next selection on the Utilities menu is "**SAVE AND EXIT SETUP**". If you select this and press the <Enter> key the values entered during the current session will be recorded in the CMOS memory on the mainboard. The system will check it every time you turn your system on and compare it to what it finds as it checks the system. This record is required for the system to operate.

Exit Without Saving

The last selection on the main screen is "**EXIT WITHOUT SAVING**". Selecting this option and pressing the <Enter> key lets you exit the Setup Utility without recording any new values or changing old ones. If you want to save a new configuration, do not use this option. If you use it, any new setting information will be lost.

You can now use your system without further reference to this utility unless you change the system hardware configuration. Remember, if the system configuration information stored in CMOS memory gets corrupted, you will have to reenter it.

NCR SCSI BIOS & Drivers

The NCR 53C810 SCSI BIOS is recorded on the same flash memory chip as the system BIOS. To use the on-board NCR SCSI BIOS, the optional SC-200 SCSI controller card must be installed in your system.

All SCSI devices you connect to your system require driver software. The NCR SCSI BIOS directly supports SCSI hard disks under DOS, Windows and OS/2. It also uses device drivers that are on the DOS-format support floppy disk that comes with the SC-200 controller card to support hard disks and other SCSI devices used with DOS, Windows, Windows NT, Novell NetWare and OS/2. These drivers provide higher performance than the direct BIOS support. To use these device drivers you must install them on your system hard disk drive and add them to your system configuration files.There is also driver support for SCSI devices used with SCO Unix. A second, SCO Unix-format, support floppy disk has the Unix drivers on it.

See the "Readme" files that come with the drivers for instructions on what they are and how to use them. You can print out the Readme files with any text editor.

Award Flash Memory Writer Utility

Your mainboard comes with a utility to upgrade the BIOS. The BIOS is stored on a 'flash' EPROM BIOS ROM chip on the mainboard that can be erased and reprogrammed. This is what the Flash Memory Writer (FMW) utility does. The utility is in the "Flash" directory on the DOS-formatted support floppy disk that comes with the mainboard. You will find three files in the directory:

flash.exe	-	the Flash Memory Writer utility
readme	-	a text file of instructions
SI4Ixxxx.AWD	-	a BIOS file

(xxxx = a 4-digit version number)

Flash Memory Writer records (or "programs") a new BIOS file onto the flash memory chip. The BIOS file on the support disk may be newer than the BIOS on the mainboard, so you may want to update your BIOS right away. Compare the four numbers after "SI4I" in the new BIOS file name to the last three numbers of the code that displays in the upper left-hand corner of your screen while the Power-On Self-Test is running. If the number from the support disk file is larger, then you should reprogram the System BIOS. If they are the same, don't bother. To reprogram the System BIOS, you must first do the following:

1. Set jumpers JP32 and 33 to the enable programming for the voltage ROM chip installed (12V or 5V). When you finish updating the BIOS, set them back to the default EPROM setting to disable programmingand enable Normal Read. See Chapter 4 for jumper setting information.

Note: If you're not sure what voltage flash chip you have, you can check by trying to run FMW with the 5-volt setting. If you have a 12-volt flash chip, which is the most likely configuration, FMW won't program the chip and you'll get an error message. You can then change the setting to the 12-volt setting and try again.

2. Make sure the CPU is running in 'real mode'.

   FMW will not run if the CPU is operating in protected or virtual mode. This means that you can not run it with Windows running or with any memory manager software. You must disable any memory manager software first. The easiest way to do this is to:

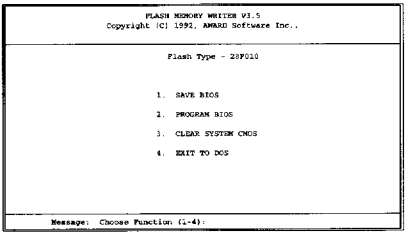
   a. Boot your system from a bootable floppy disk with no config.sys or autoexec.bat files and then run Flash Memory Writer from a backup copy of your support disk. You can make your back-up floppy bootable when you format it, and use one disk for both purposes.

   b. If you are using MS-DOS 6.x, you can use the feature that allows you to confirm or abort each line of the config.sys file. You do this by pressing <F8> while the "Starting MS-DOS..." line is on the screen.

