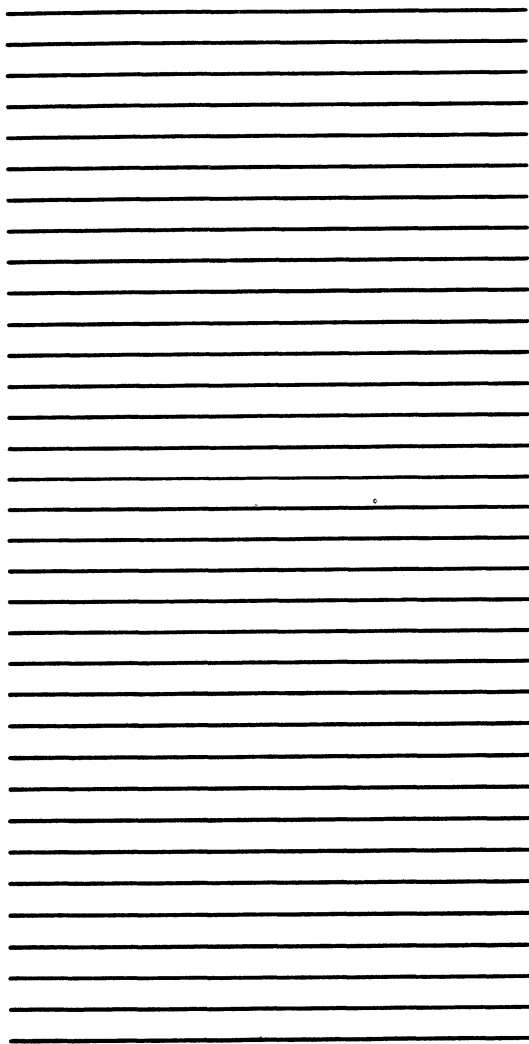
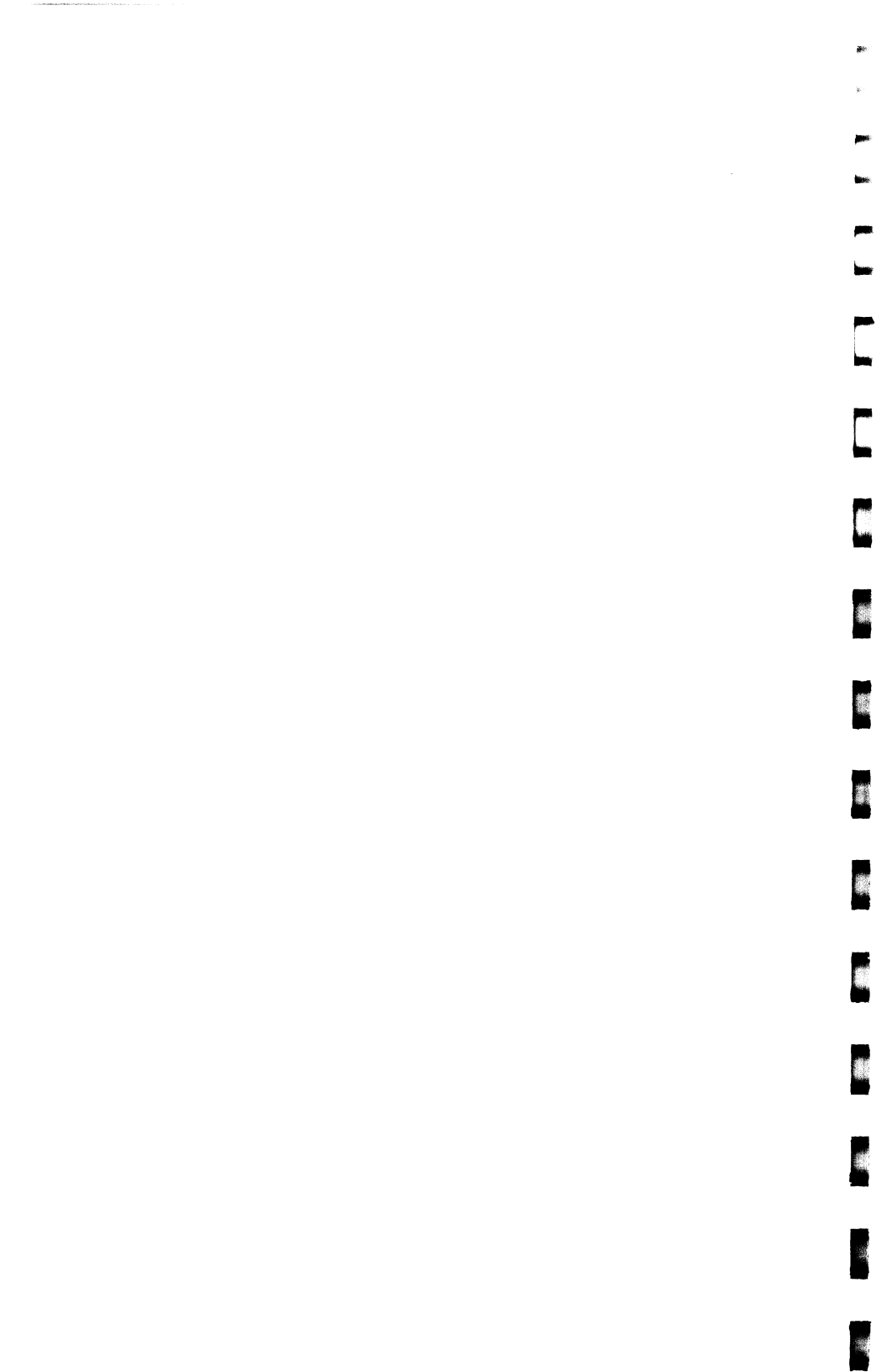


MARK 386

*Business
System
Installation/
Operation
Guide*



POINT
DATA CORPORATION





**MARK 386
Business System**

**Installation/
Operation
Guide**

December 1988

NOTICE

Every effort has been made to make this manual complete, accurate and up-to-date. However, all information herein is subject to change due to updates. All inquiries concerning this manual should be directed to POINT 4 Data Corporation.

WARNING!

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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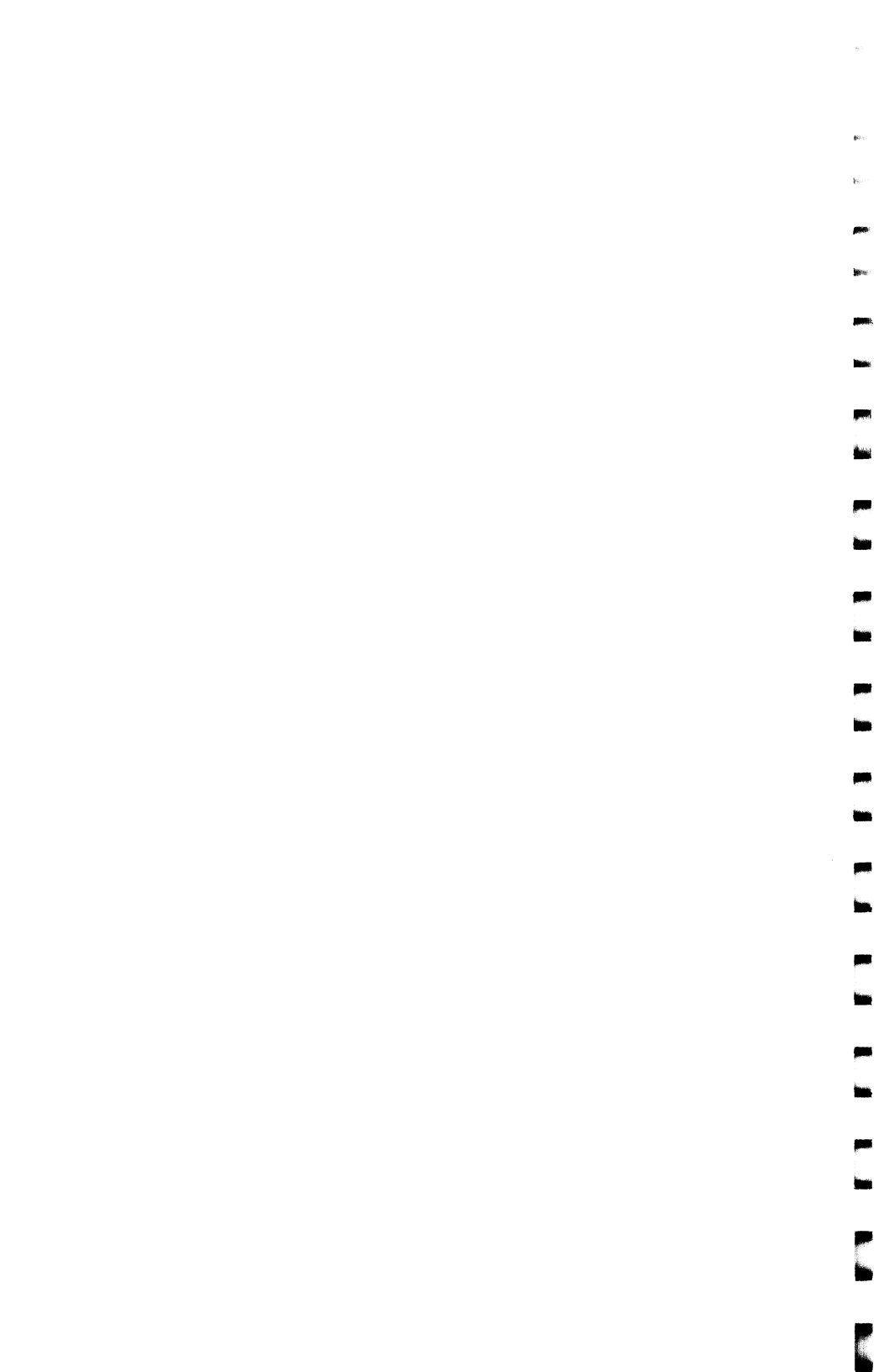
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Section 1

GETTING TO KNOW YOUR COMPUTER

Your AT-compatible supermicrocomputer workstation (Figure 1-1) is a powerful, multitasking, high-speed system ideal for use in business environments. Based on the 32-bit INTEL* 80386 processor, and operating at 20 MHz with zero wait state memory, your computer can zip through your business application software many times faster than an IBM** PC/AT.

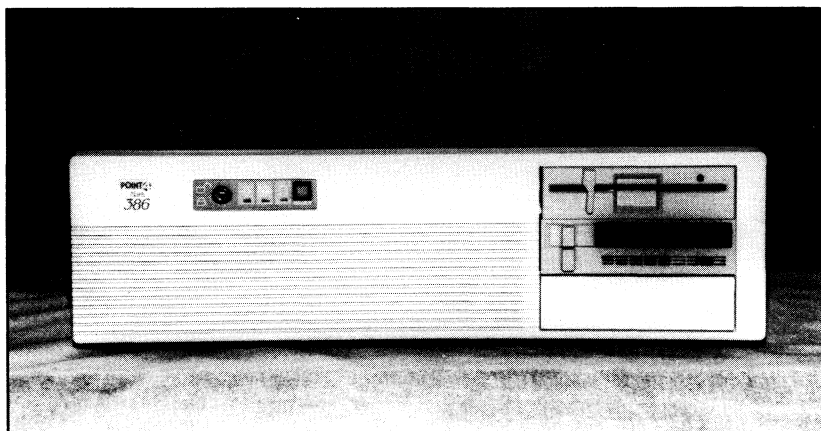


Figure 1-1. The MARK 386 Business System

*INTEL is a trademark of Intel Corporation.

**IBM is a registered trademark of International Business Machines, Inc.

1.1 MARK 386 SYSTEM FEATURES

- Intel 80386 32-bit microprocessor
- 20 MHz operation
- Automatic speed switching to 8 MHz for all I/O operations to ensure the compatibility of all option cards
- One 32-bit memory card with 2 Mbyte of DRAM memory
- Supports SCO XENIX*, MS-DOS* and UNIX** Systems V/386 and VP/ix
- Phoenix*** ROM BIOS for IBM PC/AT compatibility
- Motherboard incorporates floppy/hard disk drive controller, ST-506 interface, video circuitry, two IBM PC/AT-compatible serial ports, one monitor port and one IBM-compatible parallel printer port
- Supports monochrome/Hercules/CGA/EGA video modes at the register level; automatic video mode switching
- Five 16-bit IBM PC/AT bus-compatible expansion slots
- 1.2 Mbyte floppy disk drive
- 85 Mbyte ST-506 hard disk drive
- 150 Mbyte 1/4-inch tape backup drive

*XENIX and MS-DOS are registered trademarks of Microsoft Corporation.

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***Phoenix is a tradename of Phoenix Technologies Ltd.

- Clock/calendar with battery backup
- Socket for optional 80387 math coprocessor
- Front panel hardware reset button
- Front panel indicator light for 20 MHz operation
- ROM-resident hardware configuration program (SETUP)

1.2 OPTIONS

The following items are available from POINT 4 as options for your computer:

- 8-port serial controller board
- 2, 4, 8, or 16 Mbytes of system RAM memory
- Intel 80387 math coprocessor
- Enhanced AT-style 101-key keyboard
- 12-inch amber flat surface monochrome graphic display monitor
- 14-inch amber video display terminal featuring high-resolution screen, 80/132 column display, programmable function keys
- 170 or 382 Mbyte ESDI hard disk drive

1.3 THE CENTRAL PROCESSING UNIT

The central processing unit (CPU) is the "heart" of any computer system. Here, data is received through an input device, manipulated by the processor circuitry, and distributed through an output device and/or stored in a data storage device.

