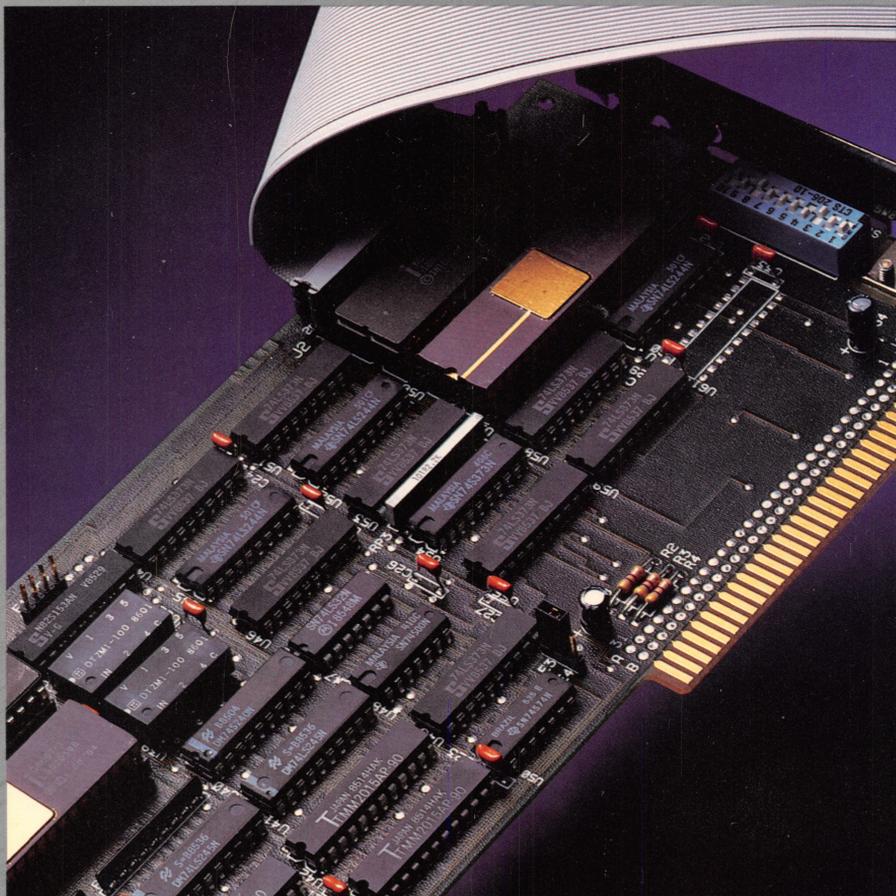


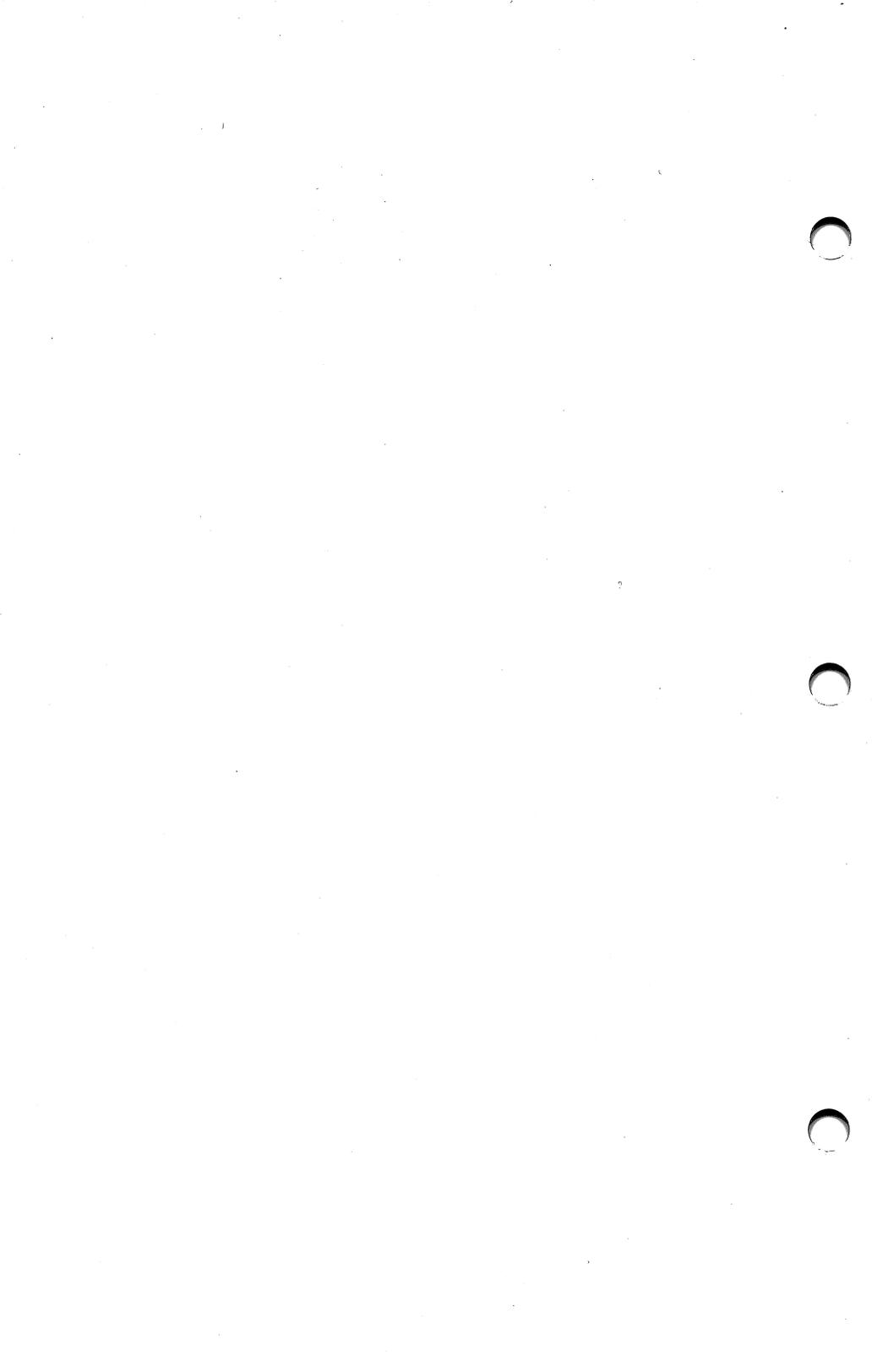
# *FLASHPAK™*

**AST**  
RESEARCH INC.

*High Performance Accelerator Card Providing Increased PC Processing Speed For Conventional And Expanded Memory Software*



*User's Manual*



AST Product  
**FlashPak™**

# Product Registration Form

**MULTIFUNCTION**

Name Last First Company Phone ( )

Street Address City State Zip

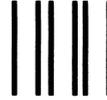
Software Version (see diskette label) Purchased from:  Retail \_\_\_\_\_  
 Distributor  Mail  Sys. House/VAR  
 Other \_\_\_\_\_ explain  
No. of PCs at Site  
 < 25  50-100  > 500  
 25-50  100-500

Purchase Date: (mm / yy) Personal Computer Used  
IBM:  PC  XT  AT Other \_\_\_\_\_  
 Other \_\_\_\_\_ mfg model  
No. of Employees at Site  
 < 50  100-500  > 1000  
 50-100  500-1000

In order to help us meet your needs, please complete as applicable:

<p>1. When was this product purchased? <input type="checkbox"/> Same time as the PC <input type="checkbox"/> After PC purchase</p> <p>2. What new product(s) or feature(s) would you like to see from AST? _____ _____ _____</p>	<p><b>System Configuration</b></p> <p><input type="checkbox"/> Multifunction/Memory Manufacturer _____</p> <p><input type="checkbox"/> Graphics <input type="checkbox"/> Color Manufacturer _____</p> <p><input type="checkbox"/> Data Communications Manufacturer _____</p> <p><input type="checkbox"/> Network Card Manufacturer _____</p> <p><input type="checkbox"/> Modem Baud Rate _____ Manufacturer _____</p> <p><input type="checkbox"/> Hard Disk MBs _____ Manufacturer _____</p>
--	--

Please complete and return this card within (10) days of purchase. All AST board-level products are warranted for two years from date of purchase. If you encounter a problem with an AST product that is under warranty, you should call AST to receive a Return Authorization Number prior to returning the product to service.



NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**BUSINESS REPLY CARD**

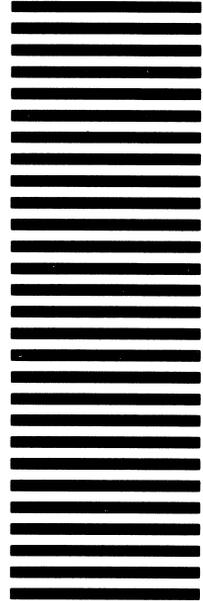
FIRST CLASS

PERMIT NO. 7379

IRVINE, CA

POSTAGE WILL BE PAID BY ADDRESSEE

**AST Research, Inc.**  
Attn: Product Marketing  
2121 Alton Avenue  
Irvine, California 92714



**For owners of AST's *RAMpage!* Enhanced Expanded Memory Specification (EEMS) products (*RAMpage!* and *RAMpage AT*).**

**Updated DESQview™ and SuperPak™ Software**

If you own an AST Research *RAMpage* EEMS product and will be using it with *FlashPak* and *DESQview*, you are entitled to receive updated *SuperPak* and *DESQview* software from AST.

- If you are using any expanded memory specification (EMS) or EEMS software, you will need AST's expanded memory manager (REMM) software (version 2.70 or later). This version of REMM is contained on the *SuperPak* diskette (version 6.0 or later).
- If you are using the *DESQview* multitasking/ windowing software package, you will need *DESQview* software (version 1.11 or later).

If you require updated software, fill out the attached form (print carefully — this is your mailing label) and mail it to us along with the title page (not the color cover) from your *RAMpage!* or *RAMpage AT* manual.

