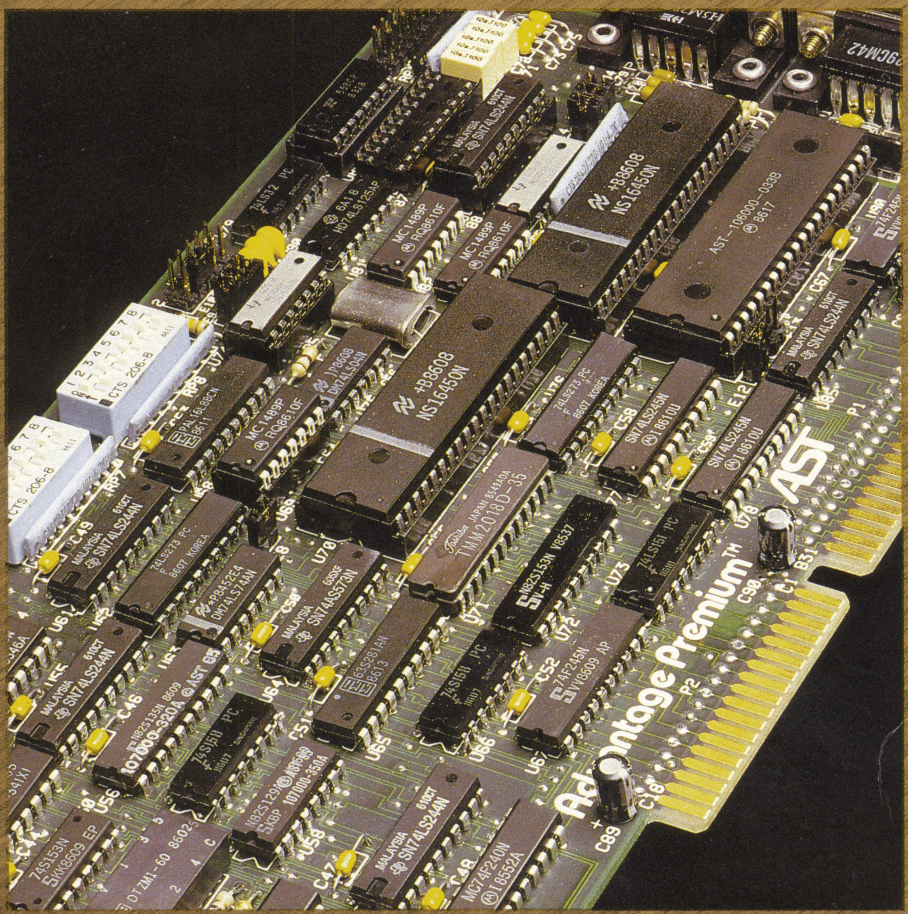
Premium Series Products

ADVANTAGE PREMIUM™

AST RESEARCH INC.

Powerful Expanded Memory/Multifunction Board for the IBM® PC AT Family and Compatibles.



THE AST PREMIUM SERIES

User's Manual

FCC WARNING

This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to a computer that complies with Class B limits. Operation with non-certified peripherals is likely to result in interference to radio and TV reception. When connecting to a peripheral device, a shielded I/O cable is required to ensure compliance with FCC rules.

Instructions to User

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

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits.
- Ensure that board slot covers are in place when no board is installed.
- Ensure that all brackets are fastened securely to the PC chassis.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission (FCC) helpful: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington, DC 20402. Stock No. 004-000-00345-4.

Advantage Premium

Expanded Memory/Multifunction Card

for the

IBM Personal Computer AT

and

Other IBM PC-AT-Compatible Computers

User's Manual
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AST Research, Inc.
Irvine, California
(714) 863-1333

First Edition (June 1986)

Changes are periodically made to the information contained in this manual; these changes will be incorporated into new editions.

In view of demonstrated product reliability and comprehensive warranty policies, AST Research, Inc. does not normally provide schematics or material lists. AST recognizes that some customers with a large installed base of AST products want supportive documentation for their own service organizations. In such cases, customers should contact AST Research corporate offices to consider an appropriate nondisclosure agreement to obtain this documentation.

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SECTION 1

INTRODUCTION

The AST Advantage Premium™ and the optional Premium-Pak AT™ combine to form a flexible and powerful multifunction enhancement that represents a new generation of products to expand your PC-AT's available memory and input/output (I/O) capabilities. Advantage Premium offers:

- *Conventional memory.* Any PC-AT system memory from 0 to 640 kilobytes (KB) is called conventional memory.

  Your PC-AT system board contains a certain amount of conventional memory, and add-on boards (such as Advantage Premium) can give your PC-AT additional conventional memory. No matter how much memory you install in your computer, you can never have more than 640 KB of conventional memory. The IBM PC Disk Operating System (DOS) can directly use all the conventional memory in your PC-AT.

- *Extended memory.* PC-AT memory in the 1-to 16-megabyte (MB) range is called extended memory. (Extended memory is also called "linear" or "non-paged" memory.)

  Extended memory is used by the PC-AT microprocessor when it operates in protected mode (the IBM® PC-AT *Technical Reference Manual* provides further information on protected mode). AST's SuperPak™ random access memory (RAM) drive and print spooler software, IBM's VDISK, and the XENIX™ operating system use extended memory. However, current versions of DOS and most application programs cannot access extended memory directly.

- *Expanded memory.* Memory installed in your computer beyond the conventional 640-KB limit. Advantage Premium expanded memory supports expanded memory specification (EMS) software, including Lotus 1-2-3 Release 2™ and Symphony 1.1™.

  Advantage Premium also supports the enhanced expanded memory specification (EEMS), providing superior performance wih software written to support it, including the DESQview™ multitasking/windowing environment.

  AST expanded memory software allows your PC-AT to access up to 8 MB of memory (using four 2-MB AST expanded memory boards, including Advantage Premium and RAMpage AT™), while maintaining DOS compatibility.

  To ensure compatibility, use only AST expanded memory products (such as RAMpage AT) in addition to Advantage Premium.

- *Full compatibility with the Lotus/Intel/Microsoft (LIM) version 3.2 Expanded Memory Specification (EMS).* In addition, AST's EEMS offers a more flexible paging scheme that maximizes software performance and exceeds the capabilities of the LIM EMS.

- *I/O capabilities*, including an RS-232C serial asynchronous communications port (a second second serial port is also available), a parallel port, and an optional game port.

Your Advantage Premium comes with these valuable SuperPak utility programs:

- RAMpage Expanded Memory Manager (REMM) and RAMpage Extended Memory Emulator (REX) software.

- *fASTdisk*, a program that simulates fixed disks in RAM. A fASTdisk can be as large as total PC-AT memory, and allows you to store and retrieve data and programs at RAM speeds.

- *SuperDrive*™, a floppy disk emulation program that allows you to use part of your memory as a superfast "electronic disk drive".

- *SuperSpool*™, an intelligent print spooler that allows you to output files to a printer while freeing your PC-AT for other tasks.

- *INSTALL*, a software installation utility that allows easy installation of the fASTdisk, SuperDrive, SuperSpool, and RAMpage programs.

Your SuperPak diskette may also include other software (which may pertain to other AST products). The README file on your SuperPak diskette describes the programs included in your SuperPak software.

1.1 Getting Started

This section tells you how to get Advantage Premium started.

STEP 1
Check the contents of your Advantage Premium package. Section 1.2 provides a checklist of what should be included with your package.

STEP 2
Review the system requirements for Advantage Premium. Read Section 1.3 to make sure your system meets the requirements for using Advantage Premium.

STEP 3
Decide on the configuration you need. How you configure Advantage Premium depends on:

- How much memory is already installed in your PC-AT.
- Whether you will use DESQview.
- How much Advantage Premium memory you want to allocate as *expanded memory.*
- Whether you have an AST *Advantage!™*, *RAMvantage!*, RAMpage AT, FlashPak, or another Advantage Premium board installed in your PC.
- Whether you want to use the serial, parallel, or game port(s).

STEP 4
Configure Advantage Premium. Based on the requirements you determined in STEP 3, set the jumpers and switches on your Advantage Premium board. You can use the configuration set at the factory (the *default configuration*) if:

- 128 KB or less of Advantage Premium memory allocated as conventional or extended memory.
- No other AST board installed in your system.
- The Advantage Premium serial port is the only serial port in your system.
- The Advantage Premium parallel port is the only parallel port in your system.

If the default configuration doesn't meet your needs, you must configure the board yourself. The Advantage Premium board has a number of switches and jumper blocks on it.

A *jumper block* is a set of bare pins. You can connect two adjacent pins by installing a jumper across them. A *jumper* is just a little piece of metal that connects onto the two pins, and is usually encased in a small plastic case.

The switch settings and jumper positions determine how Advantage Premium is configured. Section 2 tells you how to set the switches and jumpers for the different configurations you might require.

STEP 5
Configure the PC-AT system board. You must check the position of a jumper on the PC-AT system board. This jumper determines how much system board memory the PC-AT will recognize. Section 3 tells you how to check the position of the PC-AT system board jumper.

STEP 6
Install Advantage Premium. Once the Advantage Premium board is configured, you must install it in your PC. Follow the instructions in Section 3.

STEP 7
Install the software that comes with Advantage Premium. Section 4 tells you how to use AST's INSTALL program to configure and install the Advantage Premium software.

STEP 8
Start your application software package. Choose EEMS- or EMS-compatible application software. See the instructions that came with your software.

1.2 Checklist

Before you get started, check that your Advantage Premium package includes the following:

- Advantage Premium circuit board.
- SuperPak diskette (version 6.10 or later).
- *Advantage Premium User's Manual.*

- *SuperPak User's Manual.*
- Premium-Pak AT piggyback board and four nylon standoffs (if the Premium-Pak AT option is included).
- Second serial port ribbon cable and bracket (if the second serial port option is included).
- Game port ribbon cable and bracket (if the game port option is included).

1.3 System Requirements

The minimum hardware requirements for operation with Advantage Premium are an IBM PC-AT or AT-compatible with one floppy diskette drive and an unused two-connector expansion slot.

Advantage Premium software is compatible with DOS 2.0 or later (the IBM PC-AT uses DOS 3.0 or later), or an MS-DOS equivalent.

1.4 Features

Each Advantage Premium product features:

- Up to 2 MB of expanded memory beyond the normal PC-AT conventional memory limit of 640 KB. You can install as many as four 2-MB AST enhanced expanded memory boards in a single PC-AT, thus increasing the available memory by 8 MB. A typical maximum configuration might be one Advantage Premium with Premium-Pak AT installed (to provide 2 MB plus I/O capabilities) with three RAMpage AT boards (to provide 6 MB of memory only).

- Supports *conventional memory, expanded memory, and extended memory.* You can use up to 640 KB of Advantage Premium memory to round out conventional memory to its 640-KB limit, and allocate any part of Advantage Premium memory as extended memory — remaining memory is used as expanded (paged) memory.

- Advantage Premium can start at any memory address on a 128-KB boundary, from 0 to 16 KB (excluding the 640-KB to 1 MB range).

