

KEEN-2530

25MHz 286™ SYSTEM

User's
Manual

KEEN-2530

Personal Computer
User's Manual
Edition 1.2

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Federal Communications Commission (FCC) Statement

Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Any special accessories needed for compliance must be specified in the instruction manual.

Warning: A shielded-type power cord is required in order to meet FCC emission limits and also to prevent interference to nearby radio and television reception. It is essential that only the attached power cord be used.

Use only shielded cables to connect I/O devices to this computer.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communication.

Le Present appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Class B prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

Reconfiguring

- To keep the computer from being damaged, NEVER reconfigure the board while the power is ON.
- If you wish to reconfigure the computer at any time, ensure that the power is turned OFF before changing any hardware settings, such as DIP switches or jumpers.

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About This Manual

What's Inside

Here's what you'll find in this manual:

Chapter 1 — “System Overview”, gets you acquainted with the basic concepts of your system.

Chapter 2 — “Setting *Up* Your System”, shows you how to install or upgrade your system.

Chapter 3 — “*Operating Your System*”, shows you the basics of the MS-DOS functions and the system setup program.

Chapter 4 — “*Keyboard*”, explains the keyboard's features, layout and basic functions.

Chapter 5 — “Troubleshooting”, covers a simple troubleshooting procedures and provides directions for additional help.

Chapter 6 — “*Appendix*”, provides some technical specifications for your system.

Chapter 7 — “Glossary: explains some microcomputer terms.

For the advanced user

If you are an experienced PC user and do not want to upgrade your system now and you want to start using your personal computer as soon as possible, refer to the Quick Start section at the beginning of chapter one.

Quick Start will provide you all the information you need to set up the hardware.

For the beginner

Chapter 1 gives you the basic information you need to use this system. Chapter 2 provides greater detail on the hardware and on how to upgrade your system. Your system is quite simple to set up. However if you are unsure of yourself, find an experienced PC hand to help out.

System Overview

Chapter 1

System Overview

This chapter covers:

- the basics of your system
- the system's features and specifications
- control panel features and connectors outside of the case
- how to maintain your computer

If you are an experienced user who wants to get to work as soon as possible, the *Quick Start* section at the beginning of this chapter beginning provides you all the information you need to set up the hardware.

you want to upgrade your hardware later, read chapter 2, *INSTALLATION*.

If you want to gain a more thorough understanding of your computer, read the entire manual.

Note: You may refer to the "GLOSSARY" section for definitions on computer terminology.

1-1 Introduction

This manual will guide you through the setup of your computer and provide the information necessary to tailor the system to fit your needs. If you are a novice, you will be able to have your computer up and running with a minimum of fuss. You will also gain valuable hands-on experience by following the easy step-by-step instructions. If you are an advanced user, you will appreciate the affordable power of this system.

Your system uses an Intel 80386-25 microprocessor with 80387-25 or Weitek WTL3167-25 coprocessors optional. While maintaining complete compatibility with software written for IBM PC/AT 80286-type computers, your computer vastly exceeds them in capability and processing power. The PEI-306 RAM Card maintains the highest performance and flexibility for the whole system. The PEI-306 RAM Card is specifically designed for some DTK 386 or higher level products for memory expansion. It is not compatible with mainboards produced by other companies and you can buy it from a dealer who sells DTK products. Also, a wide variety of expansion cards are available for your choice of peripherals.

Quality, flexibility, and functionality are the key design features of your system.

Operating System

Your computer uses the MS-DOS® operating system. For more details on this operating system, please refer to the Microsoft® *MS-DOS* User's Guide and User's Reference. This manual is included with your system.

1-2 Quick Start

If you are an experienced user anxious to start using your computer, observe the figure below to set up your personal computer. You will still want to use this manual later as a reference book.

Note: Save all packing materials in case you need to ship or resell your computer in the future.

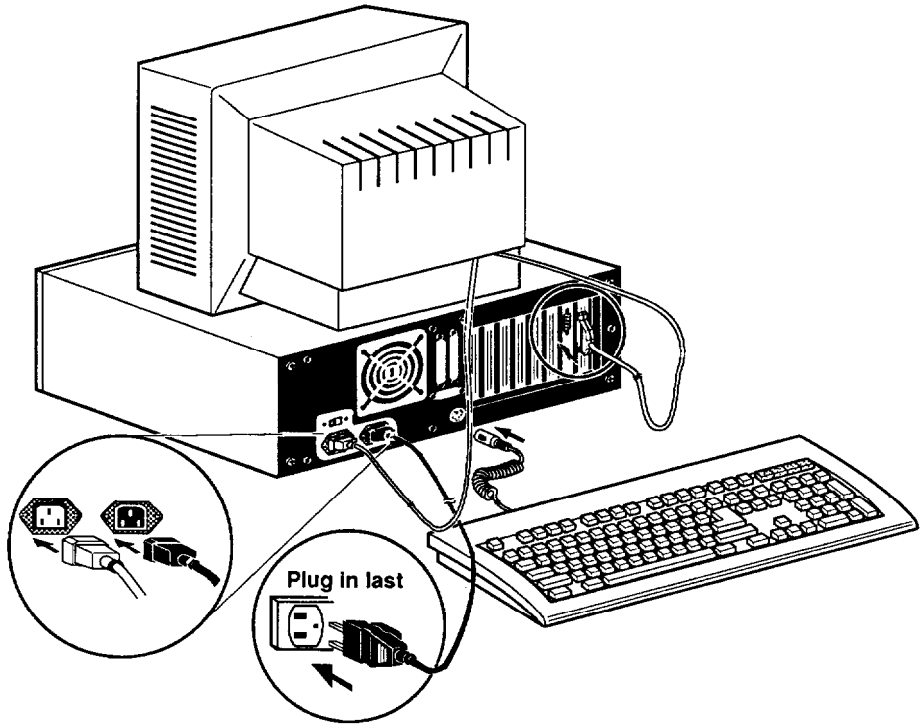


Figure 1-1: Quick Start

1-3 Features

A brief description of your system is given below:

- Intel 80386-25 microprocessor with 80387-25 or Weitek WTL3167-25 coprocessors optional.
- Dual speeds of 12.5 and 25MHz, switchable by either software or hardware switches.
- A maximum 16MB 32-bit DRAM subsystem — four SIP RAM modules onboard and a PEI-306 local 32-bit memory card
- Base memory of 640KB and maximum extended memory of 15232KB.
- Shadow RAM function for BIOS and video, controllable with built-in setup utility or external command.
- Eight expansion slots — one 32-bit, five 16-bit and two 8-bit bus slots.
- 27256 or 27512 type ROM subsystem which DTK and Phoenix BIOS support.
- Sixteen-level interrupt.
- Three-channel timer for sound and clock.
- Seven-channel DMA for disk and special I/O.
- Hardware reset switch capability.

1-4 Specifications

- CPU — Intel 80386 microprocessor, 25MHz
- RAM -RAM subsystem of 1MB, 2MB, 4MB and 8MB optional
Maximum: 16MB with the PEI-306 RAM Card
- ROM — 64 or 128KB legal BIOS
- Expansion slots — One 32-bit, five 16-bit, two 8-bit
- Disk Drive(s) —Three 5.25" disk drive bays
Two 3.5" disk drive bays
- Power Supply — 200 W
- Options — Math coprocessor 80387-25 or
Weitek® WTL3167-25

1-5 Example of a System Configuration

The basic system is pictured below. You may choose peripherals and upgrades for the system as your needs require. Even if your system is different from the one pictured, it should operate in the same basic manner.

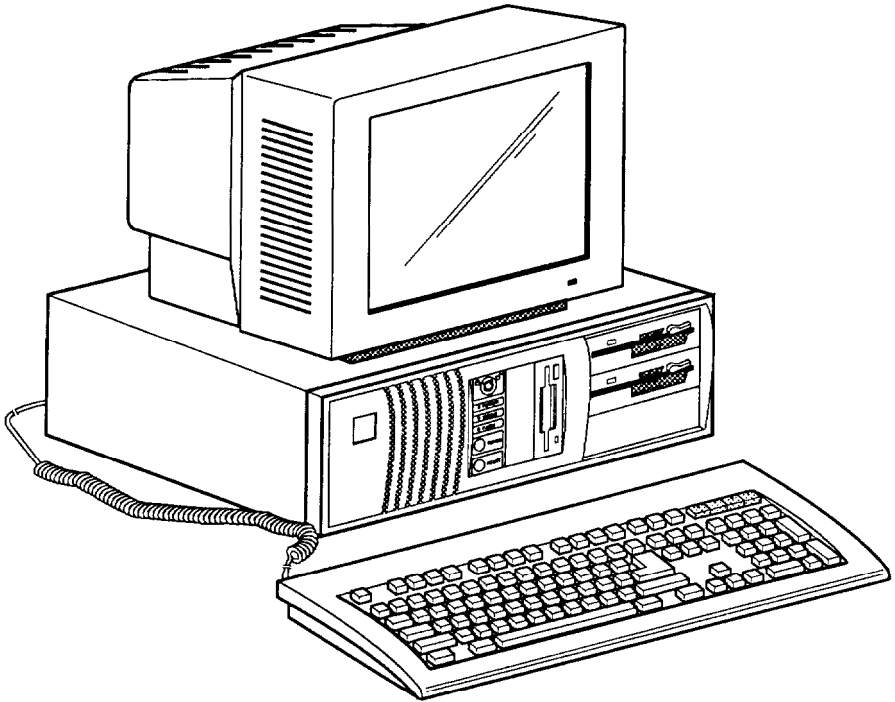


Figure 1-2: System Configuration

1-6 System Unit

The system unit may house a motherboard, disk drives, a power supply and other optional expansion cards.

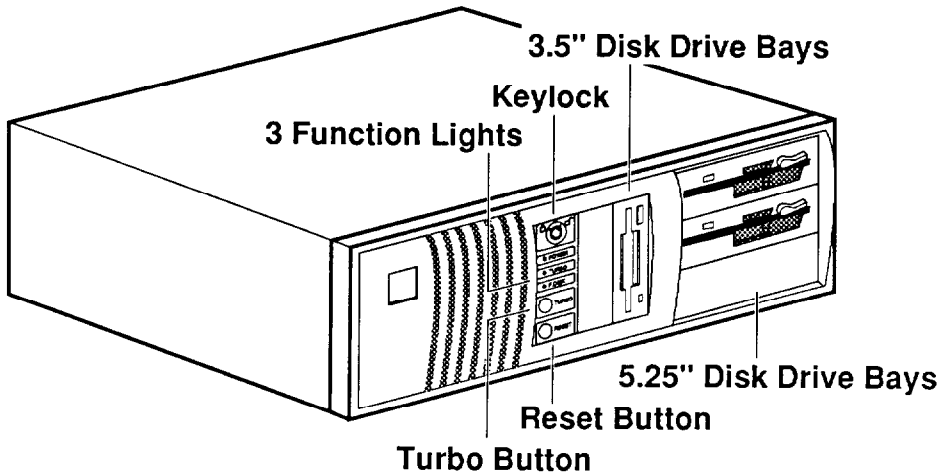


Figure 1-3: System Unit Case

1-7 Control Panel

The control panel provides several useful functions which are explained below. You are likely to use the front panel frequently, so let's start there.

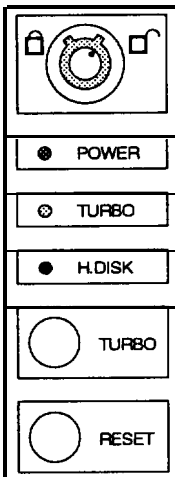


Figure 14: Front Panel

Reset Button

The reset button allows you to restart the system without turning the power off. If you encounter any problems while using unfamiliar software, you can always restart quickly from the RAM test stage by pressing the reset button. Note, however, that any data which have not been saved to disk will be lost.

Turbo Button

The Turbo button allows you to change the running speed of the microprocessor to accommodate software requirements. Some software applications must be run at a slow clock speed.

Indicator Lights

These lights indicate the operation status of your computer. The red LED comes on when the hard disk is being accessed. The *green* LED is lit when the power is on. The yellow LED comes on when Turbo clock speed is activated.

Keyboard Lock

The keyboard lock enables or disables the keyboard. In the unlock mode the keyboard is activated. In the lock mode, the keyboard is disabled to deny unauthorized user's access to the computer.

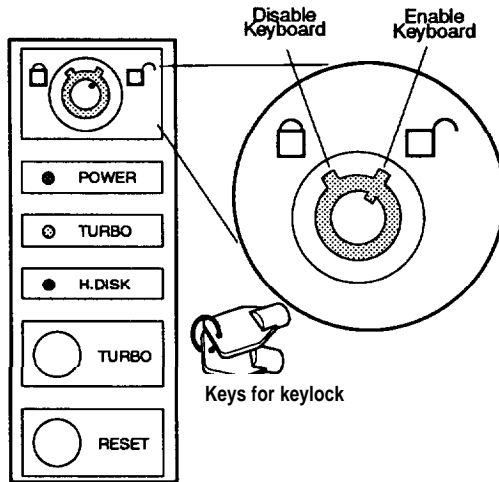


Figure 1-5: 1Keyboard lock and Two Security-Lock Keys

System Power Switch

The system power switch is located on the right side of the case toward the rear. You should always be certain that the power is turned off before modifying the hardware configuration in any way.

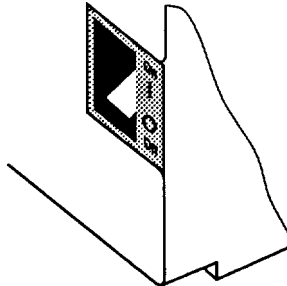


Figure 1-6: Power Switch

1-8 Rear Panel

The rear panel has all the connections that lead from the system unit to external peripherals and the power source. Turn off all power switches before connecting or disconnecting cables/wires! Ensure that cables/wires are attached to the external device first and connected to the outlet unit later. Turn the system unit power switch off before you plug the power cable into an electrical outlet.

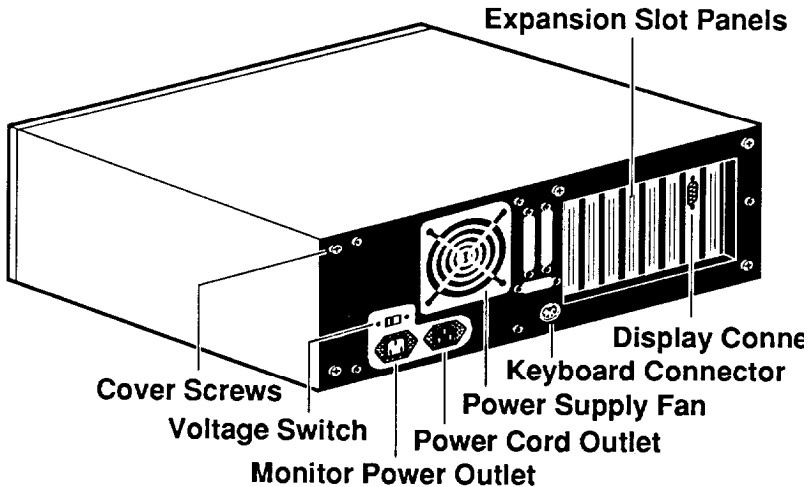


Figure 1-7: Rear Panel

Keyboard Connector

The keyboard supplied with your system can be plugged into sockets at back of the case. Plug the keyboard cable into the socket as shown below.

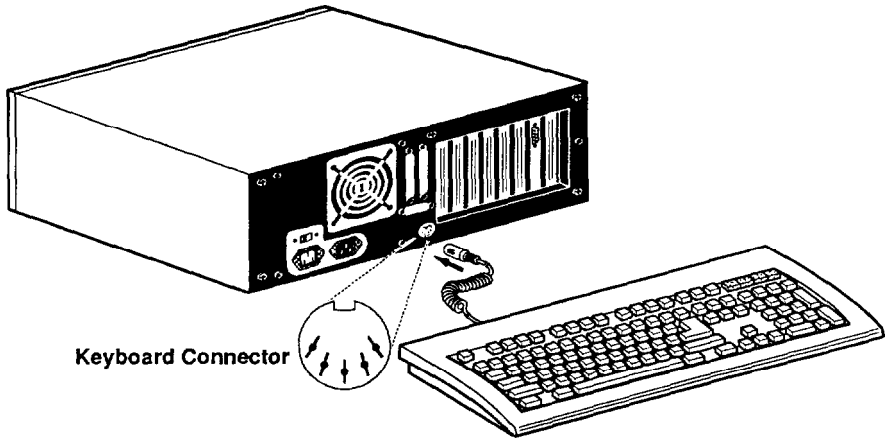


Figure 1-8: Connecting the Keyboard Cable

Power Cord Connector

The power supply has two receptacles: one supplies power to a monitor; the other connects to the main power source.

Yet, if your monitor power plug does not fit the system unit's monitor power outlet, you should plug it into a wall electrical outlet.

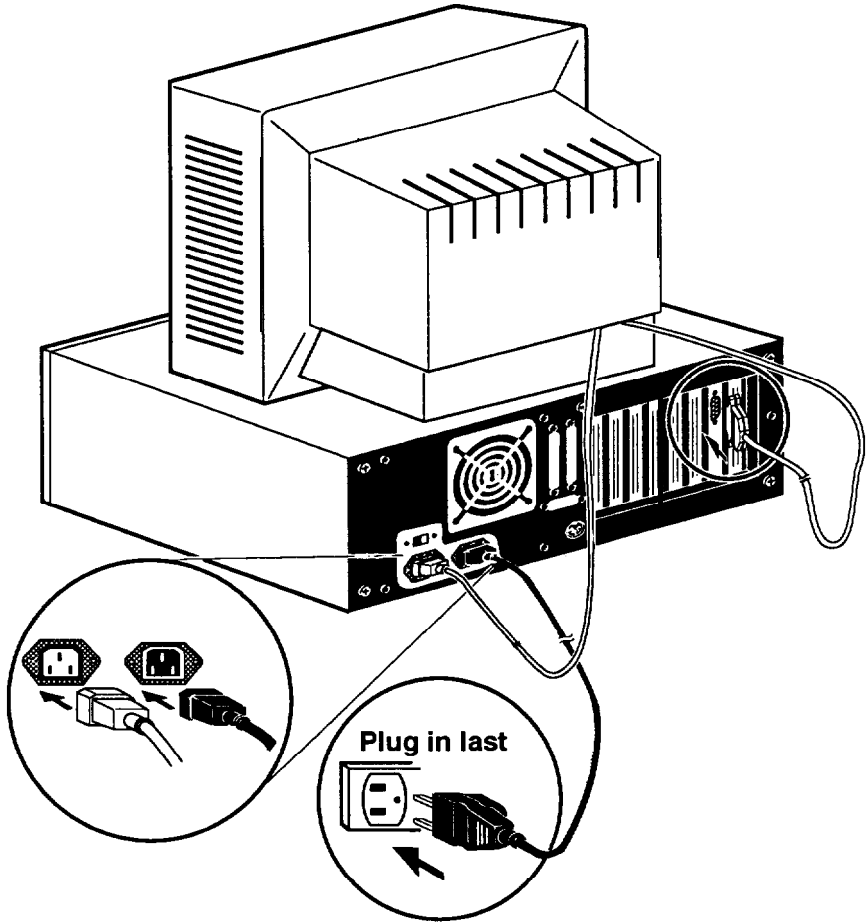


Figure 1-9: System Power Cord

Display Port

You will also need to connect your monitor to the system unit at a female display port in one of the expansion slots as shown on the previous page.