---

**FlashPak Updated Software Request Form**

Please send AST's *SuperPak* (version 6.0 or later) and *DESQview* (version 1.11 or later) optimized for use with *FlashPak* to this address:

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

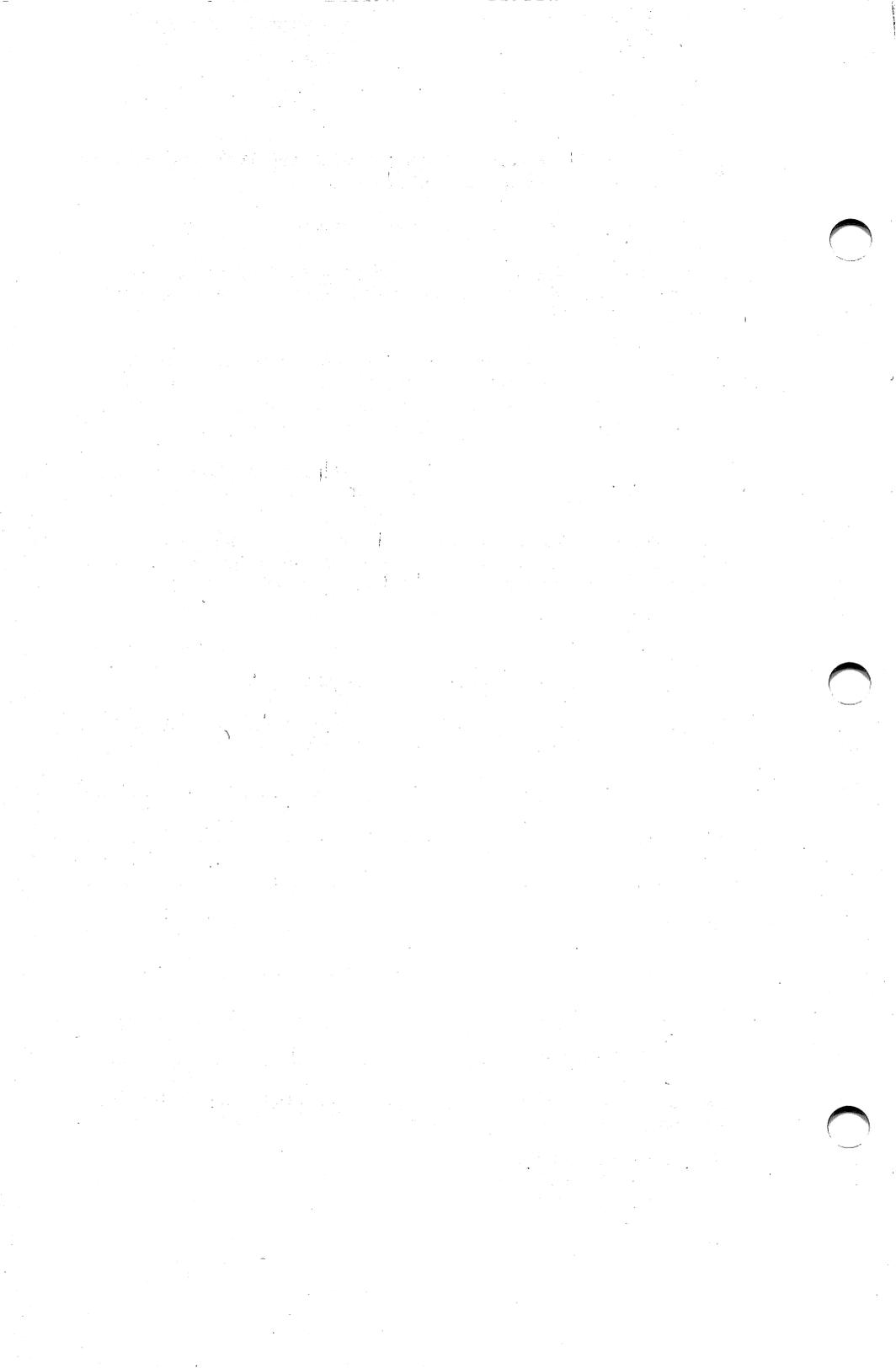
Address \_\_\_\_\_  
\_\_\_\_\_

Phone \_\_\_\_\_

AST EEMS Product Serial Number \_\_\_\_\_

**Please enclose the actual title page (not a copy) from your *RAMpage!* or *RAMpage AT* User's Manual.**

Mail to: AST Research, Inc.  
Attn: Customer Service  
2121 Alton Ave.  
Irvine, CA 92714



**FlashPak™**  
**Accelerator Board**  
for the  
**IBM PC, PC-XT, and**  
**Other IBM-Compatible Machines**

User's Manual  
000332-001 A  
April 1986

AST RESEARCH, INC.  
Irvine, California  
(714) 863-1333

First Edition (April 1986)

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# TABLE OF CONTENTS

<b>SECTION 1 INTRODUCTION</b> .....	1-1
1.1 Checklist .....	1-2
1.2 Features .....	1-3
1.3 System Requirements .....	1-5
1.4 How To Use This Manual .....	1-5
1.4.1 Format Notation .....	1-5
1.4.2 Related Documentation .....	1-6
1.4.3 Manual Outline .....	1-7
<b>SECTION 2. HARDWARE INSTALLATION AND           CONFIGURATION</b> .....	2-1
2.1 Standard Configuration .....	2-2
2.2 Getting Your PC Ready .....	2-6
2.3 Installing FlashPak in Your PC .....	2-13
<b>SECTION 3. SOFTWARE INSTALLATION AND           CONFIGURATION</b> .....	3-1
<b>SECTION 4. USING FLASHPAK</b> .....	4-1
4.1 Applications Software Compatibility .....	4-1
4.2 Changing Processing Modes .....	4-2
4.3 Cache Disable/Enable .....	4-3
4.4 Using FlashPak with AST EEMS Products .....	4-5
<b>APPENDIX A. SWITCH SETTINGS</b> .....	A-1
A.1 Processor Mode .....	A-1
A.2 Math Coprocessor Installed .....	A-2
A.3 I/O Address .....	A-3
A.3.1 Using FlashPak with EEMS Boards .....	A-4
A.4 Cache On/Off Select .....	A-4
A.5 Cached Memory Ranges .....	A-5

# TABLE OF CONTENTS

(Continued)

<b>APPENDIX B. GLOSSARY</b> .....	B-1
<b>APPENDIX C. PRODUCT REPAIR PROCEDURE</b> .....	C-1

## Figures

Figure 2-1. FlashPak Installation Overview .....	2-1
Figure 2-2. FlashPak Board Layout (Default Configuration) .....	2-3
Figure 2-3. FlashPak Cached Memory Settings .....	2-6
Figure 2-4. Removing the PC Cover .....	2-7
Figure 2-5. 8088/8087 Chip Positions on the PC and PC-XT System Boards .....	2-9
Figure 2-6. Removing a Chip from the PC System Board .....	2-11
Figure 2-7. Installing the 8088 and 8087/8087-1 Chips on the FlashPak Board .....	2-12
Figure 2-8. Installing the Plastic Card Guide .....	2-13
Figure 2-9. Installing the FlashPak Ribbon Cable onto the PC System Board (as Viewed from Front of PC) .....	2-14
Figure 2-10. Installing the FlashPak Board .....	2-15
Figure 2-11. Installing the FlashPak Ribbon Cable onto the FlashPak Board Connector .....	2-16
Figure 4-1. Setting the FlashPak Processing Mode .....	4-3
Figure A-1. Processor Mode Switch Settings .....	A-1
Figure A-2. Math Coprocessor Installed .....	A-2
Figure A-3. FlashPak I/O Address Settings .....	A-3
Figure A-4. Cache On/Off Select .....	A-5
Figure A-5. Cached Memory Range Settings .....	A-6

## Tables

Table 2-1. FlashPak Default Configuration .....	2-4
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## SECTION 1

# INTRODUCTION

FlashPak™ is an accelerator board designed to speed your personal computer's (PC's) processing time. FlashPak can (depending on the software) allow your PC to execute applications programs up to two to three times faster than a standard IBM® PC.

FlashPak offers:

- A 16-bit NEC V30 microprocessor, which runs at a clock speed of 9.54 megahertz (MHz) — twice the clock speed of the standard, 8-bit (4.77 MHz) Intel 8088 microprocessor. The V30 is an Intel 8086-compatible (the 8086 microprocessor is also available in place of the V30).
- Cache memory. Cache memory is a high-speed random access memory (RAM) buffer that contains the most-recently accessed data and instructions from PC memory to speed your PC's performance.
- Easy installation and use. FlashPak features simple installation and transparent operation — once you've installed FlashPak, no further changes are required to take advantage of its accelerated processing capability.
- Enhanced expanded memory specification (EEMS) compatibility. FlashPak is designed to complement and accelerate the function of AST's EEMS memory products, including *RAMpage!*™ and SixPakPremium™.

Like *RAMpage!* and SixPakPremium, FlashPak is also fully compatible with the Lotus/Intel/Microsoft Expanded Memory Specification (LIM EMS).

- Selectable cached memory areas. This allows you to speed up applications and operating environment software by caching the memory areas used by the software. This also allows you to avoid areas of memory that cannot be cached (such as the area used by the PC-XT fixed disk controller).
- Switch-selectable processing speed. *Fast mode* causes your PC to use the 16-bit V30 microprocessor, while *nonaccelerated mode* causes the PC to use its original 8-bit 8088 microprocessor (which is reinstalled on the FlashPak board). This makes it simple to return to nonaccelerated processing mode when running certain speed-sensitive programs (such as some game software).
- 8087 math coprocessor (4.77- and 9.54-MHz) support. Math coprocessors perform fast and accurate mathematical calculations in either nonaccelerated or fast mode.

### 1.1 Checklist

Before getting started, check that your FlashPak package includes the following items:

- FlashPak full-length board.
- A 40-wire ribbon cable.
- A chip puller.
- *FlashPak User's Manual*.

## 1.2 Features

Each FlashPak board offers the following features:

- *EEMS compatibility:* FlashPak is designed to complement and accelerate operation with AST's EEMS expanded memory products (such as *RAMpage!* or *SixPakPremium*). FlashPak automatically updates cache memory whenever your AST EEMS product swaps memory pages, providing designed-in compatibility.
- *Increased PC processing speed:* FlashPak allows you to use its faster (9.54 MHz) microprocessor, which offers up to four times the performance of the standard IBM PC 8088 microprocessor.

The standard FlashPak board features an NEC V30 (Intel 8086-compatible) microprocessor. Although the V30 and 8086 operate at the same clock speed, the internal technology of the V30 allows a significant improvement in execution speed over the 8086.

FlashPak is also available with the Intel 8086 microprocessor installed. This is appropriate for any PC that is designed for compatibility with the 8086 only (see your dealer for further information).

- *Switch-selectable processing modes:* You can select fast mode (9.54 MHz) or nonaccelerated (4.77 MHz) processing mode with a toggle switch on the FlashPak board. This switch is easily accessible from the back of your PC when FlashPak is installed.

Fast mode causes your PC to use the 16-bit V30 (or 8086) microprocessor, while nonaccelerated mode causes the PC to use its original 8-bit 8088 microprocessor, which is reinstalled on the FlashPak board. (You must turn off your PC and reboot when you change processing modes.)

Fast mode is typically the standard operating mode, while nonaccelerated mode is used only to run time-sensitive programs, such as certain game software.

- *Cache memory:* FlashPak speeds your PC's access to the most-recently accessed data and instructions. Words can be accessed up to twice as fast from cache memory. Because two bytes can be accessed at once, byte accesses are up to four times faster.
- *Switch-selectable cache memory ranges:* Although you will probably not need to change the factory preset cached memory ranges, you can set the switches on the FlashPak board to enable any one of the predefined PC memory ranges for caching.

