

INSTALLING THE  
**INBOARD™ 386/PC**  
**PERSONAL COMPUTER**  
**ENHANCEMENT**



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Math Coprocessor

Other

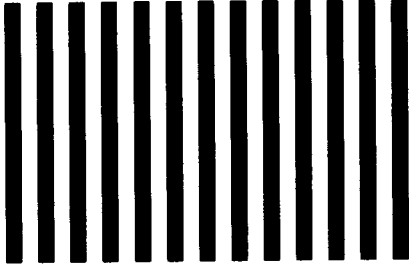
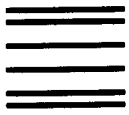
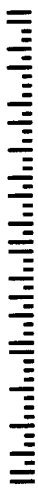
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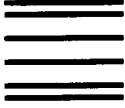
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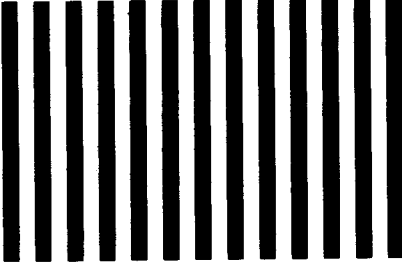
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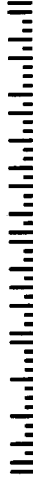
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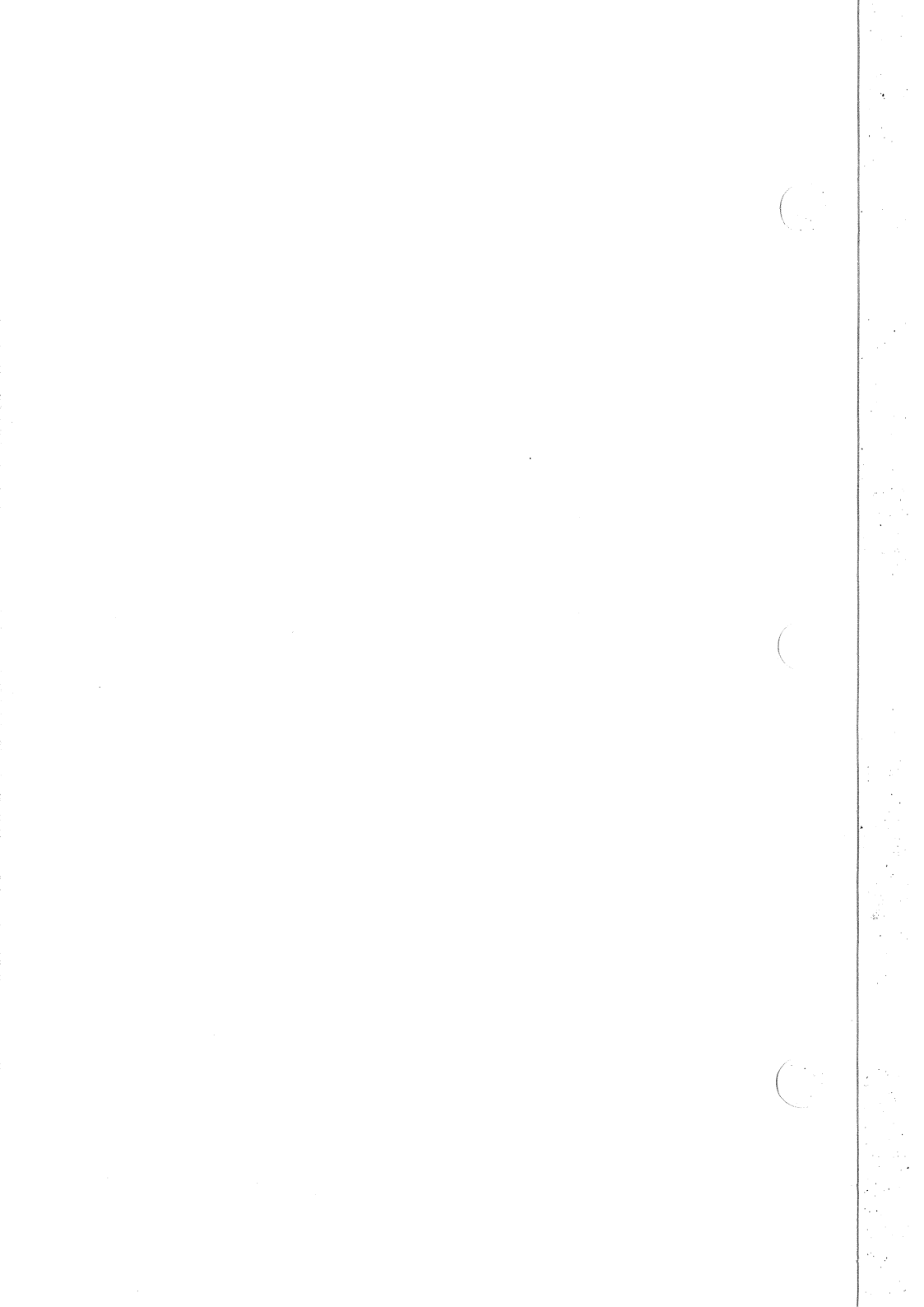
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MEMORY**

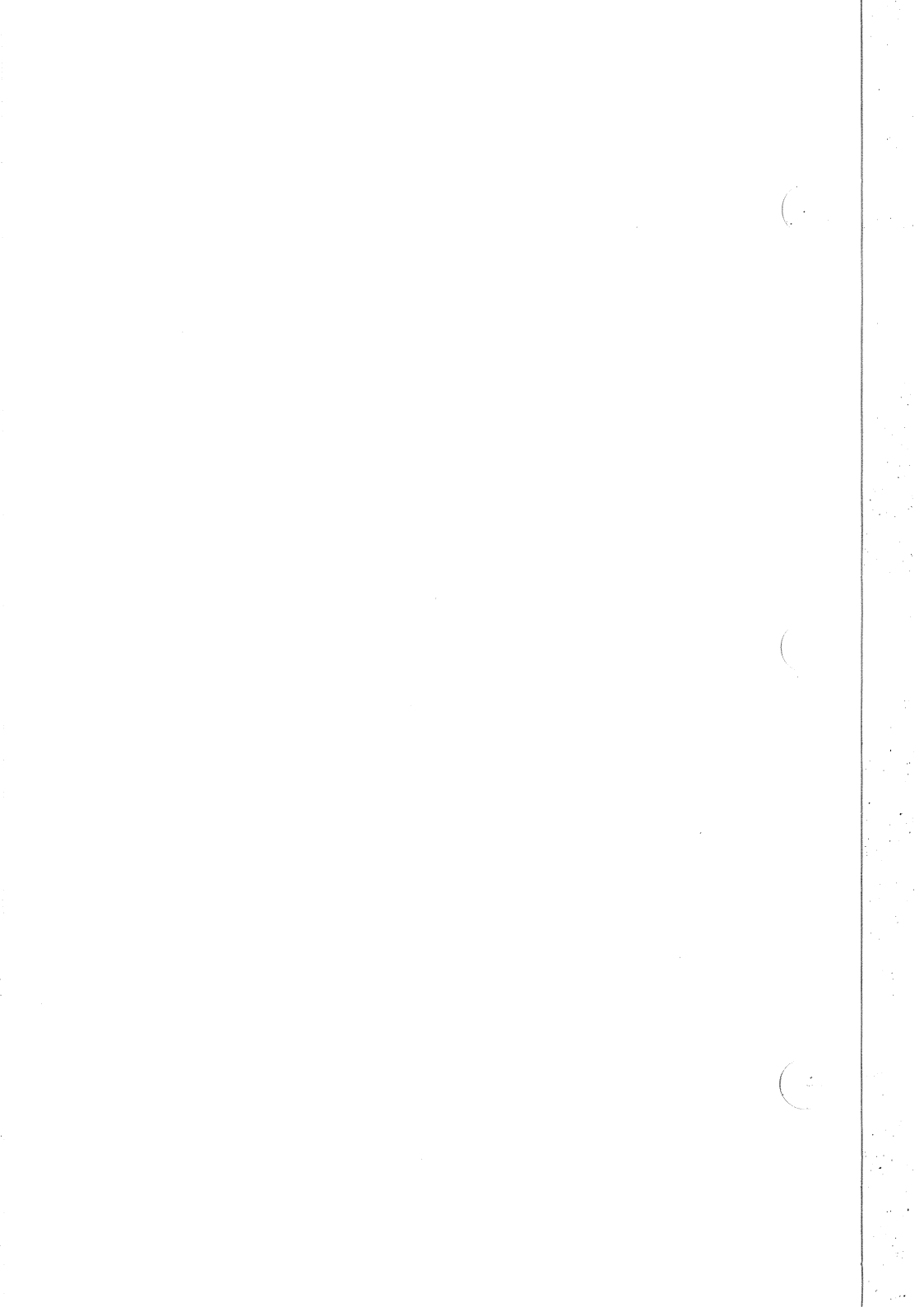
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# 1 INTRODUCTION

If you're in a hurry to use the Inboard 386/PC, reading this chapter can save you time. It tells you what you can skip, so you can focus on the information you need.

## ***How to save time using this book***

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

- Chapter 1 *Introduction*  
Summarizes the board's features and the accompanying software. This chapter also contains compatibility information, a list of the box's contents, and an installation overview. If you're familiar with the Inboard 386/PC, skip this chapter.
- Chapter 2 *IBM PC XT installation*
- Chapter 3 *IBM PC installation*
- Chapter 4 *COMPAQ PORTABLE and PORTABLE PLUS installation*
- Chapter 5 *Tandy 1200 HD installation*
- Chapter 6 *Installing and using the Inboard™ 386/PC software*

The appendixes cover specialized technical topics. You don't need to read them unless one of the chapters advises you to. The Glossary at the end of the manual defines many of the technical terms.

If you're familiar with the Inboard 386/PC, and you're interested only in installation instructions, turn to the chapter for your computer.

## ***Inboard™ 386/PC features***

The Inboard 386/PC takes your computer to the high performance of the Intel 80386 microprocessor. Here's what the Inboard 386/PC will do for your computer:

- Performance up to 10 times faster than an IBM PC alone.
- 1M byte of 32-bit high-performance memory -- 640K of conventional and 256K of extended memory, with 128K reserved for the system BIOS.



- Support for 80386-specific software.
- Enhanced hard disk performance.
- Compatibility with the Lotus/Intel/Microsoft (LIM) Expanded Memory Specification (EMS) version 4.0 so you can continue to use your expanded memory boards (such as the Intel Above Board).
- Software that turns extended memory on the Inboard 386/PC into expanded memory (for users without expanded memory boards).

## ***Inboard™ 386/PC options***

You can add two optional products to your Inboard 386/PC:

- Inboard 386/PC Piggyback Memory board -- for up to an additional 2M bytes of high-performance extended memory.
- 80387 math coprocessor -- performs floating-point arithmetic eight times faster than the 8087 you may have in the computer.

Contact your dealer for more information on Inboard 386/PC options.

## ***Who can use extended memory?***

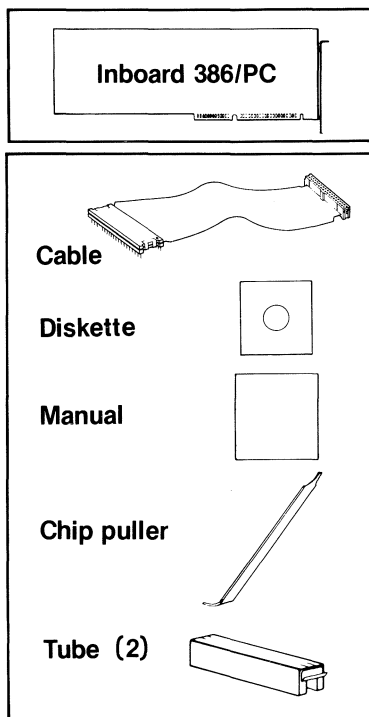
The Inboard 386/PC has 256K bytes of extended memory -- and you can add up to 2M bytes more extended memory with an optional Inboard 386/PC Piggyback Memory board. You can use extended memory for DOS's VDISK, specially written application programs (such as Framework II and AutoCAD), 80386 control software, the Inboard 386/PC disk cache software, and the Inboard 386/PC software for turning extended memory into expanded memory.

Read Appendix A for more information on extended memory and how it differs from conventional and expanded memory.



## What's in the Inboard™ 386/PC box?

Be sure your Inboard 386/PC box contains everything shown in Figure 1-1. Contact your dealer if you're missing anything.



PC-0401

**Figure 1-1** Contents of the Inboard™ 386/PC box

### Installation overview

Installing the Inboard 386/PC is a two-step process:

- 1 Put the board in the computer.** This involves removing the computer's 8088 microprocessor (and the 8087 if one is installed) and installing the Inboard 386/PC cable and board. Chapters 2 through 5 describe installing the Inboard 386/PC in specific computers.
- 2 Install the Inboard 386/PC software.** You can't take advantage of the Inboard 386/PC's speed until you install its software. Chapter 6 explains how.

After you've performed both steps, your Inboard 386/PC will be ready to use.

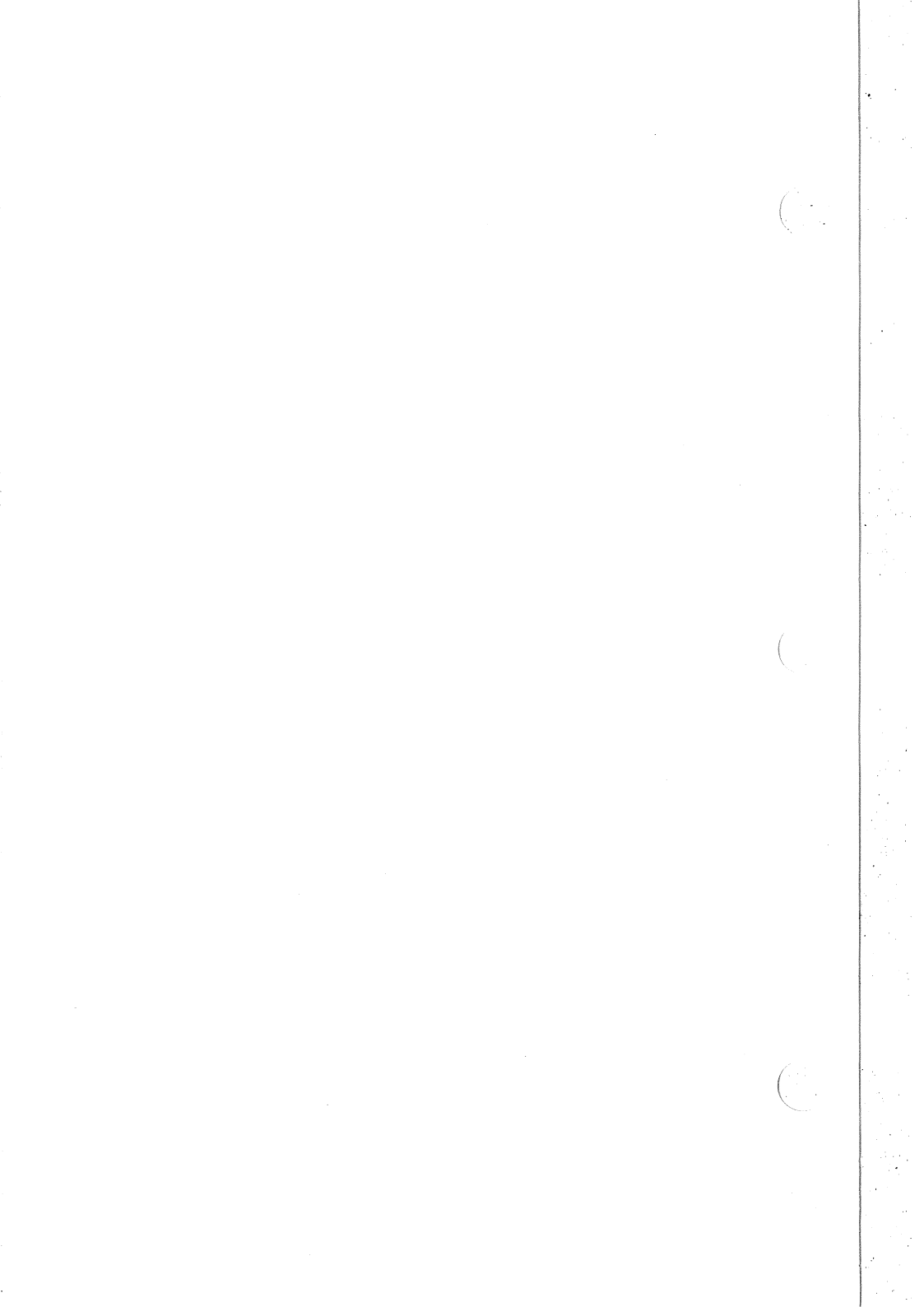
Installing the Inboard 386/PC isn't difficult -- if you've installed other boards and if you follow the directions *exactly*. If you're not comfortable working inside your computer, have your dealer install the Inboard 386/PC.

## ***Where to go from here***

Turn to the installation chapter for your computer. Table 1-1 lists the installation chapters.

**Table 1-1**      *Installation chapters*

<b>Computer</b>	<b>Chapter</b>
IBM PC XT	2
IBM PC	3
COMPAQ PORTABLE and PORTABLE PLUS	4
Tandy 1200 HD	5



# 2 IBM PC XT INSTALLATION

This chapter contains instructions for installing the Inboard 386/PC in an IBM PC XT.

## ***Before you start***

The Inboard 386/PC has two optional products you can purchase separately:

- Inboard 386/PC Piggyback Memory board
- 80387 math coprocessor

If you have one or both of these options, install them on your Inboard 386/PC before you begin the installation instructions in this chapter. The manual that comes with each option tells you how.

## **NOTE**

*It's always a good idea to back up your hard disk before adding new hardware or software.*

## ***Installation instructions***

This section contains instructions for installing the Inboard 386/PC in an IBM PC XT computer.

## **CAUTION**

*Follow the steps in order -- if you don't, you'll miss crucial steps. Skipping steps and skimming the instructions will not save time. The least you can expect from skipping the directions is a major inconvenience. At most, you'll ruin an expensive investment: the Inboard 386/PC and your computer.*

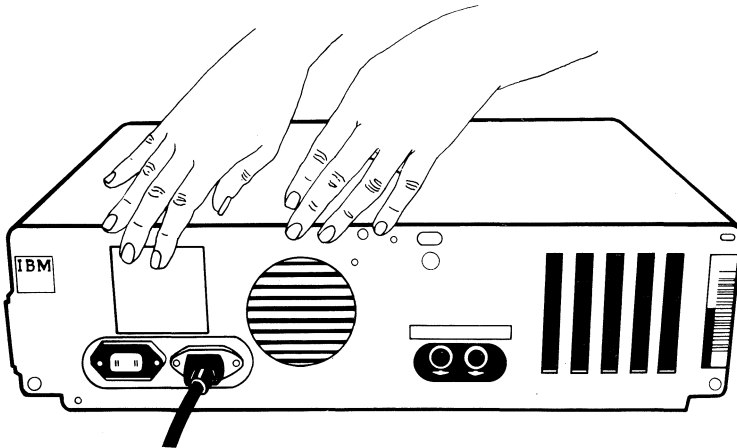
Each step has a box beside it near the outside edge of the page. To keep track of where you are, check off the box after you complete each step.

Before you begin the installation, gather everything you'll need -- your computer, the Inboard 386/PC, this manual, cable, chip puller, plastic tubes, and a flat-blade screwdriver -- and arrange them on a clean, dry work surface. (Having everything close will reduce the risk of generating static electricity.)

## Preparing the computer

Perform the steps in this section to prepare your computer for the installation.

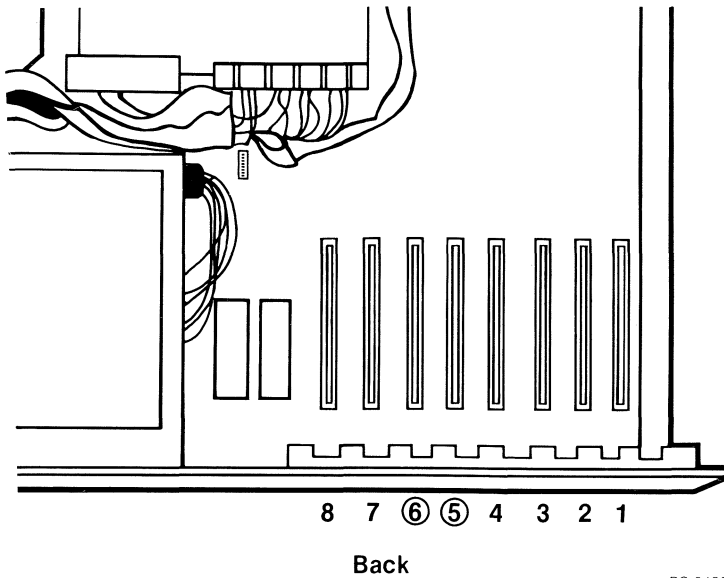
- **1** Run your computer's diagnostic software before installing the Inboard 386/PC to verify that the computer is working correctly. Correct any error conditions before you install the Inboard 386/PC.  
  
Computers can develop subtle problems that don't interfere with daily operations. Sometimes these problems go unnoticed until new hardware or software is installed.
- **2** Your computer can be damaged by static discharge. You're less likely to discharge static electricity if you ground yourself by touching the metal back panel of your computer's system unit before you begin the installation. Figure 2-1 illustrates grounding. Moving around increases the chance of static discharge, so limit your movements while installing the Inboard 386/PC.



PC-0347

**Figure 2-1** *Grounding yourself on the system unit*

- 3 Turn off the power switch on the system unit and any attached equipment (such as your printer and screen), and unplug the system unit's power cord from the wall outlet. If you don't, you could electrocute yourself.
- 4 Remove the cover from the computer's system unit. (Refer to the computer's *Guide to Operations* if you don't know how.)
- 5 Remove any boards in expansion slots 5, 6, 7, and 8. (See Figure 2-2.)



**Figure 2-2**      *Expansion slots on the IBM PC XT computer's system board*



## **CAUTION** ■■■■■■

*The computer won't operate correctly if more than one board provides the same conventional memory address. This can cause garbled data on disks (both floppy and hard disks) when programs read data from conventional memory and store it on the disks.*

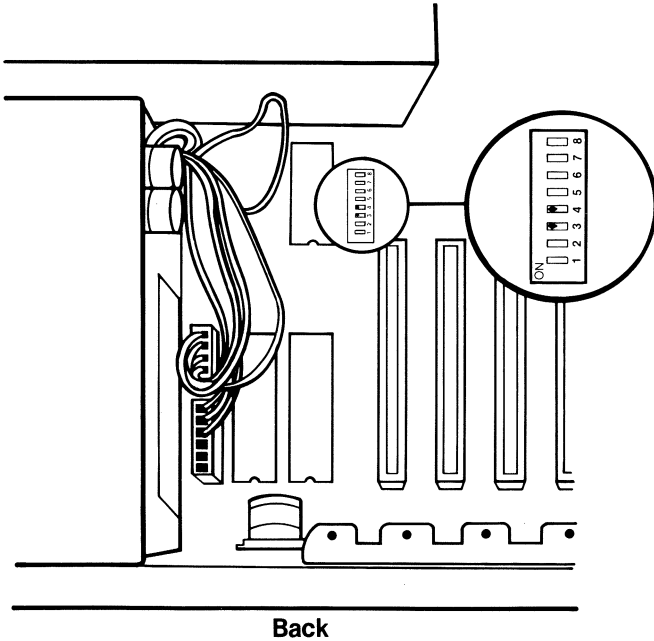
*Protect the information on your disks by disabling the conventional memory on the computer's system board and any add-in memory board (such as an Intel Above Board). Because the Inboard 386/PC provides the full 640K bytes of conventional memory, you don't need an additional conventional memory board.*

*The rest of this section explains how to disable other conventional memory in the computer.*

## **CAUTION** ■■■■■■

*Use a ballpoint pen to set switches. Don't use a pencil because the graphite in the lead could short-circuit the switches.*

- 6 You must disable conventional memory on the system board down to 256K bytes. Use a ballpoint pen to set switches 3 and 4 on the system board to ON. (See Figure 2-3.)