1.3.1 The Motherboard

The "heart" of the CPU is the VLSI (Very Large Scale Integration) design main circuit board, called the motherboard, on which the following electronic subsystems reside:

- **Processor Circuitry** - Based on the 32-bit Intel 20 MHz 80386 microprocessor and an optional 80387 math coprocessor chip for greatly accelerated numeric processing
- **Floppy/Hard Disk Drive Controller Circuitry** - Supports up to four data storage devices. The possible configuration combinations are any combination of the following to a total of four, as long as one storage device is a 1.2 Mbyte floppy drive:

- Up to 2 floppy drives
- Up to 2 hard disk drives
- 1 tape backup drive

- **Video Circuitry** - The sophisticated automatic mode switching design supports the most popular video modes at the register level:

- Monochrome/Hercules - 720 x 348 pixel resolution
- CGA - 640 x 200 pixels
- EGA - 640 x 350 pixels
- Extended EGA - 640 x 480 pixels

- **Serial and Parallel Circuitry** - Supports two DB9 IBM PC/AT-compatible serial ports, and one IBM-compatible parallel printer port
- **Real-Time Clock with Battery Backup** - The hardware configuration data stored on the motherboard is protected from loss by a long-life lithium battery

CAUTION

The hardware configuration data will be lost if the battery is disconnected from the motherboard.

1.3.2 Memory Card

A separate memory card (Figure 1-2) plugs into a special 32-bit expansion slot on the motherboard. The available memory configurations are 2, 4, 8, or 16 Mbytes organized as follows, in Single In-line Memory Modules (SIMMs):

- 2 Mbytes - Eight 256 kbyte x 9 SIMMs
- 4 Mbytes - Sixteen 256 kbyte x 9 SIMMs
- 8 Mbytes - Eight 1 Mbyte x 9 SIMMs
- 16 Mbytes - Sixteen 1 Mbyte x 9 SIMMs

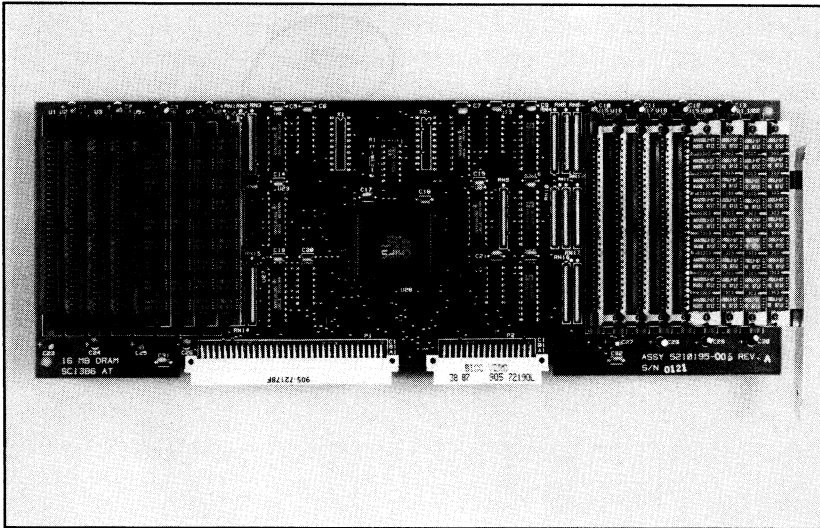


Figure 1-2. The Memory Card

1.3.3 Front Panel Controls and Indicators

The front panel of your computer is shown in Figure 1-3. The controls and indicators consist of:

- **Keyboard/enclosure lock switch** - Enables or disables the keyboard and locks or unlocks the enclosure. Is used to prevent keyboard input during critical tests or data processing, and unauthorized removal of the enclosure

Two lock symbols appear to the right of the switch, one open and the other closed. If the switch is turned to the "closed lock" position, the keyboard is disabled and the enclosure is locked

- **Hardware reset push button** - "Cold boots" the system without having to switch the power off and on

- **Power on indicator** - A green light-emitting diode (LED) which indicates power is supplied to the unit and the power switch is on
- **Hard disk drive indicator** - This red LED is lit whenever the hard disk is being accessed. The picture of a cylinder appears above this LED
- **20 MHz operation indicator** - An amber LED which lights and remains lit when the processor is operating at 20 MHz. The word "turbo" appears above this indicator

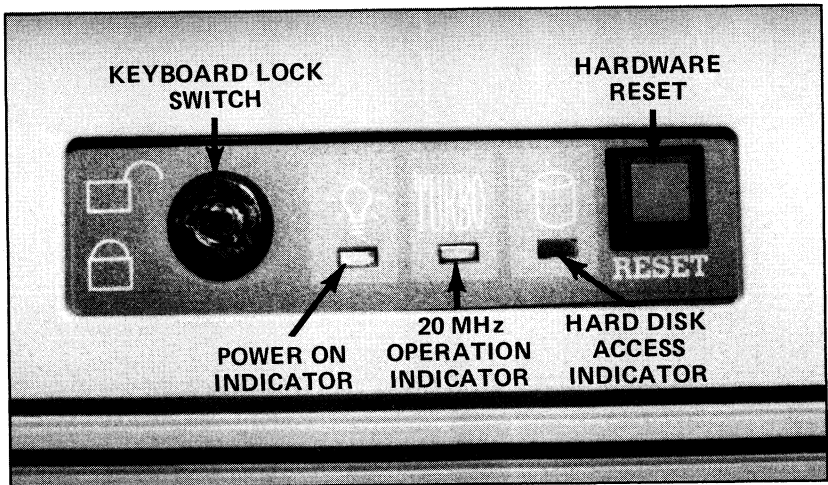


Figure 1-3. Front Panel Controls and Indicators

1.3.4 Selecting the Processor Speed

The speed of the 80386 processor can be selected by the SETUP program or from the keyboard for either 8 or 20 MHz operation. This is an important feature, since some software will not work well at speeds over the IBM AT standard 8 MHz. The computer boots at the speed chosen in the SETUP program as the default setting.

To select the processor speed, hold down <Ctrl> and <Alt>, then press the <up arrow> or <down arrow> keys on the numeric keypad.

1.3.5 Input/Output Devices

Input/output devices for your computer include:

- A 101-key enhanced design keyboard (optional)
- Two DB9 IBM PC/AT-compatible serial ports and one DB25 IBM-compatible printer port on the rear panel for connecting a modem, mouse, printer, or other external input device

1.3.6 Data Storage Devices

Your computer is equipped with five half-height slots for data storage devices. Two slots may be combined to accept a full-height device.

The basic MARK 386 system includes an 85 Mbyte ST-506 hard disk drive, a 1.2 Mbyte floppy disk drive, and a 150 Mbyte tape backup drive. The system may be ordered with a 170 Mbyte or 382 Mbyte ESDI hard disk drive.

1.4 THE KEYBOARD

The optional keyboard (Figure 1-4) is a 101-key enhanced AT-style keyboard, with 12 function keys and separate cursor and number pads. The keyboard also offers a large RETURN key, and LED indicators for number lock, caps lock, and scroll lock.

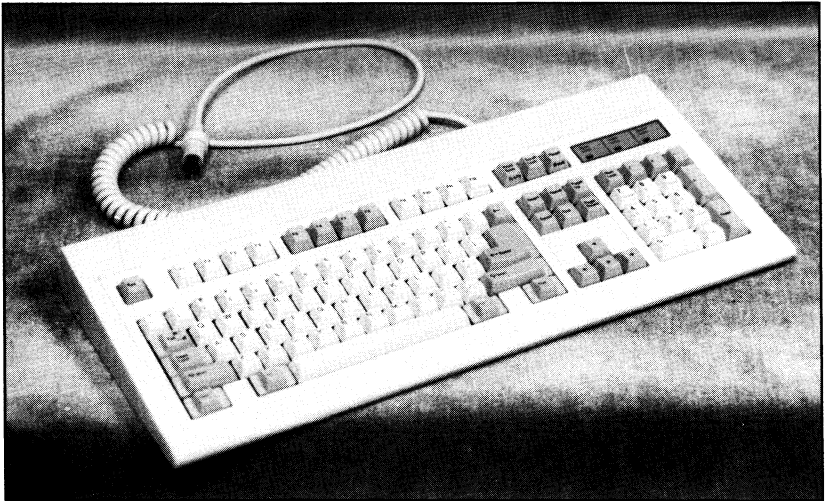


Figure 1-4. The Keyboard

1.5 THE FLOPPY DISK DRIVE

The MARK 386 system will accept up to two half-height drives. The basic system includes one half-height floppy disk drive with 1.2 Mbytes of capacity. This allows up to 1.2 million bytes of information to be stored on a single diskette.

1.5.1 Diskette Requirements

For the optimum performance of your computer, use only diskettes that have been certified to be 100% error-free. Low-priced diskette "deals" that sound too good to be true usually are. Low-quality diskettes can have failure rates as high as 25% or more.

Diskettes are delicate and should be handled with care. Here are some do's and don'ts for handling diskettes:

Do's

- Do keep diskettes in their protective anti-static envelopes when they are not in use
- Do store seldom used diskettes in their boxes or some other safe place
- Do handle diskettes carefully
- Do write-protect all important diskettes by covering the write-protect notch with tape or specially designed stickers
- Do make backup copies of all important diskettes

Don'ts

- Don't bend or fold diskettes
- Don't touch any part of the internal diskette surface
- Don't expose diskettes to strong electromagnetic fields such as those generated by magnets, telephones, televisions, and video display terminals
- Don't expose diskettes to very hot or cold temperatures, or high relative humidity
- Don't put heavy objects on top of diskettes
- Don't write on diskette labels with anything other than a soft felt tip pen, while on the diskette

1.5.2 Diskette Insertion

To insert the diskette into the drive, the diskette label must be facing up and the write-protect notch must point to the left (Figure 1-5). Press the diskette into the drive until it latches. Close the drive door by turning the handle down until it stops.

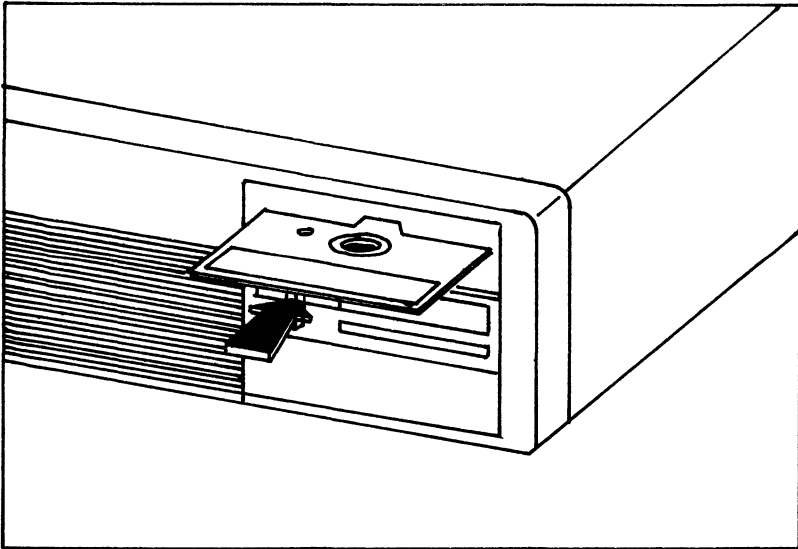


Figure 1-5. Proper Floppy Diskette Orientation for Insertion

1.6 THE HARD DISK DRIVE

The MARK 386 system is factory-equipped with a standard ST-506 interface on the motherboard, along with the driver circuitry for hard disk drives. Drives available from the factory include one with 85 Mbyte capacity, and with the ESDI interface option, drives with 170 and 382 Mbyte capacity.

The hard disk drive is supplied with low-level formatting. The user is required to perform high-level format and to create DOS or UNIX partitions, as required. Refer to Section 4 for DOS installation or Section 5 for XENIX installation.

1.7 THE TAPE BACKUP DRIVE

Your computer includes a 150 Mbyte tape backup drive. A tape backup drive is used, as its name implies, to periodically "backup" or archive the data on the hard disk. This half-height drive occupies the second highest half-height slot in the right of the chassis.

To utilize the drive's full 150 Mbyte capacity, DC600XTD tapes must be used.

1.8 VIDEO DISPLAYS

POINT 4 offers two optional video displays for your MARK 386 system:

- 12-inch amber flat surface monochrome graphic display monitor
- Full-featured, conversational, editing alphanumeric video display terminal with high-resolution 14-inch amber screen, 80/132 column display, programmable function keys

A standard 9-pin (DB9) video connector is provided on the rear panel of your computer for connecting video monitors. Switches on the motherboard must be set for the type of monitor to be used. Refer to Section 3, Setting Up Your Computer, for additional details on connecting a monitor to your computer.

The sophisticated video circuitry on the motherboard will support a wide range of video modes (automatic mode selection) at the register level:

- Monochrome/Hercules (HGC) - 720 x 348 pixels
- Color (CGA) - 320/640 x 200 pixels
- Enhanced color (EGA) - 640 x 350 pixels
- Extended EGA - 640 x 480 pixels (requires a multi-frequency monitor)

1.9 PRINTERS

Your computer provides both serial and parallel ports on the rear panel, allowing the connection of most commercially available printers. The two serial ports are standard DB9 IBM PC/AT-compatible printer connectors, while the parallel port is a standard DB25 IBM-compatible printer connector. Refer to Section 3, Setting Up Your Computer, for additional details on connecting a printer.

1.10 OPTION PORTS

Your computer is equipped with four option ports:

- one 9-pin (DB9F) female video port
- one 25-pin (DB25) standard IBM-compatible parallel printer port
- two 9-pin (DB9M) male IBM PC/AT-compatible serial ports

Port Descriptions:

1. The DB25 standard IBM-compatible printer port can be used for the connection of a printer or any other device requiring a parallel connector. See Section 3 for pinout information.
2. The two DB9 male IBM PC/AT-compatible serial ports can be configured to allow you to connect your MARK 386 system to a main-frame downlink, computer terminal, mouse, modem, etc. The external device connection must terminate in a DB9 female connector. See Section 3 for pinout information.



Section 2

INSTALLING INTERNAL OPTIONS

Your MARK 386 system has built-in expansion features, allowing the user to "customize" the system for specific applications. User-installable options include RAM memory, a math coprocessor, an additional floppy or hard disk drive, and third-party option boards. All user-installable options require removal of the enclosure.