In general, set switches to cache all memory installed in the 0-640 KB range and additional memory ranges that depend on your particular system (Section 2 gives more information on cache switch settings).

Switch-selectable cached memory also allows FlashPak to avoid areas of memory that cannot be cached (for example, the memory range used by the IBM PC-XT fixed disk controller).

FlashPak can also be configured to allow software disable and enable of cache memory. This feature is intended for software developers, and avoids the need to open the PC and reset switches every time FlashPak cache memory is disabled or enabled. For example, a software developer would want to disable the cache when performing memory diagnostics.

- *8087/8087-1 math coprocessor support:* FlashPak can accommodate the Intel 8087 (4.77-MHz clock speed) and/or the Intel 8087-1 (9.54 MHz) math coprocessors. The 8087 is used when running in nonaccelerated mode, and the 8087-1 is used when running in fast mode.

With appropriate software, the math coprocessor enables your PC to perform high-speed, highly-accurate arithmetic, logarithmic, and trigonometric functions in parallel with the processor. Parallel processing saves time by allowing the processor to do other work while the math coprocessor performs its calculations. A growing number of numerically oriented programs (such as Lotus 1-2-3™ release 2) support the use of math coprocessors.

### 1.3 System Requirements

This section outlines the minimum hardware requirements for operating FlashPak.

The minimum hardware requirements for FlashPak are:

- A FlashPak board and ribbon cable (included in the package).
- An IBM PC, PC-XT, or compatible with one floppy diskette drive and an unused full-length expansion slot.

### 1.4 How To Use This Manual

This section provides an outline of the format notation used throughout the manual, a list of related documentation, and outline of the manual.

#### 1.4.1 Format Notation

The following format notation is used in this manual:

- *Uppercase characters* indicate items (such as commands) that you enter exactly as shown. However, you can enter those items in any combination of upper- or lowercase letters.

- *Boldface* indicates information that you enter, as contrasted to system prompts or messages (which are shown in regular typeface). A boldface entry can be a parameter such as a file name or a key to press.
- *Square brackets* ([ ]) indicate an optional term which is included or omitted at your discretion. The brackets are not entered.
- *Lowercase letters* represent parameters that are defined by the user. While the user defines the parameters, they must satisfy the conditions of the command description.
- *Angle brackets* tell you to press a key. For example, <Esc> instructs you to press the “Esc” key. You do not have to press the “Enter” key unless you are specifically told to do so.
- System prompts and messages are shown in color.

### 1.4.2 Related Documentation

This manual assumes some familiarity with the DOS operating system and IBM PC or PC-XT hardware. You can find this information in these manuals for your IBM PC:

*Guide to Operations*

*Technical Reference*

*Disk Operating System*

If you are installing FlashPak in your PC along with *RAMpage!* or *SixPakPremium*, the following AST Research manuals provide further information on that product:

*RAMpage! User's Manual* (AST p/n 000295-001).

*SixPakPremium User's Manual* (AST p/n 000334-001).

*SuperPak User's Manual* (AST p/n 000300-001).

### **1.4.3 Manual Outline**

The following outline describes this manual.

#### ***SECTION 1: INTRODUCTION***

Contains overviews of the product and the manual.

#### ***SECTION 2: HARDWARE INSTALLATION AND CONFIGURATION***

Gives you step-by-step instructions on configuring and installing FlashPak into your PC.

#### ***SECTION 3: SOFTWARE INSTALLATION AND CONFIGURATION***

Tells you how to install the FlashPak software that ensures EEMS compatibility. You do not need to read this section if you are not using an EEMS product.

#### ***SECTION 4: USING FLASHPAK***

Provides information about FlashPak, including applications software compatibility, changing processing modes, and cache memory disable/enable via software.

#### ***APPENDIX A: SWITCH SETTINGS***

Explains and illustrates the possible FlashPak board switch settings in case you need to change them from the factory default configuration.

#### ***APPENDIX B: GLOSSARY***

Contains a glossary of terms used in this manual.

#### ***APPENDIX C: PRODUCT REPAIR PROCEDURE***

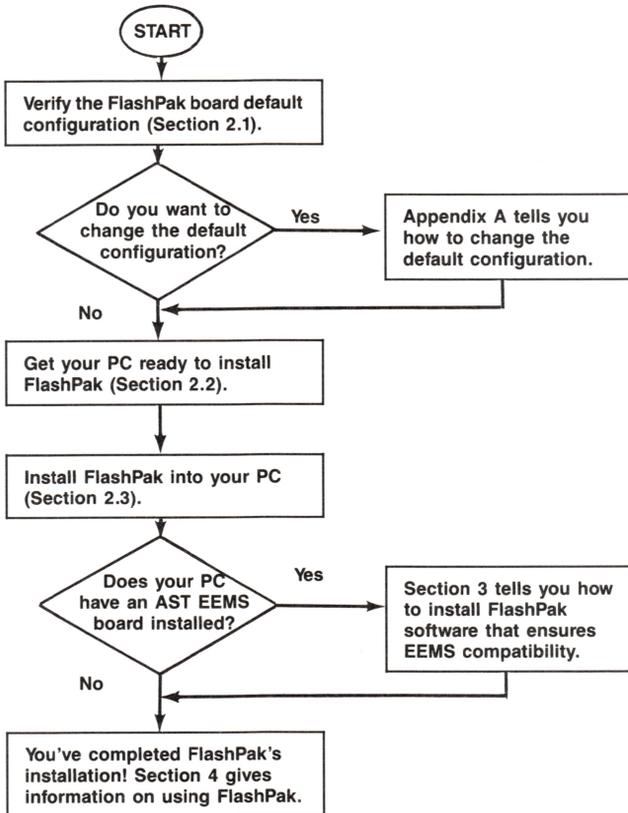
Provides instructions for obtaining repair service on your AST Research product.

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## SECTION 2

# HARDWARE CONFIGURATION AND INSTALLATION

As it is shipped from the factory, FlashPak should be properly configured and ready to use in most PCs. This section tells you how to check FlashPak's configuration and install it in your PC. Figure 2-1 summarizes the FlashPak installation procedure.



**Figure 2-1. FlashPak Installation Overview.**

## 2.1 Standard Configuration

Figure 2-2 shows the default configuration of the FlashPak board. Remember, the default settings are appropriate for most applications, and you probably will not need to change them. Appendix A gives more detailed information on FlashPak configuration.

Figure 2-2. FlashPak Board Layout (Default Configuration).

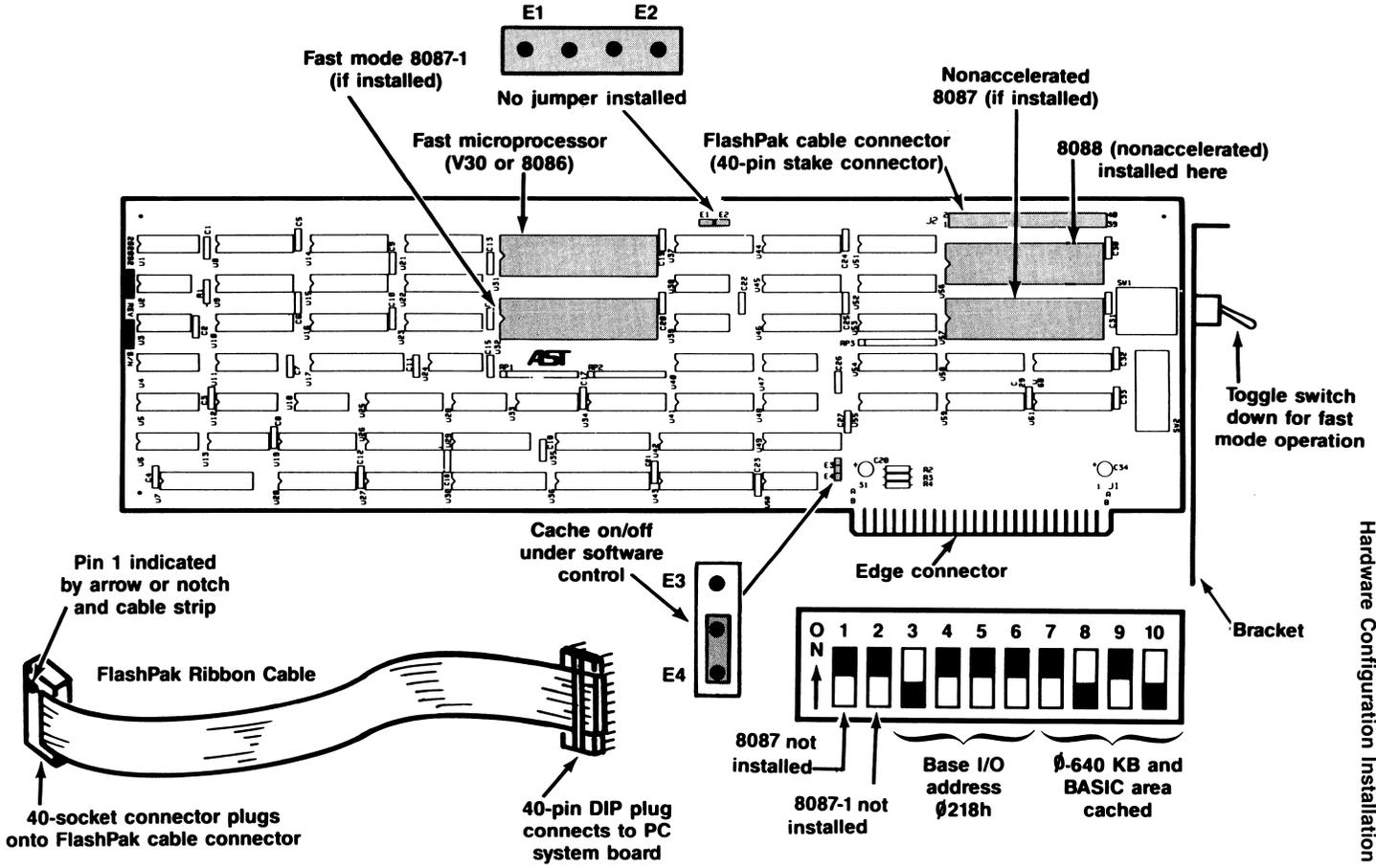


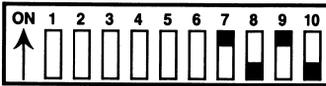
Table 2-1 summarizes the FlashPak board’s default configuration. See Appendix A for complete switch setting information.