PC-0404

**Figure 2-3** *Setting switches 3 and 4 on the IBM PC XT*

- 7 If you have an add-in board providing conventional memory, either remove the board or disable its conventional memory.

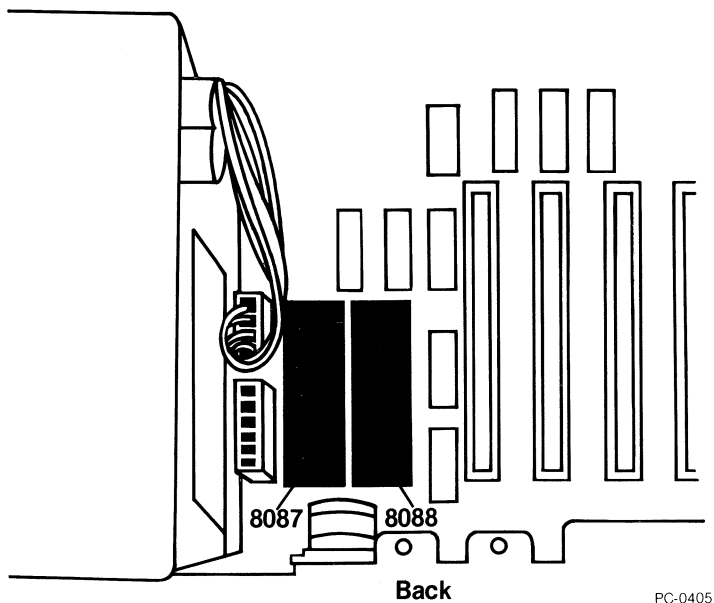
For example, an Intel Above Board can provide both conventional and expanded memory. You don't need to remove the Above Board if you set it to provide only expanded memory. (Refer to the memory board's manual for information on disabling conventional memory.)

## Removing the 8088 and the 8087

You must remove the computer's 8088 microprocessor -- its brain -- so you can install the Inboard 386/PC cable. If an 8087 math coprocessor is installed, remove it also to avoid damaging the Inboard 386/PC and the 8087.

Perform the steps in this section to remove the 8088 and 8087 from the system board.

- 1 Use Figure 2-4 to find the 8088 on the computer's system board.

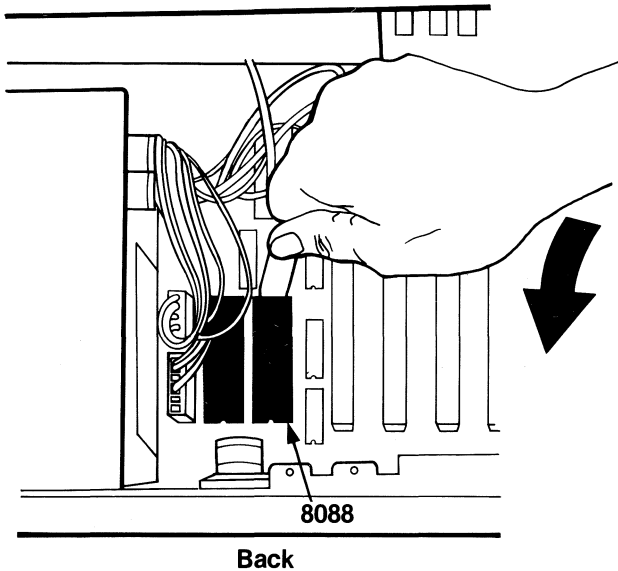


**Figure 2-4** *Location of the 8088 and the 8087 on the IBM PC XT's system board*

# CAUTION

*Don't insert the chip puller between the socket and the system board. You could damage the socket and the system board if you do.*

- 2 Refer to Figure 2-5, and use the chip puller that came with the Inboard 386/PC to ease the 8088 from its socket. Removing the 8088 is easier if you stand in back of computer and gently pull the chip puller toward you. To avoid damaging the system board, loosen only the end of the 8088 nearest the front of the computer.



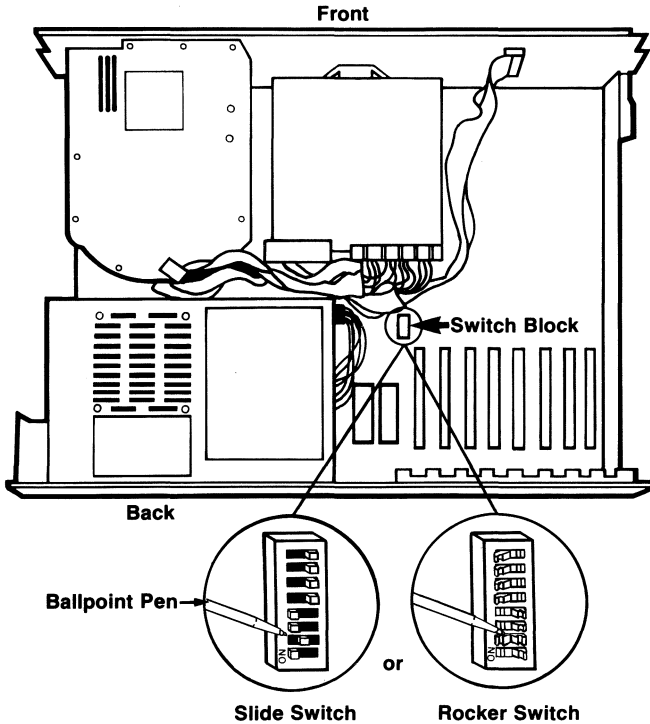
PC-0406

**Figure 2-5** Removing the 8088

- 3 You may wish to save the 8088, so handle it carefully. Store the 8088 in either of the plastic tubes that came with the Inboard 386/PC.
- 4 If an 8087 isn't installed on the system board, skip this step.
- If an 8087 is installed, refer to Figure 2-5, and remove the 8087 as you did the 8088. Store the 8087 in the other plastic tube.

- 5 Switch 2 on the system board tells the computer whether a math coprocessor is installed (Figure 2-6). If you added an 80387 to the Inboard 386/PC, use a ballpoint pen to set switch 2 to OFF.

If you *didn't* add an 80387 to the Inboard 386/PC, use a ballpoint pen to set switch 2 to ON.



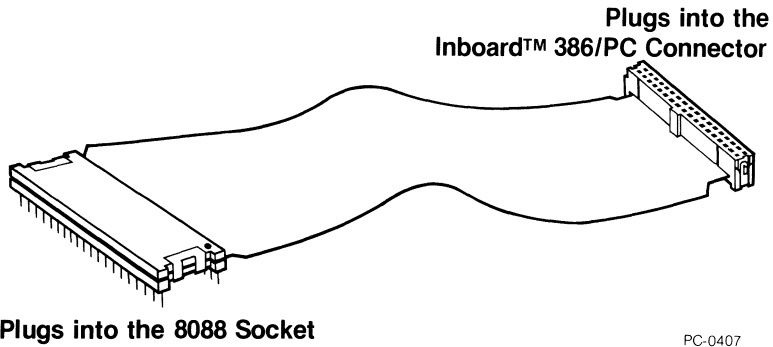
PC-0346

**Figure 2-6** *Setting switch 2 on the system board*

## Installing the Inboard™ 386/PC cable

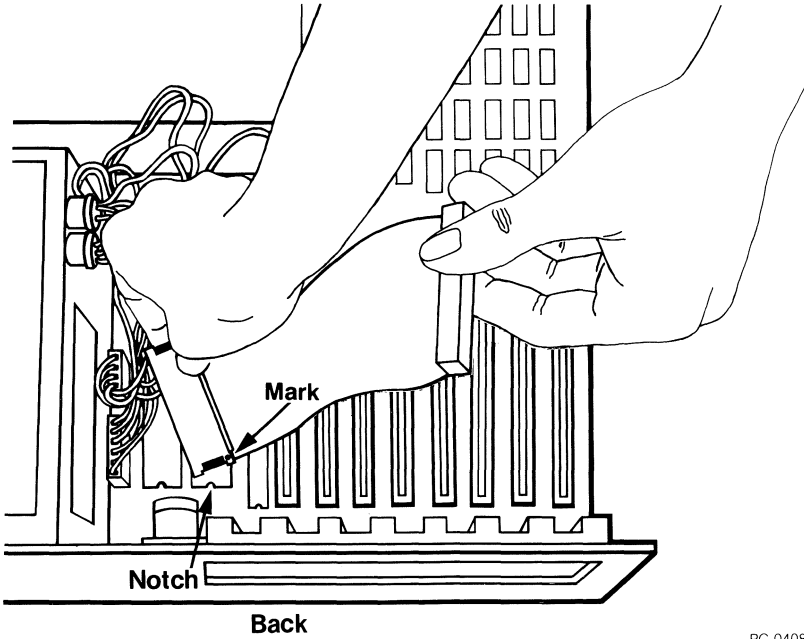
Perform the steps in this section to install the Inboard 386/PC cable on the system board.

- 1 The Inboard 386/PC cable has a connector at each end. One connector has two rows of pins and fits into the 8088 socket on the system board. The other connector has two rows of holes and fits into the cable socket on the Inboard 386/PC. See Figure 2-7.



**Figure 2-7**     *The Inboard™ 386/PC cable*

- 2 Use Figure 2-8 to orient the connector which has pins with the 8088 socket. The mark on the connector should face the back of the computer.

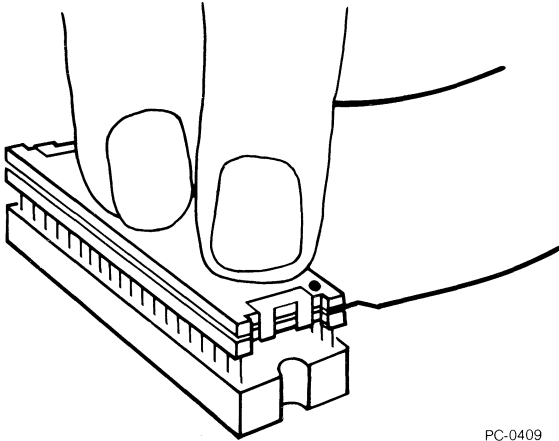


PC-0408

**Figure 2-8** *Orienting the cable with the 8088 socket*

- 3 Carefully insert the connector's pins into the 8088 socket -- but don't apply pressure yet. Check that the pins on the connector line up with the socket holes, and check for bent pins. If you find bent pins, remove the connector, carefully straighten the bent pins with needle-nose pliers, and align the connector again.

- 4 When the pins are properly aligned, apply gentle, even pressure until the connector settles into the socket. Then apply firm pressure on both ends of the connector until it will go no farther. See Figure 2-9.



PC-0409

**Figure 2-9** *Installing the cable connector in the 8088 socket*

### Installing the Inboard™ 386/PC

Perform the steps in this section to install the Inboard 386/PC in the computer.

- 1 Install the Inboard 386/PC in expansion slot 5 or 6. Use Figure 2-2 to find slots 5 and 6.

### **NOTE**

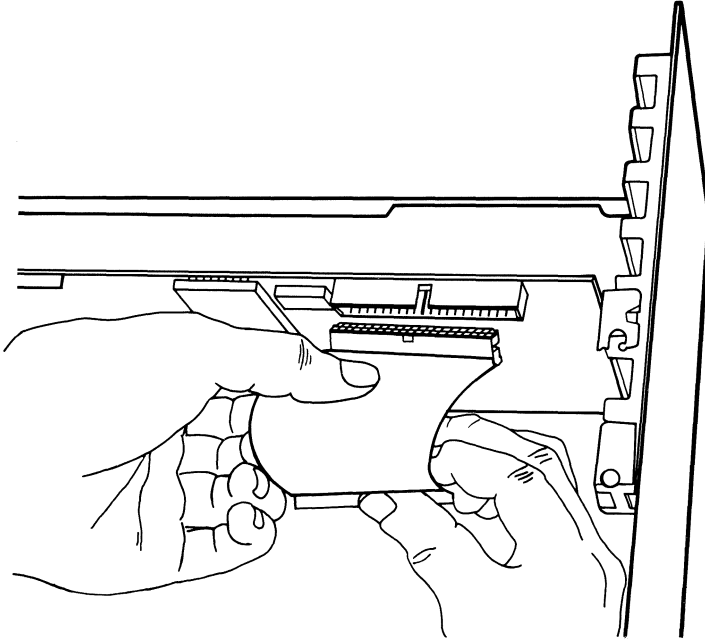
*Don't trap the cable when you replace the boards -- route the cable **over** other boards to reach the Inboard 386/PC.*

- 2 Replace the boards you removed from the computer. Be sure to reconnect any of the boards' cables you disconnected.
- 3 Route the Inboard 386/PC cable over other boards to the Inboard 386/PC.



□

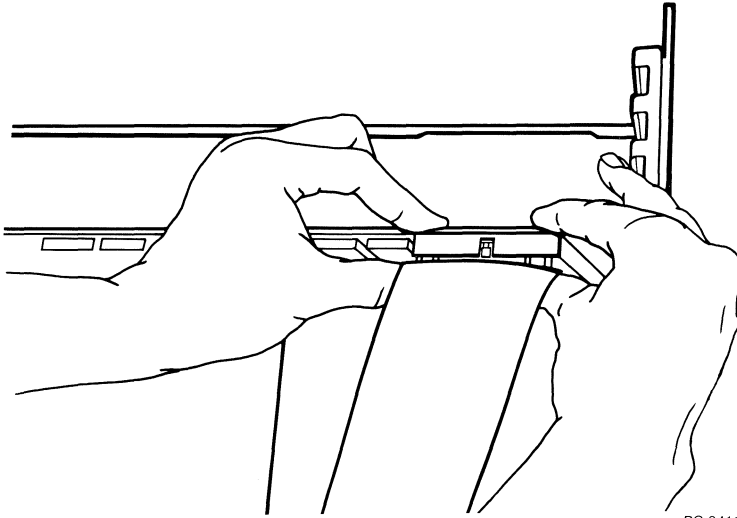
- 4 Refer to Figure 2-10, and align the free end of the Inboard 386/PC cable with the cable connector on the Inboard 386/PC.



PC-0410

**Figure 2-10** *Aligning the cable with the Inboard™ 386/PC connector*

- 5 Support the Inboard 386/PC while applying even pressure to the cable connector until the connector will go no farther, as shown in Figure 2-11.



PC-0411

**Figure 2-11** *Installing the cable on the Inboard™ 386/PC*

### Completing the Installation

Perform the steps in this section to complete the installation.

- 1 Replace the system unit's cover -- be sure the cover doesn't catch the Inboard 386/PC cable.
- 2 Reconnect the cables and plug the power cord into the outlet.
- 3 Turn on the computer. You should see the computer counting memory. If it doesn't, refer to the next section.

## ***A quick checklist***

If you have any problems with your computer immediately after installing the Inboard 386/PC, check the following items in order.

- Is the power cord plugged into the wall outlet?
- Are the cables and cords attached correctly?
- Are the boards inside the computer properly seated and reconnected?
- Did you disable conventional memory on the system by setting switches 3 and 4 to ON? Do any memory boards in the computer still provide conventional memory? (When you turn on the power, the computer will beep -- SOS in Morse code [short-short-short long-long-long short-short-short] -- if you haven't disabled conventional memory on the computer's system board or on another add-in board.)
- Is the Inboard 386/PC cable plugged into the 8088 socket and not the 8087 socket?
- Is the Inboard 386/PC cable oriented correctly in the 8088 socket on the system board and the socket on the Inboard 386/PC? Are the cable connector's pins lined up with the 8088 socket? Are the connectors pushed all the way into the sockets?
- If an 8087 was installed on the system board, did you remove it?
- Did you set switch 2 correctly (OFF if an 80387 is installed and ON if it isn't)?

If your computer doesn't work correctly after you've checked these potential problems, turn to Appendix B for troubleshooting advice.

## ***Where to go from here***

Turn to Chapter 6 for instructions on installing and using the Inboard 386/PC software.



Before you begin the installation, gather everything you'll need -- your computer, the Inboard 386/PC, this manual, cable, chip puller, plastic tubes, and a flat-blade screwdriver -- and arrange them on a clean, dry work surface. (Having everything close will reduce the risk of generating static electricity.)

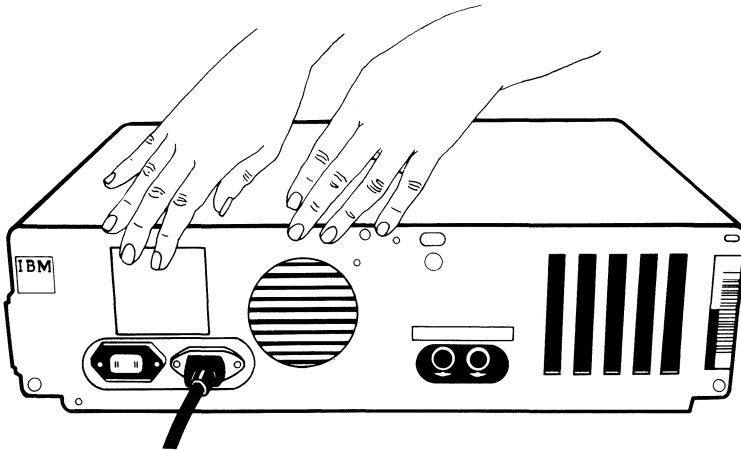
## Preparing the computer

Perform the steps in this section to prepare your computer for the installation.

- 1** Run your computer's diagnostic software to verify that the computer is working correctly. Correct any error conditions before you install the Inboard 386/PC.

Computers can develop subtle problems that don't interfere with daily operations. Sometimes these problems go unnoticed until new hardware or software is installed.

- 2** Your computer can be damaged by static discharge. You're less likely to discharge static electricity if you ground yourself by touching the metal back panel of your computer's system unit before you begin the installation. Figure 3-1 illustrates grounding. Moving around increases the chance of static discharge, so limit your movements while installing the Inboard 386/PC.



---

**Figure 3-1**      *Grounding yourself on the system unit*

- 3      Turn off the power switch on the system unit and any attached equipment (such as your printer and screen), and unplug the system unit's power cord from the wall outlet. If you don't, you could electrocute yourself.
  
- 4      Remove the cover from the computer's system unit. (Ask your dealer if you don't know how.)

## CAUTION ■■■■■■■■■■

*The computer won't operate correctly if more than one board provides the same conventional memory address. This can cause garbled data on disks (both floppy and hard disks) when programs read data from conventional memory and store it on the disks.*

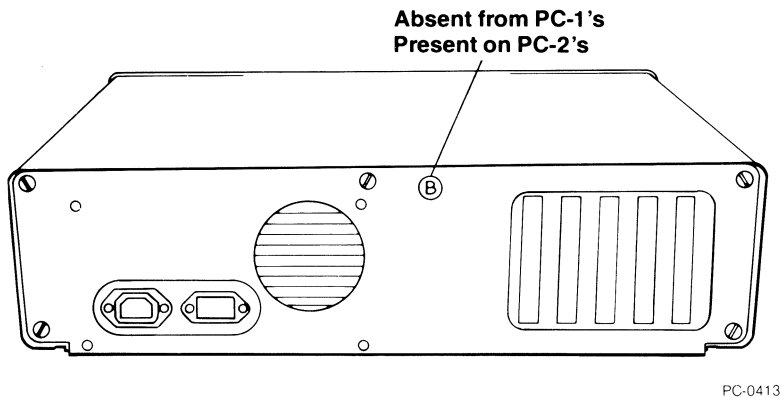
*Protect the information on your disks by disabling the conventional memory on the computer's system board and any add-in memory board (such as an Intel Above Board). Because the Inboard 386/PC provides the full 640K bytes of conventional memory, you don't need an additional conventional memory board.*

*The rest of this section explains how to disable other conventional memory in the computer.*

- 5 There are two types of IBM PCs, PC-1's and PC-2's. PC-2's have the letter "B" stamped on the back panel of the system unit, and PC-1's don't. Use Figure 3-2 to determine which computer you have.

## NOTE ■■■■■■■■■■

*Some technically advanced PC-1 users have updated their computers (replaced the ROM BIOS). These updated PC-1's behave as if they're PC-2's. If your PC-1 has been updated, follow the instructions for a PC-2.*



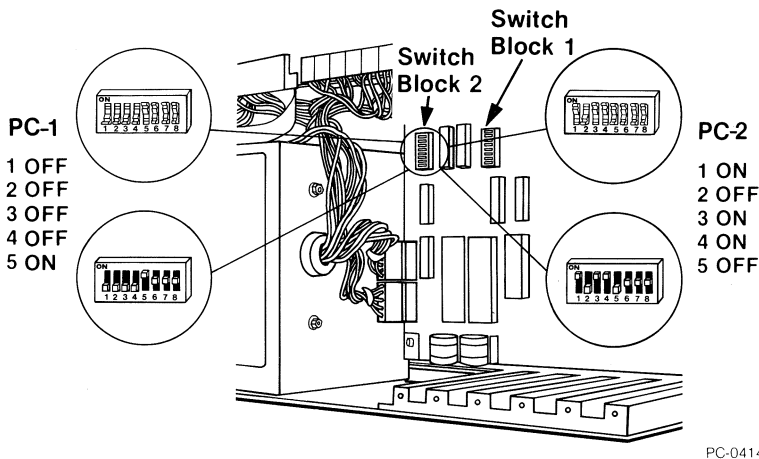
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**Figure 3-2**     *Distinguishing between IBM PC-1 and PC-2*

# CAUTION

Use a ballpoint pen to set switches. Don't use a pencil because the graphite in the lead could short-circuit the switches.

- 6 You must reset the computer's memory switches (to 544K bytes of conventional memory for the PC-1 and 640K bytes of conventional memory for the PC-2). Use a ballpoint pen to set switches 1 through 5 on switch block 2 as shown in Figure 3-3. (IBM installed two kinds of switches in PCs: slide switches and rocker switches. Figure 3-3 shows both.)