2.1 REMOVING AND REPLACING THE ENCLOSURE

The enclosure protects the internal computer components from damage and marginally from dust. It must be removed to install any internal options.

WARNING!

Make sure the system power switch is off and the power cord is disconnected from the wall outlet before attempting to remove the enclosure.

Tools Needed:

The tool needed for removing the enclosure is either a #2 Phillips screwdriver or a 1/4-inch nut driver.

Removal Procedure:

1. Make sure the keyboard/enclosure lock switch on the computer front panel is in the unlocked position.

2. Locate the five enclosure retaining screws on the rear panel of the computer (see Figure 2-1).

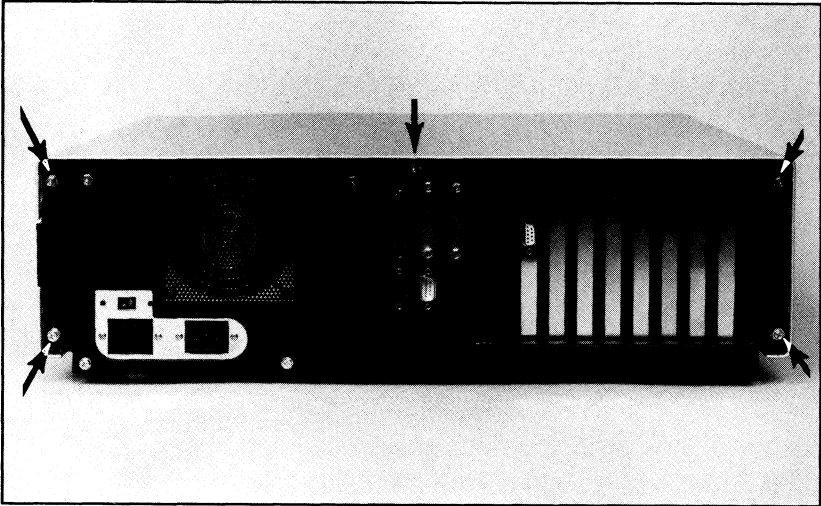


Figure 2-1. Location of the Enclosure Retaining Screws

3. Remove the retaining screws with the screwdriver or the nut driver.
4. Face the front of the computer. Grasp the enclosure on the left and right sides simultaneously. Gently slide the enclosure forward until it is free from the chassis (See Figure 2-2).

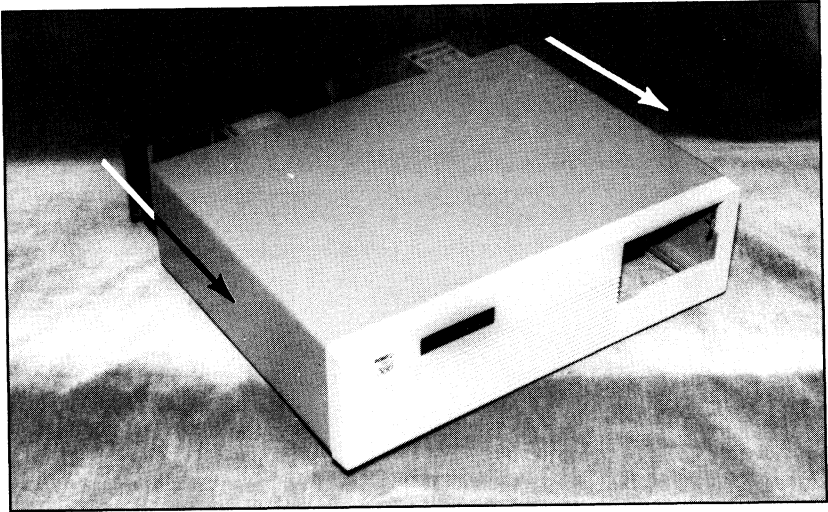


Figure 2-2. Removing the Enclosure

Replacement Procedure:

Replace the enclosure by reversing steps 1 through 3 in the previous procedure.

2.2 ADDING RAM MEMORY

Your computer is factory-equipped with a 32-bit memory card capable of holding 2, 4, 8, or 16 Mbytes in the form of Single In-Line Memory Modules (SIMMs). The modules are installed in the memory sockets on the memory card. The available memory configurations are as follows:

TABLE 2-1. SIMM MEMORY CONFIGURATIONS

2 Mbytes	- Eight 256 Kbyte x 9 DRAM SIMMs
4 Mbytes	- Sixteen 256 Kbyte x 9 DRAM SIMMs
8 Mbytes	- Eight 1 Mbyte x 9 DRAM SIMMs
16 Mbytes	- Sixteen 1 Mbyte x 9 DRAM SIMMs

Use the following procedure to install system memory:

WARNING!

Make sure the system is turned off and unplugged before attempting this procedure.

CAUTION

Memory components are extremely susceptible to damage from static electricity. Installation in an uncarpeted area is recommended.

Always touch a metal surface, such as a desk or bench to dissipate static charges before handling memory components.

1. Remove the enclosure using the procedure in Section 2.1.
2. Locate the memory card. Remove the memory card by removing the retaining screws holding the card to the expansion slot bracket and the motherboard, and pulling straight up on the card (Figure 2-3).

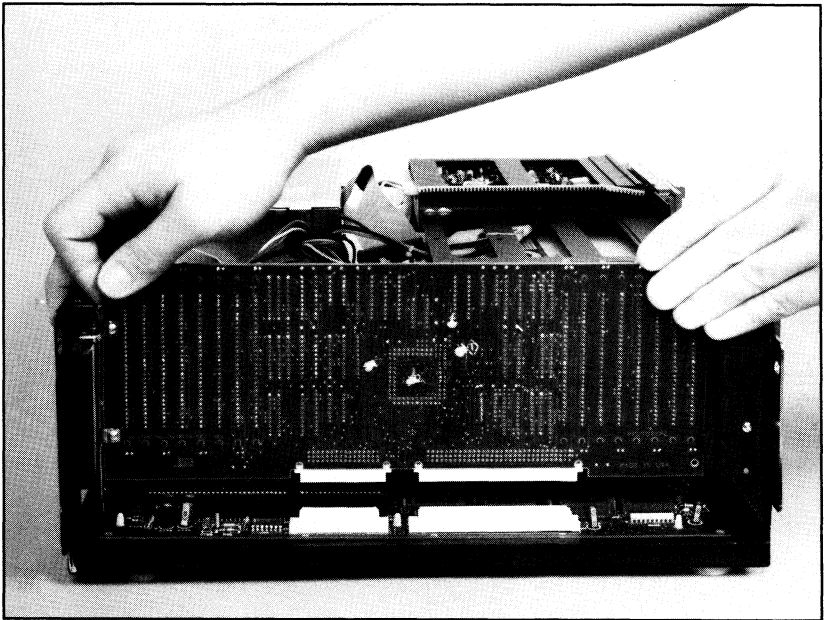


Figure 2-3. Removing the Memory Card

3. Locate the memory sockets on the memory card (Figure 2-4). Install the SIMMS in the locations given below:

NOTE

When upgrading from 2 Mbytes to 8 or 16 Mbytes, all eight 256 Kbyte SIMMs must be removed.

TABLE 2-2. SIMM MEMORY SOCKET LOCATIONS

Memory Capacity	SIMMs Required	SIMM Socket Numbers
2 Mbytes	Eight 256 Kbyte x 9	U5-U8, U19-U22
4 Mbytes	Sixteen 256 Kbyte x 9	U1-U8, U15-U22
8 Mbytes	Eight 1 Mbyte x 9	U5-U8, U19-U22
16 Mbytes	Sixteen 1 Mbyte x 9	U1-U8, U15-U22

- a. If required (see note above), remove current modules by carefully spreading the clips holding them to the sockets, and tilting the modules away from the board. Lift the modules out at an angle to remove.
 - b. Repeat step 3a for the remainder of the modules.
4. Starting with sockets U8 and U22, install the new modules by inserting them into the sockets at an angle, with the notch pointing toward the rear of the system. Press down while raising them to the vertical until they snap into place. Next install U7 and U21, U6 and U20, etc.
 5. Replace the memory card, reversing the procedure used in step 2.

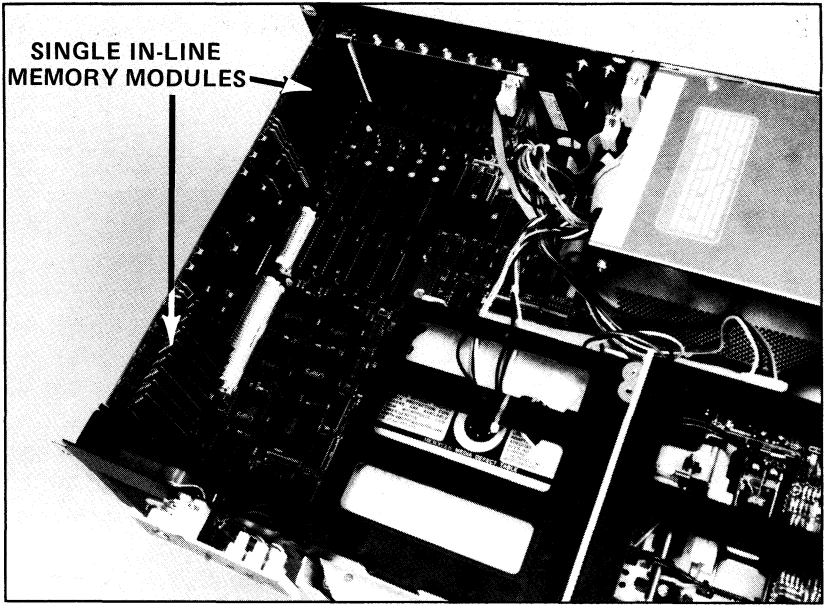


Figure 2-4. Location of the Single In-line Memory Modules (SIMMs)

6. Replace the cover by reversing the procedure given in Section 2.1.
7. Plug the AC cord into the wall outlet and turn the power switch to on.
8. You must now run the ROM-resident hardware configuration program SETUP. This permits the additional memory to be accessed by your CPU. Access SETUP by holding down <Ctrl> and <Alt> then pressing <Esc>.

For more information on running SETUP refer to Section 3.5.

2.3 INSTALLING THE MATH COPROCESSOR

The addition of an 80387 math coprocessor will greatly reduce the time required to run math intensive software, such as spreadsheets, financial or scientific packages, and CAD/CAM programs. The coprocessor is installed in socket U65, using the following procedure:

WARNING!

Make sure the system is turned off and unplugged before attempting this procedure.

CAUTION

The math coprocessor is extremely susceptible to damage from static electricity. Installation in an uncarpeted area is recommended.

Always touch a metal surface, such as a desk or bench to dissipate static charges before handling the math coprocessor.

1. Remove the enclosure using the procedure in Section 2.1.
2. Locate socket U65 on the motherboard (Figure 2-5).
3. Align the notched end on the 80387 math coprocessor chip with the notch in the socket. Carefully press the chip into the socket, making sure all pins are properly inserted and are not bent.
4. Installation of the math coprocessor is now complete. Replace the enclosure by reversing the procedure given in Section 2.1.
5. You must now run the ROM-resident hardware configuration program SETUP and exit with <Esc>. This automatically enables the math coprocessor.

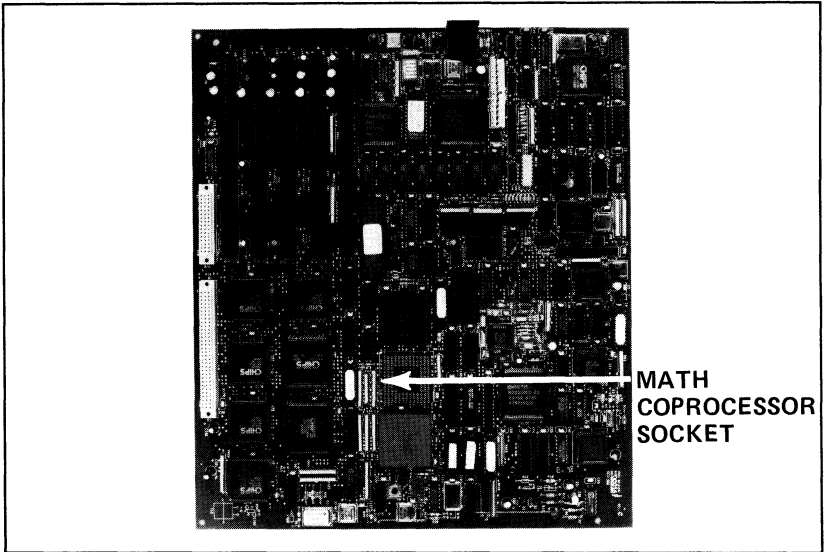


Figure 2-5. Location of the Math Coprocessor Socket

2.4 INSTALLING OPTION BOARDS

Your MARK 386 system offers five 16-bit AT-compatible expansion slots for optional boards, labeled J7 through J11 (Figure 2-6). The option board may be an internal modem or other communications board, a mouse driver, or a special application board.

The boards are held in place by the card edge connector, which holds the board into the slot, and the backplate, which is connected to the rear panel by a single screw (see Figure 2-6).

Use the following procedure to install all option boards:

1. Remove the enclosure using the procedure in Section 2.1.
2. Locate the expansion slots J7 through J11 and the rear panel expansion slot covers (Figure 2-6).
3. Select the expansion slot you wish to use. Remove the rear panel cover for that slot by removing the cover retaining screw with either a #2 Phillips screwdriver or a 1/4-inch nut driver. Retain the screw.