- Memory that is user-upgradeable in 512-KB increments, using 256-KB RAM chips.

- An RS-232C serial port. You can use the serial port to interface to a modem, serial printer, remote display terminal, or other serial device.

- A parallel printer port. You can use the parallel port to connect a parallel printer or plotter to the PC-AT.

These options are available for your Advantage Premium:

- Memory expansion is available in 512-KB increments up to 1024 KB (1 MB) on the Advantage Premium board, plus additional memory of up to 1 MB on the Premium-Pak AT piggyback board (AST model number MPAD-512/120).

- A second RS-232C serial communications port (AST Model No. ADV-000S) on the Advantage Premium board that can interface to a modem, serial printer, remote display terminal, or other serial device.

- A game port (AST Model No. ADV-000G) that can be used with one or two IBM-compatible joysticks.

You can purchase these options onboard or install them at a later date. Upgrade kits are available from your dealer or AST.

Advantage Premium software offers the following features:

- The RAMpage Expanded Memory Manager (REMM) software driver, which works with applications software such as the DESQview operating environment to provide expanded memory for data and programs, and Lotus 1-2-3 Release 2 to provide expanded memory for data.

  NOTE

  To use Advantage Premium expanded memory, the REMM.SYS program *must* be installed in the CONFIG.SYS file on your boot disk. The SuperPak INSTALL program performs this installation automatically.

  Older versions of REMM.SYS and INSTALL will not work properly with Advantage Premium. To ensure compatibility, *use only the versions of SuperPak programs that came with your Advantage Premium.*

- The RAMpage Extended Memory Emulator (REX) module, which allows Advantage Premium expanded memory to emulate extended memory. This allows you to dynamically reconfigure Advantage Premium *expanded* memory as *extended* memory without having to remove the board and reset its switches.

- AST Research's RAM disk and print spooler software, including fASTdisk, SuperDrive, and SuperSpool.

- Full compatibility with the Lotus/Intel/Microsoft (LIM) version 3.2 Expanded Memory Specification (EMS). Advantage Premium is fully compatible with LIM EMS software.

- AST's enhanced EMS (EEMS) exceeds the LIM EMS and is a superset of that standard. EEMS's more flexible paging scheme allows maximum software performance, including fast access to multiple programs and multitasking under DESQview.

NOTE

You can run several application programs — which together might require much more than 640 KB — at the same time under DESQview if your Advantage Premium starting address is *256 KB* (and your Advantage Premium has enough memory installed). The more Advantage Premium memory that is allocated in the area from 0-640 KB, the greater the enhancement of DESQview's performance. Appendix G tells you more about memory allocation with DESQview.

The AST enhanced expanded memory manager identifies all open 16-KB memory pages above 640 KB as windows for accessing expanded memory. EEMS allows up to 64 pages at one time to be allocated for swapping (EMS supports 4). To significantly enhance performance, EEMS also supports the swapping of programs residing in expanded memory directly into Advantage Premium conventional memory.

NOTE

You must use a version 6.10 (or later) SuperPak diskette with Advantage Premium. For information on the SuperPak utilities, see your *SuperPak User's Manual*. All SuperPak software is fully downward-compatible, and can be used in place of any earlier SuperPak software you are now using with other AST products.

1.5 Example Memory Allocation

For example, your PC-AT has 512 KB of conventional memory installed. An Advantage Premium with Premium-Pak AT installed provides 2 MB of RAM. You would like to use Advantage Premium to accomplish the following:

- Fill out conventional memory to 640 KB.
- Allocate extended memory to create a 384-KB fASTdisk.
- Use all remaining Advantage Premium memory as expanded memory for use with applications programs running under DESQview multitasking/windowing software.

You would set Advantage Premium for 512 KB of conventional/extended memory already installed in your PC-AT, and allocate 512 KB of Advantage Premium memory as conventional/extended memory — 128 KB to round out conventional memory, and 384 KB as extended memory. The remaining 1536 KB (1.5 MB) of Advantage Premium memory would then be used as expanded memory. Figure 1-1 shows the memory map for this example application.

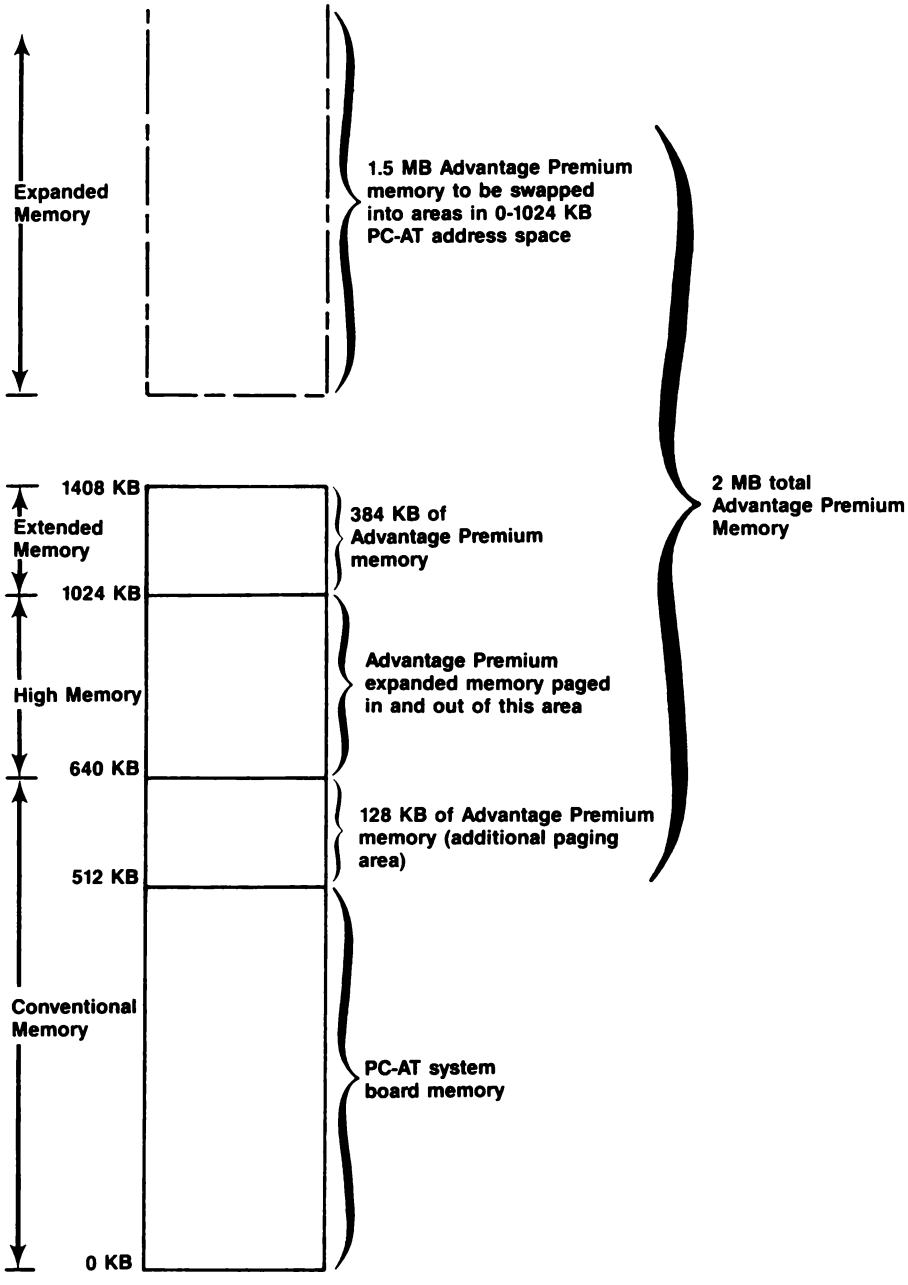

Figure 1-1. Example Memory Map.

NOTE

To use DESQview most efficiently, you should set the Advantage Premium conventional/extended memory already installed parameter at 256 KB (and set the J18 jumper on the PC-AT system board in the 256-KB position). The more Advantage Premium memory that is allocated in the area below 640 KB, the greater the enhancement of DESQview's performance. (See Appendix G for more information on memory allocation with DESQview.)

1.6 How To Use This Manual

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

1.6.1 Format Notation

The following format notation is used in this manual:

- *Boldface* is used to indicate keyboard entries the user must make.
- *Angle brackets (< >)* tell you to press a key. For example, <**Esc**> instructs you to press the "Esc" key. You do not have to press <**Enter**> unless you are specifically instructed to do so.
- System prompts and messages are indicated in color.

1.6.2 Related Documentation

This manual assumes some familiarity with the DOS operating system and the IBM PC-AT hardware. You may find it useful to have available the following documents for reference:

- IBM PC-AT *Guide to Operations*
- IBM PC-AT *Disk Operating System (DOS) Manual.*
- IBM PC-AT *Installation and Setup*
- AST Research *SuperPak User's Manual.*
- *Specification for an Expanded Memory Device Interface Product Version 1.0*, Copyright 1985 AST Research, 2121 Alton Avenue, Irvine, CA 92714.
- *Specification for the Enhanced Expanded Memory Product Software Interface Version 3.2*, Copyright 1986 AST Research, 2121 Alton Avenue, Irvine, CA 92714.
- *The Lotus® /Intel® /Microsoft® Expanded Memory Specification for Hardware Vendors*, Copyright 1985 Lotus Development Corporation, 55 Cambridge Avenue, Cambridge, MA 02142.

1.6.3 Manual Outline

The following outline describes this manual.

SECTION 1: INTRODUCTION

Describes the features of the Advantage Premium product, and provides an overview on getting started, information on system requirements, format notation, and related documentation.

SECTION 2: SETTING UP YOUR ADVANTAGE PREMIUM

Provides a quick reference guide to the most common settings for Advantage Premium and PC-AT system board. Includes a step-by-step guide through every switch and jumper setting.

SECTION 3: INSTALLING ADVANTAGE PREMIUM IN YOUR PC-AT

Tells you how to install your Advantage Premium board in your PC-AT.

SECTION 4: SOFTWARE CONFIGURATION AND INSTALLATION

Tells you how to use the INSTALL program to configure and install the software that comes with your Advantage Premium.

SECTION 5: SERIAL PORTS

Gives a detailed description of the serial port(s). You probably don't need to read this section unless you are installing the second serial port or you have a technical background.

SECTION 6: PARALLEL PRINTER PORT

Gives a detailed description of the parallel printer port. You probably don't need to read this section unless you need more information on parallel ports or you have a technical background.

SECTION 7: GAME PORT

Provides information on the optional game port. You probably don't need to read this section unless you are installing the game port option or you have a technical background.

SECTION 8: MEMORY CONFIGURATION

Tells you how to add or remove Advantage Premium and/or Premium-Pak AT memory. You don't need to read this section unless you are changing the amount of memory installed on Advantage Premium.

APPENDIX A: SWITCH AND JUMPER SETTING SUMMARY

A detailed summary of all Advantage Premium switch and jumper settings. Unless you have a particular reason to change the board configuration, you should not need the information in this appendix.

