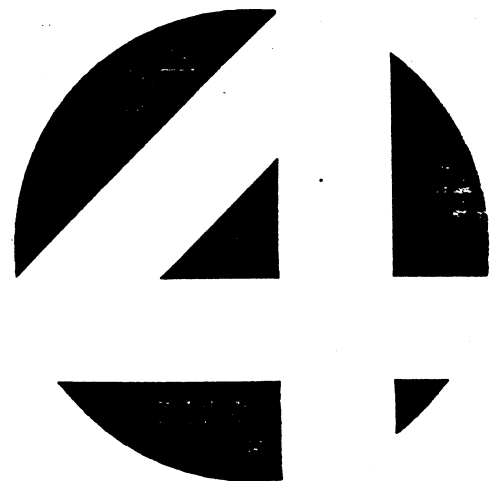


**MARK 386S**  
BUSINESS SYSTEM  
INSTALLATION/  
OPERATION  
GUIDE

Revision A



## 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.

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Document Order Number: HTP0091  
Preliminary: April 1990

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# CONTENTS

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## SECTION 1. GETTING TO KNOW YOUR COMPUTER

1.1	MARK 386S SYSTEM FEATURES.....	1-1
1.2	OPTIONS .....	1-2
1.3	THE CENTRAL PROCESSING UNIT.....	1-3
1.3.1	80386SX Motherboard .....	1-3
1.3.1.1	The Math Coprocessor .....	1-3
1.3.1.2	Memory .....	1-3
1.3.2	80386DX Motherboard .....	1-4
1.3.2.1	The Math Coprocessor .....	1-4
1.3.2.2	Memory .....	1-4
1.3.3	Front Panel Controls and Indicators .....	1-5
1.3.4	Input/Output Devices .....	1-5
1.3.5	Data Storage Devices .....	1-6
1.4	THE KEYBOARD.....	1-6
1.5	THE FLOPPY DISK DRIVE .....	1-7
1.5.1	Diskette Requirements .....	1-7
1.5.2	Diskette Insertion .....	1-8
1.6	THE HARD DISK DRIVE .....	1-9
1.7	THE TAPE BACKUP DRIVE .....	1-9
1.8	VIDEO DISPLAYS .....	1-9
1.9	PRINTERS .....	1-9

## SECTION 2. INSTALLING INTERNAL OPTIONS

2.1	REMOVING AND REPLACING THE ENCLOSURE .....	2-1
2.2	ADDING RAM MEMORY .....	2-3
2.2.1	Adding RAM Memory to the 80386SX Motherboard .....	2-3
2.2.2	Adding RAM Memory to the 80386DX Motherboard .....	2-6
2.3	INSTALLING THE MATH COPROCESSOR .....	2-7
2.3.1	Installing the Math Coprocessor on the 80386SX Motherboard .....	2-7
2.3.2	Installing the Math Coprocessor on the 80386DX Motherboard .....	2-8
2.4	INSTALLING OPTION BOARDS .....	2-9
2.5	INSTALLING MASS STORAGE DEVICES .....	2-10
2.5.1	Installing a Hard Disk Drive .....	2-10
2.5.2	Installing a Floppy Disk Drive .....	2-14
2.5.3	Installing a Tape Backup Drive .....	2-16
2.6	32-PORT INTELLIGENT SERIAL I/O MULTIPLEXER .....	2-18
2.6.1	Diagnostics .....	2-18
2.7	INSTALLING THE 8-PORT SERIAL CONTROLLER .....	2-19
2.7.1	Installing the 8-Port Serial Controller as COM1 .....	2-19

2.7.2	Installing the 8-Port Serial Controller as COM2 .....	2-19
2.8	INSTALLING THE ATI VIDEO ADAPTER .....	2-20
2.9	INSTALLING THE PARALLEL AND TWO SERIAL PORT ADAPTER.....	2-22

### **SECTION 3. SETTING UP YOUR COMPUTER**

3.1	CONNECTING THE VIDEO MONITOR .....	3-1
3.2	CONNECTING THE POWER CORD .....	3-2
3.3	CONNECTING THE PRINTER .....	3-2
3.4	INITIAL MS-DOS BOOT .....	3-4
3.5	RUNNING THE HARDWARE CONFIGURATION PROGRAM (SETUP) ....	3-7
3.5.1	SETUP for the 80386SX Motherboard .....	3-7
3.5.2	SETUP for the 80386DX Motherboard .....	3-9

### **SECTION 4. INSTALLING DOS ON THE HARD DISK DRIVE**

4.1	GENERAL .....	4-1
4.2	CONFIGURING THE HARD DISK .....	4-1
4.2.1	Low-Level Formatting .....	4-2
4.2.2	Partitioning the Hard Disk .....	4-14
4.2.3	Formatting the Hard Disk and Installing MS-DOS .....	4-14

### **SECTION 5. INSTALLING XENIX ON THE HARD DISK DRIVE**

5.1	INTRODUCTION .....	5-1
5.2	INSTALLING XENIX .....	5-1
5.2.1	Preparing to Install XENIX.....	5-1
5.2.2	Installing a XENIX Partition .....	5-2
5.2.3	Going between a XENIX and DOS Partition.....	5-2
5.3	POINT 4 8-PORT SERIAL CONTROLLER BOARD.....	5-3
5.4	INSTALLING THE CARTRIDGE TAPE CONTROLLER .....	5-3

### **SECTION 6. MAINTENANCE**

6.1	CLEANING THE INTERIOR .....	6-1
6.2	FLOPPY DISK DRIVE CARE .....	6-2
6.3	TAPE DRIVE CARE .....	6-3
6.4	CLOCK/CALENDAR BATTERY REPLACEMENT .....	6-4

### **SECTION 7. TROUBLESHOOTING .....** 7-1

## APPENDICES

<b>Appendix A. Glossary .....</b>	<b>A-1</b>
<b>Appendix B. 80386SX Motherboard Configuration .....</b>	<b>B-1</b>
<b>Appendix C. 80386DX Motherboard Configuration .....</b>	<b>C-1</b>

## FIGURES

1-1	The Keyboard .....	1-6
1-2	Proper Floppy Diskette Orientation for Insertion .....	1-8
2-1	Location of the Enclosure Retaining Screws .....	2-2
2-2	Removing the Enclosure .....	2-2
2-3	80386SX Motherboard Layout .....	2-3
2-4	80386DX Motherboard Layout .....	2-6
2-5	EMC Socket Pinouts .....	2-8
2-6	Mounting Location of an Optional Hard Disk Drive .....	2-10
2-7	Location of the Hard Disk Drive Mounting Rails .....	2-11
2-8	NCL 5355 Controller Connector and Jumper Locations .....	2-13
2-9	Securing the Drive with a Mounting Bracket .....	2-13
2-10	Location of the Floppy Disk Drive Mounting Rails .....	2-14
2-11	Mounting Location of an Optional Floppy Disk Drive .....	2-15
2-12	Tape Controller Jumper Settings .....	2-16
2-13	1P/2S Adapter Layout .....	2-22
3-1	MS-DOS Boot Procedure Screen 1 .....	3-5
3-2	MS-DOS Boot Procedure Screen 2 .....	3-5
3-3	MS-DOS Boot Procedure Screen 3 .....	3-6
3-4	80386SX SETUP Program Screen .....	3-8
3-5	80386DX CMOS SETUP Program Screen .....	3-10
3-6	80386DX Extended CMOS SETUP Menu Screen .....	3-10
3-7	80386DX EASY C&T 386 CHIPSET REGISTER SETUP Screen .....	3-11
4-1	MAXTOR PCBA #1014520, FAB #9 .....	4-12
4-2	MAXTOR PCBA #1015468, FAB #8 .....	4-13
4-3	MAXTOR PCBA #1014150, FAB #7 .....	4-13
6-1	Location of the Air Exchange Grilles .....	6-1
6-2	Cleaning Diskette Insertion Orientation .....	6-3
B-1	80386SX Motherboard Configuration .....	B-1
C-1	80386DX Motherboard Configuration .....	C-1
C-2	80386DX CMOS SETUP Program Screen .....	C-4
C-3	80386DX Extended CMOS SETUP Program Screen .....	C-4

C-4	80386DX EASY C&T 386 CHIPSET REGISTER SETUP Screen .....	C-5
C-5	80386DX 206, 301 REGISTER SETUP Screen .....	C-5
C-6	80386DX 307 REGISTER SETUP Screen .....	C-6
C-7	80386DX Enable/Disable Video and Main BIOS Shadow SETUP Screen .....	C-6
C-8	80386DX System Boot Screen .....	C-7

## TABLES

2-1	SW2 Memory Select Settings (SX386-20 Memory Option Settings) .....	2-4
2-2	Wait State Operation .....	2-5
2-3	NCL 5355 Installation Specifications .....	2-12
2-4	Video Mode Select .....	2-20
2-5	Monitor Type Select .....	2-21
2-6	Video Adapter Select (J4) .....	2-21
2-7	Printer Port Settings .....	2-23
2-8	Serial Ports Settings .....	2-23
3-1	Parallel Printer Port Pinouts .....	3-3
3-2	Serial Port #1 Pinouts .....	3-3
3-3	Serial Port #2 Pinouts .....	3-4
3-4	80386DX Wait State Select .....	3-11
4-1	MAXTOR 765MB, FAB #9 Jumper Settings .....	4-6
4-2	MAXTOR 765MB, FAB #8 Jumper Settings .....	4-8
4-3	MAXTOR 765MB, FAB #7 Jumper Settings .....	4-10
7-1	General Troubleshooting .....	7-1
B-1	SW2 Settings (Part 1) .....	B-2
B-2	SW2 Settings (Part 2) .....	B-3
B-3	SW2 Settings (Part 3) .....	B-3
B-4	Motherboard Jumpers .....	B-4
C-1	80386DX Motherboard Jumpers and Switch Settings .....	C-2

# Section 1

## GETTING TO KNOW YOUR COMPUTER

---

### 1.1 MARK 386S SYSTEM FEATURES

- Intel 80386SX 32-bit microprocessor motherboard
  - 20 MHz operation
  - Shadow RAM for system BIOS
  - Up to 8MB of memory on motherboard, with 4MB standard
  - Socket for optional 80387SX math coprocessor
  - ROM-resident hardware configuration program (SETUP)
  - Supports SCO XENIX\*, MS-DOS\*, OS/2, and UNIX\*\* Systems V/386 and VP/ix
  - Clock/calendar with battery backup
  - Six 16-bit IBM PC/AT bus-compatible expansion slots and two 8-bit IBM PC/AT bus-compatible expansion slots
  - FCC-tested – 6dB below FCC class B noise limit
- 170MB ESDI hard disk drive
- 150MB 1/4-inch tape backup drive
- 1.2MB floppy disk drive
- 1 parallel and 2 serial ports
- 8-Port Serial Controller Board
- Enhanced AT-style 101-key keyboard
- Front panel hardware reset button
- Front panel indicator light for TURBO mode operation

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\*\* UNIX is a trademark of AT&T Bell Laboratories.

## 1.2 OPTIONS

The following items are available from POINT 4 as options for your MARK 386S:

- Intel 80386DX 32-bit microprocessor motherboard
  - 25 MHz operation
  - 32KB high-speed cache memory
  - Shadow RAM for system BIOS
  - Up to 16MB of memory on motherboard, with 4MB standard
  - Socket for optional Intel 80387 or Weitek 3167 math coprocessor
  - ROM-resident hardware configuration program (SETUP)
  - Supports SCO XENIX, MS-DOS, OS/2, and UNIX Systems V/386 and VP/ix
  - Clock/Calendar with battery backup
  - Six 16-bit IBM PC/AT bus-compatible expansion slots and two 8-bit IBM PC/AT bus-compatible expansion slots
- Upgrades to 6, or 8MB of system RAM memory for the 80386SX or 8, 12, or 16MB for the 80386DX
- Intel 80387SX math coprocessor for the 80386SX or Intel 80387 or Weitek 3167 for the 80386DX
- 12-inch amber flat surface monochrome graphic display monitor
- 382 or 765MB ESDI hard disk drive (in lieu of 170MB drive)
- 32-port intelligent serial I/O multiplexer (in lieu of 8-port serial controller board)
- A second 8-port serial controller board



## **1.3 THE CENTRAL PROCESSING UNIT**

The MARK 386S system is furnished with an 80386SX motherboard as standard. As an option, the system can be equipped with an 80386DX motherboard in place of the 80386SX.

### **1.3.1 80386SX Motherboard**

The Central Processing Unit of the 80386SX board is Intel's 80386SX microprocessor, a high-performance, 32-bit CPU with a 16-bit external data bus and a 24-bit external address bus. It is 100% object code compatible with the 80386, 80286, and 8086 microprocessors. Additional features include:

- Full 32-Bit internal architecture
  - 8, 16, 32-Bit Data Types
  - 8 General Purpose 32-Bit Registers
- Runs Intel 386 software in a 16-Bit hardware environment
  - Runs MS-DOS, OS/2, and UNIX/XENIX
  - Very High Performance 16-Bit Data Bus
  - 16 or 20 MHz Clock
  - Two-Clock Bus Cycles
  - Address Pipe Lining Allows Use of Slower, Low-Cost Memories
- Virtual 8086 mode allows execution of 8086 software in protected mode
- Large uniform address space
  - 16 Megabyte Physical
  - 64 Terabyte Virtual
  - 4 Gigabyte Max Segment Size

#### **1.3.1.1 THE MATH COPROCESSOR**

A socket is provided for an optional 80387SX math coprocessor. The coprocessor uses a 20 MHz Clock (same as the processor clock).

#### **1.3.1.2 MEMORY**

The SX386-20 uses 256Kbit x9 or 1Mbit x9 SIMMS, or a combination of both (see Table 2-1, SW2 Memory Select Settings), 100ns SIMMS are recommended for 16 MHz, and 70 or 80ns SIMMS for 20 MHz. Memory configurations range from 512K to 8MB.

## 1.3.2 80386DX Motherboard

The 80386DX motherboard is a high-performance Intel 80386-based AT-compatible system board. To achieve increased processor speed and system throughput, and low cost, the 80386DX architecture features a 32KB 2-way set associative static RAM caching system that the '386 can access with zero wait states.

The 32KB static RAM cache is a high-speed memory array that is accessed by the 386 microprocessor. As the '386 runs, the cache stores the data or instructions most likely to be accessed next by the '386.

For memory read cycles, if the needed data is in the cache RAM, this read cycle is a cache read-hit cycle. Typically, the cache read-hit ratio is 99%.

For write cycles, data is always written through to the RAM memory. To obtain better write performance, the motherboard features a "post-write register" and supports the "cache write hit/update cache RAM" scheme. This caching architecture provides the following benefits:

- Lower cost, lower speed RAM memory can be used without decreasing system performance.
- The AT bus can run at 8 MHz. This allows interface boards designed to work with a standard IBM-AT or compatible to work without timing problems.
- The system can be configured with off-board RAM without decreasing system performance. No special 32-bit slot is needed.

### 1.3.2.1 THE MATH COPROCESSOR

The 80386DX motherboard provides a socket for the installation of either an Intel 80387 or a Weitek 3167 math coprocessor.

### 1.3.2.2 MEMORY

The 80386DX motherboard can use 256Kbit x9 or 1Mbit x9 SIMMs, but the two cannot be used at the same time. Using 1Mbit x9 SIMMs, the 80386DX can support 4, 8, 12, or 16MB of on-board memory.

### 1.3.3 Front Panel Controls and Indicators

The controls and indicators consist of:

- **Keyboard/enclosure lock switch** - Enables or disables the keyboard. Is used to prevent keyboard input during critical tests or data processing.

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.

- **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.
- **TURBO switch and operation indicator** - An amber LED which lights and remains lit when the processor is operating at its maximum rated speed. The word TURBO appears under this indicator. The switch has no function.

### 1.3.4 Input/Output Devices

Input/output devices for your computer include:

- A 101-key enhanced design keyboard
- One DB9 IBM PC/AT-compatible serial port, one DB25 serial port, and one DB25 IBM-compatible printer port on the rear panel for connecting a modem, mouse, printer, or other external input device
- A 12-inch amber flat-surface monochrome graphic display monitor (optional)
- An 8-port serial controller board
- An optional second 8-port serial board  
or  
An optional 32-port Intelligent serial I/O multiplexer (in place of the 8-port board)

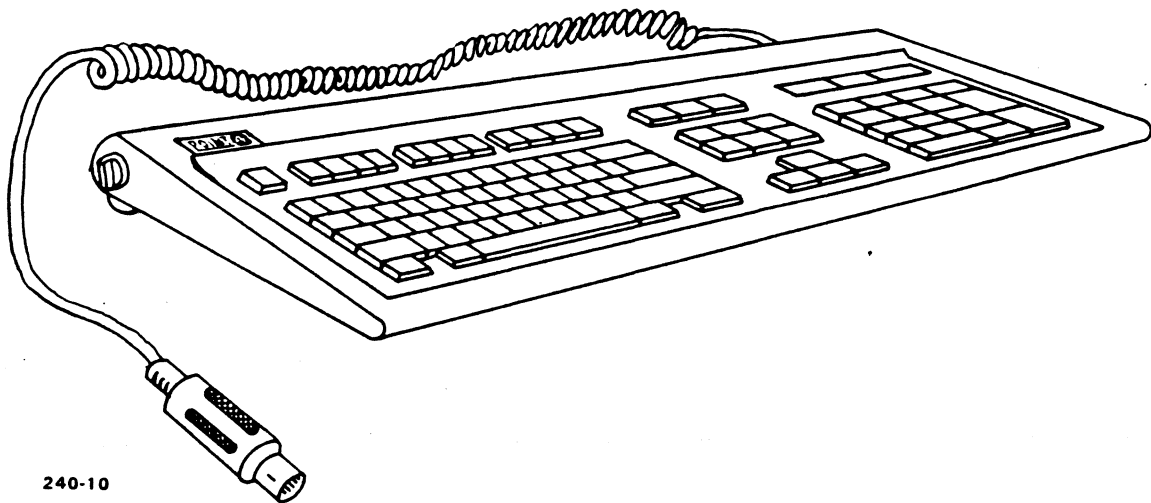
### 1.3.5 Data Storage Devices

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 a 170MB ESDI hard disk drive, a 1.2MB floppy disk drive, and a 150MB tape backup drive. The system may be ordered with a 382MB or 765MB ESDI hard disk drive, instead of the 170MB drive.

### 1.4 THE KEYBOARD

The keyboard (Figure 1-1) 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 Num Lock, Caps Lock, and Scroll Lock.



**Figure 1-1. The Keyboard**

## 1.5 THE FLOPPY DISK DRIVE

The MARK 386S system will accept up to two half-height drives. The basic system includes one half-height floppy disk drive with 1.2MB of capacity.