**Figure 3-3** Setting switches 1 through 5 on switch block 2

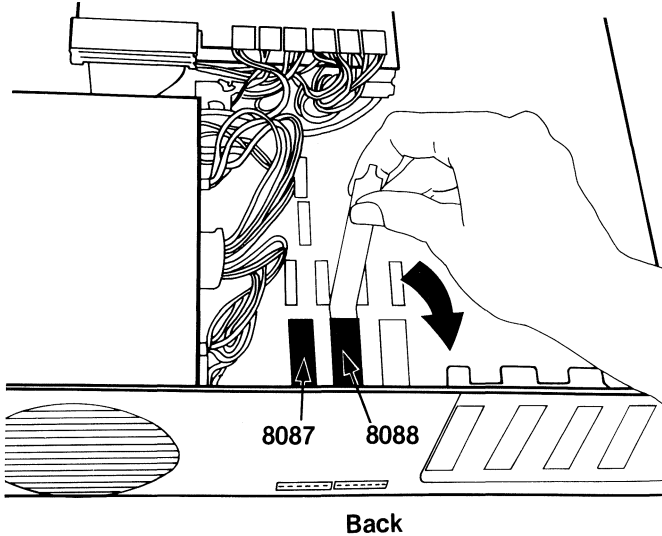
- 7 If you have an add-in board providing conventional memory, either remove the board or disable its conventional memory.

For example, an Intel Above Board can provide both conventional and expanded memory. You don't need to remove the Above Board if you set it to provide only expanded memory. (Refer to the memory board's manual for information on disabling conventional memory.)





- 2 Refer to Figure 3-5, and use the chip puller that came with the Inboard 386/PC to gently ease the 8088 from its socket. Removing the 8088 is easier if you stand in back of computer and gently pull the chip puller toward you. To avoid damaging the system board, loosen only the end of the 8088 nearest the front of the computer.

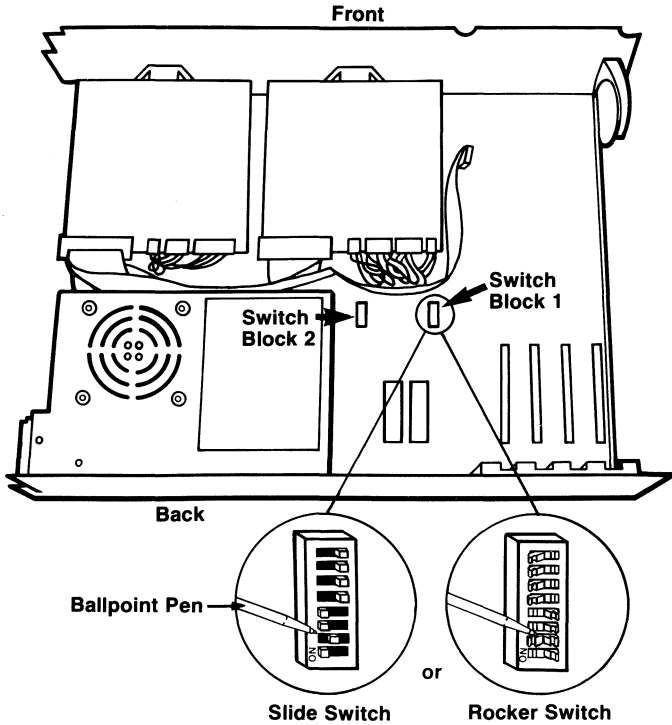


**Figure 3-5** *Removing the 8088*

- 3 You may wish to save the 8088, so handle it carefully. Store the 8088 in either of the plastic tubes that came with the Inboard 386/PC.
- 4 If an 8087 isn't installed on the system board, skip this step.
- If an 8087 is installed, refer to Figure 3-6, and remove the 8087 as you did the 8088. Store the 8087 in the other plastic tube.

- 5 Switch 2 on the system board's switch block 1 tells the computer whether a math coprocessor is installed (Figure 3-6). If you added an 80387 to the Inboard 386/PC, use a ballpoint pen to set switch 2 to OFF.

If you *didn't* add an 80387 to the Inboard 386/PC, use a ballpoint pen to set switch 2 to ON.



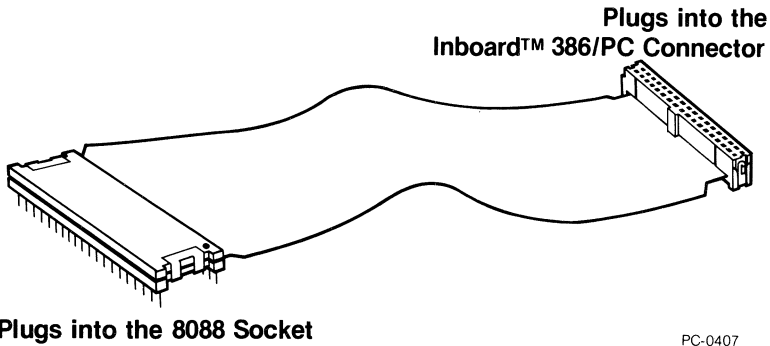
PC-0349

Figure 3-6 Setting switch 2 on the system board

## Installing the Inboard™ 386/PC cable

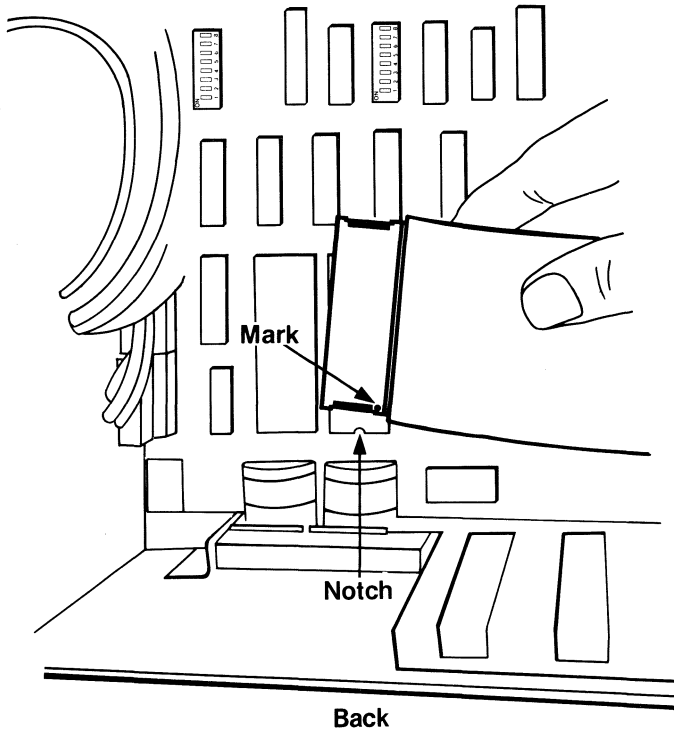
Perform the steps in this section to install the Inboard 386/PC cable on the system board.

- 1 The Inboard 386/PC cable has a connector at each end. One connector has two rows of pins and fits into the 8088 socket on the system board. The other connector has two rows of holes and fits into the cable socket on the Inboard 386/PC. See Figure 3-7.



**Figure 3-7** *The Inboard™ 386/PC cable*

- 2 Use Figure 3-8 to orient the connector which has pins with the 8088 socket. The mark on the connector should face the back of the computer.

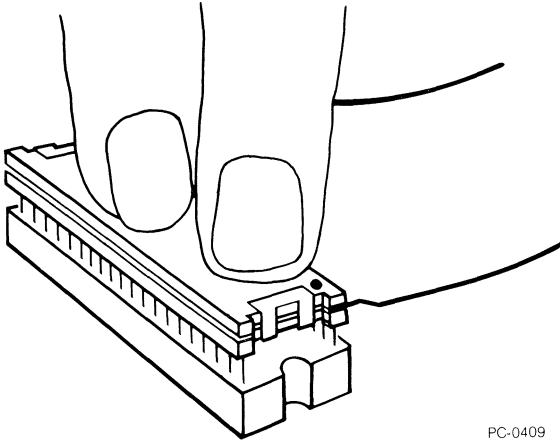


PC-0417

**Figure 3-8** *Orienting the cable with the 8088 socket*

- 3 Carefully insert the connector's pins into the 8088 socket -- but don't apply pressure yet. Check that the pins on the connector line up with the socket holes, and check for bent pins. If you find bent pins, remove the connector, carefully straighten the bent pins with needle-nose pliers, and align the connector again.

- 4 When the pins are properly aligned, apply gentle, even pressure until the connector settles into the socket. Then apply firm pressure on both ends of the connector until it will go no farther. See Figure 3-9. □
- 



PC-0409

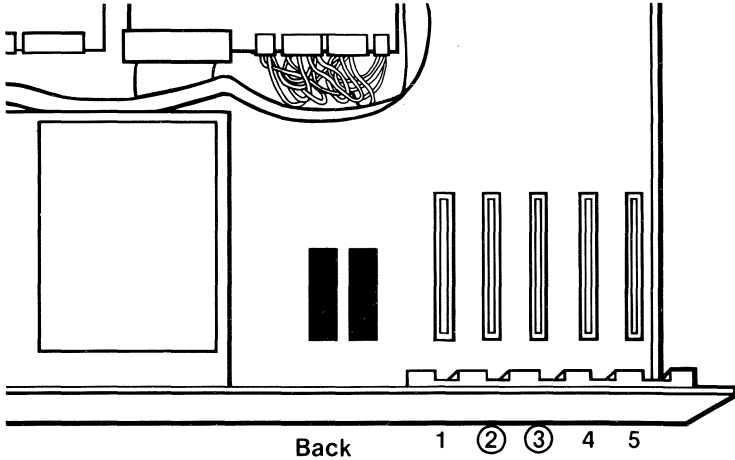
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**Figure 3-9** *Installing the cable connector in the 8088 socket*

## Installing the Inboard™ 386/PC

Perform the steps in this section to install the Inboard 386/PC in the computer.

- 1 Install the Inboard 386/PC in expansion slot 2 or 3. Use Figure 3-10 to find slots 2 and 3.



PC-0445

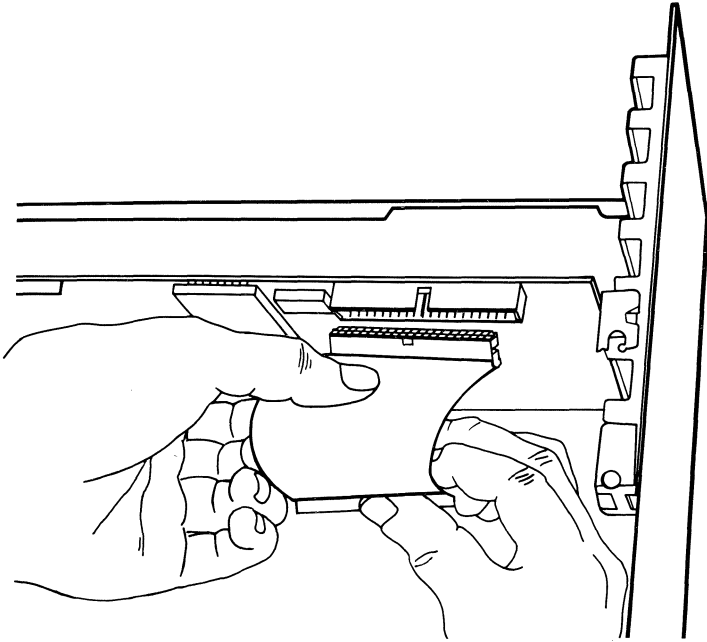
**Figure 3-10** Expansion slots on the the IBM PC's system board

### NOTE

*Don't trap the cable when you replace the boards -- route the cable **over** other boards to reach the Inboard 386/PC.*

- 2 Replace the boards you removed from the computer. Be sure to reconnect any of the boards' cables you disconnected.
- 3 Route the Inboard 386/PC cable over other boards to the Inboard 386/PC.

- 4 Refer to Figure 3-11, and align the free end of the Inboard 386/PC cable with the cable connector on the Inboard 386/PC. □

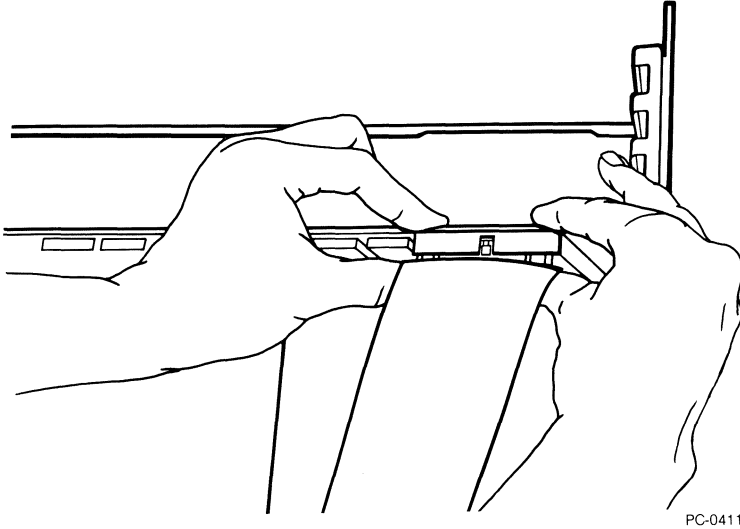


PC-0410

**Figure 3-11** *Aligning the cable with the Inboard™ 386/PC connector*



- 5 Support the Inboard 386/PC while applying even pressure to the cable connector until the connector will go no farther, as shown in Figure 3-12.



---

**Figure 3-12** *Installing the cable on the Inboard™ 386/PC*

### Completing the Installation

Perform the steps in this section to complete the installation.

- 1 Replace the system unit's cover -- be sure the cover doesn't catch the Inboard 386/PC cable.
- 2 Reconnect the cables and plug the power cord into the outlet.
- 3 Turn on the computer. The cursor should appear on the screen - start-up will take longer because the computer must count the memory on the Inboard 386/PC.

If you have problems immediately after the installation, refer to the next section.

## ***A quick checklist***

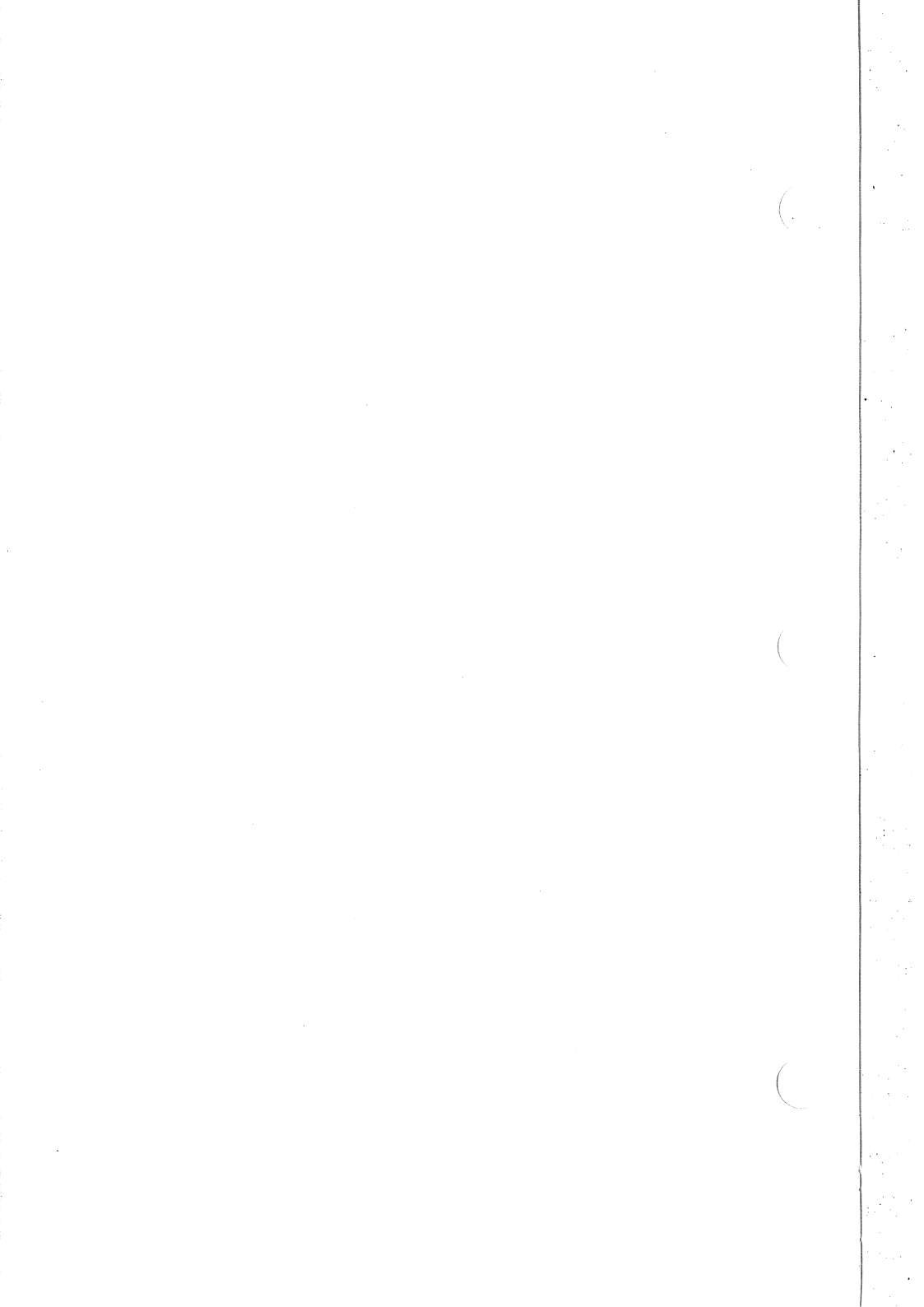
If you have any problems with your computer immediately after installing the Inboard 386/PC, check the following items in order.

- Is the power cord plugged into the wall outlet?
- Are the cables and cords attached correctly?
- Are the boards inside the computer properly seated and reconnected?
- Did you disable conventional memory on the system board by setting switches 1 through 5 on switch block 2? Do any memory boards in the computer still provide conventional memory? (When you turn on the power, the computer will beep -- SOS in Morse code [short-short-short long-long-long short-short-short] -- if you haven't disabled conventional memory on the computer's system board or on another add-in board.)
- Is the Inboard 386/PC cable plugged into the 8088 socket and not the 8087 socket?
- Is the Inboard 386/PC cable oriented correctly in the 8088 socket on the system board and the socket on the Inboard 386/PC? Are the cable connector's pins lined up with the 8088 socket? Are the connectors pushed all the way into the sockets?
- If an 8087 was installed on the system board, did you remove it?
- Did you set switch 2 on switch block 2 correctly (OFF if an 80387 is installed and ON if it isn't)?

If your computer doesn't work correctly after you've checked these potential problems, turn to Appendix B for troubleshooting advice.

## ***Where to go from here***

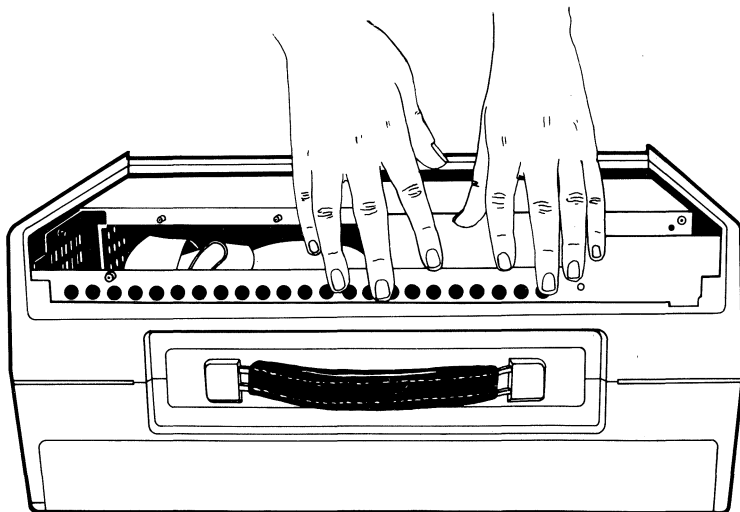
Turn to Chapter 6 for instructions on installing and using the Inboard 386/PC software.







- 2 Your computer can be damaged by static discharge. You're less likely to discharge static electricity if you ground yourself by touching the metal side panel of your computer's system unit before you begin the installation. Figure 4-1 illustrates grounding. Moving around increases the chance of static discharge, so limit your movements while installing the Inboard 386/PC. □



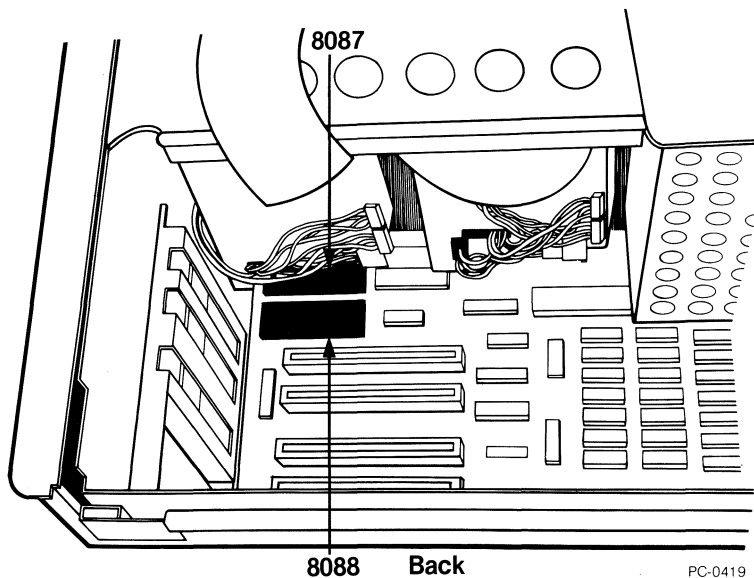
PC-0418

**Figure 4-1** *Grounding yourself on the system unit*

- 3 Turn off the power switch on the system unit and any attached equipment (such as your printer and screen), and unplug the system unit's power cord from the wall outlet. If you don't, you could electrocute yourself. □
- 4 Remove the cover and the metal grill from the computer's system unit. □
- 5 Remove all the add-in boards in the computer. □



1 Use Figure 4-2 to find the 8088 on the computer's system board. □



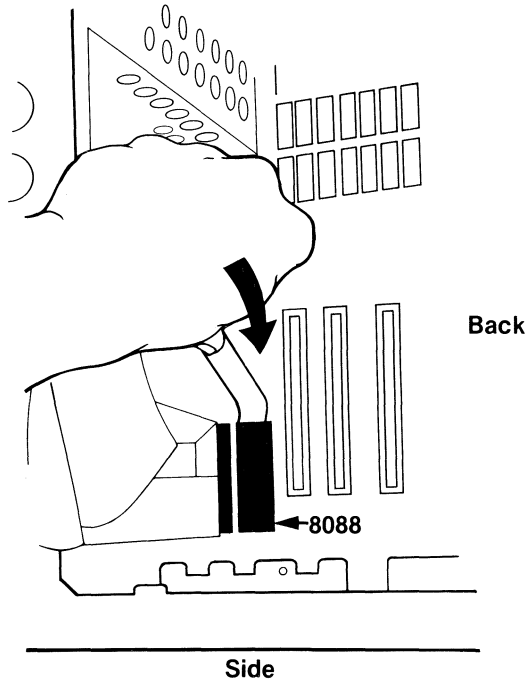
**Figure 4-2** *Location of the 8088 and the 8087 on the COMPAQ PORTABLE's system board*

## **CAUTION** ■■■■■■■■

*Don't insert the chip puller between the socket and the system board. You could damage the socket and the system board if you do.*



- 2 Refer to Figure 4-3, and use the chip puller that came with the Inboard 386/PC to gently ease the 8088 from its socket. Removing the 8088 is easier if you stand on the side of the computer nearest the 8088 and gently pull the chip puller toward you. To avoid damaging the system board, loosen only the end of the 8088 farthest from the side of the computer.