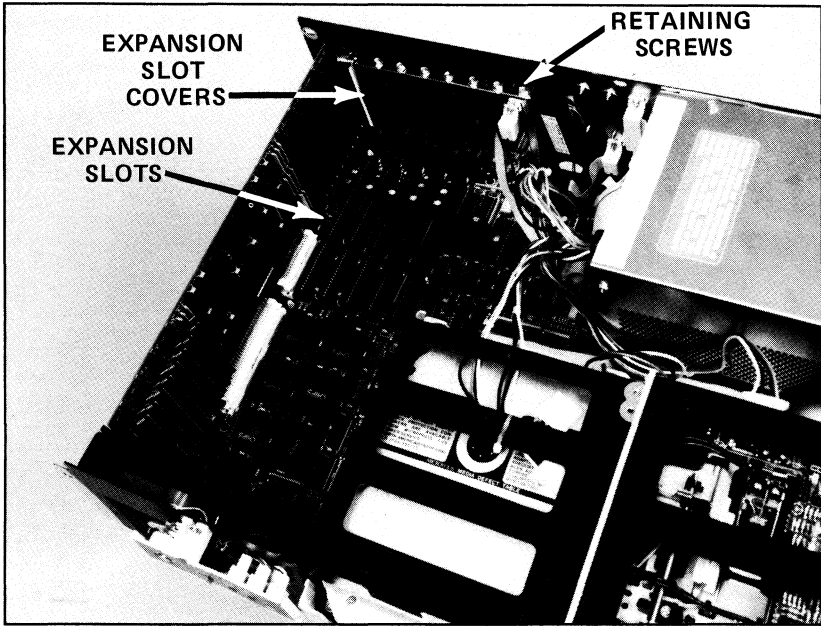


Figure 2-6. Location of Expansion Slots

4. Press the option board into the slot firmly to engage the card edge connector. Install the screw to secure the slot cover to the board and tighten it.
5. Repeat steps 3 and 4 for each option board you wish to install. Replace the enclosure by reversing the procedure used in Section 2.1.

2.5 INSTALLING MASS STORAGE DEVICES

Your computer provides the flexibility for adding additional internal mass storage devices. There is a system limit of five half-height slots.

CAUTION

If you wish to use your own floppy/hard disk drive controller card, it can be secondary to the motherboard controller circuitry. Alternatively, it can be configured as the primary controller.

NOTE

The system power supply has outlets for only four drives.

2.5.1 Installing a Hard Disk Drive

Your computer will support up to two half-height or one full-height hard disk drive. The basic system contains an 85Mbyte full-height ST-506 drive; 170 or 382 Mbyte capacity full-height ESDI drives are available as factory options.

Full-height drives are installed in the chassis central location and/or the middle and bottom right-hand half-height slots (see Figure 2-7). Half-height drives are installed in the right-hand half-height slots only.

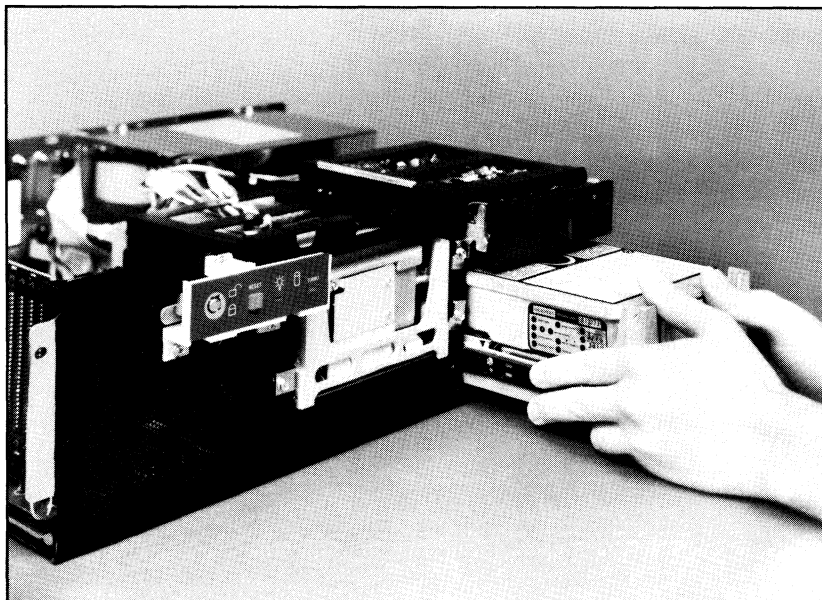


Figure 2-7. Mounting Location of an Optional Hard Disk Drive

IMPORTANT

You must run the SETUP program (Section 3) after performing this procedure to update the system hardware configuration.

2.5.1.1 Installing ST-506 Drives

WARNING!

Make sure the system power switch is off and the power cord is disconnected from the wall outlet before attempting to remove the enclosure.

1. Remove the enclosure using the procedure given in Section 2.1.
2. Locate your hard disk drive (half-height or full-height) and make sure the mounting rails are attached to the drive chassis (Figure 2-8). If the rails are not connected, attach them according to the manufacturer's instructions.

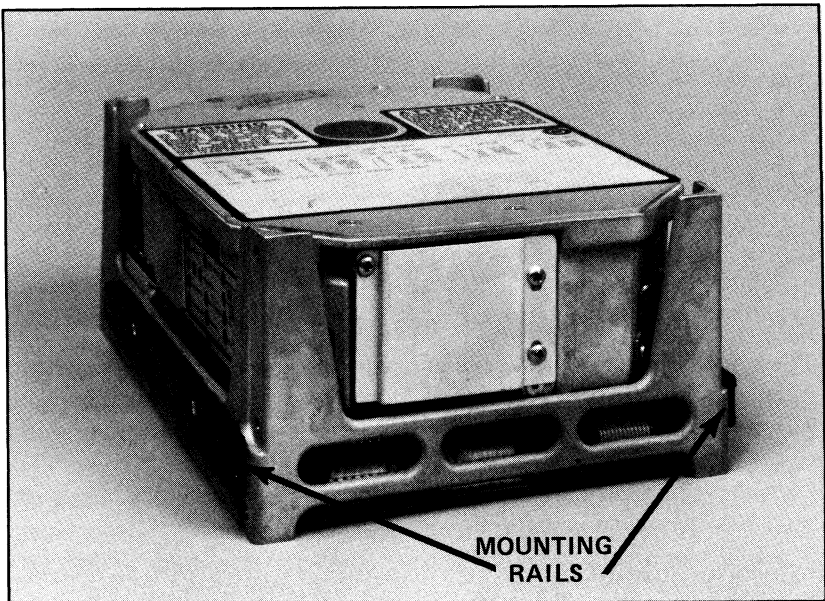


Figure 2-8. Location of the Hard Disk Drive Mounting Rails

3. Locate the hard disk drive control cable, data cable, and power cable. Pass these cables through the chassis opening for that drive, and attach each cable to its corresponding connector on the hard disk drive.
4. Make certain that the disk drive cables are connected to the motherboard and that the red conductor on the ribbon cable corresponds to pin 1. Refer to Figure 2-9. The cable connections are as follows:

Cable	Motherboard Connector
Control cable	Plug P5
Drive 1 Data cable	Plug P6
Drive 2 Data cable	Plug P7

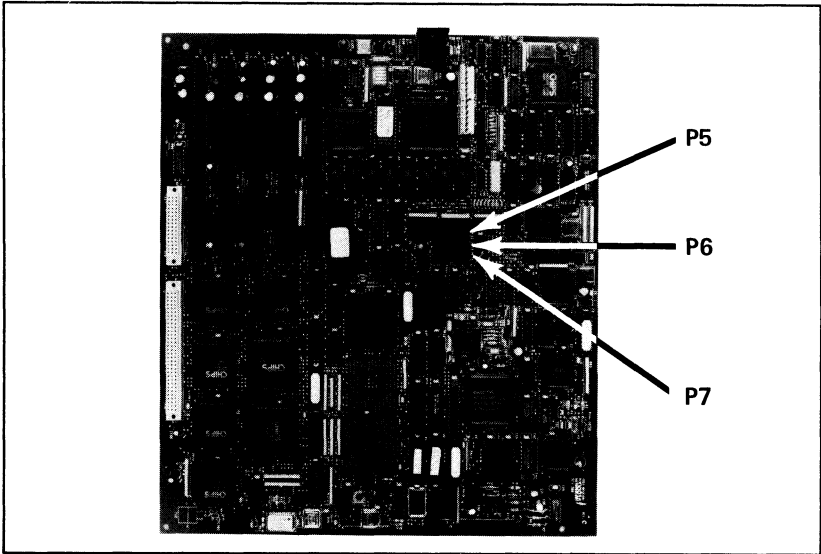


Figure 2-9. Hard Disk Drive Cable Connections on the Motherboard

5. Attach each cable to its corresponding connector on the hard disk drive.
6. Secure the hard disk drive in place by attaching the mounting bracket into the drive and the hole to the left of the drive (Figure 2-10).
7. Replace the enclosure by reversing the procedure given in Section 2.1.
8. Plug the AC cord into the wall outlet and turn the power switch on.
9. You must now run the ROM-resident hardware configuration program **SETUP**. This permits the motherboard to access the new drive(s). Refer to Section 3 for detailed information on the **SETUP** program. The installation procedure is now complete.

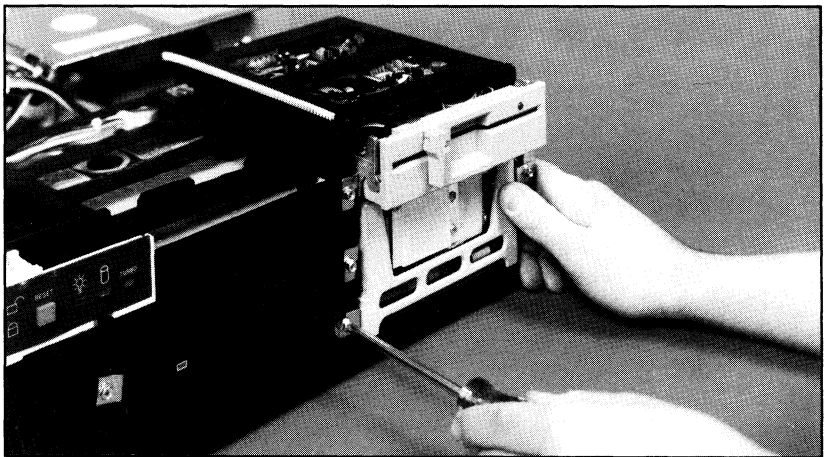


Figure 2-10. Securing the Drive with a Mounting Bracket

2.5.1.2 Installing ESDI Disk Drives

Before the ESDI disk drive can be installed, configuration changes must be made to both the motherboard and the ESDI disk controller board. These changes are detailed in steps 2 and 3 of the following procedure:

WARNING!

Make sure the system power switch is off and the power cord is disconnected from the wall outlet before attempting to remove the enclosure.

1. Remove the enclosure using the procedure given in Section 2.1.
2. On the motherboard, locate JP8 and JP27 (under the hard disk enclosure, next to U31). Move the jumpers from 2-3 to 1-2.
3. On the ESDI disk controller, WD1007A, verify that W1 is on 2-3 and W2 is on 2-3. All other jumpers must be removed from the board.
4. Make sure the mounting rails are attached to the drive chassis (Figure 2-8). If the rails are not connected, install them according to the manufacturer's instructions.
5. Insert the ESDI controller board into an available expansion slot.
6. Locate the hard disk drive control and data cables, as well as an unused power cable from the power supply. Pass them through the chassis opening for that device and attach the cables to their corresponding connectors on the disk drive. The red conductor on the ribbon cable corresponds to pin 1 and the keyed slots in the connectors on the disk drive are closest to pin 1. Connect the other end of the control and data cables to the controller board. Disconnect the cable from P10 on the motherboard and connect it to J5 on the controller board.

7. Slide the hard disk all the way into the chassis opening and secure the drive in place by attaching the mounting bracket into the drive and the hole to the left of the drive (Figure 2-10).
8. Replace the enclosure by reversing the procedure given in Section 2.1.
9. Plug the AC cord into the wall outlet and turn the power switch on.
10. You must now run the ROM-resident hardware configuration program SETUP. This permits the motherboard to access the new drive(s). Refer to Section 3 for detailed information on the SETUP program. The installation procedure is now complete.

2.5.2 Installing a Floppy Disk Drive

Up to two half-height floppy disk drives (either 360 kbyte or 1.2 Mbyte) can be installed in your MARK 386 system. The basic system includes one 1.2 Mbyte drive. Use the following procedure to install the drives:

WARNING!

Make sure the system power switch is off and the power cord is disconnected from the wall outlet before attempting to remove the enclosure.

Installation Procedure:

1. Remove the enclosure using the procedure described in Section 2.1.
2. Examine your floppy disk drive. Make sure that the mounting rails are attached to the drive chassis. If they are not, attach them according to the instructions provided by the drive manufacturer (Figure 2-11).

9. Plug the AC cord into the wall outlet and turn the power switch on.
10. You must now run the ROM-resident hardware configuration program SETUP. This permits the motherboard to access the new drive. Refer to Section 3 for detailed information on the SETUP program. The installation procedure is now complete.

2.5.3 Installing a Tape Backup Drive

A 150 Mbyte 1/4-inch tape drive is installed at the factory. This drive is used to periodically copy the files from the hard disk drive. This preserves the data in case it is lost from the hard disk.