### 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-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**

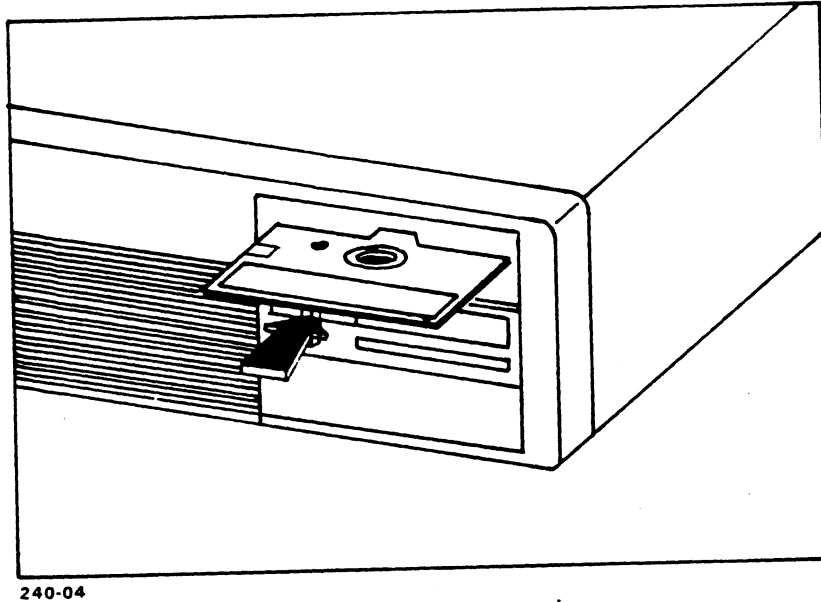
- Do keep diskettes in their protective anti-static envelopes when they are not in use
- Do store seldom used diskettes in their boxes or some other safe place
- Do handle diskettes carefully
- Do write-protect all important diskettes by covering the write-protect notch with tape or specially designed 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 1-2). Press the diskette into the drive until it latches. Close the drive door by turning the handle down until it stops.



**Figure 1-2. Proper Floppy Diskette Orientation for Insertion**

## **1.6 THE HARD DISK DRIVE**

The MARK 386S is factory-equipped with a dual floppy/dual ESDI hard disk controller. The standard drive for the MARK 386SX is 170MB, with options of 382 and 765MB.

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 150MB tape backup drive. A tape backup drive is used 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 150MB capacity, DC600XTD tapes must be used.

DC6250 tapes may be used to increase the capacity to 250MB.

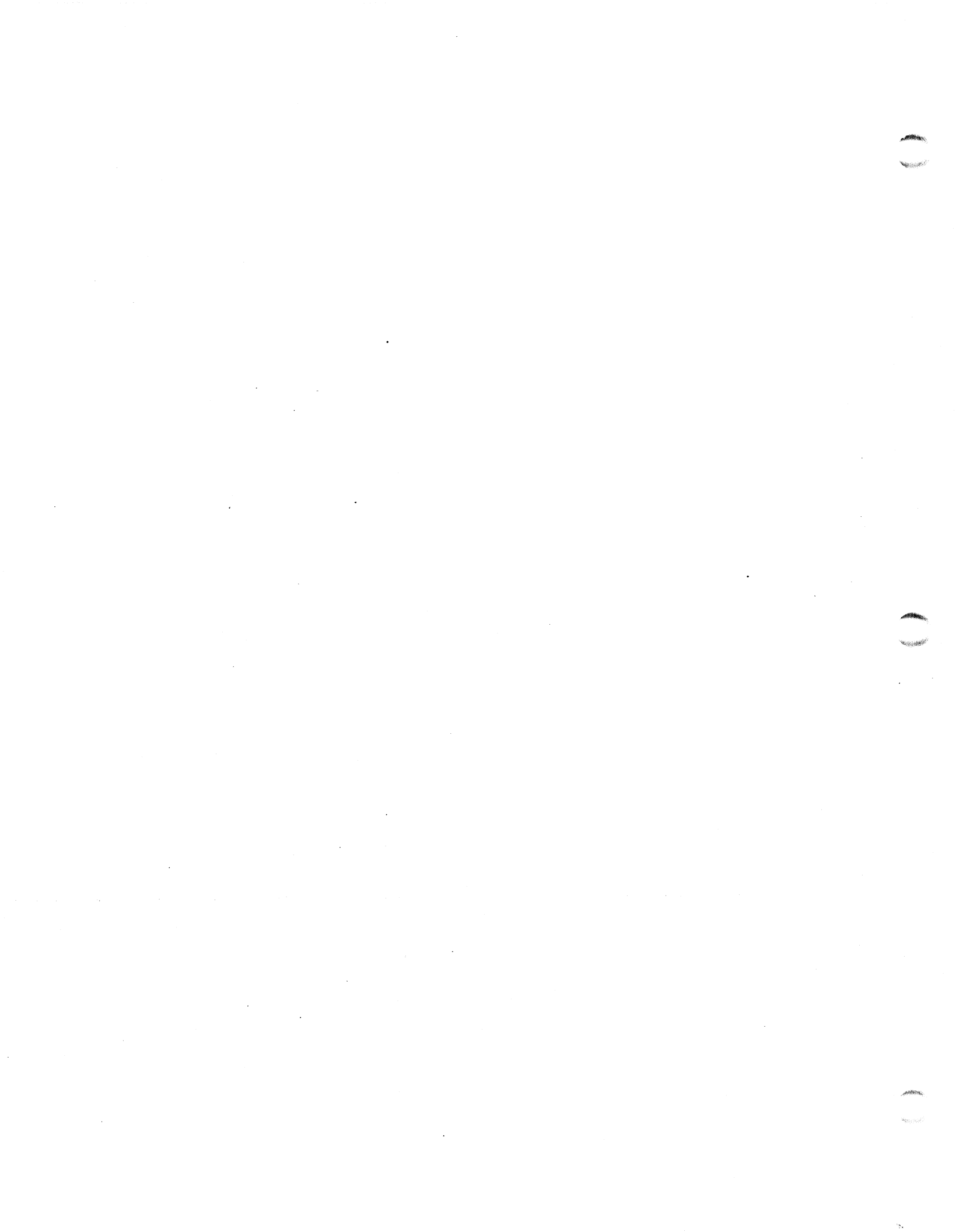
## **1.8 VIDEO DISPLAYS**

POINT 4 offers a 12-inch amber flat-surface monochrome graphic display monitor for your MARK 386 system.

A standard 9-pin (DB9) video connector is provided on the rear panel of your computer for connecting video monitors. 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.

## **1.9 PRINTERS**

Your computer provides both serial and parallel ports on the rear panel, allowing the connection of most commercially available printers. One serial port is a DB9 IBM PC/AT style and the second is a DB25, with standard RS232 pin outs, 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.





## 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!**

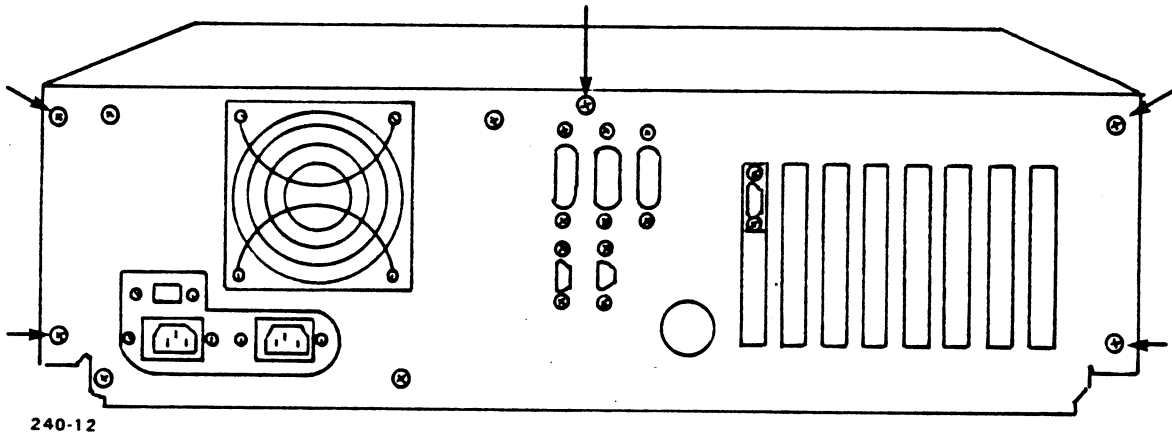
Make sure the system power switch is off and the power cord is disconnected from the wall outlet before attempting to remove the enclosure.

#### **Tools Needed:**

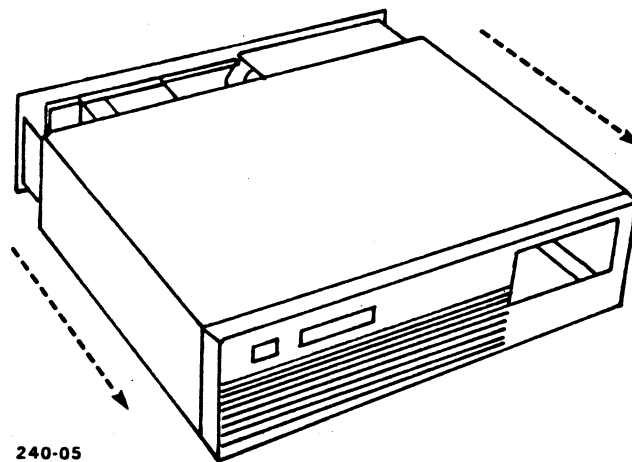
The tool needed for removing the enclosure is either a #2 Phillips screwdriver or a 1/4-inch nut driver.

#### **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).
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 2-1. Location of the Enclosure Retaining Screws**



**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

Use the following procedures 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.

### 2.2.1 Adding RAM Memory to the 80386SX Motherboard

The 80386SX motherboard can provide 4, 6, or 8MB of system RAM using 1MB Single In-Line Memory Modules (SIMMs). Adding memory to a system requires simply installing one or more pairs of SIMMS and changing the settings on the Memory Select DIP switch.

1. Remove the enclosure using the procedure in Section 2.1.
2. Locate the memory area on the motherboard. (See Figure 2-3.)

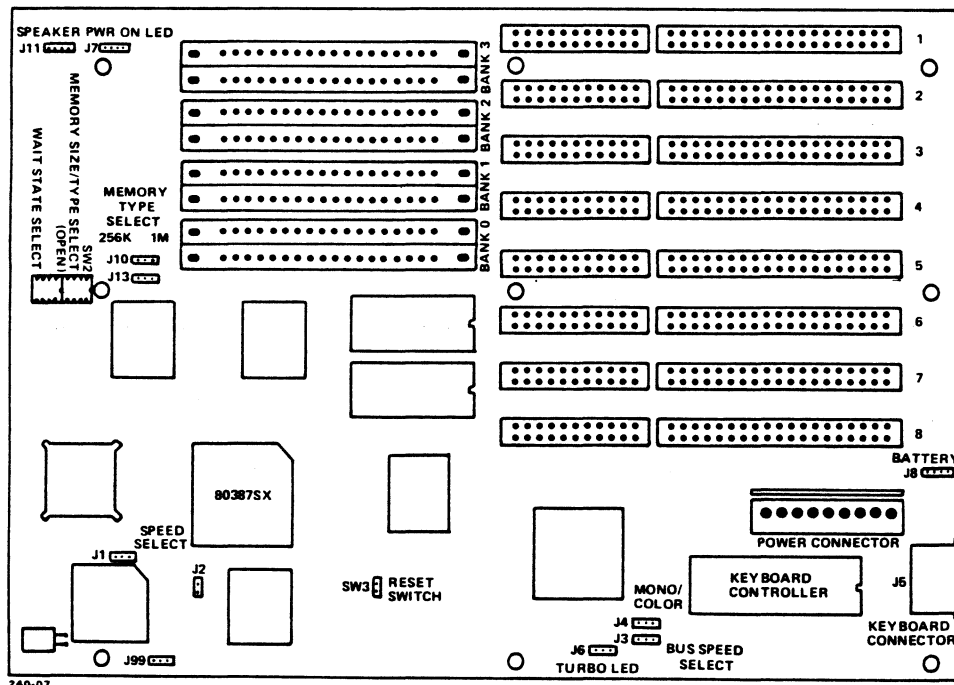


Figure 2-3. 80386SX Motherboard Layout

3. Install SIMMs in banks 0 through 3 for the desired memory configuration as shown in Table 2-1. The correct configurations for 4, 6, and 8MB have been shaded.

**Table 2-1. SW2 Memory Select Settings  
(SX386-20 Memory Option Settings)**

MEMORY OPTIONS	BANKS				JUMPER SETTINGS		MEMORY SELECT (SW2)
	0	1	2	3	J13	J10	
512K	TWO 256K SIMMS				256K	256K	ALL OFF
1MB	TWO 256K SIMMS	TWO 256K SIMMS			256K	256K	MS1=ON MS2=OFF MS3=OFF MS4=OFF
1.5MB	TWO 256K SIMMS	TWO 256K SIMMS	TWO 256K SIMMS		256K	256K	MS1=OFF MS2=ON MS3=OFF MS4=OFF
2MB	TWO 256K SIMMS	TWO 256K SIMMS	TWO 256K SIMMS	TWO 256K SIMMS	256K	256K	MS1=ON MS2=ON MS3=OFF MS4=OFF
	TWO 1MB SIMMS				1MB	1MB	MS1=OFF MS2=OFF MS3=ON MS4=ON
3MB	TWO 256K SIMMS	TWO 256K SIMMS	TWO 1MB SIMMS		256K	1MB	MS1=OFF MS2=ON MS3=ON MS4=OFF
4MB	TWO 1MB SIMMS	TWO 1MB SIMMS			1MB	1MB	MS1=ON MS2=OFF MS3=ON MS4=ON
5MB	TWO 256K SIMMS	TWO 256K SIMMS	TWO 1MB SIMMS	TWO 1MB SIMMS	256K	1MB	MS1=ON MS2=ON MS3=ON MS4=OFF
6MB	TWO 1MB SIMMS	TWO 1MB SIMMS	TWO 1MB SIMMS		1MB	1MB	MS1=OFF MS2=ON MS3=ON MS4=ON
8MB	TWO 1MB SIMMS	TWO 1MB SIMMS	TWO 1MB SIMMS	TWO 1MB SIMMS	1MB	1MB	ALL ON
NOTE: 256Kx9 or 1MBx9 SIMMS Only (16 MHz=100NSEC, 20 MHz=80NSEC or 70NSEC)							

4. Set the Memory Select switches (SW2) to the correct settings indicated in Table 2-1.
5. Verify that SW2-7 and SW2-8 are both ON to select 2 wait-state operation at 20 MHz (see Table 2-2).

**Table 2-2. Wait State Operation**

SW2-8	SW2-7	WAIT STATES	
		READ	WRITE
ON	ON	2*	2*
ON	OFF	DON'T CARE	DON'T CARE
OFF	ON	1	2
OFF	OFF	1	1

\* Default settings are factory-set positions.

Factory Default: All OFF, for 16 MHz (100ns) or 20 MHz (70ns), 7 and 8 ON for 20 MHz (80ns).

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 <Insert>.

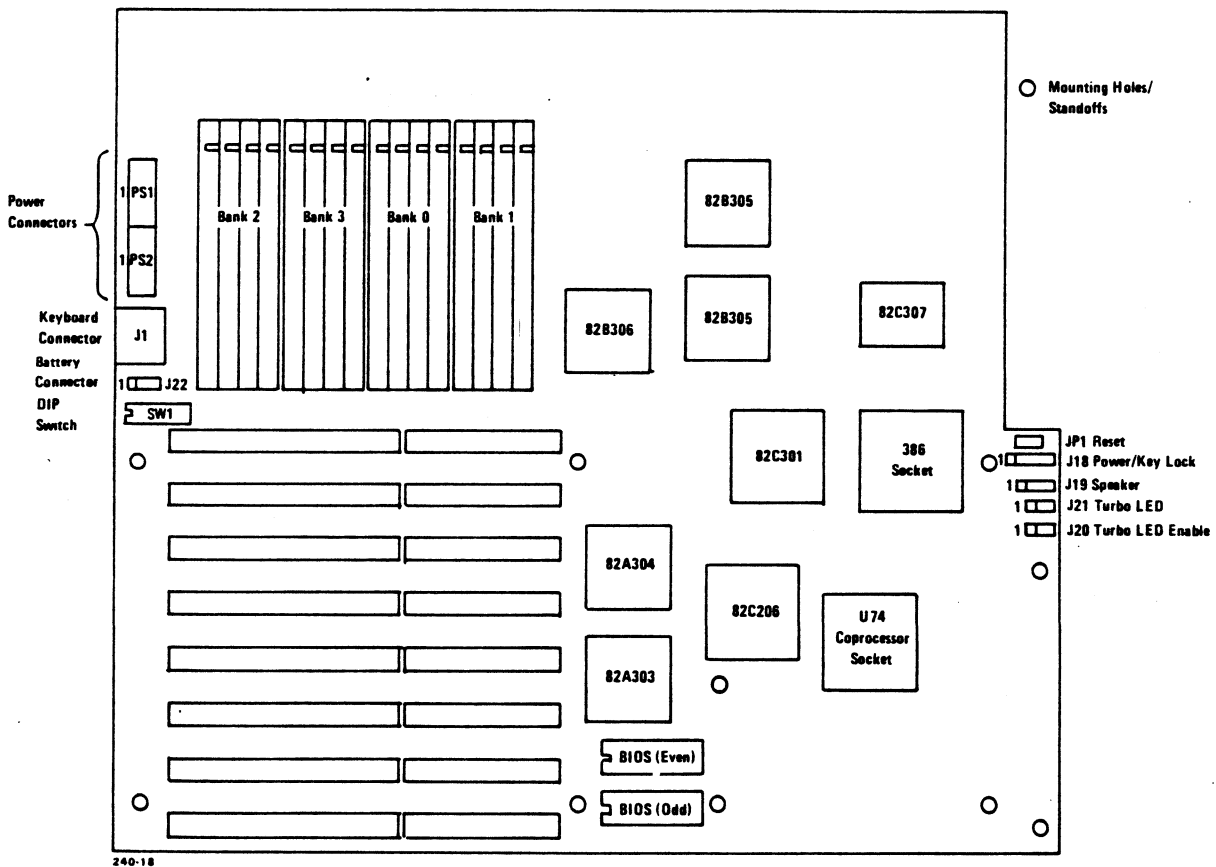
For more information on running SETUP, refer to Section 3.5.1.

## 2.2.2 Adding RAM Memory to the 80386DX Motherboard

1. Remove the enclosure using the procedure in Section 2.1.
2. Locate the memory area on the motherboard (see Figure 2-4).
3. Install 1MBx9 80ns SIMMs in banks 0 through 3 for the desired memory configuration as follows:

Bank 0	4MB
Bank 0 and 1	8MB
Bank 0, 1, and 2	12MB
Bank 0, 1, 2, 3	16MB

4. Replace the cover by reversing the procedure given in Section 2.1.
5. Plug the AC cord into the wall outlet and turn the power switch ON.
6. You must now run the ROM-resident hardware configuration program SETUP. (See Section 3.5.2)



**Figure 2-4. 80386DX Motherboard Layout**

## 2.3 INSTALLING THE MATH COPROCESSOR

The addition of a math coprocessor will greatly reduce the time required to run math intensive software, such as spreadsheets, financial or scientific packages, and CAD/CAM programs.

### **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.

### 2.3.1 Installing the Math Coprocessor on the 80386SX Motherboard

1. Remove the enclosure using the procedure in Section 2.1.
2. Locate the socket for the 80387SX on the motherboard (see Figure 2-3).
3. Align the notched end on the 80387SX 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. Remove the jumper at J2 (see Figure 2-3).
5. Installation of the math coprocessor is now complete. Replace the enclosure by reversing the procedure given in Section 2.1.
6. You must now run the ROM-resident hardware configuration program SETUP and exit with <ESC>. This automatically enables the math co-processor.

### 2.3.2 Installing the Math Coprocessor on the 80386DX Motherboard

The 80386DX supports both the Intel 80387 or the Weitek 3167 math coprocessor. Location U74 on the motherboard contains an EMC socket for the installation of the coprocessor.

1. Remove the enclosure using the procedure in Section 2.1.
2. Locate U74 on the motherboard (see Figure 2-4).
3. For 80387 Installation:
  - a. If the EMC socket has an adapter socket for the 80387 installed, leave it in place and insert pin 1 of the coprocessor into pin 1 of the adapter socket.
  - b. Otherwise, insert pin 1 of the coprocessor into pin B2 of the EMC socket (see Figure 2-5).