To attach the monitor cable to the video port, plug the cable into the port and screw the cable connector down securely.

Your computer gives you a wide range of video options to meet your needs.

You have a wide choice of the following video standards.

- MGA (Monochrome Graphics Adapter) also referred to as Hercules
- CGA (Color Graphics Adapter)
- EGA (Enhanced Graphics Adapter)
- VGA (Video Graphics Adapter)

Your monitor power plug may not fit the system unit's monitor power outlet. If not, connect the monitor cable to a wall electrical outlet. Refer to the figures below for mono and color display connections.

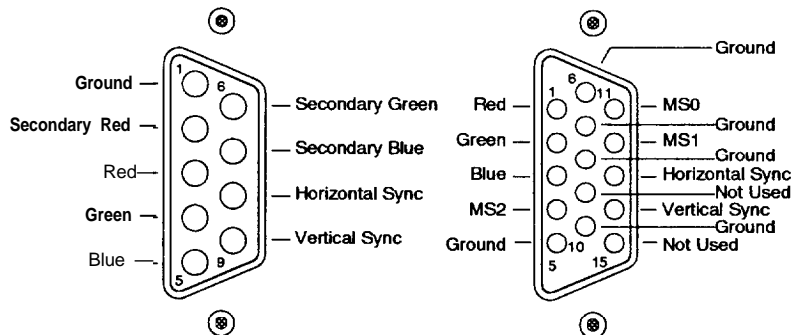


Figure 1-10: Two Kinds of Display Connectors

Power Voltage Setting

Your system can be used with either a 115 or 230-volt power source. You can choose the appropriate setting with the switch located above the monitor power receptacle. The switch slides back and forth to show which setting is being used

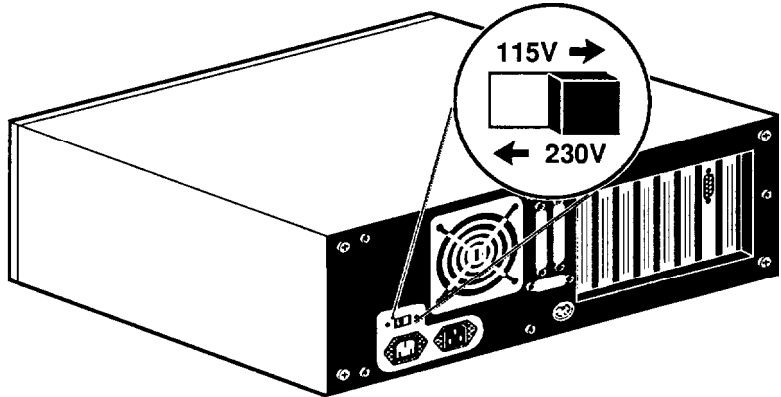


Figure 1-11: Voltage Switch

Power Cord Specification

When you are using the PC in American areas, switch the voltage selector switch to 115V and if you are in European countries, switch to 230V. Refer to the following table for the appropriate specification of the power cord used.

Power Source	Cord Specification
115v	UL listed; SVT/SJT type; three-conductor rated 10A, 125V; <15ft. in length
230V	Appropriate approval listed in that specific country; three-conductor; rated 6A, 250V
230V (U.S.A. only)	UL listed; SVT/SJT type; three-conductor; rated 6A, 125V; <16ft. in length

Table 1-1: Power Cord Specifications

1-9 Other Peripherals

To connect other peripherals (printers, modems, etc.) determine which ports are to be used by referring to your expansion card manuals or peripheral manuals. You may consult your dealer for more about the expansion cards available for your system. Typical peripherals are shown in Figure 1-12.

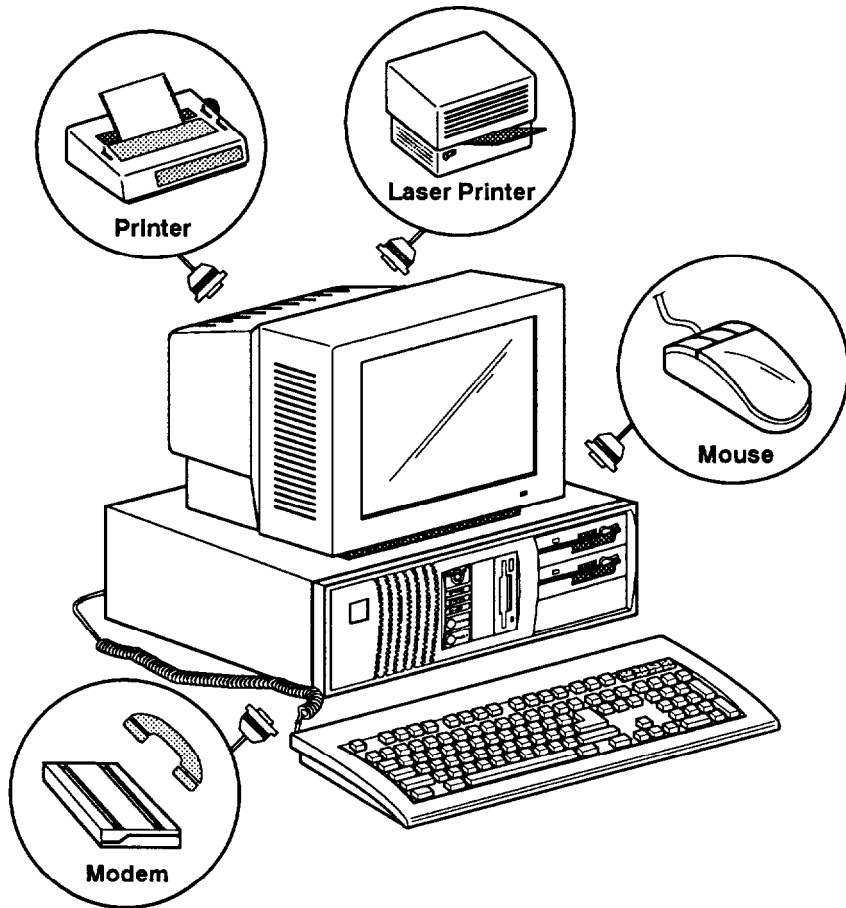


Figure 1-12: System Unit Connected to Peripherals

1-10 Disk Drives

You can install up to three 5.25" and two 3.5" disk drives in the system unit. More information about how to install disk drives may be found in Chapter 6.

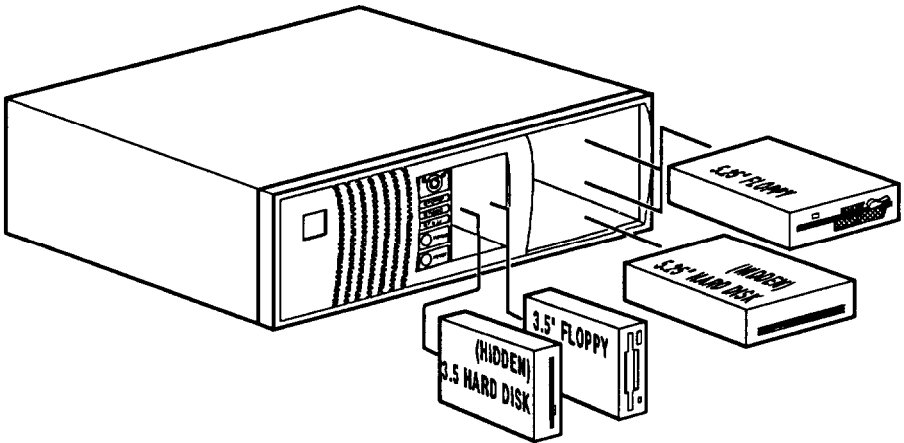


Figure 1-13: Floppy and Hard Disk Drive Bays

Floppy Disks

With a floppy disk drive you can format and use double-sided (or single-sided) double-density (or high-density) floppy disks.

One double-sided double-density 5.25" floppy disk can store up to 360KB of data. One double-sided high-density 5.25" floppy disk can store up to 1.2MB of data. One standard 3.5" floppy disk can store up to 720KB of data. One high-density 3.5" floppy disk can store up to 1.44MB of data.

Quality	Tracks Per Inch	Capacity	
		5.25"	3.5"
Double Density (DD, DS, RH)	48 TPI	360 KB	720 KB
High Density (DH)	96 TPI	1.2 MB	1.44 MB

Table 1-2: Floppy Disk Specifications

Note:

- Only high-density floppy disks can be formatted to high capacities of either 1.2M for 5.25" or 1.44M for 3.5" floppy disks. You may lose data if you use a low-density floppy disk formatted for high density.
- You can't use a high-density disk in a low-density disk drive.

Copy Protection

A tab on the 3.5" diskette is used for protection of data. This is a mechanical method of protecting the disk from additions, deletions and alterations of existing data.

The figure below shows a diskette with the write protect tab. To enable write protection, slide the tab toward the outermost position so that you can see through the write protect hole. To disable write protection, slide the tab in the opposite direction so that the hole is covered.

Note that write protection does not prevent loss of data from accidents such as coffee spills, fires and nuclear holocausts.

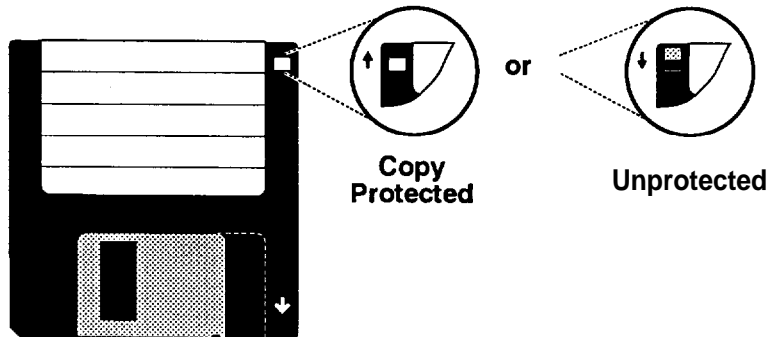


Figure 1-14: Copy Protection for 3.5" Floppy Disk

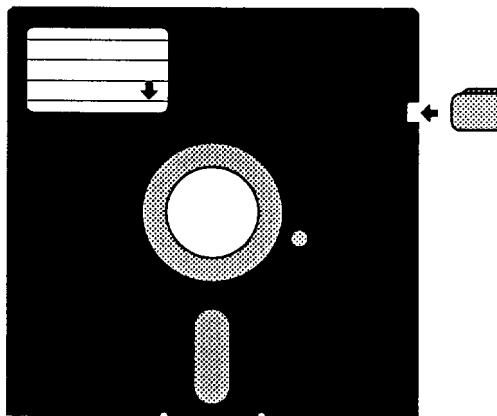


Figure 1-15: Copy Protection for 5.25" Floppy Disk

Hard Disks

Your system is very powerful and versatile. To make full use of all its capabilities, it is best to use a hard disk. A hard disk can raise your efficiency because the hard disk keeps programs and data available at your fingertips.

Moreover, your system gives you a wide range of half-high or full-high hard disk(s) of 3.5" or 5.25" to meet your needs.

1-11 Keyboard

Your keyboard has a set of function keys, cursor keys and a numeric keypad. The figure below shows a typical keyboard. Refer to Chapter 4 for a more detailed description of the keyboard.

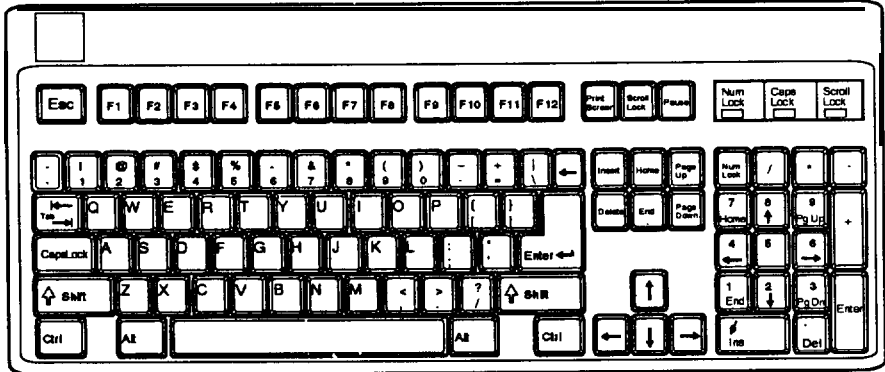


Figure 1- 16: Keyboard

1-12 Maintaining Your Equipment

Read and follow carefully all the instructions and warnings in this manual and on these products!

- Only use a damp cloth to clean your system unit and monitor case. Do not use detergents!
- Position your system unit, monitor and cables/wires away from direct sunlight, moisture, dust, oil, and thoroughfares.
- Do not submit your equipment to harsh jarring.
- Ensure that all ventilation outlets are always free from obstruction.
- In the event of mechanical/power failure or damage, do not attempt to repair the system unit, monitor/s, cables/wires. Refer all such problems to experienced service personnel.
- Ensure that the back of the system unit is at least 3" away from anything that might obstruct the ventilation outlets and cause overheating.
- Ensure that the power source is grounded correctly. This product is equipped with a 3-wire grounding-type plug. This plug will only fit into a grounded power outlet.
- It is recommended not to service this product yourself, as opening and removing covers exposes dangerous voltage areas and other risks. Refer all servicing to service persons.

Setting Up Your System

Chapter

2

Setting Up Your System

In this chapter you will learn about:

- how to assemble a knocked-down system
- how to upgrade your system

Setting up a system is easy and takes only a short time. If your dealer has set up your system for you, you can skip this chapter. With the system setup you are now ready to load your application software and begin to work. This chapter covers topics you are less likely to need to know right away.

You may also skip this chapter unless you want to add to or alter your system unit hardware yourself. It is recommended to have your dealer or technician upgrade your system if you are a novice. Ensure that the power is off before modifying the hardware configuration!

2-1 PEM-2530 Motherboard

Your motherboard contains an Intel® 80386-25 microprocessor, a math coprocessor socket, BIOS chips and expansion slots. The figure below will familiarize you with the layout of the PEM-2530 Mainboard.

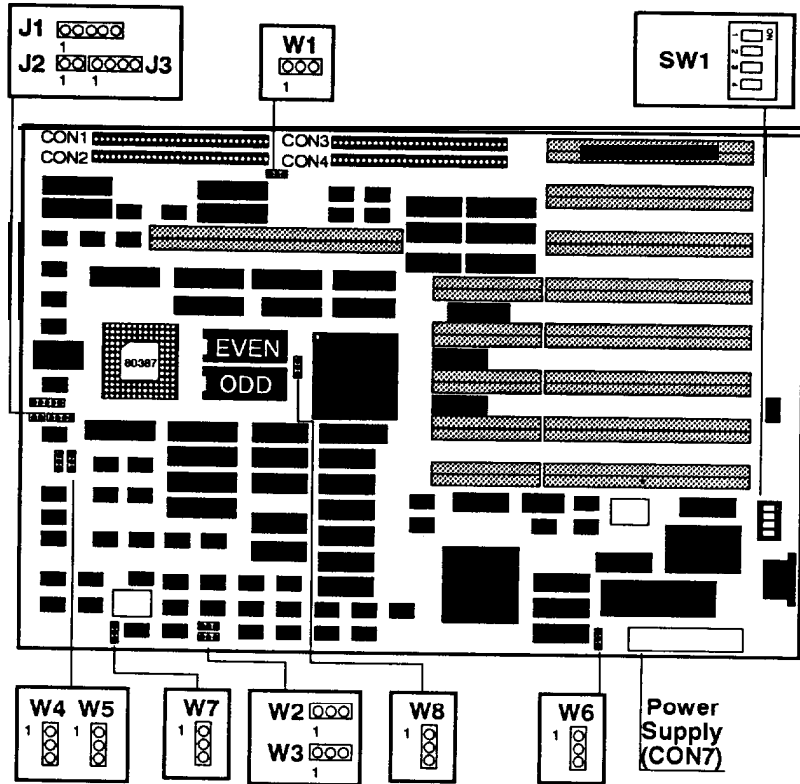


Figure 2-1: PEM-2530 Motherboard Layout

80386 CPU

The PEM-2530 uses an Intel Corporation 80386-25 microprocessor running at 25MHz. The 80386 has a number of features enabling a substantial leap in processing power and capability over the 80286-standard microprocessor used in AT-type microcomputers. Aside from being able to execute 80286 programs more quickly, the 80386 is capable of concurrent processing, hardware-based multitasking, the creation of 8086 “virtual machines” and superior extended-memory support.

Virtual machines allow for the creation of discrete, non-interfering operating environments for application programs. This means that each application can have its own 640K working environment. With the appropriate control software, virtual machines may be created within extended memory.

The PEM-2530 is switchable between 12.5 and 25MHz with either a hardware or a software switch. The default setting is 25MHz. For software that fails to operate at 25MHz you may switch to the lower 12.5MHz speed.

Math Coprocessor

An optional Intel 80387-25 or the daughter board Weitek WTL3167-25 coprocessor can be installed on the PEM-2530 to accelerate processing of calculation-intensive applications. The empty square socket for the coprocessor is located on the left side of the mainboard beside the two BIOS chips. Note that there are three rows in the pin socket. Use the two internal rows to install the Intel 80387-25 coprocessor. Use all the rows to install a Weitek WIL3167-25 coprocessor which is made by Weitek Co. Ltd.

Jumper W7 is used to enable math coprocessor. Refer to the table for jumper settings,



Jumper W7	Math Coprocessor
	Installed
	NOT Installed

Table: 2-1 Jumper W7

Remember that you must make sure the dotted end of the chip is lined up with the notched end of the socket. Refer to the illustrations on the next page to install the Intel 80387 and the daughter board Weitek WTL3167.