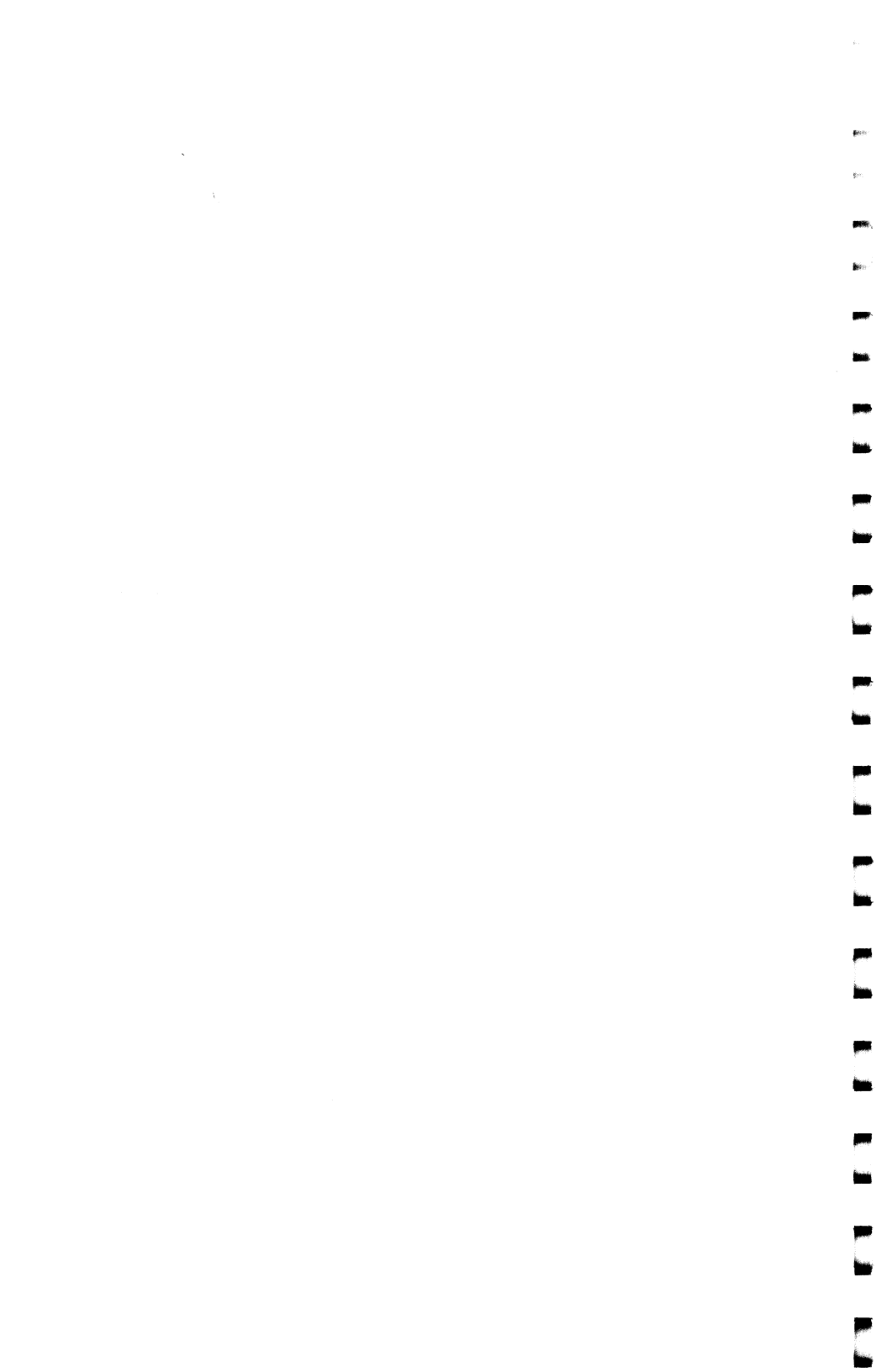
WARNING!

Make sure the system power switch is off and the power cord is disconnected from the wall outlet before attempting to remove the enclosure.

Installation Procedure:

1. Remove the enclosure using the procedure described in Section 2.1.
2. Examine your tape backup drive. Make sure that the mounting rails are attached to the drive chassis. If they are not, attach them according to the instructions provided by the drive manufacturer.
3. Insert the tape backup drive controller board into an available expansion slot, using the procedure given in Section 2.4.
4. Locate the data and power cables for the drive. One end of the data cable is connected to the controller board and the other end connects to the tape drive. Locate an unused power cable coming from the power supply.

5. Remove the mounting bracket on the left side of the highest available half-height drive slot (Figure 2-7).
6. Insert the drive into the chassis. Secure the drive in place by replacing the mounting bracket and tightening the mounting screw.
7. Attach the connectors on the data and power cables to the corresponding connectors on the drive. Note that the red conductor on the ribbon cable corresponds to pin 1.
8. Replace the enclosure by reversing the procedure given in Section 2.1.
9. Plug the AC cord into the wall outlet and turn the power switch on.
10. Refer to the installation instructions supplied with the tape backup drive for more detailed information. The installation procedure is now complete.



Section 3

SETTING UP YOUR COMPUTER

This section provides you with all of the information necessary to set up your MARK 386 hardware, initialize your operating system, and run the hardware configuration program.

3.1 CONNECTING THE VIDEO MONITOR

To connect a video monitor to your computer you need a power cord and a video cable. Your monitor should be equipped with both. The video cable should terminate at the system end in a 9-pin male DB9 video connector.

Your computer's motherboard must also be configured for the type of monitor to be used (monochrome, CGA, EGA). It is set up from the factory for monochrome mode operation.

WARNING!

Be sure that the computer and monitor power is off and the units are unplugged before attempting to connect the monitor.

1. Remove the computer enclosure by removing the five retaining screws on the rear panel and sliding the enclosure forward.
2. Locate the monitor video cable and connect the system end of it to the 9-pin female video port on the rear panel of the computer, as shown in Figure 3-1.

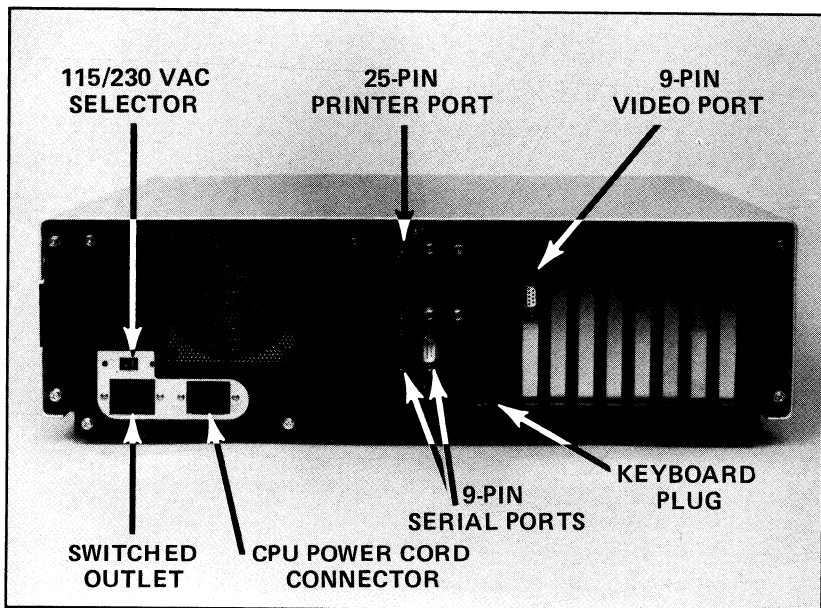


Figure 3-1. The Workstation Rear Panel

3. Locate switch pack S1 on the motherboard as shown in Figure 3-2. Set switches according to the type of monitor to be used, referencing Table 3-1. The position labeled OPEN on the switch equals OFF, and the opposite, unmarked position on the switch equals CLOSED or ON. The factory setting is monochrome, with automatic switching OPEN.
4. Connect the monitor power cord to a wall outlet, or to the switched outlet on the rear panel, if applicable.

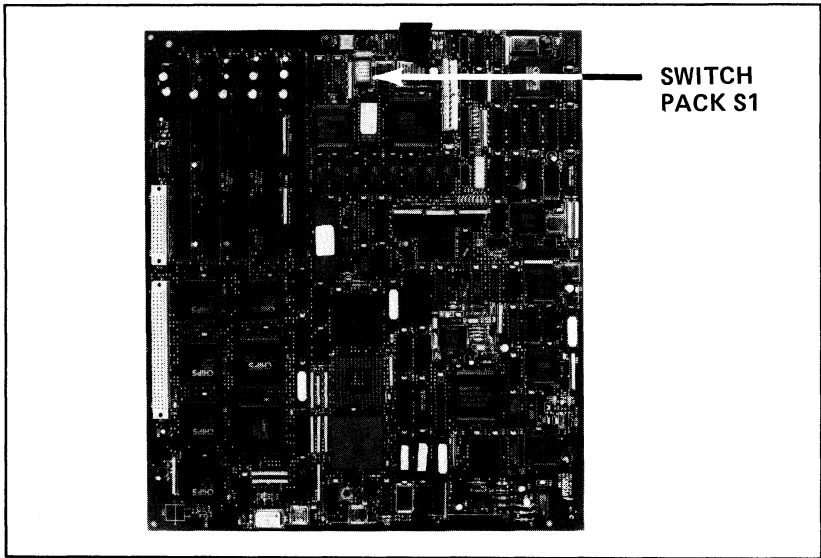


Figure 3-2. Location of Switch Pack S1 on the Motherboard

**TABLE 3-1. VIDEO MONITOR SELECTION
ON SWITCH PACK S1**

Monitor Type	S1-1	S1-2	S1-3	S1-4	S1-5*
Monochrome	Open	Open	Closed	Open	Open
CGA	Open	Open	Open	Closed	Open
EGA	Open	Closed	Closed	Open	Open

*Switch for setting automatic mode selection feature. Only set in CLOSED (ON) position if your software sets the video mode.

3.2 CONNECTING THE POWER CORD

WARNING!

Be sure the CPU power cord is not plugged into the wall outlet before you try to connect it to the computer.

CAUTION

Be sure that the CPU power switch is off before attempting to connect the power cord.

The main unit has a switch that allows you to select a 115 VAC or 230 VAC input voltage. DO NOT adjust this switch while your unit is in operation.

1. Connect the female end of the power cord to the three-prong male outlet on the rear panel of the computer, as shown in Figure 3-1.
2. Connect the male end of the power cord to the wall outlet.

3.3 CONNECTING THE PRINTER

The MARK 386 rear panel has both serial and parallel ports, allowing most commercially available printers to be connected. The two serial ports are DB9 IBM PC/AT-compatible serial connectors, and the parallel port is a standard IBM-compatible DB25 printer connector.

WARNING!

Be sure that the computer and printer power is off and the units are unplugged before attempting to connect the printer.

1. The 25-pin standard IBM-compatible printer port can be used for the connection of a printer or any other device requiring a parallel connector. The pinouts for the DB25 female connector are:

TABLE 3-2. PRINTER PORT PINOUTS

Pin Number	Description
1	-STROBE
2	D0
3	D1
4	D2
5	D3
6	D4
7	D5
8	D6
9	D7
10	-ACK
11	BUSY
12	PE
13	SLCT
14	-AUTOFD
15	-ERROR
16	-INIT
17	-SLCT IN
18-25	GROUND

2. The pinouts for the two DB9 male IBMPC/AT-compatible serial ports are:

TABLE 3-3. SERIAL PORT PINOUTS

Pin Number	Description	RS-232C Name
1	DCD (Carrier Detect)	CF
2	RxD (Receive Data)	BB
3	TxD (Transmit Data)	BA
4	DTR (Data Terminal Ready)	CD
5	SG (Signal Ground)	AB
6	DSR (Data Set Ready)	CC
7	RTS (Request to Send)	CA
8	CTS (Clear to Send)	CB
9	RI (Ring Indicator)	CE

3.4 INITIAL MS-DOS BOOT

To boot MS-DOS for the first time, you need only your DOS master diskette and your MS-DOS manual. Refer to your MS-DOS User's Guide for more detailed information.

Initial Boot Procedure:

1. Make sure your computer is turned off.
2. Remove the MS-DOS master diskette from its jacket and insert it into floppy disk drive A. Make sure the diskette is inserted properly, with the label side up.
3. Close the disk drive door and turn on your computer.
4. After a couple of seconds, the floppy disk drive access light will come on, indicating that the MS-DOS diskette is being read. A message similar to Figure 3-3 will be displayed on your monitor:

```
Phoenix 80386 ROM BIOS PLUS Version n.nn nn  
Copyright (C) 1985-1988 Phoenix Technologies Ltd.  
All Rights Reserved
```

```
SCI Technology, Inc.
```

```
640K Base Memory, 01024K Extended  
Current date is Tue 11-01-1988  
Enter new date (mm-dd-yy):
```

Figure 3-3. MS-DOS Boot Procedure Screen 1

Type in the current date in the format requested (month-day-year) and press <Return>. If the date displayed is correct, or you wish to skip this step, press <Return>.

5. A message similar to Figure 3-4 will be displayed:

```
Phoenix 80386 ROM BIOS PLUS Version n.nn nn
Copyright (C) 1985-1988 Phoenix Technologies Ltd.
All Rights Reserved

SCI Technology, Inc.

640K Base Memory, 01024K Extended
Current date is Fri 11-04-1988
Enter new date (mm-dd-yy):
Current time is 00:31:49:00
Enter new time:
```

Figure 3-4. DOS Boot Procedure Screen 2

Type in the current time in the format requested (24-hour clock). If the current time is 2:35 pm you would enter 14:35:00:00. If the time displayed is correct, or you wish to skip this step, press <Return>.

6. A message similar to Figure 3-5 will be displayed:

```
Phoenix 80386 ROM BIOS PLUS Version n.nn nn  
Copyright (C) 1985-1988 Phoenix Technologies Ltd.  
All Rights Reserved
```

```
SCI Technology, Inc.
```

```
640K Base Memory, 01024K Extended
```

```
Current date is Tue 11-01-1988
```

```
Enter new date (mm-dd-yy):
```

```
Current time is 00:31:39:00
```

```
Enter new time:
```

```
Microsoft (R) MS-DOS (R) Version 3.20  
(C) Copyright Microsoft Corp 1981-1986
```

```
A>
```

Figure 3-5. DOS Boot Procedure Screen 3

The A> prompt is called the system prompt, and indicates that MS-DOS is ready to receive instructions from you.

3.5 RUNNING THE HARDWARE CONFIGURATION PROGRAM (SETUP)

A ROM -resident hardware configuration program called SETUP is included on your system. This program must be used to initially configure your system, and must be run each time you:

- Add or remove memory or disk drives, or change monitors.
- Add a math coprocessor.
- Wish to update the time and/or date in the battery-backed clock/calendar.
- Change the default speed.