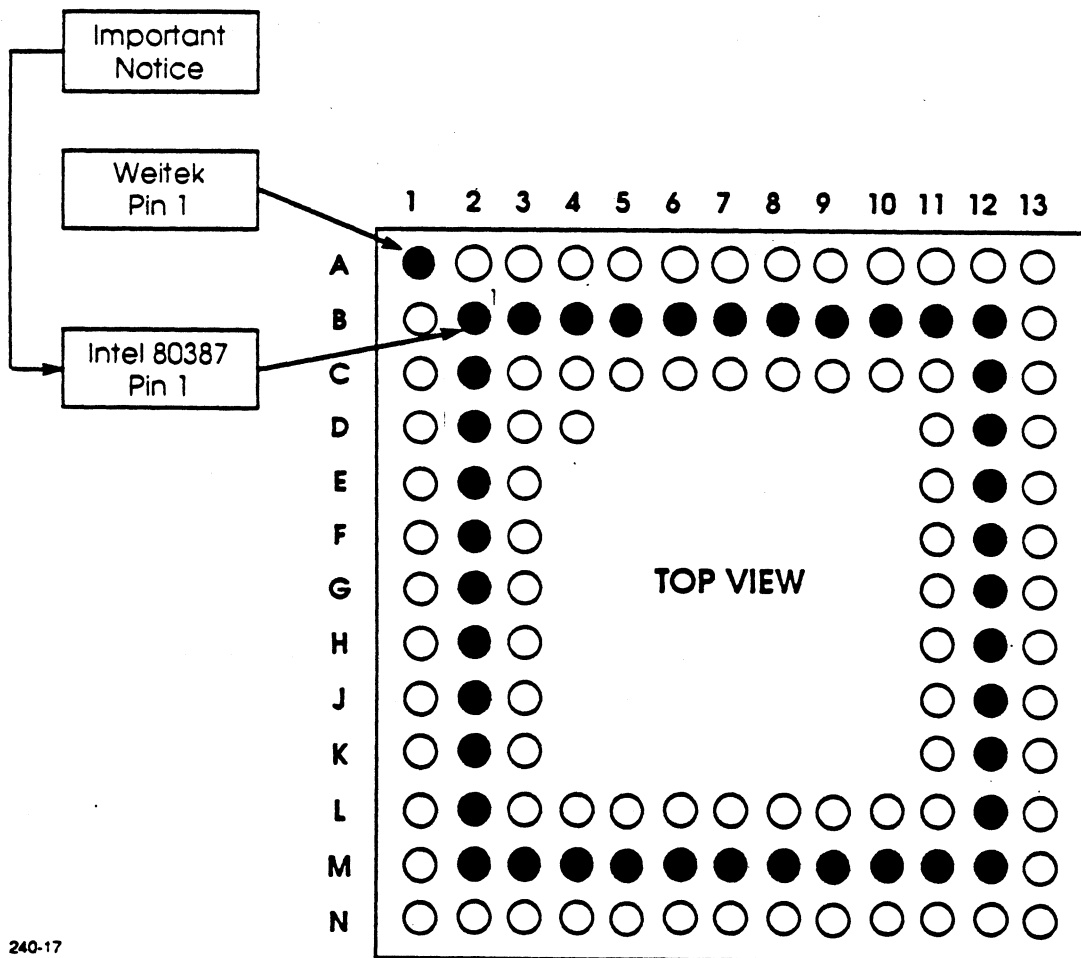


Figure 2-5. EMC Socket Pinouts



4. For Weitek 3167 Installation:
  - a. If the EMC socket has an adapter socket for an 80387 installed, remove it.
  - b. Insert pin 1 of the 3167 into pin A1 of the EMC socket (see Figure 2-1).
5. Carefully press the coprocessor into the socket until it is completely seated and making sure that no pins are bent.
6. Set SW2, key 2 to ON (see Figure 2-4).
7. Replace the enclosure by reversing the procedure given in Section 2.1.
8. You must now run the ROM-resident hardware configuration program SETUP (see Section 3.5.2).

## 2.4 INSTALLING OPTION BOARDS

Your MARK 386S system offers six 16-bit AT-compatible and two 8-bit AT-compatible expansion slots for optional boards. 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.

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 and the rear panel expansion slot covers.
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.
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.

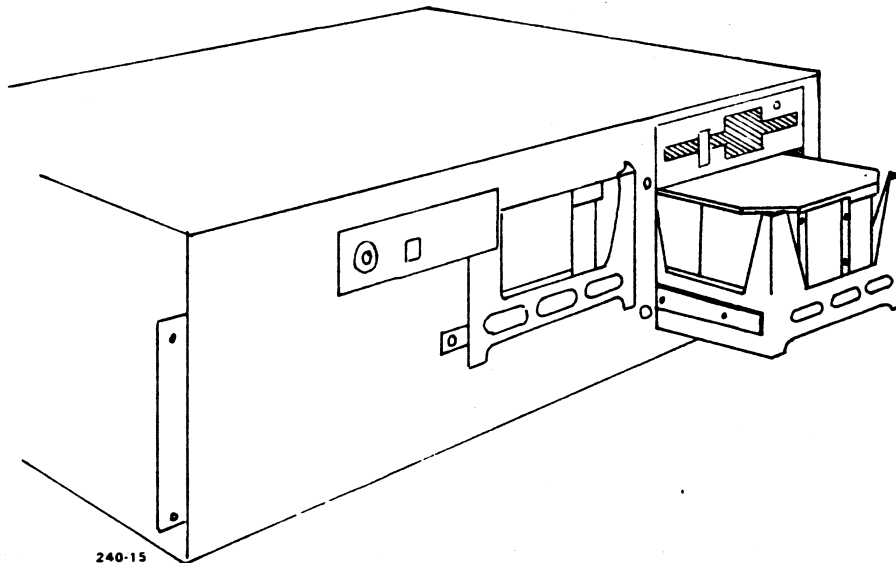
### **NOTE**

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 170MB full-height ESDI drive; 382 or 765MB capacity full-height ESDI drives are available as factory options.

Full-height drives are installed in the chassis central location (see Figure 2-6). Half-height drives are installed in the right-hand half-height slots only.



**Figure 2-6. Mounting Location of an Optional Hard Disk Drive**

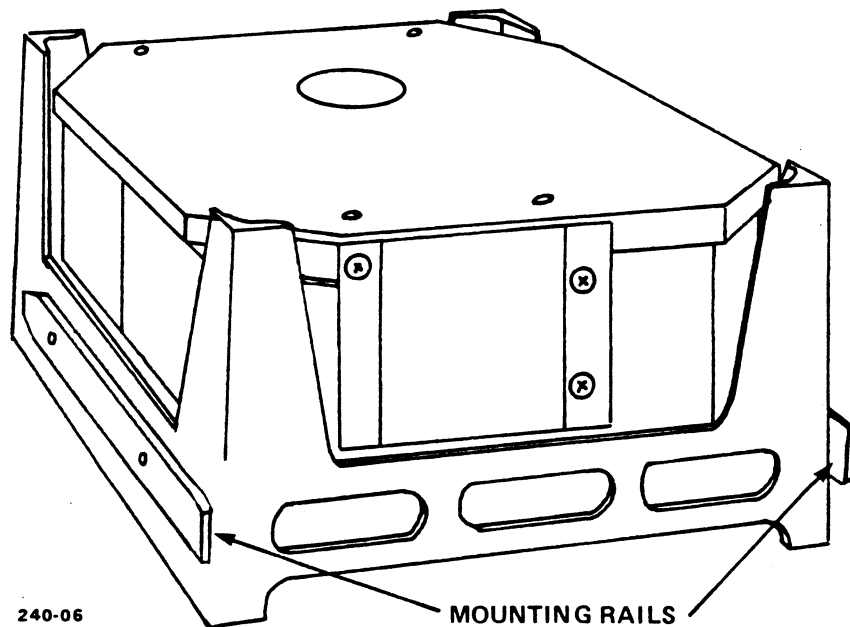
### **IMPORTANT**

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

**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. Verify that the jumper settings on the ESDI controller match the defaults (shaded) in Table 2-3.
3. Make sure the mounting rails are attached to the drive chassis (Figure 2-7). If the rails are not connected, install them according to the manufacturer's instructions.

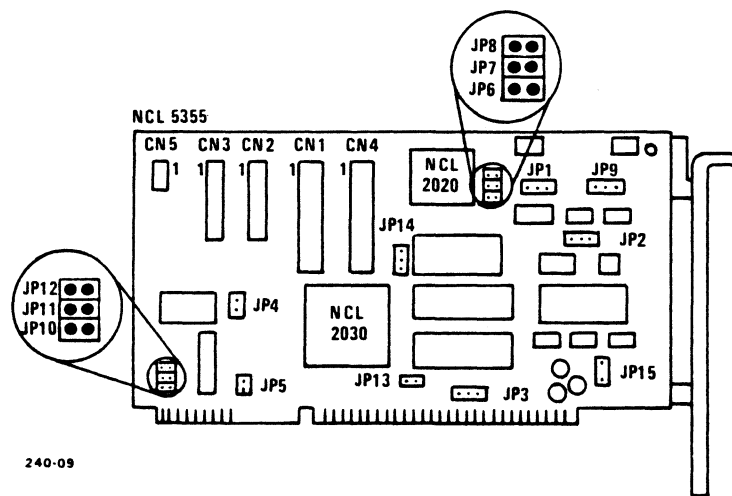


**Figure 2-7. Location of the Hard Disk Drive Mounting Rails**

**Table 2-3. NCL 5355 Installation Specifications**

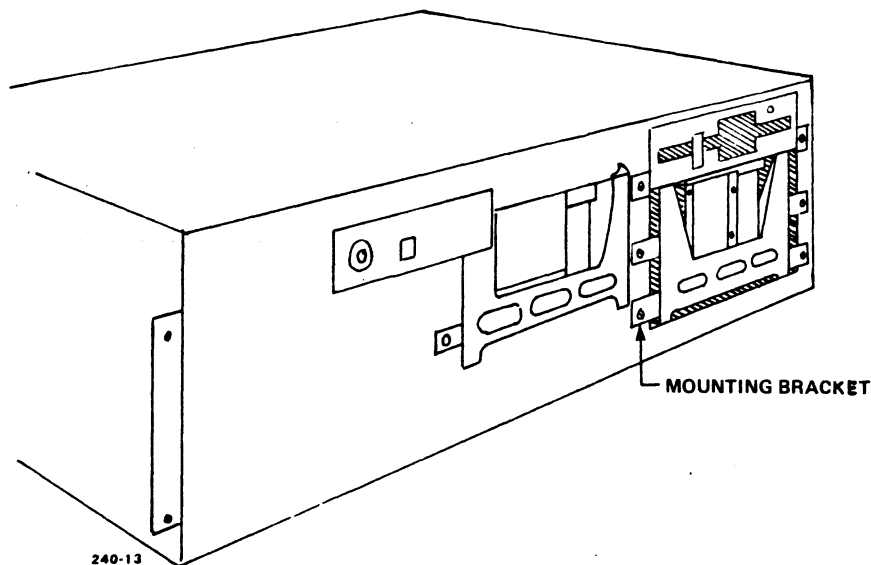
<b>Fixed Disk Interface:</b> CN1 = 34-Pin Control Cable CN2 = 20-Pin Data Cable (Drive One) CN3 = 20-Pin Data Cable (Drive Two) CN5 = LED Connector	
<b>Floppy Disk Interface:</b> CN4 = 34-Pin Control and Data Cable	
<b>Jumpers:</b>	
JP1 = I/O Address Host to Controller Primary 1F0-1F7, 3F6H 3F7H: Secondary 170-177, 376H 377H:	Pins 1-2: Closed (Factory Setting) Pins 2-3: Closed
JP2 = CPU ROM Select 256K bit: 128K bit:	Pins 1-2: Closed Pins 2-3: Closed (Factory Setting)
JP3 = BIOS ROM Select 256K bit: 128K bit:	Pins 1-2: Closed Pins 2-3: Closed (Factory Setting)
JP4 =	NOT USED
JP5 = Factory Test	Closed (Factory Setting)
JP6 = Factory Test	Open (Factory Setting)
JP7 = I/O Address Host to Controller Primary 3F2-3F7: Secondary 372-377:	Closed (Factory Setting) Open
JP8 = Factory Test	Open (Factory Setting)
JP9 = Factory Test	Pins 1-2: Open Pins 2-3: Closed
JP10 = Buffer Size Select 16KB: 64KB:	Closed Open
JP11 = Sector Sparing	Disabled: Open Enabled: Closed
JP12 =	NOT USED
JP13 = Buffer Size Select 64KB: 16KB:	Closed Open
JP14 = Buffer Size Select 256K bit RAM: 64K bit RAM:	Pins 1-2-3: Open Pins 1-2: Closed Pins 2-3: Closed
JP15 = Factory Test	Closed (Factory Setting)

Default Settings



**Figure 2-8. NCL 5355 Controller Connector and Jumper Locations**

4. Insert the ESDI controller board into an available expansion slot.
5. 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.
6. 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 2-9).



**Figure 2-9. Securing the Drive with a Mounting Bracket**

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.

## 2.5.2 Installing a Floppy Disk Drive

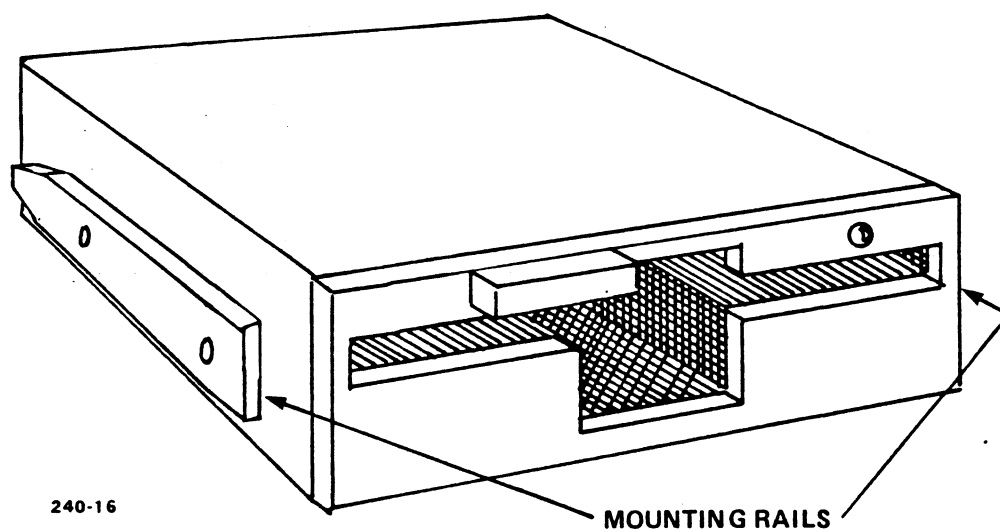
Up to two half-height floppy disk drives (either 360KB, 720KB, 1.2MB or 1.44MB) can be installed in your MARK 386 system. The basic system includes one 1.2MB drive. Use the following procedure to install the drives:

### **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.

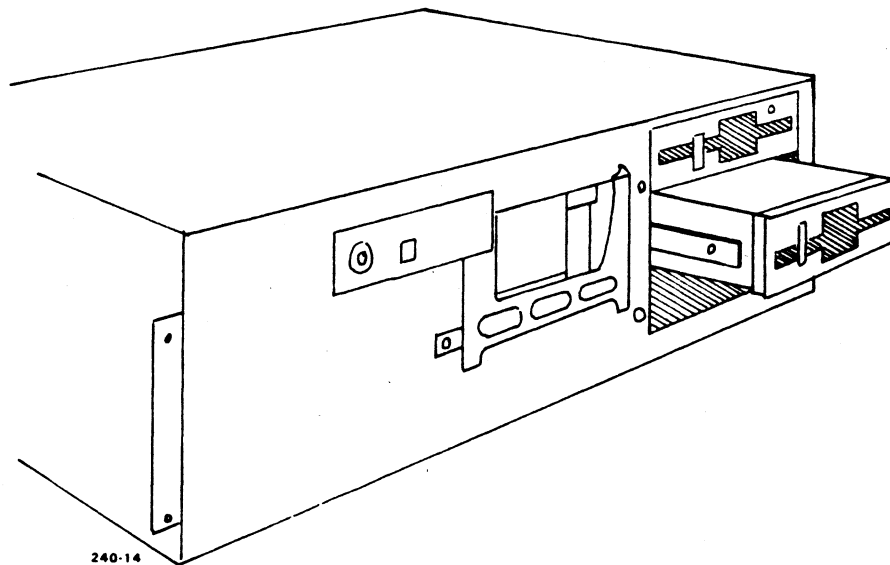
### **Installation Procedure:**

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 2-10).



**Figure 2-10. Location of the Floppy Disk Drive Mounting Rails**

3. Locate the data and power cables for the drive. One end of the data cable is connected to the motherboard and the other end is connected to the floppy disk drive. Locate an unused power cable coming from the power supply.
4. Remove the mounting plate on the left side of the drive slot.
5. Insert the drive into the middle right hand slot in the chassis, below the existing floppy disk drive (Figure 2-11). Secure the drive in place by replacing the mounting bracket and tightening the mounting screw.



**Figure 2-11. Mounting Location of an Optional Floppy Disk Drive**

6. Attach the connectors from the data and power cables from the motherboard to the corresponding connectors on the floppy disk drive. Note that the red conductor on the ribbon cable corresponds to pin 1.
7. Install the second drive, if applicable, in the same manner using the middle right-hand slot.
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. 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

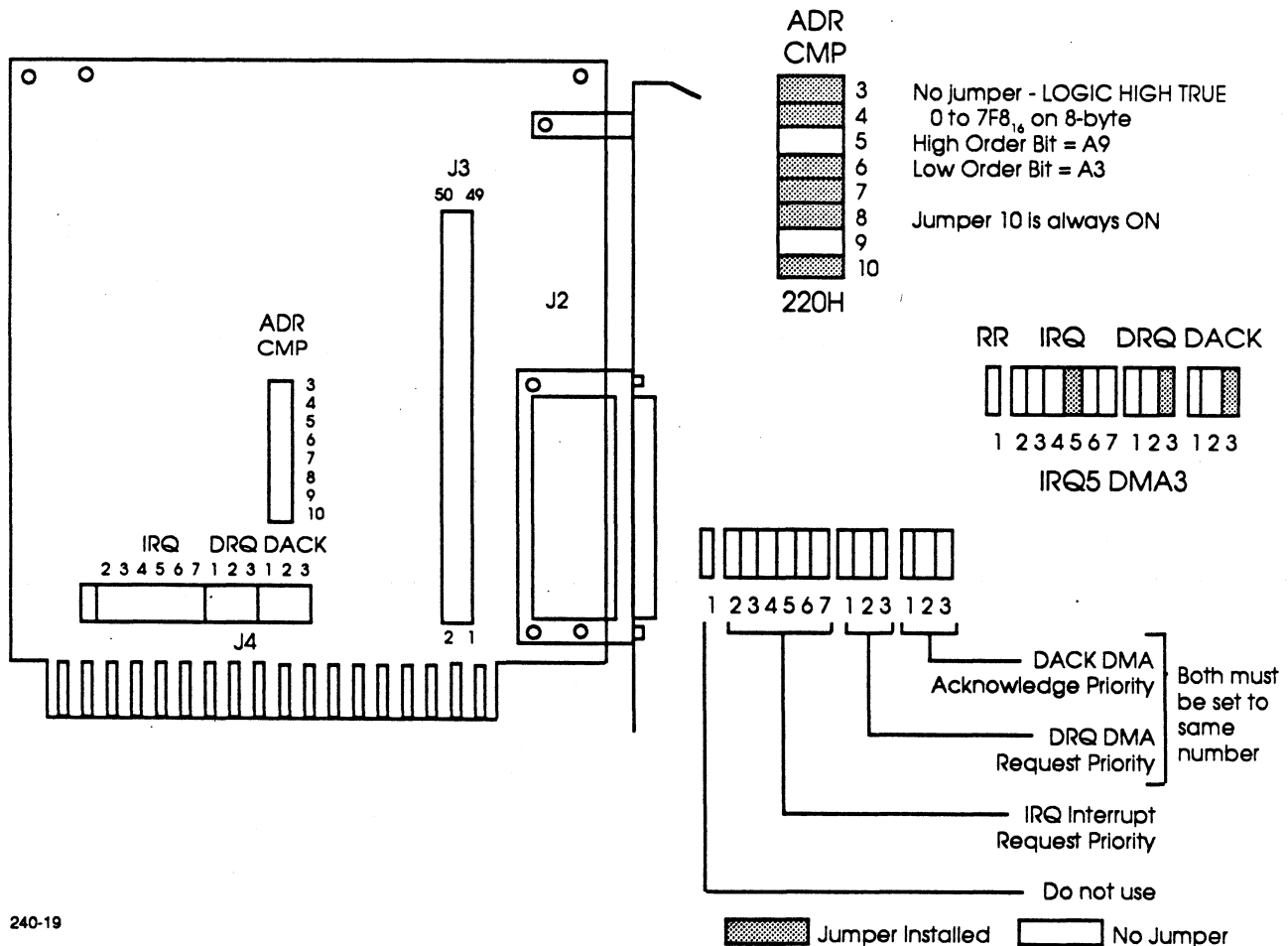
A 150MB 1/4-inch tape drive is installed at the factory. This drive is used to periodically copy the files from the hard disk drive. This preserves the data in case it is lost from the hard disk.