**Table 2-1. FlashPak Default Configuration.**

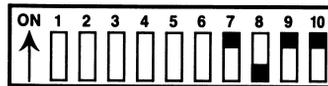
Parameter	Default	Comments
Processor Mode	Fast Mode (toggle switch down)	Can select fast mode or 8088 (nonaccelerated) mode by flipping the FlashPak toggle switch at the back of your PC, turning off the PC, then rebooting.
4.77-MHz 8087 Math Coprocessor	Not installed (SW2-1 ON)	Can set for nonaccelerated math coprocessor installed or not installed. Change this setting only if a 4.77-MHz math coprocessor is installed. Appendix A provides further information on this parameter.
9.54-MHz 8087 Math Coprocessor	Not installed (SW2-2 ON)	Can set for fast mode math coprocessor installed or not installed. Change this setting only if a 9.54-MHz math coprocessor is installed. Appendix A provides further information on this parameter.
Base I/O Address	0218 (SW2-6 ON SW2-5 ON SW2-4 ON SW2-3 OFF)	<p>This setting tells the PC what I/O address to use to communicate with FlashPak. You need not be concerned with this setting unless you have an AST EEMS board, or unless some other device in your PC uses the same I/O address (such as a non-AST expanded memory product).</p> <p>For AST EEMS compatibility, use the same I/O address for FlashPak and the EEMS board (The default base I/O address for <i>RAMpage!</i> and <i>SixPakPremium</i> is also 0218.) If you have more than one AST EEMS board in your PC, use the <i>final</i> I/O address displayed at boot-up time (Section 3 gives further information on systems that also include AST EEMS boards).</p>
Cache on/off	On/off function under software control (Jumper E4 installed)	<p>Can also select cache always off or always on (not under software control). Appendix A provides further information on this setting.</p> <p>This setting overrides the cached memory range settings (SW2-7 through SW2-10).</p>
Cached memory ranges	0–640 kilobytes (KB) and BASIC area (SW2-7 ON SW2-8 OFF SW2-9 ON SW2-10 OFF)	This parameter selects the areas of PC memory to be cached area (accelerated), and excludes all other areas from caching. The default setting is appropriate for most applications. See Figure 2-3 for a summary of FlashPak cached memory settings.

Figure 2-3 summarizes the FlashPak cached memory settings. Do not change the cached memory setting unless:

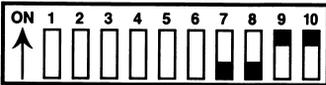
- You want to disable the cache completely.
- Your PC has less than 640 KB of system memory installed.
- You will be running a BASIC program that is incompatible with the FlashPak cache.
- You have an AST EEMS board (such as *RAMpage!* or *SixPakPremium*) installed in your PC and want to maximize the operation of your expanded memory software (such as *DESQview* or *Symphony 1.1*). The default setting accelerates the operation of such software, but it is possible to further improve software performance by 10-40% (depending on the particular program).



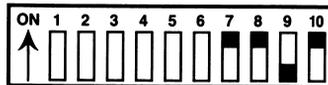
**\*0-640 KB + BASIC (default setting, appropriate for most applications). Your PC must have 640 KB installed.**



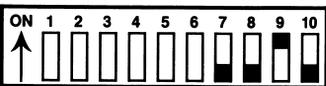
**0-256 KB cached (use this setting if you have only 256 KB of system memory).**



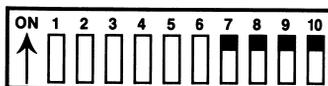
**0-512 KB cached (use this setting if you have only 512 KB of system memory).**



**0-640 KB cached (use this setting if you are running a BASIC program that is incompatible with cache). Your PC must have 640 KB installed.**



**0-640 KB + BASIC + 832-960 KB (CC000-EFFFh) cached (use this setting for maximum performance with AST EEMS boards and software written to EEMS). Your PC must have 640 KB installed. Do not use this setting for non-AST expanded memory boards.**



**Cache disabled (use this setting to turn off cache).**

\* Default setting

**Figure 2-3. FlashPak Cached Memory Settings.**

## 2.2 Getting Your PC Ready

Before installing FlashPak, you must turn off your PC, disconnect any device attached to it, and remove the PC cover. This section tells you how to prepare the PC and PC-XT.

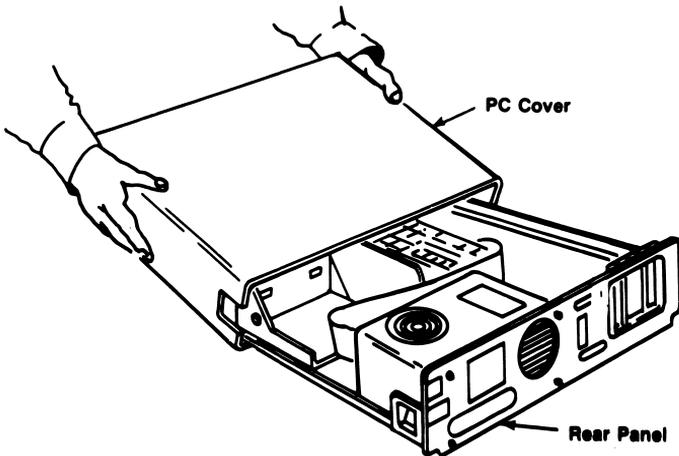
## CAUTION

Be sure that the power switch is off and the power cord is removed from the system unit. Turn off any other equipment connected to the computer. Installing any component while the power is on can permanently damage your computer and its components.

You will need a flathead screwdriver or nut driver to perform the following procedure.

### STEP 1

*Remove the PC cover:* Use a flathead screwdriver or nut driver to remove the cover mounting screws from your PC (see your PC's manual for the location of the cover mounting screws). Once you have removed the cover mounting screws, pull the PC cover off as shown in Figure 2-4.



**Figure 2-4. Removing the PC Cover.**

**STEP 2**

*Set PC or PC-XT system board switches:* You must set the switches on your PC system board if you add a math coprocessor chip to your system. Figure 2-5 shows PC and PC-XT system board switch settings as well as the positions of the 8088 and optional math coprocessor chips.

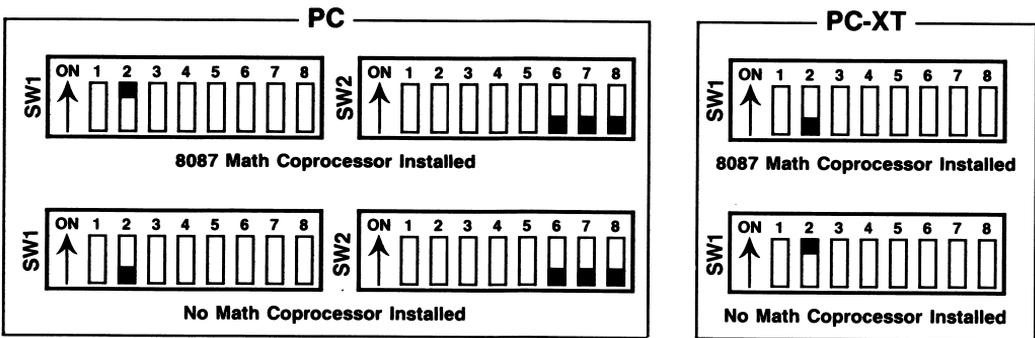
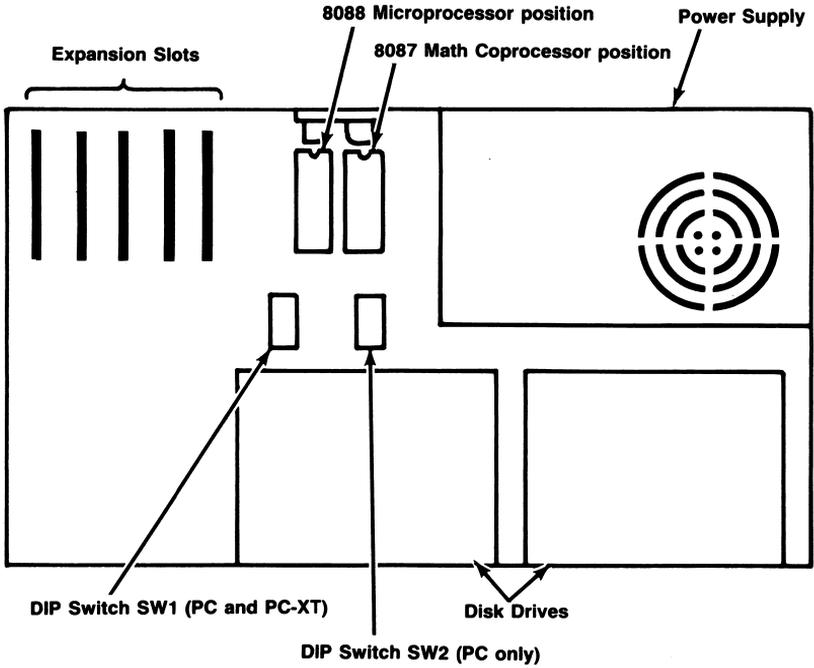


Figure 2-5. 8088/8087 Chip Positions on the PC and PC-XT System Boards.

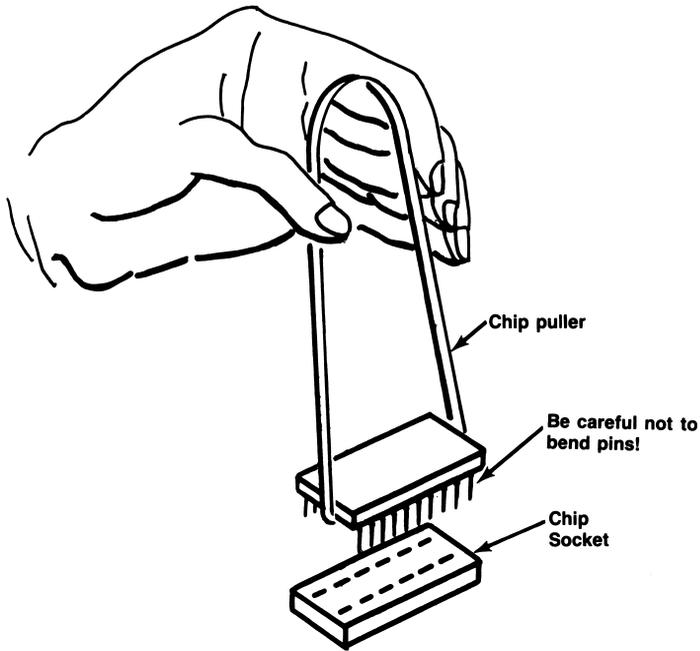
FlashPak can accommodate the 8087 (4.77 MHz) and/or 8087-1 (9.54 MHz) math coprocessors (available from your dealer or local electronics distributor). The 8087 math coprocessor operates in parallel with the 8088 microprocessor only, while the 8087-1 works only with the FlashPak V30 (or optional 8086) microprocessor.

You can also install a math coprocessor yourself later, if you like. If the 8087 and/or 8087-1 are installed (whether on your PC's system board or on the FlashPak board), you must set system board switch SW1 (there is only one DIP switch in a PC-XT) to indicate that a math coprocessor is installed in your PC, as shown in Figure 2-5.