APPENDIX B: HOW ADVANTAGE PREMIUM WORKS

Gives a brief overview of how Advantage Premium works, including the concept of memory paging, descriptions of the REMM and REX software modules, and how to modify them.

APPENDIX C: RUNNING SETUP

Gives several examples of how to run the SETUP program when you install Advantage Premium in your PC-AT.

APPENDIX D: SERIAL INTERFACES

Gives general serial port wiring information, and is of interest primarily to users with technical backgrounds.

APPENDIX E: SWITCHING BETWEEN PARALLEL PRINTER PORTS

Provides a program that routes printer output from one parallel port to another.

APPENDIX F: TROUBLESHOOTING

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

APPENDIX G: MEMORY ALLOCATION WITH DESQVIEW

Includes complete information on the best Advantage Premium and system board memory allocation. Intended for DESQview users.

APPENDIX H: GLOSSARY

Defines some of the terms used in this manual.

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SECTION 2

CONFIGURING YOUR ADVANTAGE PREMIUM BOARD

This section gives a step-by-step procedure for configuring the Advantage Premium board. It provides the information you need to configure your board in most circumstances. If your system requires an unusual configuration, you can refer to other sections of this manual for more information. Appendix A provides a complete summary of all Advantage Premium switch and jumper settings.

Section 2.1 shows the Advantage Premium default configuration (how the board is configured at the factory). If the default configuration meets your needs, you can skip directly to Section 3 (Installing Advantage Premium in Your PC).

If you need to change any of the settings, Section 2.2 leads you step-by-step through each switch and jumper setting.

2.1 Quick Configuration

This section provides a quick reference guide to the most common settings for the Advantage Premium board (shown in Figure 2-1) and the IBM PC-AT system board (Figure 2-2).

If the default settings are appropriate for your system, you can skip directly to Section 3, with no further configuration. The default settings are appropriate if:

- You are installing Advantage Premium in a PC-AT that already has exactly 512 kilobytes (KB) of conventional memory installed.

- You install Advantage Premium in its default configuration (summarized in Table 2-1).

- None of the following is already installed in your PC-AT: a serial port, parallel port, or another expanded memory board.

For a step-by-step guide to changing any of the above parameters, see Section 2.2.

Table 2-1. Advantage Premium Default Configuration.

Parameter	Default Setting	Comments
	Expanded Memory Parameters	
Advantage Premium conventional/ extended memory size	128 KB (SW1-1 ON SW1-2 ON SW1-3 ON SW1-4 ON)	The amount of Advantage Premium memory that can be allocated as conventional or extended memory. Any remaining Advantage Premium memory is used as expanded memory.
Base I/O Address	0218-0219h (SW1-5 ON SW1-6 ON SW1-7 ON SW1-8 OFF)	Advantage Premium uses the I/O address to communicate with the PC-AT, allowing the PC-AT to use expanded memory. Do not change this parameter unless necessary to avoid conflict with another device in your PC-AT (such as a RAMpage-AT board).
Dual Page Mode	Enabled (SW1-9 ON)	Ensures proper multitasking operation (allows two sets of mapping registers).
	Conventional/Extended Memory Configuration	
Conventional/ extended memory already installed	512 KB (SW2-1 ON SW2-2 ON SW2-3 ON SW2-4 ON SW2-5 OFF SW2-6 ON SW2-7 ON)	Change this setting if your PC-AT has other than 512 KB of conventional memory installed or if you want to address additional Advantage Premium memory below 640 KB to enhance multitasking with DESQview (see NOTE).
	NOTE You can run several application programs — which together may require much more than 640 KB — at the same time under DESQview if your Advantage Premium starting address is 256 KB (and your Advantage Premium has enough memory installed). The more Advantage Premium memory that is allocated in the area from 0-640 KB, the greater the enhancement of DESQview's performance. Section 2.2 tells you how to change this parameter for use with DESQview.	
Parity Checking	Enabled (SW2-8 ON)	Parity checking enables memory error checking.

Table 2-1. Continued.

Parameter	Standard Configuration	Comments
	Input/Output Parameters	
Serial ports	Serial ports enabled (Jumper E8 installed)	Removing this jumper disables both Advantage Premium serial ports.
	First serial port enabled as COM1 (SW3-1 ON, SW3-2 OFF).	Do not change unless another serial port is installed in you PC.
	Second serial port disabled (SW3-3 OFF).	Do not enable unless second serial port is installed on Advantage Premium.
	IRQ4 enabled for COM1 (SW3-7 ON, SW3-8 OFF).	Do not change this setting unless you have reconfigured the first serial port as COM2.
	IRQ3 disabled for COM2 (SW1-10 OFF).	Do not change this setting unless Advantage Premium's second serial port is installed.
Serial port inputs	All inputs driven by the connected device. (Jumpers installed at E9, E10, E11, E14, E15, and E16).	You should not need to change this setting. However, you can force certain serial input signals true if required by your serial device (the manual for the serial device should tell you if you need to force serial inputs true).
Parallel port	Configured as LPT1 (SW3-4 ON, SW3-5 OFF), using IRQ7 (Jumper E12 installed).	Do not change this setting unless there is another parallel port installed in your PC.
Game port	Disabled (SW3-6 OFF).	Do not change this setting unless the optional game port is installed.

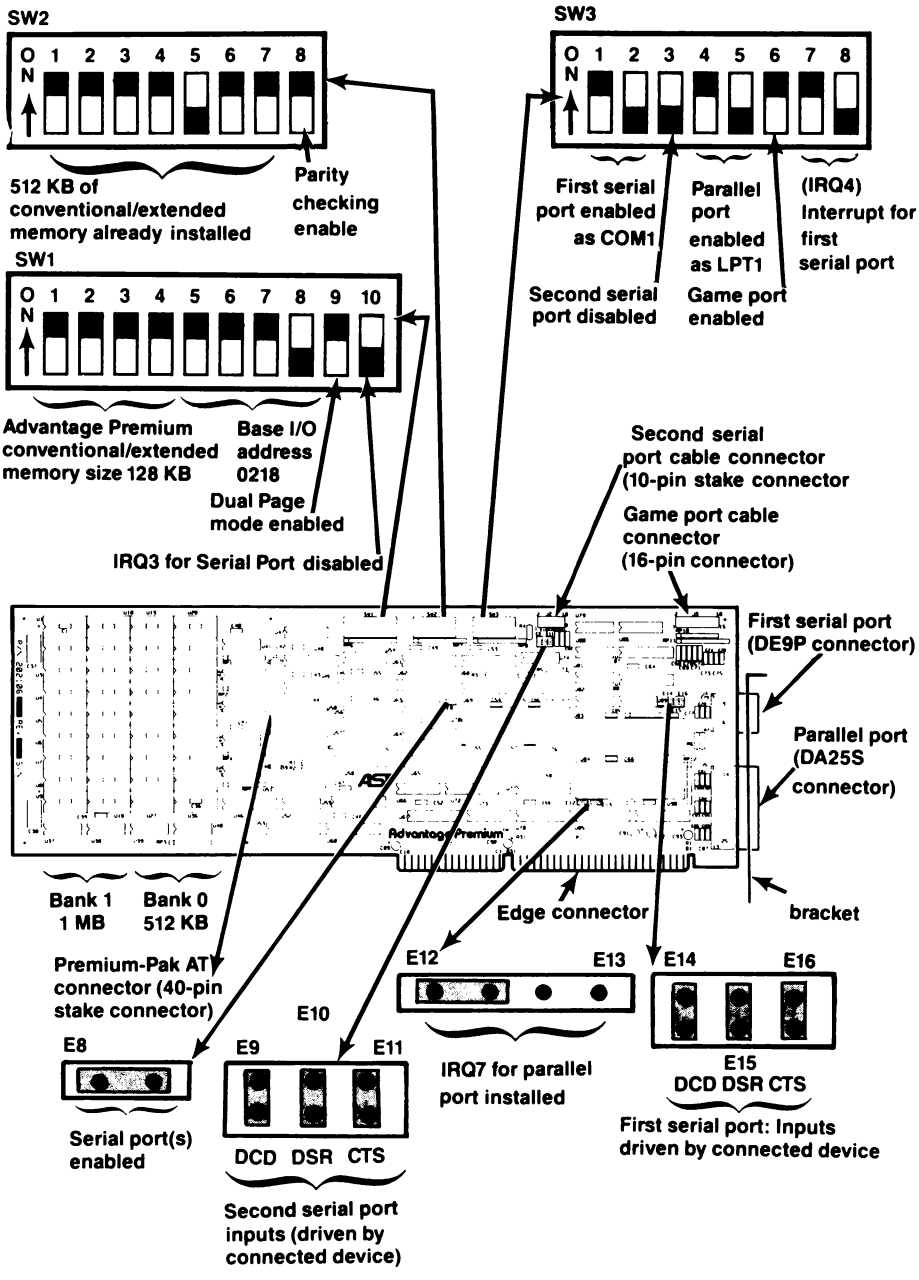
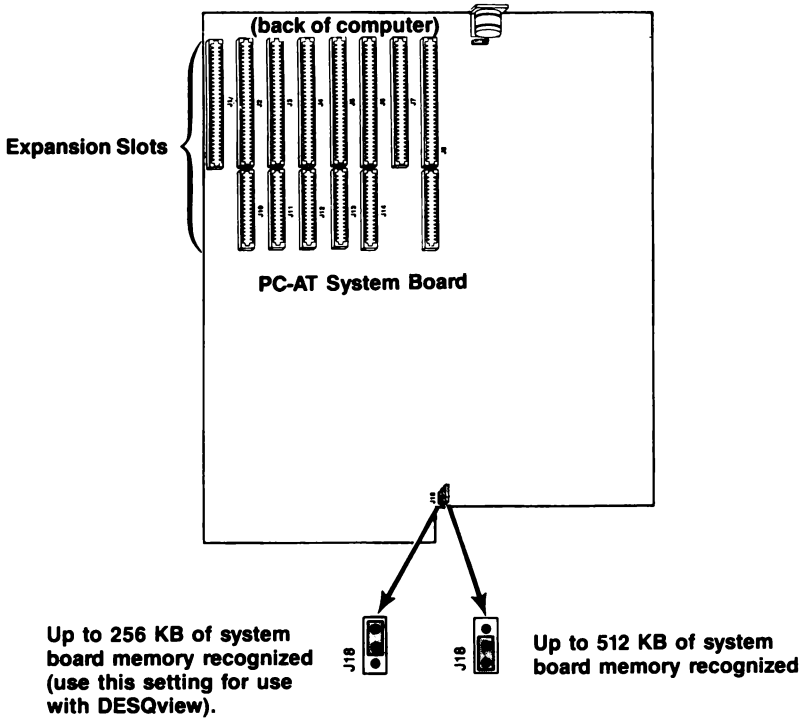


Figure 2-1. Advantage Premium Board Layout.



NOTE

You must lift the disk controller board to access this jumper.

Figure 2-2. PC-AT System Board Jumper Settings.