### 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. Set the jumpers on the tape controller to I/O address 220H, IRQ5, and DMA3 (see Figure 2-12).



240-19

Figure 2-12. Tape Controller Jumper Settings



4. Insert the tape backup drive controller board into an available expansion slot, using the procedure given in Section 2.4.
5. 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.
6. Remove the mounting bracket on the left side of the highest available half-height drive slot (see Figure 2-6).
7. Insert the drive into the chassis. Secure the drive in place by replacing the mounting bracket and tightening the mounting screw.
8. 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.
9. Replace the enclosure by reversing the procedure given in Section 2.1.
10. Plug the AC cord into the wall outlet and turn the power switch on.
11. Refer to the installation instructions supplied with the tape backup drive for more detailed information. The installation procedure is now complete.

## 2.6 32-PORT INTELLIGENT SERIAL I/O MULTIPLEXER

Installing and using the Corollary 8x4 Serial I/O subsystem is described in the Corollary *Installation and User's Manual*. The following notes describe the two different 8x4 mux (controller) boards that are available and how to configure them.

The only difference in the two 8x4 mux board types is that one contains two jumpers (at S1 and S2) and the other contains two rotary switches (H and L). These jumpers or switches are used to set address ranges so that multiple boards can be used in the same system. The following chart shows the settings needed when multiple boards are used:

	Jumpers:		or	Rotary:		Starting Address (Hexadecimal)
	S1	S2		H	L	
1st 8x4:	out	out		E	8	E80000
2nd 8x4:	in	out		E	0	E00000
3rd 8x4:	out	in		D	8	D80000
4th 8x4:	in	in		D	0	D00000

It is possible to mix the two types of 8x4 mux boards in the same system. However, it is important that the two-jumper boards be the first boards and the rotary switch boards come after them.

Note that there is an error in the Corollary *Installation and User's Manual*. It says that the 8x4 board with the lowest address will be the first board. As you can see from the above table, the exact opposite is true: the 8x4 board with the highest address will be the first board.

### 2.6.1 Diagnostics

The mxd diagnostic works equally well on both types of 8x4 processor boards. Instructions on running mxd are found in the Corollary *Installation and User's Manual*.

## 2.7 INSTALLING THE 8-PORT SERIAL CONTROLLER

Instructions for installing the 8-port Serial Controller are contained in the *8-Port Serial Controller User Guide*, dated November 1988 (Order Number HTP0076).

Using the Arnet driver, XENIX supports a maximum of two 8-port controllers, one as COM1 and the other as COM2. XENIX does not support chaining two or more boards on one interrupt.

### 2.7.1 Installing the 8-Port Serial Controller as COM1

1. JP1 must have a jumper across location 3.
2. JP2 must have a jumper across location 3 (IRQ4).
3. Set SW1, keys 1 through 4, to 1 0 1 1, where 1=ON or Closed (Address 100H).
4. Set SW2, keys 1 through 8 to 1 0 1 0 1 1 0 0.
5. On the 1P/2S Adapter change Port 1 to use COM3 instead of COM1 (see Table 2-8).
6. Run **mkdev serial** to install an 8-port card on COM1.
7. Run **mkdev serial** to install a 1-port card on COM3.

### 2.7.2 Installing a Second 8-Port Serial Controller as COM2

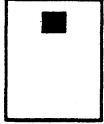
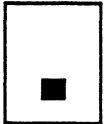
1. JP1 must have a jumper across location 3.
2. JP2 must have a jumper across location 2 (IRQ3).
3. Set SW1, keys 1 through 4, to 1 0 0 1, where 1=ON or Closed (Address 180H).
4. Set SW2, keys 1 through 8, to 1 0 0 0 1 1 0 0.
5. On the 1P/2S Adapter change Port 2 to use COM4 instead of COM2 (see Table 2-8).
6. Run **mkdev serial** to install an 8-port card on COM2.
7. Run **mkdev serial** to install a 1-port card on COM4.

## 2.8 INSTALLING THE ATI VIDEO ADAPTER

There are four switches in one assembly on the rear of the card.

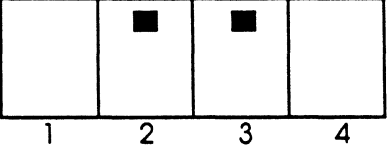
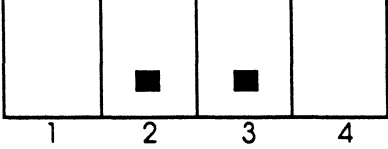
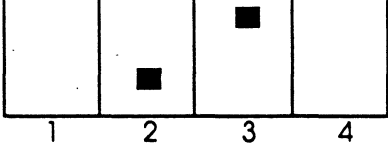
Switch 1 (SW1) is used to select the mode of operation which will be in effect at power-on (see Table 2-4).

**Table 2-4. Video Mode Select**

Default Mode	Graphics Solution SW1 Switch Settings	
Color/Graphics	 <p style="text-align: center;">1</p>	OFF/Closed ON/Open
Monochrome/Graphics	 <p style="text-align: center;">1</p>	OFF/Closed ON/Open
<p><b>Color/Graphics</b> – Selects for IBM Color/Graphics, Plantronics Color/Graphics and ATI 640 x 200 16 Color/Graphic modes.</p> <p><b>Monochrome/Graphics</b> – Selects for Monochrome Text Mode (MDA), and Hercules Monochrome/Graphics Mode.</p>		

Switches 2 and 3 are used to identify the type of monitor that is being used (see Table 2-5).

**Table 2-5. Monitor Type Select**

Monitor Type	Graphics Solution SW2 & SW3 Switch Settings
TTL Monochrome	 <p>OFF/Open ON/Closed</p>
RGB Color, Composite Color	 <p>OFF/Open ON/Closed</p>
IBM PC Portable Composite Monochrome	 <p>OFF/Open ON/Closed</p>
Switch 4 is not used.	
<p><b>NOTE:</b> When Color/Graphics Mode and TTL Monochrome Monitor are selected at the same time, the Graphics Solution will perform color/graphics emulation on a monochrome monitor. The same applies, if monochrome mode and RGB or Composite Monitor is selected, the Graphics Solution will enable interlace and display high-resolution monochrome text and graphics on an RGB Monitor.</p>	

1. Position the switches on the Video Adapter as appropriate using the information above.
2. Remove the enclosure using the procedure described in Section 2.1.
3. Install the Video Adapter into an available expansion slot, using the procedure in Section 2.4.
4. Locate J4 on the motherboard (see Figure 2-3) and configure it appropriately (see Table 2-6).

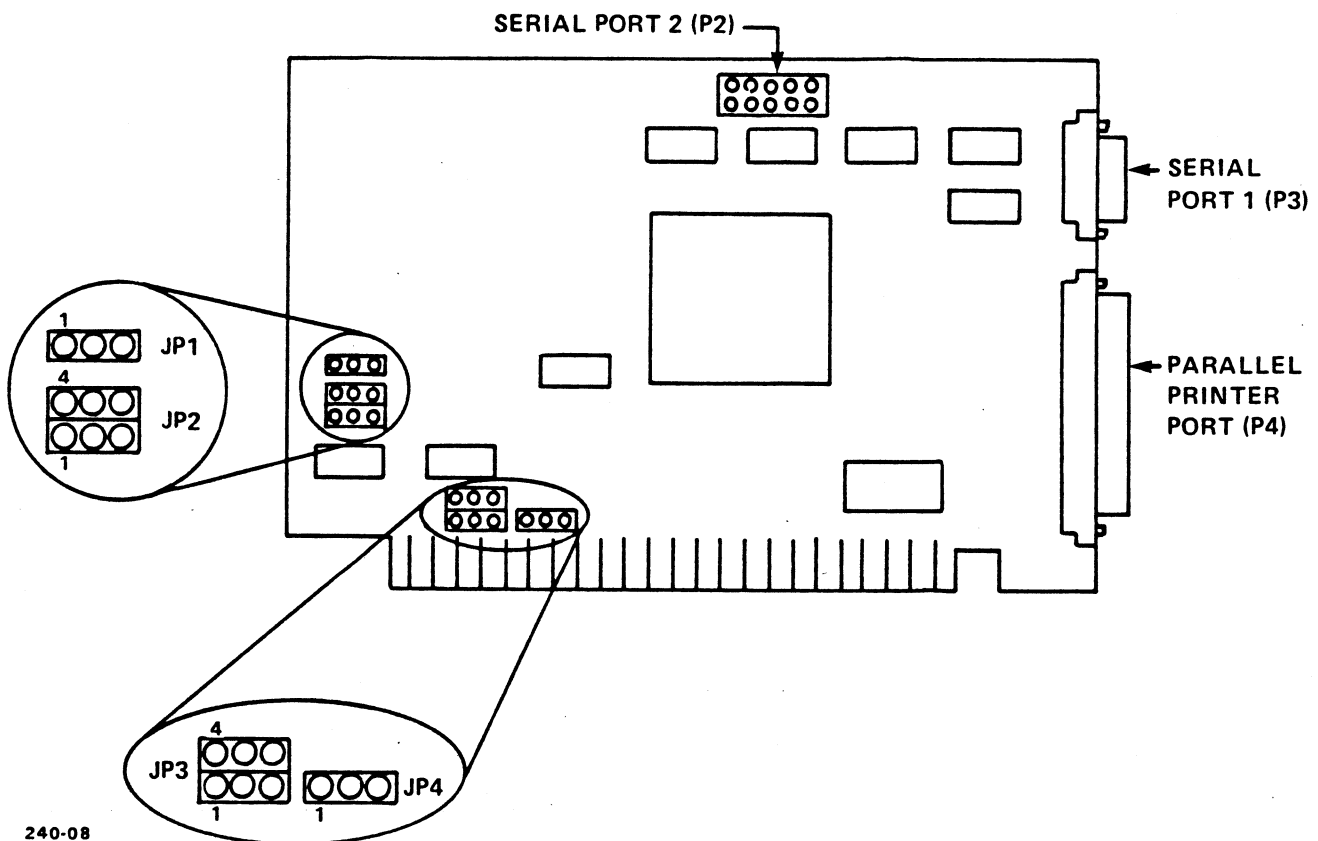
**Table 2-6. Video Adapter Select (J4)**

Adapter Type	Jumper
Monochrome	NONE (or 1-2)
Color	2-3

5. Replace the enclosure by reversing the procedure in Section 2.1.
6. Plug the Monitor interface cable into the 9-pin connector on the Video Adapter.
7. Plug the computer's and the monitor's AC line cords into an appropriate power source, and turn both units on.
8. You must now run the ROM-based SETUP routine (see Section 3).

## 2.9 INSTALLING THE PARALLEL AND TWO SERIAL PORT ADAPTER

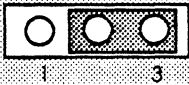
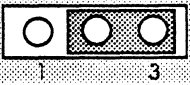


Figure 2-13 shows the location of JP1 through JP4 on the parallel and two serial port (1P/2S) adapter.



**Figure 2-13. 1P/2S Adapter Layout**

1. Position the jumpers on JP1 and JP4 to select the desired printer port and IRQ (see Table 2-7).

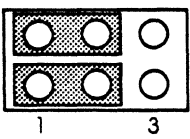
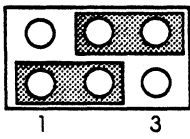
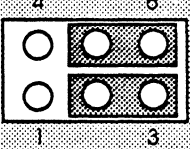
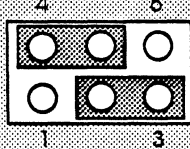
**Table 2-7. Printer Port Settings**

JP1	JP4	I/O Port	IRQ
		LPT1	IRQ7
		LPT2	IRQ5

 Factory Default

2. Position the Jumpers on JP2 and JP3 to select the desired serial ports and IRQs (see Table 2-8).

**Table 2-8. Serial Ports Settings**

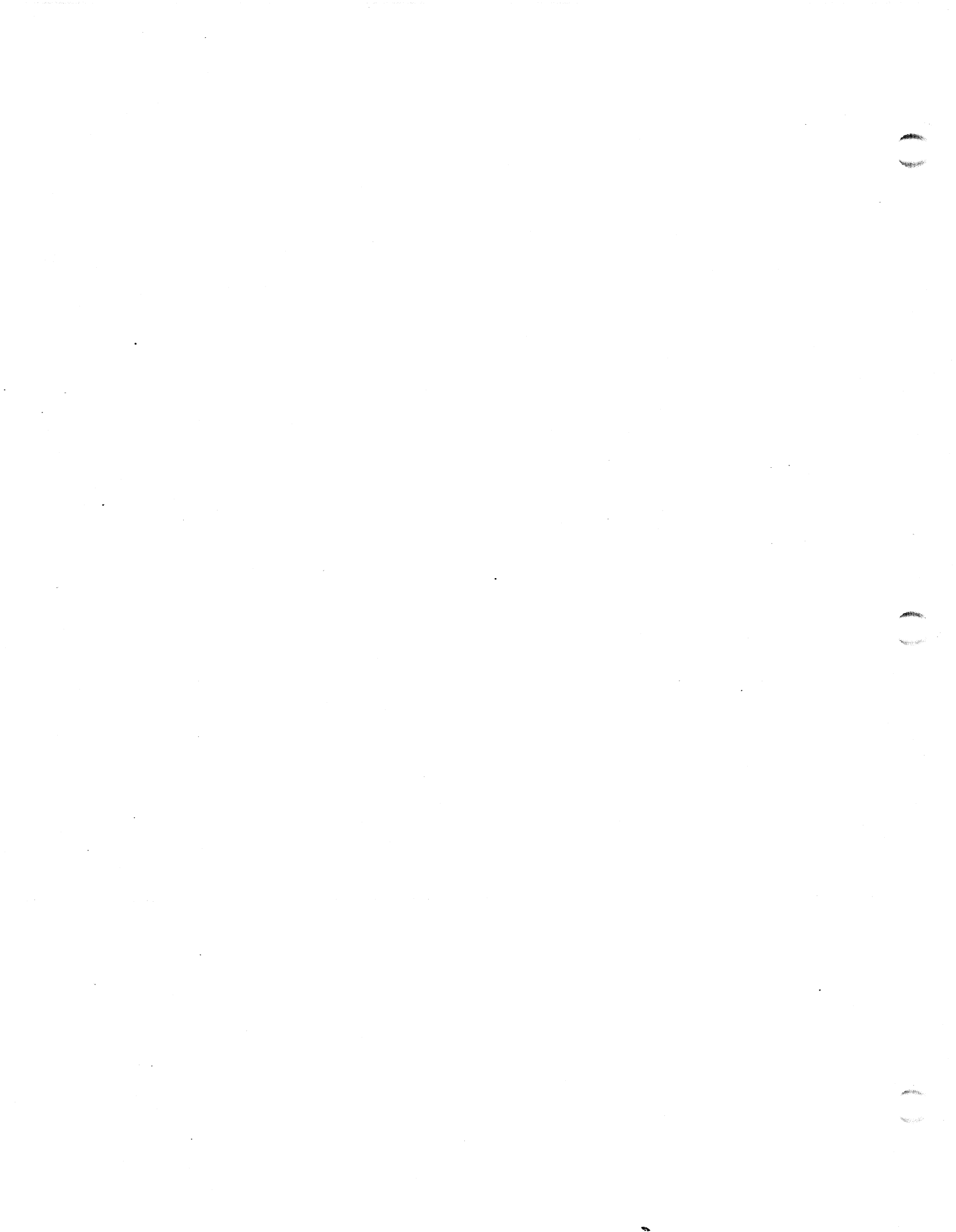
JP2 	Port #1 = COM3 Port #2 = COM4	JP3 	Port #1 = IRQ3 Port #2 = IRQ4
JP2 	Port #1 = COM1 Port #2 = COM2	JP3 	Port #2 = IRQ3 Port #1 = IRQ4

 Factory Default

3. Remove the enclosure using the procedure described in Section 2.1.
4. Install the 1P/2S adapter into an available expansion slot using the procedure in Section 2.4.
5. Remove one of the DB25 cover plates on the rear panel; using the screws on the DB25 connector, attach the DB25-to-10-pin ribbon cable to the rear panel.
6. Attach the other (10-pin) end of the cable to P2 on the 1P/2S adapter.

**NOTE:** Make sure the color stripe on the cable mates with pin 1 of P2.

7. Replace the enclosure by reversing the procedure in Section 2.1.





## 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). It is set up from the factory for monochrome mode operation. If you need to change this setting, see Section 2.8.

#### **WARNING!**

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

1. Locate the monitor video cable and connect the system end of it to the 9-pin female video port on the video adapter card.
2. Connect the monitor power cord to a wall outlet, or to the switched outlet on the rear panel, if applicable.

## 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.
2. Connect the male end of the power cord to the wall outlet.

## 3.3 CONNECTING THE PRINTER

The MARK 386S rear panel has both serial and parallel ports, allowing most commercially available printers to be connected. One serial port is a DB9 IBM AT standard; the second serial port is a DB25 RS232 industry standard, 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 shown in Table 3-1.
2. The pinouts for the DB9 male IBM PC/AT-compatible serial port is shown in Table 3-2.
3. The pinouts for the male DB25 RS232 serial port is shown in Table 3-3.

**TABLE 3-1. PARALLEL 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

**TABLE 3-2. SERIAL PORT #1 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

**Table 3-3. Serial Port #2 Pinouts**

RS-232C Name	Port #2 Pin	Signal Name	Signal Direction
AA	1	(Protective ground)	-
BA	2	TX (Transmit data)	Output
BB	3	RX (Receive data)	Input
CA	4	RTS (Request to send)	Output
CB	5	CTS (Clear to send)	Input
CC	6	DSR (Data set ready)	Input
AB	7	SG (Signal ground)	-
CF	8	CD (Carrier detect)	Input
CD	20	DTR (Data terminal ready)	Output
CE	22	RI (Ring indicate)	Input

### 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 3-1 will be displayed on your monitor:

```
Phoenix 80386 ROM BIOS PLUS Version 1.10.00  
Copyright (C) 1985-1988 Phoenix Technologies Ltd.  
All Rights Reserved
```

```
SX 386 C.C.I.
```

```
640K Base Memory, 3456K Extended  
Current date is Wed 11-01-1989  
Enter new date (mm-dd-yy):
```

NOTE: The BIOS Copyright information in this illustration will be different with the 80386DX motherboard (see Figure C-8).