There are other ways to accomplish the same result. The main point is to make sure no memory managers are running. If you aren't sure, try running FMW. If it runs, you've succeeded. If it displays a warning message about the CPU mode, you'll have to try again.

Once you've satisfied the two requirements mentioned above, you can run FMW. You can copy the contents of the "Flash" directory to your hard disk drive, or you can run the utility from a backup of the support floppy disk. Make sure the new BIOS file is in the same directory as the FMW utility. To run FMW, switch to the "Flash" directory if you're not already in it. Type 'FLASH' at the DOS command line and press the <Enter> key. The following screen will appear:

The Flash Memory Writer Utility Screen



There are four command options which you invoke by typing the number of the command:

1. SAVE BIOS
   This command reads the system BIOS already installed on the mainboard and writes a copy of it to a file in the 'Flash' directory. This leaves you with a backup of your original BIOS in case you need to re-install it. This option is highly recommended.
2. PROGRAM BIOS
   This will erase the existing system BIOS and program the new BIOS file you select into the flash memory on the mainboard.
3. CLEAR SYSTEM CMOS

   Selecting this option will erase the system configuration record created by the BIOS setup program and recorded in the CMOS memory on the mainboard. You don't need to use this feature to upgrade the BIOS since the old settings will be used by the new BIOS.
4. EXIT TO DOS
   When you're finished, use this command to return to DOS. A message will display reminding you to turn the system off and on again to start using the new BIOS.

Follow this procedure to update the system BIOS:

1. Back up your existing system BIOS by using the SAVE BIOS command.

   Flash Memory Writer will write a file containing the current system BIOS to the directory you are running FMW from.
2. Install the new BIOS with the PROGRAM BIOS command.

   When you type this command a second screen will pop up instructing you to type in the name of the new BIOS file. Type in the whole file name, e.g. SI4I0101.AWD and confirm that you want to program the BIOS. The utility will then 'Blank', 'Erase' and then 'Program' the flash ROM chip with the new BIOS file.

   DO NOT TURN OFF THE SYSTEM IF THERE IS A PROBLEM!

   If you have a problem 'flashing' (installing) the new BIOS, choose the PROGRAM BIOS command again and try again. If you can not successfully program the new BIOS file for whatever reason, re-install your original BIOS from the backup file by substituting the backup file name for the name of the new BIOS file name in this setup.
3. Once you have successfully installed a new BIOS, exit FMW and turn your system OFF. Set jumpers JP32&33 to the EPROM setting and turn the system ON again. The system should come on using the new BIOS.

Warning: If you do not successfully install a complete BIOS file, your system may not be able to boot. If this happens it will require service by your system vendor. Follow the requirements and instructions in this section precisely to avoid this inconvenience.

Enhanced IDE Drivers

This mainboard comes supplied with software drivers that enhance the performance of the on-board IDE controller and speed up hard disk drive I/O operations. The drivers are on the support floppy disk. The driver software includes drivers for MS-DOS, Windows, Windows For Workgroups, Windows NT, OS/2 and Novell Netware.

To install the drivers, follow the instructions in the 'readme' text files that accompany the drivers.

NOTE: To use the IDE drivers you must set the "IDE HDD Block Mode" line in the BIOS Features Setup screen of the BIOS Setup utility to "Disabled".

Technical Summary

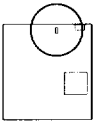
The first part of this section summarizes the mainboard's specifications and explains L2 external cache. The second part explains how to set up the optional PCI-SC200 SCSI Interface card.

Jumper Setting Summary

On-board Multi I/O Selector: JP1

This jumper controls the on-board Super Multi I/O chip. When set to Enable, the I/O ports on the board are functional.