PC-0420

**Figure 4-3** *Removing the 8088*

- 3 You may wish to save the 8088, so handle it carefully. Store the 8088 in either of the plastic tubes that came with the Inboard 386/PC.
- 4 If an 8087 isn't installed on the system board, skip this step.

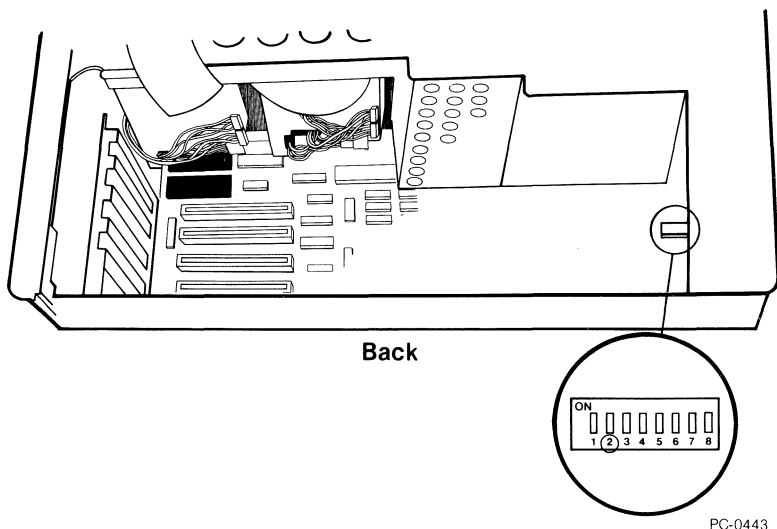
If an 8087 is installed, refer to Figure 4-3, and remove the 8087 as you did the 8088. (The 8087 socket is under the floppy disk drive. Have your dealer remove the 8087 for you if don't know how to move the floppy disk drive.) Store the 8087 in the other plastic tube.

# CAUTION

Use a ballpoint pen to set switches. Don't use a pencil because the graphite in the lead could short-circuit the switches.

- 5 Switch 2 on the system board tells the computer whether a math coprocessor is installed (see Figure 4-4). If you added an 80387 to the Inboard 386/PC, use a ballpoint pen to set switch 2 to OFF.

If you didn't add an 80387 to the Inboard 386/PC, use a ballpoint pen to set switch 2 to ON.



**Figure 4-4** Setting switch 2 on the system board

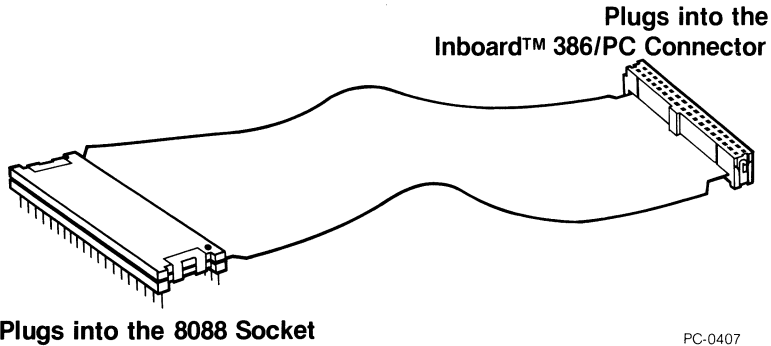
## Installing the Inboard™ 386/PC cable

Perform the steps in this section to install the Inboard 386/PC cable on the system board.

# NOTE

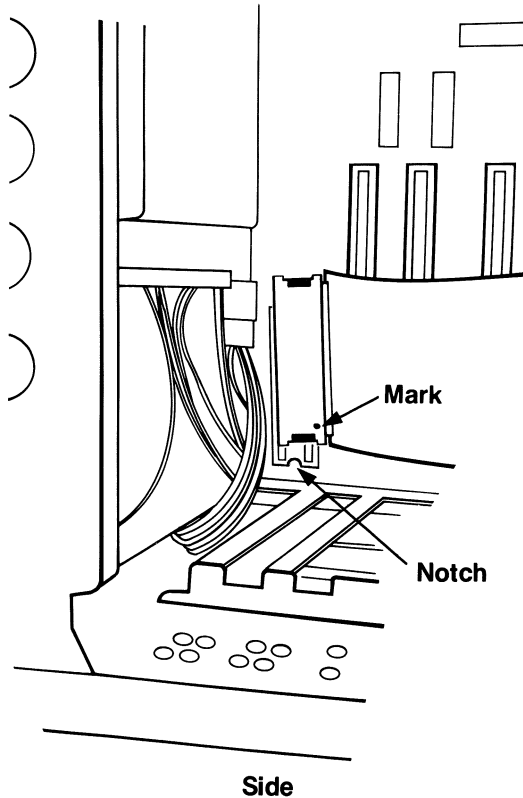
Some video and disk controller boards in early PORTABLEs are taller than standard boards. The Inboard 386/PC cable in the installation kit isn't long enough to reach over the tall boards. If your PORTABLE has tall boards, call Customer Support (the number is in Appendix B) and ask for the long cable.

- 1 The Inboard 386/PC cable has a connector at each end. One connector has two rows of pins and fits into the 8088 socket on the system board. The other connector has two rows of holes and fits into the cable socket on the Inboard 386/PC. See Figure 4-5.



**Figure 4-5**     *The Inboard™ 386/PC cable*

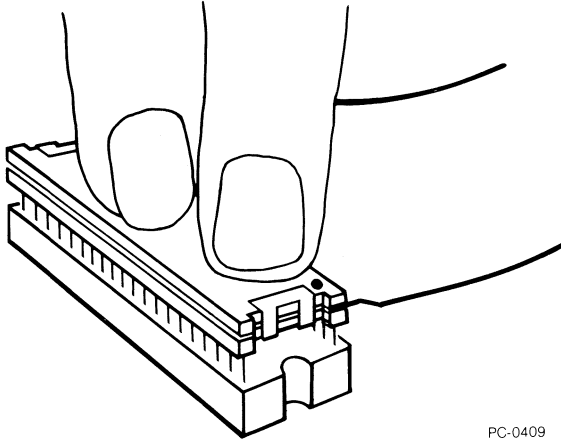
- 2 Use Figure 4-6 to orient the connector which has pins with the 8088 socket. The mark on the connector should face the end of the socket nearest the side of the computer, as shown in Figure 4-6.



**Figure 4-6** *Orienting the cable with the 8088 socket*

- 3 Carefully insert the connector's pins into the 8088 socket -- but don't apply pressure yet. Check that the pins on the connector line up with the socket holes, and check for bent pins. If you find bent pins, remove the connector, carefully straighten the bent pins with needle-nose pliers, and align the connector again.

- 4 When the pins are properly aligned, apply gentle, even pressure until the connector settles into the socket. Then apply firm pressure on both ends of the connector until it will go no farther. See Figure 4-7.
- 



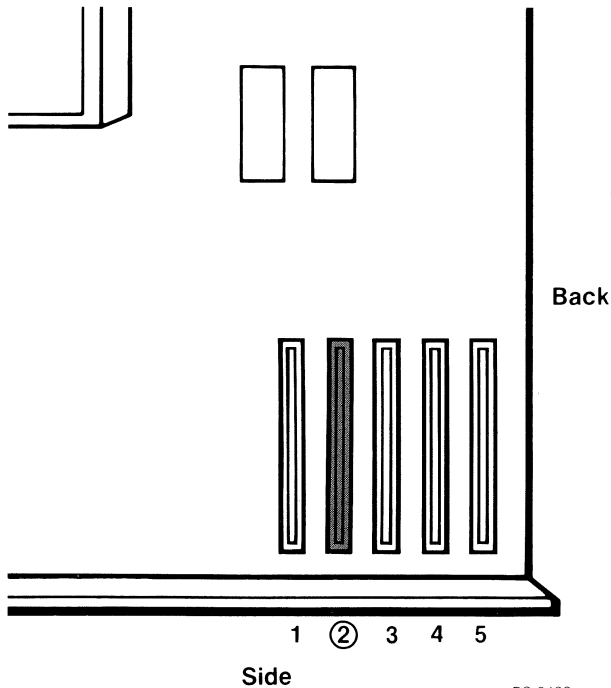
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**Figure 4-7**      *Installing the cable connector in the 8088 socket*

## Installing the Inboard™ 386/PC

Perform the steps in this section to install the Inboard 386/PC in the computer.

- 1 Install the Inboard 386/PC in expansion slot 2. Use Figure 4-8 to find slot 2.



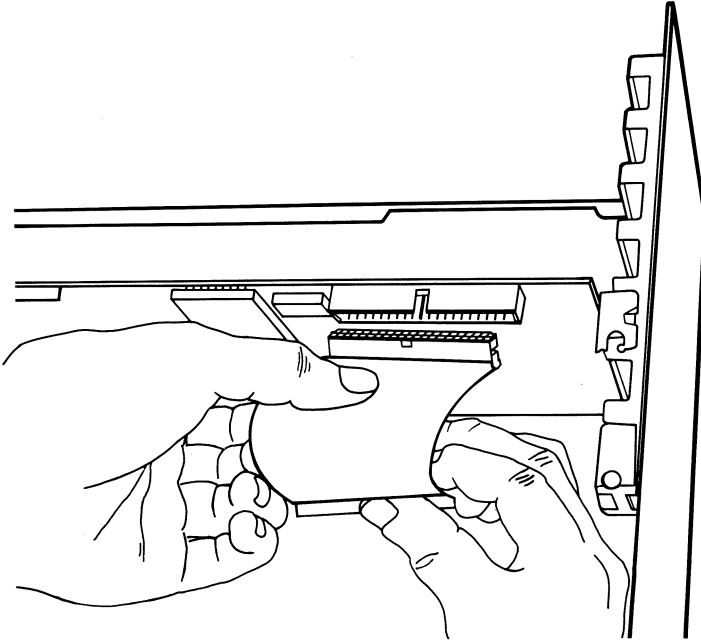
**Figure 4-8** Slot 2 on the COMPAQ's system board

### NOTE

*Don't trap the cable when you replace the boards -- route the cable **over** other boards to reach the Inboard 386/PC.*

- 2 Replace the boards you removed from the computer. Be sure to reconnect any of the boards' cables you disconnected.
- 3 Route the Inboard 386/PC cable over other boards to the Inboard 386/PC.

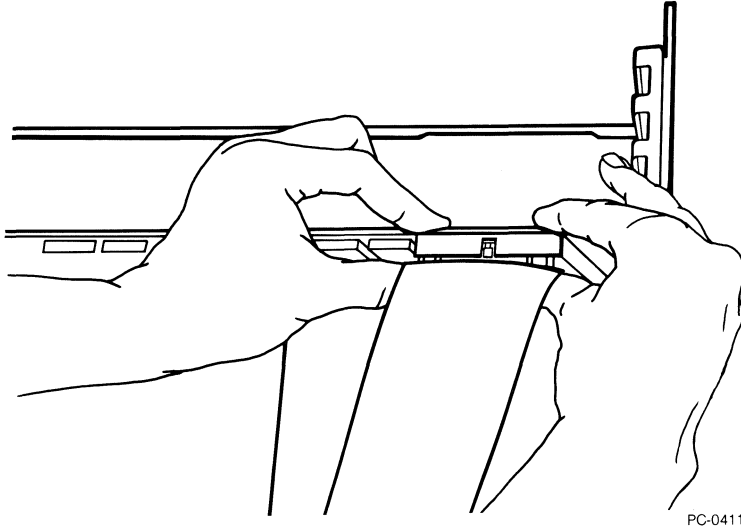
- 4 Refer to Figure 4-9, and align the free end of the Inboard 386/PC cable with the cable connector on the Inboard 386/PC.



PC-0410

**Figure 4-9** *Aligning the cable with the Inboard™ 386/PC connector*

- 5 Support the Inboard 386/PC while applying even pressure to the cable connector until the connector will go no farther, as shown in Figure 4-10.



**Figure 4-10** *Installing the cable connector on the Inboard™ 386/PC*

### Completing the Installation

Perform the steps in this section to complete the installation.

- 1 Replace the system unit's grill and cover -- be sure the grill doesn't catch the Inboard 386/PC cable.
- 2 Reconnect the cables and plug the power cord into the outlet.
- 3 Turn on the computer. The cursor should appear on the screen -- start-up will take longer because the computer must count the memory on the Inboard 386/PC.

If you have problems immediately after the installation, refer to the next section.



## ***A quick checklist***

If you have any problems with your computer immediately after installing the Inboard 386/PC, check the following items in order.

- Is the power cord plugged into the wall outlet?
- Are the cables and cords attached correctly?
- Are the boards inside the computer properly seated and reconnected?
- Do any boards in the computer still provide conventional memory? (When you turn on the power, the computer will beep -- SOS in Morse code [short-short-short long-long-long short-short-short] -- if you haven't disabled conventional memory on the computer's system board or on another add-in board.)
- Is the Inboard 386/PC cable plugged into the 8088 socket and not the 8087 socket?
- Is the Inboard 386/PC cable oriented correctly in the 8088 socket on the system board and the socket on the Inboard 386/PC? Are the cable connector's pins lined up with the 8088 socket? Are the connectors pushed all the way into the sockets?
- If an 8087 was installed on the system board, did you remove it?
- Did you set switch 2 correctly (OFF if an 80387 is installed and ON if it isn't)?

If your computer doesn't work correctly after you've checked these potential problems, turn to Appendix B for troubleshooting advice.

## ***Where to go from here***

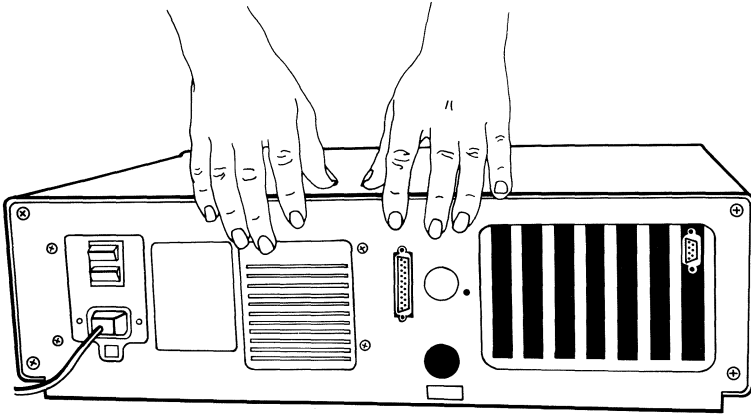
Turn to Chapter 6 for instructions on installing and using the Inboard 386/PC software.



## Preparing the computer

Perform the steps in this section to prepare your computer for the installation.

- 1 Your computer can be damaged by static discharge. You're less likely to discharge static electricity if you ground yourself by touching the metal side panel of your computer's system unit before you begin the installation. Figure 5-1 illustrates grounding. Moving around increases the chance of static discharge, so limit your movements while installing the Inboard 386/PC.



PC-0423

**Figure 5-1** *Grounding yourself on the system unit*

- 2 Turn off the power switch on the system unit and any attached equipment (such as your printer and screen), and unplug the system unit's power cord from the wall outlet. If you don't, you could electrocute yourself.
- 3 Remove the cover from the computer's system unit. (Refer to the computer's *User's Guide* if you don't know how.)
- 4 Remove all the boards in the computer.

## CAUTION ■■■■■■

*The computer won't operate correctly if more than one board provides the same conventional memory address. This can cause garbled data on disks (both floppy and hard disks) when programs read data from conventional memory and store it on the disks.*

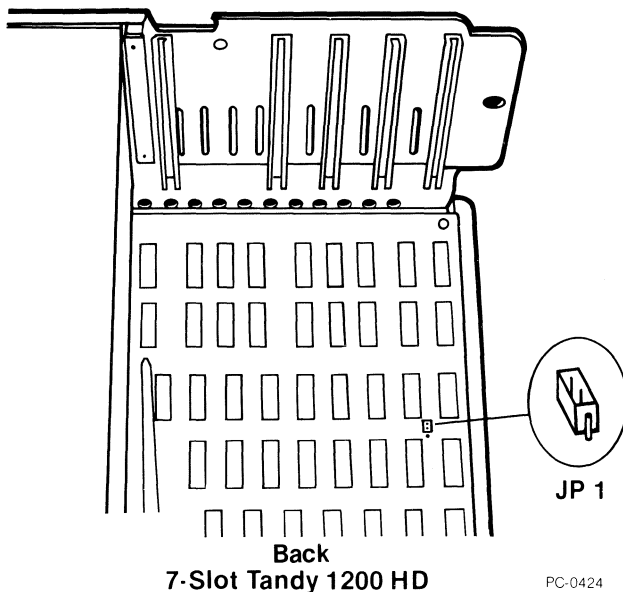
*Protect the information on your disks by disabling the conventional memory on the computer's system board and any add-in memory board (such as an Intel Above Board). Because the Inboard 386/PC provides the full 640K bytes of conventional memory, you don't need an additional conventional memory board.*

*The rest of this section explains how to disable other conventional memory in the computer.*

- 5 Tandy makes two kinds of 1200 HDs. One has seven expansion slots for add-in boards, and the other has five slots. If your computer has five slots, skip this step and go to step 6. □

For a Tandy 1200 HD with seven slots, jumper JP1 on the computer's system board specifies the amount of conventional memory on the system board. Use Figure 5-2 to find jumper JP1 on the computer's system board.

Be sure the jumper on JP1 encloses the two pins closest to the front of the computer.



**Figure 5-2** *Jumper JP1 on the computer's system board*

- 6 If you have an add-in board providing conventional memory, either remove the board or disable its conventional memory.

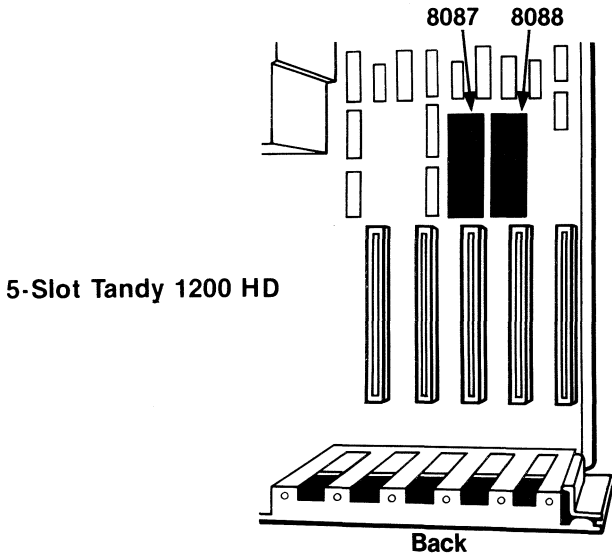
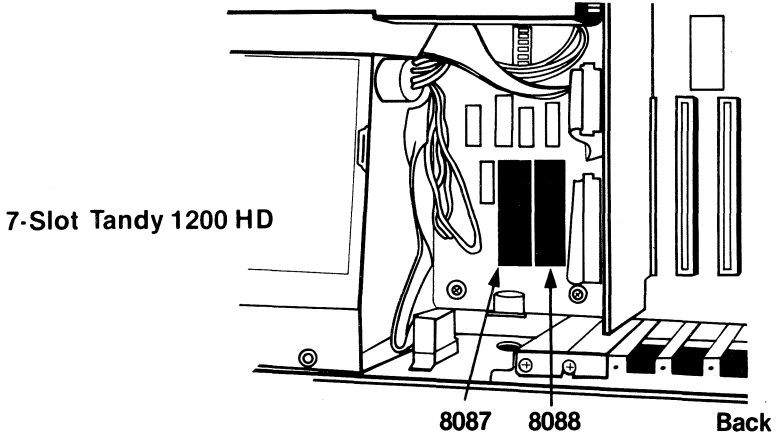
For example, an Intel Above Board can provide both conventional and expanded memory. You don't need to remove the Above Board if you set it to provide only expanded memory. (Refer to the memory board's manual for information on disabling conventional memory.)

### Removing the 8088 and the 8087

You must remove the computer's 8088 microprocessor -- its brain -- so you can install the Inboard 386/PC cable. If an 8087 math coprocessor is installed, remove it also to avoid damaging the Inboard 386/PC and the 8087.

Perform the steps in this section to remove the 8088 and 8087 from the system board.

1 Use Figure 5-3 to find the 8088 on the computer's system board. □



PC-0425

**Figure 5-3** *Location of the 8088 and the 8087 on the Tandy 1200 HD's system board*

## CAUTION

*Don't insert the chip puller between the socket and the system board. You could damage the socket and the system board if you do.*

□

2

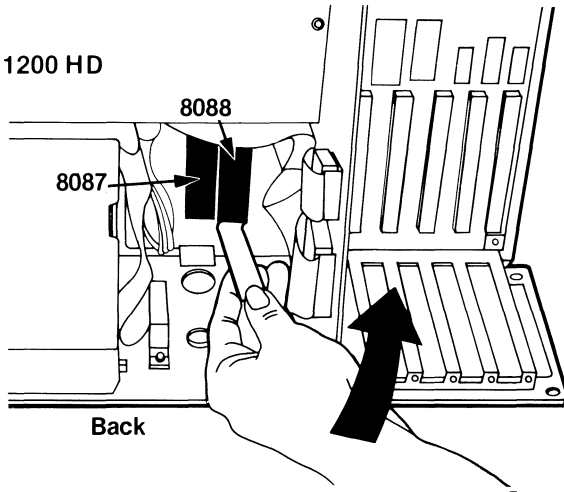
Refer to Figure 5-4, and use the chip puller that came with the Inboard 386/PC to gently ease the 8088 from its socket.

For the 7-slot Tandy 1200 HD, removing the 8088 is easier if you stand in front of the computer and gently pull the chip puller toward you. To avoid damaging the system board, loosen only the end of the 8088 nearest the back of the computer.

For the 5-slot Tandy 1200 HD, removing the 8088 is easier if you stand in back of the computer and gently pull the chip puller toward you. To avoid damaging the system board, loosen only the end of the 8088 nearest the front of the computer.