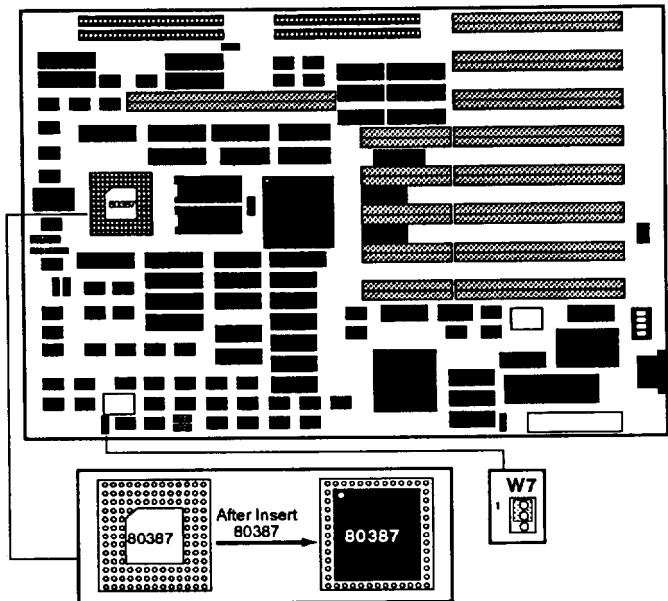


Figure 2-2: Installing 80387

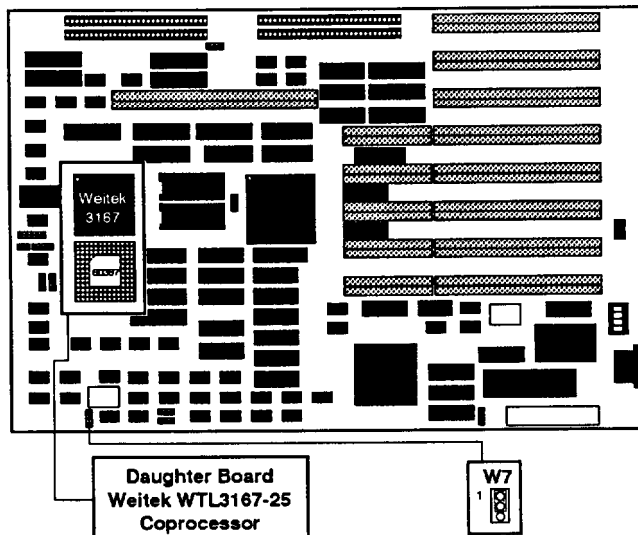


Figure 2-3: Installing WTL3 167-25

Expansion Bus

The PEM-2530 has one 32-bit, five 16-bit and two 8-bit slots. To ensure complete compatibility with all types of memory expansion cards, the bus clock is wait-state selectable for either 8 or 16-bit I/O interfaces. The long 32-bit slot is for 32-bit memory expansion card using SIMM-type DRAM.

Jumper W2 is used to set the wait states for 16-bit slots and jumper W3 is for 8-bit memory expansion cards running at 8MHz. Refer to the tables below for the appropriate jumper settings. The jumpers pictured below are in the same orientation as the motherboard layout.

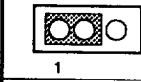
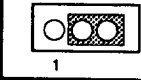
Jumper W2	16-bit Memory I/O
 1	One wait state
 1	Two wait state

Table 2-2: Jumper W2

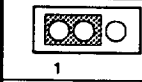
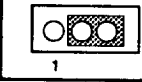
Jumper W3	8-bit Memory I/O
 1	Four wait state
 1	Five wait state

Table 2-3: Jumper W3

RAM Subsystem

One PEI-306 RAM Card can be installed in the 32-bit slot as shown below. The RAM card utilizes local-access technology to achieve the highest performance. Note that the upper limit for local memory is 16MB. For more detailed information, refer to the PEI-306 user's manual and the PEI-306 section in Chapter 6.

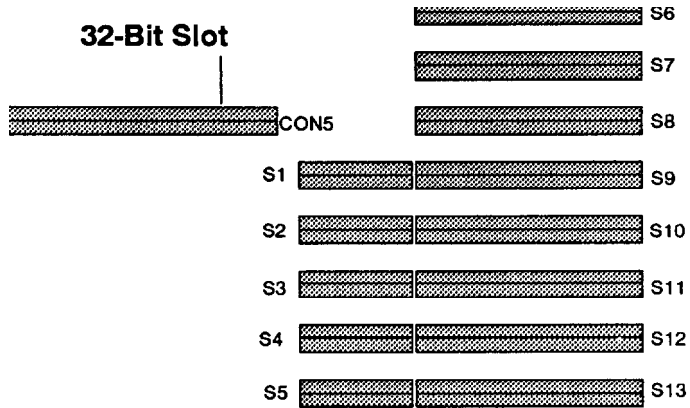


Figure 24: Expansion Slots

ROM Installation

To install the ROM chips, refer to the table below for jumper setting. If you are not sure what you have, you may need to consult your dealer for the right chips.



BIOS Selection	Jumper W8
256K	1 
512K	1 

Table 2-4: Jumper W 8

Jumper Settings for Connectors

Following is a brief explanation of the various functions of a control panel that the PEM-2530 supports and some of the jumpers which may be connected:

Keyboard Lock (Jumper J1)

Jumper J1 is used to enable the use of the keyboard and the power LED. The keyboard lock is used to enable or disable the keyboard. By disabling the keyboard, you can ensure that anyone who does not have a key will be unable to use the computer. Unlocking the keylock enables the keyboard.

Power LED (Jumper J1)

The power LED indicates whether the power is on. Refer to the figure below for jumper J1 pinouts.

Jumper J1 Pinouts

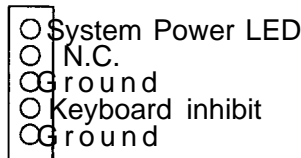


Figure 2-5: Jumper J1 Pinouts

Hardware Reset (Jumper J2)

Jumper J2 is used to enable the hardware reset. The reset switch restarts the computer from the RAM test stage. If you encounter any problems while using unfamiliar software, you can always restart from the beginning by pressing the reset button. Note, however that any data which has not been saved to disk will be lost. Refer to the figure below for jumper J2 pinouts.

Jumper J2 Pinouts



Figure 2-6: Jumper J2 Pinouts

Turbo LED (Jumper W5)

Jumper W5 is used to connect a Turbo LED. You may connect either pins one and two or two and three. The Turbo LED in the hardware switch indicates operation in the Turbo mode.

Jumper W5 Pinouts

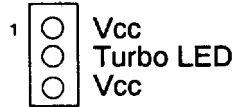


Figure 2-7: Jumper W5 Pinouts

Turbo Switch (Jumper W4)

The Turbo switch allows you to toggle the speed of the microprocessor between 125MHz and 25MHz. Note that if you are going to attach the Turbo switch connector on the control panel, attach pins one and two or pins two and three of jumper W4. If no cap is placed over the pins of W4 this sets the default speed at 25MHz. Microprocessor speed is also controllable from the keyboard by means of a software switch. Refer to the figure on the next page for more about this.




Jumper W4	Microprocessor Running Speed
1 	12.5MHz
1 	Keyboard Control
1 	25MHz

Table 2-5: Jumper W4

Speaker Connector (Jumper J3)

Jumper J3 is used to connect a speaker. When the four pins are in a closed circuit, the speaker is functional. Refer to the figure below for the pinouts of jumper J3.

Jumper J3 Pinouts

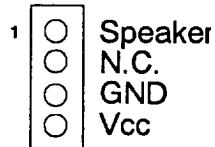


Figure 2-8: Jumper J3 Pinouts

Video Selection (Jumper W6)

Jumper W6 is used to select display mode. Refer to the figure for the settings.

Jumper W6	Video Selection
<p>A vertical rectangular box contains four circles representing pins. The top pin is shaded with a stippled pattern. To the left of the top pin is the number '1'.</p>	Monochrome
<p>A vertical rectangular box contains four circles representing pins. The top pin is unshaded. To the left of the top pin is the number '1'.</p>	Color

Table 2-6: Jumper W6

Shadow RAM

For higher performance, the PEM-2530 has two shadow RAM functions. We have released DTK and Phoenix (under the authorization of Phoenix) BIOS, and one program on a diskette for your convenience. Shadow RAM is one of the advanced features of the PEM-2530. Your BIOS or diskette will support the following:

- A 64KB DRAM space allocated for BIOS shadow RAM
- A 64KB DRAM space allocated for video shadow RAM

BIOS and video addresses are allocated for shadow RAM. Both sections are 64KB in size. Refer to the table below for more information.

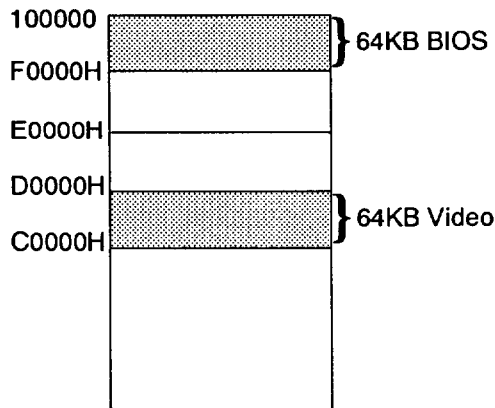


Figure 2-9: Address Map of BIOS and video

Note:

- If the working area of your package or add-on card (except video card) is located between addresses C0000H-CFFFFH, you must disable the video shadow RAM to avoid an address conflict.
- A reserved 128K DRAM space is allocated for shadow RAM. You cannot use it for another purpose even if these functions are disabled. Refer to the table below for more information.

If you use DTK or Phoenix BIOS with shadow RAM, you can enable or disable these two shadow RAM functions through your BIOS setup. Refer to the system setup manual for more information.

I/O Port Address 72H		
Data bit 5	1	Cannot write to shadow
	0	Can write to shadow
Data bit 6	1	Enable video shadow
	0	Disable video shadow
Data bit 7	1	Enable BIOS shadow
	0	Disable BIOS shadow

Table 2-7: Shadow RAM Control Ports

If your BIOS does not support shadow RAM, and you may use the program resident in the diskette included with this mainboard to set up the shadow RAM driver.

To install shadow RAM program, follow the setps below:

- Insert the diskette into drive A and enter a:.
- Enter this command:
SH INST
- Respond to the prompts on your screen according to your request.

The shadow RAM function is now installed and your AUTOEXE.BAT file has been modified by the installation program. The shadow RAM function will automatic active after you reboot your system.

If you want to update your shadow RAM function. You may run the "SHADOW.EXE" file and modify the shadow RAM as you desired.

Onboard System Memory Size

The PENT2630 mainboard can accommodate up to 8MB DRAM on-board of module RAM (41256,44256 end 411000 types).

If necessary, the PEI-306 RAM Board can increase system memory to a total of 16MB.

The PEM-2630 has a 30-pin single-in-line socket for SIP module RAM. Remember that when module RAM is inserted into the sockets, you must make sure that pin 1 of a module is lined up with pin 1 of its socket. Remove any static charge from your body before touching the module. Gently push the module RAM into the socket, and be careful not to bend the pins.

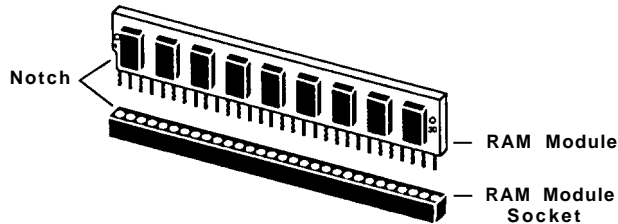


Figure 2-10: Installing the SIP Module

Jumper

A jumper is a kind of switch which uses a plastic cap with a metal interior to connect (short) two pins. If a jumper needs to be left open, you should save the cap for future use by covering one pin only of a jumper. This has no effect on the function of the board while it keeps the cap handy. The illustration below shows the side and top views of a three-pin jumper in which pins two and three are shorted.

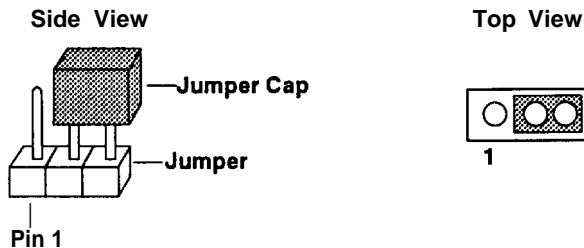


Figure 2-11: An Example of Three-Pin Jumper Setting

Switch

DIP switch- SW1 on the mainboard is shown below in side and top

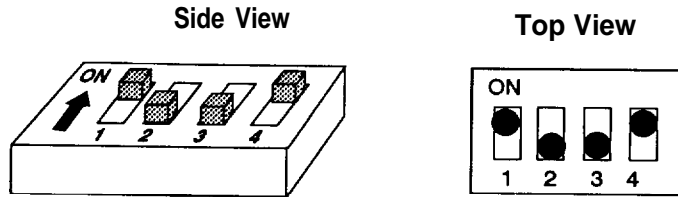


Figure 2-12: Dip Switch SW1

Memory Size

Four types of module RAM can be installed on the PEM-2530 mainboard. SW1 -1 and SW1 -2 are use to select onboard DRAM type. See the tables below and the figures on the following pages.

* DTK supports this kind of module RAM. There are two banks of 44256 type DRAM mounted on each RAM module.

Total Onboard System Memory	Jumper W1	Switch SW1 Settings	RAM Type	Starting Address of AT bus in RAM card
1MB	1		(256Kbitx9)x4 Module RAM	***
2MB	1		(44256x4+41256x2) [*] x4 Module RAM	240000H
4MB	1		(1Mbitx9) x4 Module RAM	440000H
8MB	1		(1Mbitx36) x2 Module RAM ^{**}	840000H

Table 2-8: Switch Settings for Different Total Memory Size

** DTK supports this kind of module RAM. There are two banks of 411006 type DRAM mounted on the RAM module.

*** Due to the address limitations, this configuration cannot accommodate an AT bus RAM card.

Restrictions

You should observe the specifications below:

- Ž 411000 and 44256 CMOS RAM modules with 80ns access time.
- Ž 41256 NMOS RMA modules with 60ns access time.
- Ž All module RAM must be page mode or page/static column mode type.

The following are some recommended RAM modules.

- TOSHIBA — 514256AP-8
- MOTOROLA- MCM514256AP80
- NEC — 421000-80
- PANASONIC — MN41 CI 000SJ-80
- HITACHI — HM514256AJP8
- NMBS — AAAI M204J-08H

Consult your dealer for advice on these and other appropriate RAM modules for the PEM-2580 mainboard.