2.2 Basic Configuration

This section tells you what you need to know before you configure Advantage Premium, then guides you step-by-step through each switch and jumper setting on the board.

2.2.1 What You Need to Know Before You Start

Before you change the configuration of your Advantage Premium board, you need to answer the following questions.

How much conventional memory is already installed in your PC?

PC-AT system memory between 0 and 640 KB is called conventional memory. If you are unsure of how much system memory is installed in your computer, run the DOS CHKDSK command (see your *DOS* manual for more information on CHKDSK).

Be sure to include system board memory as well as any conventional memory (such as *Advantage!* memory) that has been added to your PC-AT.

How much Advantage Premium memory do you want to allocate as conventional/extended memory?

Non-paged (linear) PC-AT memory between 1 and 16 megabytes (MB) is called extended memory. Current versions of DOS and most applications programs do not access extended memory directly.

If your PC has less than 640 KB of conventional memory installed (and you do not plan to use DESQview), you will probably want to allocate enough Advantage Premium memory to round out your system memory to 640 KB.

Unless you will be running the IBM VDISK program or the XENIX operating system, or you want to use AST's SuperPak RAM drive and print spooler programs in extended memory, you probably do not want to add extended memory to your system.

If you plan to use Advantage Premium extended memory only for AST RAM disks and print spooler, you need not worry about how much extended memory you will need (set Advantage Premium only for the *conventional memory* amount). The SuperPak INSTALL program will automatically allocate the required amount of *emulated* extended memory.

Are there any other expanded memory boards installed in your PC?

If your PC-AT includes any other expanded memory boards (for example, AST's RAMpage AT board), you will need to make sure that Advantage Premium and the other board(s) are configured to avoid conflicts with each other (see Appendix A for more information on I/O addresses).

Do you want to use DESQview?

If so, you will need to make sure that the PC-AT system board is configured for optimum performance with DESQview.

How do you want to use the serial port?

The Advantage Premium serial port allows the PC-AT to communicate with serial devices such as modems, mice, or serial printers (most dot-matrix printers are parallel printers). Under DOS, the PC-AT can access a maximum of two serial ports.

DOS gives a name to each serial port attached to the PC-AT. The first serial port is called COM1. If a second serial port is installed, it is called COM2. Two different serial ports in the same computer cannot have the same name.

If the Advantage Premium serial port is the only serial port in the system, do not change the default configuration.

If a device using the name COM1 is already installed in your system, you can reconfigure the Advantage Premium serial port as COM2. You can also disable the Advantage Premium serial port if you do not want to use it.

How do you want to use the parallel port?

The Advantage Premium parallel port allows your PC-AT to communicate with parallel devices — usually printers. Under DOS, the PC-AT can access a maximum of three printers.

DOS gives a name to each parallel port attached to the PC-AT. The first is called LPT1. If second and third parallel ports are installed, they are called LPT2 and LPT3. Different parallel ports in the same computer cannot have the same name.

If the Advantage Premium parallel port is the only one in the system, do not change the default configuration.

If a device using the name LPT1 is already installed in your system, you can reconfigure the Advantage Premium parallel port as LPT2. You can also disable the Advantage Premium parallel port if you do not want to use it.

Does your Advantage Premium include the second serial port or game port options?

Unless you specifically ordered your Advantage Premium with the second serial port option or the game port option, you should not have to change the default configuration.

2.2.2 Configuring the Board

This section takes you step-by-step through the configuration of every switch and jumper on your Advantage Premium board.

STEP 1

Set SW1. Figure 2-3 shows the location and default setting for SW1.

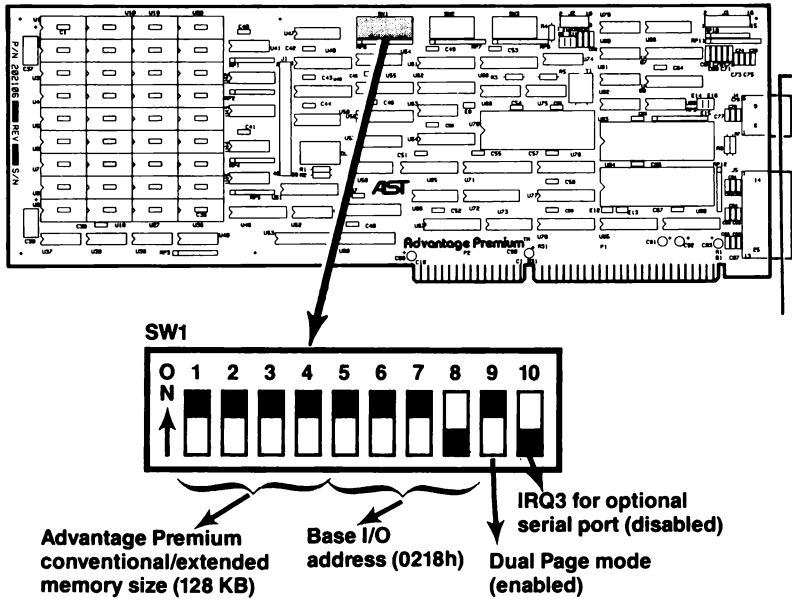


Figure 2-3. Advantage Premium Switch SW1 (Default Setting).

Advantage Premium conventional/extended memory size (default: 128 KB):

Leave switches SW1-1 through SW1-4 in their default settings if your PC-AT has 512 KB of system memory installed and you want to fill out conventional memory to 640 KB.

If you want to allocate other than 128 KB of Advantage Premium memory as conventional/extended memory, set switches SW1-1 through SW1-4 as shown in Table 2-2.

For best operation with DESQview, you might also want to reconfigure SW1-1 through SW1-4 to allocate 384 KB as conventional/extended memory. See Appendix G for more information on memory allocation with DESQview. If you plan to use Advantage Premium extended memory only for AST RAM disks and print spooler, the simplest option is to set these switches only for the *conventional*

memory amount. The SuperPak INSTALL program will automatically cause Advantage Premium expanded memory emulate the required amount of *extended* memory, thus eliminating the need to set Advantage Premium switches for extended memory.

Table 2-2. Advantage Premium Conventional/Extended Memory Size.

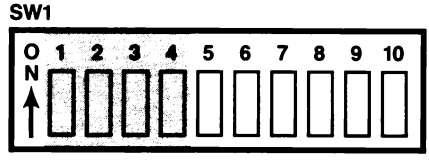
Advantage Premium Conventional/Extended Memory Size	SW1-1	SW1-2	SW1-3	SW1-4
* 128 KB	ON	ON	ON	ON
256 KB	ON	ON	ON	OFF
** 384 KB	ON	ON	OFF	ON
512 KB	ON	ON	OFF	OFF
640 KB	ON	OFF	ON	ON
768 KB	ON	OFF	ON	OFF
896 KB	ON	OFF	OFF	ON
1024 KB	ON	OFF	OFF	OFF
1152 KB	OFF	ON	ON	ON
1280 KB	OFF	ON	ON	OFF
1408 KB	OFF	ON	OFF	ON
1536 KB	OFF	ON	OFF	OFF
1664 KB	OFF	OFF	ON	ON
1792 KB	OFF	OFF	ON	OFF
1920 KB	OFF	OFF	OFF	ON
2048 KB	OFF	OFF	OFF	OFF

* Default setting.

** For best operation with DESQview.

NOTE

If Advantage Premium is configured to allocate all of its memory as expanded memory (for example, SW2-1 through SW2-7 OFF), the above settings will be ignored.



Base I/O address (default: 0218h):

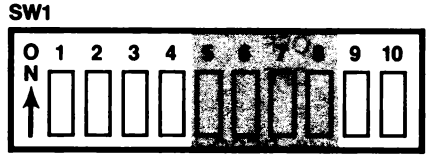
Leave SW1-5 through SW1-8 in the default positions unless you have another *expanded memory* board in your computer, or another device that uses the base I/O address.

If you have another expanded memory board in your PC-AT (for example, AST's RAMpage AT), configure Advantage Premium to use a different I/O address (Table 2-3 summarizes base I/O addresses).

Table 2-3. Advantage Premium Base I/O Address.

Base I/O Address	Advantage Premium Switch Settings			
	SW1-5	SW1-6	SW1-7	SW1-8
0208h	ON	ON	ON	ON
*0218h	ON	ON	ON	OFF
0258h	ON	OFF	ON	OFF
0268h	ON	OFF	OFF	ON
02A8h	OFF	ON	OFF	ON
02B8h	OFF	ON	OFF	OFF
02E8h	OFF	OFF	OFF	ON

* Default setting



Dual Page mode (default: enabled):

Leave SW1-9 on unless you have a special reason to disable Dual Page mode. Only under rare circumstances would you ever change this switch setting. (Dual Page mode allows Advantage Premium to handle multitasking — handling several jobs at once — efficiently, as when you use the DESQview program).

IRQ3 for the second serial port (default: disabled):

Leave SW1-10 off unless your Advantage Premium includes the second serial port.

STEP 2

Set SW2. Figure 2-4 shows the location and default setting for SW2.

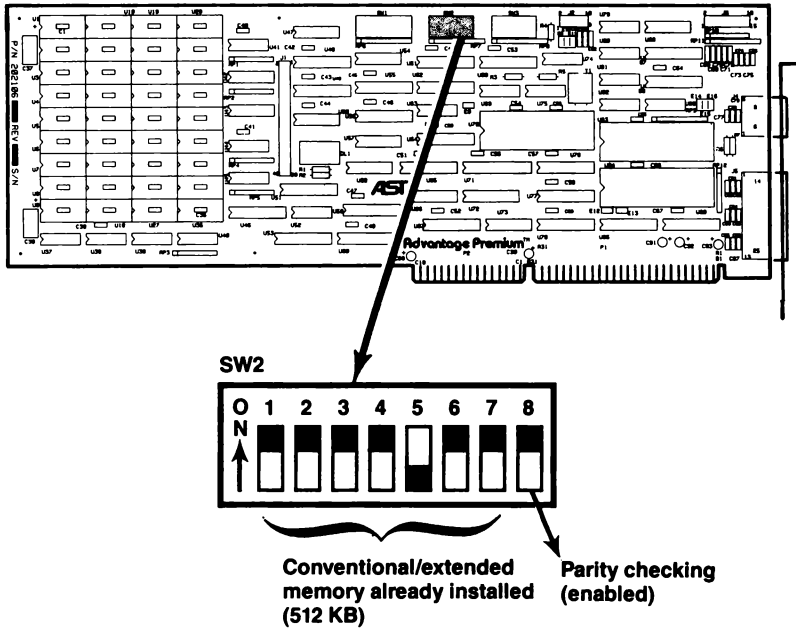


Figure 2-4. Advantage Premium Switch SW2 (Default Setting).

Conventional/extended memory already installed (default: 512 KB):

Leave switches SW2-1 through SW2-7 in their default setting if your PC-AT has 512 KB already installed *and* you do not plan to use DESQview.