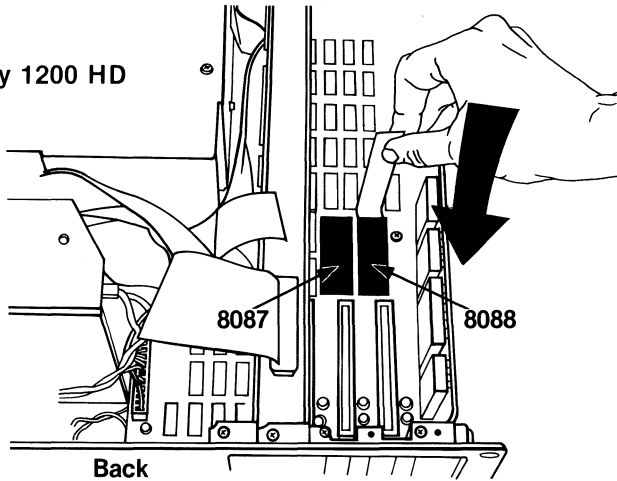
---

**7-Slot Tandy 1200 HD**



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**5-Slot Tandy 1200 HD**



PC-0426

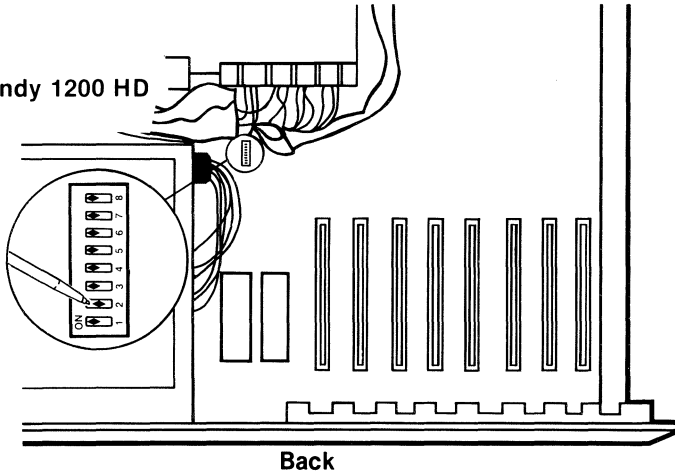
---

**Figure 5-4**     *Removing the 8088*

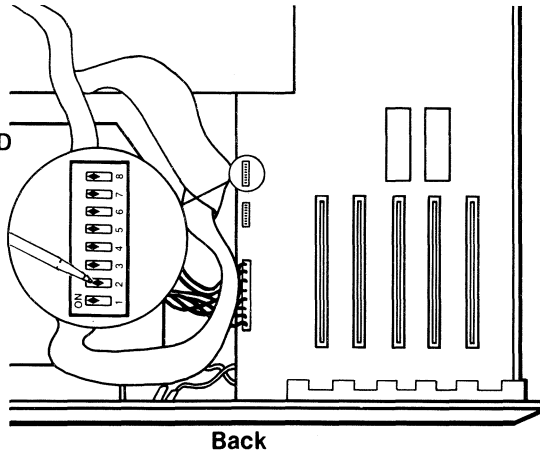




7-Slot Tandy 1200 HD



5-Slot Tandy 1200 HD



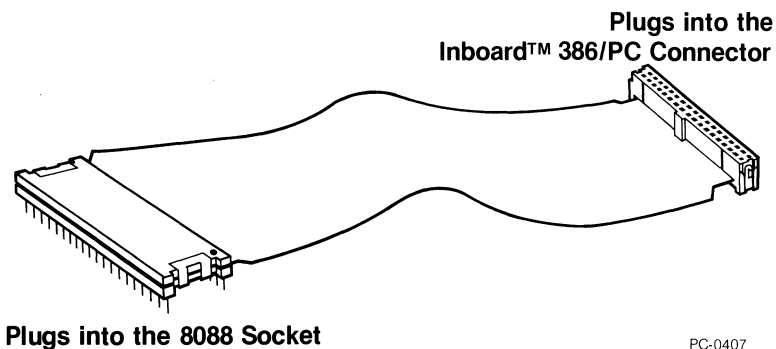
PC-0435

**Figure 5-5**     *Setting switch 2 on the system board*

## Installing the Inboard™ 386/PC cable

Perform the steps in this section to install the Inboard 386/PC cable on the system board.

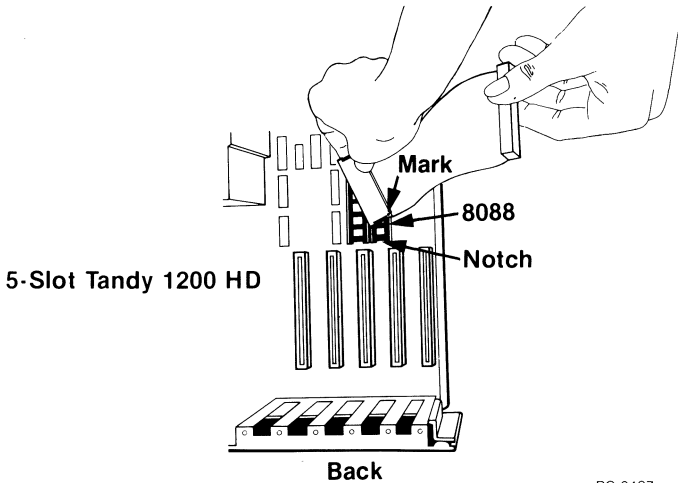
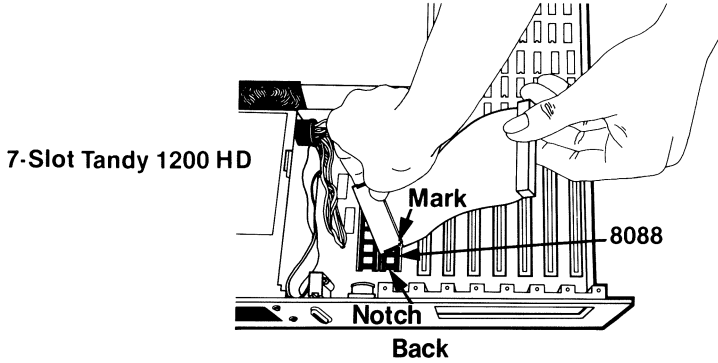
- 1 The Inboard 386/PC cable has a connector at each end. One connector has two rows of pins and fits into the 8088 socket on the system board. The other connector has two rows of holes and fits into the cable socket on the Inboard 386/PC. See Figure 5-6.



---

**Figure 5-6**     *The Inboard™ 386/PC cable*

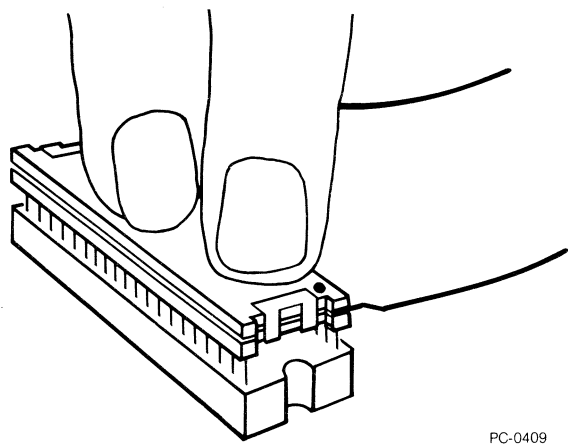
- 2 Use Figure 5-7 to orient the connector which has pins with the 8088 socket. The mark on the connector should face the back of the computer.



PC-0427

**Figure 5-7**      *Orienting the cable with the 8088 socket*

- 3 Carefully insert the connector's pins into the 8088 socket -- but don't apply pressure yet. Check that the pins on the connector line up with the socket holes, and check for bent pins. If you find bent pins, remove the connector, carefully straighten the bent pins with needle-nose pliers, and align the connector again.
  
- 4 When the pins are properly aligned, apply gentle, even pressure until the connector settles into the socket. Then apply firm pressure on both ends of the connector until it will go no farther. See Figure 5-8.



PC-0409

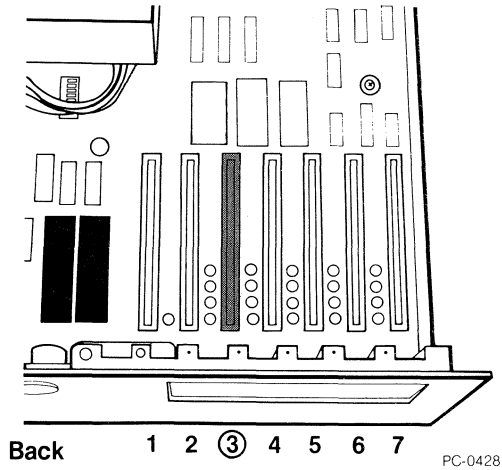
**Figure 5-8**     *Installing the cable connector in the 8088 socket*

### **Installing the Inboard™ 386/PC**

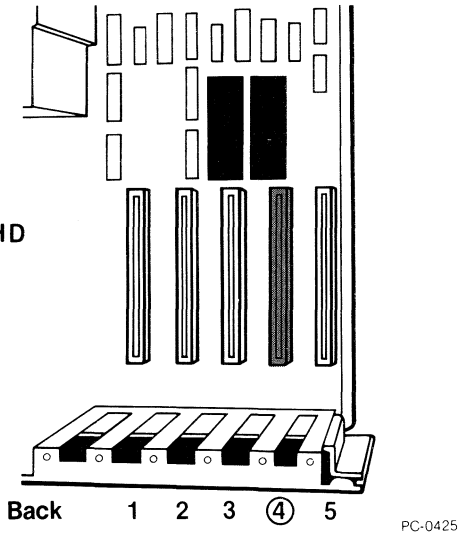
Perform the steps in this section to install the Inboard 386/PC in the computer.

- 1 For the 7-slot Tandy, install the Inboard 386/PC in expansion slot 3. For the 5-slot Tandy, install the Inboard 386/PC in expansion slot 4. Use Figure 5-9 to find these slots.

7-Slot Tandy 1200 HD



5-Slot Tandy 1200 HD



**Figure 5-9** Installation slots on the Tandy 1200 HD system board

For the 7-slot Tandy, follow the directions in the next subsection.  
For the 5-slot Tandy, follow the directions in the "Installation in the 5-slot Tandy" subsection.

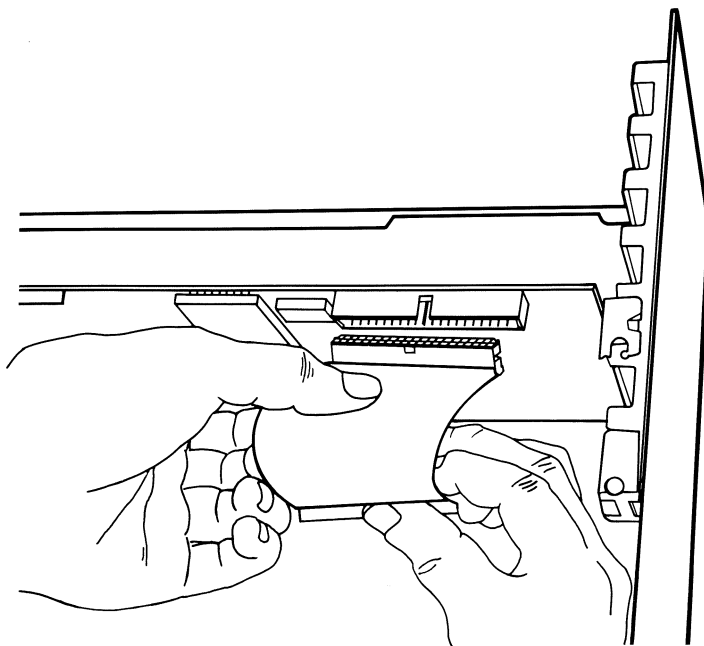
### Installation in the 7-slot Tandy

## **NOTE**

*Don't trap the cable when you replace the boards -- route the cable over other boards to reach the Inboard 386/PC.*

- 1** Replace the boards you removed from the computer. Be sure to reconnect any of the boards' cables you disconnected.
- 2** Route the Inboard 386/PC cable over other boards to the Inboard 386/PC.

- 3 Refer to Figure 5-10, and align the free end of the Inboard 386/PC cable with the cable connector on the Inboard 386/PC. □
- 



PC-0410

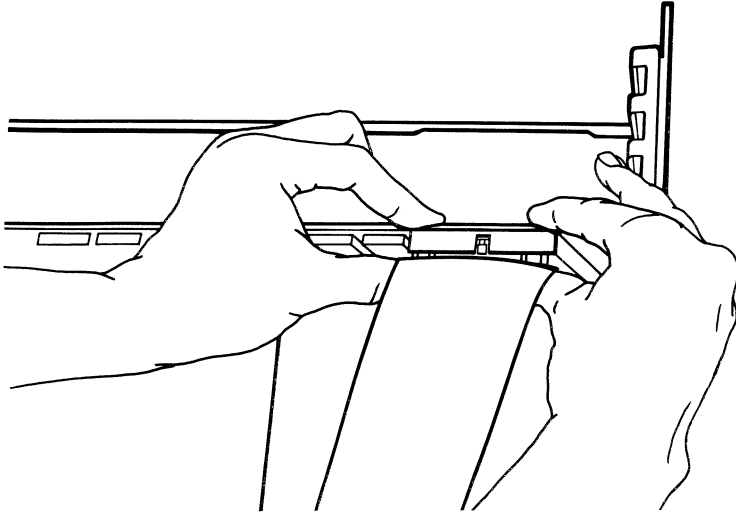
---

**Figure 5-10** *Aligning the cable with the Inboard™ 386/PC connector*



□

- 4 Support the Inboard 386/PC while applying even pressure to the cable connector until the connector will go no farther, as shown in Figure 5-11.

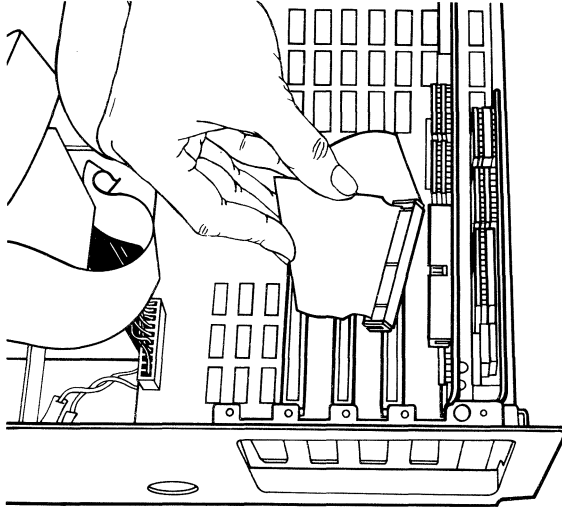


PC-0411

**Figure 5-11** *Installing the cable on the Inboard™ 386/PC*

## Installation in the 5-slot Tandy

- 1 Because of the location of the 8088 socket, you must twist the cable to reach the Inboard 386/PC. Twist the cable as shown in Figure 5-12.

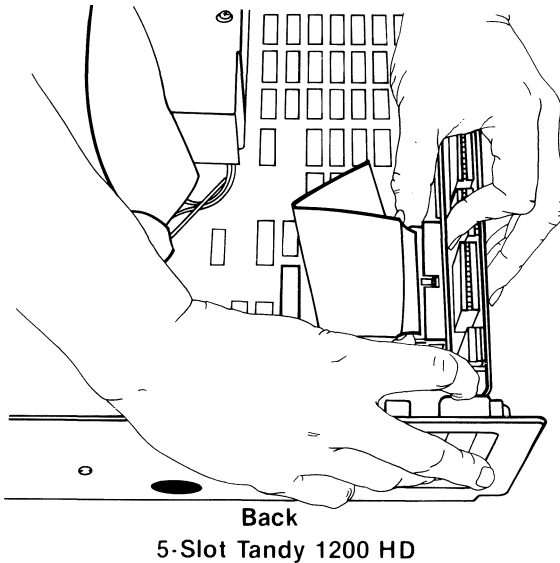


Back  
5-Slot Tandy 1200 HD

PC-0415

**Figure 5-12** *Twisting the Inboard™ 386/PC cable*

- 2 Refer to Figure 5-13, and align the free end of the Inboard 386/PC cable with the cable connector on the Inboard 386/PC.



PC-0416

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**Figure 5-13** *Aligning the cable with the Inboard™ 386/PC connector*

- 3 Support the Inboard 386/PC while applying even pressure to the cable connector until the connector will go no farther, as shown in Figure 5-11.
- 4 Flatten the cable by gently pressing it against the Inboard 386/PC.
- 5 Replace the boards you removed from the computer. Be sure to reconnect any of the board's cables you disconnected.

## Completing the Installation

Perform the steps in this section to complete the installation.

- 1 Replace the system unit's cover -- be sure the cover doesn't catch the Inboard 386/PC cable.
- 2 Reconnect the cables and plug the power cord into the outlet.
- 3 Turn on the computer. You should see the computer counting memory. If it doesn't, refer to the next section.

## A quick checklist

If you have any problems with your computer immediately after installing the Inboard 386/PC, check the following items in order.

- Is the power cord plugged into the wall outlet?
- Are the cables and cords attached correctly?
- Are the boards inside the computer properly seated and reconnected?
- Did you disable conventional memory on the system board by moving jumper JP1 on the system board to enclose the two pins closest to the front of the computer? Is any memory board in the computer still providing conventional memory? (When your turn on the power, the computer will beep -- SOS in Morse code [short-short-short long-long-long short-short-short] -- if you haven't disabled conventional memory on the computer's system board or on another add-in board).
- Is the Inboard 386/PC cable plugged into the 8088 socket and not the 8087 socket?
- Is the Inboard 386/PC cable oriented correctly in the 8088 socket on the system board and the socket on the Inboard 386/PC? Are the cable connector's pins lined up with the 8088 socket? Are the connectors pushed all the way into the sockets?
- If an 8087 was installed on the system board, did you remove it?
- Did you set switch 2 correctly (OFF if an 80387 is installed and ON if it isn't)?

If your computer doesn't work correctly after you've checked these potential problems, turn to Appendix B for troubleshooting advice.

## ***Where to go from here***

Turn to Chapter 6 for instructions on installing and using the Inboard 386/PC software.

# 6 **INSTALLING AND RUNNING THE INBOARD™ 386/PC SOFTWARE**

This chapter explains installing and using the Inboard 386/PC software. The Inboard 386/PC software performs the following functions:

- Dynamic speed switching.
- Extended memory support -- not available until now on the IBM PC or XT, COMPAQ PORTABLE or PORTABLE PLUS, or Tandy 1200 HD.
- Extended memory diagnostics.
- Turning extended memory into expanded memory.
- Up to four times faster hard disk and screen performance.

## ***Inboard™ 386/PC programs***

The Inboard 386/PC software diskette contains the following Inboard 386/PC programs:

- **INBRDPC.SYS** provides features to let you get the most from the Inboard 386/PC, such as extended memory, changing speed with control keys, and faster system and screen performance.
- **ISTATPC.EXE** displays the status of the INBRDPC.SYS settings.
- **ICACHE.COM** stores data from the computer's hard disk in Inboard 386/PC memory so disk reads are faster.
- **ILIM386.SYS** turns extended memory into expanded memory.
- **ILIM386.COM** displays the status of all the memory in the computer, including on Inboard 386/PC.
- **ISPEEDPC.EXE** changes speed from the DOS prompt or from a batch file.
- **CHKCOP.EXE** verifies that the optional 80387 math coprocessor is installed correctly.
- **KEYBRDPC.EXE** is for use with European keyboard drivers and ill-designed resident programs that steal keyboard interrupt vectors without chaining correctly.



- 2 With your screen displaying the DOS prompt, insert the backup copy of the Inboard 386/PC diskette into drive A. (If you will be installing the Inboard 386/PC software on a system diskette rather than a hard disk, also insert the system diskette in drive B.)
- 3 Select drive A as the default drive. Type:   
A:  
and press Enter.
- 4 To invoke the software, type:   
SETUP  
and press Enter.
- 5 Answer the questions SETUP asks.
- 6 If you told SETUP to add Inboard 386/PC commands to the CONFIG.SYS and AUTOEXEC.BAT files, go to step 7.   

If you want to edit these files yourself, add the command lines (in order) from the CONFIG.SYS file SETUP created to the *top* of your CONFIG.SYS file, and add the command lines (in any order) from the AUTOEXEC.BAT file SETUP created to your AUTOEXEC.BAT file. (Use any ASCII file editor, such as EDLIN, to edit the CONFIG.SYS and AUTOEXEC.BAT files.)
- 7 Restart the computer by pressing Ctrl/Alt/Del. The commands in the CONFIG.SYS and AUTOEXEC.BAT files can't take effect until you do.

## ***Using the Inboard™ 386/PC software***

The following subsections describe using the Inboard 386/PC software.

### **Changing the Inboard™ 386/PC's speed**

By default, the computer runs in very fast speed when Inboard 386/PC is installed. The Inboard 386/PC software lets you change the computer's operating speed in two ways: by typing the ISPEEDPC command or by pressing a combination of control keys. Use the ISPEEDPC command from the DOS prompt or in a batch file. Press the control keys any time, even while a program is running.



The following two subsections explain how to change speed.

If you're like most users, very fast speed and very slow speed are all you'll ever need. But for the rare situation where neither of these modes is right, Intel provides two additional speeds (described in Appendix D).

### **The ISPEEDPC command**

The ISPEEDPC command lets you switch between very slow speed and very fast speed by entering the ISPEEDPC command from the DOS prompt. You can enter the ISPEEDPC command from the DOS prompt or from a batch file, not while an application program is running.

The ISPEEDPC command has the following format:

```
ISPEEDPC n
```

where *n* is 1 (very slow) or 4 (very fast).

To go to very fast speed, type:

```
ISPEEDPC 4
```

and press Enter.

To go to very slow speed, type:

```
ISPEEDPC 1
```

and press Enter.

### **Left-Shift/Ctrl/Alt**

You can change speed anytime using Left-Shift/Ctrl/Alt, whether you're at the DOS prompt or in a program.

To go to very fast speed, simultaneously press the Left-Shift key, the Ctrl key, the Alt key, and the 4 key. The computer will beep four times.

To go to very slow speed, simultaneously press the Left-Shift key, the Ctrl key, the Alt key, and the 1 key. The computer will beep once.



- Delete the DEVICE=EMM.SYS command in your CONFIG.SYS file.
- Install the ILIM386.SYS program and edit the CONFIG.SYS file. (If you told the SETUP program you wanted to reserve extended memory for ILIM386.SYS, this has been done for you. Refer to Appendix D if you want to do it yourself.)

## Displaying status

To display the status of all parameters for the DEVICE=INBRDPC.SYS command (in the CONFIG.SYS file), type:

```
ISTATPC
```

and press Enter.

The display provides information only -- you can't change the settings from the display. (Edit the DEVICE=INBRDPC.SYS command line in the CONFIG.SYS file to change settings. Appendix D describes all the INBRDPC.SYS parameters.)

If you've installed ILIM386.SYS and want to display the status of all the memory in the computer, including memory on Inboard 386/PC, type:

```
ILIM386
```

and press Enter.

## Checking the 80387 math coprocessor

The CHKCOP.EXE software tells you whether the optional 80387 math coprocessor is installed correctly on the Inboard 386/PC.

To use the CHKCOP software, type:

```
CHKCOP
```

and press Enter.



**Table 6-1***Well-designed extended memory programs*

<b>Application program</b>	<b>Company</b>
AutoCAD	AutoDesk
Framework II	Ashton Tate
IBM Disk Cache*	IBM
Software Carousel	Softlogic Solutions
Super PC-Kwik*	Multisoft
Vcache*	Golden Bow Systems
VDISK	IBM

\*You can use only one disk caching program at a time. Although these disk caching programs work with Inboard 386, Intel recommends you use ICACHE.COM (which was written especially for Inboard 386/PC) instead.

## ***If you have problems***

Almost all programs run fine with Inboard 386/PC. An occasional program, however, may need special treatment. If you have trouble running a program, try the following solutions in order.