1 MB Total Onboard Memory

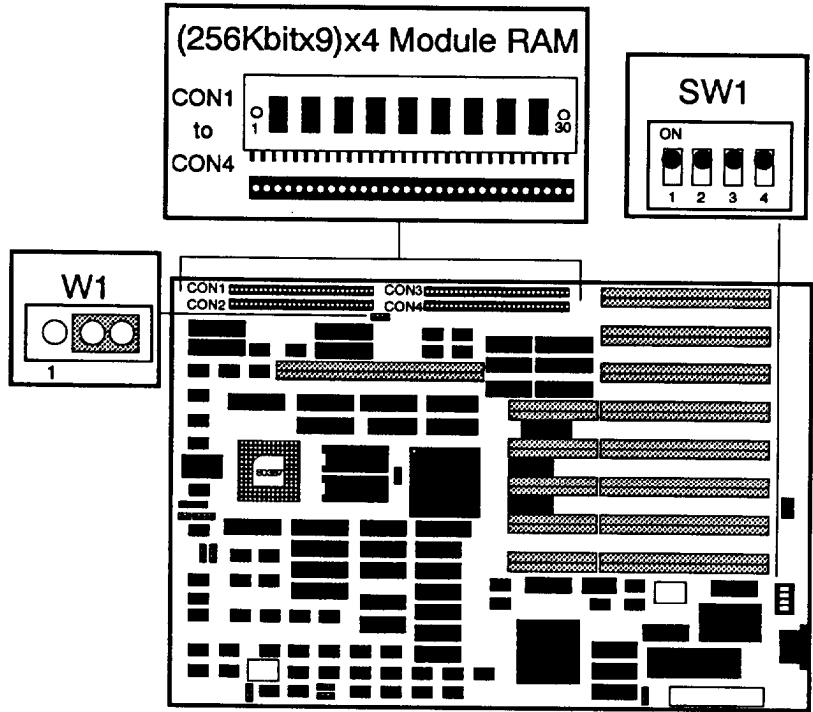


Figure 2-13: 1 MB Total Onboard Memory

2MB Total Onboard Memory

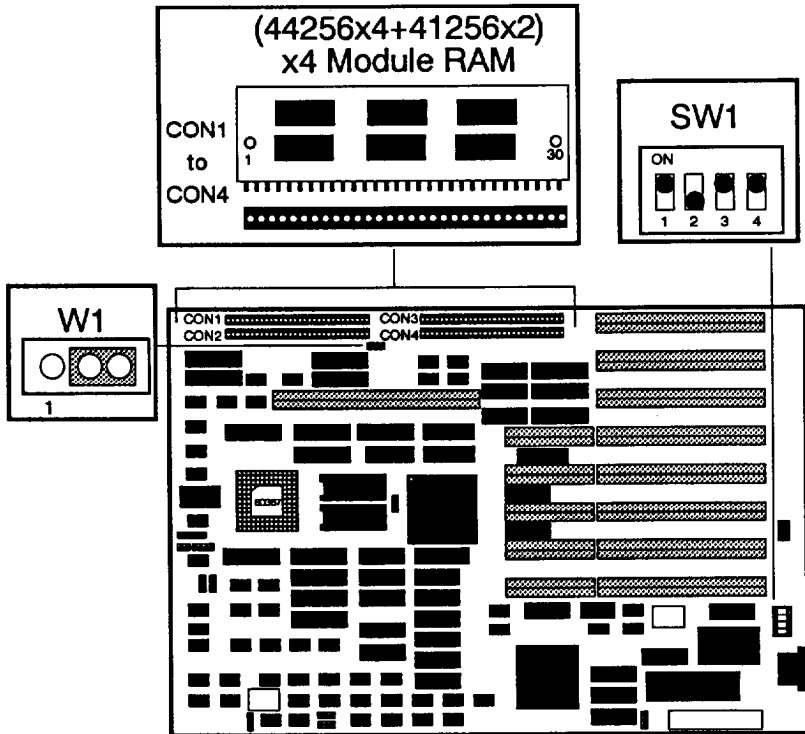


Figure 2-14: 2MB Total Onboard Memory

4MB Total Onboard Memory

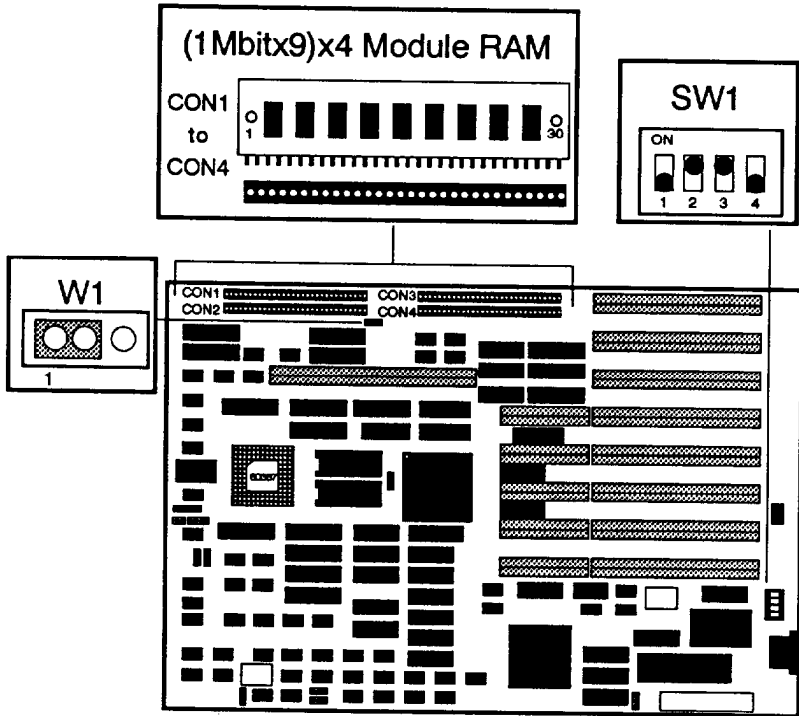


Figure 2-15: 4MB Total Onboard Memory

8MB Total Onboard Memory

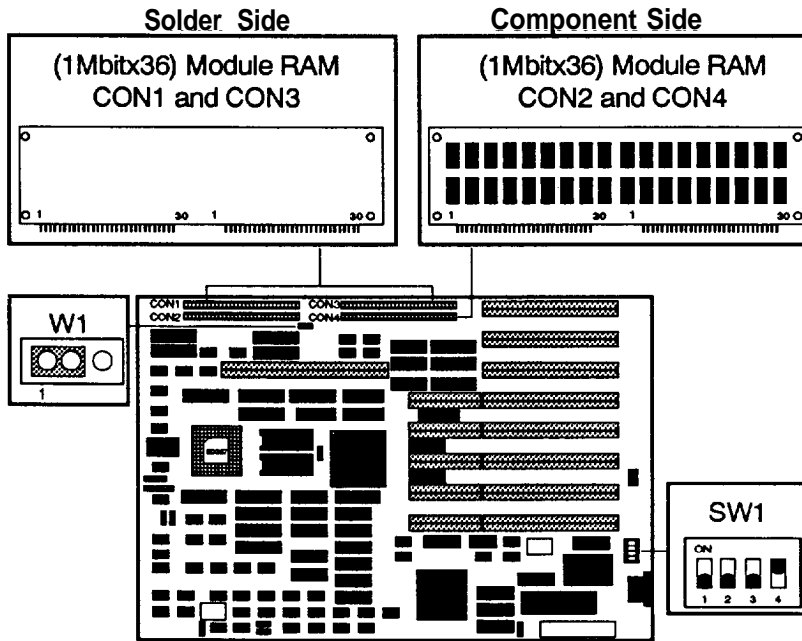


Figure 2-16: 8MB Total Onboard Memory

Note that 1 Mbit x36 type RAM module are to be inserted back to back. Make sure pin one of the RAM module printed circuit board is lined up with pin one of the socket. The illustration below shows the top view after two RAM modules have been inserted and the support post is used to tie up two RAM modules.

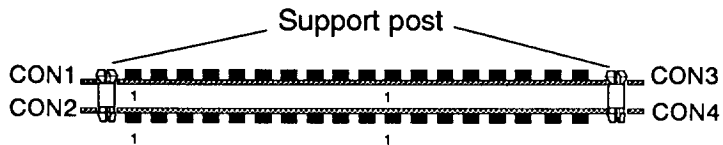


Figure 2-17: Support Posts Tying Up Two RAM Modules

32-bit Local Memory Size

Switches 3 and 4 of SW1 are used to select local memory size (total onboard 32-bit memory plus the 32-bit memory on the PEI-306). Note that the settings are for 32-bit memory sizes less than or equal to the memory sizes indicated in the table.


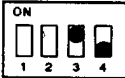
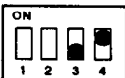
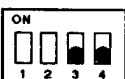
Switch SW1 Settings (SW1-3 and SW1-4)	Memory Size
	≤ 2MB
	≤ 4MB
	≤ 8MB
	≤ 16MB

Table 2-9: Switch Settings for Different 32-bit Local Memory Sizes

To add a 16-bit RAM Board in the AT slot, your total 32-bit memory must equal exactly either 2MB, 4MB or 8MB. Otherwise, your system will crash due to a starting address conflict for the 16-bit memory on the RAM board.

Remember that you'll have to insert the four pieces of module RAM before you can add a 32-bit extension memory card.

Starting Address

Refer to the following tables to find corresponding starting addresses for an AT-bus RAM card and a PEI-306 RAM card:

32-bit Local Memory Size	Starting Address of AT-bus RAM card
2MB	240000H
4MB	440000H
8MB	840000H
16MB	None

Table 2-10: Starting Address of AT- Bus RAM Card

The 32-bit local memory is four pieces of onboard SIP-type DRAM plus a PEI-306 RAM card which is provided by DTK.

Onboard DRAM-type	Starting Address of PEI-306 RAM card *
41256 SIP-type **	140000H
44256 SIP-type ***	240000H
411000 SIP-type **	440000H
411000 SIP-type ***	840000H

Table 2-11: Starting Address of PEI-306 RAM Card

* DTK sells PEI-306 RAM Card.

**These are standard RAM modules and has one bank DRAM mounting on the RAM module.

*** DTK sells these RAM modules and have two banks DRAM mounting on the RAM module.

**** Refer to Chapter 6 for more information about the installation of PEI-306 RAM card.

Factory Default Settings

Because of the large number of jumpers and options on the PEM-2530 board, you are advised to start with the factory default settings and to make experimental modifications from that point. The following table shows the factory default settings.

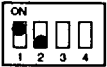
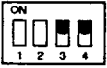

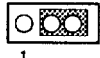






Jumper or Switch	Illustration	Function
SW1-1&2		44256 type module RAM
SW1-3&4		32-bit local memory size \leq 2MB
W1		41256/44256 type module RAM
W2		Two wait state
W3		Five wait state
W4		25MHz
W5		Turbo LED
W6		Monochrome
W7		Math coprocessor is NOT Installed
W8		256K BIOS

Table 2-12: Factory Default Settings

2-2 Installation

The time may come when you want to upgrade your system. To do so, you may need to remove the cover of the unit. This is easily accomplished with the following tools: a small flat-blade screwdriver and a small Philips screwdriver.

Be sure that the power to the system is switched OFF before you open the case. Your computer interior is as below:

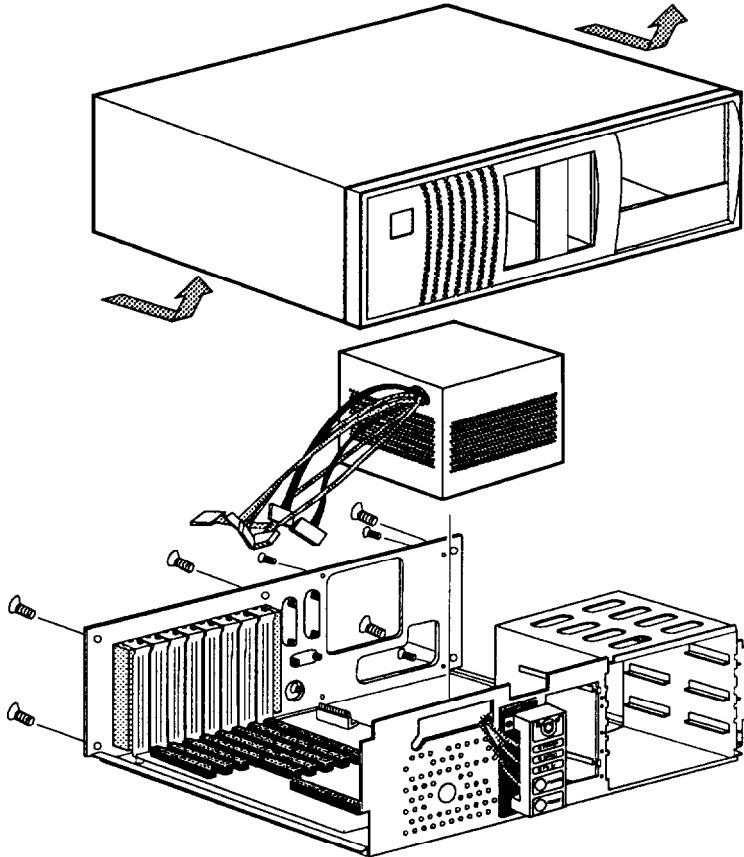


Figure 2- 18: Unpacking Your Main System

Connection to Power Supply

If you are installing the PEM-2530 yourself, the final step is attaching the power supply cable to the mainboard at connector CON7. On the left side of the power supply are some cables. Find the two six-pin plastic connectors (the four-pin connectors are for the disk drives). Refer to the figure below. Pin 1 is numbered in the picture for your convenience. Be sure that the four black wires of the power supply are located at the middle of the power connectors.

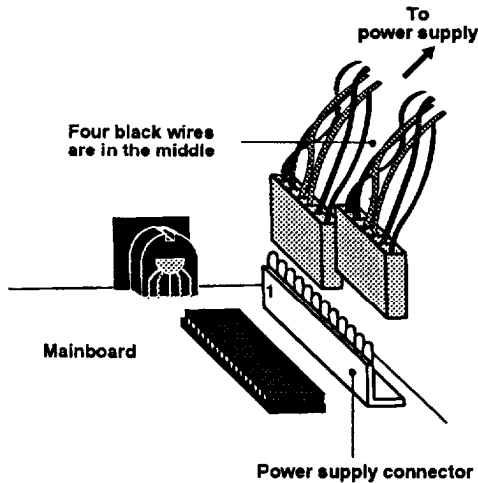


Figure 2-19: Connecting to a Power Supply

The pinouts for the connectors at pin 7 are as follows:

Pin	Assignment
1	Power Good
2	+5 VDC
3	+12 VDC
4	-12 VDC
5	Ground
6	Ground
7	Ground
8	Ground
9	-5 VDC
10	+5 VDC
11	+5 VDC
12	+5 VDC

Table 2-13: Power Supply Pinouts

Choosing a Power Supply

A 200W power supply is installed in your system. But, if you need to purchase a power supply in a later time, the following information will be of interest.

The power supply provides a “power-good” signal to indicate proper operation of the power supply. The power-good signal is a TTL-compatible high level for normal operation or a low level for fault conditions. If the power-good signal works well, the system will function properly. Otherwise, the data setting in the CMOS RAM will be lost. Since the PEM-2530 is an 80386 PC, a minimum 200W power supply is strongly recommended in order to ensure reliability.

The following is recommended for choosing a suitable power supply

- The power-good signal should have a turn-on delay of at least 250ms but not longer than 500ms when the power is on (This means that the power-good signal goes to a high level later than +5V.).
- The power-good signal goes to a low level at least 100ms before the +5V power falls below the regulation limits when the power is off.

To install a power supply in your system case you may need to consult your dealer for information. Installation is a simple and straightforward procedure.

After you have completed connecting the cables and installing the RAM Cards, close the case according to the instructions in your system manual. Now you are ready to go.

2-3 Entering 25MHz Turbo Mode

The PEM-2530 supports both a software and hardware switch to toggle between 12.5MHz and 25MHz (Turbo) modes. The two switches are set up using jumper W4 and are mutually exclusive. You must choose which one you prefer if you are setting up the board yourself.

Software Turbo Switch

When pins two and three of jumper W4 are covered with a jumper cap or are connected to a closed hardware Turbo switch the microprocessor's speed can be toggled between Turbo and Normal speeds from the keyboard. The speed when you turn the system on will be 12.5MHz. To switch the speed to 25MHz, do the following: press and hold down the control <Ctrl> and alternate <Alt> keys on the keyboard while you press the minus <-> key. The cursor on the screen will turn into a box. The Turbo LED on your panel, if you have one, will light. For more information on the Turbo LED, refer to the Connectors section.

Now the computer is in 25MHz mode. To return to 12.5MHz mode, press the same keys you used to enter 25MHz mode. When you enter the 12.5MHz mode, the cursor will return to the dash (_) form and the Turbo LED will turn off.

Hardware Turbo Switch

If your hardware Turbo switch is connected to pins one and two of jumper W4, pushing the switch on and off will initiate 12.5MHz Normal mode and 25MHz Turbo mode respectively.

Using the hardware switch means that the only indication of operation mode will be the Turbo LED. It will turn on in the 25MHz (Turbo) mode and turn off in the 12.5MHz mode. The cursor will always have the same appearance.

Operating Your System

Chapter

Operating Your System

In this chapter you will learn:

- a few MS-DOS functions
- the basics of the system setup program

The software that your system will use falls into two categories. First there is the operating system, the language that tells the system what to do. The operating system in this computer uses is Microsoft Corporation's MS-DOS, the worlds most widely used operating system for PC/XT/ATs.

Next, there is the application software what you use for work and play. Finding application software is a simple matter of going to your nearest PC store.

Note:

This is not an MS-DOS manual. It mentions only a few of the DOS functions available. To learn more about DOS, refer to your *MS-DOS User's Guide* and *Reference* manual included with your system.

3-1 An Introduction to DOS

DOS stands for Disk Operating System. This is a set of commands used to control the operations of a computer and its peripheral components. DOS makes it easy for you to use applications and create and manage files on your computer. DOS also lets you use devices with the computer.

Loading DOS

Loading DOS means to copy all the DOS programs into the computer's electronic memory. You should follow the instructions below to start DOS.

Starting DOS when the computer is off:

- Insert DOS disk 1 into disk drive A and close the drive lever
Turn on the computer and respond to the prompts displayed on the monitor.

Starting DOS when the computer is on:

If you don't have a DOS disk in your disk drive when you start your computer, you will see the following message on the screen following the RAM test:

```
Non-system disk or disk error
Replace and strike any key when ready
```

Then, you should:

- Insert DOS disk 1 into disk drive A and close the drive lever.
- Press the reset button on your front panel (hardware reset) or hold down the <Ctrl>, <Alt> and keys at the same time (software reset) to reboot your system.

Starting DOS from your hard disk:

If you have a hard disk, install DOS on the disk. Your PC will boot automatically whenever you turn on the power.

System Messages

Refer to *your MS-DOS User's Guide and Reference* manual for information on system messages.

3-2 DOS Operations

Following is a brief explanation of a few DOS functions. If you want a detailed explanation of all the DOS commands, refer to your DOS user manual.

Starting MS-DOS

If you are using a hard disk with DOS already installed, the computer will “boot” or start itself.

If you are using a floppy disk drive, insert the DOS system disk in drive “A” and switch on your computer. You will see a message similar to the following:

```
Current date is Fri 01-01-1990
Enter new date (MM-DD-YY):
```

For the new date, key in the month, day and year, separated by hyphens. Press <Enter>.

Time is displayed and corrected as follows:

```
Current time is 0 : 02 : 15.00
Enter new time: 2:20
```

Your computer is now booted and ready to run application programs.

Formatting Disks

You must format a floppy disk before it can be used.

Formatting high-density disk:

To format a high-density disk, type the following at the drive prompt:

```
C>Format A:      <Enter>
```

After your disk has been formatted, you will see the following prompt:

```
Format another diskette (Y/N)?
```

Press <N> if you do have nothing else to be formatted.

Formatting a low-density disk:

To format a low-density disk, type the following at the drive prompt:

```
C>Format A:/4    <Enter>
```

After your disk has been formatted, you will see the following prompt:

```
Format another diskette (Y/N)?
```

Press <N> if you have nothing else to be formatted.

Backing up your Diskettes and Files

In order not to lose your files through disk damage or accidental deletion it is important to back up all your files and diskettes regularly.

Backing up a diskette on a two-floppy disk drive system:

At the A> prompt type the following:

A> diskcopy a: b:

Press <Enter> and respond to the prompts on your screen.

Backing up a diskette on a single floppy disk drive system:

At the A> prompt type the following:

A> diskcopy

Press <Enter> and respond to the prompts on your screen.

After your target disk has been copied, you will see the following prompt:

Copy another diskette (Y/N)?

Press <N> if you have nothing else to be copied.

Backing up a file:

To back up a single file, key in the backup command and directory as below:

A>backup <path> <filename> <drive> /A

Deleting your Diskettes and Files

You may want to erase diskettes or unnecessary files to make room for other data.

Erasing a diskette:

To erase a whole directory of files, type the following at the drive prompt:

```
A>del *.*      <Enter>
```

All the files in the open directory are now erased.

Deleting a file:

To delete a single file, type the following at the drive prompt:

```
A>del filename.ext    <Enter>
```


Finding Out What is on Your Disk

If you want to find out what files are on a disk, you can list its directory by using the `<D/R>` command. If you want to display the directory of the disk in drive A, you would use the following command:

```
DIR A:
```

After you hit the enter key, all the file information will be displayed on the screen.

If you use the `<D/R>` command without a drive letter, MS-DOS lists the directory of the disk which was most recently accessed.

There are three ways to stop the screen from scrolling.

- pressing the `<Ctrl>` and the `<S>` keys simultaneous
- pressing `<Pause>`
- typing `DIR/P` to see one screen each time

3-3 Hard Disk Drive Format

A hard disk must be formatted before it can be read from or written to. If your hard disk requires this, you should carry out the following steps:

Step 1 — Preformat

The preformat utility is supplied by the system BIOS. You can press <Esc> key quickly just after the RAM test to enter the SETUP program. Choosing item 2 from the initial screen to preformat hard disk. See Figure 3-1.

Step 2 — Partition

This process creates DOS partitioning on a preformatted hard disk drive. The DOS command “FDISK” handles this partitioning process.

Insert your DOS diskette in drive A and type a: to get A prompt. Then type:

```
A> FDISK <J>
```

The “FDISK” command displays a serial of menus to help you partition your hard disk for MS-DOS. With the “FDISK” command, you can:

- create a primary partition,
- create an extended partition,
- change the active partition,
- delete an partition,
- display partition data, and
- select the next fixed disk drive for partitioning on a system with multiple fixed disks.

If your hard disk is 40MB, you may have partitions of up to 33MB in size. 33MB is the maximum space for a partition allowed by DOS.

For more information about how to use creating DOS partition, see *Appendix D* in *MS-DOS User's Guide and Reference*.