If you plan to use DESQview, and your Advantage Premium board has enough memory installed, it is a good idea to change the switch setting as shown in Figure 2-5. The more Advantage Premium memory that is allocated in the area from 0-640 KB, the greater the enhancement of DESQview's performance.See Appendix G for more information on memory allocation with DESQview.

Appendix A gives all the switch settings for this parameter.

Figure 2-5. Setting for Conventional/Extended Memory Already Installed for Use with DESQview (256 KB).

Parity checking (default: enabled):

Leave SW2-8 on unless you have a special reason to disable parity checking. Only under rare circumstances would you change this setting.

STEP 3

Set SW3. Figure 2-6 shows the location and default setting for SW3.

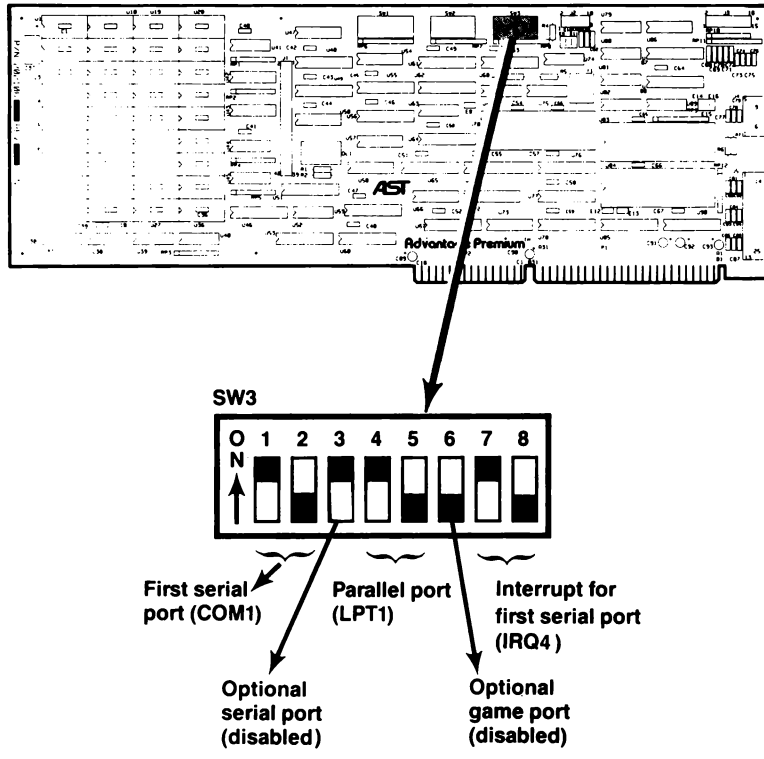


Figure 2-6. Advantage Premium Switch SW3 (Default Setting).

First serial port (default: enabled as COM1):

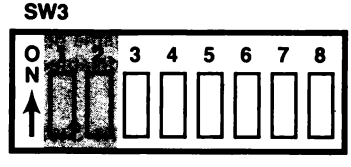
Leave switches SW3-1 and SW3-2 in their default settings if you want the Advantage Premium serial port to respond as COM1. Use this setting if the Advantage Premium port is the only serial port in your PC-AT.

If you want the Advantage Premium serial port to respond as COM2 (because another serial port in your computer is configured as COM1), or if you want to completely disable the serial port, use the switch settings summarized in Table 2-4.

Section 5 provides more information about serial ports.

Table 2-4. First Serial Port Switch Settings.

First Serial Port Configuration	SW3-1	SW3-2
Completely disabled.	OFF	OFF
*Enabled as COM1.	ON	OFF
Enabled as COM2.	OFF	ON
Reserved.	ON	ON
*Default setting		



Second serial port (deault: disabled):

Leave SW3-3 off unless your Advantage Premium board includes the second serial port.

Parallel port (default: enabled as LPT1):

Leave switches SW3-4 and SW3-5 in their default setting if you want the Advantage Premium parallel port to respond as LPT1. Use this setting if:

- The Advantage Premium parallel port is the only parallel port installed in your PC-AT, *or*
- The only other parallel port in your computer is the built-in parallel port on a video card (such as the IBM monochrome display adapter).

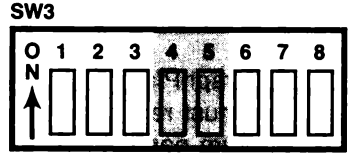
NOTE

If an AST ColorGraphPlus is installed in your PC-AT, you must reconfigure the Advantage Premium parallel port as LPT2, or you can disable it. (The ColorGraphPlus port can only respond as LPT1 or be disabled.)

Table 2-5 summarizes parallel port switch settings. See Section 6 if you'd like more information on parallel ports.

Table 2-5. Parallel Port Switch Settings.

Parallel Port Configuration	SW3-4	SW3-5
*Enabled as LPT1.	ON	OFF
Enabled as LPT2.	OFF	ON
Disabled.	OFF	OFF
Reserved.	ON	ON
* Default setting		



Optional game port (default: disabled):

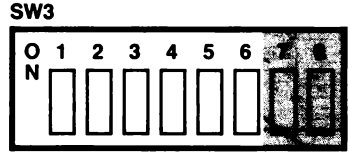
Leave SW3-6 off unless your Advantage Premium includes the optional game port. Section 7 provides more information on game ports.

Interrupt for first serial port (default: IRQ4):

Leave SW3-7 and SW3-8 in their default settings unless you have reconfigured the first serial port to respond as COM2. Table 2-6 lists the first serial port interrupt switch settings.

Table 2-6. First Serial Port Interrupt Switch Settings.

Interrupt for First Serial Port	SW3-7	SW3-8
*IRQ4 (COM1)	ON	OFF
IRQ3 (COM2)	OFF	ON
* Default setting		



STEP 4

Set Advantage Premium jumpers. Figure 2-7 shows the location and default settings for the jumpers.

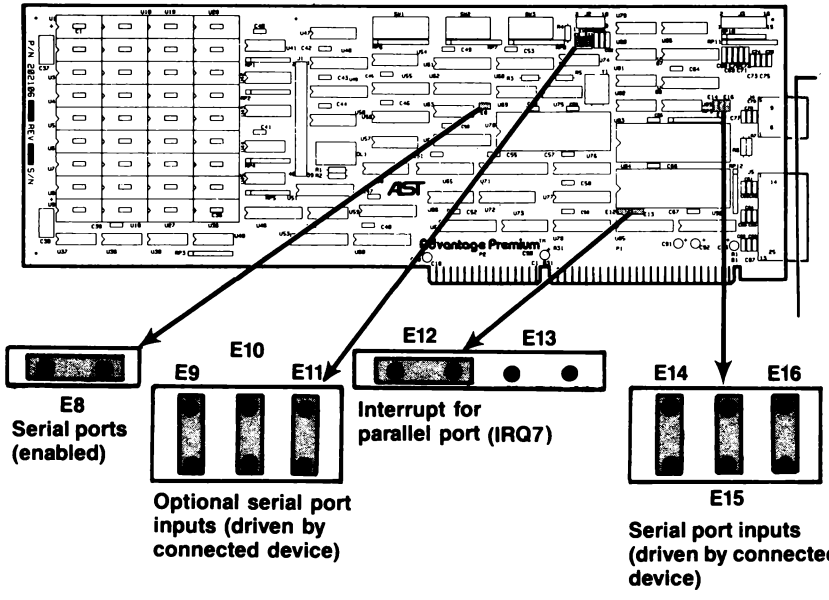


Figure 2-7. Advantage Premium Jumpers (Default Settings).

Serial ports (default: enabled):

Leave the jumper installed at position E8. This jumper allows the Advantage Premium serial port(s) to function properly, and should remain installed even if the port(s) are disabled.

Inputs for second serial port (default: driven by connected device):

Leave the jumpers installed at positions E9, E10, and E11 unless a serial device connected to that port requires certain inputs "forced true" (usually this is not required). See Section 5 if you want more information on serial port inputs.

Interrupt for parallel port (default: IRQ7):

Leave the jumper installed at position E12 unless you want to disable the Advantage Premium parallel port, or some other device in your PC-AT uses IRQ7 (you can also enable IRQ5 for the parallel port).

Table 2-7 shows the parallel port interrupt jumper settings.

Table 2-7. Parallel Port Interrupt Jumper Settings.

Interrupt Enabled	Jumper Installed
*IRQ7	E12
IRQ5	E13
No IRQ (port disabled)	None

*Default setting

Inputs for serial port (default: driven by connected device):

Leave the jumpers installed at positions E14, E15, and E16 unless the serial device connected to the serial port requires certain inputs "forced true" (usually this is not required). See Section 5 if you want more information on serial port inputs.

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SECTION 3

INSTALLING ADVANTAGE PREMIUM IN YOUR PC-AT

This section provides installation instructions, including:

- Installing the Premium-Pak AT piggyback board on your Advantage Premium (skip Section 3.1 if you are not installing the optional piggyback board).
- Opening your PC-AT (you can skip Section 3.2 if you already know how to open up your PC-AT).
- Installing Advantage Premium in your PC-AT (Section 3.3).

3.1 Installing Premium-Pak AT

This section tells you how to install Premium-Pak AT onto your Advantage Premium. If you are not installing Premium-Pak AT now, skip this section.

Premium-Pak AT (Figure 3-1) is an optional piggyback board that adds up to 1 megabyte (MB) of random access memory (RAM) to Advantage Premium. All Advantage Premium memory banks must be fully populated before installing a Premium-Pak AT.

NOTE

You must run the IBM PC-AT SETUP program whenever you change the amount of conventional or extended memory in your PC- AT. The SETUP program is included on the advanced diagnostics diskette that comes with your PC-AT. Appendix C gives several examples of how to run the SETUP program.

You must also run SETUP if you change the number of floppy disk drives (including the SuperDrive RAM disk emulation program) in your computer.

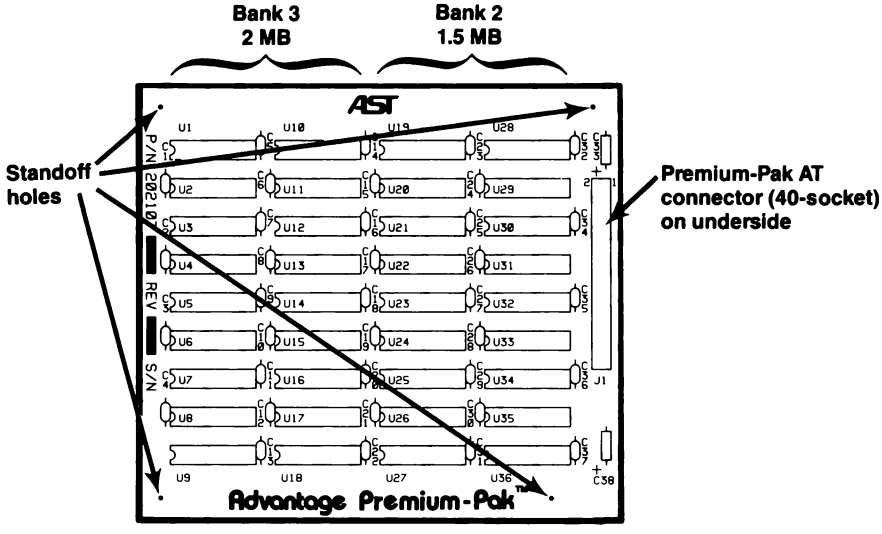


Figure 3-1. Premium-Pak AT Board Layout.