### **Figure 3-1. 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 3-2 will be displayed:

```
Phoenix 80386 ROM BIOS PLUS Version 1.10.00  
Copyright (C) 1985-1988 Phoenix Technologies Ltd.  
All Rights Reserved
```

```
SX 386 C.C.I.
```

```
640K Base Memory, 3456K Extended  
Current date is Sat 11-04-1989  
Enter new date (mm-dd-yy):  
Current time is 00:31:49:00  
Enter new time:
```

NOTE: The BIOS Copyright information in this illustration will be different with the 80386DX motherboard (see Figure C-8).

### **Figure 3-2. MS-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 3-3 will be displayed:

```
Phoenix 80386 ROM BIOS PLUS Version 1.10.00  
Copyright (C) 1985-1988 Phoenix Technologies Ltd.  
All Rights Reserved
```

```
SX 386 C.C.I.
```

```
640K Base Memory, 3456K Extended  
Current date is Wed 11-01-1989  
Enter new date (mm-dd-yy):  
Current time is 00:31:39:00  
Enter new time:
```

```
Microsoft (R) MS-DOS (R) Version 3.30  
(C) Copyright Microsoft Corp 1981-1986
```

```
A>
```

NOTE: The BIOS Copyright information in this illustration will be different with the 80386DX motherboard (see Figure C-8).

### **Figure 3-3. MS-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.

### **CAUTION**

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

### 3.5.1 SETUP for the 80386SX Motherboard

The SETUP program is very easy to use. A main set-up screen (Figure 3-4) 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.

To access the SETUP program, hold down <CTRL> and <ALT>, then press <Insert>.

Phoenix Technologies Ltd.  
System Configuration Setup V4.02

Time: 15:02:17  
Date: Fri Mar 23, 1990

Diskette A:	5.25-inch, 1.2MB					
Diskette B:	Not Installed	Cyl	HD	Pre	LZ	Sec Size
Hard Disk 1:	Type 1	306	4	128	305	17 10
Hard Disk 2:	Not Installed					
Base Memory:	640KB					
Extended Memory:	3456KB					
Display:	MONO					
Keyboard:	Installed					
CPU Speed:	Fast					

Coprocessor: Not Installed

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

**Figure 3-4. 80386SX 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>.

**NOTES:**

1. The hard disk type should be 1.
2. Base Memory cannot exceed 640KB.
3. Extended Memory equals 1024 times the number of SIMMs installed, less 640.  
(For example:  $4 \times 1024 = 4096 - 640 = 3456$ )



### 3.5.2 SETUP for the 80386DX Motherboard

The SETUP program is very easy to use. During each boot or reboot the firmware will display:

Press <DEL> if you want to run SETUP/EXTD-SET

1. If you press the <DELETE> key at this point, the following screen will be displayed:

EXIT FOR BOOT  
RUN CMOS SETUP  
RUN XMOS SETUP

2. Use the up or down arrows to move the highlight to the desired action and press <RETURN>.
3. Figure 3-5 shows the CMOS SETUP screen.
  - a. Use the right and left arrow keys to select the next or previous fields to modify.
  - b. Use the Page Up and Page Down keys to display the next or previous values for the current field.

```

Date (mn/date/year): Sun, Jan 01 1989
Time (hour/min/sec): 00:42:53
Floppy drive A      : 1.2MB, 5-1/2"
Floppy drive B      : Not Installed

Hard disk C:type    : 1
Hard disk D:type    : Not Installed
Primary display     : Monochrome
Keyboard            : Installed

Scratch RAM option : 1

Month : Jan, Feb, ... Dec
Date  : 01, 02, 03, ... 31
Year  : 1901, 1902, ... 2099
    
```

Base memory size : 640KB	
Ext. memory size : 0KB	
Numeric processor : Not Installed	

```

Cyln Head WPcom LZone Sec Size
615  4    300   615  17 20MB
    
```

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4
5	6	7	8	9	10	11

```

-----
ESC=Exit, <>=Select, PgUp/PgDn=Modify
    
```

**Figure 3-5. 80386DX CMOS SETUP Program Screen**

- c. You cannot change the memory size or numeric coprocessor status on the SETUP screen.
  - d. After all changes have been made, press the <ESC> key to write the changes and reboot the system.
4. Figure 3-6 shows the Extended CMOS SETUP Menu Screen.

```

EXTENDED CMOS SETUP PROGRAM VER 1.50 (C)1988, American Megatrends, Inc.
-----
C&T 386 CHIPSET SETUP PROGRAM
MAIN MENU

EASY C&T 386 CHIPSET REGISTER SETUP
206,301 REGISTERS SET UP
307 REGISTERS SETUP
ENABLE/DISABLE VIDEO AND MAIN BIOS SHADOW
WRITE CMOS REGISTERS AND EXIT
DO NOT WRITE CMOS REGISTERS AND EXIT
    
```

**Figure 3-6. 80386DX Extended CMOS SETUP Menu Screen**

5. The only screen that you will need to access is the EASY C&T 386 CHIPSET REGISTER SETUP. (The other screens are shown in Appendix C.)
6. Use the up and down arrow keys to move the highlight to the desired action and press <RETURN>.
7. Figure 3-7 shows the EASY C&T 386 CHIPSET REGISTER SETUP screen.

Memory Configuration

Block	No. of Banks	DRAM Type	Wait State
0	1 BANK	1024K	3 WAIT STATE
1	NONE		2 WAIT STATE
2	NONE		2 WAIT STATE
3	NONE		2 WAIT STATE

Clock Source

Processor Clock	Bus Clock	DMA Clock	Two wait state Three wait state Four wait state
Processor Oscillator	Proc Clock/3	SCLK/2	

Shadow Ram/Pipeline		Pipline
BIOS Shadow	Video Shadow	Mode
F0000H, 64K	C0000H, 16K	C4000H, 16K
ENABLED	ENABLED	ENABLED

Move bar-<PgUp/PgDn>  
to change windows  
Exit-<ESC>

**Figure 3-7. 80386DX EASY C&T 386 CHIPSET REGISTER SETUP Screen**

8. Select the proper number of wait states for the installed memory from Table 3-4.

**Table 3-4. 80386DX Wait State Select**

Memory Speed	Processor Speed		
		25 MHz	20 MHz
80ns		3	N/A
100ns		4	3
120ns		N/A	4

Factory default

9. You should not have to change any other settings on this screen.
10. Press <ESC> to return to the 80386DX Extended CMOS SETUP Menu Screen.
11. Use the up or down arrow keys to select WRITE CMOS REGISTERS AND EXIT or DO NOT WRITE CMOS REGISTERS AND EXIT.
12. The system reboots.

## 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 Microsoft MS-DOS Operating System Version 3.3.

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.

The following is a step-by-step procedure to perform the low-level formatting.

1. Get into the System Set-Up by using <CTRL>, <ALT>, and <Insert>. For each hard disk drive connected to the controller, specify "Type 1". For each hard disk drive not connected to the controller, specify "not installed".
2. Boot DOS 3.3 or higher revision from the floppy disk drive. The computer may display a hard disk error message. This is because the hard disk has not been formatted yet. Load the DEBUG program. To do this from the DOS prompt ">", enter:

```
DEBUG <RETURN>
```

Once in the DEBUG program, the prompt is changed to "-". Enter:

```
G=C800:5 <RETURN>
```

The format menu is displayed.

3. Upon entrance into the BIOS format program, the following message is displayed. Select "0" for AUTO-SETUP. AUTO-SETUP will generate the drive parameters by reading them from the ESDI disk drive.

```
DO YOU WANT AUTO-SETUP OR ROM-BASED TABLE SETUP?  
(0=AUTO-SETUP, 1=ROM-BASED TABLE): 0
```

4. The following is then displayed:

```
HOW MANY DRIVES DO YOU HAVE? (0, 1 OR 2): 1
```

Enter the number of hard disks attached to the system, then press the <RETURN> key.

5. The Main Menu is displayed on the screen:

```
NCL 5355/5356 ESDI DISK FORMAT UTILITY PROGRAM (V4.X)

DRIVE 0 PARAMETERS: HEAD=XX,CYLINDER=XXXX,SECTOR/TRACK=XX
-----
DRIVE 0 TRANSLATION NOT ACTIVE      TRUNCATION NOT ACTIVE

0-FORMAT DRIVE
1-VERIFY
2-ENABLE TRANSLATION MODE
3-DISABLE TRANSLATION MODE
4-ENABLE CYLINDER TRUNCATION
5-DISABLE CYLINDER TRUNCATION
6-EXIT

PLEASE ENTER YOUR CHOICE
```

The drive parameter displayed on the second line is the physical drive parameter acquired from the attached ESDI disk drive. If two drives are connected to the controller card, the additional drive parameter information will be displayed on the screen.

6. Format the drive by selecting "0" from the option. By selecting this option, the controller initializes the disk drive according to the drive parameter displayed on the second line of the main menu. The BIOS prompts the choice of drive "0" or "1" to be formatted.

```
WHICH DRIVE DO YOU CHOOSE? (0/1): 0

WARNING: ALL FILES ON DISK DRIVE WILL BE LOST!!!
DO YOU WISH TO CONTINUE? (Y/N): N
```

The BIOS asks the confirmation of loss of files. Answer "Y" to continue. After the completion of initialization, the following question is asked:

```
FOR DEFECT HANDLING:
DO YOU WANT SECTOR MAPPING OR TRACK MAPPING?
(0=SECTOR_MAPPING, 1=TRACK_MAPPING): 0
```

Answer "0" selecting Sector Mapping for the defect handling.

```
DO YOU WANT TO USE MANUFACTURERS DEFECT LIST? (Y/N): Y
PRESS ANY KEY TO DISPLAY MANUFACTURERS DEFECT LIST.
```

```
DEFECT LIST
```

```
PRESS ANY KEY TO START FORMATTING THE DEFECT LIST, IF ANY.
```

Answering "Y" to the question makes the controller read the defect list from the drive and perform the defect map.

If you see the following message displayed, use the manual defect entry for the particular surface by answering "Y" to additional defect entry in Step 7.

```
CAN NOT READ MANUFACTURERS DEFECT LIST FOR SURFACE: XX
```

7. After performing Step 6, the BIOS prompts for the additional defect information as shown below.

```
DO YOU WANT TO ENTER ADDITIONAL DEFECTS? (Y/N): N
```

By answering "Y" to this question, the following Cylinder and Head information will be requested. Answering "N" to this question brings you back to the main menu.

```
ENTER CYLINDER NUMBER: XXXX
ENTER HEAD NUMBER: YY
ENTER BYTE COUNT FROM INDEX: ZZZZ
```

```
ARE THE CYLINDER AND HEAD NUMBERS ABOVE CORRECT? (Y/N): Y
```

```
MORE BAD TRACK TO ENTER? (Y/N):
```

Each time the entry is confirmed, the controller performs bad sector format. Answering "N" returns to the main menu.



8. The controller BIOS provides disk surface verify function to detect additional defects. If a bad spot is detected during the verify operation, bad track format is performed automatically. If there are no more defects before the verify operation, you can skip this operation.

After performing the verification, the BIOS will return to the main menu. This verify process will destroy the data on the disk drive.

9. After preparation is complete, select "EXIT" from the main menu.

PUSH CTRL, ALT, DEL TO REBOOT THE SYSTEM  
THEN USE "FDISK" AND "FORMAT" UTILITIES  
TO COMPLETE HARD DISK INSTALLATION PROCESS

After rebooting the system, you are ready to install the operating system to the attached ESDI disk drive.

**Note:**

1. The disk drives should be set to enable Spin-Up when power is applied.
2. For the MAXTOR 760MB, set the drive to 581 bytes/sector. This should result in 54 sectors/track. For MAXTOR 765MB settings, see the tables on the following pages.

**Table 4-1. MAXTOR 765MB, FAB #9 Jumper Settings**

PCBA: 1014520-A3  
 TLA #: 1098298 A  
 FAB #: 9

JUMPER ADDRESS	STATUS MK 386S	DESCRIPTION
JP1	In (A-B)	RESERVED
JP2	In	Needed for Phase Margin Testing
JP3	In	Used for Phase Margin Testing
JP4	In*	In=2.7 Encoding
JP5	In	In=15Mbit/sec Transfer Rate
JP6	In	In=Remote Spinup Option Enabled
JP7	In (B-C)	Read Gate Delay Option
JP8	Out	Read Gate Delay Option
JP9	In (A-B)	Index Width Selection
JP10	In	Write Gate Delay
JP11	N/A	
JP12	N/A	
JP13	N/A	
JP14	Out	In=Write Protect
JP15	Out	Factory Selected
JP16	Out	Hard Sector Size
JP17	Out	Hard Sector Size
JP18	In	Hard Sector Size
JP19	In	Hard Sector Size
JP20	In	Hard Sector Size
JP21	Out	Hard Sector Size
JP22	In	Hard Sector Size
JP23	Out	Hard Sector Size
JP24	Out	Hard Sector Size
JP25	In	Hard Sector Size
JP26	Out	Hard Sector Size
JP27	Out	Hard Sector Size
JP28	Out	Hard Sector Size
JP29	Out	Hard Sector Size
JP30	Out	Enable/Disable Programmable Sector Size In=Enable-Hard Sector Mode Only

\*Etched on Solder Side of Board

**Table 4-1. MAXTOR 765MB, FAB #9 Jumper Settings (Continued)**

PCBA: 1014520-A3  
 TLA #: 1098298 A  
 FAB #: 9

JUMPER ADDRESS	STATUS MK 386S	DESCRIPTION
JP31	Out	Hard/Soft Sector Mode; In=Soft Sector
JP32	In	Head Select Jumpers
JP33	In	Head Select Jumpers
JP34	In	Head Select Jumpers
JP35	In	Head Select Jumpers
JP36	Out	RESERVED
JP37	Out	PLO Sync Field Lengths
JP38	Out	NOT USED
JP39	Out	NOT USED
JP40		Test Jumper
JP41	Out	Test Pins Differential Data Signals
JP42	In (B-C)	Test Pin - Write Gate to Flex Circuit
JP43	In	Test Out Disables On-board ROM
DS1	In	DRIVE SELECT
DS2	Out	DRIVE SELECT
DS3	Out	DRIVE SELECT
DS4	Out	DRIVE SELECT
DS5	Out	DRIVE SELECT
DS6	Out	DRIVE SELECT
DS7	Out	DRIVE SELECT

**Table 4-2. MAXTOR 765MB, FAB #8 Jumper Settings**

PCBA: 1015468-5C, 1015468-6, 1015468-6B  
 TLA #: 1098068 3  
 FAB #: 8

JUMPER ADDRESS	STATUS MK 386S	DESCRIPTION
JP1	In (B-C)	RESERVED
JP2	In	Needed for Phase Margin Testing
JP3	In	Used for Phase Margin Testing
JP4	In*	In=2,7 Encoding
JP5	In	In=15Mbit/sec Transfer Rate
JP6	In	In=Remote Spinup Option Enabled
JP7	In (B-C)	Read Gate Delay Option
JP8	Out	Read Gate Delay Option
JP9	In (A-B)	Index Width Selection
JP10	Out	Write Gate Delay
JP11	N/A	
JP12	N/A	
JP13	N/A	
JP14	Out	In=Write Protect
JP15	Out	Factory Selected
JP16	Out	Hard Sector Size
JP17	Out	Hard Sector Size
JP18	In	Hard Sector Size
JP19	In	Hard Sector Size
JP20	In	Hard Sector Size
JP21	Out	Hard Sector Size
JP22	In	Hard Sector Size
JP23	Out	Hard Sector Size
JP24	Out	Hard Sector Size
JP25	In	Hard Sector Size
JP26	Out	Hard Sector Size
JP27	Out	Hard Sector Size
JP28	Out	Hard Sector Size
JP29	Out	Hard Sector Size
JP30	Out	Enable/Disable Programmable Sector Size In=Enable-Hard Sector Mode Only

\*Etched on Solder Side of Board

**Table 4-2. MAXTOR 765MB, FAB #8 Jumper Settings (Continued)**

PCBA: 1015468-5C, 1015468-6, 1015468-6B

TLA #: 1098068 3

FAB #: 8

JUMPER ADDRESS	STATUS MK 386S	DESCRIPTION
JP31	Out	Hard/Soft Sector Mode; In=Soft Sector
JP32	In	Head Select Jumpers
JP33	In	Head Select Jumpers
JP34	In	Head Select Jumpers
JP35	In	Head Select Jumpers
JP36	Out	RESERVED
JP37	Out	PLO Sync Field Lengths
JP38	Out	NOT USED
JP39	Out	NOT USED
JP40		Test Jumper
JP41	Out	Test Pins Differential Data Signals
JP42	In (A-B)	Test Pin - Write Gate to Flex Circuit
JP43	In	Test Out Disables On-board RAM
DS1	In	DRIVE SELECT
DS2	Out	DRIVE SELECT
DS3	Out	DRIVE SELECT
DS4	Out	DRIVE SELECT
DS5	Out	DRIVE SELECT
DS6	Out	DRIVE SELECT
DS7	Out	DRIVE SELECT