Step 3 — Format

The DOS command “Format” verifies the media and moves the system file onto the hard disk drive. The command should be keyed in as:

```
A> FORMAT C:/S
```

If you have two partition, you have to format D in DOS prompt. The command should be keyed in as:

```
A> FORMAT D:
```

If you want to use the partition 1 (drive C) to start DOS, you have to specify the /S option when formatting the disk. You can use this system disk to boot your system later.

Note that you don't need to perform this procedure if you want to use new partition for other operating systems like Xenix, Novell or Unix. Refer to their manuals for details.

3-4 Helpful Hints

The following may save you some time or help you as you use your computer.

- Make copies of your diskettes regularly.

To make sure that a command works, you should:

- Check your typing (make sure you don't confuse \ with /).
 - Have the correct diskette in the drive.
 - Check the contents of the diskette with the *DIR* command.
 - Specify the correct diskette drive.
 - Remember to include the colon (:) when specifying the name of a drive.
 - Spell the filename correctly
 - Use the appropriate extension (such as *.DOC or *.EXE)
- Refer to the DOS Reference for additional information if a command still doesn't work.
 - Print contents of a disk (if you have a printer) and keep the list with the diskette.
 - All commands (except DISKCOPY and DISKCOMP) are files that will work on both diskettes and hard disk drives.
 - The date and time shown with each directory entry are the date and time of the last addition or change to that file. The date and time are not changed during a COPY or a DISKCOPY.

3-5 System Setup Program

A system setup program is included in your BIOS on the motherboard. The setup program is used to key in the configuration you want for your system. Specifically, you can set the date, time, base memory, expansion memory, number of floppy and hard disk drives and display configuration as well as get information on hard disk types.

Your system BIOS is fully compatible with IBM BIOS. In addition, many special functions are supported like:

- a low-level fixed disk format utility
- three system utilities (a calculator, a hard disk park, and a timer)
- system password
- user-defined hard disk types
- shadow RAM

The setup program is simple to be used. It is extremely important that you respond correctly to the prompts about your computer.

The following will guide you through the setup program. For more information about the setup program, refer to your BIOS manual.

Entering the Setup Program

There are two ways to enter the setup program: by pressing <F1> or by pressing <ESC> .

1. Pressing <F1> to Enter the Setup Program

You will need to press <F1>, to enter the setup program in the following situations:

- when your computer is turned on for the first time
- when the rechargeable battery is dead
- when the hardware configuration is changed

If the battery for CMOS chip is dead or the system configuration does not match your actual hardware configuration, you will have to reconfigure your system. The computer will give you this screen message:

**Press the F1 key to enter the setup program or
press any other key to continue**

Under the above three conditions, pressing <F1> will automatically start the setup program.

Under any conditions within DOS, you can use the DOS DEBUG command as follows:

```
A> DEBUG ↵  
-g=F000:FF60 ↵
```

This command will start the setup program.

2. Pressing <ESC> to Enter the Setup Program

If you want to set up special functions provided by BIOS or reconfigure your system, you will need to enter the setup program. After starting your computer, press the <Esc> key quickly before the RAM test finishes. If you miss the chance to do so, reset your system and repeat the above procedures to enter the setup program. Before the setup program appears, the following message will appear on the screen:

SETUP utility will be starting

When the system self test is completed, the setup program will take over.

Once you have entered the setup program, you will see the following initial screen:

ROM SETUP PROGRAM VERSION 2.0
(C) COPYRIGHT DATATECH ENTERPRISES CO., LTD 1990.
ALL RIGHTS RESERVED.

1. SET UP SYSTEM CONFIGURATION.

2. PREFORMAT HARD DISK.
3. SET UP BUILT-IN UTILITY.
4. SET UP PASSWORD.
5. SET UP USER-DEFINED HARD DISK TYPE.
6. SET UP SHADOW RAM.
9. QUIT SETUP PROGRAM.

CHOOSE ITEM NUMBER : [1]

Figure 3-1: Initial Screen

Running the Setup Program

The menu of the setup program highlights the selected command. You can use the up < ↑ > and down < ↓ > arrows to select the desired item. Pressing the enter key < ↵ > confirms your selection or enters the next screen. If the option on the screen does not match your configuration, you have two ways to make modifications. You may either highlight selections and press < ↵ > to enter the command or use the left < ← > and right < → > arrows to show different options and select from them.

If you want to exit a current screen, you may press < Esc > or select the exit item of the screen.

The following are some examples of setup program screens you will see in using the program.

1. Setting Up System Configuration

If you choose item 1 from the screen on the previous page to configure your system, the following will appear:

```
ROM SETUP PROGRAM VERSION 2.0
(C) COPYRIGHT DATATECH ENTERPRISES CO., LTD 1990.
ALL RIGHTS RESERVED.
```

```
SET UP SYSTEM CONFIGURATION

1. CURRENT DATE : [04-26-1990]
2. CURRENT TIME:[ 05:30:00]
3. COPROCESSOR : [ 1 ]
4. BASE MEMORY : [ 640 kB]
5. EXTENDED MEMORY : [ 1280 KB]
6. DISKETTE DRIVE A : [ 1.2 M ]
   DISKETTE DRIVE B : [ NO ]
7. FIXED DISK TYPE C: [40/MFM]
   FIXED DISK TYPE D : [ NO / NONE ]
8. PRIMARY DISPLAY CARD : [ MGA ]
9. EXIT

CHOOSE ITEM NUMBER : [1]

↑ ↓ : CHANGE ITEM ← → :MODIFY ↵ :ACCEPT
```

Figure 3-2: “Set Up System Configuration” Screen

Once you have entered all appropriate information and exited by choosing item 9, you will be asked to confirm that the configuration data are correct.

If at a later date you alter the configuration of your system, you will need to go through the program again and make the appropriate changes.

2. Preformatting Hard Disk

If you want to preformat your hard disks, reenter the setup program by pressing <Esc>, and select item 2 on the initial screen. The program will then proceed as below:

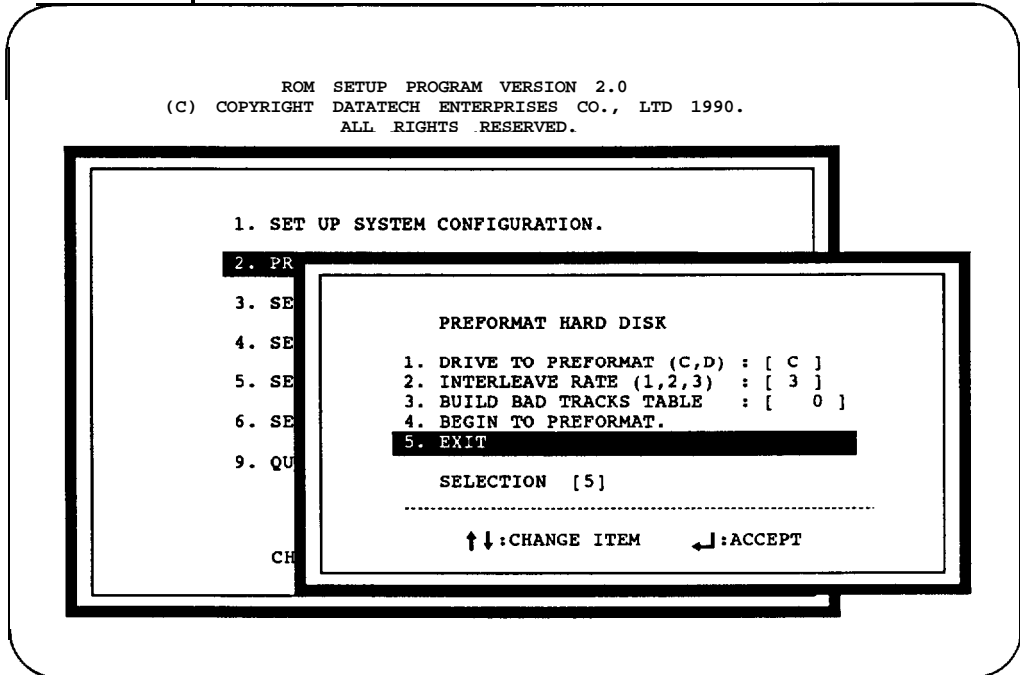


Figure 3-3: "Preformat Hard Disk" Screen

3. Setting Up Built-in Utilities

three system utilities, a calculator, a hard disk park, and a timer, are in your system BIOS. These utilities are enabled by the setup program. Note that these utilities can be used in the 80-column text display mode only.

he calculator and the hard disk park can be used if you press <Ctrl> <Alt>, and <5> (on the key pad). Pressing <Esc> will exit these utilities. The following is the figure for the calculator.

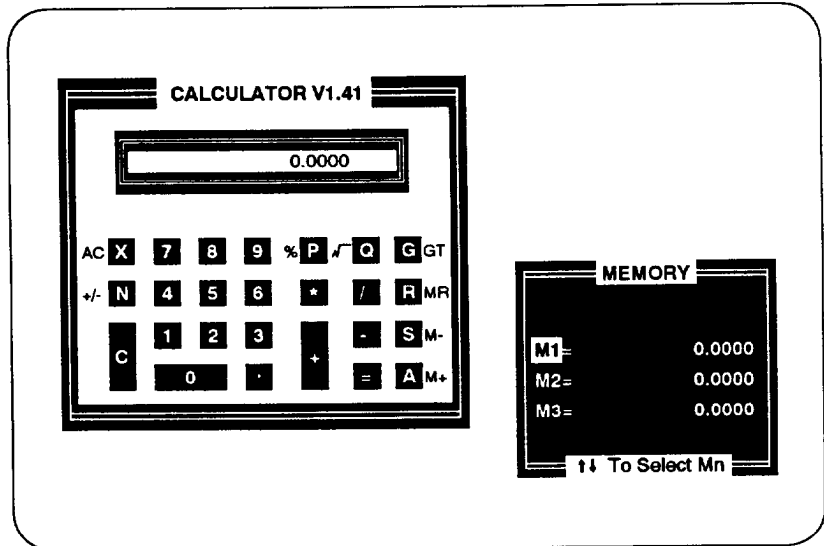


Figure 3-4: Calculator

4. Setting Up Password

Selecting item 4 in the initial setup menu will lead you to set up a system password. A password can deny unauthorized users access to the computer. You can key in a password with a maximum of seven alphanumeric units.

You may press <F1> to see the present password status.

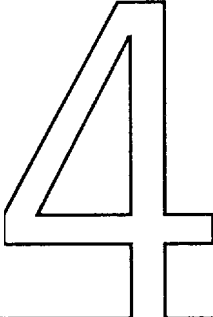
5. Setting Up User-Defined Hard Disk Type

If none of the drive types (I-47) match the fixed disk drive specifications you have, select item 5 in the setup menu to set a user-defined hard disk type.

6. Shadow RAM

If you want to set up shadow RAM, you should enter the setup program and select item 6. Shadow RAM can reduce the read time for system BIOS or video BIOS, thereby enhancing performance.

Keyboard

Chapter 

In this chapter you will learn:

- the basics of your keyboard and its functions
- how to adjust your keyboard angle

A computer keyboard sends messages from you to the computer. It has:

- QWERTY keys
- Function keys
- Cursor control keys
- A numeric keypad
- Special keys
- Keyboard indicator lights

-

4-1 Keyboard Layout

Currently several of keyboard styles are available for PC/AT/XT compatible computers. The most popular are the PC keyboard, the PC/AT keyboard, and the enhanced keyboard. Figure 4-1 below illustrates the basic layout of a typical enhanced keyboard.

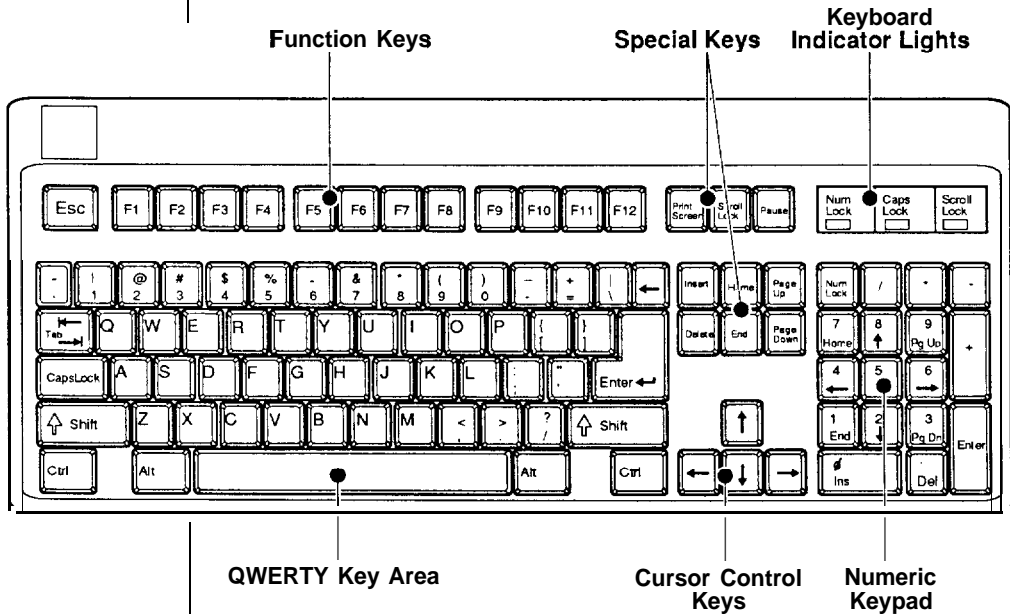


Figure 4-7: Keyboard Layout

4-2 Getting Acquainted with Your Keyboard

Before you begin using your computer, you should become familiar with some keyboard functions. Your keyboard is divided into six sections. Refer to the previous page for the layout. The following gives an explanation of these keys.

Function Keys

These are located on the left or at the top of the keyboard. Function keys have specially defined uses preassigned by the software you use. They are used independently or in combination with other keys.



Figure 4-2: Function Keys

Numeric Keypad

This is located on the right of the keyboard. At the center of the keypad are nine numeric keys. These keys are used to move the cursor as well as to enter numbers when either the Caps Lock key or Num Lock key is pressed. Refer to the figure below:

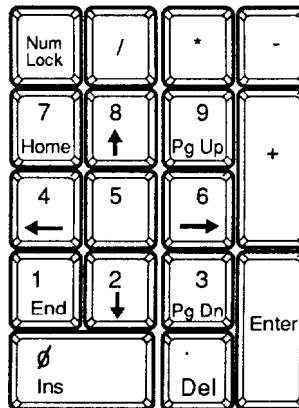


Figure 4-3: Numeric Keypad


















Keys	Function
	Turns on and off the numeric mode on the numeric keypad
	Used for division operations.
	Used for multiplication operations.
	Used for subtraction operations.
	Activating Num Lock makes 7 operative. Home returns cursor to the beginning of the line it is on.
	Activating Num Lock makes 8 operative. Otherwise the up cursor key is active.
	Activating Num Lock makes 9 operative. Otherwise page up is active.
	Used for addition operations.
	Activating Num Lock makes 4 operative. Otherwise the cursor key is activated.
	Activating Num Lock makes 5 operative.
	Activating Num Lock makes 6 operative. Otherwise the cursor key is activated.
	Activating Num Lock makes 1 operative. Otherwise end moves the cursor to the end of the line it is on.
	Activating Num Lock makes 2 operative. Otherwise the cursor key is activated.
	Activating Num Lock makes 3 operative. Otherwise page down is activated.
	Activating Num Lock makes 0 operative. Otherwise the key) functions to insert characters at the position of the cursor.
	Used for decimal points. Otherwise it deletes characters where the cursor is positioned.
	Enters commands or inserts invisible paragraph characters

Table 4-1: Function of Numeric Keypad Keys

Mode Indicator Lights

In addition to the character, number and control keys, every keyboard has three lights that indicate the typing mode. These lights and their functions are explained as follows:

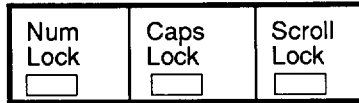


Figure 4-4: indicator Lights

Caps Lock

When this light is on, characters are in uppercase mode.

Num Lock

When this light is off, the cursor-control function of the numeric keypad is disabled and the numeric mode is activated.

Scroll Lock

When this light is on, text can be scrolled without moving the cursor.

Special Keys

Below are some special keys on your keyboard.

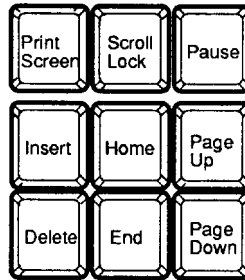


Figure 4-5: Special Keys

Check out the above key functions in the table below and in Table 4-1.





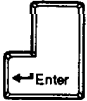


Keys	Function
	Pressing this key together with the shift key will print all data on the screen.
	With Scroll Lock activated, you can move text vertically in line units.
	Pressing this key halts the current operation: pressing it again allows operation to continue.
	Moves the cursor for corrections, but the line
	Skips to new line.
	Used with alphanumeric keys to enter BASIC key words.
	Used with another key to execute a command.

Table 4-2: Functions of Special Keys

QWERTY Keys

These are the same keys which are used on a typewriter.

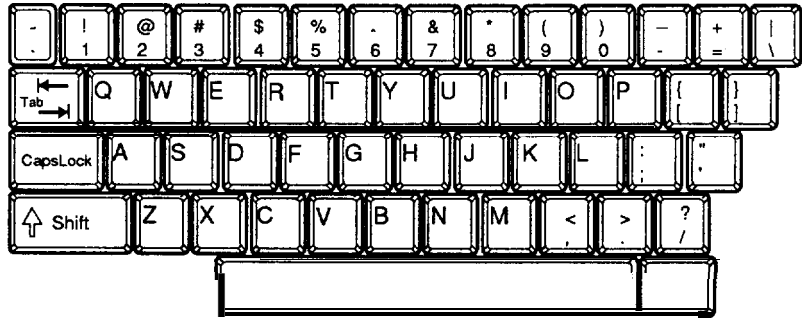


Figure 4-6: QWERTY Keys


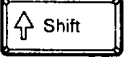
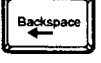
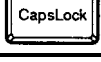
Keys	Function
	Performs a tab function similar to that of a typewriter.
	Changes lowercase letters to capitals.
	Moves cursor back one space and erases characters.
	Pressing this key activates uppercase letters; pressing it again activates lowercase letters.

Table 4-3: Functions of Special QWERTY Keys

Cursor Keys

These keys move the cursor in the indicated direction.

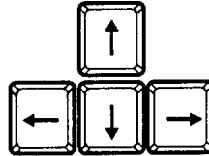


Figure 4-7: Cursor Keys

Key Combinations

The keys shown below have special functions when pressed simultaneously.

Keys	Function
Ctrl + Break Or Ctrl + S	Both keys should be used together stop a program while it's running. Pressing any key again allows you to continue
Ctrl + C	Both keys used together interrupt a program while it's running and identify line where it stops.
Ctrl + Alt + Del	These three keys reset the system so that the machine is at the RAM test stage.