Follow this procedure to install Premium-Pak AT onto Advantage Premium:

STEP 1

Install standoffs: Locate the four nylon standoffs that come with Premium-Pak AT. Snap them into the standoff holes on Advantage Premium (Figure 3-2).

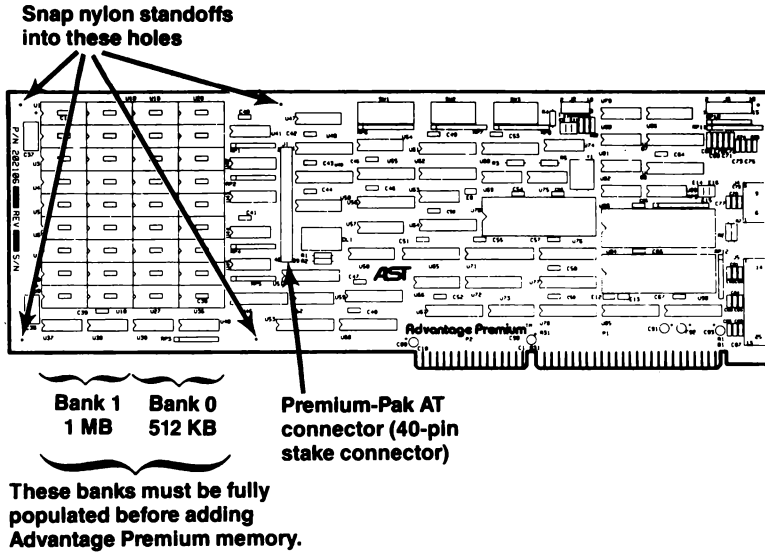


Figure 3-2. Installing Standoffs.

STEP 2

Install the piggyback board: Fit the 40-socket Premium-Pak AT stake connector onto the 40-pin stake connector, taking care not to bend any pins. Align the Premium-Pak AT standoff holes over the installed standoffs. Snap-fit the board over the standoffs. Figure 3-3 shows Premium-Pak AT installed.

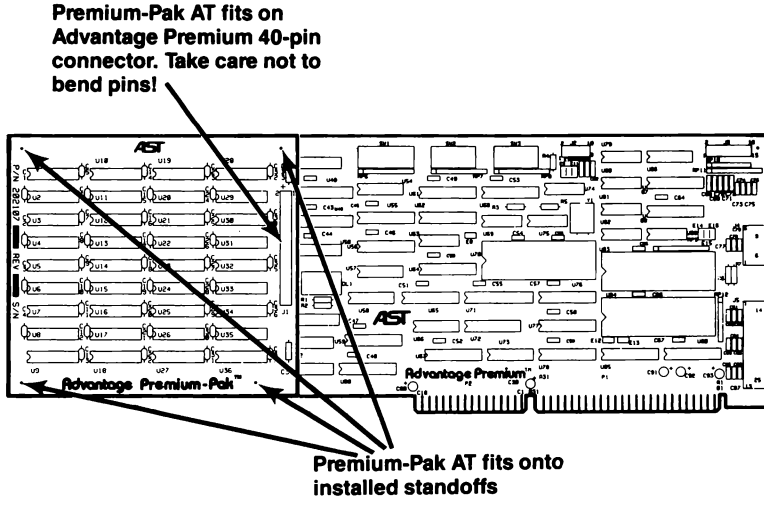


Figure 3-3. Installed Premium-Pak AT.

3.2 Opening Your PC-AT

This section tells you how to set up your IBM PC-AT before installing Advantage Premium.

CAUTION

> Be sure that the power switch is off and the power cord is removed from the wall outlet. 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 cover: Unlock the key lock at the front of the PC-AT by turning the key counterclockwise. Remove the back panel (which is attached to the PC-AT with plastic fastener strips) from the rear of the computer. Use a flathead screwdriver or nut driver to remove the cover mounting screws. Slide the cover toward the front until it comes off, as shown in Figure 3-4.

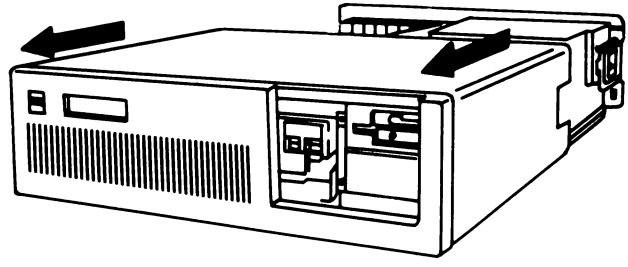


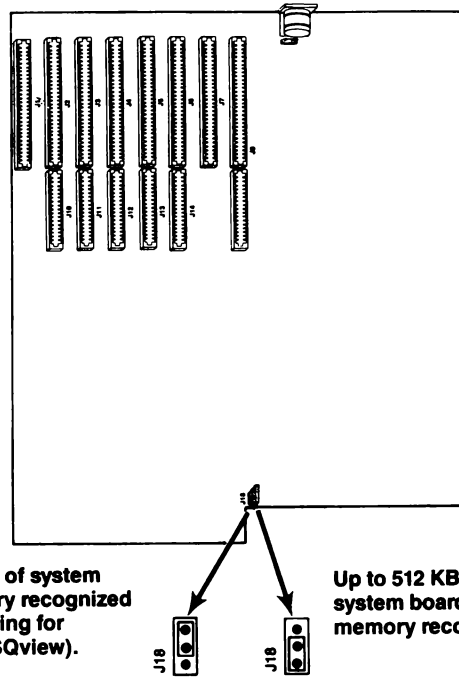
Figure 3-4. Removing the PC-AT Cover.

STEP 2

Check PC-AT system board configuration: The system board jumper J18 (shown in Figure 3-5) determines the maximum amount of system board memory the PC-AT will recognize (regardless of how much system board memory is actually installed). In the 256-KB position, the system board recognizes a maximum of 256 KB. In the 512-KB position, the system board recognizes a maximum of 512 KB. *Do not* set the jumper in the 512-KB position when only 256 KB of memory is installed on the system board.

Set the jumper in the 256-KB position if you will be using Advantage Premium paged memory in the 256-to 640-KB range (for example, for best DESQview performance).

The system board jumper is located underneath the disk controller board at the very front of the PC-AT chassis. You will have to lift the disk controller board to access the jumper. To do this, remove the disk controller board's bracket retaining screw and *carefully* lift the board about two inches. Take care not to put too much stress on the ribbon cables attached to the board. Once you've configured the jumper correctly, reinstall the disk controller board.



NOTE

You must lift the disk controller board to access this jumper.

Do not remove remove memory from the PC-AT system board regardless of the jumper setting.

Figure 3-5. PC-AT System Board Jumper.

3.3 Installing Advantage Premium in Your PC-AT

This section tells you how to install the Advantage Premium board into your computer.

STEP 1
Install Advantage Premium cables: This is required only if you plan to use the second serial port or the game port or both. If not, skip to STEP 2.

Each cable comes with a bracket. Use the hardware supplied on the D-shell connectors to mount each connector on its bracket. Plug each connector onto Advantage Premium (as shown in Figure 3-6), taking care to align pin 1 on the cable connector (the pin closest to the cable stripe) with pin 1 on the stake connector.

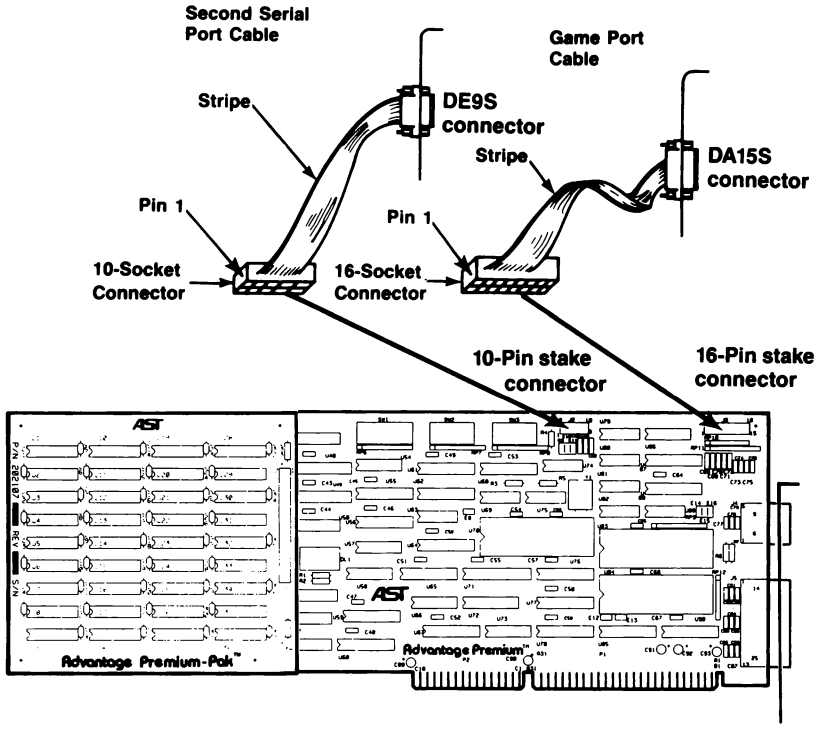


Figure 3-6. Connecting Advantage Premium Cables.

STEP 2

Select an open expansion slot: Advantage Premium requires one two-connector slot (whether or not Premium-Pak AT is installed). You will need an additional slot if you are installing the second serial port bracket or game port bracket.

STEP 3

Remove expansion slot cover: Locate the metal cover for the cutout in the back panel of the PC-AT 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 4

Install the Advantage Premium board: Line up your Advantage Premium board and position its front bottom corner in the card guide channel. Position any wires or ribbon cables so they will pass either beneath or above the installed board and will not be damaged during installation. Lower the board until its edge connector rests on the expansion slot receptacles. Using an evenly distributed pressure, press the Advantage Premium board straight down until it seats in the expansion slot (Figure 3-7).

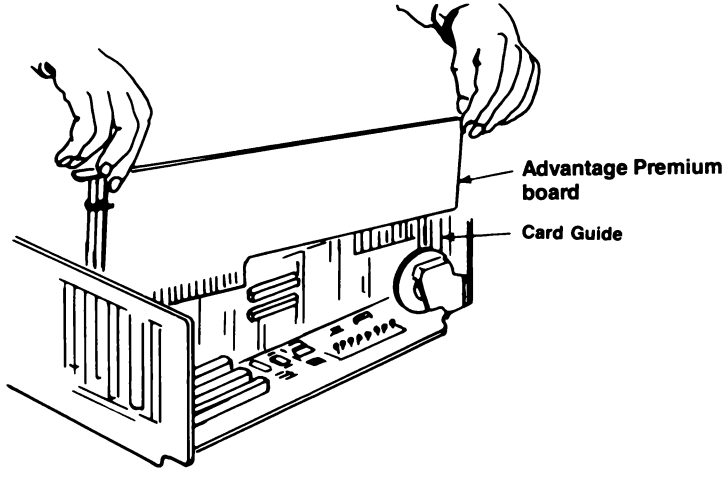


Figure 3-7. Installing the Advantage Premium Board.