	JP1	
Enable	2&3	Default
Disable	1&2	



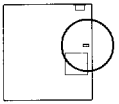
Enable On-board I/O

Disable On-board I/O

CPU Voltage Selector: JP7

This jumper selects the voltage setting for low-voltage CPUs from Intel and Cyrix.

	JP7
Intel & AMD DX4	1&2
Cyrix DX2-V	2&3

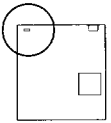


Intel & AMD DX4 3.45V **Cyrix DX2-V 3.6V**

Video Mode Selector: JP8

JP8 selects between CGA video and all other video modes (Mono/VGA). The settingis based on the video card installed. The default is Mono/VGA and you should normally not need to change it.

	JP8
Mono/VGA	1&2
CGA	2&3

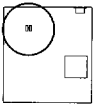


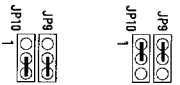
Mono/VGA **CGA**

DMA Channel Selection for ECP: JP9 – JP10

These set the DMA channel for use with the Parallel port's ECP capability. Refer to the manual for the ECP-capable device you want to connect for instructions on which DMA channel to use.

	JP9	JP10
DMA CH1	2&3	2&3
DMA CH3	1&2	1&2



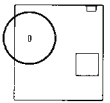


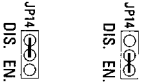
DMA CH1 **DMA CH3**

PS/2 Mouse Port Selector: JP14

This jumper controls the on-board PS/2 Mouse lead connector. When set to Enable, the port is active and uses IRQ12.

	JP14	
Disable	1&2	Default
Enable	2&3	



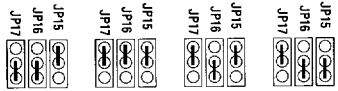


Disable PS/2 Mouse **Enable PS/2 Mouse**

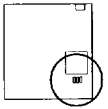
Level 2 Cache Size: JP15 – JP17

Set these according to the size of the installed cache.

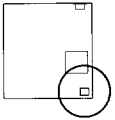
	JP15	*JP16*	*JP17*
128KB (32K8x4)	1&2	2&3	2&3
256KB (32K8x8)	1&2	1&2	1&2
256KB (64K8x4)	1&2	2&3	1&2
512KB (128K8x4)	2&3	2&3	1&2



128KB **256KB** **256KB** **512KB**

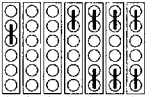


Location of CPU type jumper block JP18-24

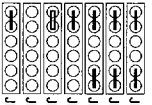


CPU Type Selector: JP18-24

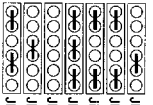
Set jumpers JP18 through 24 according to the CPU installed in the mainboard. The following diagrams indicate the settings for the supported CPUs.



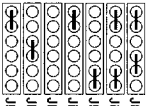
Intel i486SX, i486SX2



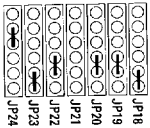
Intel i486DX, i486DX2, i486DX4, i487SX
JP22 pins 1-2 (cap outlined):
Short for 2X CPU clock
Open for 3X CPU clock



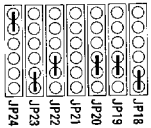
Intel P24D
(Pentium Overdrive)



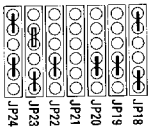
Intel P24T, P24CT
(Pentium Overdrive)



UMC-U5S; AMD Am486SX, Am486SX2, Am486SXL, Am486SXL2

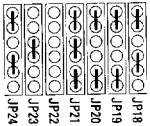


AMD Am486DX, Am486DX2, Am486DXL, Am486DXL2

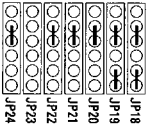


AMD Am486DX4, Am486DXL4, Am486DX2 V8T (3-volt)

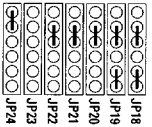
JP23 pins 2-3 (cap outlined):
Short for 2X CPU clock
Open for 3X CPU clock