Table 4-4: Special Functions

4-3 Keyboard Tilt Adjustment

Under the rear of the keyboard are two small legs that can be pulled out or pushed in to change the keyboard angles to suit you.

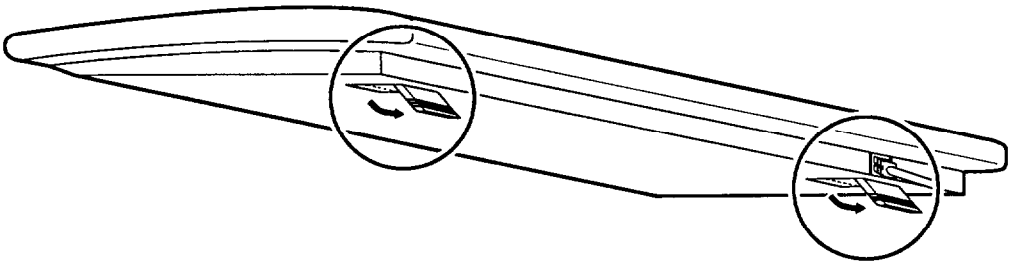


Figure 4-8: Adjustment of Keyboard Angles

Troubleshooting

Chapter 5

In this chapter you will learn about:

- the basics of how to solve software/hardware problems
- when to get technical help for your computer

Your computer has been designed to last for years of optimum performance. But if some problems do occur, more likely than not you will be able to solve them by referring to this chapter.

No matter whether you are a new or experienced user, you should become familiar with the material in this chapter. For detailed explanations of computer problems and how to solve them, you are urged to buy personal computer troubleshooting books from your nearest hardware or software dealer.

5-1 Command Problems

Often what appears to be a big problem is in fact just a matter of a small oversight. Before taking your computer to the shop for major surgery, check the following items:

- Make sure that all devices (computer and peripherals) have power and are turned on.
- If you encounter a problem while you are working, stop what you are doing immediately.
- On paper, make notes of what is happening. List the actions you have taken and the responses from the computer. You may want to print a copy of the screen by using the <Shift> + <PrtSc> keys combination.
- Use the diagnostic software on your computer. Try to find out the conditions under which the malfunction occurs. Try also to isolate where the problem is occurring. Is it with a certain software program **or** with your hardware? If the problem is with software, you should probably talk to your software dealer. If the problem is with the hardware, try to narrow down the source of the problem. Is it your disks or disk drives? Keyboard? Printer? Screen?
- If some messages appear on the screen, refer to your MS-DOS manual for an explanation of the message. You may want to write down the message or print it out with the <Shift> + <PrtSc> key combination. Problems (except blackouts) can be avoided if you run your system on a dedicated electrical line. That is, ensure that your computer and peripheral electric cords are not shared by other appliances such as a refrigerator or air conditioner. Also, it is highly advisable to purchase a surge suppressor. This is a set of electric sockets enclosed in a single housing. A surge suppressor prevents sudden pulses of high electric power (spikes) from damaging the computer. This appliance is inexpensive and can be purchased at any computer or electronic hardware store.

- Are you using a startup disk?
- Is your disk formatted?
- Is the system configuration correct?
- Are all the external and internal connectors are connected well?
- Make sure that you are running software compatible with your display port, because some software programs can only run on the MGA display mode.
- Is the power fuse burned out?

If you have gone through the above checklist and your system still does not function properly, check the following pages. The following instructions will help you solve some common problems. However, you should be aware that other problems might stem from system software, applications or other peripherals.

5-2 System Error Messages

Basically there are three levels of system error messages that you might see displayed on your computer. These are related to the software you use. The following are the ones most commonly encountered.

Software error messages are a result of:

- ▮ **Software lockup;** the application becomes stuck and the cursor will not move. When this happens, remove your application program from the disk drive (unless a hard disk is used) and reboot your computer. If the problem persists, contact your nearest software dealer.
- ▮ **Software crash;** the application suddenly displays garbled text on the monitor or the cursor locks up. Try to reboot the computer. If the problem persists, you will need to contact the software dealer from whom you purchased the package. He/she should replace the package, depending on the service contract, or have it repaired.

Hardware error messages:

These messages are related to the computer's internal components, your monitor, mouse, or printer. Hardware problems are usually ones that the user cannot solve alone. Professional services are therefore required.

Error messages generated by MS-DOS, BASIC or other high-level applications:

These messages relate to problems due to incorrect use or malfunction of a high-level application under which you might run your software. It is still advisable to contact your software dealer for assistance with such problems.

Consult your dealer if you have any questions about troubleshooting.

Examples of System Error Messages

System crash

The cursor cannot be moved and does not respond to the keyboard. This could indicate a software crash. Mark where you are in your document. Reboot your system and reload your software. Scroll the cursor to where you last saved your data. Retype the information up to where the cursor could not be moved. Enter the rest of the data. If the cursor continues to function normally, the problem was probably caused by accidentally pressing the wrong key. If the problem occurs again, go over the same procedure. If the problem persists, contact your software dealer.

System does not boot

This can be caused by defective hardware or a faulty system disk. Turn off your computer and try again. If unsuccessful, try using your backup system disk because your working disk may be damaged. If the problem persists, you might have a hardware problem. You should contact the dealer from whom you purchased your computer.

Monitor displays garbled, unrecognizable characters on the screen

This usually indicates the monitor is set to an incorrect baud rate. Ask your computer dealer the correct baud rate for the computer's output board. Locate the baud rate switches on your monitor and reset the baud rate.

5-3 System BIOS Error Messages

ROM B/OS Checksum Error

— Indicates an invalid ROM BIOS failure.

8254 Error

— Indicates a 8264 timer controller failure.

8237 Error

— Indicates a 8237 DMA controller failure.

74612 Error

— Indicates a 74612 page register failure.

8259 Error

— Indicates a 8259 interrupt controller failure.

8742 Error

— Indicates a 8742 controller failure.

Check Battery

— Indicates a system backup battery disconnection or power loss.

RTC Checksum Error

— Indicates that the system memory refresh function does not work.

Refresh indicator Error

— Indicates that the system memory refresh does not work.

Base 64K Memory Error

— Indicates that the system's first 64K memory does not work.

FDC Error User Check

— Indicates that the floppy diskette controller does not work.

FDD Seek Failure

— Indicates a failure of the floppy diskette drive "seek operation.

Keyboard Error User Check

- Indicates the disconnection of the keyboard from the system or a keyboard device failure.

Parity Error but Segment not Found, Press any Key to Continue

- Indicates that the NMI circuit has detected a RAM parity error.

System Memory Mismatch, Run SETUP

- Indicates a mismatch of memory size in the CMOS RAM as well as onboard. You need to run the setup program.

Display Card Mismatch, Run SETUP

- Indicates a mismatch of a record typed in the CMOS RAM as well as onboard. You need to run the setup program.

Appendix

Chapter 6

This chapter provides:

- technical information
- information on disk drive installation
- information on moving your computer
- information on memory expansion with a PEI-306 RAM card

This manual is not a technical reference manual. This chapter provides some technical information about your system, but if you need more, check out at a technical library or bookstore. You will find technical reference books in most bookstores.

6-1 Installing Disk Drives

Three 5.25" and two 3.5" disk drives may be installed in the system unit. Installation of a hard disk is essentially the same as that for a floppy disk.

You may at sometime want to add to or change your floppy or hard disk drives. Follow the instructions below to do so.

Be certain to refer to the manuals for both the disk drive and the controller card for any additional specific information regarding them that may be of importance.

Installing 5.25 Disk Drives

To install a 5.25" disk drive, follow the steps below:

- Open the system unit case as described in Chapter 2. Refer to figure 2-18.
- Screw the metal guides to the disk drive as shown below:

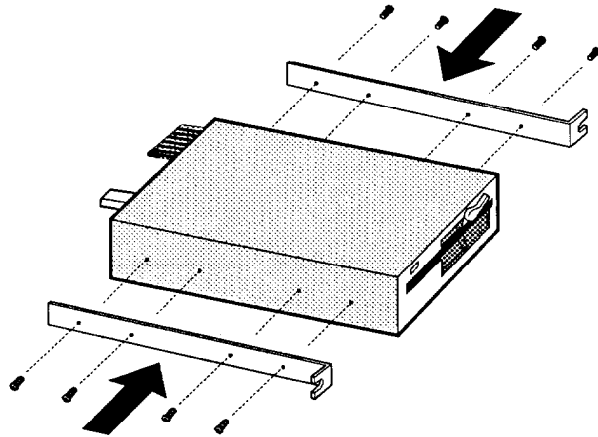


Figure 6-1: Fastening Metal Guides to a 5.25 Disk Drive

Slide the disk drive, back end first, into the disk drive bay and fasten it to the chassis.

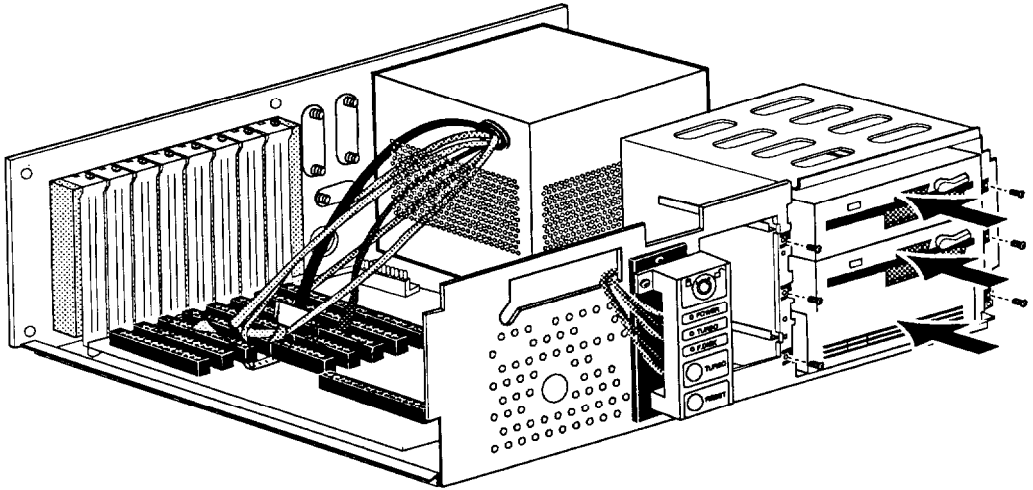


Figure 6-2: Installing 5.25 Disk Drives

Installing 3.5" Disk Drives

The installation of a 3.5" disk drive is similar to that of a 5.25" disk drive.

- First, fasten the bracket to the drives.

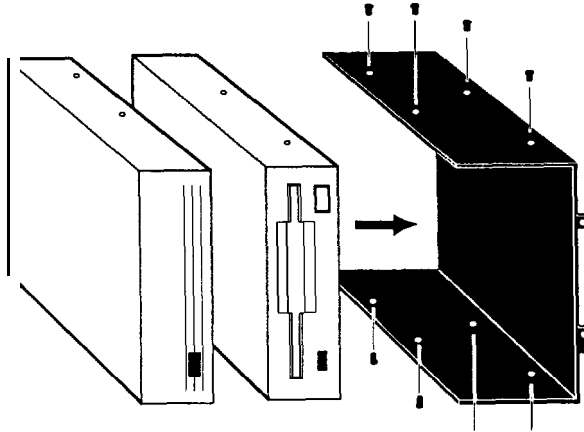


Figure 6-3: Fastening the bracket to 3.5 Disk Drives

- Next, place the disk drive inside the bay and fasten the brackets to the chassis. Refer to the figure below:

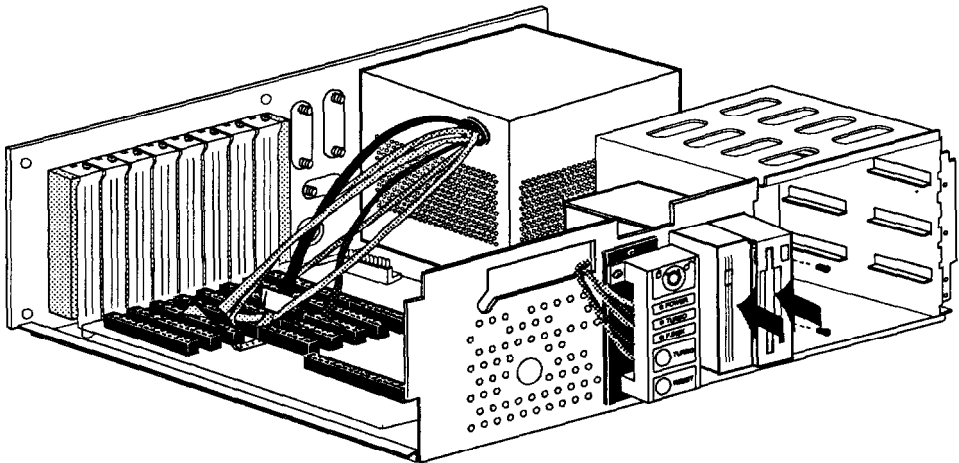


Figure 6-4: Installing 3.5 Disk Drives

Connecting Cables to Disk Drives

After you have screwed the disk drive securely in the disk drive bay, you should connect the floppy/hard disk controller cables, the data cable of the hard disk drive as well as one of the four cables from the power supply. See the figures on the following pages.

The power cable is simple to connect: simply plug it to the correct adapter. The shape of the plug ensures that no mistakes will be made. 3x the figures on the following pages.

One edge of the ribbon cable is marked with a color line. This specific line side of the connector should be at pin 1 when attached to the FDC/HDC card. Pin 1 is clearly marked on the card. See the figure below for the color line of the cable:

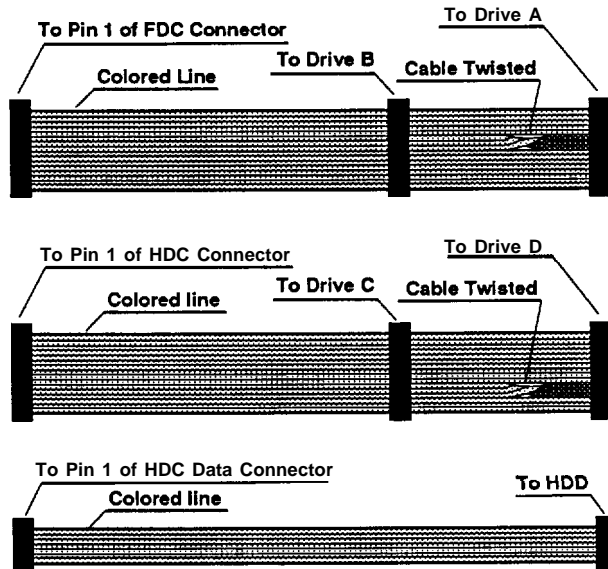


Figure 6-5: Cables for Disk Drives

Connecting Cables to Floppy Disk Drives

- First, connect the four-wire power cable to the disk drive.

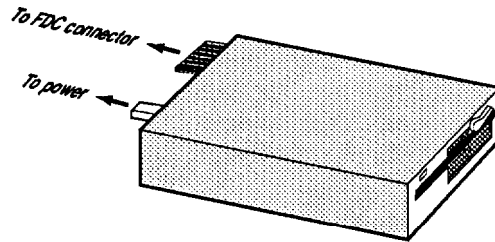


Figure 6-6 : Connecting to a Floppy Disk Drive

- Then, connect the controller cable: one end to floppy disks and the other end to the FDC card with the colored-line side of the cable attached to pin 1 of the connector on the FDC card.

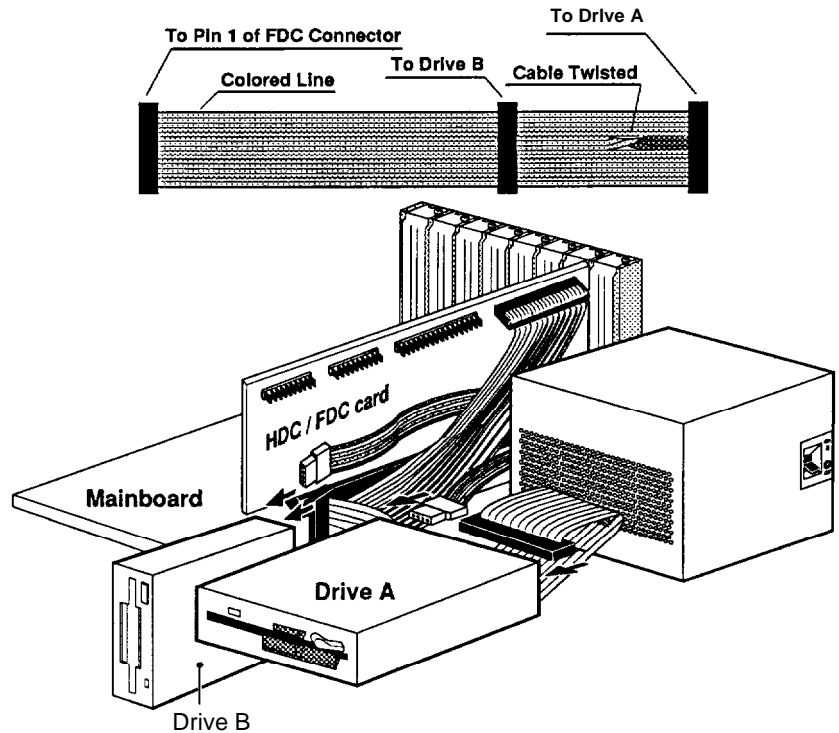


Figure 6-7: Connecting Cables to Floppy Disk Drives

Connecting Cables to Hard disks

- First, connect the four-wire power cable to the disk drive.

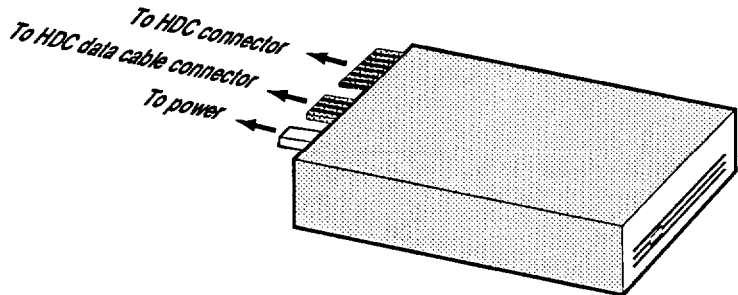


Figure 6-8: Connecting to a Hard Disk Drive

- next, connect the cable: one end to the disk drives and the other end to the HDC card with the colored-line side of the cable attached to pin 1 of the connector on the HDC card.