STEP 5
Secure the board to the rear of the PC-AT chassis: Use the screw you removed from the expansion slot cover in STEP 3.

STEP 6
Replace cover: Carefully slide the cover from the front until it stops securely against the rear panel. Reinstall the cover mounting screws you removed earlier. Press the back panel so that the plastic fastener strips secure it in place.

STEP 7
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.

STEP 8
Now you are ready to power up.

NOTE

You must run the IBM PC-AT SETUP program whenever you add or subract conventional or extended memory from your PC-AT. The SETUP program is included on the advanced diagnostics diskette that comes with your PC-AT. Appendix gives several examples of how to run the SETUP program.

You must also run SETUP if you change the number of floppy disk drives (including the SuperDrive RAM disk emulation program) in your computer.

SECTION 4

SOFTWARE CONFIGURATION AND INSTALLATION

This section tells you how to run the SuperPak INSTALL program. INSTALL installs the simple, basic configurations of the SuperPak software on your PC-AT boot disk.

You can install these SuperPak programs:

- fASTdisk.
- SuperDrive.
- SuperSpool.
- REMM.SYS (AST expanded memory manager; an additional program, REX.SYS, is also automatically installed transparently to you when you install the AST expanded memory manager).

NOTE

All SuperPak files may not pertain to your particular AST product. Your SuperPak diskette contains a README file that describes which files are applicable to your product. To view the README file, enter:

TYPE README<Enter>

For more information on SuperPak software, see your *SuperPak User's Manual*. For more information on AST expanded memory software, see Appendix B of this manual.

You will have to modify your AUTOEXEC.BAT and/or CONFIG.SYS files (using a text editor) after running INSTALL if you want to send printer output to a serial (not parallel) port, or if you want to use advanced parameters for the SuperPak software. The *SuperPak User's Manual* discusses the SuperPak utilities in greater detail.

4.1 Using INSTALL

For your convenience, INSTALL uses a screen and keyboard interface design similar to popular spreadsheet programs:

- The main SuperPak INSTALL menu offers several options: the currently selected option is highlighted in reverse video. To select an option, press the right- or left-arrow keys on the numeric keypad to the right of your keyboard. Select items within each option by pressing the up- or down-arrow keys.

- To create a highlighted option, press the <**Enter**> or <**Ins**> key.

- To call up the INSTALL edit box (applicable to the fASTdisk, SuperDrive, and SuperSpool options only): Press the up- or down-arrow key to select the item you want to modify. Press <**Enter**> to invoke the edit box.

- Press <**F1**> to bring up a help screen that corresponds to the currently-selected option or item.

- Press <**Ctrl**>-<**C**> to abort the INSTALL program without changing your AUTOEXEC.BAT or CONFIG.SYS files.

- The cursor appears as an underline character when an alphanumeric entry is required from you.

Once you have installed and configured your SuperPak options, INSTALL modifies the AUTOEXEC.BAT and CONFIG.SYS files on your boot disk. If those files do not already exist on your boot disk, INSTALL will create them for you. If those files do already exist on your boot disk, any existing statements not changed by the new installation will remain. INSTALL appends its statements to the end of existing AUTOEXEC.BAT and CONFIG.SYS files.

AUTOEXEC.BAT is a batch file that contains commands that are automatically executed when you boot up your computer. CONFIG.SYS contains the software drivers that allow devices that are external to your PC-AT (such as REMM, REX, and fASTdisk) to function.

INSTALL first creates fASTdisks, SuperDrives, and the SuperSpool from available extended memory, then uses conventional memory if extended memory is exhausted. If you create a device that is larger than available extended memory, this message is displayed at the bottom of the screen:

> Not enough extended memory — switching to conventional

NOTE

There are two ways to allocate Advantage Premium extended memory.

- You can set switches on the board.
- You can rely on AST's expanded memory software to cause *expanded* memory to emulate the required amount of *extended* memory.

If you install AST RAM disks and print spoolers which require more extended memory than allocated by hardware switches, the INSTALL program automatically invokes the REX.SYS program. REX.SYS causes Advantage Premium expanded memory to emulate extended memory (assuming sufficient memory is installed on the board).

Each device can be composed of only one memory type (extended *or* conventional). INSTALL allocates available expanded memory as extended memory only as necessary to create the device.

4.2 Running the INSTALL Program

Follow these steps to use the SuperPak INSTALL program:

STEP 1
Back up the SuperPak diskette: Store the master diskette in a safe place. You can then use the master diskette to back up your software if your working disk is lost or damaged.

STEP 2
Start the program: With the backup copy of your SuperPak diskette in the default drive, enter this command from the DOS prompt:

INSTALL<Enter>

NOTE

To ensure proper operation, run INSTALL from DOS (*not* from another program, such as DESQview) only. Make sure you're using the INSTALL program that came with your Advantage Premium board.

The initial INSTALL screen shown in Figure 4-1 will appear:

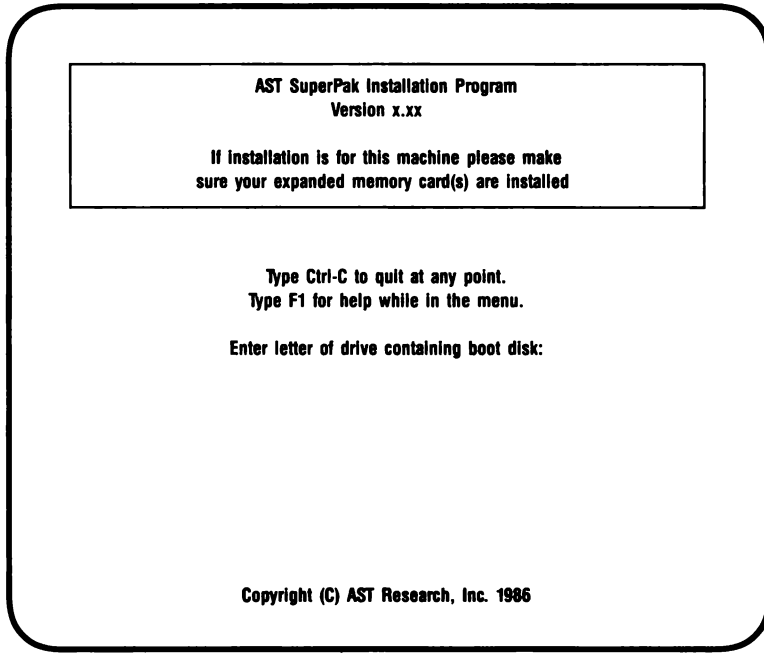


Figure 4-1. Initial INSTALL Screen.

Enter letter of drive containing boot disk:
This tells INSTALL where to find your AUTOEXEC.BAT and/or CONFIG.SYS files (the files that automatically execute certain commands when you boot your computer). When the INSTALL program is complete, it will modify the AUTOEXEC.BAT and CONFIG.SYS files on the specified drive (or create them if they do not already exist) to install your software. To select the default drive as the drive containing the boot disk, press <**Enter**>.

This question will then appear on your screen:

Is your video card one of the following (Y/N)?:

- IBM Monochrome Adapter or compatible
- Hercules Graphics Adapter or compatible

If you press **N**, this line will appear:

- IBM Color Graphics Adapter or compatible

If you press **N**, this line will appear:

- IBM Enhanced Graphics Adapter or compatible

Press **Y** for the type of video card installed in your computer. Press **N** if your PC-AT does not have one of those video cards installed. This question allows INSTALL to avoid conflicts with the memory area used by your video card.

NOTE

For PC-AT installations, the INSTALL program automatically avoids conflicts with other reserved memory.

Your screen will then display this question:

Is installation for this machine (y/n)?:

Press **Y** if you are installing SuperPak software for the computer you are using now. This causes this message to be displayed on the screen:

Testing for expanded memory boards. . .

INSTALL then goes to the main menu shown in Figure 4-2.

Press **N** if you are installing SuperPak software for another computer. This causes INSTALL to display these questions about the PC-AT for which you are installing software:

> Is your computer a PC-AT or AT-compatible (y/n)?
>
> Enter amount of conventional memory in K bytes:
> Enter amount of extended memory in K bytes:
> Enter amount of expanded memory in K bytes:
> Enter number of floppies and RAM diskettes (1-4):

Is your computer a PC-AT or AT-compatible (y/n)?: Press **Y**.

Enter amount of conventional memory in K bytes:
Enter the number of kilobytes (KB) (from **0** to **640**) of conventional memory for the computer whose software you are installing (including any memory allocated from Advantage Premium). Conventional memory (as opposed to expanded or extended memory) is the PC-AT system memory between 0 and 640 KB. Pressing <Enter> is equivalent to entering "0".

Enter amount of extended memory in K bytes:
Enter the number of kilobytes (KB) (from **0** to **15360**) of actual, physical extended memory for the PC-AT whose software you are installing. Extended memory (*not* expanded memory) is the non-paged memory in the 1-to 16-MB range. Pressing <Enter> is equivalent to entering "0".

Enter amount of expanded memory in K bytes:
Enter the number of KB (from **0** to **8192** — 8 megabytes (MB)) of expanded memory for the PC-AT whose software you are installing. The amount of expanded memory is the total amount of memory on your AST expanded memory product that is *not* allocated as conventional or extended memory. Pressing <Enter> is equivalent to entering "0".

Examples
Here are some examples of how you would supply the requested memory amounts for several different configurations:

- Your PC-AT has 256 KB of system memory and a 2-MB Advantage Premium board. You have allocated 384 KB as conventional memory and 512 KB as extended memory. Enter these parameters:

  Conventional memory: **640**
  Extended memory: **512**
  Expanded memory: **1152** (2048 minus 512 minus 384)

- Your PC-AT has 512 KB of system memory and a 2-MB Advantage Premium board. You have allocated 128 KB as conventional memory and all remaining Advantage Premium memory as expanded memory. Enter these parameters:

  Conventional memory: **640**
  Extended memory: **0**
  Expanded memory: **1920** (2048 minus 128)

- Your PC-AT has 256 KB of system memory, a 2-MB Advantage Premium, and a 1.5-MB *Advantage!* board. You have allocated all *Advantage!* memory as extended memory, 384 KB of Advantage Premium memory as conventional memory, and all remaining Advantage Premium memory as expanded memory. Enter these parameters:

  Conventional memory: **640**
  Extended memory: **1536**
  Expanded memory: **1664** (2048 minus 384)

Enter number of floppies and RAM diskettes (1-4):
Enter the number (from **1** to **4**) of floppy diskettes (including random access memory (RAM) floppy diskettes, such as SuperDrive), then press <**Enter**>.

Once you have answered all the questions in the initial INSTALL, screen, the main menu shown in Figure 4-2 appears.