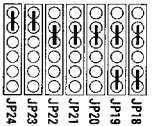
AMD Am486DX4 V8B Plus Am486DX2 V8B Plus



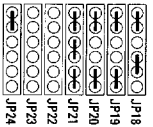
Cyrix Cx486S, Cx486S2



Cyrix Cx486DX, Cx486DX2



Cyrix Cx486DX2-V

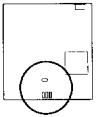


Cyrix Cx486DX5

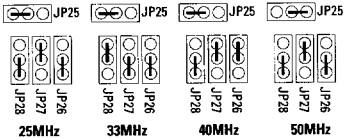
CPU External Clock Speed Selector: JP25 - 28

Set these by the CPU's external clock speed for the installed clock generator.

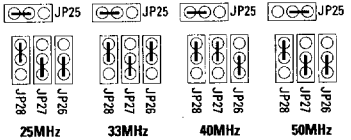
VT8228	JP25	JP26	JP27	JP28
25Mhz	1&2	2&3	1&2	2&3
33MHz	1&2	2&3	2&3	1&2
40MHz	1&2	1&2	1&2	2&3
50MHz	2&3	2&3	1&2	2&3
AV9155				
25Mhz	1&2	2&3	2&3	1&2
33MHz	1&2	1&2	2&3	1&2
40MHz	1&2	2&3	1&2	1&2
50MHz	2&3	2&3	2&3	1&2



VT8228



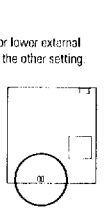
AV9155



VESA ID Selector: JP29 & JP30

These set up the VL-Bus slot. Default is for CPU with 33MHz or lower external clock speed. If CPU external clock is greater than 33MHz, use the other setting.

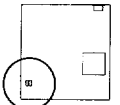
	JP29	JP30
0 WS/<=33MHz (Def.)	1&2	1&2
1 WS/>33MHz	2&3	2&3

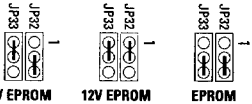


EPROM Programming Selector: JP32 & JP33

These enable programming for a 5- or 12-volt flash ROM chip. The EPROM setting is for Normal Read and no programming.

	JP32	JP33
5-Volt EPROM	1&2	2&3
12-Volt EPROM	1&2	1&2
EPROM (default)	2&3	2&3





Memory Subsystem

Memory Specifications:

See pages 2-7.

Memory Configurations

See page 2-8 for a chart of the configuration options.

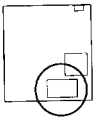
Level 2 Cache Options

SRAM speed: 15ns

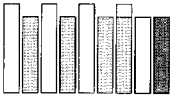
Cache Size: See jumper section for settings and below for other specifications.

Level 2 Cache Configurations

Cache Size	*Cache Chips*	*Pin Configuration*	*Tag Chip*
128KB	Four 32K8	28 pins/chip	8K8
256KB	Eight 32K8	28 pins/chip	32K8
256KB	Four 64K8	32 pins/chip	32K8
512KB	Four 128K8	32 pins/chip	32K8

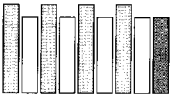


Note: 28-pin chips can use the 32-in sockets

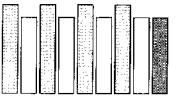


128KB cache
32K8x4
Note irregular position of 4th chip!

256KB cache
32K8x8
[four 28-pin chips in the 32-pin sockets]



256KB cache
64K8x4



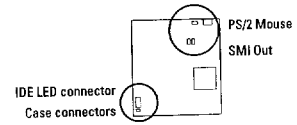
512KB cache
128K8x4

External Connections

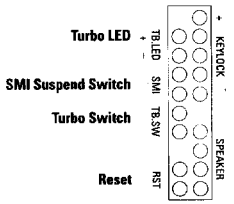
There are several connectors on the board for switches and indicator lights from the system case. The connectors are made of the same components as the jumper switches. There are also connectors for the on-board I/O ports and the leads from a 5-volt system power supply.