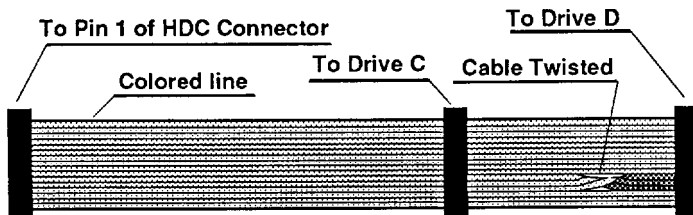


Figure 6-9: Connecting the Controller Cable

- Then, connect the data cable: one end to the disk drives and the other end to the HDC card with the colored-line side of the cable attached to pin 1 of the connector on the HDC card.

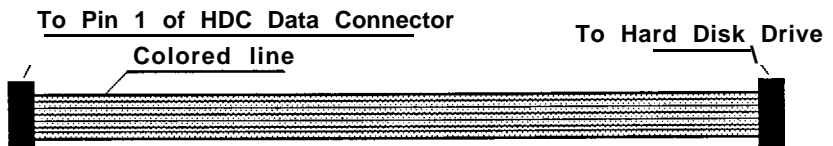


Figure 6-10: Connecting the Data Cable

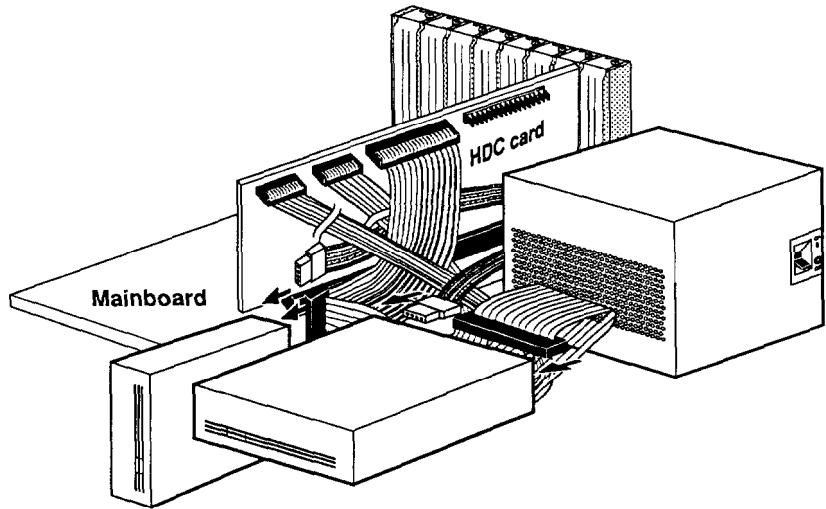


Figure 6-11: Connecting Cables to Hard Disk Drives

Follow the same procedure for any additional drives you want to install.

Removal

To remove a drive, just reverse the procedure described above. Disconnect the cables, undo the screws, slide the disk drive out and remove the mounting guides or bracket.

6-2 Quick Reference for Jumper Settings

W1 — DRAM type selection








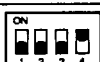
Total Onboard System Memory	Jumper W1	Switch SW1 Settings	RAM Type	Starting Address of AT bus in RAM card
1MB			(256Kbitx9)x4 Module RAM	***
2MB			(44256x4+41256x2) x4 Module RAM *	240000H
4MB			(1Mbitx9) x4 Module RAM	440000H
8MB			(1Mbitx36) x2 Module RAM **	840000H

Table 6-1: Jumper W1 and Switch SW1 Settings

W2 and W3 — memory I/O wait state selection


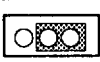
Jumper W2	16-bit Memory I/O
	One wait state
	Two wait state

Table 6-2: Jumper W2

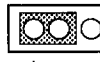
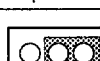
Jumper W3	8-bit Memory I/O
	Four wait state
	Five wait state

Table 6-3: Jumper W3

W4 — running speed




Jumper W4	Microprocessor Running Speed
1 	8MHz
1 	Keyboard Control
1 	25MHz

Table 6- 4: Jumper W4

W5 — Turbo LED

W6 — video selection

1 & 2 shorted — mono

2 & 3 shorted -color

W7 — math coprocessor

1 & 2 shorted — install

2 & 3 shorted — not install

W8 — BIOS selection

J1 — power LED

J2 — hardware reset

J3 — speaker connector

6-3 Expanding Your Memory with a PEI-306 RAM Card

The PEI-306 RAM Card is a flexible memory solution for your system's motherboard. It can be installed in a 32-bit expansion slot designed for this purpose.

The PEI-306 RAM Card makes use of a combination of 256KB and 1MB SIMM modules which allow for up to 12MB of memory for maximum expandability.

With so many memory configurations, setup becomes a major consideration. The PEI-306 RAM Card has been designed with maximum ease of use in mind with all configuration settings made on one DIP switch and a few jumpers.

Card Layout

The figures below will familiarize you with the layout of the '386 RAM Card, the jumpers, the DIP switch as well as banks 0, 1, and 2.

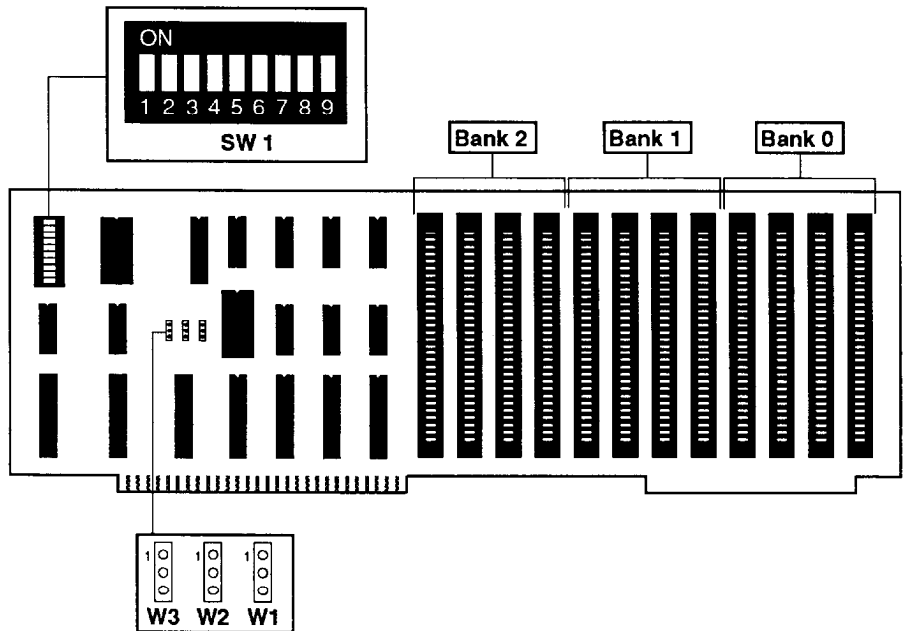


Figure 6-12: PEI-306 RAM Card Layout

1 Card Setup

Memory Banks

The PEI-306 RAM Card memory is divided into three banks. At the very least, bank 0 must be full for the card to function. By setting DIP switch SW1 and jumpers WI - W3 the PEI-306 RAM Card can be set up with a minimum of 1 MB and a maximum of 12MB memory.

The PEI-306 RAM Card has SIMM-type RAM module sockets. These 30-pin single-in-line sockets are aligned at an angle of 25 degrees. Refer to the figure below.

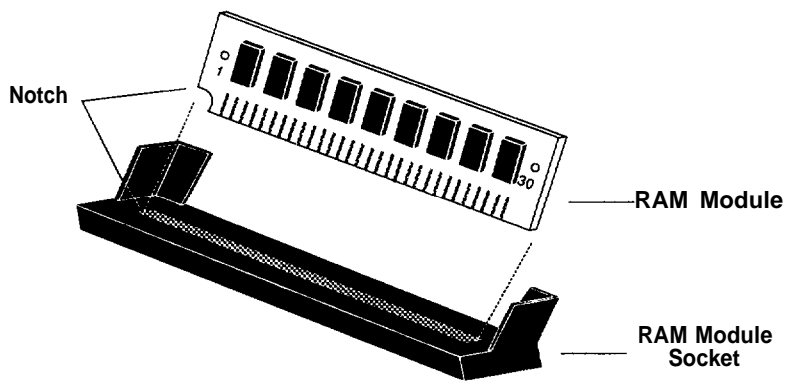


Figure 6-13: SIMM-Type RAM Module

Remember that when inserting the RAM module, you must make sure the notched or dotted end of the module is lined up with the notched end of the socket. Gently push the RAM module into the socket.

Three banks (bank 0, 1 and 2) for memory are on the PEI-306. Each bank accommodates a 32-bit wide data bus. Bank 0 must be filled first.

Jumper Settings

Jumpers W1 - W3 allow you to set the DRAM type of banks 0 - 2 for either 411000 RAM or 41256 RAM.

Jumper W1 selects bank 0, W2 selects bank 1 and W3 selects bank 2.

The three banks must be filled with the same type of RAM: either 41266 or 411000. Refer to the table below for more information.

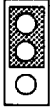



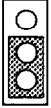

DRAM Type	Bank 0 Jumper Selection W1 Settings	Bank 1 Jumper Selection W2 Settings	Bank 2 Jumper Selection W3 Settings
411000 RAM module x 4 pieces	1 	1 	1 
41256 RAM module x 4 pieces	1 	1 	1 

Table 6-5: Jumpers W1 - W3 Settings (PEI-306)

DRAM Chip Speed

Your mainboard has a clock speed which requires the use of 80ns DRAM on the PEI-306 RAM Board.

Both types of DRAM (256KB and 1MB) are available in both speeds so you can take full advantage of the RAM Boards various configurations. Refer to the charts below for a synopsis of this information.

Your mainboard's clock's speeds-25MHz

PEI-306 32-bit RAM Card: 80ns DRAM

**256KB or 1 MB SIMM-Type RAM Modules
Static Column/Page Mode**

Table 6-6: DRAM Chip Speed

Total System Memory Size

The PEI-306 RAM Board provides you up to 16MB of total system memory.

Total system memory means the onboard memory of the mainboard plus that of the PEI-306 extension memory card.

Note: You only can have 16MB maximum of **total system memory**.

Refer to the following pages for more information.

Note for the following pages:

- * We support this kind of module RAM. There are two banks of DRAM mounted on each RAM module.
- * Due to address limitations, this configuration cannot accommodate an AT bus RAM card.
- * 16MB maximum total system memory has no starting address.

Table 6-7: Total System Memory Configurations - A

Total Memory Size	PEM-2530			PEI-306							Start Addr. of AT Bus RAM Card			
	SIP Memory	DIP SW1	W1	Bank 0	Bank 1	Bank 2	DIP SW1	W1	W2	W3				
1 MB	41256 SIP x 4			Not Used			Not Used			Not Used			**	
2 MB	44256 * SIP x 4												240000H	
4 MB	411000 SIP x 4												440000H	
8 MB	(1Mbit x36) * SIP x 2												840000H	
2 MB	41256 SIP x 4			41256 SIMMx4	Not Used									240000H
5 MB				411000 SIMMx4										**
3 MB	44256 * SIP x 4			41256 SIMMx4										**
6 MB				411000 SIMMx4										**
5 MB	411000 SIP x 4			41256 SIMMx4										**
8 MB				411000 SIMMx4										840000H
9 MB	(1Mbit x36) * SIP x 2			41256 SIMMx4										**
12 MB				411000 SIMMx4										**

Note : means "ON" and means "OFF".

Table 6-8: Total System Memory Configurations-B

Total Memory Size	PEM-2530			PEI-306							Start Addr. of AT Bus RAM Card			
	SIP Memory	DIP SW1	W1	Bank 0	Bank 1	Bank 2	DIP SW1	W1	W2	W3				
3 MB	41256 SIP x 4			41256 SIMMx4	41256 SIMMx4	Not Used					**			
9 MB				411000 SIMMx4	411000 SIMMx4									
4 MB	44256 SIP x 4			41256 SIMMx4	41256 SIMMx4		Not Used					440000H		
10 MB				411000 SIMMx4	411000 SIMMx4									
6 MB	411000 SIP x 4			41256 SIMMx4	41256 SIMMx4			Not Used					**	
12 MB				411000 SIMMx4	411000 SIMMx4									
10 MB	(1Mbit x36) SIP x 2			41256 SIMMx4	41256 SIMMx4				Not Used					A40000H
16 MB				411000 SIMMx4	411000 SIMMx4									
4 MB	(1Mbit x36) SIP x 2			41256 SIMMx4	41256 SIMMx4	Not Used								B40000H
4 MB				41256 SIMMx4	41256 SIMMx4					41256 SIMMx4				
13 MB	41256 SIP x 4			411000 SIMMx4	411000 SIMMx4		Not Used							440000H
5 MB				411000 SIMMx4	411000 SIMMx4					411000 SIMMx4				
5 MB	44256 SIP x 4			41256 SIMMx4	41256 SIMMx4			Not Used						**
14 MB				411000 SIMMx4	411000 SIMMx4					411000 SIMMx4				
7 MB	411000 SIP x 4			41256 SIMMx4	41256 SIMMx4				Not Used					**
16 MB				411000 SIMMx4	411000 SIMMx4					411000 SIMMx4				

Note: means "ON" and means "OFF".

Installing Your PEI-306 RAM Card

Having ensured that the power to the system is switched OFF, open your computer.

You will see expansion slots on your mainboard as below:

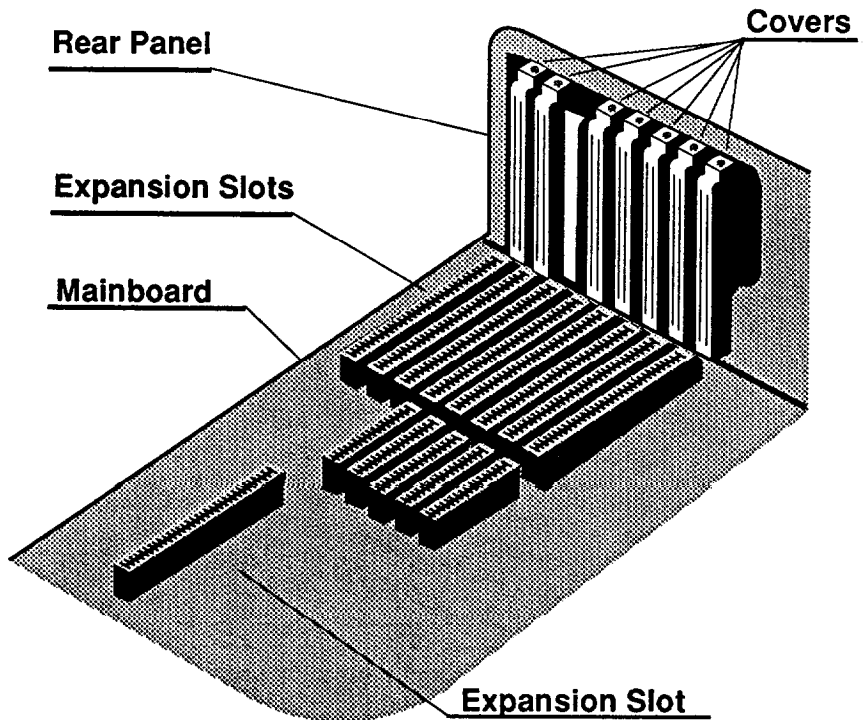


Figure 6-14: 32-Bit Expansion Slot for PEI-306 RAM Card

Expansion Slots and Slot Covers

Before you install the PEI-306 RAM Card in your computer, make sure the computer is unplugged, and remove any static electric charge from your body by placing one hand on the power supply box inside your computer.

Pick up the card by its non-conductive edges. Avoid touching the connector contacts or any components with your hands as this could damage the card. Insert the card into an empty expansion slot as shown in the illustration below:

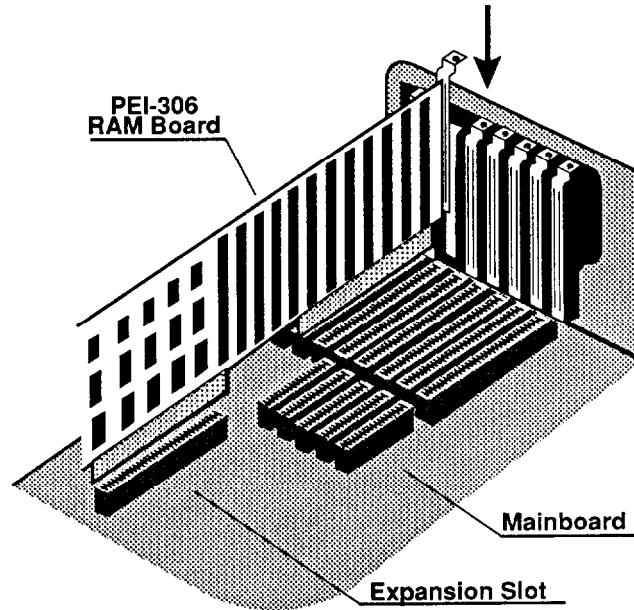


Figure 6-15: Installing a PEI-306 RAM Card

Expansion Card Insertion

Press the card firmly into the slot. Be careful not to exert excess force or torque the card. Attach the mounting bracket of the card securely to the rear panel of your computer with the slot cover screw you saved.

6-4 Moving Your Computer and Peripherals

Your personal computer and its peripheral components are highly sensitive machines that can be damaged easily through bad shipping and handling. We recommend that you take the following steps before moving the equipment to another location.

Short Move

An example of this is moving from one location to another in the same building. Ensure that you have taken the following steps before moving any items:

- Be sure that all data in your hard disk is backed up onto floppy disks.
- Enter the DOS system program and invoke the PARK command. This command will lock up your hard disk to protect it from damage while the computer is being moved.
- Turn off all power switches.
- Insert the cardboard diskette/s supplied with the system unit into the disk drive/s and close the disk drive levers.
- Detach all cables and cords. Next, coil and tie them to protect the connectors.
- Move each item separately.

Long Move

This kind of move involves use of a motor vehicle to carry your computer and its peripherals from one location to another. Before moving any items, follow the instructions stated above. Next, repack all items in their original packing cases.

Overview

The PEM-2530 incorporates the Intel 80386 microprocessor as the basis of its 32-bit architecture. The 25MHz speed of the microprocessor, coupled with the performance benefits of the 32-bit architecture, provide exceptional performance well beyond the reach of most personal computer products currently using 16-bit architectures. A feature of primary importance is the PEM-2530's compatibility with existing software and hardware products designed for the 8088 and 80286 members of the Intel microprocessor family.

The PEM-2530 mainboard uses a 25MHz 32-bit DRAM subsystem and a 32-bit memory expansion bus for maximum bandwidth in the memory subsystem. This architecture is critical to the PEM-2530's performance, given the high bandwidth requirements and 32-bit optimum of the instruction prefetch of the 80386. The 8MHz, 8 and 16-bit expansion buses provide full compatibility with industry-standard hardware expansion products designed for 8MHz 80286-based personal computers.