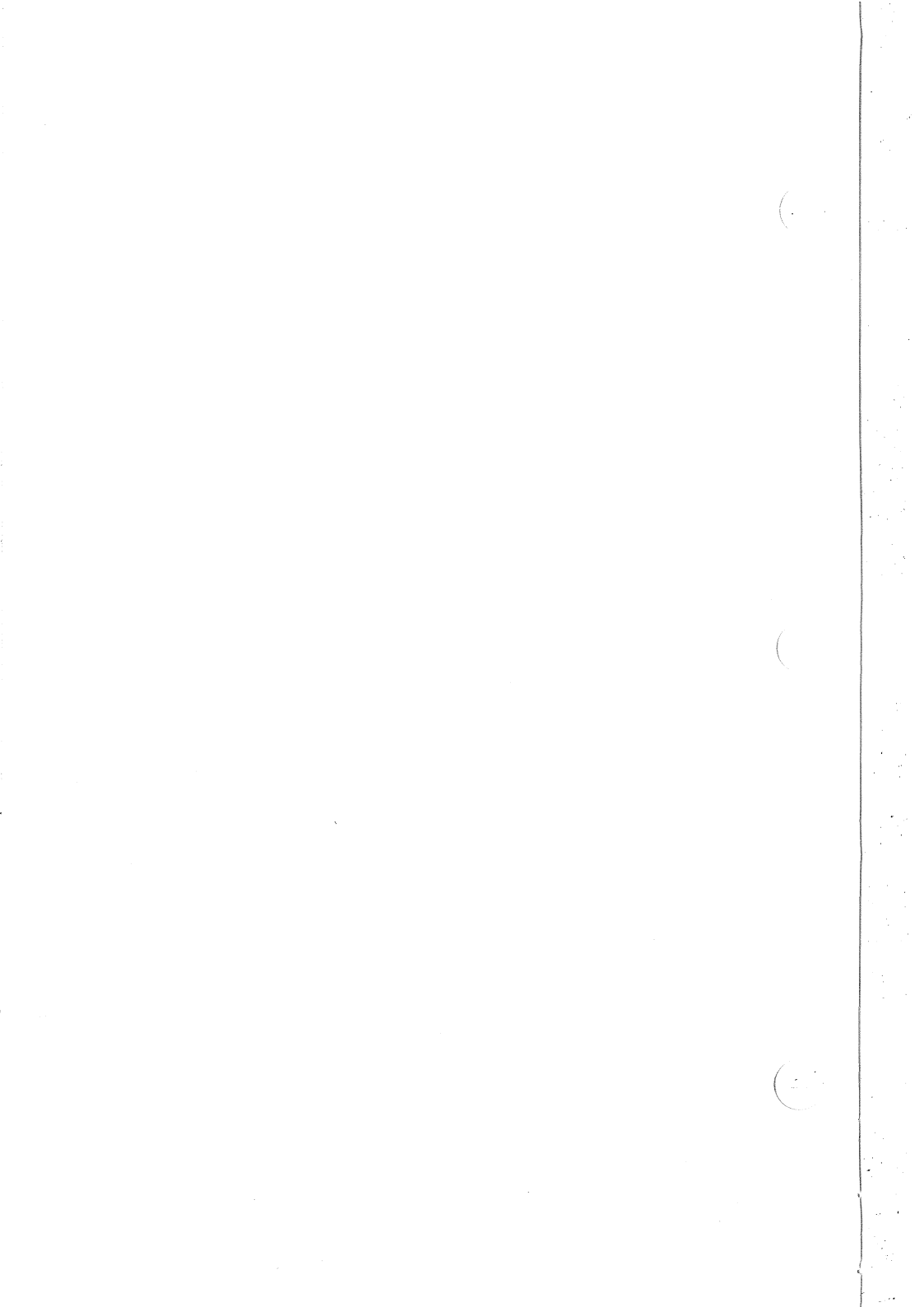
- Almost all application programs run fine in very fast speed. A few copy-protected programs, though, can't run in very fast speed. If you get a message such as "Disk Error" or "Illegal Copy" when your programs run in very fast speed, load the program in very slow speed and then switch to very fast speed (by pressing Left-Shift/Ctrl/Alt/4) to run it. If you still get errors, load and run the program in very slow speed.

- Reset any time-dependent parameters to compensate for the computer's increased speed when Inboard 386/PC is installed. For example, turn off the MultiMate Advantage keyboard accelerator. For CROSSTALK XVI, increase the time-out for the dial tone and redial tone.

If these solutions don't fix the problem or you have problems with your computer immediately after installing the Inboard 386/PC software, turn to Appendix B for troubleshooting advice.

## ***Where to go from here***

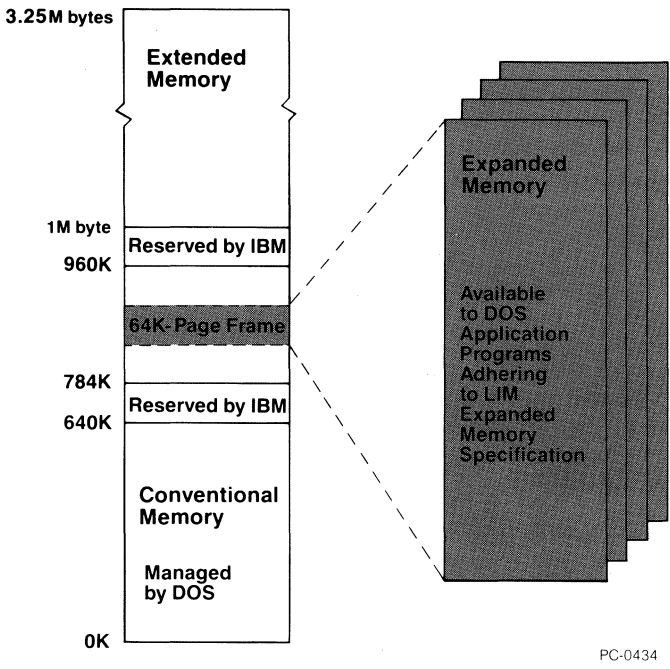
Now that you've installed the software, run your programs like always. The only difference you'll notice is the increased speed. Enjoy!



# A YOUR COMPUTER'S MEMORY

IBM PCs, IBM PC XTs, and PC-compatible computers can use two kinds of memory: conventional and expanded. The Inboard 386/PC gives you a third kind of memory previously available only on IBM AT-compatible computers: extended. This appendix describes the three kinds of memory.

Figure A-1 is a memory map that shows the location of the three types of memory.



**Figure A-1** Memory map

## Conventional memory

DOS manages conventional memory. Application programs that run under DOS use conventional memory. The Inboard 386/PC has 640K bytes of conventional memory, which your computer uses instead of the much slower conventional memory on the computer's system board.



Conventional memory is limited to 640K bytes. The two ways to get around the 640K-byte limitation are expanded memory and extended memory.

## ***Beyond conventional memory***

Both expanded and extended memory provide memory beyond 640K bytes. The following sections explain the differences between expanded memory and extended memory.

### **Expanded memory**

Expanded memory is usable memory beyond DOS's 640K-byte conventional memory limit. Expanded memory lets you use large programs by accessing memory beyond 640K -- memory that DOS can't reach. DOS application programs which conform to the *Lotus/Intel/Microsoft Expanded Memory Specification* (such as Symphony and 1-2-3) can use expanded memory.

You can also use expanded memory for RAM disks. (RAM disks are described in the Glossary.)

Physically, expanded memory resides on an expansion board (such as an Intel Above Board). As shown in Figure A-1, IBM reserves some of the address space between 640K and 1M byte, but the rest of this address space is available. A 64K-byte page frame in this available space is a window into expanded memory -- just as your computer screen can be a window into a large spreadsheet.

You can add expanded memory to your computer with Intel Above Boards. Each Above Board 286 and PS/286 can have up to 2M bytes of memory. Both Above Boards accept an optional Piggyback board that can add up to another 2M bytes.

The ILIM386.SYS software (on the Inboard 386/PC software diskette) lets you turn extended memory into expanded memory. Chapter 6 describes installing and using the ILIM386.SYS software.

### **Extended memory**

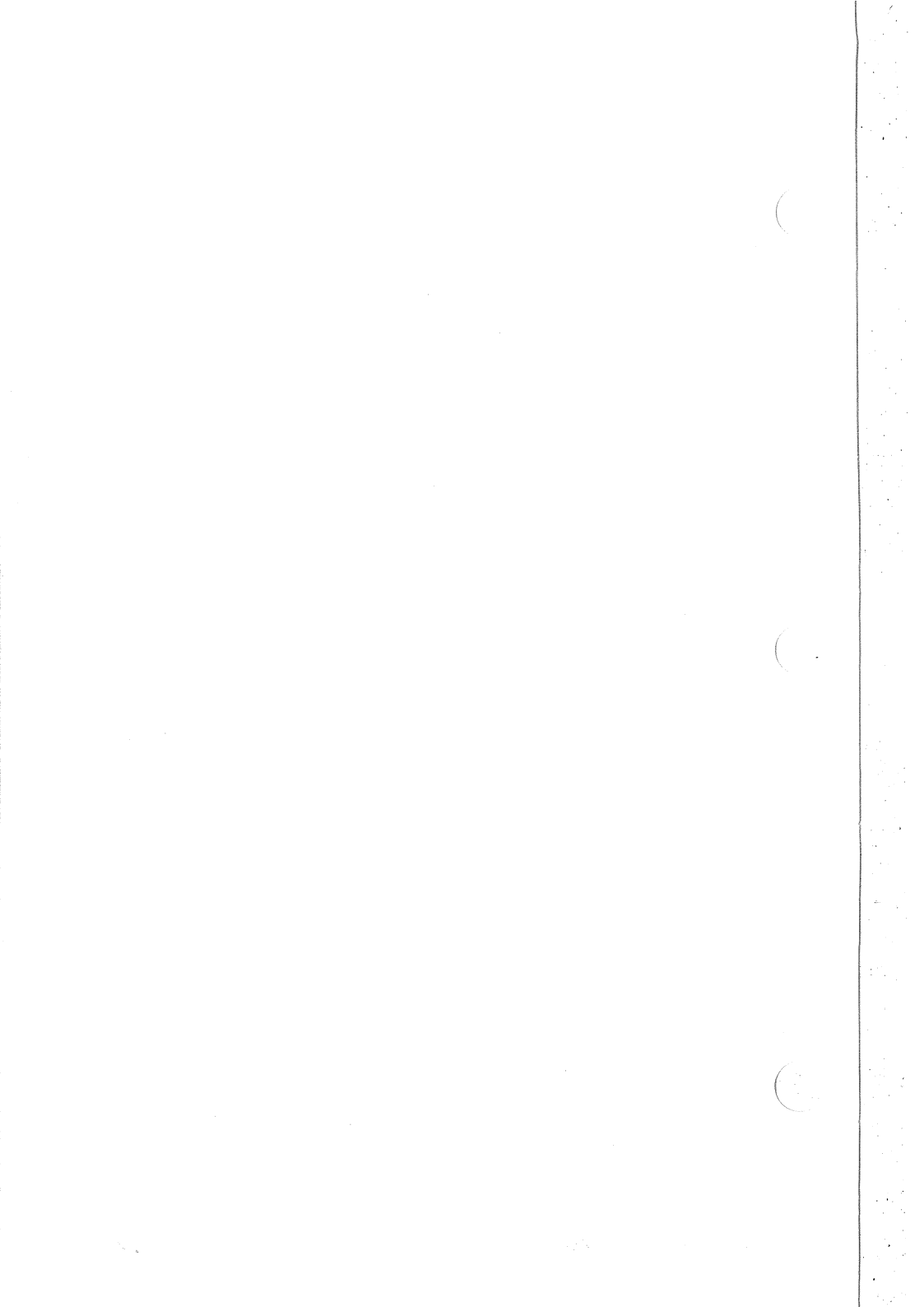
Extended memory (also called protected mode memory) is memory above 1M byte (1024K bytes).

The 80386 microprocessor (and the 80286) can access extended memory directly. (Contrast this with expanded memory, which must be accessed through a page frame.) The 8088 microprocessor can't access extended memory.

You can't use extended memory directly to run DOS application programs because extended memory is outside the range that DOS manages. However, you can load DOS application programs from a VDISK RAM disk in extended memory. And specially-written programs such as AutoCAD and Framework II use extended memory directly.

The ILIM386.SYS software (on the Inboard 386/PC software diskette) lets you turn extended memory into expanded memory. Chapter 6 describes installing and using the ILIM386.SYS software.

The Inboard 386/PC has 256K bytes of extended memory. You can add to up another 2M bytes with the optional Inboard 386/PC Piggyback Memory board.



# B TROUBLESHOOTING

This appendix lists the most common situations that can cause the Inboard 386/PC to operate incorrectly. Read through the lists of symptoms in Table B-1. When you find one(s) that resemble the problem you're having, try the corresponding solutions.

**Table B-1**      *Symptoms and actions*

<b>Symptom</b>	<b>Action</b>
<i>The computer doesn't power on when you turn on the switch, or the operating system prompt doesn't appear on the screen.</i>	<p><i>Check the following:</i></p> <ul style="list-style-type: none"><li>• The power cord is plugged into the wall outlet.</li><li>• The cables and cords are attached correctly.</li><li>• The boards inside the computer are properly seated and reconnected.</li><li>• The Inboard 386/PC cable is installed in the 8088 socket and not the 8087 socket.</li><li>• The Inboard 386/PC cable is oriented correctly in the 8088 socket on the system board and in the connector socket on the Inboard 386/PC.</li><li>• The Inboard 386/PC cable connectors are pushed all the way into the 8088 socket and the connector socket on the Inboard 386/PC.</li><li>• The cable's connector pins are straight; remove the cable and carefully straighten any pins that are bent.</li><li>• The expansion slot in which you've installed Inboard 386/PC may be defective. Move the Inboard 386/PC to another slot.</li></ul>
<i>There's a flashing cursor on the screen but no operating system prompt.</i>	<p><i>Check the following:</i></p> <ul style="list-style-type: none"><li>• Wait a minute or two. The computer takes a little longer to power up when the Inboard 386/PC is installed.</li></ul>

**Table B-1**      *Symptoms and actions (cont.)*

---

<b>Symptom</b>	<b>Action</b>
<i>The computer beeps (SOS in Morse code: short-short-short long-long-long short-short-short).</i>	You didn't disable conventional memory on the computer or another add-in board. Refer to the installation chapter for your computer and disable the conventional memory.

---

## ***Customer Support information***

If these solutions don't fix your problem, call Intel's Customer Support.

- From the United States or Canada, call (800) 538-3373.
- From outside the United States or Canada, call (503) 629-7354.

Customer Support representatives are ready to answer your call Monday through Friday, from 7 a.m. to 5 p.m. Pacific time.

You can help the Customer Support representative serve you better if you have ready access to the computer, the Inboard 386/PC, and this manual when you call.

If your computer has a modem and you subscribe to CompuServe, you can reach Customer Support through:

CompuServe mailbox 70307,461

## ***The Intel electronic bulletin board***

If you have a modem, you can use the Intel electronic bulletin board. The bulletin board has the latest versions of all Inboard 386/PC, Inboard 386, and Above Board software for you to download. You can also get up-to-date information on Intel products.

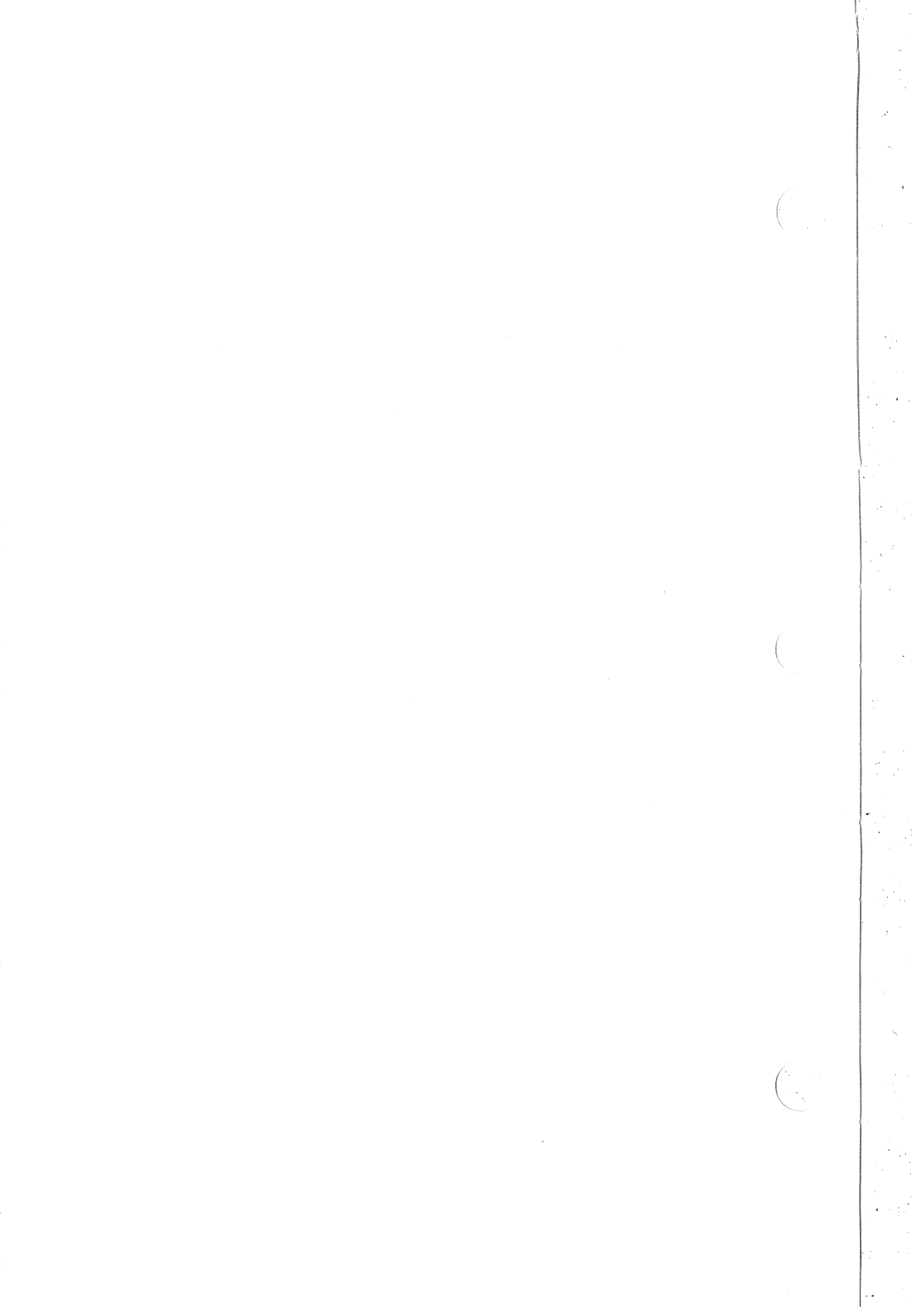
You can reach the bulletin board 24 hours a day by calling:

(503) 645-6275

Before you call:

- 1** Set your modem for 300, 1200, or 2400 bits per second (bps).
- 2** Set your communications parameters as follows:

8 DATA BITS; NO PARITY; 1 STOP BIT



# C **TECHNICAL INFORMATION**

This appendix contains technical information about your computer and the Inboard 386/PC.

## ***Power consumption***

If you have an early version of the IBM PC, the original power supply probably isn't large enough to support the Inboard 386/PC. Upgrade the power supply before installing the Inboard 386/PC.

The IBM PC's power supply provides 15 amps of +5 volts. The system board, disk drive adapter, and disk drives consume some of this, as do the 8087 math coprocessor and each board plugged into an expansion slot.

The Inboard 386/PC consumes approximately 4.2  $\pm$  .5 amps at +5 volts. The Inboard 386/PC Piggyback board consumes 0.5 amps, and the 80387 math coprocessor consumes 0.1 amp.

The power supplies in later IBM PCs, IBM PC XT computers, COMPAQ PORTABLEs and PORTABLE PLUSs, and Tandy 1200 HDs are large enough to support all the boards in the computer.

## ***Error Messages***

Don't ignore error messages, even if they don't prevent you from using the computer. Correct any error conditions as soon as you receive an error message.

## ***Number of slots***

An Inboard 386/PC, even with the optional Piggyback Memory board, fits in one slot.

## ***Memory capacity***

The Inboard 386/PC provides your computer with 1M byte of memory. The optional Piggyback Memory board provides up to 2M bytes of extended memory.



## ***Inboard™ 386/PC and Above™ Board compatibility***

The Inboard 386/PC is compatible with the Above Board PC, PS/PC, 286, and PS/286. This section lists situations to be aware of when you have an Inboard 386/PC and one or more Above Boards in your computer.

- Disable the conventional memory provided by the Above Board *before* installing the Inboard 386/PC.
- You can't install both ILIM386.SYS and EMM.SYS; you must choose one or the other. Install EMM.SYS if you want to use expanded memory on the Above Board(s). Install ILIM386.SYS if you want to turn Inboard 386/PC extended memory into expanded memory.
- If you install EMM.SYS, be sure it's version 4.0 or greater. (EMM.SYS version 4.0 is on the Inboard 386/PC software diskette.) The EMM 4.0 command line parameters have changed. You must edit the CONFIG.SYS file before you use EMM 4.0. Refer to the next section.
- Perform the following steps to install EMM.SYS.

With your screen displaying the DOS prompt, insert the backup copy of the Inboard 386/PC diskette into drive A.

Use the COPY command to copy EMM.SYS to the root directory of your hard disk or diskette.

To copy EMM.SYS to your hard disk, type:

```
COPY A:EMM.SYS C:\
```

and press Enter.

To copy EMM.SYS to a system diskette, put the system diskette in drive B and type:

```
COPY A:EMM.SYS B:\
```

and press Enter.

- If you have an Above Board 286 or PS/286 and want to use the SETBOARD program *after* you install Inboard 386/PC, use the SETBOARD program on the Inboard 386/PC diskette rather than SETBOARD on the Above Board diskette.

To start SETBOARD, turn on or restart your computer using a plain DOS diskette. Then insert the backup copy of the Inboard 386/PC diskette in drive A and, at the DOS prompt, type:

```
A:\AB286\SETBOARD
```

and press Enter. Then follow the instructions SETBOARD gives you.

### The EMM 4.0 command line parameters

To use EMM 4.0, you'll need to add new commands to your CONFIG.SYS file. This section explains how to edit the CONFIG.SYS file to use EMM 4.0. Use any ASCII file editor (such as EDLIN) to view and edit the file. Then perform the following steps to add the commands:

- 1 If you already have a DEVICE=EMM.SYS command in the CONFIG.SYS file, copy its parameters (for example, M5 and I5) here:

---

If you write down these parameters, you won't need to remove your computer's cover to see your Above Board's switches. And you can use the old parameters to help you choose the new parameters.

- 2 Replace the DEVICE=EMM.SYS command line in your CONFIG.SYS file with the following command:

```
DEVICE=EMM.SYS PC Memory_Address I/O_Address1...16  
[EXP=x] [ND] [NP] [H=x]
```

The parameters in italics are required for using expanded memory; the parameters in brackets ([ ]) are optional. The order of the parameters doesn't matter.

Be sure you have only one DEVICE=EMM.SYS line in your CONFIG.SYS file.