CAUTION

The system configuration settings entered into this program become the default settings, and are stored in battery-backed memory on the motherboard. If the battery is disconnected, the configuration data will be lost.

The SETUP program is very easy to use. A main set-up screen (Figure 3-6) lists the configuration information currently stored in memory. The information is changed by using the up and down arrow keys to select the desired parameter, and then using the left and right arrow keys to toggle through the available choices.

Exceptions to this are the base and extended memory parameters, which require you to type in the correct memory size, and the coprocessor parameter, which is automatically selected and entered by the program.

When the hard drive parameters are selected, drive type tables are also provided, listing specifications for standard drive types 1 through 47.

If you have an 85 Mbyte (unformatted) ST-506 disk, select type 28. If you have a 170 Mbyte ESDI, select type 48 and specify your own disk parameters. In this case specify 1024 cylinder, 8 heads, 34 sectors per track. The precomp, LZ and size may be left zero. If you have a 382 Mbyte ESDI drive, select type 36.

To access the SETUP program, hold down <Ctrl> and <Alt> then press <Esc>.

Phoenix Technologies Ltd.
System Configuration Setup Vn.nn nn

Time: 00:00:13
Date: Tue Nov 01, 1988

Diskette A:	5.25-inch, 1.2MB
Diskette B:	Not Installed
Hard Disk 1:	Type 28
Hard Disk 2:	Not Installed
Base Memory:	640KB
Extended Memory:	1024KB
Display:	VGA/EGA
Keyboard:	Installed
CPU Speed:	HIGH
Coprocessor:	Not Installed

Up and Down Arrow to select entries
Left and Right Arrow to change entries
PgUp for 386 CHIPSet options
F1 for help. F10 to exit. Esc to reboot.

Figure 3-6. SETUP Program Screen

On-line help is available for each parameter, and may be accessed at any time by pressing <F1>. When you have finished making changes, press <Esc> to reboot the system and save your changes. To exit the set-up program at any time, without saving your changes, press <F10>.

3.6 GENERAL NOTES ABOUT SETUP

- The Base Memory specified cannot exceed 640KB.
- The Extended Memory specified should be equal to the amount of memory in Kbytes that exceed 1024 Kbytes. For instance, if you have 4 Mbytes in your system, you should specify 640KB for the Base Memory and (1024 x 3) 3072KB for the Extended Memory.
- The entry for the display should always be EGA/VGA, even if you have a monochrome or CGA monitor.
- There is a second page to the System Configuration Setup. Press the "page up" key to get to this second page. Make sure that you enable all shadow RAM locations.
- The last entry on this page is the 0/1 wait state. Select "0" when using 80ns memory and "1" when using slower memory.



Section 4

INSTALLING DOS

ON THE HARD DISK DRIVE

4.1 GENERAL

This section provides the user with the information or references necessary to initially load the Disk Operating System (DOS), low-level format the hard disk, partition it with **fdisk**, format it for DOS, and finally install DOS.

Many versions of DOS are available. While the general steps given in this section will be applicable to all versions of DOS, specific steps are given for one of the most popular versions: Microsoft MS-DOS Operating System Version 3.2. Information is also provided in this section for exiting DOS.

Additional information can be found in the MS-DOS User's Guide and User's Reference manuals, or in the manuals provided with your particular operating system.

Section 5 provides information on installing XENIX on the hard disk.

4.2 CONFIGURING THE HARD DISK

To enable MS-DOS to boot automatically when you turn on your computer, you must load the MS-DOS files onto your hard disk. First, you must configure your hard disk to accept MS-DOS, since it was only low-level formatted at the factory. The following subsections contain the procedures necessary to configure the hard disk; they include:

1. Low-level format the disk (done at the factory).
2. Partition the disk using the `fdisk` command.
3. Format the disk for MS-DOS.
4. Install MS-DOS.

4.2.1 Low-Level Formatting

The hard disk drive installed in your system was low-level formatted before it left the factory. Low-level formatting is only required for newly installed, unformatted drives or drives which have experienced a catastrophic failure.

CAUTION

Low-level formatting will result in the loss of all data stored on the hard disk drive. Back up the data (if applicable) before beginning this procedure.

4.2.1.1 ST-506 Disks

Use the following procedure to low-level format new, unformatted hard disk drives, or drives currently in use which have experienced catastrophic failures.

1. Insert the MS-DOS diskette into drive A and boot MS-DOS.
2. At the A> prompt, remove the MS-DOS diskette and install the MARK 386 Utilities diskette into drive A.

At the A> prompt type:

hdform <Return>

The first screen (Figure 4-1) asks which hard disk drive (1 or 2) you wish to format. We will select drive 1 (drive C) for this example.

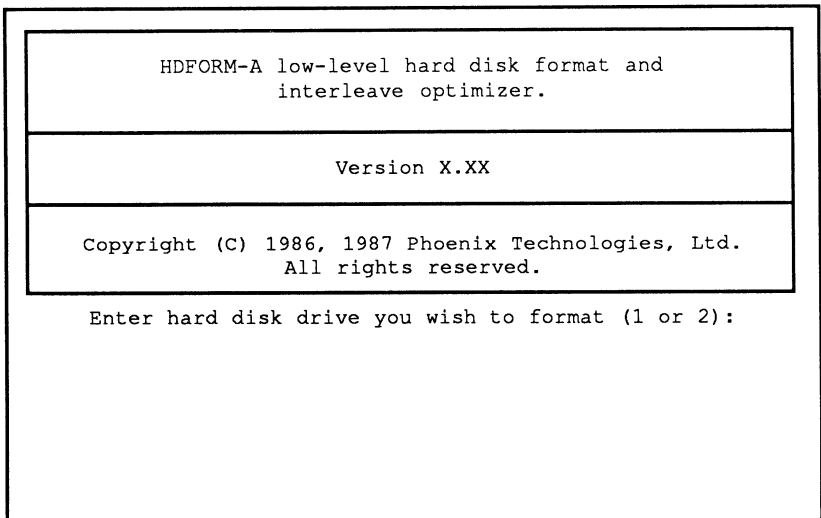


Figure 4-1. Low-Level Formatting Program Screen 1

When a drive has been selected, the screen will change to list the type and other specifications for drive 1 (see Figure 4-2). You are asked if these are correct. If one or more items are incorrect,

Type: n

HDFORM-A low-level hard disk format and interleave optimizer.
Version X.XX
Copyright (C) 1986, 1987 Phoenix Technologies, Ltd. All rights reserved.

Enter hard disk drive you wish to format (1 or 2):

Drive	1
Drive type	28
Number of heads	8
Number of cylinders	1024
Number of sectors	17

Figure 4-2. Low-Level Formatting Program Screen 2

The next screen will ask you to run the SETUP program in order to change the drive type listed for drive 1 (drive C). Refer to Section 3 for details on running the SETUP program.

4. If the items are correct,

Type: y

The next screen (Figure 4-3) is a warning screen, giving you an opportunity to discontinue the formatting process.

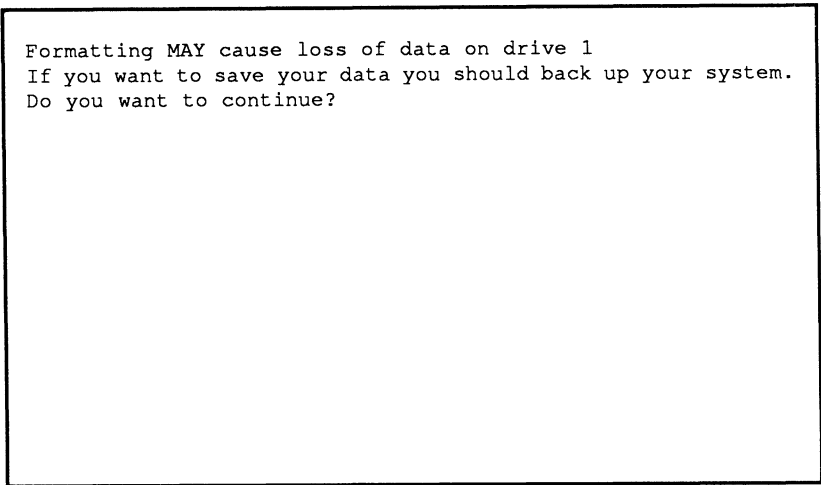


Figure 4-3. Low-Level Formatting Program Screen 3

If your wish to continue,

Type: y (go to step 5).

If you do not wish to continue,

Type: **n**

5. You will be returned to the system prompt.

The next screen (Figure 4-4) gives two options for entering bad track information. Option 1 requires all bad track numbers to be entered by the user. This option should be selected for new, unformatted drives. The bad track information can be found on a label attached to the top of the drive. Very few drives will have no bad tracks at all.

```
Formatting MAY cause loss of data on drive 1
If you want to save your data you should back up your system.
Do you want to continue?  y
```

```
Now choose one of the following options:
```

1. All bad track numbers will be entered by the user.
2. The format program will locate the previously entered bad tracks and the user will be given the opportunity to add additional bad track numbers.

```
Choice:
```

Figure 4-4. Low-Level Formatting Program Screen 4

Option 2 is to be selected for drives which have been formatted and contain data.

6. To select option 1 (new, unformatted drives),

Type: 1

On this screen, shown in Figure 4-5, you are directed to locate a bad track table which may be attached to the hard disk drive. If you locate it, you are encouraged to enter the bad track information into this program.

Your hard disk may have a sticker attached which lists tracks which have been identified as bad by the hard disk drive manufacturer. If so, you should report these tracks to this program so that the system won't attempt to use these tracks.

Do you wish to enter any information about bad tracks?

Figure 4-5. Low-Level Formatting Program Screen 5

If you do not wish to do so,

Type: n (go to step 7)

If you wish to do so,

Type: y

An empty table format (Figure 4-6) is presented. Enter the cylinder number and head number of bad tracks, as listed on the drive. When you have finished,

Press: <Esc>

Enter the cylinder and head numbers of bad tracks. Cylinder range: 0-1024 Head range: 0-8 Press ESC when finished.						
CYL HEAD	CYL HEAD	CYL HEAD	CYL HEAD	CYL HEAD	CYL HEAD	CYL HEAD

Figure 4-6. Low-Level Formatting Program Screen 6

The table will reappear, with a question at the bottom of the screen and instructions for deleting an entry. When you have finished,

Press: <Esc>, then

Type: n

7. To select option 2 (formatted, data-bearing drives),

Type: 2

The program searches the disk media for bad tracks. When a bad track is found, its location is displayed on a screen similar to that shown in Figure 4-7.

```
Searching for bad tracks

Cylinder  0      Head 4
Cylinder 731    Head 4 previously flagged bad
Cylinder 614    Head 4 found bad
Cylinder  90    Head 0 found bad
Cylinder  89    Head 0 found bad
Cylinder  81    Head 0 found bad
```

Figure 4-7. Low-Level Formatting Program Screen 7

At the end of the search, the locations are displayed in a table, and the user is given the opportunity to add additional bad tracks,

```
Do you wish to add any bad tracks?

Enter the cylinder and head numbers of bad tracks.
Cylinder range: 0-1024   Head range: 0-8
Press ESC when finished.
```

CYL	HEAD	CYL	HEAD	CYL	HEAD	CYL	HEAD	CYL	HEAD	CYL	HEAD	CYL	HEAD
731	4												
614	4												
90	0												
89	0												
81	0												

Figure 4-8. Low-Level Formatting Program Screen 8

To add additional bad tracks,

Type: y

Follow the procedures given in step 5 for adding information to this table, editing if necessary.

8. If you do not wish to add additional bad track locations,

Type: n

The next screen (Figure 4-9) asks if you wish the optimum interleave factor to be calculated on a test cylinder on the drive being formatted. A "no" response will cause the default interleave factor to be used. We recommend that a "yes" response be entered, so that the optimum factor for your particular drive will be calculated.

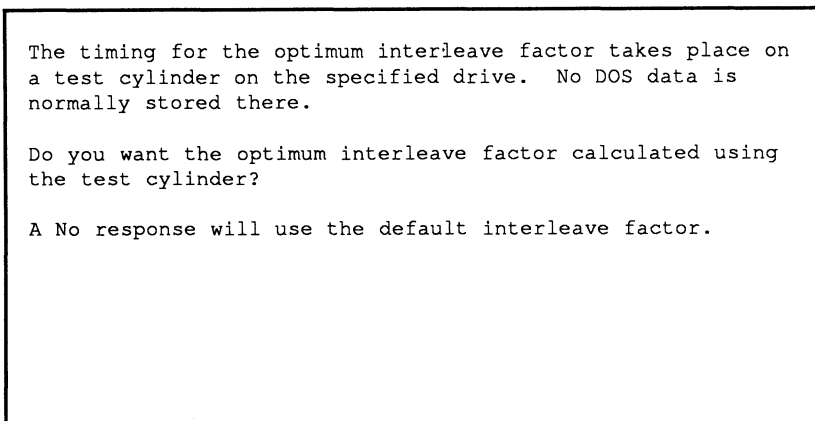


Figure 4-9. Low-Level Formatting Program Screen 9

The optimum interleave factor determines the logical placement of data on the disk media for the fastest data throughput.

Type: y

9. Shown in Figure 4-10, the next screen says that the optimum interleave factor is being calculated, and will display the cylinder being used for the calculation. When the calculation has been completed, the resultant factor will be displayed (Figure 4-11). You are asked if you wish to choose a different value for the interleave factor. We recommend that you enter a "no" response and use the calculated value.

```
Calculating optimum interleave factor, please wait.  
Cylinder 1024 head 0 is being used for interleave factor timing.
```

Figure 4-10. Low-Level Formatting Program Screen 10

The calculated optimum interleave factor is 2

If you choose to modify this value, system performance may be severely impacted.

Do you wish to change the optimum interleave factor?