### STEP 3

*Remove chip(s) from the PC system board:* You must remove the 8088 and 8087 (if installed) chips from the PC system board and install them on the FlashPak board. Use the chip puller supplied with FlashPak to *carefully* remove the 8088 and 8087 (if an 8087 is installed) from their positions on the system board. Although removing chips from the system board is straightforward, it is a delicate procedure (ask your PC dealer to help you if you have any questions).

Figure 2-6 shows how to use the chip puller to remove chips from the system board. Grasp the chip lengthwise (with the hooked ends of the tool under the body of the chip), and pull straight up with a *slight* end-to-end rocking motion if necessary. Take care not to bend any pins (if the pins are slightly bent, you can carefully straighten them).



**Figure 2-6. Removing a Chip from the PC System Board.**

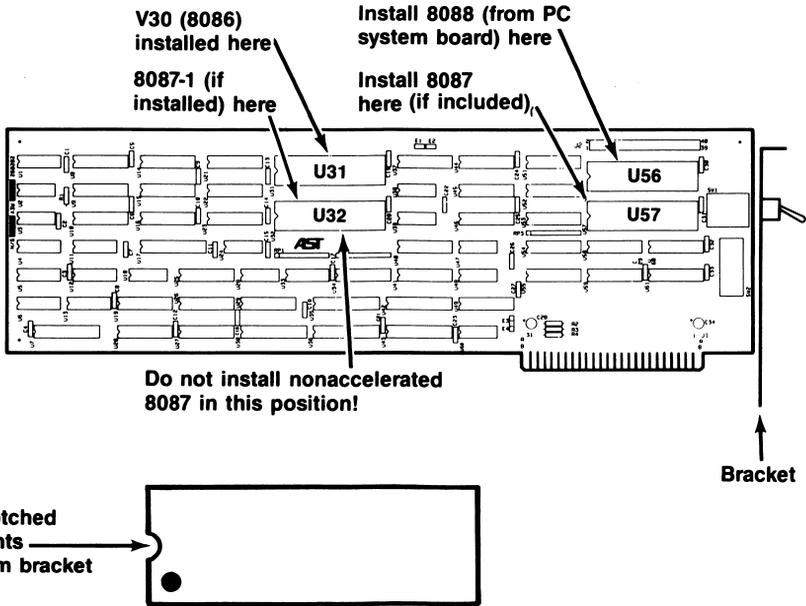
**CAUTION**

To ensure proper operation of your PC and FlashPak board, be careful not to bend chip pins when you remove them from your system board and install them onto the FlashPak board. Once you've installed the chip(s) onto your FlashPak board, look at the pins: they should be evenly spaced and aligned.

**STEP 4**

*Install the chip(s) on FlashPak:* Figure 2-7 shows how to install the 8088 and 8087 on FlashPak. The 8087 on the system board operates at 4.77 MHz, so be sure to install it in the proper position (*not* the 9.54-MHz position) on the FlashPak board. Installing a 4.77-MHz 8087 in the 9.54-MHz position can cause unpredictable math calculations.

Be careful not to bend any of the chip pins. Install the chips so that the pin 1 indicators (the notched ends of the chip) point away from the board's bracket.



**Figure 2-7. Installing the 8088 and 8087/8087-1 Chips on the FlashPak Board.**

## 2.3 Installing FlashPak in Your PC

Follow this procedure to install FlashPak in your IBM PC or PC-XT:

### STEP 1

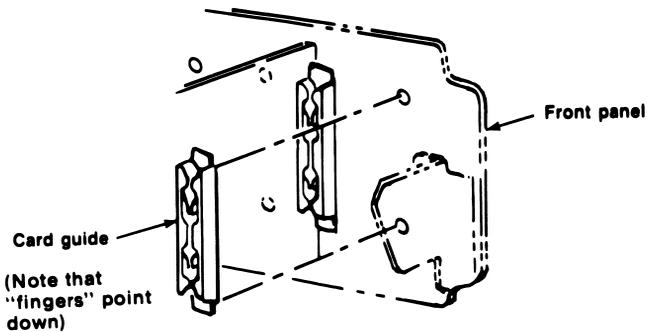
*Select an open expansion slot:* The FlashPak board requires one full-length slot.

### STEP 2

*Remove expansion slot cover:* Locate the metal cover for the cutout in the back panel of the PC chassis for the slot that you have selected. Remove and save the bracket retaining screw using a small flathead screwdriver. Remove the expansion slot cover.

### STEP 3

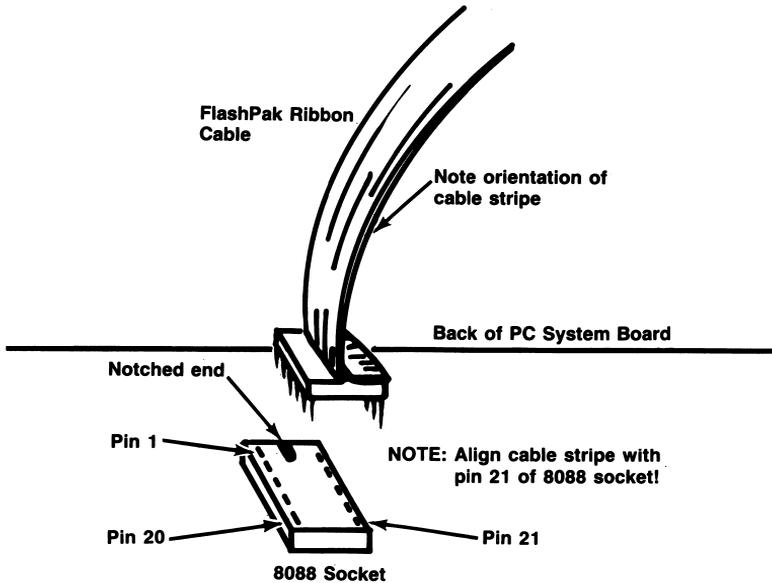
*Install the card guide:* Install the plastic card guide supplied with FlashPak (if one is not already installed) on the inside of the front panel of the PC that will hold your FlashPak board (Figure 2-8).



**Figure 2-8. Installing the Plastic Card Guide.**

**STEP 4**

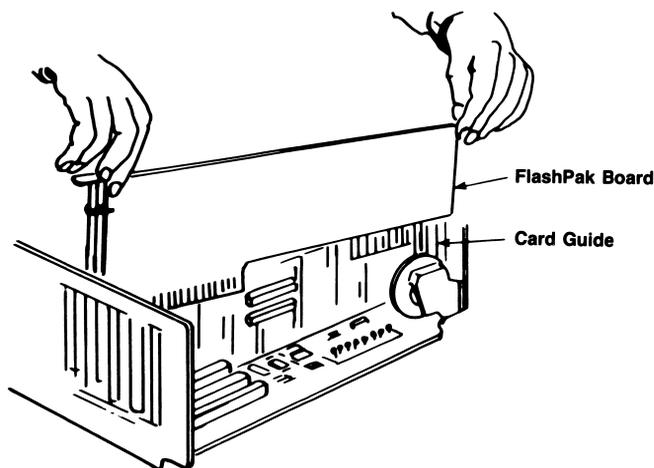
*Install the FlashPak cable onto the PC system board:* Figure 2-9 shows how to install the 40-pin rectangular connector into the open 8088 sockets on your PC's system board. Note that the cable connector's pin 1 indicator (a stripe on the cable) aligns with *pin 21* of the 8088 connector. Be careful not to bend the connector pins.



**Figure 2-9. Installing the FlashPak Ribbon Cable onto the PC System Board (as Viewed from Front of PC).**

**STEP 5**

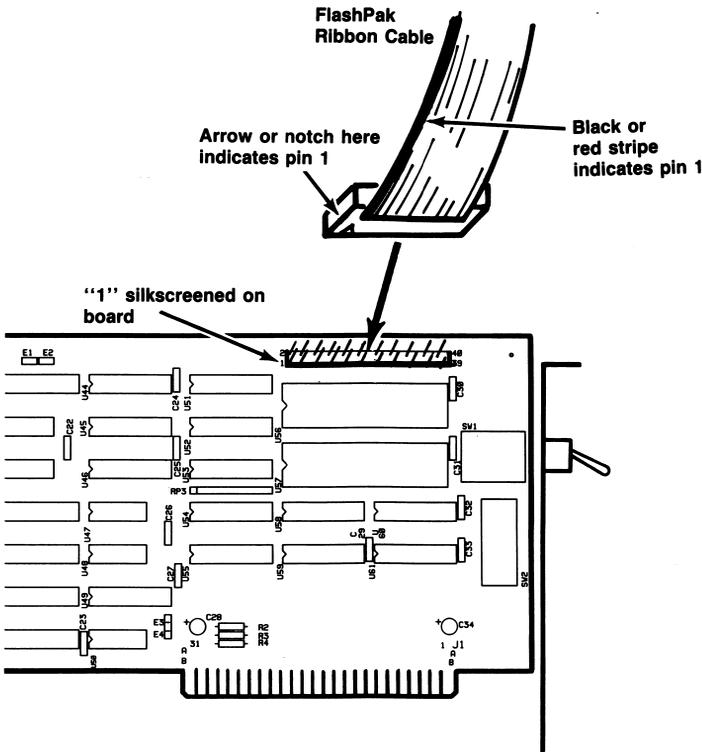
*Install FlashPak into the PC:* Line up the FlashPak board and position its front bottom corner in the card guide channel. Lower the board until its edge connector is resting on the expansion slot receptacle. Using an evenly distributed pressure, press the FlashPak board straight down until it seats in the expansion slot (Figure 2-10).



**Figure 2-10. Installing the FlashPak Board.**

**STEP 6**

*Install the cable onto the FlashPak board:* With the pin 1 indicators as shown in Figure 2-11, push the free end of the FlashPak ribbon cable onto the connector on the FlashPak board.



**Figure 2-11. Installing the FlashPak Ribbon Cable onto the FlashPak Board Connector.**

**STEP 7**

*Secure the board to the rear of the PC chassis:* Use the screw you removed from the expansion pin slot cover in STEP 2.

**STEP 8**

*Replace PC cover:* Carefully slide the cover from the front until it stops securely against the rear panel. Reinstall the cover mounting screws you removed in STEP 2.

**STEP 9**

*Install cables:* Replace the power cord to the system unit and be sure that the keyboard and the monitor connectors are plugged in. Reattach any other cables and connectors you removed previously.

*If your PC will also have a RAMpage! board installed:* See Section 3 for software installation directions.

*Recheck the FlashPak toggle switch:* For operation in fast mode, the FlashPak toggle switch must be in the “down” position.

*Now you are ready to power up.*

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## SECTION 3

# SOFTWARE CONFIGURATION AND INSTALLATION

This section tells you how to install and configure software in order to use AST enhanced expanded memory specification (EEMS) products (such as AST's *RAMpage!* or SixPakPremium) with FlashPak. You do not need to read this section if you are not using an AST EEMS product with FlashPak.