Connector Block:

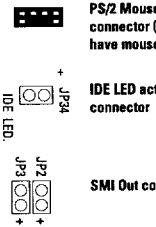
SMI Switch	Connector for the lead from a case-mounted Suspend switch.
Turbo Switch	Shorted for maximum speed operation (default), or connector for the lead from a case-mounted Turbo Switch.
Turbo LED	Connector for the lead from a case-mounted Turbo Switch status indicator LED.
Reset Switch	Connector for the lead from a Reset switch mounted on the system case.
Speaker	Connector for the lead from a speaker mounted inside the system case.
KeyLock	Connector for both a case-mounted keyboard lock and a Power-On LED.
PS/2 Mouse	Connector for a lead from a case-mounted PS/2 mouse port.
IDE LED	Connector for IDE activity LED lead.
SMI Out	Two 2-pin jumpers, JP2 & JP3 for a power management control signal cable from a "green" power supply or other green devices.



Case Feature Connectors



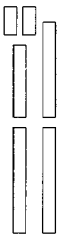
Other Feature Connectors



I/O Port Connectors

Pin1 is the upper left-hand pin on each port connector

Parallel Port cable connector



Serial Ports, COM2, 1 cable connectors

Floppy Disk Drive cable connector

IDE Hard Disk Drive cable connectors, Secondary IDE (L) Primary IDE (R)

When you connect a ribbon cable to any of these I/O connectors, you must orient the cable connector so that the Pin 1 edge of the cable is at the Pin 1 end of the on-board connector. The Pin 1 edge of the ribbon cable is colored to indentify it.

Port & Controller Cables

The mainboard comes with the following cables:

- 2 serial port ribbon cables attached to one mounting bracket
- 1 parallel port ribbon cable with mounting bracket
- 2 IDE ribbon connector cables
- 1 floppy disk drive ribbon connector cable

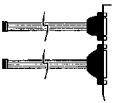
Connector and Port Cables

Floppy Drive ribbon cable

Parallel ribbon cable

IDE ribbon cables

Serial ribbon cables & port bracket



Connecting A Power Supply

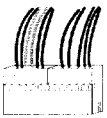
The system power supply connector is for a 5–volt power supply. To connect the leads from the power supply, you should first make sure the power supply is unplugged. Most power supplies have two leads. Each lead has six wires, two of which are black. Orient the connectors so the black wires are in the middle.

Align the plastic guide pins on lead to their receptacles on the connector. You may need to hold the lead at an angle to line it up. Once you have the guide pins aligned, press the lead onto the connector so that the plastic clips on the lead snap into place and secure the lead to the connector.

This mainboard has a voltage regulator that converts the 5-volt power from the main leads to 3.3-volts for use by the parts of the board that require it.

See the diagram on page 1-5 for the location of these connectors.

Connecting Power Supply Leads



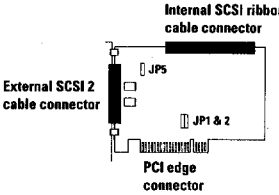
The black wires should be in the middle.

The PCI-SC200 SCSI Interface Card

Your mainboard may have come with an optional SCSI (Small Computer System Interface) controller card, the PCI-SC200. The card is also available separately. This card works with the SCSI BIOS on the mainboard. Together, they provide a complete PCI Fast SCSI-2 interface. With the card installed in your system you can connect SCSI devices installed in your system case to the internal connector on the card. You also have the additional option of connecting external SCSI devices to the external SCSI-2 connector on the card.

If you get the PCI-SC200 later on as an option, you will need to install it yourself. The setup procedure is explained here. The basic card installation procedure is explained at the end of Chapter 2.

The PCI-SC200 SCSI Interface Card



Setting Up the PCI-SC200

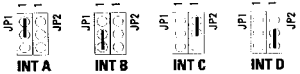
There are two jumper settings you may need to make on the card to set it up. One setting assigns the PCI INT interrupt, the other sets the card's termination.

Setting the INT Assignment

As explained in Chapter 2, any PCI card you install must use PCI INT A. On the PCI-SC200, you assign the INT by setting jumper JP1 or JP2. The default setting for the card already is INT A, so you do not need to change the setting to use the SC-200 with this mainboard.