System Timers

The system has three programmable timer/counters controlled by a VLSI-VL82C100 peripheral controller that encloses the Intel 8254-2 chip. These are channels 0 through 2 defined as follows:

Channel 0	System Timer
GATE 0	TIED ON
CLK IN 0	1.190MHz OSC
CLK OUT 0	8259A IRQ 0

Table 6-9: Channel 0 -System Timer

Channel 1	Refresh Request Generator
GATE 1	TIED ON
CLK IN 1	1.190MHzOSC
CLK OUT 1	Request Refresh Cycle

Table 610: Channel 1-Refresh Request Generator

Note: Channel 1 is programmed to generate a 15 microsecond period signal.

Channel 2	Tone Generation for Speaker
GATE 2	Controlled by bit 0 of port hex 61 PP1 bit
CLK IN 2	1.190MHz OSC
CLK OUT 2	Used to drive speaker

Table 6-11: Channel 2—Tone Generation for Speaker

The sub port of the VLSI is treated by system programs as an arrangement of four programmable external I/O ports. Three are treated as counters; the fourth is a control register for mode programming.

System Interrupts

Sixteen levels of system interrupts are provided by the 80386 NMI as well as the VLSI-VL82C 100 that encloses the two 8259A Interrupt Controller chips. The following shows the interrupt-level assignments, decreasing priority:

Level	Function
Microprocessor NMI	Parity or I/O Channel Check
Interrupt Controllers	
CTLR1 CTLR2	
IRQ 0	Timer Output 0
IRQ 1	Keyboard (Output Buffer Full)
IRQ 2	Interrupt from CTLR 2
	Realtime Clock Interrupt
	Software Redirected to INT OAH (IRQ2)
	Reserved
	Reserved
	Reserved
	Coprocessor
	Fixed Disk Controller
	Reserved
IRQ 3	Serial Port 2
IRQ 4	Serial Port 1
IRQ 5	Parallel Port 2
IRQ 6	Diskette Controller
IRQ 7	Parallel Port 1

Table 6-12: Interrupt Con trollers

ROM Subsystem

The ROM subsystem has a 32K or 64K by 16-bit arrangement consisting of two 32K by 8-bit ROM/EPROM modules. The odd and even address codes reside in separate modules. The top of the first megabyte and the bottom of the last megabyte address space is assigned to ROM (hex 0F 0000 and hex FF0000). Parity checking is not done on ROM.

Note: the EPROM speed should be under 200ns.

RAM Subsystem

The RAM subsystem is a 32-bit memory subsystem that starts at address hex 000000 of the 16M address space. It is a RAM Module installed on CON1, CON2, CON3 and CON4 plus the optional PEI-366 which is installed on the motherboard. The onboard 32-bit memory and the 32-bit memory on the PEI-306 allow for the configuration of extended memory from one to sixteen megabytes. For more information, refer to the PEI-306 user's manual. Memory refresh forces one memory cycle every 15 microseconds through channel 1 of the timer/counter. The following functions are performed by the RAM-initialization program:

- Write operation to any memory location.
- Initialization of channel 1 of the timer/counter to the rate generation mode (15 microseconds).

Note:

Memory can be used only after being accessed or refreshed eight times.

Direct Memory Access

The VLSI-VL82C100 that encloses the two Intel 8237-5 DMA controller chips (four channels in each chip) are used to provide eight DMA channels. The DMA channels are assigned as follows:

CTR 1		CTR 2	
CH 0	Spare	CH 4	Cascade for CTRL 1
CH 1	SDLC	CH 5	Spare
CH 2	Diskette	CH 6	Spare
CH 3	Spare	CH 7	Spare

Table 6-13: DMA Channels

DMA Channels

Channels 0 through 3 are contained in DMA controller 1. Transfers of 8-bit data, 8-bit I/O adapters and 8-bit or 16-bit system memory are supported by these channels. Each of these channels will transfer data in 64KS blocks throughout the 1 g-megabyte system address space.

Channels 4 through 7 are contained in DMA controller 2. To cascade channels 0 through 3 to the microprocessor, use channel 4. Transfer of 16-bit data between 16-bit adapters and 16bit system memory are supported by channels 5, 6 and 7. DMA channels 5 through 7 will transfer data in 128KB blocks throughout the 16-megabyte system address space. These channels will not transfer data on odd-byte boundaries.

The addresses for the page register are as follows:

Page Register	I/O Hex Address
DMA Channel 0	0067
DMA Channel 1	0063
DMA Channel 2	0061
DMA Channel 3	0062
DMA Channel 5	0068
DMA Channel 6	0089
DMA Channel 7	000A
Refresh	008F

Table 6-14: Addresses for the Page Register

Address generation for the DMA channels is as follows:

For DMA Channels 3 through 0		
Source	DMA Page Registers	8237A - 5
Address	A23 ↔ A16	A15 ↔ A0

Table 6-15: Address Generation for DMA Channels 3 Through 0

Note: To generate the addressing signal “byte high enable” (BHE), invert address line A0.

For DMA Channels 7 through 5		
Source	DMA Page Registers	8237A - 5
Address	A23 ↔ A17	A16 ↔ A1

Table 6-16: Address Generation for DMA Channels 7 Through 5

Note: The BHE and A0 addressing signals are forced to a logical 0. DMA channel addresses do not increase or decrease through page boundaries (84KB for channels 0 through 3 and 128KB for channels 5 through 7).

I/O Channel Slots

The I/O channel supports:

- Refresh of system memory from channel micro-processors
- Selection of data accesses (either 8 or 16-bit)
- Interrupts
- 24-bit memory addresses (16MB)
- I/O wait-state generation
- I/O address space hex 100 to hex 3FF
- Open-bus structure (allowing multiple microprocessors to share the system's resources, including memory)
- DMA channels

The pinouts of the expansion bus I/O channels are shown as below and on the next page.

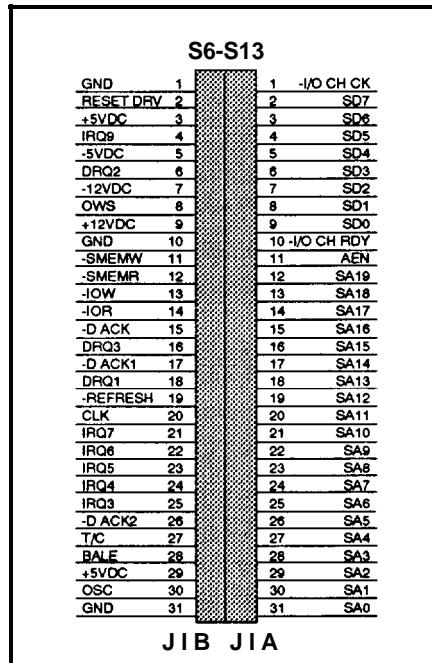


Figure 6-16: Sixty-Two Pin I/O Channels

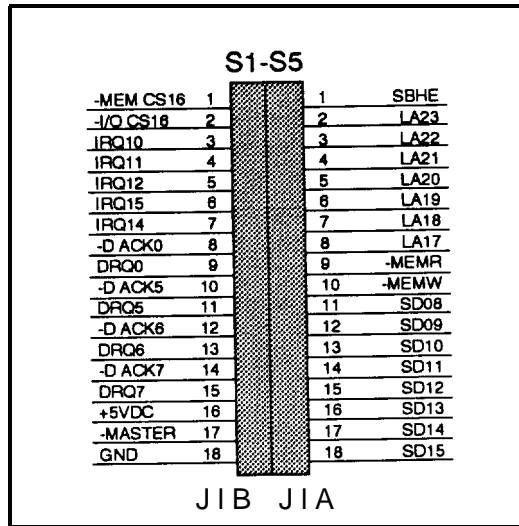


Figure 6-17: Thirty-Six Pin VO Channels

Math Coprocessor Control

The math coprocessor functions as an I/O device through I/O port addresses hex OF8, OFA and OFC. The microprocessor sends OP codes and operands to I/O ports. The microprocessor also receives and stores results through the same I/O ports. The "busy" signal sent by the coprocessor forces the microprocessor to wait until the coprocessor has finished executing.

The following describes the math coprocessor controls:

OF0

The latched math coprocessor busy signal can be cleared with an 8-bit "out" command to port FO. The coprocessor will latch "busy" if it asserts its error signal. Data output should be zero.

OF1

The math coprocessor will reset if an 8-bit "out" command is sent to port F1. Again, the data output should be zero.

32-bit Memory Expansion Bus

The 32-bit-memory expansion bus optimizes the memory subsystem to take advantage of the 32-bit architecture of the 80386. The PEM-2530 mainboard and PEI-306 RAM Board allow for the configuration of extended local memory up to 16MB. This bus is not intended to be a general-purpose, industry standard 32-bit bus. It is simply a mechanism to optimize the performance of the PEM-2530 memory subsystem for the 80386 architecture.

32-bit Memory Expansion Bus Signals

- D0, D1, D2, D3, D4, D5, D6, D7

These bidirectional signals should be driven during 32-bit memory access when qualified by the SBEO signal going active.

- D8, D9, D10, D11, D12, D13, D14, D15

These bidirectional signals should be driven during 32-bit memory access when qualified by the SBE1 signal going active.

- D16, D17, D18, D19, D20, D21, D22, D23

These bidirectional signals should be driven during 32-bit memory access when qualified by the SBE2 signal going active.

- D24, D25, D26, D27, D28, D29, D30, D31

These bidirectional signals should be driven during 32-bit memory access when qualified by the SBE3 signal going active.

- MA0-MA7, 1MA8, 2MA8, MA9

These output signals address memory devices on the 32-bit memory bus.

- SBEO

This output signal (active low) indicates when the 32-bit memory board should operate on D0 through D7.

- SBE1

This output signal (active low) indicates when the 32-bit memory board should operate on D8 through D15.

- SBE2

This output signal (active low) indicates when the 32-bit memory board should operate on D16 through D33.

- SBE3

This output signal (active low) indicates when the 32-bit memory board should operate on D24 through D31.

- RA17-RA23, RA31, RF25

These outputs are qualified to enable each bank of memory.

- REFRESH

This output signal indicates a refresh cycle.

- BAMEMR

This output signal (active low) orders the memory device to output data to the data bus.

- BAMEMW

This output signal (active low) instructs the memory devices to store the data present on the data bus.

- MRAS

This output signal (active low) provides the “RAS” signal to the DRAM.

- MCAS

This output signal (active low) provides the “CAS” signal to the DRAM.

- ERR0/ERR3

This output signal (active low) indicates the RAM card DRAM parity error.

The pinouts for the eighty-pin I/O channels of the 32-bit memory expansion bus are shown below:

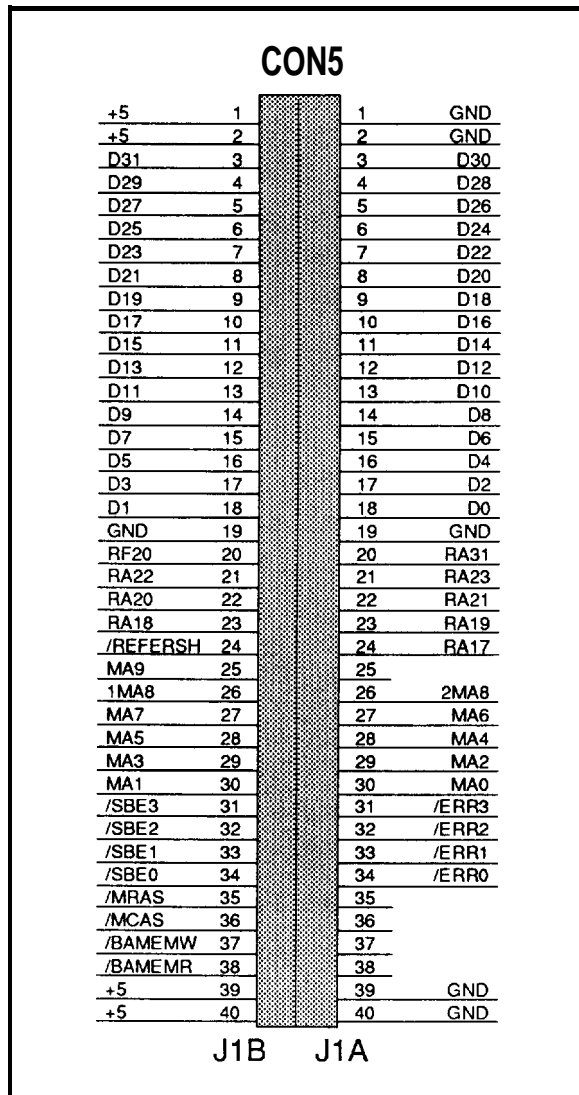


Figure 6-18: Pin Assignments of the 32-bit Memory Expansion Bus

Glossary

Chapter

7

Some of the terms you will come across frequently in this manual are defined here.

add-on card

- This card connects through expansion slots to the motherboard. Also known as an adapter, an expansion card or an interface card, this is used to increase the capabilities of your computer.

address

- This is a value that is given to specific memory locations so that data can be read or written. Make sure that devices do not have the same address. Otherwise, there will be an address conflict.

ASCII

- This is an acronym for the American Standard Code for Information Interchange. The ASCII code includes both control and graphic characters, and is used for exchanging information between data-processing systems, data-communication systems and related equipment.

asynchronous communication

- A type of information vehicle whereby data can be transmitted at any time without requiring synchronized timing.

back up (v)

- To make a spare copy of a disk or of a file.

backup (n)

- A copy of a disk or file.

bank

- The area on a printed circuit board for RAM chips is usually divided into rows. These are called banks.

BIOS

— This stands for Basic Input Output System. BIOS controls the real-time clock and disk drives as well as the computer's peripheral equipment.

bit

— This is a binary data digit, either 1 or 0. 1 or 0 represents a single unit of data.

boot

— This means to turn on the power switch and load the operating system (DOS) into the computer so that it is ready to accept software applications.

bus

— This is a set of lines that transmit signals/information between the components within the computer. If the I/O channel is 32-bit, this means the data travels at least twice as fast as data on a 16-bit data bus.

byte

— A group of data units forming a single unit of data. There are eight bits in a single byte.

clock (processing) speed

— This measurement, usually given in MHz (megahertz) tells how fast the microprocessor in your computer handles data. The higher the number, the faster your computer.

CPU

— Central Processing Unit. Also known as a microprocessor. This chip processes all the instructions in the computer.

computer

— An electronic device that can receive, store and transmit data, and process arithmetic or logic operations.

cursor

— The blinking, moving spot of light that marks the active place on the monitor.

data

— Any kind of information. However, this word is generally used to describe computer-related information.

debug

— A method for correcting computer errors.

default

— This is an existing setting in a computer.

DIP

— This is an acronym for Dual In-line Package, which is a method for packaging integrated circuits.

directory

— A directory works like a desk drawer to keep files. It contains not only your files but also the information on the size of the file and the dates they were created and updated. It is always good to organize all the related files in the same directory.

diskette

— This refers to removable data storage disks, sometimes also called floppies or floppy disks. Diskettes generally come in two sizes: 5.25" and 3.5".

disk drive

— A device that stores and retrieves data.

display

— The information/graphics visible on the monitor screen.

DOS

— Disk Operating System. This is a set of commands is used to control the operations of a computer and its peripheral components.

DRAM

— Dynamic Random Access Memory. This type of RAM chip differs from Static Random Access Memory (SRAM).

driver

— A program that lets a peripheral device and a computer function harmoniously; a hard disk driver controls exchanges between a hard disk and a computer.

expansion slot

— This is a slots in which adapters and/or cards can be housed.

file

— A file is a collection of related information/data you store on a diskette or a hard disk drive.

filename

— Each file on a disk has a name. This name has two parts: a filename and an extension. In DOS, filenames are from one to eight characters long. An extension starts with a period, has three characters and follows immediately after the filename.

fixed or hard disk

— This is a non-removable disk used for storage of large volumes of data.

format

— The arrangement of data on a magnetic disk. Format also means to prepare a disk.

hardware

— All physical components of a computer.

HZ

— Hertz. This signifies one complete cycle of a wave signal.

I/O

— Input/Output. The transfer of data between the computer and its peripheral components.

IC

— Integrated Circuit.

interface

— A means for electronic machines to communicate. Interface also means to communicate with a computer and its peripheral components.

kilobyte (KS)

— A single data unit that is composed of 1024 bytes.

math coprocessor

— A math coprocessor lets you do arithmetic and calculations more efficient.

megabyte (MB)

— A single data unit that is composed of 1,048,576 bytes.

memory address

— A hexadecimal or decimal value given to a memory location.

microprocessor

— This is an integrated circuit that receives coded instructions for execution. It is also referred to as a CPU.

modem

— A modem lets your computer communicate with other computers over telephone lines.

motherboard

— It is the main printed circuit board in the system case. It is also known as a mainboard or systemboard.

MS-DOS

— The Microsoft Disk Operating System. This is the most popular operating system for IBM PCs and compatibles.

network

— A network lets everyone in your group communicate with one another or share the cost of high-performance resources.

ns

- Nanoseconds. This is a unit of time measurement for processing speed.

operating system

- This is software that controls the execution of programs.

output

- Any information or bits of data that are channeled from one electronic device to another.

partition

- A disk drive can be divided into several logical sections or partitions, each of which becomes a logical device with a drive letter.

peripheral

- Output devices which are driven by the computer.

port

- A communication channel between a computer and its peripheral components.

printed circuit board

- An electronic circuit board sandwiched between fiberglass plates.

program

- A series of instructions that command the computer to perform certain tasks.

prompt

- A screen message or position of the cursor at the beginning of a line.

RAM

- Random Access Memory; read/write memory. The memory in a computer while it is activated. When the power is turned off, this type of memory is cleared.

ROM

— Read Only Memory. This is data that is stored on an IC in the computer.

KG-232

— *RS232* is a standardized communications interface between data communication equipment and your computer.

setup

— This section guides you through the preparations you'll need to make before operating your computer. If this is your first computer, you're advised to read this section carefully. Although this system has been designed to be as foolproof as an ordinary television set, a careful reading of this section will help you to ensure the long life and trouble free operation of your computer.

software

— Computer programs such as a word processor, operating system or programming languages.

synchronous transmission

— Syncopated transmission of signals between devices.

Turbo

— High-speed

virtual disk

— Also referred to as a RAM disk, this is a portion of memory used to simulate a hard disk.

wait state

— Wait states are pauses. Zero wait state means there are no pauses when the contents of the memory chips are being read.

window

— A independent screen that can be invoked onto the monitor and in which data can be viewed, altered or stored.