### NOTE

If you own an AST EEMS product and will be using it with FlashPak and DESQview, you are entitled to receive updated SuperPak and DESQview software from AST. If you do not have SuperPak version 6.0 (or later) or DESQview version 1.11 (or later), fill out the FlashPak Updated Software Request Form at the beginning of this manual.

The SuperPak diskette contains REMM.SYS, the AST Research EEMS software driver. REMM.SYS (version 2.70 or later) *must* be loaded with the CONFIG.SYS file on your PC's boot disk in order to use AST EEMS memory with FlashPak.

AST EEMS products use REMM.SYS to provide expanded memory (memory beyond the conventional 640-KB PC memory limit) for your PC. Expanded memory allows your PC to run new versions of popular applications software (including DESQview™, Symphony™ 1.1, and Framework II™). For further information on REMM.SYS, see your AST Research EEMS product user's manual.

Follow this procedure to install REMM.SYS on your boot diskette:

**STEP 1**

*Back up the SuperPak diskette:* Store the original SuperPak diskette in a safe place. You can then use the master diskette to back up your software if your working diskette is lost or damaged.

**STEP 2**

*Copy REMM.SYS:* Copy the REMM.SYS file from the version 6.0 (or later) SuperPak diskette to your boot disk. If the boot disk already contains a previous version of REMM.SYS, overwrite the old REMM.SYS with the current version of REMM.SYS.

**STEP 3**

*Create or modify CONFIG.SYS:* The CONFIG.SYS file contains DOS commands that configure your PC and install the software drivers that allow external devices (such as EEMS products) to work.

Check the contents of your CONFIG.SYS file by typing:

**TYPE x:CONFIG.SYS <Enter>**

where x: is the drive that contains your boot disk.

If your CONFIG.SYS file does not exist, or does not contain the "DEVICE = REMM.SYS" statement, you can use any word processor or editor software to add the following line to the CONFIG.SYS file on your PC's boot diskette:

**DEVICE = REMM.SYS**

If this line already exists in your CONFIG.SYS file, you do not need to change it. If the "DEVICE = REMM.SYS" line includes other parameters, you do *not* need to change them.

When adding “DEVICE = REMM.SYS” to your CONFIG.SYS file, remember:

- The “DEVICE = REMM.SYS” line should follow any lines in the CONFIG.SYS file that do not pertain to expanded memory.
- “DEVICE = REMM.SYS” should precede any other EEMS-related lines (such as “DEVICE = REX.SYS” or “DEVICE = FASTDISK.SYS”) in the CONFIG.SYS file.

#### **STEP 4**

*Now the software installation is complete:* Once you’ve installed the new REMM.SYS, you can boot up your PC with the updated boot disk (press <Ctrl>-<Alt>-<Del>).

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## SECTION 4

### USING FLASHPAK

Once you install FlashPak in your PC and boot up, you should not be aware of it — except that your PC's performance is greatly accelerated. Although FlashPak operates transparently to the user, this section provides further information, including:

- How to tell if your applications software is compatible with FlashPak (Section 4.1).
- Changing FlashPak processing modes from fast (9.54 MHz) to nonaccelerated (4.77 MHz) processing speeds (Section 4.2).
- Disabling and enabling FlashPak cache memory via software — intended for software developers and programmers (Section 4.3).
- Using FlashPak with AST EEMS products (Section 4.4).

#### NOTE

Some software packages may include setup utilities that customize the software for your system's processor speed. See your software dealer for details.

#### 4.1 Applications Software Compatibility

Although FlashPak is designed to speed the execution time of your applications software, certain programs may not be compatible with FlashPak's fast mode.

Software that does not operate properly with FlashPak might depend on the nonaccelerated 4.77-megahertz (MHz) clock cycle of the 8088 microprocessor. If the applications software also does not work on a PC-AT (which has a faster clock cycle than the standard PC), it is probably incompatible with FlashPak's fast (9.54 MHz) mode. Ask your software dealer for more information.

Section 4.2 tells you how to change processing modes so you can run applications software that is incompatible with FlashPak's fast mode.

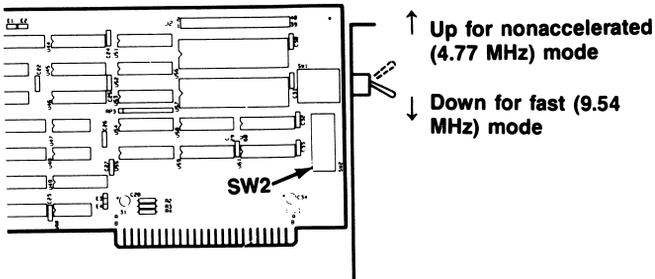
## 4.2 Changing Processing Modes

If your software is incompatible with FlashPak's fast mode, return to standard mode: turn off your PC, flip the FlashPak toggle switch to the "up" position, then turn on your PC. Figure 4-1 shows the FlashPak toggle switch settings.

- ↑ Up for nonaccelerated (4.77 MHz) mode
- ↓ Down for fast (9.54 MHz) mode

### NOTE

You must turn off your PC, then reboot when changing the FlashPak processing mode. Be sure to exit the software you are currently using before rebooting your PC.



**Figure 4-1. Setting the FlashPak Processing Mode.**

### 4.3 Disabling/Enabling Cache

This section tells you how to set up your FlashPak board to allow software disable/enable of the cache via software — even if your FlashPak board switches are set to enable cached memory.

#### NOTE

This information in this section is intended for software developers and programmers, and is not required for general users.

## Using FlashPak

You would want to disable cache memory when you test your PC's memory, for example (however, the IBM PC Power On Self Test functions properly with cache enabled). Using software to enable and disable the cache saves you the trouble of having to open your PC and reset switches.

Use the following procedure to disable and enable cache memory:

Write **x0** to I/O address 42s9 to disable cache.

Write **x1** to I/O address 42s9 to enable cache.

where:

xx is any byte whose least significant bit is 1 (to enable cache memory) or 0 (to disable cache memory).

s is the third digit of the base I/O address for your FlashPak board. (Appendix A gives further details on the FlashPak settings for the base I/O address.)

For example, let's say your FlashPak board is configured to use base I/O address 0218 (to ensure compatibility, FlashPak and your expanded memory board must be set for the same base I/O address). You would then write to I/O address 4219 to disable and enable the cache.

In BASIC, the cache enable command would be:

```
OUT 4219,1
```

The cache disable command would be:

```
OUT 4219,0
```

In DEBUG, the cache enable command would be:

```
-O 4219 1
```

The cache disable command would be:

```
-O 4219 0
```

Writing to I/O address 42s9 also erases all cached information, allowing a complete update.

## **4.4 Using FlashPak with AST EEMS Products**

SuperPak contains the AST EEMS software driver (REMM.SYS) that allows AST EEMS products to work with FlashPak. REMM.SYS *must* be loaded with the CONFIG.SYS file on your PC's boot disk in order to use expanded memory.

### **NOTE**

You must use SuperPak version 6.0 (or later) to ensure compatibility with AST enhanced expanded memory specification (EEMS) products. Section 3 tells you how to install and configure EEMS software.

REMM swaps memory between expanded memory and PC memory by creating pointers, loading the registers, and mapping PC windows to expanded memory.

*Expanded memory* is memory beyond the conventional 640-kilobyte (KB) PC memory limit, which allows your PC to run new versions of popular applications software (including DESQview, Symphony 1.1, and Framework II). For further information on EEMS memory, see your AST EEMS user's manual.

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## APPENDIX A

### SWITCH SETTINGS

This section provides more detailed information on FlashPak hardware configuration.

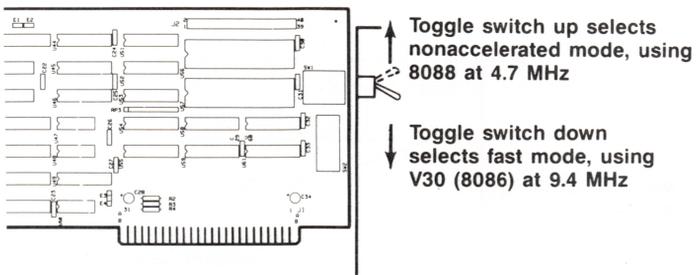
#### A.1 Processor Mode

The toggle switch on the FlashPak bracket determines whether FlashPak operates in fast or nonaccelerated mode, as shown in Figure A-1.

#### NOTE

You must turn off your PC and reboot when you change processing modes.

The toggle switch is visible at the back of the PC when FlashPak is installed. Fast mode causes FlashPak to use the 16-bit NEC V30 microprocessor (or the Intel 8086, if installed), which operates at a clock speed of 9.54 megahertz (MHz). Nonaccelerated mode causes FlashPak to use the 8-bit IBM PC 8088 microprocessor, whose clock speed is 4.77 MHz.



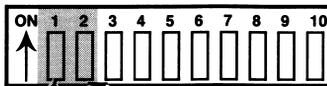
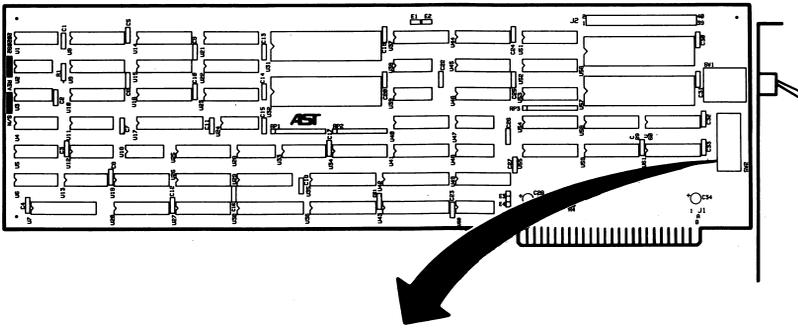
**Figure A-1. Processor Mode Switch Settings.**

## A.2 Math Coprocessor Installed

Figure A-2 shows how to set switches SW2-1 and SW2-2 to tell FlashPak whether or not math coprocessor(s) are installed. (The math coprocessor is available in two speeds: the 8087 runs at 4.77 MHz, and the 8087-1 runs at 9.54 MHz.)

This parameter actually tells FlashPak whether to accept or ignore interrupts from the math coprocessor(s), if installed. Do not set the switch to accept an interrupt from a coprocessor that is not installed.

The math coprocessor generates a nonmasked interrupt (NMI) in case of an incorrect instruction (dividing by zero, for example). See your software manual or dealer for further information.