### Required EMM command line parameters

**The *Memory\_Address* parameter** specifies the address of the 64K-byte block of memory to which expanded memory is mapped.

If your old DEVICE=EMM.SYS line has an M parameter, replace the M parameter with the corresponding *Memory\_Address* listed in Table C-1.

**Table C-1**      *Old M parameters and corresponding new Memory\_Address parameters*

---

<b>Old M Parameter</b>	<b>New Memory_Address</b>
M0*	C400
M1	C800
M2	CC00
M3	D000
M4	D400
M5	D800
M6	DC00
M7	E000

---

\*for an Above Board PC or PS/PC only

If you don't have an old DEVICE=EMM.SYS line, use a memory address listed in Table C-2. Be sure you use a memory address listed for your specific Above Board.

If in doubt over which address to choose, use address D000.

The *Memory\_Address* parameter is required on the EMM command line.

**Table C-2**      *Memory\_Address parameters*

---

	<b>AboveTM Board PC &amp; PS/PC</b>	<b>AboveTM Board 286 &amp; PS/286</b>
<b>Memory Address</b>	C400	C800
	C800	CC00
	CC00	D000
	D000	D400
	D400	D800
	D800	DC00
	DC00	E000
	E000	

---

The *I/O\_Address* parameters specify which I/O addresses Above Boards use to access expanded memory. Assign a unique I/O address to each board. No boards in your computer can share I/O addresses. Use one I/O address for each Above Board with expanded memory. Piggyback Memory boards don't need I/O addresses.

If your old DEVICE=EMM.SYS line has an I parameter, replace the I parameter with the corresponding *I/O\_Address* listed in Table C-3.

**Table C-3**      *Old I parameters and corresponding new I/O\_Address parameters*

---

<b>Old I parameter</b>	<b>New I/O_Address</b>
I0	208
I1	218
I4	248
I5	258
I6	268
IA	2A8
IB	2B8
IE	2E8

---

If you don't have an old DEVICE=EMM.SYS line, use an I/O address listed in Table C-4. Be sure your *I/O\_Address* parameter matches the I/O addresses you selected when you set your Above Board switches or ran the SETBOARD program.

If in doubt, use the addresses at 208 or 258.

The *I/O\_Address* parameter is required on the EMM command line.

**Table C-4** I/O\_Address parameters

---

	<b>Above™ Board PC &amp; PS/PC</b>	<b>Above™ Board 286 &amp; PS/286</b>
<b>I/O Address</b>	208	208
	218	218
	258	248
	268	258
	2A8	2A8
	2B8	2B8
	2E8	2E8

---

**Example.** You're using two Above Board 286s in an IBM PC XT. You're installing expanded memory at D000. One board is set for I/O address 208 and the other for 258. Use this command:

```
DEVICE=EMM.SYS PC D000 208 258
```

#### Optional EMM command line parameters

**The EXP=x** (expanded memory amount) **parameter** lets you verify the amount of expanded memory in your computer, where *x* is the amount in K bytes. The value for *x* must be a multiple of 16 and less than or equal to 32768.

The EXP=*x* parameter is optional. If this parameter is on the command line, the EMM compares the number you specify (for example, EXP=512 for 512K bytes) with the amount of expanded memory it finds. If the numbers aren't the same, you'll receive an error message.

**The ND** (no diagnostics) **parameter** tells software to run abbreviated memory tests after a warm boot (Ctrl-Alt-Del). The ND parameter is optional. If ND is on the command line, the EMM will run abbreviated memory tests; if ND is absent, the EMM will run full tests. In either case, full tests are run during a cold boot (power-on).

**The NP** (no pause) **parameter** lets you set the EMM *not* to pause after an EMM error or advisory message. The NP parameter is optional. If NP is on the command line, the EMM won't pause after errors or messages. If NP is absent, the EMM will pause.

**The H=x (handle count) parameter** lets you tell the EMM to support as many handles as a particular application program needs. A handle is a value that the EMM assigns and uses to identify a block of memory requested by an application program. The EMM allocates memory based on the number entered. Specifying a small EMM handle count can save conventional memory and allow EMM to run faster.

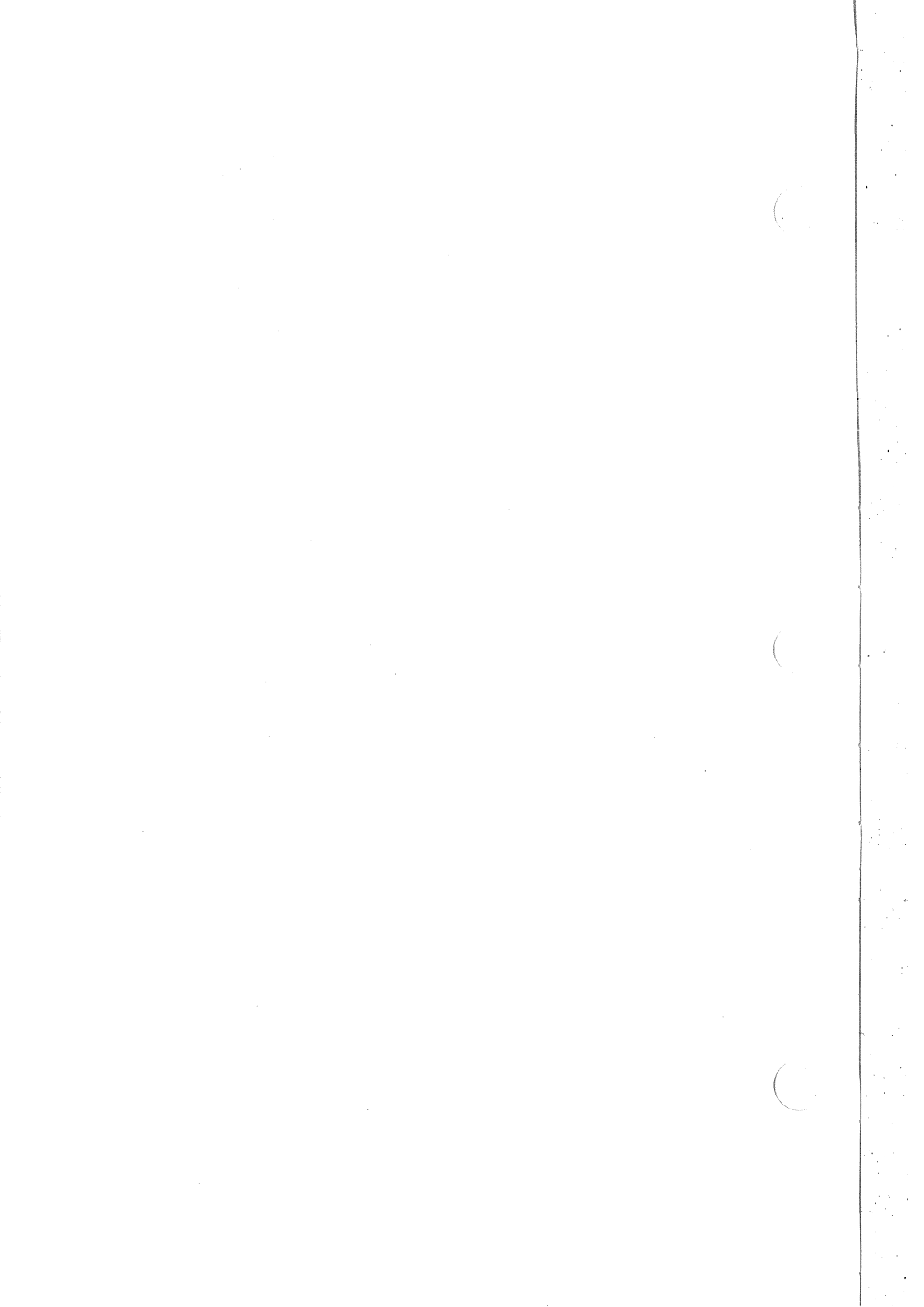
The EMM handle count default is 64 handles. Application programs written to use EMM versions below EMM 4.0 use a maximum of 32 handles. If you're using older application programs, you may change the EMM handle count to H=32, but using the default of 64 handles will work fine. The maximum value for x is 254 handles.

The H=x parameter is optional. If the H=x parameter is on the command line, the EMM will support the number of handles specified by x. The handle count will appear on the screen when EMM is installed. If H=x is absent, the EMM uses 64 handles. You won't see a handle count on the screen when EMM is installed.

**Example.** You're using one Above Board 286 in an IBM PC XT. Expanded memory is installed at D000. The board is set for I/O address 208. You have 1.5M bytes of expanded memory and no extended memory. You want abbreviated diagnostics, and your application program uses 128 handles. Use this command:

```
DEVICE=EMM.SYS PC D000 208 EXP=1536 ND H=128
```

Now that you're finished editing the CONFIG.SYS file, reboot your computer. EMM 4.0 is installed and ready to go.



# D TECHNICAL PARAMETERS

For most people, two speed parameters and the Inboard 386/PC environment selected by the SETUP program will handle all their programs. Occasionally, however, you may need a different speed, or you may want to change the Inboard 386/PC environment. This appendix describes the additional speed parameters and describes manually installing the Inboard 386/PC software.

## *The ISPEEDPC parameters*

Because of timing constraints, some application programs can't run at very fast speed (4). You can slow down the computer's operating speed by adding wait states -- speed decreases as the number of wait states increases. Table D-1 shows the number of wait states Inboard 386/PC adds for each speed.

**Table D-1**      *Wait states*

<b>Speed</b>	<b>Number of additional wait states</b>
1	30
2	16
3	8
4	0

## *Manually installing the Inboard™ 386/PC software*

Manually installing the Inboard 386/PC software is a two-part process: copying the software to the root directory and adding commands to the CONFIG.SYS and AUTOEXEC.BAT files. If you'd rather have the software do this for you, turn to Chapter 6.



## Copying the Inboard™ 386/PC software

Before you can use the Inboard 386/PC software, you must copy the files you need from the Inboard 386/PC diskette to your hard disk's root directory or to your system diskette. Copy only the files you need.

Chapter 6 describes the files on the Inboard 386/PC diskette.

## Setting up the Inboard™ 386/PC software

### NOTE

*The only Inboard 386/PC software you must set up is INBRDPC.SYS (described in step 1). All other Inboard 386/PC software is optional.*

- 1 Add the following command to the first line of the CONFIG.SYS file in the hard disk's root directory or on the system diskette.

```
DEVICE=INBRDPC.SYS [SPEED=n] [EGACACHE]
                  [NOCACHE] [NODIAGS]
                  [NOPAUSE] [NOSCRUB]
                  [SYSWAIT=n] [FDWAIT=n]
                  [HDWAIT=n]
```

The parameters in brackets ([ ]) are optional. You may include none or one or more on the command line. Don't type the brackets. Table D-2 describes these parameters.

**Table D-2**      *INBRDPC.SYS optional parameters*

Parameter	Description
<code>SPEED=<i>n</i></code>	<p>Specifies the initial operating speed of the Inboard 386/PC. The variable <i>n</i> can be 1 (very slow) or 4 (very fast). If you don't specify <code>SPEED=<i>n</i></code> on the command line, the computer starts in very fast speed. Almost all application programs run fine in very fast speed (<code>SPEED=4</code>).</p> <p>If you're like most users, very fast speed and very slow speed are all you'll ever need. But for the rare situation where neither is right, Intel provides two additional speeds (refer to Table D-1).</p>

**Table D-2***INBRDPC.SYS optional parameters (cont.)*

<b>Parameter</b>	<b>Description</b>
EGACACHE	<p>Specifies that the EGA ROM BIOS (if present) will run in the Inboard 386/PC's 32-bit memory. This means the EGA display will update faster. Use EGACACHE only if you have an EGA monitor. Don't use EGACACHE with an auto-switch EGA (the auto-switch EGA BIOS can't be cached).</p> <p>Depending on the size of the ROM BIOS, the EGACACHE parameter reserves up to 32K bytes of Inboard 386/PC 32-bit conventional memory for caching the EGA ROM BIOS.</p>
NOCACHE	<p>By default, the system BIOS is executed from the Inboard 386/PC 32-bit RAM. NOCACHE lets you switch system BIOS execution back to the computer's slower ROM.</p> <p>In some cases, you can't warm-boot the computer (by pressing Ctrl/Alt/Del) if you specify the NOCACHE parameter.</p>
NODIAGS	<p>By default, extended memory diagnostics are run when you turn on or restart the computer. NODIAGS lets you turn off the extended memory diagnostics. If extended memory parity errors are detected when you turn on or restart the computer, the diagnostics will be run even with NODIAGS on the command line.</p> <p>Intel recommends you don't use NODIAGS -- the diagnostics are fast and give you an extra measure of protection.</p>
NOPAUSE	<p>The Inboard 386/PC software pauses after it installs -- you have to press a key to continue. The NOPAUSE parameter eliminates this pause unless an error occurs. The software always pauses for error conditions.</p>

**Table D-2**      *INBRDPC.SYS optional parameters (cont.)*

<b>Parameter</b>	<b>Description</b>
NOSCRUB	<p>By default, conventional memory is initialized when you turn on or restart the computer. NOSCRUB lets you specify that conventional memory not be initialized.</p> <p>Be aware that not initializing conventional memory may result in the computer's getting parity errors.</p>
SYSWAIT= <i>n</i>	<p>By default, no wait states are added for the computer's operation (except for floppy disk I/O). SYSWAIT lets you specify a number of wait states added for the computer's operation. (These wait states don't affect floppy disk or hard disk I/O. Refer to the FDWAIT and HDWAIT parameters for floppy disk and hard disk I/O wait state parameters.)</p> <p><i>n</i> is an even number from 0 to 30 (inclusive).</p> <p><i>Don't put both SYSWAIT and SPEED=<i>n</i> on the DEVICE=INBRDPC.SYS command line. You can use one or the other but not both.</i></p>
FDWAIT= <i>n</i>	<p>System BIOS code executes much faster when it runs from Inboard 386/PC 32-bit RAM. Use FDWAIT to slow down timing-sensitive BIOS routines (such as floppy disk code).</p> <p>By default, 16 wait states are added for floppy disk operations. FDWAIT lets you specify a number of wait states added for floppy disk operations.</p> <p><i>n</i> is an even number from 0 to 30 (inclusive).</p>



- The command line should like like this if:
  - you don't have an EGA monitor
  - you don't want diagnostics
  - you want the Inboard 386/PC to run in fast speed.

```
DEVICE=INBRDAT.SYS  NODIAGS  SPEED=3
```

- 2 ILIM386.SYS turns extended memory into expanded memory. If you already have an expanded memory board (such as an Intel Above Board) in the computer, you can *either* continue to use the expanded memory board *or* turn extended memory on the Inboard 386/PC into expanded memory. You can't do both. Intel recommends you continue to use the expanded memory board.

ILIM386.SYS doesn't support expanded memory on Above Boards -- use EMM.SYS. If you install ILIM386.SYS, you must disable expanded memory on Above Boards.

## NOTE

*The DEVICE=ILIM386.SYS command must come **after** the DEVICE=INBRDPC.SYS command and **before** any other device drivers in the CONFIG.SYS file.*

To use ILIM386.SYS, add the following command line to the CONFIG.SYS file:

```
DEVICE=ILIM386.SYS  [EMS=n or EXT=n]  [FRAME=x]
```

The brackets ([ ]) specify an optional parameter. Don't type the brackets. Table D-3 describes these parameters.

**Table D-3**      *ILIM386.SYS optional parameters*

<b>Parameter</b>	<b>Description</b>
<b>EMS=<i>n</i></b>	Specifies the amount of extended memory to be turned into expanded memory. The values for <i>n</i> range from 0K bytes to the total amount of extended memory on the Inboard 386/PC and the optional Piggyback Memory board. <i>n</i> must be a multiple of 16. (Type just the number; don't type the K.)
<b>OR*</b>	
<b>EXT=<i>n</i></b>	Specifies the amount of extended memory <i>not</i> turned into expanded memory (that is, the amount of extended memory left as extended memory). The values for <i>n</i> range from 0K bytes to the total amount of extended memory on the Inboard 386/PC and the optional Piggyback Memory board. If <i>n</i> isn't a multiple of 4, ILIM386 will round the value of <i>n</i> up to the next multiple of 4. (Type just the number; don't type the K.)
	Be sure <i>n</i> equals or exceeds the amount of extended memory needed by all extended memory device drivers.

\*You can specify the EMS=*n* parameter or the EXT=*n* parameter, but not both. Use EXT=*n* when you need a specific amount of extended memory, such as when caching the hard disk with ICACHE.COM (described in step 3). When all you care about is expanded memory, and the amount of extended memory left over doesn't matter, use the EMS=*n* parameter. Or don't specify either EMS=*n* or EXT=*n* and use the default value of turning all available extended memory into expanded memory.

**Table D-3** *ILIM386.SYS optional parameters (cont.)*

Parameter	Description												
FRAME= <i>x</i>	<p>Specifies the address (in hexadecimal) of the 64K-byte page frame through which expanded memory is mapped. If you don't include the FRAME parameter, the default address of E000 is used.</p> <p>Intel recommends you not use the FRAME parameter. That way, if the default address of E000 isn't available, the ILIM386.SYS program will automatically select a non-conflicting address.</p> <p>If you want to choose the page frame address, include the FRAME parameter, replacing <i>x</i> with one of the following addresses:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="3" style="text-align: center;">Hex addresses</th> </tr> </thead> <tbody> <tr> <td>E000</td> <td>D400</td> <td>C800</td> </tr> <tr> <td>DC00</td> <td>D000</td> <td>C400</td> </tr> <tr> <td>D800</td> <td>CC00</td> <td>C000</td> </tr> </tbody> </table> <p>Try E000 first. If this causes a conflict with other boards in the computer, try DC00 and so on.</p>	Hex addresses			E000	D400	C800	DC00	D000	C400	D800	CC00	C000
Hex addresses													
E000	D400	C800											
DC00	D000	C400											
D800	CC00	C000											

The following are two sample ILIM386.SYS command lines.

- The command line should look like this if you want to turn 1024K bytes of extended memory into expanded memory.

```
ILIM386.SYS EMS=1024
```

- The command line should look like this if you want to reserve 512K bytes of extended memory and turn the rest into expanded memory.

```
ILIM386.SYS EXT=512
```

- 3 ICACHE.COM speeds disk reads by storing the information from the computer's hard disk in Inboard 386/PC 32-bit extended memory. □

To use ICACHE.COM (only if the computer has a hard disk), add the following command line to the AUTOEXEC.BAT file:

```
ICACHE [/S:n] [/B-] [/T-] [/-x]
```

Table D-4 describes these parameters.

**Table D-4**      *The ICACHE.COM parameters*

Parameter	Description
/S:n	Specifies the amount of extended memory (in K bytes) used for caching the hard disk. Values for <i>n</i> range from 48 to 1024. If you don't specify the S parameter, the default value of all available extended memory up to 1024K bytes is used.
/B-	By default, data is copied to and from the disk cache in batches of sectors. This increases performance, but batch copying can increase the time interrupts are turned off.  If you have problems during high-speed data communications (for example, using a modem at 4800 bps or faster), specify the /B- parameter.



**Table D-4**      *The ICACHE.COM parameters (cont.)*

Parameter	Description
/T-	<p>By default, when a program requests a disk read, the rest of the track is also read into cache memory. This lets ICACHE read more sectors from the hard disk at one time. Because DOS often requests information from nearby sectors soon after requesting a given sector, reading the rest of the track in advance usually increases performance.</p> <p>The T- parameter disables whole-track reads. Consider using the T- parameter in the following situations:</p> <ul style="list-style-type: none"><li>- You have little conventional memory to spare (the software uses 12.5K bytes of conventional memory).</li><li>- Your programs access many small files scattered over the disk. Reading the rest of the track will give little performance gain and may actually bump sectors in the cache that are read frequently, decreasing performance slightly.</li><li>- Your disk has many bad sectors that have been mapped out. If the files you are reading are on the same tracks as these bad sectors, reading the rest of a track can cause an error. W ICACHE automatically backs off and reads only the data originally requested, this can waste time.</li></ul>
/-x	<p>Specifies that drive x not be cached. You can specify as many drives as you wish, as long as each is preceded by "/-." If you specify a drive that is a partition, <i>both</i> drives won't be cached.</p> <p>x is the letter of the disk drive you don't want cached.</p>

The following are three sample ICACHE command lines.

- The command line should look like this if:
  - you want a 256K-byte disk cache
  - you don't want batching because you have a modem running at 9600 bps.

```
ICACHE /S:256 /B-
```

- The command line should look like this if:
  - you want a 512K-byte disk cache
  - you have two hard drives (C and D) and don't want to cache drive D.

```
ICACHE /S:512 /-D
```

- The command line should look like this if:
  - you want the disk cache to be the size of all available extended memory up to 1024K bytes (the default)
  - you don't want the entire track read into disk cache memory.

```
ICACHE /T-
```

You can enter the following command after ICACHE.COM is installed (the parameters are described in Table D-5).

ICACHE [/M] [/F] [/P] [/U]

**Table D-5**      *The ICACHE.COM post-installation parameters*

Parameter	Description
/M	Displays the number of disk transfer requests, the number of transfers from the disk, the number of disk transfers saved by the disk cache, and the percentage of transfer requests saved by the disk cache.
/F	Flushes the cache and resets its measurements to zero. This resets the disk cache to its initial state, which can be useful when performing benchmarks.
/P	Displays all the parameters specified.
/U	Un-installs the disk cache. This is useful when you want to un-install the disk cache and re-install it with new parameters.

- 4 Restart the computer (by pressing Ctrl/Alt/Del). The commands you added to the CONFIG.SYS and AUTOEXEC.BAT files won't take effect until you do.

### Sample Inboard™ 386/PC software set-ups

This section shows five sample Inboard 386/PC software set-ups.

- 1 Your files should look like this if:

- you don't have an EGA monitor
- you don't want to turn Inboard 386/PC extended memory into expanded memory
- you don't want to speed up disk reads by caching the hard disk.

CONFIG.SYS  
 DEVICE=INBRDPC.SYS  
*non-Intel device drivers*

AUTOEXEC.BAT  
*add nothing*

- 2 Your files should look like this if you have the same situation as sample 1 except you have an EGA monitor that you want cached in 32-bit memory.

<u>CONFIG.SYS</u>	<u>AUTOEXEC.BAT</u>
DEVICE=INBRDPC.SYS EGACACHE	<i>add nothing</i>
<i>non-Intel device drivers</i>	

- 3 Your files should look like this if:

- you don't have an EGA monitor
- you want to set up a 128K-byte VDISK in Inboard 386/PC extended memory
- you want to set up a 128K-byte hard disk cache.

<u>CONFIG.SYS</u>	<u>AUTOEXEC.BAT</u>
DEVICE=INBRDPC.SYS	ICACHE /S:128
DEVICE=VDISK.SYS 128 512 64 /E:8	<i>other commands</i>
<i>non-Intel device drivers</i>	

- 4 Your files should look like this if you have the same situation as sample 1 and you want to continue using an Above Board in the computer.

<u>CONFIG.SYS</u>	<u>AUTOEXEC.BAT</u>
DEVICE=INBRDPC.SYS	<i>add nothing</i>
DEVICE=EMM.SYS PC D000 258	
<i>non-Intel device drivers</i>	

Note that the EMM.SYS command line parameters changed with EMM 4.0. Refer to Appendix C for information on using expanded memory on Above Boards when the Inboard 386/PC is installed.