Figure 4-11. Low-Level Formatting Program Screen 11

Type: n

10. The screen shown in Figure 4-12 asks if you wish to format the disk using the `SAVEDATA` option. If you have a new, unformatted drive the answer is obviously no. If you are formatting a previously formatted disk containing data that has suffered a catastrophic failure, we recommend that you still enter a "no" response.

Do you want to format this disk using the SAVEDATA option?

If you choose this option, it is STRONGLY recommended that you have backed up your disk previously.

If you do not choose this option, all data will be lost.

Figure 4-12. Low-Level Formatting Program Screen 12

Type: n

The next screen (Figure 4-13) gives you one last chance to back up the data (if any) on drive C before it is actually formatted. To continue,

THIS IS YOUR FINAL WARNING!

Formatting WILL cause loss of data on drive 1

If you want to save your data you should back up your system

Do you want to continue?

Figure 4-13. Low-Level Formatting Program Screen 13

Type: y

The screen will change to include a counter showing cylinder and head location during formatting. When the formatting process is complete, the final screen will be displayed, saying that formatting is complete and displaying the A> prompt. Remove the utilities program diskette from drive A. The hard disk is now ready for MS-DOS partitioning.

If you type "n" instead, you will be returned to the system prompt.

4.2.1.2 ESDI Disks

Use the following procedure to low-level format new, unformatted ESDI drives or drives that have experienced problems and require reformatting:

1. Make sure that you have installed your ESDI drive and controller per the instructions in Section 2.5.
2. Insert the MS-DOS diskette into drive A and boot MS-DOS.
3. At the A> prompt, remove the MS-DOS diskette and run the SETUP program to update your system configuration. Refer to Section 3.5 for details on using SETUP.
4. Install the MARK 386 Utilities diskette into drive A. At the A> prompt type:

WDFMT <Return>

A screen requesting format parameters (see Figure 4-14) will be displayed.

```
***Western Digital Corporation***
  AT Disk Format Utility
    Rev. n.nn

Current drive parameters are:

Drive (0/1):
  Cylinders:
    Heads:
      Sectors:
        Interleave:
          Precomp:
            Skew:
              Alt Sector:
```

Figure 4-14. ESDI Format Parameters

5. Enter the appropriate parameters based on the drive you want to format and make sure you specify the following:

Sectors: 35
Interleave: 1
Skew: 2
Alt Sector: YES

6. Press <RETURN> to get the following:

ENTER MENU CHOICE

Format disk (CAUTION - this will destroy all data on drive!)
Verify disk
Bad Sector entry
Surface test (CAUTION - this will destroy all data on drive!)
Quit

7. Select and perform the following in sequence:

- Format disk
- Verify disk
- Bad Sector entry

8. When performing the Bad Sector entry you should enter the manufacturer's defect list plus any additional defects detected in the verify disk operation. You may also enter any other locations that you suspect of being defective.
9. You have now completed the low-level format of your ESDI disk drive. Select "Quit" to exit the format utility properly.

4.2.2 Partitioning the Hard Disk

A hard disk can be partitioned, or divided, into a maximum of four independent sections, each containing the same or different operating systems. Before your hard disk can use MS-DOS, an MS-DOS partition must be created on it. Many users create a single partition and use the entire hard disk for MS-DOS. If you plan to create partitions for both MS-DOS and XENIX, the MS-DOS partition must be created first.

Run **fdisk** and try to create an MS-DOS partition. If an MS-DOS partition exists, a message to that effect will be displayed.

NOTE

You can have only one active MS-DOS partition on your hard disk at a time. To install other operating systems, refer to the manuals provided with the software.

Refer to the MS-DOS User's Reference, Appendix F or the manual provided with your operating system for the hard disk partitioning procedure.

4.2.3 Formatting the Hard Disk and Installing MS-DOS

After you have low-level formatted and partitioned the hard disk for MS-DOS, you must format it so that it can accept MS-DOS. The following procedures assume your hard disk is designated as drive C.

Format Procedure:

1. Manually boot MS-DOS and enter the current date and time.

At the A> prompt type:

```
format c: /v /s <Return>
```

where: /v allows the user to assign a name to the volume of data in drive C, and /s adds the system files to drive C making it self-booting.

MS-DOS will now format the hard disk.

2. When the format process is complete, a message similar to the following is displayed:

```
Volume label (11 characters, ENTER for none)?
```

Enter the name you wish to use to identify the volume of data in drive C and press <Return>, or just press <Return> if you do not wish to choose a name at this time.

MS-DOS then asks:

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

Type N (for no) to stop the format process.

4.3 COPYING MS-DOS TO THE HARD DISK

1. Your hard disk is now formatted so it can accept MS-DOS files. You will now need to use the Copy command to copy the files from your MS-DOS master diskette to your hard disk. Make sure your MS-DOS master diskette is in drive A.

At the A> prompt type:

```
copy a:*.* c: <Return>
```

This command will copy all files on the floppy diskette in drive A to hard disk drive C.

2. At the system prompt, remove the master diskette and store it in a safe place. The master diskette is now your backup copy of MS-DOS.

4.4 EXITING MS-DOS

Although there is no command available for exiting MS-DOS, you can do so by using the following simple procedure:

1. Make sure your last task is completed, and the system prompt is displayed.
2. Turn off your monitor and your computer, in that order.



Section 5

INSTALLING XENIX ON THE HARD DISK DRIVE

5.1 INTRODUCTION

This chapter provides the user with the information or reference to the information necessary to install the XENIX Operating System, and to activate the XENIX drivers for the POINT 4 Data Corporation 8-Port Serial Controller and the 150MB cartridge tape drive and controller (SC402).

The 150MB cartridge tape drive requires XENIX version 2.3 or later.

The following reference documents are used along with additional information included in each section to install the software.

References:

- MS-DOS User's Reference Manual, Appendix F on fdisk References
- POINT 4 Data Corporation 8-Port Serial Controller User Guide
- SCO XENIX System V Operating System
 - Installation and Maintenance Guide (ADM) (HW)
 - (ADM) section on FDISK
 - (ADM) section on MKDEV
 - Installation Guide section on Disc Layout Worksheet
- User's Reference (C) (M) (F)
 - (C) section on ENABLE

5.2 INSTALLING XENIX

5.2.1 Preparing to Install XENIX

The first step in installing XENIX is to verify that the hardware is set up properly. The hardware setup is explained in Section 3, Setting Up Your Computer. The low-level format of the drive need only be done if there has been some problem with the disk. The factory has already done a low-level format on the disk.

The next step is to decide if you want to have a DOS partition on the disk along with the XENIX partition. The DOS partition is always installed before the XENIX partition. The installation of a DOS partition is described in Section 4. The SCO XENIX System V Operating System Installation Guide contains a Disc Layout Worksheet that is helpful in determining the disk space requirements.

5.2.2 Installing a XENIX Partition

The installation of XENIX is done by following the instructions in the SCO XENIX System V Operating System Installation and Maintenance Guide section, "Installation Guide".

The installation of the system is done in the system maintenance (single-user) mode. You should be installing from 96tpi (high density) diskettes. The flawed tracks are entered using the cylinder/head option. The highest value for the swap area should be used instead of the default; this gives you better performance and you would have to reinstall the system to change the value later.

5.2.3 Going between a XENIX and DOS Partition

The command **fdisk** is used by both XENIX and DOS to switch between the two systems. This is done by changing the active partition and rebooting using the new active partition.

XENIX requires that the system be properly shut down before exiting or booting. Type **shutdown** to shut down the XENIX operating system gracefully. Then wait until the system displays the message, "it is okay to power down or reboot the system".

5.3 POINT 4 8-PORT SERIAL CONTROLLER BOARD

The POINT 4 8-Port Serial Controller Board is compatible with the Arnet* software driver that is provided with XENIX 2.3. The driver supports one board per Com port for a maximum of 2 boards (16 ports).

The 8-Port Serial Controller User Guide provides the information necessary to install the software to support this board using the XENIX command **mkdev serial**. The serial controller is installed using Com 1 and 2. After setting the parameters for the installation of the board and relinking the system, the system should be shutdown and rebooted. The ports can then be enabled using the XENIX command **enable**. Refer to Section 3.1 of the POINT 4 8-Port Serial Controller User Guide for proper switch and jumper settings.

*Amet is a tradename of Amet Corporation

5.4 INSTALLING THE CARTRIDGE TAPE CONTROLLER

The first step is to verify the controller board set up. The hardware settings for the cartridge tape controller are:

- The interrupt vector is set to 5 by jumpering IRQ at location 5 (interrupts 3 and 4 are used by the com ports).
- The DMA channel is set to 1 or 3 by jumpering DRQ and DACK to location 1 or 3, respectively.
- The Base I/O Port Address is set to 220H by jumpering all address locations except locations 5 and 9.

XENIX 2.3 has a built-in driver for the Cartridge Tape Controller (Type A). To install the driver, **mkdev tape** is invoked and the "Install cartridge tape" option is used. The driver parameters are listed above.

After setting the parameters for the tape driver, relink the system, and make the new system the boot default file; then shut down the system and reboot at which time the diagnostic should state that the tape driver is active.

Section 6

MAINTENANCE

Your MARK 386 Business System requires very little periodic maintenance. Use the following procedures to insure that your unit will continue to operate at peak efficiency.

6.1 CLEANING THE INTERIOR

There are four air exchange grilles (Figure 6-1) on the inside of the unit. These are the only inside areas to be cleaned. An air hose is required with a maximum pressure of 60 psi.

WARNING!

Make sure the system power is off and the power cord is disconnected from the wall outlet before attempting to remove the enclosure.

CAUTION

The air from the hose should be directed at the air exchange grilles. Misdirection may cause damage to the PC boards.

Cleaning Procedure (see Figure 6-1):

1. Remove the enclosure using the procedure in Section 2.
2. Locate the power supply in the right, back corner of the computer. Find the three air exchange grilles on the power supply.

3. Carefully blow the dust from the grilles with the air hose.
4. Locate the air exchange grille at the front of the computer, just under the power switch.
5. Gently blow the dust from the grille with the air hose.
6. Replace the enclosure by reversing the procedure used in step 1.

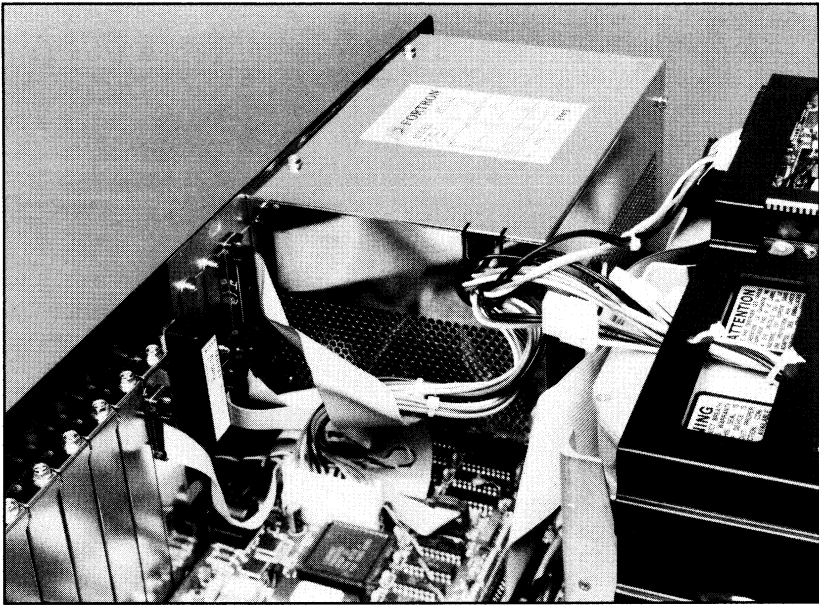


Figure 6-1. Location of the Air Exchange Grilles

6.2 FLOPPY DISK DRIVE CARE

Periodical maintenance of the floppy disk drive consists of cleaning the drive head once a month. If the drive is used more than an average of 8 hours per day, maintenance may need to be more frequent. A cleaning diskette is used to clean the drive head.

CAUTION

Help keep dust out of the disk drive by covering the computer.

Clean the disk drive no more than twice a month. The drive may otherwise be damaged.

Replace the cleaning diskette as suggested by the manufacturer.

Cleaning Procedure:

1. Make sure the power is off.
2. Prepare the cleaning diskette as instructed by the manufacturer and insert it into the drive to be cleaned. Make sure to orient the diskette with the facing up, as shown in Figure 6-2.
3. Turn the power on and allow the diskette to clean for one minute.
4. Repeat for any other drives, if applicable.

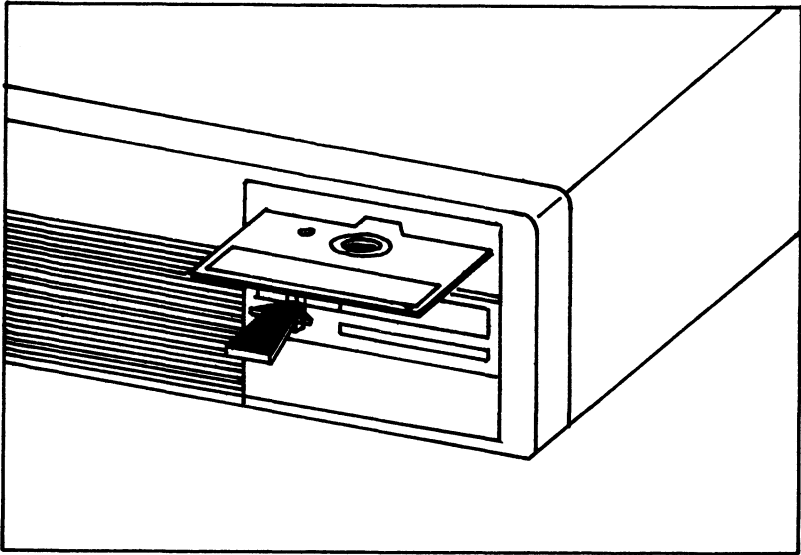


Figure 6-2. Cleaning Diskette Insertion Orientation

6.3 CLOCK/CALENDAR BATTERY REPLACEMENT

The clock/calendar battery powers the timekeeping circuitry on the motherboard and maintains the hardware configuration data in the event of a power failure or whenever the computer is turned off.