**Table 4-3. MAXTOR 765MB, FAB #7 Jumper Settings**

PCBA: 1014150 10  
 TLA #: 1098068 2  
 FAB #: 7

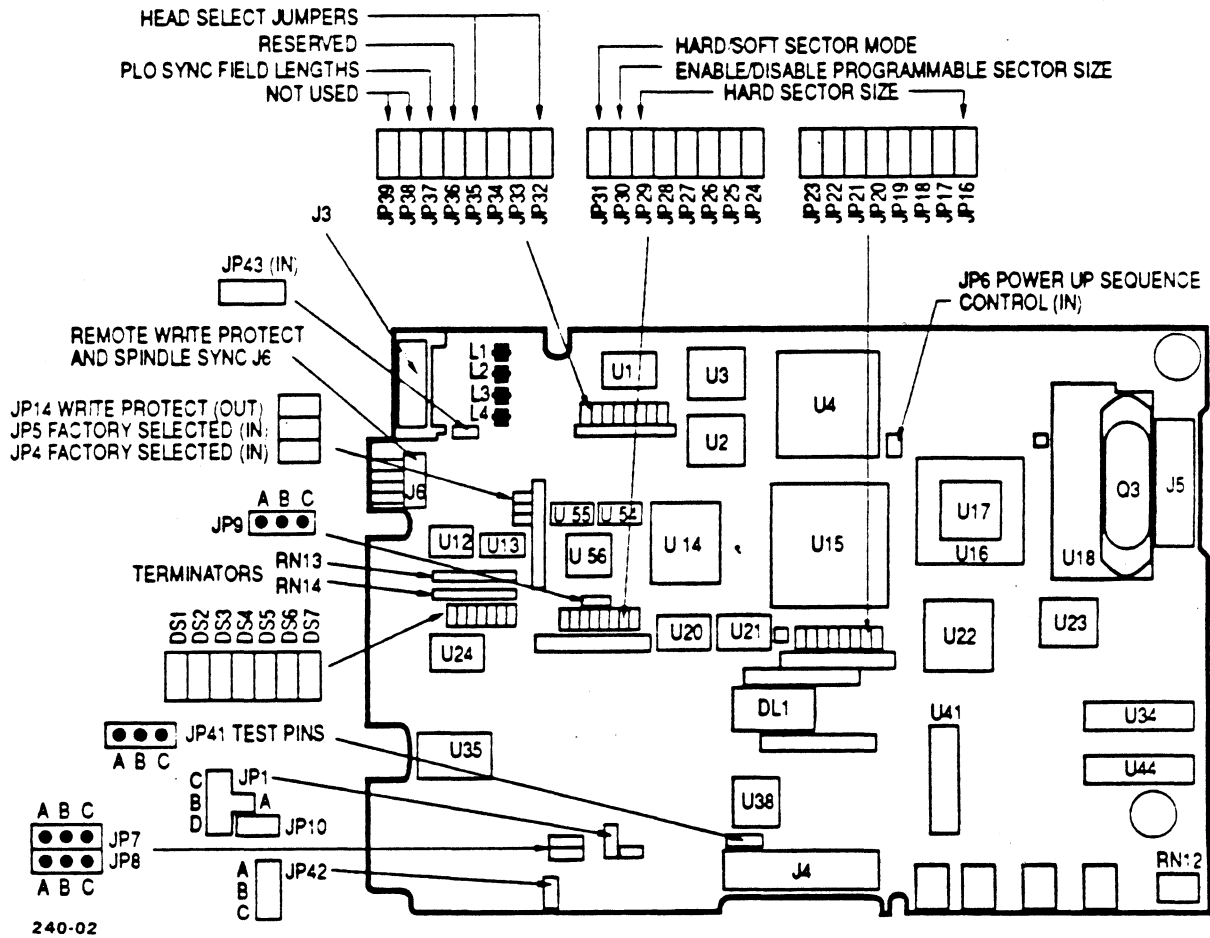
JUMPER ADDRESS	STATUS MK 386S	DESCRIPTION
JP1	In	Encoded Write Data, TTL Needed for Phase Margin Testing Used for Phase Margin Testing In=2,7 Encoding In=15Mbit/sec Transfer Rate
JP2	In	
JP3	In	
JP4	In*	
JP5	In	
JP6	In	In=OFF Power-Up Sequence Control
JP7	N/A	
JP8	N/A	
JP9	N/A	
JP10	N/A	
JP11	N/A	
JP12	N/A	
JP13	N/A	
JP14	Out	In=Write Protect Factory Selected
JP15	Out	
JP16	Out	Hard Sector Size
JP17	Out	
JP18	In	
JP19	In	
JP20	In	
JP21	Out	Hard Sector Size
JP22	In	
JP23	Out	
JP24	Out	
JP25	In	
JP26	Out	Hard Sector Size
JP27	Out	
JP28	Out	
JP29	Out	
JP30	Out	

\*Etched on Solder Side of Board

**Table 4-3. MAXTOR 765MB, FAB #7 Jumper Settings (Continued)**

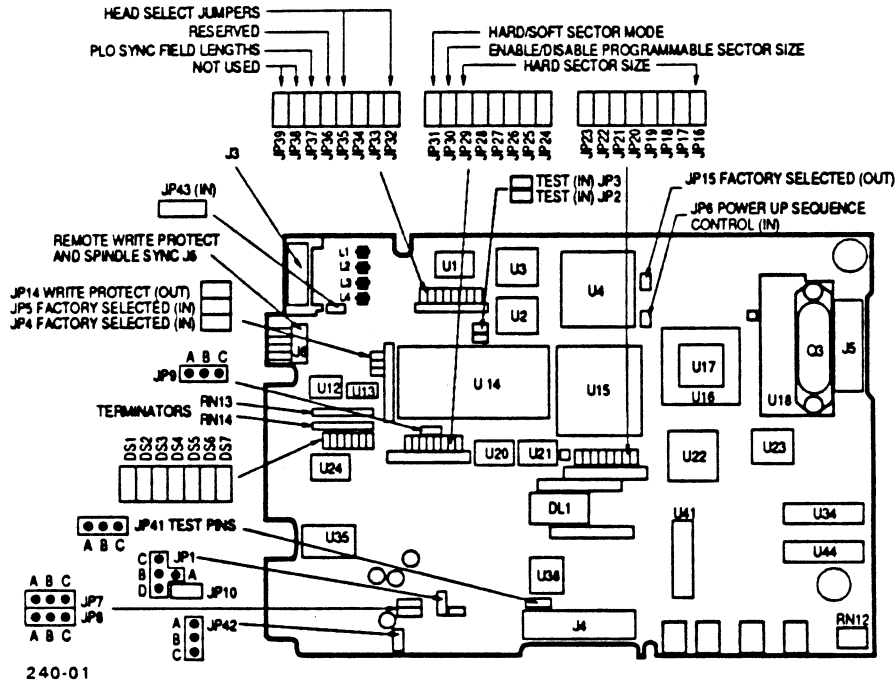
PCBA: 1014150 10  
 TLA #: 1098068 2  
 FAB #: 7

JUMPER ADDRESS	STATUS MK 386S	DESCRIPTION
JP31	Out	Hard/Soft Sector Mode; In=Soft Sector
JP32	In	Head Select Jumpers
JP33	In	Head Select Jumpers
JP34	In	Head Select Jumpers
JP35	In	Head Select Jumpers
JP36	Out	Head Select Jumper
JP37	Out	PLO Sync Field Lengths
JP38	Out	NOT USED
JP39	Out	NOT USED
JP40	Out	Factory Selected
JP41	Out	Test Pins Differential Data Signals
JP42	In	Test Pin - Write Gate to Flex Circuit
JP43	In	Test Out Disables On-board RAM
DS1	In	DRIVE SELECT
DS2	Out	DRIVE SELECT
DS3	Out	DRIVE SELECT
DS4	Out	DRIVE SELECT
DS5	Out	DRIVE SELECT
DS6	Out	DRIVE SELECT
DS7	Out	DRIVE SELECT

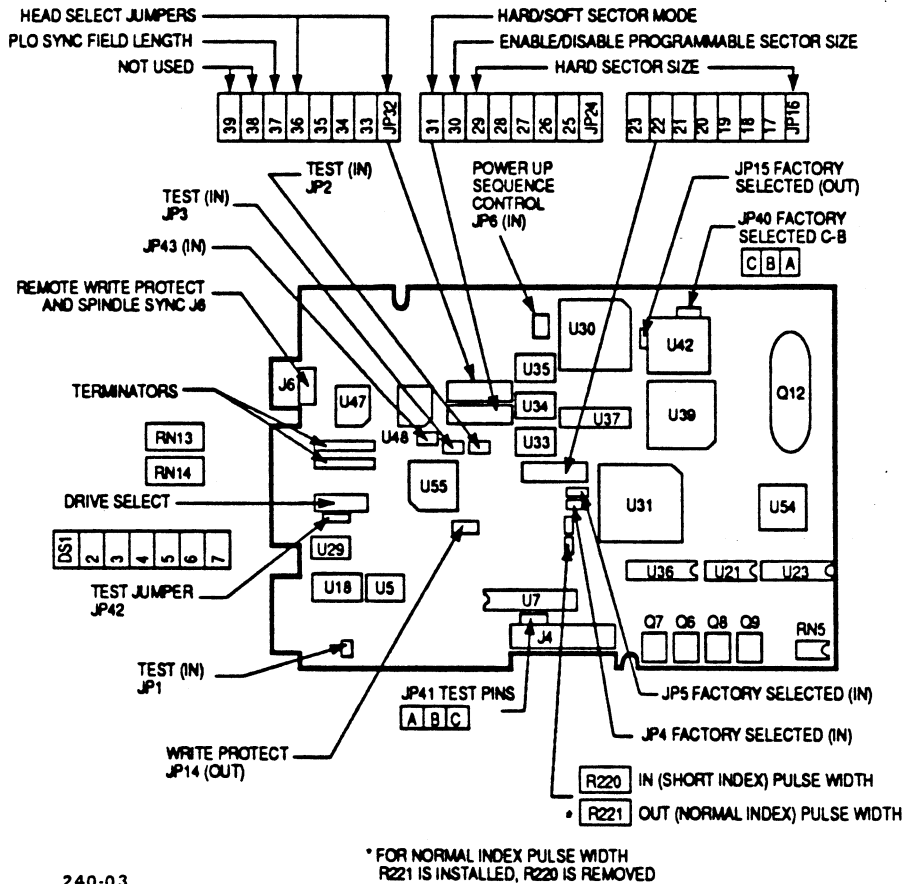


**Figure 4-1. MAXTOR PCBA #1014520, FAB #9**





**Figure 4-2. MAXTOR PCBA #1015468, FAB #8**



**Figure 4-3. MAXTOR PCBA #1014150, FAB #7**

## 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.

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:

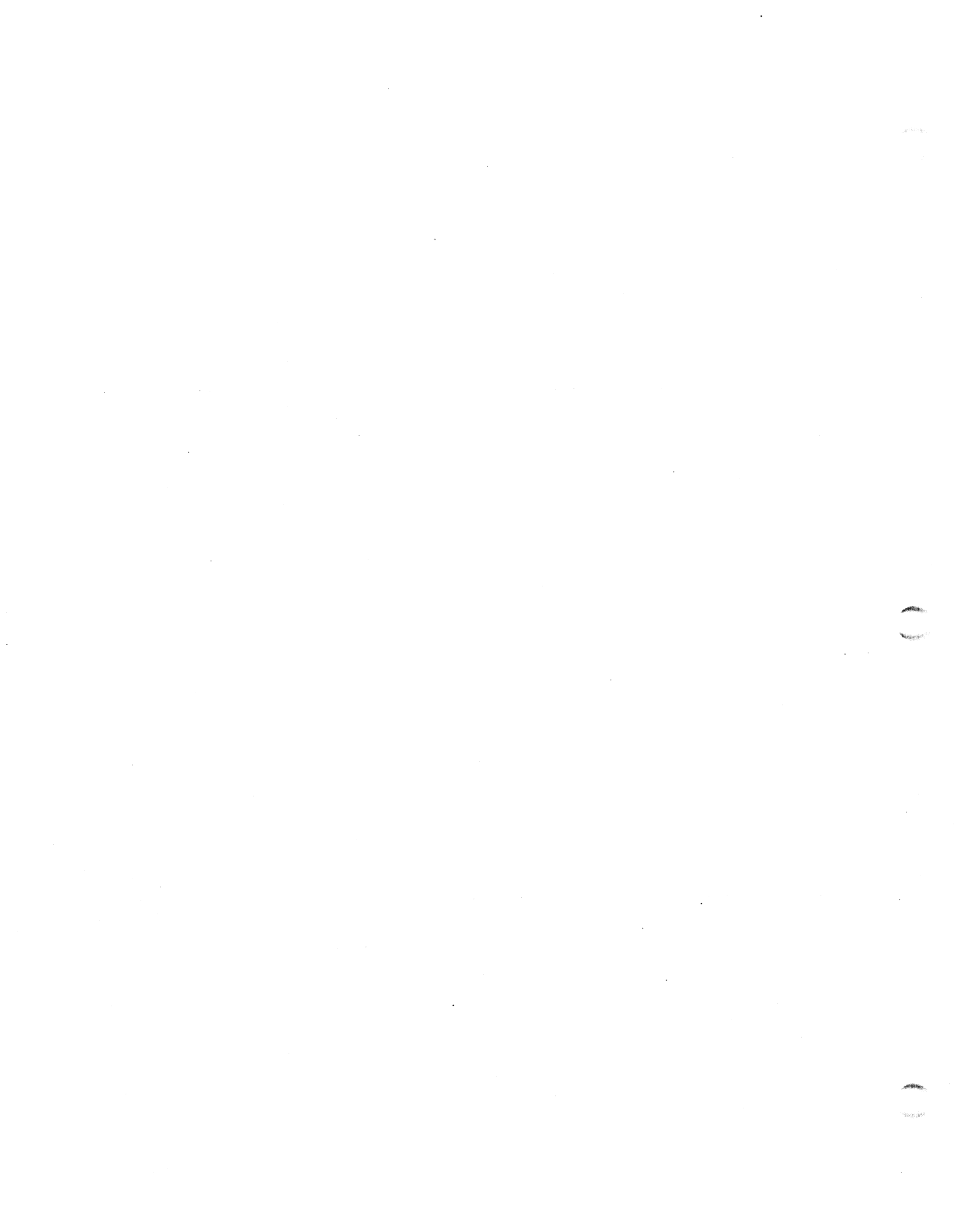
```
Volume label (11 characters, ENTER for none)?
```

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" to stop the format process.



# 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.

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*

*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 entitled, Installation Guide, and by using the following information:

1. During **fdisk**(ADM), be sure to use the Activate Partition option to make the XENIX partition active.
2. During **badtrk**(ADM) use the Cylinder/Head option to enter the bad track information from the disk drive manufacturer's defect list. Make sure you enter the bad track information before scanning the disk.
3. During **divvy**(ADM), select the suggested number of blocks recommended for swap space, unless this is less than your memory size. In that case, select a number of blocks equal to your memory size plus 256KB.

## 5.2.3 Going Between a XENIX and DOS Partition

When you turn on or re-boot your computer with XENIX as the active partition on the hard disk, the following will be displayed on the monitor:

```
XENIX System V

Boot
:
```

To boot XENIX, press <ENTER>.

To boot MS-DOS, type **dos** and press <ENTER>.

### 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, and Section 2.7 of this manual.

### 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 (see Figure 2-10):

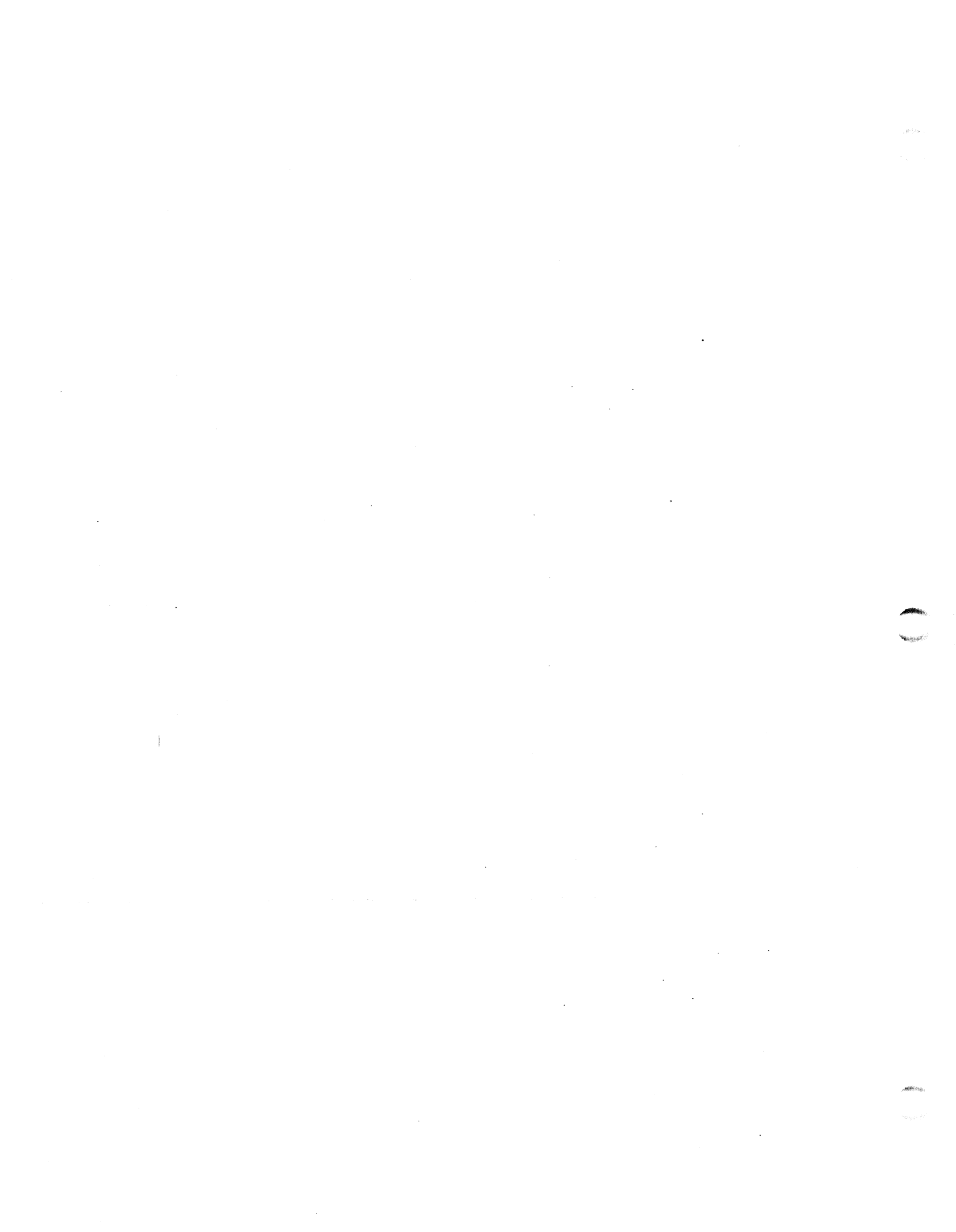
- The DMA channel is set to 3 by jumpering DRQ and DACK to location 3, respectively.
- The interrupt vector is set to 5 by jumpering IRQ at location 5 (interrupts 3 and 4 are used by the com ports).
- The Base I/O Port Address is set to 220H by jumpering all address locations except locations 5 and 9.

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, re-link the system, and make the new system the default boot file; then shut down the system and reboot at which time the diagnostic should state that the tape driver is active.

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\*Arnet is a tradename of Arnet Corporation





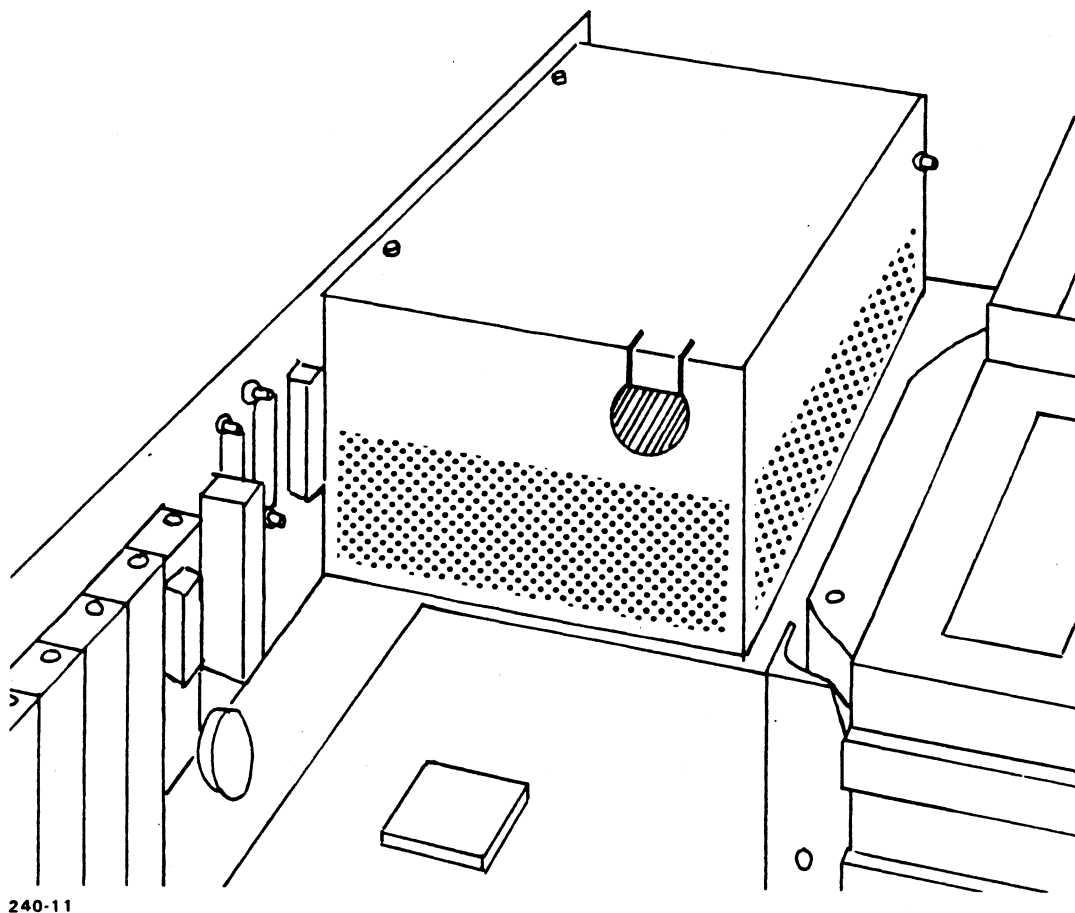
## Section 6 MAINTENANCE

---

Your MARK 386S 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.