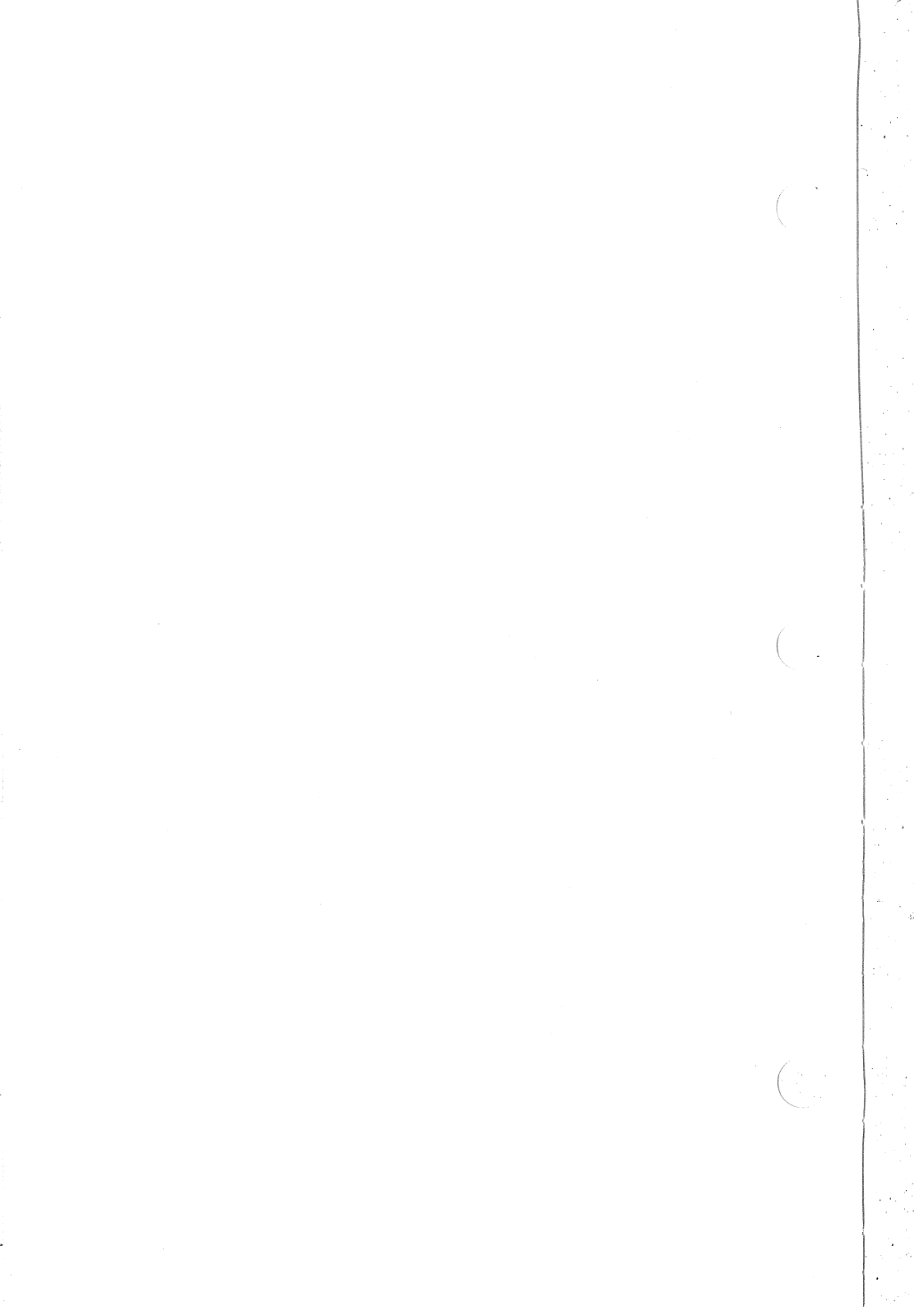
- 5 Your files should look like this if you have the same situation as sample 1 plus:

- you want to turn extended memory into expanded memory, while reserving 256K bytes for extended memory
- you want to set up a 256K-byte hard disk cache.

<u>CONFIG.SYS</u>	<u>AUTOEXEC.BAT</u>
DEVICE=INBRDPC.SYS	ICACHE /S:256
DEVICE=ILIM386.SYS EXT=256	<i>other commands</i>
<i>non-Intel device drivers</i>	

## ***Where to go from here***

This completes the Inboard 386/PC software installation. Chapter 6 explains how to use the software.



# GLOSSARY

This glossary defines some of the technical terms used in this manual. It will help you understand unfamiliar words. If you understand the terms used in the manual, you can skip this glossary.

The terms are defined in alphabetical order.

## **Above™ Board**

The Above Board is one of Intel's memory boards. By installing Above Boards you can add expanded memory for DOS application programs. (Expanded memory is defined elsewhere in this glossary and in Appendix A.)

## **Address**

An address is a number that your computer uses to identify a byte of memory. Each byte in your computer has an address different from that of any other byte.

## **Application program**

An application program is the software you use to do your work on the computer. Some categories of application programs are word processors, database managers, spreadsheet managers, and project managers. Specific examples of application programs are MultiMate, dBase II, 1-2-3, Framework II, and Symphony.

## **AUTOEXEC.BAT file**

An AUTOEXEC.BAT file is a special-purpose batch file. (Batch file is defined elsewhere in this glossary.) When you turn on your computer or restart it by pressing the Ctrl-Alt-Del key combination, DOS searches your system disk's root directory for the AUTOEXEC.BAT file. If DOS finds one, it automatically executes it.

## **Batch file**

A batch file is a special kind of file that saves time and effort by executing one or more commands at a time. You can recognize batch files by the ".BAT" extension that follows the file name.

If you use a sequence of DOS commands frequently, you can create a batch file containing the commands, and then run the entire sequence by typing the name of the batch file. This reduces the number of keystrokes needed to run a sequence of commands.

## **BIOS**

B-I-O-S stands for basic I/O system. The BIOS is hardware-specific control software. It handles the details of making various types and brands of hardware work with the computer so DOS doesn't have to.

## **Caching**

Caching is a method of increasing the computer's speed by copying instructions or data from one part of memory to another (usually faster) part of memory where the instructions are executed.

The Inboard 386/PC has 128K bytes of 32-bit RAM memory reserved for the system BIOS. When the system BIOS is cached, it's accessed much more quickly by the 80386, and this speeds up processing.

You can also use extended memory to cache the hard disk so disk accesses are much faster.

## **CONFIG.SYS file**

CONFIG.SYS is a special-purpose file. Among other things, it provides DOS with information about the kinds of hardware attached to your computer. Whenever you turn on your computer or restart it by pressing the Ctrl-Alt-Del key combination, DOS searches your system disk's root directory for the CONFIG.SYS file. If DOS finds one, it reads the commands from the file and uses them to prepare your computer's hardware.

## Conventional memory

Conventional memory is the memory that DOS recognizes and uses. This is limited to 640K bytes.

Some computers' setup programs call conventional memory "base" memory.

Refer to Appendix A for more information on conventional memory.

## Disk

In this manual, "disk" is a generic term meaning either hard disk or diskette.

## DOS

The letters D-O-S stand for Disk Operating System. DOS manages your computer's basic functions, such as conventional memory, disk drives, printers, and the screen. This allows DOS-based application programs to focus on their tasks.

For more information about DOS, read the DOS manual that came with your computer. If you are new to computers, read *Running MS-DOS*, written by Van Wolvert and published by Microsoft Press. It's a particularly clear book designed for new computer users.

## EMM

The Expanded Memory Manager manages expanded memory on Intel Above Boards.

## Expanded memory

Expanded memory is memory above 640K that specially written DOS application programs (such as 1-2-3 Release 2, Symphony Release 1.1, Framework II, SuperCalc4, Ready!, and Javelin) can use. You can use the extended memory on the Inboard 386/PC to emulate expanded memory.

Refer to Appendix A for more information on expanded memory.



## **Expansion slot**

An expansion slot is a space in your computer into which you can plug a board.

## **Extended memory**

Extended memory (also called protected mode memory) is memory above 1024K bytes (1M byte) that only DOS's VDISK and specially written application programs such as AutoCAD and Framework II can use.

You can't use extended memory to run DOS application programs (such as Symphony) on DOS 3.2 or lower. However, you can turn extended memory on the Inboard 386/PC into expanded memory and run many DOS applications in this emulated expanded memory.

Appendix A discusses extended memory in detail.

## **Inboard 386/PC**

The Inboard 386/PC is an add-in board which replaces the computer's 8088 microprocessor with the high-performance 80386. The Inboard 386/PC provides 1M byte of high-performance memory plus up to 2M bytes of extended memory with the optional Piggyback Memory board.

The Inboard 386/PC boosts your IBM PC or PC-compatible computer's operating speed to 16 MHz and provides all the advanced features of the 80386 microprocessor.

## **K bytes**

In computer publications, K (for kilo) means 1024. So 1K byte is 1024 bytes, and 64K bytes is 65,536 bytes.

## **M bytes**

In computer publications, M (for mega) means 1,048,576 or 1024K. So, 1M byte is 1,048,576 bytes, and 4M bytes is 4,194,304 bytes.

## **Math coprocessor**

A math coprocessor is a chip specially designed to perform complex floating-point arithmetic operations (such as calculating standard deviations and exponents) faster than a microprocessor. (Microprocessor is defined elsewhere in this glossary.) Programs written to take advantage of a coprocessor's increased speed automatically use the coprocessor when it's present.

## **Microprocessor**

A microprocessor is the chip that is the personal computer's brain. IBM PCs and PC-compatible computers have an 8088 microprocessor. The Inboard 386/PC substitutes the more advanced 80386 microprocessor to give your computer even more power and speed.

## **Nanosecond**

A nanosecond is one billionth of a second. Many computer operations are so fast they're measured in nanoseconds.

## **Parity checking**

Parity checking is an error-detection technique used by many computers (including IBM PC computers) to verify the integrity of data while the computer is running.

## **Protected mode memory**

See the Extended memory entry in this glossary.

## **RAM**

The letters R-A-M stand for Random Access Memory. RAM is the kind of memory your application programs use to store data inside your computer.

RAM has the following characteristics:

- RAM is much faster than disk memory. Programs can read information from or write information to RAM in much less time than they can read and write to a disk.
- RAM is volatile. When you shut off the power, the information stored in RAM vanishes.

## **RAM disk**

A RAM disk lets you use part of your computer's RAM as a very fast disk. If your programs frequently read from or write to disk, a RAM disk will speed them up substantially.

The VDISK entry in your DOS manual explains how to set up a RAM disk in extended memory.

## **Restart**

Restarting your computer is a technique for reloading DOS and device drivers without turning off your computer.

If you don't have a hard disk, restart the computer by inserting a DOS system diskette in drive A, and pressing the Ctrl-Alt-Del key combination.

If you have a hard disk, leave drive A empty and press the Ctrl-Alt-Del key combination. This will restart your computer from your hard disk.

## ROM

The letters R-O-M stand for read-only memory. ROM is the kind of memory your computer uses to store information that never changes and is frequently referenced.

ROM has the following characteristics:

- Programs can read information from ROM, but they can't write to ROM.
- ROM is non-volatile. When you shut off the power, the information stored in ROM is retained.

## System disk

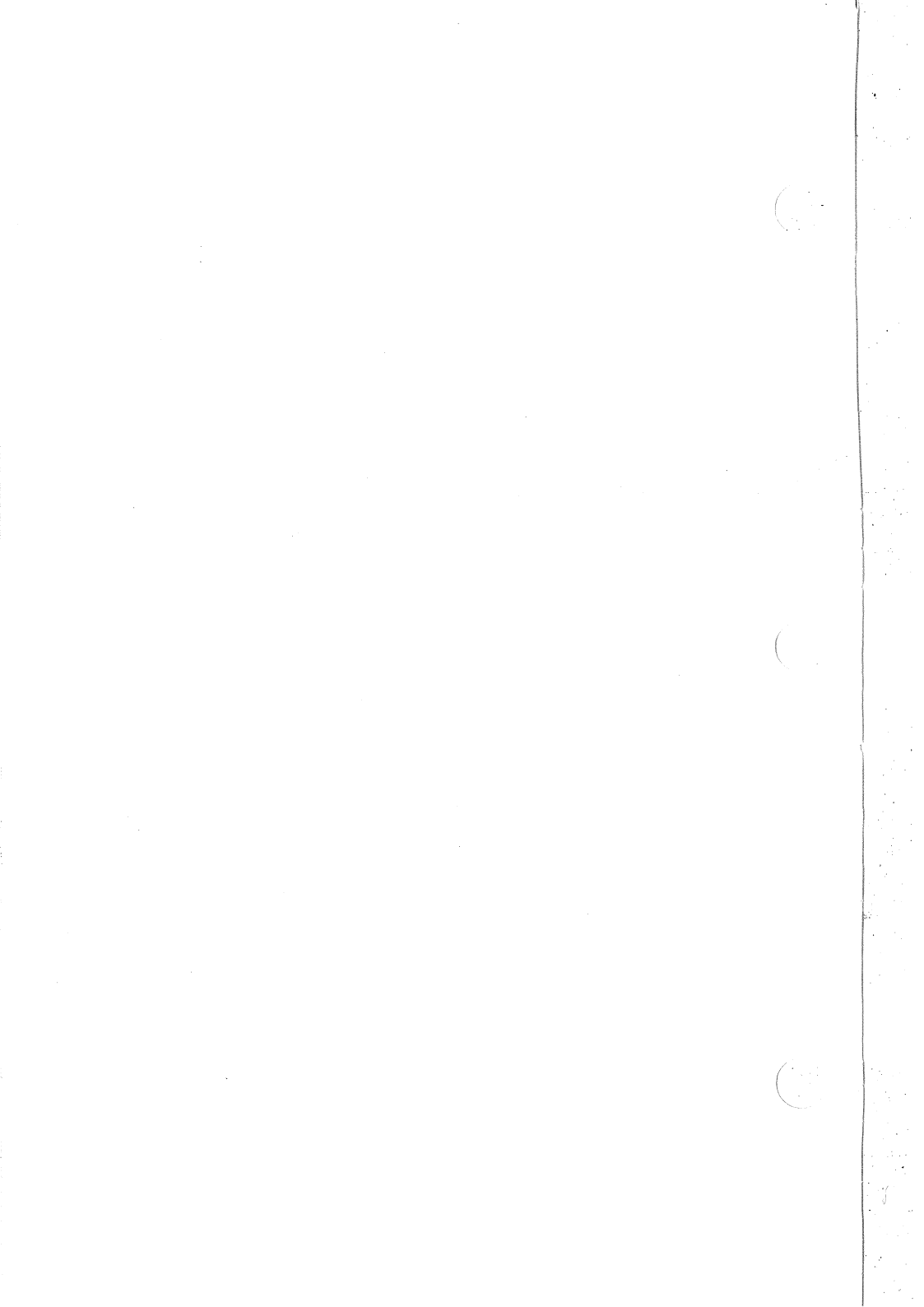
A system disk is a disk from which you can start or restart your computer. It loads DOS into the computer and (optionally) starts an application program running. If your computer has a hard disk, the hard disk is the system disk.

Some application programs include diskettes labeled "system disk" that don't contain DOS and, therefore, aren't really system diskettes. Newer versions of 1-2-3, Symphony, and Framework II are examples of this type of application program. In these situations, start or restart your computer from a DOS system disk first. Then run the application program from a separate diskette.

## Wait state

The computer's operating speed depends on how fast its clock ticks. The faster the clock, the faster the computer runs.

You can slow the computer by slowing its clock -- that is, reducing the number of clock ticks per second. Or, you can slow the computer by adding wait states -- clock ticks when nothing happens. For example, if you add four wait states, the computer performs an operation on one clock tick, does nothing while its clock ticks four times, performs an operation on the fifth clock tick, does nothing for four clock ticks, and so on.



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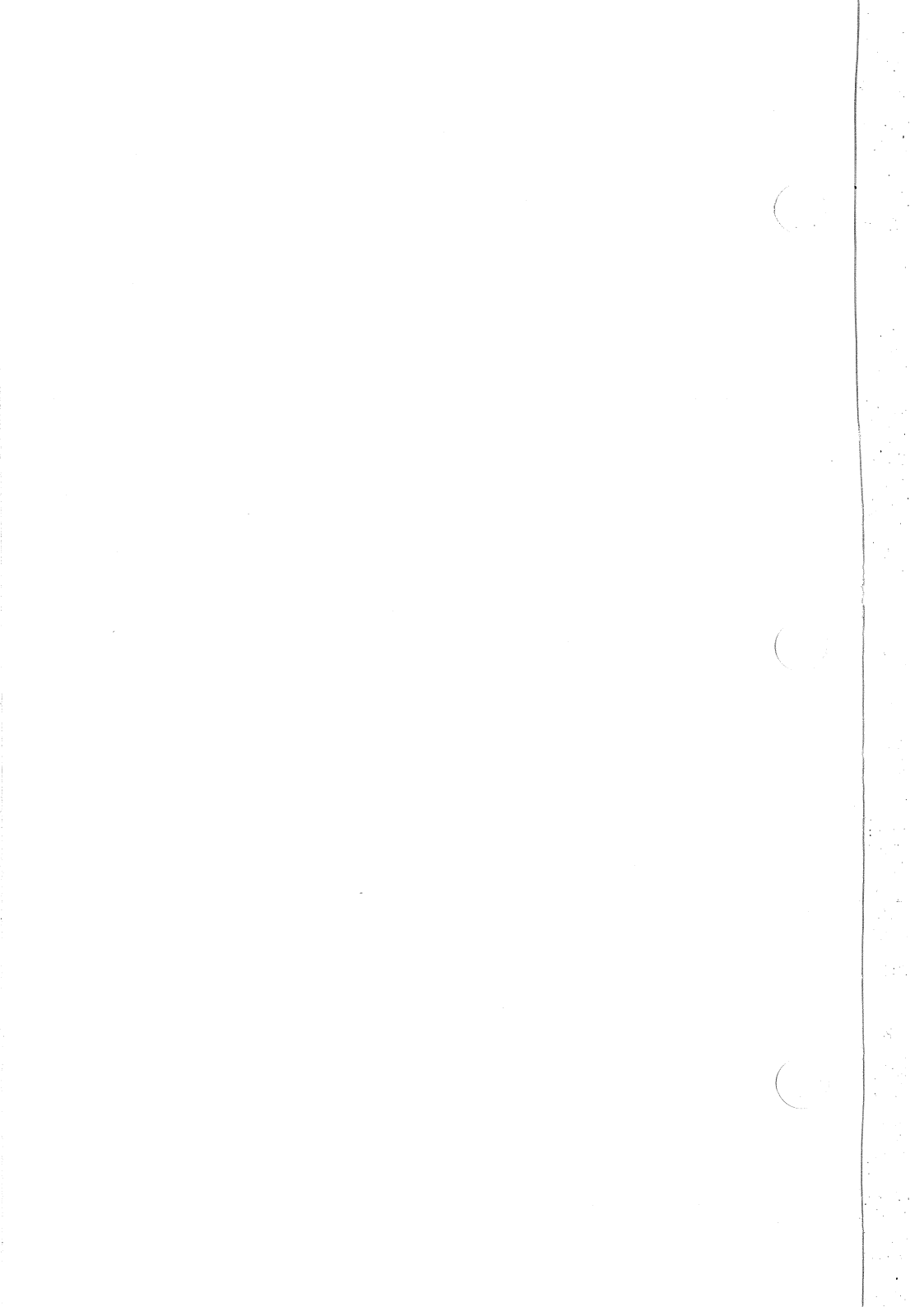
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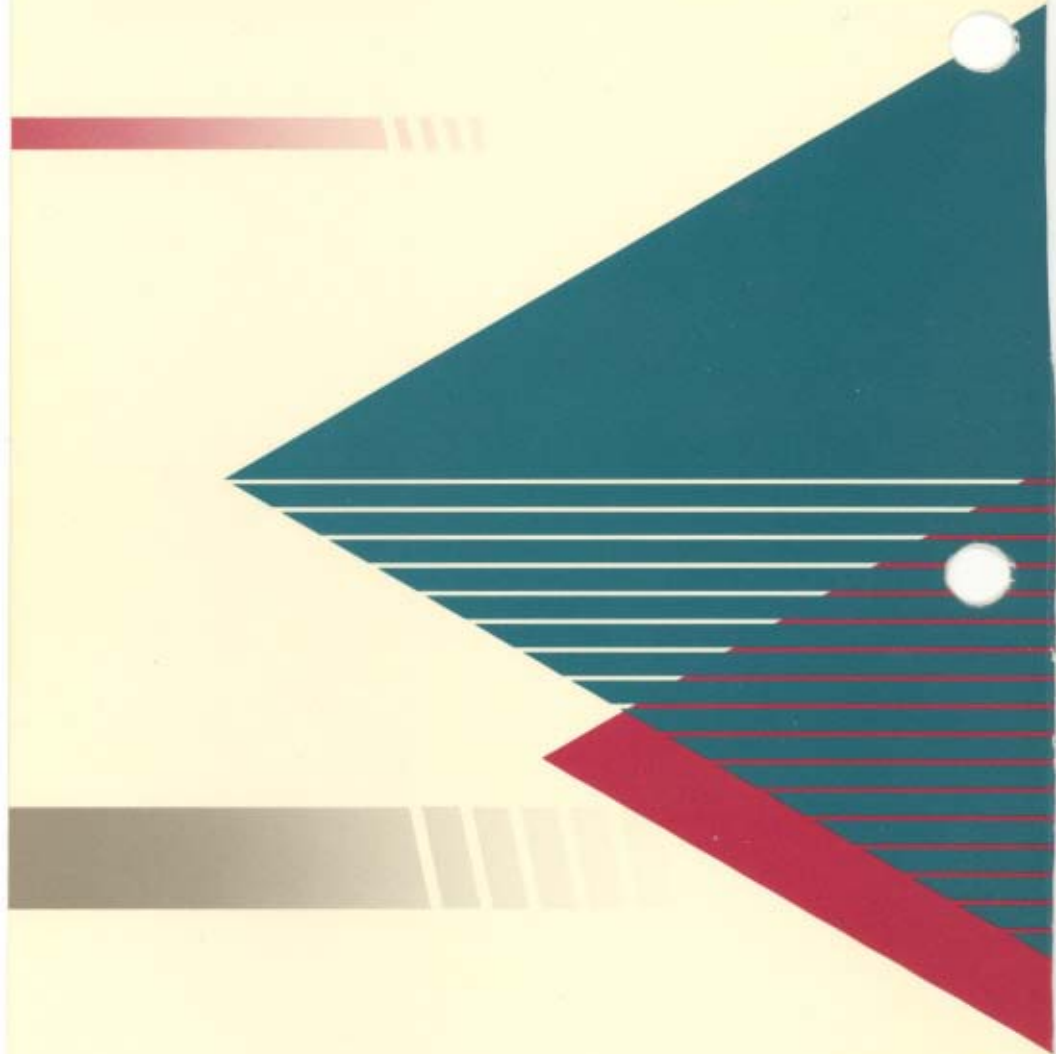
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