Most such batteries have a long life span, with some rated for a service life of up to 10 years, depending on use. It is not anticipated, therefore, that the clock/calendar battery will need to be replaced frequently. If the battery does fail, it should be replaced using the following procedure:

WARNING!

Make sure the system is off and the power cord is disconnected from the wall outlet before attempting to remove the enclosure.

CAUTION

If the battery fails, the hardware configuration data will be lost.

Replacement Procedure:

1. Remove the enclosure using the procedure in Section 2.
2. Locate the battery connection point (P2) on the motherboard (Figure 6-3) and disconnect it.
3. Locate the clock/calendar battery (Figure 6-4) on the inside rear panel of the computer. Grasp the battery and pull it away from the hook and loop fastener.
4. Attach the new battery to the inside rear panel.
5. Reconnect the new battery to P2 on the motherboard. Make sure the red (positive) conductor is connected to pin 1 of P2, which is toward the rear of the unit.
6. Replace the enclosure by reversing the procedure used in step 1.

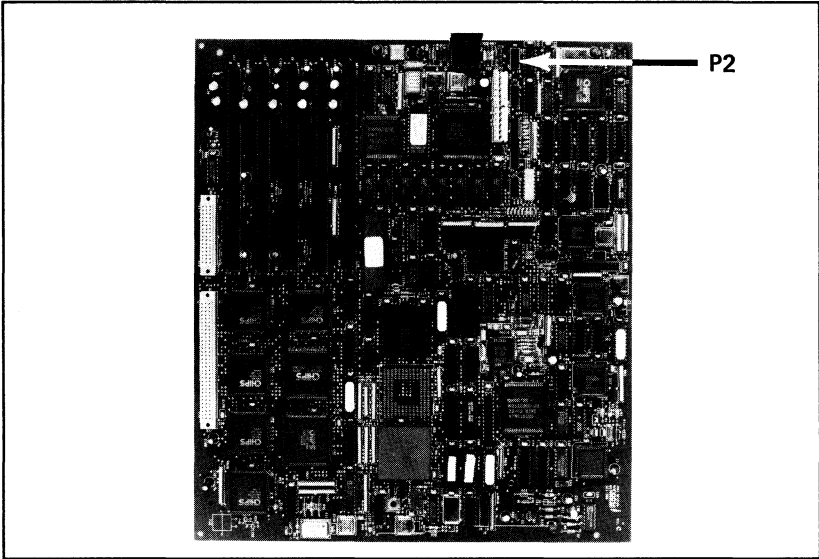


Figure 6-3. Location of the Clock/Calendar Battery Connector

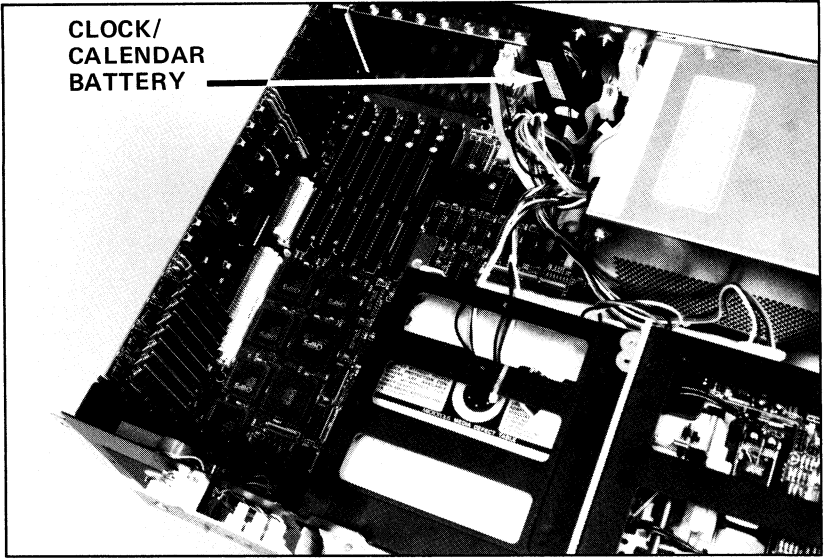


Figure 6-4. Location of the Clock/Calendar Backup Battery



Section 7

TROUBLESHOOTING

There are many parts of your MARK 386 Business System that are not user serviceable. However, there are a few things which the user can do to solve some basic problems. Below is a table for general troubleshooting.

TABLE 7-1. GENERAL TROUBLESHOOTING

Problem	Probable Cause(s)	Remedy
1. Computer will not boot, no power light on front panel.	Power cord connection loose at rear panel or wall outlet.	Make sure power cord is plugged in all the way at the rear panel and at the wall outlet.
	Power cord defective or malfunctioning.	Attempt to replace cord or call your technical support representative.
	Voltage selector switch on rear panel may be set incorrectly.	Check switch setting and adjust as required.
		<p>CAUTION</p> <p>Unplug system before switch is reset.</p>

TABLE 7-1. GENERAL TROUBLESHOOTING (Continued)

Problem	Probable Cause(s)	Remedy
1. (continued)	Power supply unplugged from motherboard.	Reconnect power supply.
	Power supply defective or malfunctioning.	Contact your technical support representative.
2. Computer on, monitor not responding.	Monitor power switch not on.	Turn monitor power switch on.
	Monitor power cord not plugged into switched outlet on system.	Make sure power cord is properly plugged in.
	9-pin video cable not connected.	Check connection.
	Monitor defective.	Contact your technical support representative.
3. System will not boot.	Keyboard not properly connected.	Check connection at the back of computer.
	System locked.	Unlock system.
	User error.	Check Section 4 of this manual for proper boot procedure.

TABLE 7-1. GENERAL TROUBLESHOOTING (Continued)

Problem	Probable Cause(s)	Remedy
3. (continued)	Software error.	Consult software manual to see that the proper procedure is being used and that there is no software error.
	Disk drive is inoperative.	Contact your technical support representative.
4. Printer will not operate.	Printer not receiving power.	Check that printer power cord is plugged in.
	Printer/computer I/O cable not connected properly.	Check cable connection at both ends.
	Printer internal switches not set correctly.	Refer to printer manual for correct switch settings.
	Printer inoperative.	Contact your printer manufacturer.
5. Software will not operate.	Software error.	Consult software manual for proper boot procedure and usage.

TABLE 7-1. GENERAL TROUBLESHOOTING (Continued)

Problem	Probable Cause(s)	Remedy
5. (continued)	Disk read error.	Contact your technical support representative.
	Serial port is disabled.	Contact your technical support representative.
6. Math intensive software runs too slow or improperly.	Math coprocessor is not installed or is installed incorrectly.	Consult Section 2 of this manual for the proper installation procedure.
	Math coprocessor may be damaged or defective.	Contact your technical support representative.
7. Option expansion board is not functioning.	Optional board may not be installed properly.	Consult Section 2 of this manual and the instructions provided with the board for installation information.
	Option board may be damaged or defective.	Contact option board manufacturer.
	Computer hardware defect.	Contact your technical support representative.

Section 8

TECHNICAL SPECIFICATIONS

The technical specifications for your MARK 386 Business System, listed below, were accurate at the time of printing. Product improvements could render these specifications obsolete at any time.

TABLE 8-1. TECHNICAL SPECIFICATIONS

Motherboard	
Main Processor:	32-bit Intel 80386
Clock Frequency:	8 or 20 MHz
Math Coprocessor:	Optional Intel 80387 coprocessor
Video Modes:	Monochrome/Hercules (720 x 348 pixels) CGA - (640 x 200) EGA - (640 x 350) Extended EGA - (640 x 480)
Power Consumption:	27 watts
Memory Card	
Configuration:	One 32-bit memory card with up to sixteen DRAM SIMMs modules
Wait States:	0
Card Dimensions:	4 3/4-inch W x 13 1/8-inch D
Memory Size Options:	2 Mbytes - Eight 256 Kbyte x 9 SIMMs 4 Mbytes - Sixteen 256 Kbyte x 9 SIMMs 8 Mbytes - Eight 1 Mbyte x 9 SIMMs 16 Mbytes - Sixteen 1 Mbyte x 9 SIMMs
Operating System:	Supports MS-DOS 3.x or SCO XENIX Version 2.3

TABLE 8-1. TECHNICAL SPECIFICATIONS (Continued)

Input/Output	2 standard DB9 IBM PC/AT-compatible serial ports 1 standard DB25 IBM-compatible printer port
Expansion Slots	Five 16-bit AT-bus compatible slots One 32-bit memory slot
Floppy Disk Drives	Options: 360 Kbyte or 1.2 Mbyte half-height drives Drives Per Unit: 2 half-height floppy disk drives, maximum
Hard Disk Drive	Options: 85 Mbyte full-height (ST-506) 86 Mbyte (ST-506) 170 or 382 Mbyte (ESDI) Access Time: 18, 23, or 28 ms Disk Size: 5-1/4 inches Interface: ST-506 or ESDI
Tape Backup Drive	Drives Per Unit: 1 maximum Storage Capacity: 150 Mbyte streaming Type: 1/4-inch cartridge tape
Physical Description	Width: 21-1/2 inches Height: 7-1/2 inches Depth: 16-1/2 inches Weight: 47.5 lbs.

TABLE 8-1. TECHNICAL SPECIFICATIONS (Continued)

Power Supply	
Power Rating:	200 watts*
Input Voltage:	90-130 VAC or 180-260 VAC, rear panel switch
Frequency Range:	47-440 Hz
Output Voltage/ Current Ratings:	+5V @ 20A maximum -5V @ 1A maximum +12V @ 8A maximum (peak for 10 seconds) -12V @ 1A maximum
Certification	UL Listed FCC Class A CSA Approved VDE Pending

*For a 250-watt optional power supply, consult your POINT 4 sales representative.



APPENDICES



Appendix A

GLOSSARY

Air exchange grille - An open screen found on the back, top, or sides of a computer enclosure that allows a constant airflow through the internal portion of the computer.

Backup - Copying data from one form of storage media to another, e.g. copying data from the hard drive to a diskette.

BIOS - Acronym for Basic Input/Output System. The computer control system for the major I/O devices.

Boot - To load software into memory from storage as part of the computer startup procedure. See boot procedure.

Boot procedure - The procedure that is used to bring up the computer under the control of the operating system.

CGA - An acronym for IBM's Color/Graphics Adapter. A standard video mode specified as a resolution of 640 dots x 200 lines with 4 colors displayed simultaneously, or 320 x 200 with 16 simultaneous colors, both with a horizontal scan rate of 15.75 kHz.

CPU - Central Processing Unit. The "heart" of a computer which sorts, delegates, and solves tasks.

Command - A keyboard entry that causes the computer to carry out a specific operation. It is usually executed by pressing the <RETURN> key.

Configure - The process of setting up a port, terminal, or printer so that communications with another device can be accomplished.

Coprocessor - A microprocessor device connected to a central microprocessor that performs specialized computations.

<Ctrl> key - A key marked "Ctrl" that is used in combination with another key to perform a specific function or command.

Cursor - A position indicator used in a display to indicate a character to be corrected or a position in which data is to be entered.

Default - A value set by software if no other value is given.

DOS - Disk Operating System. A group of software that enables a computer to operate using a disk drive system for data entry and storage.

DRAM - An acronym for Dynamic Random Access Memory. A computer system's high-speed work area, which information can be written to or read from.

EGA - An acronym for IBM's Enhanced Color Adapter. A standard video mode specified as a resolution of 640 dots x 350 lines with 16 colors displayed simultaneously, and a horizontal scan rate of 21.85 kHz.

Electromagnetic fields - A magnetic field produced by an electrical current passing through a wire or electrical device, e.g. an electric motor, or monitor display.

Electrostatic discharge (ESD) - A discharge of static electricity. Potentially harmful to many modern computer components, including floppy and hard disk drives, and CMOS integrated circuits.

<Enter> key - The key marked "Enter" which is located on the numeric key pad of most terminals. In many applications, the key used to initiate preset equipment functions. See also **<Return> key**.

Expansion slots - Places on the motherboard allotted for option boards that can be used to expand the computer's abilities.

File - A collection of information in the form of a (possibly unstructured) stream of characters that is accessed by a name. Files may contain data, executable programs, or other text.

File name - A sequence of characters that denote a file. A file name may contain any character except a slash character (/) or ASCII NULL.

Function keys - The keys marked F1 through Fn whose value or meaning is determined by the software controlling the system at that time.

Hard disk drive - A magnetic storage device that uses Winchester technology and permits packing fixed disks, instead of removable disks, inside a small physical package.

Parallel - Multiple data handling functions occurring at the same time. A format of input/output that allows the transmission of data in a multipath format.

Partition - The division of a large block of disk space into smaller units that can be handled more conveniently, or be formatted with different operating systems.

Port - An external connection point to the computer that allows input/output communications with terminals or other peripherals.

Power supply - A unit that converts AC line voltage to the voltages needed by the computer.

Prompt - An indication from the computer that there is a response needed from the operator before the program can continue.

<Return> key - The key marked "Return" or "--", which can be pressed to start an operation. See also **<Enter> key**.

SCSI - An acronym for Small Computer System Interface.

SIMM - An acronym for Single In-line Memory Module. A method of packaging memory chip banks on small, removable circuit cards on the motherboard instead of in rows of sockets. Reduces the amount of space required on the motherboard, and makes upgrading memory capacity easier.

Serial - Pertaining to the sequential or consecutive transmission of data bits.

Serial ports - An input/output port that is configured by hardware to transfer data sequentially.

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COMMENT SHEET

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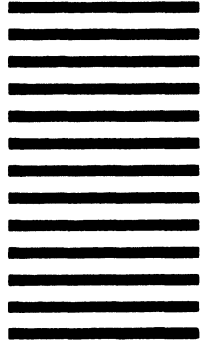
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