**Figure 6-1. Location of the Air Exchange Grilles**

### **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.

## **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**

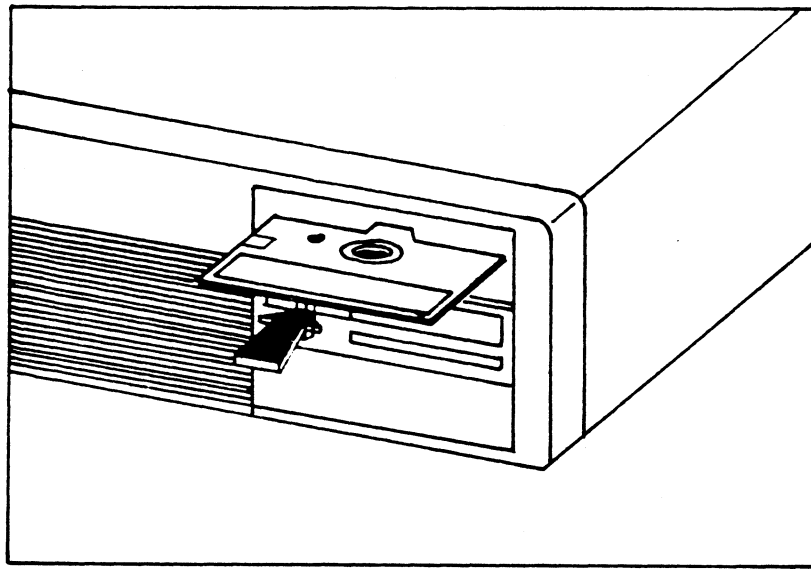
Help keep dust out of the disk drive by covering the computer.

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 label face-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.



240-04

**Figure 6-2. Cleaning Diskette Insertion Orientation**

### **6.3 TAPE DRIVE CARE**

The Tape Drive Read/Write heads should be cleaned periodically. Head cleaning should be done:

- a. After the first full pass with a new tape.
- b. After every 8 hours of normal use.
- c. Whenever problems or errors are encountered in reading or writing a tape.

Heads can be cleaned with a lint-free swab and Freon TF.

For end-user sites, POINT 4 offers a head-cleaning kit (P/N 977001) that is easy to use. A refill kit of pads and solution is also available (P/N 977002).

## 6.4 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 (J8) on the motherboard (Figure 2-1) and disconnect it.
3. Locate the clock/calendar battery 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 J8, which is toward the front of the unit.
6. Replace the enclosure by reversing the procedure used in Step 1.

# Section 7

## TROUBLESHOOTING

---

There are many parts of your MARK 386S 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.  <b>CAUTION</b> Unplug system before switch is moved.
	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.

**TABLE 7-1. GENERAL TROUBLESHOOTING (Continued)**

Problem	Probable Cause(s)	Remedy
3. (continued)	<p>System locked.</p> <p>User error.</p> <p>Software error.</p> <p>Disk drive is inoperative.</p>	<p>Unlock system.</p> <p>Check Section 4 of this manual for proper boot procedure.</p> <p>Consult software manual to see that the proper procedure is being used and that there is no software error.</p> <p>Contact your technical support representative.</p>
4. Printer will not operate.	<p>Printer not receiving power.</p> <p>Printer/computer I/O cable not connected properly.</p> <p>Printer internal switches not set correctly.</p> <p>Printer inoperative.</p>	<p>Check that printer power cord is plugged in.</p> <p>Check cable connection at both ends.</p> <p>Refer to printer manual for correct switch settings.</p> <p>Contact your printer manufacturer.</p>
5. Software will not operate.	<p>Software error.</p> <p>Disk read error.</p> <p>Serial port is disabled.</p>	<p>Consult software manual for proper boot procedure and usage.</p> <p>Contact your technical support representative.</p> <p>Contact your technical support representative.</p>
6. Math intensive software runs too slow or improperly.	<p>Math coprocessor is not installed or is installed incorrectly.</p> <p>Math coprocessor may be damaged or defective.</p>	<p>Consult Section 2 of this manual for the proper installation procedure.</p> <p>Contact your technical support representative.</p>
7. Option expansion board is not functioning.	<p>Optional board may not be installed properly.</p> <p>Option board may be damaged or defective.</p> <p>Computer hardware defect.</p>	<p>Consult Section 2 of this manual and the instructions provided with the board for installation information.</p> <p>Contact option board manufacturer.</p> <p>Contact your technical support representative.</p>

# 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, for example, copying data from the hard drive to a cartridge tape.

**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 Graphics 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, for example, 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.

**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.

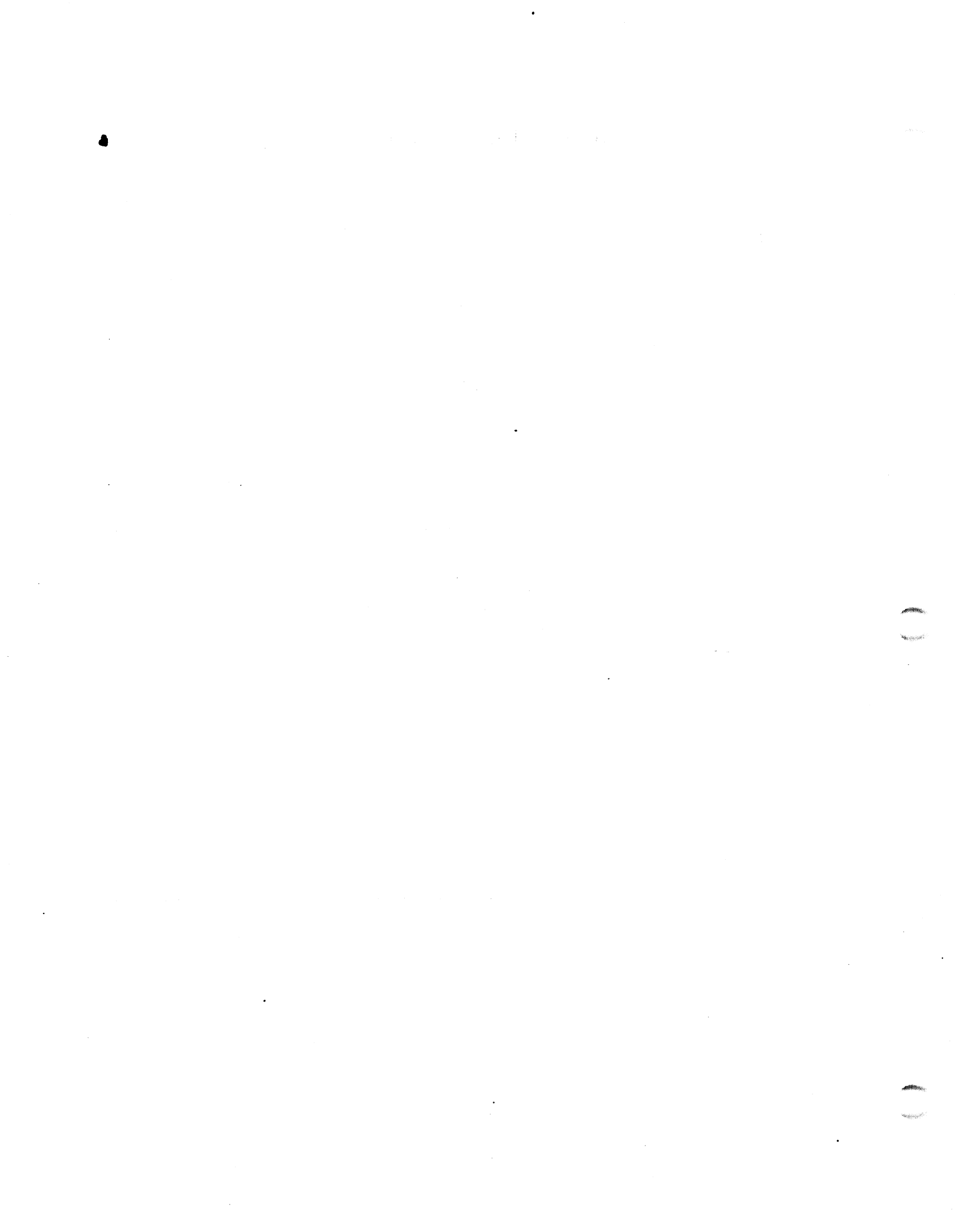
**Prompt** - An indication from the computer that there is a response needed from the operator before the program can continue.

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

**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.

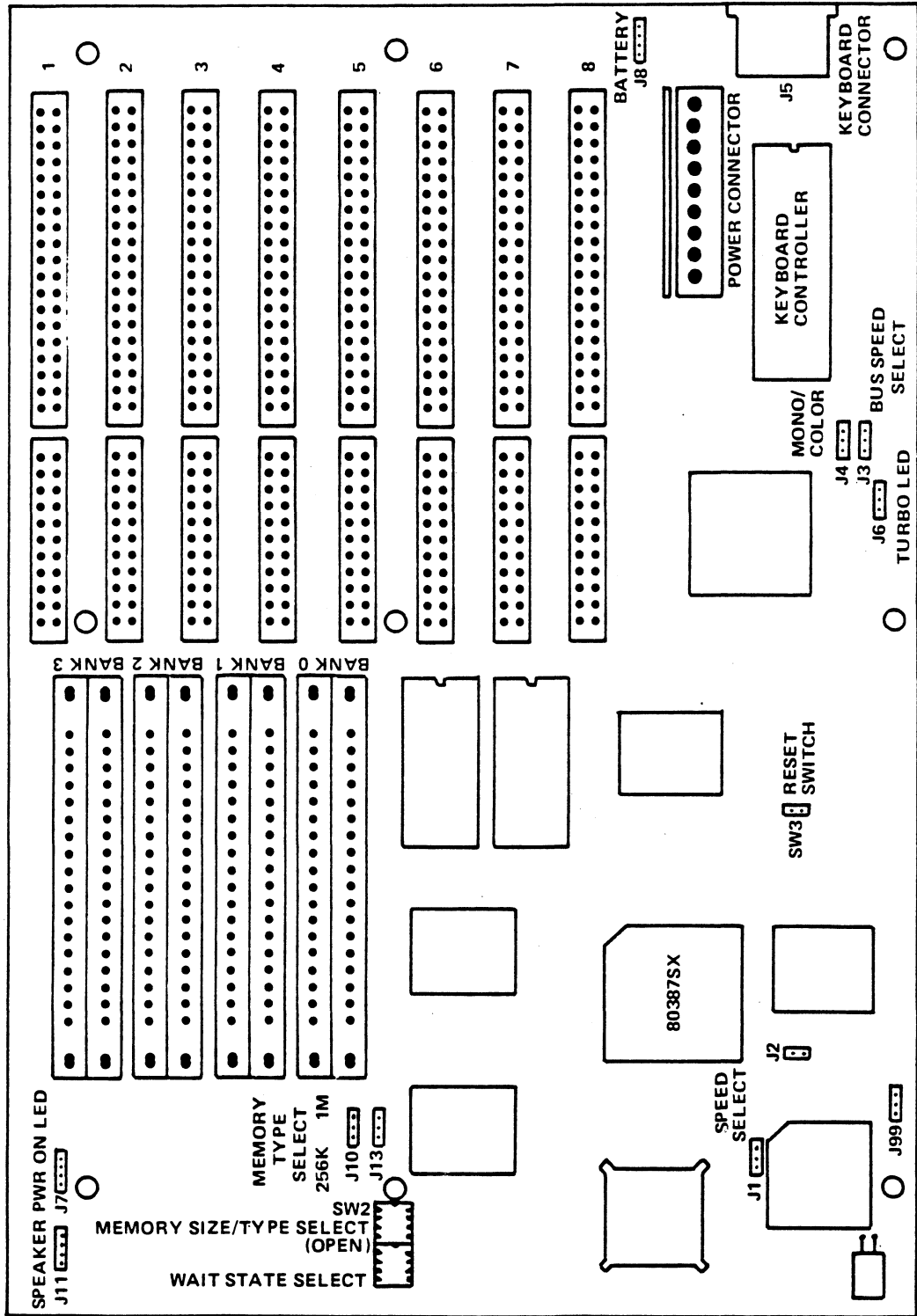
**Serial** - Pertaining to the sequential or consecutive transmission of data bits.

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



# Appendix B

## 80386SX MOTHERBOARD CONFIGURATION



240-07

**Figure B-1. Motherboard Layout**

**Table B-1. SW2 Settings (Part 1)**

MEMORY OPTIONS	BANKS				JUMPER SETTINGS		MEMORY SELECT (SW2)
	0	1	2	3	J13	J10	
512K	TWO 256K SIMMS				256K	256K	ALL OFF
1MB	TWO 256K SIMMS	TWO 256K SIMMS			256K	256K	MS1=ON MS2=OFF MS3=OFF MS4=OFF
1.5MB	TWO 256K SIMMS	TWO 256K SIMMS	TWO 256K SIMMS		256K	256K	MS1=OFF MS2=ON MS3=OFF MS4=OFF
2MB	TWO 256K SIMMS	TWO 256K SIMMS	TWO 256K SIMMS	TWO 256K SIMMS	256K	256K	MS1=ON MS2=ON MS3=OFF MS4=OFF
	TWO 1MB SIMMS				1MB	1MB	MS1=OFF MS2=OFF MS3=ON MS4=ON
3MB	TWO 256K SIMMS	TWO 256K SIMMS	TWO 1MB SIMMS		256K	1MB	MS1=OFF MS2=ON MS3=ON MS4=OFF
4MB	TWO 1MB SIMMS	TWO 1MB SIMMS			1MB	1MB	MS1=ON MS2=OFF MS3=ON MS4=ON
5MB	TWO 256K SIMMS	TWO 256K SIMMS	TWO 1MB SIMMS	TWO 1MB SIMMS	256K	1MB	MS1=ON MS2=ON MS3=ON MS4=OFF
6MB	TWO 1MB SIMMS	TWO 1MB SIMMS	TWO 1MB SIMMS		1MB	1MB	MS1=OFF MS2=ON MS3=ON MS4=ON
8MB	TWO 1MB SIMMS	TWO 1MB SIMMS	TWO 1MB SIMMS	TWO 1MB SIMMS	1MB	1MB	ALL ON
NOTE: 256Kx9 or 1MBx9 SIMMS Only (16 MHz=100NSEC, 20 MHz=80NSEC or 70NSEC)							

**Table B-2. SW2 Settings (Part 2)**

SW2-8	SW2-7	WAIT STATES	
		READ	WRITE
ON	ON	2*	2*
ON	OFF	DON'T CARE	DON'T CARE
OFF	ON	1	2
OFF	OFF	1	1

\* Default settings are factory-set positions.

Factory Default: All OFF, for 16 MHz (100ns) or 20 MHz (70ns), 7 and 8 ON for 20 MHz (80ns).

**Table B-3. SW2 Settings (Part 3)**

Switch No.	Configuration	Setting
SW2-5	NOT USED	OFF
SW2-6	NOT USED	OFF

**Table B-4. Motherboard Jumpers**

<p><b>J1 CLOCK SPEED SELECT</b></p> <ul style="list-style-type: none"> <li>• 1 and 2 (or no jumper) for 20 MHz operation*</li> <li>• 2 and 3 for 16 MHz operation</li> </ul>													
<p><b>J2 COPROCESSOR SELECT</b></p> <ul style="list-style-type: none"> <li>• Jumper IN, without Coprocessor*</li> <li>• Jumper OUT, with Coprocessor</li> </ul>													
<p><b>J3 CPU/BUS SPEED SELECT</b></p> <ul style="list-style-type: none"> <li>• NO Jumper (or 2 and 3) for HIGH-SPEED (16/8 or 20/10 MHz)*</li> <li>• 1 and 2 for ORIGINAL-AT-SPEED (8/4 MHz)</li> </ul>													
<p><b>J4 DISPLAY ADAPTER SELECTION</b></p> <ul style="list-style-type: none"> <li>• 2 and 3 for COLOR</li> <li>• NO Jumper (or 1 and 2) for MONOCHROME*</li> </ul>													
<p><b>J5 KEYBOARD CONNECTOR</b></p> <table border="0"> <thead> <tr> <th>Pin Outs</th> <th>Signal Name</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Keyboard Clock</td> </tr> <tr> <td>2</td> <td>Keyboard Data</td> </tr> <tr> <td>3</td> <td>No Connection</td> </tr> <tr> <td>4</td> <td>Ground</td> </tr> <tr> <td>5</td> <td>+5V</td> </tr> </tbody> </table>		Pin Outs	Signal Name	1	Keyboard Clock	2	Keyboard Data	3	No Connection	4	Ground	5	+5V
Pin Outs	Signal Name												
1	Keyboard Clock												
2	Keyboard Data												
3	No Connection												
4	Ground												
5	+5V												
<p><b>J6 TURBO LED</b></p> <table border="0"> <thead> <tr> <th>Pin Outs</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+5V</td> </tr> <tr> <td>2</td> <td>/FSEL</td> </tr> <tr> <td>3</td> <td>+5V</td> </tr> </tbody> </table> <p>(LED ON indicates faster BUS SPEED; LED OFF indicates original AT BUS SPEED)</p>		Pin Outs	Description	1	+5V	2	/FSEL	3	+5V				
Pin Outs	Description												
1	+5V												
2	/FSEL												
3	+5V												
<p><b>J7 KEYBOARD LOCK/POWER ON LED</b></p> <table border="0"> <thead> <tr> <th>Pin Outs</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+V to LED (Power ON)</td> </tr> <tr> <td>2</td> <td>No Connection</td> </tr> <tr> <td>3</td> <td>Ground</td> </tr> <tr> <td>4</td> <td>Key Switch Input (KBD INH)</td> </tr> <tr> <td>5</td> <td>Ground</td> </tr> </tbody> </table>		Pin Outs	Description	1	+V to LED (Power ON)	2	No Connection	3	Ground	4	Key Switch Input (KBD INH)	5	Ground
Pin Outs	Description												
1	+V to LED (Power ON)												
2	No Connection												
3	Ground												
4	Key Switch Input (KBD INH)												
5	Ground												
<p><b>J8 EXTERNAL BATTERY</b></p> <table border="0"> <thead> <tr> <th>Pin Outs</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+DC Battery Input (+V connection to Battery)</td> </tr> <tr> <td>2</td> <td>No Connection</td> </tr> <tr> <td>3</td> <td>-DC Battery Input (-V Connection to Battery)</td> </tr> <tr> <td>4</td> <td>-DC Battery Input (-V Connection to Battery)</td> </tr> </tbody> </table>		Pin Outs	Description	1	+DC Battery Input (+V connection to Battery)	2	No Connection	3	-DC Battery Input (-V Connection to Battery)	4	-DC Battery Input (-V Connection to Battery)		
Pin Outs	Description												
1	+DC Battery Input (+V connection to Battery)												
2	No Connection												
3	-DC Battery Input (-V Connection to Battery)												
4	-DC Battery Input (-V Connection to Battery)												
<p><b>J10 MEMORY TYPE SELECT</b></p> <ul style="list-style-type: none"> <li>• 1 and 2 for 1MB DRAMs in Bank 2 and 3*</li> <li>• 2 and 3 for 256KB DRAMs in Bank 2 and 3</li> </ul>													
<p>*Default Setting</p>													