ON = Nonaccelerated (8087) math coprocessor not installed\*

Off = Nonaccelerated (8087) math coprocessor installed

ON = Fast math coprocessor (8087-1) not installed\*

OFF = Fast math coprocessor (8087-1) installed

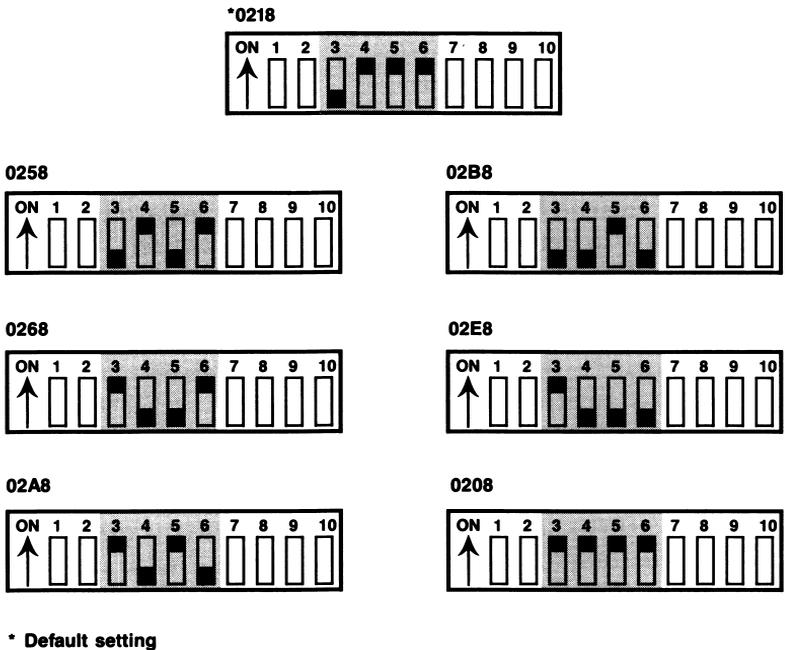
\* Default setting

**Figure A-2. Math Coprocessor Installed.**

### A.3 I/O Address

The I/O address tells the PC where it can communicate with the FlashPak board. The FlashPak I/O address should not be used by any other device — except an AST Research enhanced expanded memory specification (EEMS) board (such as *RAMpage!* or *SixPakPremium*), if installed (Section A.3.1 discusses using FlashPak with EEMS boards).

Figure A-3 shows the FlashPak I/O address settings.



**Figure A-3. FlashPak I/O Address Settings.**

### A.3.1 Using FlashPak with EEMS Boards

If you are installing an EEMS product and FlashPak in the same PC, they must use the same I/O address.

If there are two or more EEMS boards in your PC (each EEMS board uses a different I/O address), use the address used by your EEMS board that is closest to the top of this list:

0218  
0258  
0268  
02A8  
02B8  
02E8  
0208

If an AST Research EEMS product is already installed in your PC, it's easy to determine the I/O address to use for FlashPak. When you turn on your PC, it will display a message similar to this when initializing REMM.SYS software:

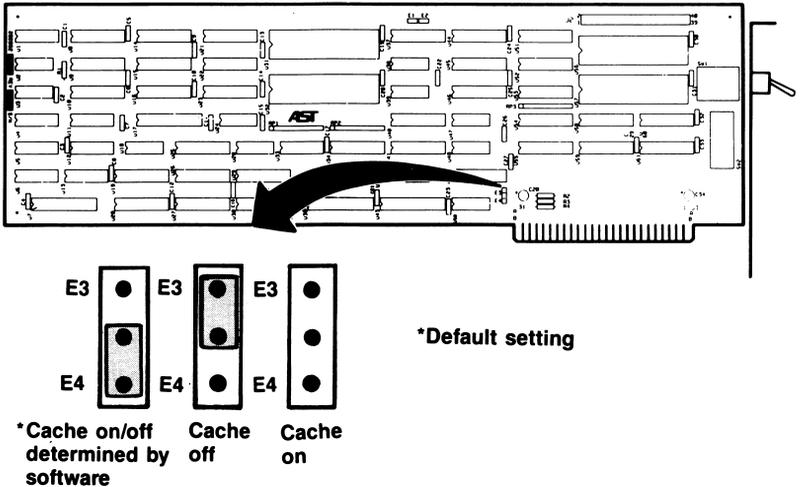
```
RAMpage Expanded Memory Manager      Version x.xx  
© Copyright AST Research, Inc. 1985, 1986    All rights reserved  
2048 KB ok, board at port 0258  
1664 KB ok, board at port 0218
```

Set the FlashPak I/O address to the last address shown in the bootup message (0218 in the example above). Notice also that 0218 is the I/O address closest to the top of the list.

### A.4 Cache On/Off Select

Figure A-4 shows the jumper settings that determine whether the cache is always enabled, always disabled, or whether the cache can be enabled and disabled by your software. This setting overrides the cached memory range setting (as determined by SW2-7 through SW2-10, described in Section A.5).

For more information on cache disable/enable via software, see Section 4.3.



**Figure A-4. Cache On/Off Select.**

## A.5 Cached Memory Ranges

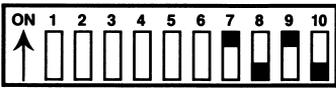
Switches SW2-7 through SW2-10 select the areas of PC memory to be cached, and excludes all other areas from caching. Figure A-5 shows the switch settings.

The default setting caches memory ranges 0-640 kilobytes (KB) and the BASIC ROM memory area (976-992 KB). This setting will work for any application where you want to use the cache. However, you can change the switch settings for more accelerated operation (such as when using an AST Research EEMS product).

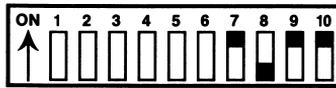
## Switch Settings

To ensure proper operation of a device installed in your PC, do not cache the areas of memory used by that device. For example, the IBM PC fixed disk controller uses the memory range from 784 to 800 KB, so you must exclude that area of memory from caching. To prevent data loss, **DO NOT** set the cached memory parameter for a memory range that is not actually installed in your PC.

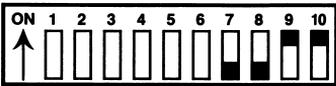
This parameter can be overridden by the cache on/off select jumper setting (see Section A.4).



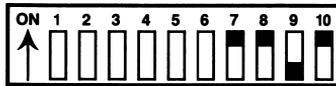
**\*0-640 KB + BASIC (default setting, appropriate for most applications). Your PC must have 640 KB installed.**



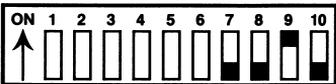
**0-256 KB cached (use this setting if you have only 256 KB of system memory).**



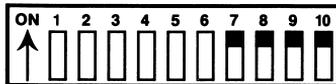
**0-512 KB cached (use this setting if you have only 512 KB of system memory).**



**0-640 KB cached (use this setting if you are running a BASIC program that is incompatible with cache). Your PC must have 640 KB installed.**



**0-640 KB + BASIC + 832-960 KB (CC000-EFFFh) cached (use this setting for maximum performance with AST EEMS boards and software written to EEMS). Your PC must have 640 KB installed. Do not use this setting for non-AST expanded memory boards.**



**Cache disabled (use this setting to turn off cache).**

\* Default setting

**Figure A-5. Cached Memory Range Settings.**

## APPENDIX B

### GLOSSARY

This appendix defines some of the terms used in this manual.

#### **Cache**

A high-speed random access memory (RAM) buffer that contains the most-recently accessed data and instructions from PC memory.

#### **CONFIG.SYS**

A DOS file that contains the commands that configure your PC and install the software drivers for devices added to the PC.

#### **Conventional memory**

Memory upgradeable to the maximum 640 kilobytes (KB) of addressable user memory recognized by the Disk Operating System (DOS).

#### **EEMS**

The AST Research enhanced expanded memory specification. The EEMS is a superset of the enhanced memory specification (EMS), and supports software written to the EMS. Software written to the EEMS (such as the DESQview multitasking/windowing environment) provide superior performance. EEMS boards include *RAMpage!* and SixPakPremium.

#### **Expanded memory**

Memory beyond the conventional 640-KB limit. Expanded memory uses a technique called memory paging that allows certain popular applications software to use more than 640 KB on an IBM PC or compatible.

**Fast mode**

The FlashPak operational mode that causes your PC to use the NEC 16-bit V30 microprocessor (or the Intel 8086, if installed), which operates at a clock speed of 9.54 megahertz (MHz) — twice the speed of the standard IBM PC 8088 microprocessor.

**I/O address**

The address the PC uses to communicate with an installed device. Do not change the FlashPak I/O address setting except to avoid a conflict with another device installed in your PC. If you have an AST Research EEMS board installed in your PC, you should set the FlashPak for the same I/O address.

**Math coprocessor**

A specialized processor chip (supported by a growing number of applications) that enables your PC to perform high-speed, highly-accurate arithmetic, logarithmic, and trigonometric functions in parallel with the processor. Parallel processing saves time by allowing the processor to do other work while the math coprocessor performs its calculations. The Intel 8087-1 is designed to operate at 9.54 MHz (for use in fast mode), while the Intel 8087 operates at 4.77 MHz (for use in nonaccelerated mode).

**Nonaccelerated mode**

The FlashPak operational mode that causes your PC to use the Intel 8-bit 8088 microprocessor, which operates at a clock speed of 4.77 MHz — half the speed of fast mode.

***RAMpage!***

AST's expanded memory product. FlashPak is designed to be compatible with *RAMpage!*

**REMM.SYS**

The *RAMpage!* Expanded Memory Manager (REMM) software driver. REMM.SYS *must* be loaded with the CONFIG.SYS file on your PC's boot disk in order to use AST expanded memory.

**SixPakPremium**

AST's expanded memory product. FlashPak is designed to be compatible with SixPakPremium.

**Software driver**

Programs that allow devices that are added to the CONFIG.SYS file (such as the AST Research REMM.SYS expanded memory program) to work as an integral part of the system. Software drivers provide an interface between an external device and DOS.

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## APPENDIX C

### PRODUCT REPAIR PROCEDURE

If your AST Research product ever requires repair, contact your dealer first. The dealer from whom you originally purchased the product can usually service the product. If you must return a hardware product to the factory for service, follow these guidelines to ensure rapid, accurate turnaround:

1. *Call AST Research Technical Support for a Return Authorization Number (RAN):* A technician will discuss the problem with you; if factory service is required, the technician will give you a Return Authorization Number (RAN). Always refer to the RAN when you return anything for service. AST Research will return anything without a RAN to the sender.
2. *If the product is covered under an AST Research warranty:* There is no charge for parts or labor involved in the repair. Please include a copy of your original purchase receipt as the proof of date of purchase for all warranty repairs.

*If the product is not covered under an AST Research warranty:* Contact your dealer or AST Research Technical Support for further information.