The INT assignment jumper settings are illustrated below. The settings are printed on the card for your convenience.

JP1 & 2: Interrupt settings



Terminator Settings

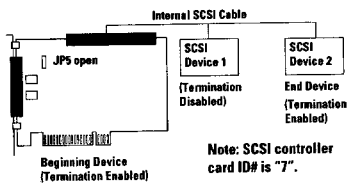
SCSI devices are connected together in a "chain" by cables. Internal devices connect to the PCI-SC200 with a fifty-pin flat ribbon cable. External devices connect to the external port with a SCSI-2 cable. If there is more than one internal or external device, additional devices are connected with cables to form a "daisy chain". The SCSI chain must be "terminated" at both ends, or the devices in the chain will not work properly.

Many SCSI devices use a set of terminating resistors to terminate the device. The PCI-SC200 has "active" termination that you set using jumper JP5. If you need to terminate the PCI-SC200, you do it by setting the jumper. The are two settings, terminated and unterminated, as shown below.

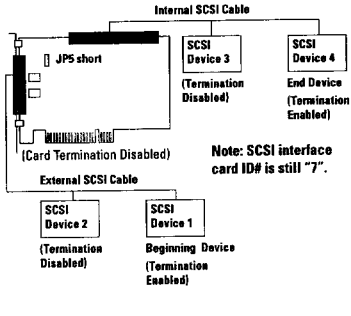
JP5: Terminator setting

Decide whether or not you need to terminate the PCI-SC200 based on its position in the SCSI chain. Only the devices at each end of the chain need to be terminated. If you have *only* internal or *only* external devices connected to the PCI-SC200, then you *must* terminate the PCI-SC200. If you have *both* internal and external devices connected, you *must not* terminate the card. The figures on the next page illustrate these requirements.

Example 1: Only internal or only external devices connected



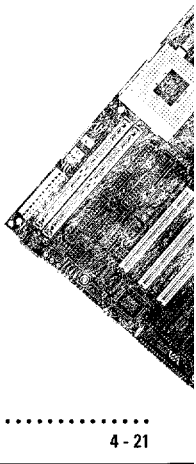
Example 2: Both internal and external devices connected



SCSI ID Numbers

All SCSI devices, including the PCI-SC200 interface card must have a SCSI identification number that is not in use by any other SCSI device. There are eight possible ID numbers, 0 through 7. The PCI-SC200 has a fixed SCSI ID of 7.

You can connect up to seven SCSI devices to the interface card. You must set a SCSI ID number for each device. SCSI devices vary in how they set the ID number. Some use jumpers, others have some kind of selector switch. Refer to the manual for any device you install for details on how to set its ID number.



Preface

This is an update to the PVI–486SP3 User's Manual versions 1.2 and 1.3. It covers items which have changed since the manual was printed, as noted below. Please be certain to use the information provided here rather than in the equivalent section of the manual.

Chapter 4: Jumper Setting Changes

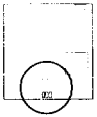
Page 4-8: **No 50MHz external clock speed support**

Page 4-4

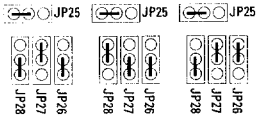
CPU External Clock Speed Selector: JP25 - 28

Set these by the CPU's external clock speed for the installed clock generator.

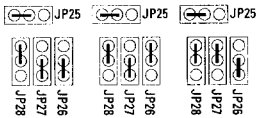
VT8226	*JP25*	*JP26*	*JP27*	*JP28*
25Mhz	1&2	2&3	1&2	2&3
33MHz	1&2	2&3	2&3	1&2
40MHz	1&2	1&2	1&2	2&3
AV9155				
25Mhz	1&2	2&3	2&3	1&2
33MHz	1&2	1&2	2&3	1&2
40MHz	1&2	2&3	1&2	1&2