**Table B-4. Motherboard Jumpers (Continued)**

<b>J11 SPEAKER CONNECTOR</b>	
Pin Outs	Description
1	Speaker Out
2	No Connection
3	Ground
4	+5V

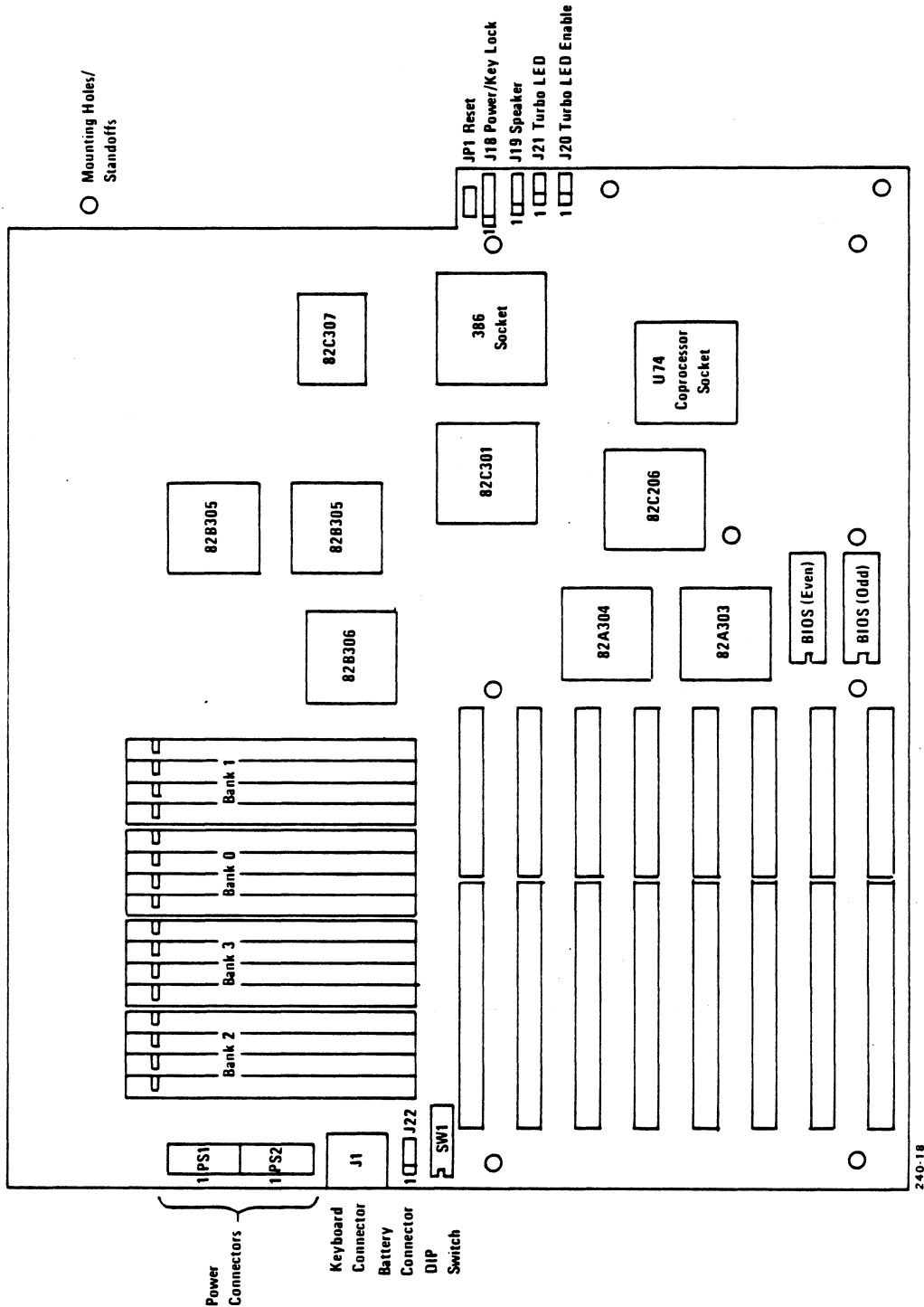
**J13 MEMORY TYPE SELECT**	
- 1 and 2 for 1MB DRAMs in Bank 0 and 1\* - 2 and 3 for 256KB DRAMs in Bank 0 and 1	
**J20 POWER CONNECTOR**	
Pin Outs	Description
1	POWER GOOD
2	+5V
3	+12V
4	-12V
5	Ground
6	Ground
7	Ground
8	Ground
9	-5V
10	+5V
11	+5V
12	+5V
**J99 DMA SPEED SELECT**	
- Selects DMA speed independent of CPU speed - 1 and 2 DMA at 8 (16 MHz) or 10 (20 MHz)\* - 2 and 3 DMA at 4 MHz	
**SW3 EXTERNAL RESET SWITCH**	
- A mechanical Switch is installed onto SW3; when SW3 is OPEN, the CPU will RUN; when SW3 is CLOSED, the CPU will RESET	
\*Default Setting	





# Appendix C

## 80386DX MOTHERBOARD CONFIGURATION



**Figure C-1. 80386DX Motherboard Layout**

**Table C-1. 80386DX Motherboard Jumpers and Switch Settings**

<p><b>JP1 RESET CONNECTOR (2-PIN HEADER)</b></p>
<p><b>J18 LED POWER AND KEY LOCK</b>  Pin 1 – LED Power  Pin 2 – Ground  Pin 3 – Ground  Pin 4 – Key Lock  Pin 5 – Ground</p>
<p><b>J19 SPEAKER CONNECTOR</b>  Pin 4 – +5V  Pin 3 – Ground  Pin 2 – Key (No Connection)  Pin 1 – Speaker</p>
<p><b>PS1 6-PIN POWER CONNECTOR</b>  Pin 2 – Black  Pin 3 – White  Pin 4 – Red  Pin 5 – Red  Pin 6 – Red</p>
<p><b>PS2 6-PIN POWER CONNECTOR</b>  Pin 1 – Orange  Pin 2 – Red  Pin 3 – Yellow  Pin 4 – Blue  Pin 5 – Black  Pin 6 – Black</p>
<p><b>J1 5-PIN DIN SOCKET</b>  Keyboard Connector</p>
<p><b>J20 TURBO LED ENABLE</b>  Pin 2 and Pin 3 are always connected (see NOTE)</p>
<p><b>J21 TURBO LED</b>  Pin 1 – +5V  Pin 2 – /FSEL  Pin 3 – +5V</p>
<p><b>NOTE:</b> The BIOS does not support the use of the Front Panel TURBO switch. The system always boots-up in TURBO mode (Processor Speed = 25 MHz, I/O Bus Speed = 8 MHz).</p> <p>The system can be switched to non-TURBO mode by pressing &lt;CTRL&gt;, &lt;ALT&gt;, and “-” simultaneously. This will establish the processor speed at 8 MHz and the I/O Bus speed at 4 MHz. The TURBO indicator will extinguish and the cursor will change shape.</p> <p>The system can be switched back to TURBO mode by pressing &lt;CTRL&gt;, &lt;ALT&gt;, and “+” simultaneously.</p> <p>The &lt;CTRL&gt; &lt;ALT&gt; key sequences are disabled by XENIX.</p>

**Table C-1. 80386DX Motherboard Jumpers and Switch Settings (Continued)**

<p><b>J22 BATTERY CONNECTOR</b>                  Pin 1 - Battery positive                  Pin 2 - Key                  Pin 3 - Ground                  Pin 4 - Ground</p>
<p><b>SW1 7-POSITION SWITCH</b>                  Position 1 - RESERVED (OFF)                  Position 2 - 80387 coprocessor Not installed - OFF                  Position 3 - RESERVED (OFF)                  Position 4 - RESERVED (OFF)                  Position 5 - RESERVED (OFF)                  Position 6 - RESERVED (OFF)                  Position 7 - Video Adapter Selection                      Monochrome Video Adapter - OFF                      EGA/VGA/COLOR Video Adapter - ON</p>
<p><b>U49 EPROM (BIOS Low) 256K</b></p>
<p><b>U50 EPROM (BIOS High) 256K</b></p>
<p><b>J2 - J9 62-PIN I/O CONNECTOR</b></p>
<p><b>J10 - J17 36-PIN I/O CONNECTOR</b></p>
<p><b>W1 OPTIONAL ON-BOARD BATTERY SELECT</b>                  OFF - Use off-board battery connected to J22                  ON - Use on-board battery</p>

Factory default

CMOS SETUP (C) Copyright 1985-1989, American Megatrends, Inc.

Date (mn/date/year) : Sun, Jan 01 1989  
Time (hour/min/sec) : 00:42:53  
Floppy drive A : 1.2MB, 5-1/2"  
Floppy drive B : Not Installed

Hard disk C:type : 1  
Hard disk D:type : Not Installed  
Primary display : Monochrome  
Keyboard : Installed

Scratch RAM option : 1

Month : Jan, Feb, ... Dec  
Date : 01, 02, 03, ... 31  
Year : 1901, 1902, ... 2099

-----  
ESC=Exit, <>=Select, PgUp/PgDn=Modify

Base memory size : 640KB  
Ext. memory size : 0KB  
Numeric processor : Not Installed

Cyln Head WPcom LZone Sec Size  
615 4 300 615 17 20MB

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4
5	6	7	8	9	10	11

**Figure C-2. 80386DX CMOS SETUP Program Screen**

EXTENDED CMOS SETUP PROGRAM VER 1.50 (C)1988, American Megatrends, Inc.

C&T 386 CHIPSET SETUP PROGRAM  
MAIN MENU

EASY C&T 386 CHIPSET REGISTER SETUP  
206,301 REGISTERS SET UP  
307 REGISTERS SETUP  
ENABLE/DISABLE VIDEO AND MAIN BIOS SHADOW  
WRITE CMOS REGISTERS AND EXIT  
DO NOT WRITE CMOS REGISTERS AND EXIT

**Figure C-3. 80386DX Extended CMOS SETUP Program Screen**

Memory Configuration

Block	No. of Banks	DRAM Type	Wait State
0	1 BANK	1024K	3 WAIT STATE
1	NONE		2 WAIT STATE
2	NONE		2 WAIT STATE
3	NONE		2 WAIT STATE

Clock Source

Processor Clock	Bus Clock	DMA Clock	Two wait state Three wait state Four wait state
Processor Oscillator	Proc Clock/3	SCLK/2	

Shadow Ram/Pipeline			Move bar-<PgUp/PgDn> to change windows Exit-<ESC>
BIOS Shadow	Video Shadow	Pipeline	
F0000H, 64K	C0000H, 16K	C4000H, 16K	
ENABLED	ENABLED	ENABLED	

**Figure C-4. 80386DX EASY C&T 386 CHIPSET REGISTER SETUP Screen**

<p style="text-align: center;">BITS 7-0</p> <p>82C206 01H -&gt; 11 00 00 00</p> <p>82C301 04H -&gt; RRR 0 0 0 RR</p> <p>05H -&gt; 00 00 01 01</p> <p>06H -&gt; 01 01 01 00</p>	<p>Go to Prev/Next Register - ↑ ↓</p> <p>Go to Prev/Next Entry - → ←</p> <p>Scroll Bot value - PgUp/PgDn</p> <p>Return to Main Menu - &lt;ESC&gt;</p> <hr/> <p style="text-align: center;">CLOCK AND WAIT STATE CONTROL</p> <hr/> <p>XIOR/XIOW WAIT STATES</p> <p>00=1 I/O WAIT STATE</p> <p>01=2 I/O WAIT STATE</p> <p>10=3 I/O WAIT STATE</p> <p>11=4 I/O WAIT STATE</p>
--	--

**Figure C-5. 80386DX 206, 301 REGISTER SETUP Screen**

BITS 7-0		Go to Prev/Next Register - ↑ ↓	
82C307 08H ->	RRR 0 0 0 1 0	Go to Prev/Next Entry - → ←	
09H ->	0 0 0 0 0 0 1	Scroll Bot value - PgUp/PgDn	
0AH ->	0 0 0 0 0 0 0	Return to Main Menu - <ESC>	
0CH ->	0 0 0 0 0 0 0	IDENTIFICATION	
0DH ->	1 1 1 1 1 1 1	MIDDLE BOOT WRITE PROTECT	
0EH ->	1 1 1 1 1 1 1	0=R/W RAM AT 16128K	
0FH ->	1 1 1 1 1 1 1	1=R/O RAM AT 16128K	
10H ->	01 0000 00		
11H ->	00 R 00 00 R		
12H ->	00 0000 00		
13H ->	00 R 00 00 RRR		
14H ->	00 0000 00		
15H ->	00 R 00 RRR		
16H ->	00 0000 00		
17H ->	00 R 00 RRR		
20H ->	1 0 RR 0 RRR		
28H ->	0 RRRRRR		
2AH ->	RRRRRR 1		

**Figure C-6. 80386DX 307 REGISTER SETUP Screen**

SETUP SHADOW RAM FOR 212		Go to Prev/Next Register - ↑ ↓	
MAIN BIOS SHADOW AT F0000H,64K -> 1		Go to Prev/Next Entry - → ←	
VIDEO BIOS SHADOW AT C0000H,16K -> 1		Scroll Bot value - PgUp/PgDn	
VIDEO BIOS SHADOW AT C4000H,16K -> 1		Return to Main Menu - <ESC>	
06H -> 01 01 01 00		MAIN BIOS SHADOW AT F0000H,64K	
		1=SHADOW ENABLE	
		0=SHADOW DISABLE	

NOTE: The functions available on this screen are also available on the EASY C&T CHIPSET REGISTER SETUP Screen (see Figure C-4).

**Figure C-7. 80386DX Enable/Disable Video and Main BIOS Shadow SETUP Screen**

CMOS SETUP (C) Copyright 1985-1989, American Megatrends, Inc.

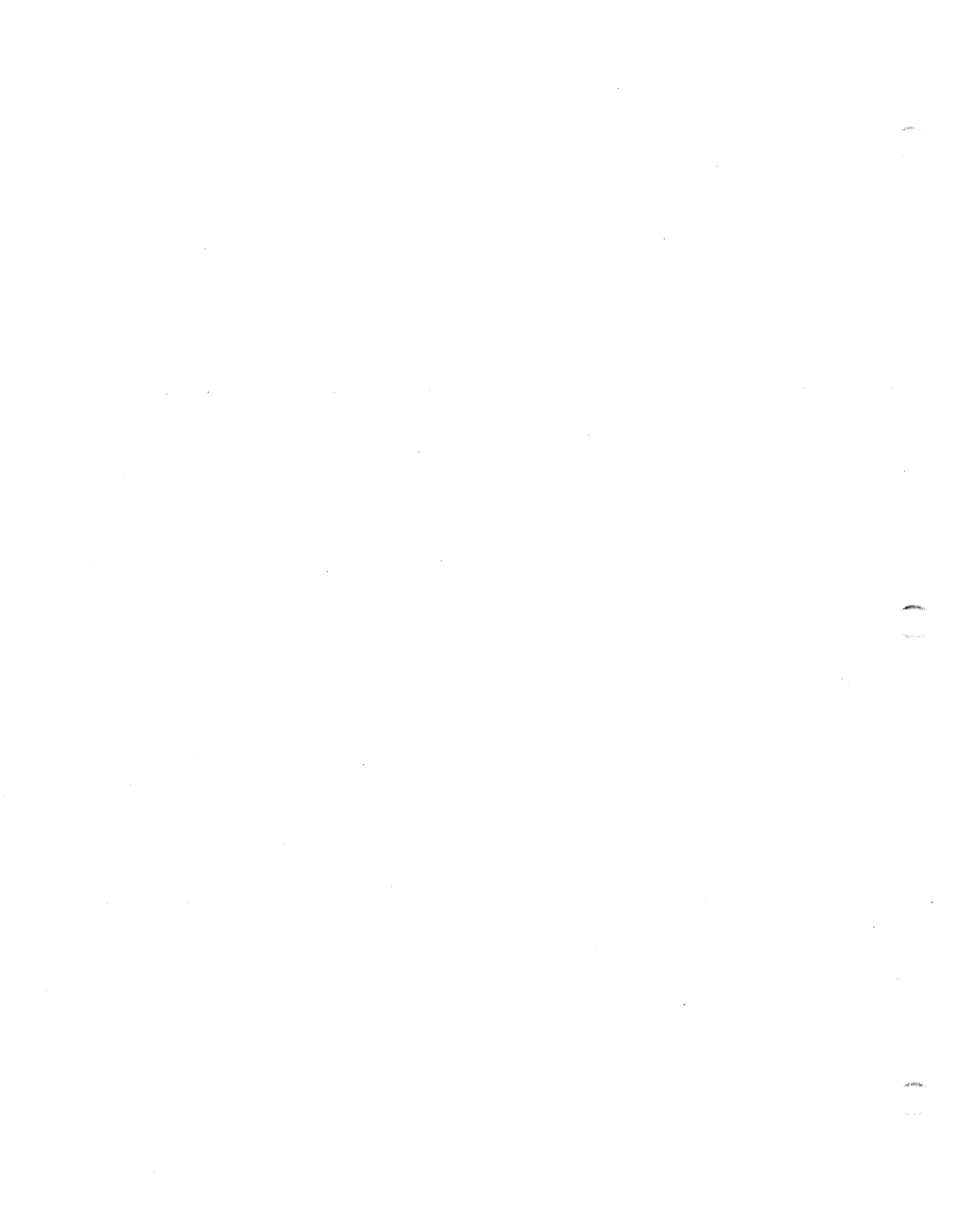
```
Main Processor      :80386           :Base Memory Size  :640KB
Numeric Processor  :Present          :Ext. Memory Size  :0KB
Floppy Drive A     :1.2MB,5-1/2"    :Hard Disk C: Type :2
Floppy Drive B     :1.44MB,3-1/2"   :Hard Disk D: Type :None
Display Type       :VGA or EGA      :Serial Port(s)    :3FB
ROM-BIOS Date      :09/15/89        :Parallel Port(s)  :378

Block 0            :256K DRAM, 1 Bank(s), 2W/S      :Block 1: Disabled
Block 1            :Disabled          :Block 3           :Disabled
Pipeline Mode     :Enabled          :Processor Clock   :CLK2IN
Shadow C0000H,16K :Enabled          :Bus Clock         :CLK2In/3
Shadow C4000H,16K :Enabled          :DMA Clock         :SCLK/2
Shadow F0000H,64K :Enabled

XENIX System V

Boot
:
```

**Figure C-8. 80386DX System Boot Screen**





## COMMENT SHEET

MANUAL TITLE: MARK 386S Business System Installation  
and Operations Guide

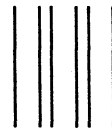
DOCUMENT ORDER NUMBER: HTP0091 REVISION: A

FROM: NAME/COMPANY: \_\_\_\_\_

BUSINESS ADDRESS: \_\_\_\_\_

CITY/STATE/ZIP: \_\_\_\_\_

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NO POSTAGE  
NECESSARY  
IF MAILED  
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