3. *Parts not covered under the warranty:* Dealer- or user-installed parts (such as RAM chips) are not covered under the terms of the warranty. Dealer-installed parts are warranted by the dealer; parts that you install are covered only by the parts suppliers' warranties. If we find that your dealer- or user-installed parts are defective, we can identify which parts are defective, but we will not replace parts unless you specifically authorize us to do so in

writing when you send the board to us. The parts charges and any applicable labor charges will be billed COD.

4. *Describe the problem and return any related accessories:* Please include a brief but explicit written description of the problem when you return your AST product to the factory for repair. Also return any accessories that might relate to the problem. For example, if the the parallel port does not function correctly, be sure to return the parallel port adapter cable with the board.
  
5. *Be sure to provide a return shipping address that UPS can deliver to and include your RAN:* UPS cannot normally deliver to post office boxes. Reference the RAN issued to you by AST Technical Support on all correspondence. Securely package all materials to prevent shipping damage. Shipping charges must be prepaid; CODs will not be accepted. Ship the materials to the following address:

AST Research, Inc.  
Customer Service—RAN xxxx  
2722 Michelson Avenue  
Irvine, CA 92715

where xxxx is your assigned Return Authorization Number.

6. Once your product is repaired, we will return it to you by UPS or UPS Blue Label service, whichever is appropriate for your geographical location. We will return items covered by warranty at our expense. Shipping costs and repair expenses for items not covered by warranty will be billed COD. If you prefer overnight service (UPS Red Label), the shipping charges will be billed COD. If you want us to ship Federal Express, please give us your Federal Express account number for billing purposes.

## **LIMITED WARRANTY**

AST Research, Inc. warrants to the original purchaser of this AST Research, Inc. product that it is to be in good working order for a period of two years from the date of purchase from AST Research, Inc. or an authorized AST Research, Inc. dealer. Should this product, in AST Research, Inc.'s opinion, malfunction during the warranty period, AST will, at its option, repair or replace it at no charge, provided that the product has not been subjected to misuse, abuse, or non-AST authorized alterations, modifications, and/or repairs.

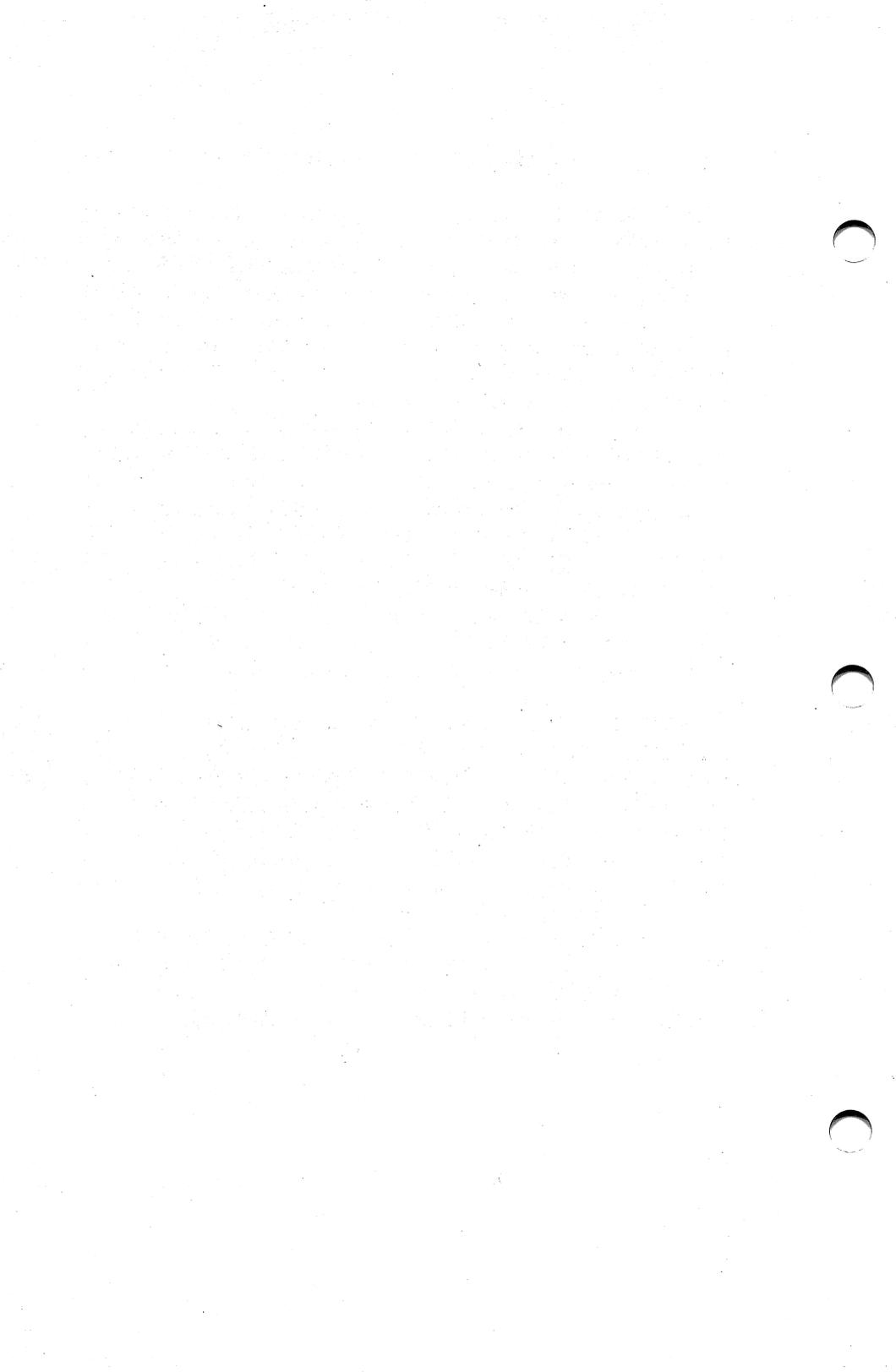
Products requiring Limited Warranty service during the warranty period should be delivered to AST with proof of purchase. If the delivery is by mail, you agree to insure the product or assume the risk of loss or damage in transit. You also agree to prepay shipping charges to AST.

**ALL EXPRESS AND IMPLIED WARRANTIES FOR THIS PRODUCT INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE ABOVE TWO-YEAR PERIOD.** Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.

**UNDER NO CIRCUMSTANCES WILL AST RESEARCH, INC. BE LIABLE IN ANY WAY TO THE USER FOR DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF, OR INABILITY TO USE, SUCH PRODUCT.** Some states do not allow the exclusion or limitation of incidental or consequential damages for consumer products, so the above limitations or exclusion may not apply to you.

**THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.**

The limited warranty applies to hardware products only.



**AST RESEARCH, INC.**

**Product Comment Form**

**FastPak User's Manual  
000332-001 A**

We appreciate your comments regarding any problems or suggestions related to AST Research products. Please use this form to communicate any observations that you have concerning the improvement of either the product itself or the product documentation provided in this manual.

**Submitter Information**

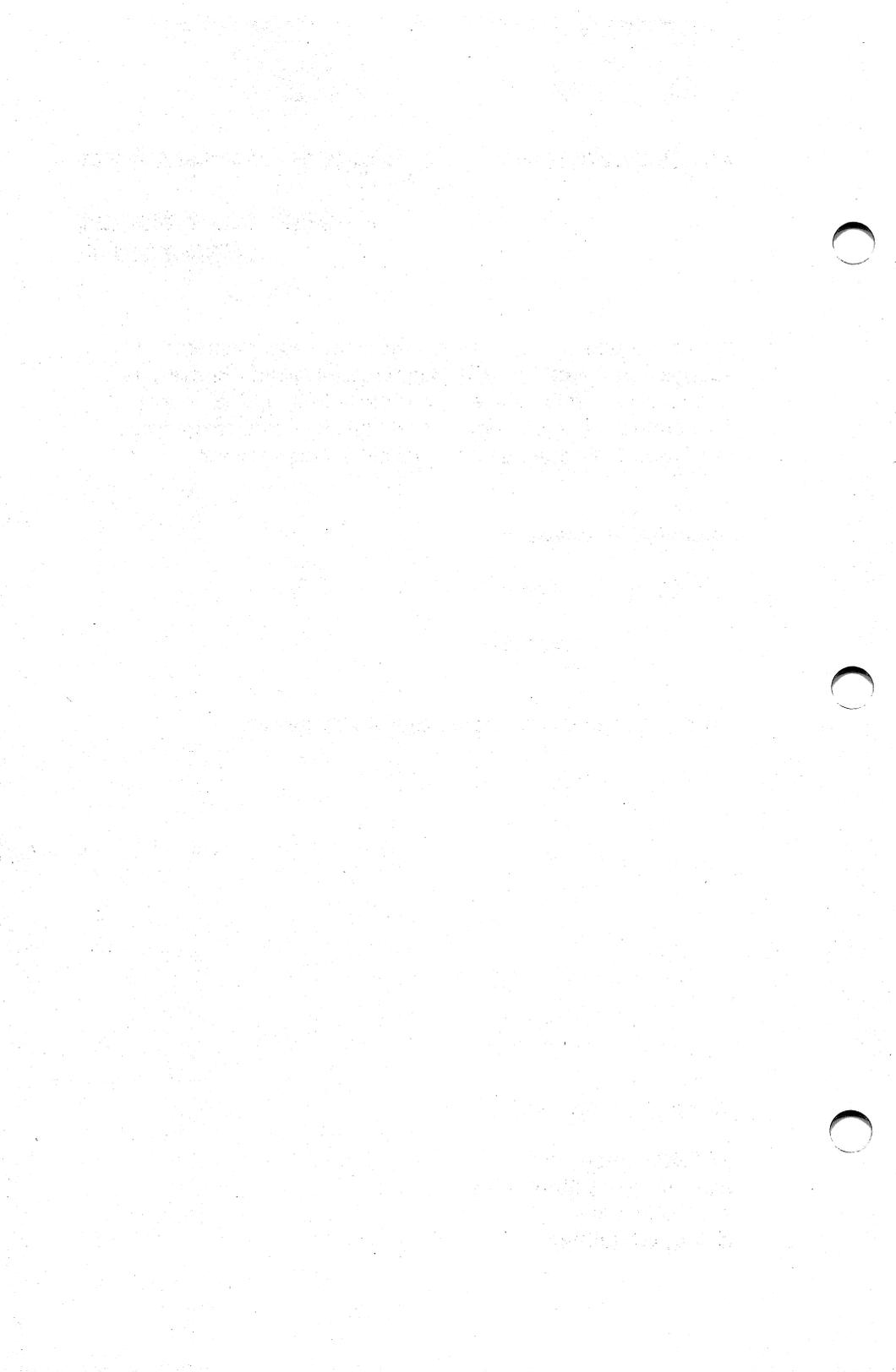
Submitter's name:

Address:

**Product/Manual Comments and Suggestions**

Please mail this form to:

**AST Research, Inc.  
Attn: Product Marketing  
2121 Alton Ave.  
Irvine, CA 92714**





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