VT8228

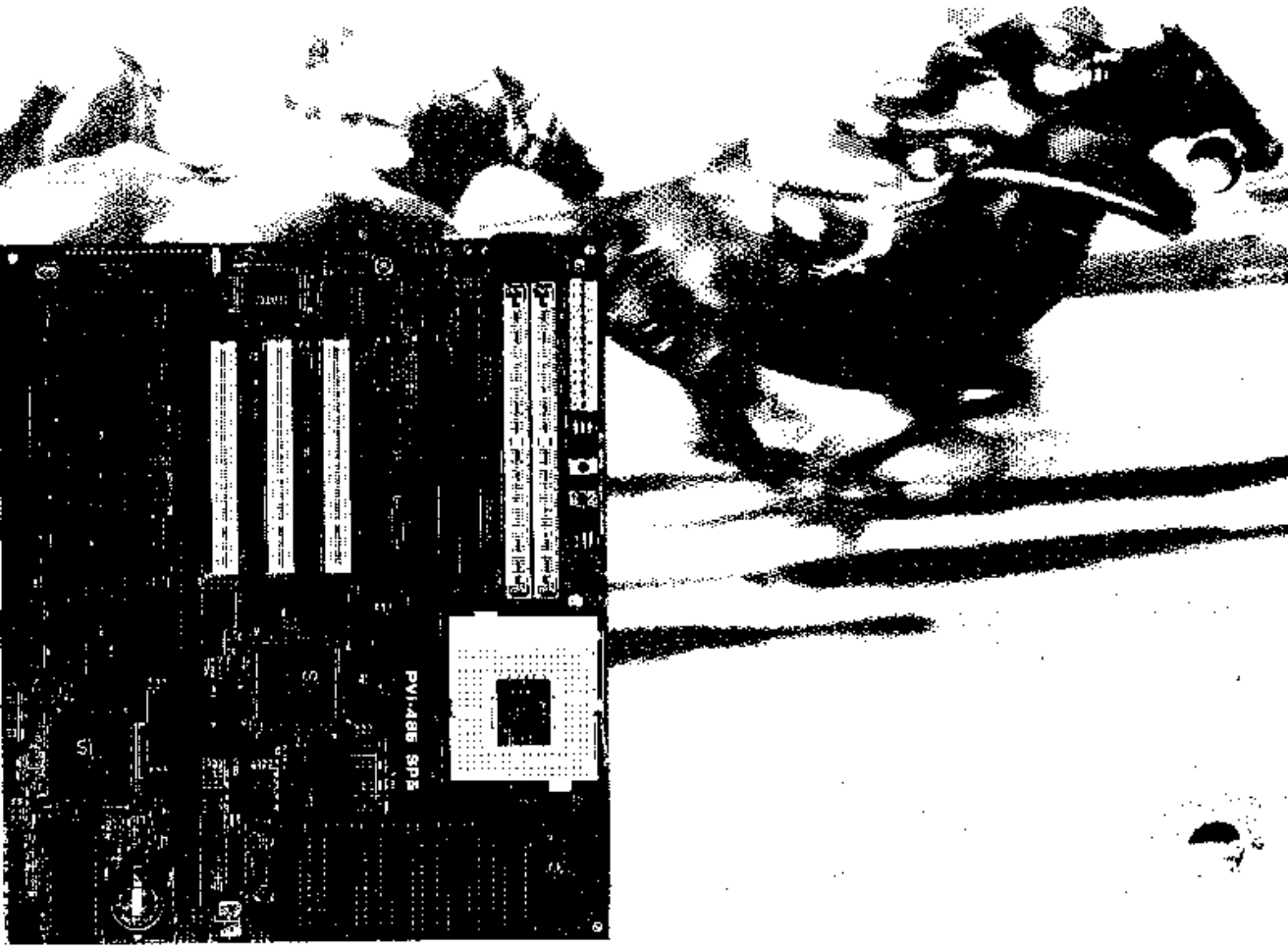


AV9155



PVI-486SP3

PCI-Bus, VL Bus & ISA Bus Mainboard
With 32-bit Local Bus IDE Controller



USER'S MANUAL

ASUSTeK Doc No. AS9503A