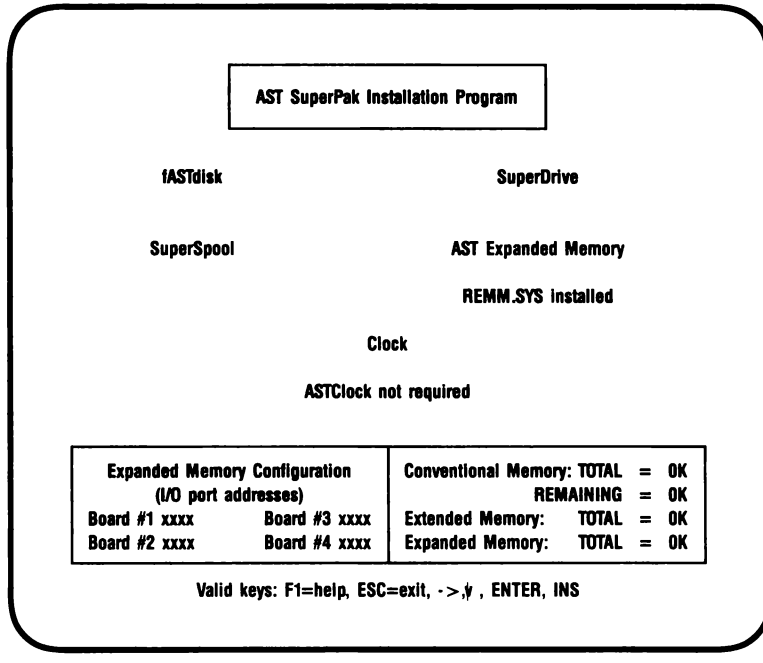


Figure 4-2. Main INSTALL Menu.

Notice that the amounts of conventional, extended, and expanded memory you entered appear at the bottom of the screen. For conventional memory, both the total amount and the amount remaining are shown.

The amount of extended memory shown refers to actual extended memory and/or expanded memory that *emulates* extended memory.

As you progress, you will notice that as extended memory is allocated, it may be subtracted from expanded memroy. This indicates that extended memory is "borrowing" from expanded memory (that is, expanded memory is emulating extended memory).

The main menu offers these options:

- *fASTdisk* — the program that simulates up to two fixed disk drives in RAM. You can change the size and memory type for each fASTdisk.

- *SuperDrive* — the program that simulates 360-KB floppy disk drives in RAM. INSTALL can install up to two SuperDrives in your system. You can change the letter designation and memory type for each SuperDrive.

- *SuperSpool* — the program that creates a RAM print spooling buffer (default size 64 KB), freeing your PC-AT for other work while your files print. You can change the device name, size, and memory type for the SuperSpool buffer.

  As installed by the INSTALL program, SuperSpool is configured to use a parallel printer. You must modify the SUPERSPL command in your AUTOEXEC.BAT file to use SuperSpool with a serial printer.

- *AST Expanded Memory* — the software that enables expanded memory, providing maximum performance with new multitasking/windowing software, and allowing you to use expanded memory specification (EMS) programs. You can enable or disable this feature. The expanded memory manager is automatically installed when expanded memory is used to create RAM disks or a print spooler.

- *Clock* — the clock-calendar program does not apply to the PC-AT (which includes its own clock-calendar). If you attempt to enable this feature, this message is displayed at the bottom of your screen:

  ASTClock not required for PC-AT or compatible

4.2.1 Installing fASTdisk

This option allows you to create up to two RAM fixed disk drives (default size: 512 KB each).

To create a fASTdisk:

1. Press the right- or left-arrow key to highlight "fASTdisk".

2. Press <**Enter**> or <**Ins**> once for each fASTdisk you want to create. If you press <**Enter**> more than twice, this message will appear at the bottom of the screen:

   Maximum of two fASTdisks allowed

   If extended memory is exhausted, the memory totals in the lower right corner of the screen (Figure 4-3) will shown 512 KB subtracted from expanded memory (and added to extended memory) each time you create a fASTdisk. This indicates that fASTdisk is using expanded memory that is emulating extended memory.

To change the size or memory type of a fASTdisk:

1. Press right- or left-arrow key to highlight "fASTdisk".

2. Press the down-arrow key to highlight the fASTdisk you want to modify (Figure 4-3 shows fASTdisk "1" highlighted).

3. Press <**Enter**> to invoke the edit box, shown in Figure 4-3.

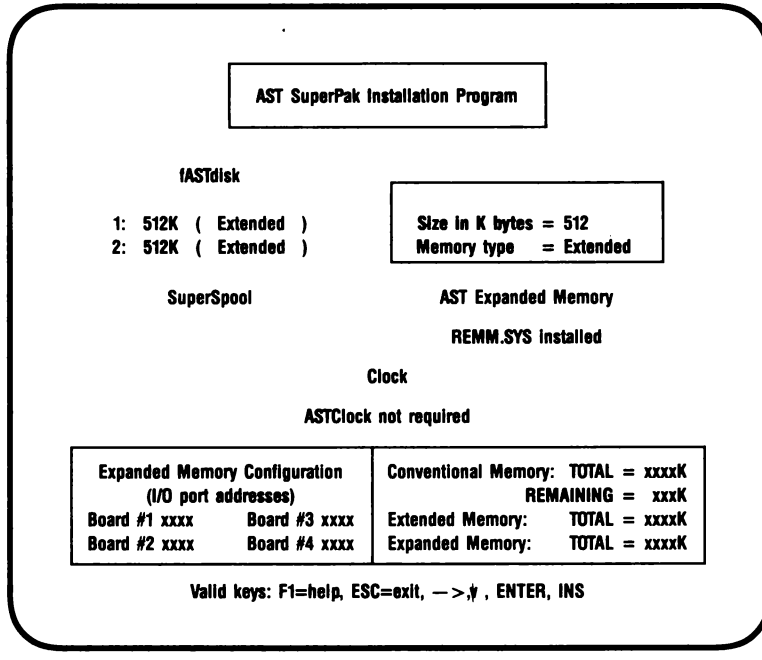


Figure 4-3. INSTALL with fASTdisk Edit Box.

4. Press the up- or down-arrow key to highlight the parameter you want to modify (Figure 4-3 shows the fASTdisk size parameter highlighted).

5. To change the size: Enter the new size (in KB) of the fASTdisk (from 1 to 9999 KB). Your computer will beep if you enter more than four digits. This message will appear at the bottom of your screen if you enter a non-numeric character:

   Input must be a decimal digit

   To change the memory type: Press the right- or left-arrow key to select the memory type ("Conventional" or "Extended") you want the fASTdisk to use.

6. Press <**Esc**> to exit the edit box. Notice that the memory allocation at the lower right corner of the screen changes to reflect changes you have made.

To delete a fASTdisk:

1. Press the right- or left-arrow key to highlight "fASTdisk".

2. Press the down-arrow key to highlight the fASTdisk you want to delete.

3. Press <**Del**> — the fASTdisk will disappear from the screen.

4.2.2 Installing SuperDrive

This option allows you to create up to three 360-KB RAM floppy disk drives.

To create a SuperDrive:

1. Press the right- or left-arrow key to highlight "SuperDrive".

2. Press <**Enter**> once for each SuperDrive you want to create.

   Watch the memory totals at the lower right corner of the screen (see Figure 4-4): if physical extended memory is exhausted, 360 KB is subtracted from expanded memory, and added to extended memory, each time you create a SuperDrive.

   INSTALL assumes your PC-AT has one floppy diskette drive installed (therefore the first SuperDrive will be B:). If you told INSTALL that your PC-AT has one floppy installed (see the INSTALL initial screen shown in Figure 4-1) and you try to create a SuperDrive, this message will be displayed at
   the bottom of your screen:

   Not enough disk devices to add SuperDrive

If you tell INSTALL that your PC-AT has two or three floppy drives installed, the default drive letter will be B: (you must change the drive letter to C: if the SuperDrive is the third drive in your system).

If you tell INSTALL that your PC-AT has four floppy drives installed, the default drive letter for the first floppy drive will be C: (you must change the drive letter to D: if the SuperDrive is the fourth floppy drive in the system).

If you attempt to create a third SuperDrive, this message appears at the bottom of your screen:

Maximum of two SuperDrives allowed.

To change the drive letter or memory type of a SuperDrive:

1. Press the right- or left-arrow key to highlight "SuperDrive".

2. Press the down-arrow key to highlight the SuperDrive you want to modify (Figure 4-4 shows SuperDrive B: highlighted).

3. Press <**Enter**> to invoke the edit box, shown in Figure 4-4.

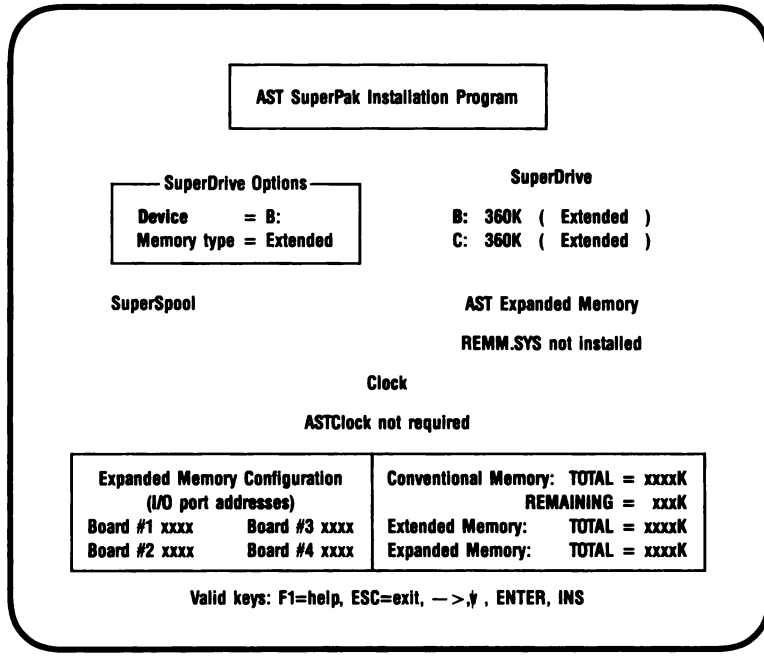


Figure 4-4. INSTALL with SuperDrive Edit Box.

4. Press the up- or down-arrow key to highlight "Device" or "Memory type" (Figure 4-4 shows "Device" highlighted).

5. To change the letter designation: Press the right- or left-arrow key to select the letter you want (A:, B:, C:, or D:).

   To change the memory type: Press the right- or left-arrow key to select the memory type ("Conventional" or "Extended") you want the SuperDrive to use.

6. Press <**Esc**> to exit the edit box. Notice that the memory allocation at the lower right corner of the screen now reflects changes you have made.

To delete a SuperDrive:

1. Press the left- or right-arrow key to highlight "SuperDrive".

2. Press the down-arrow key to highlight the SuperDrive you want to delete.

3. Press <**Del**> to delete the SuperDrive.

4.2.3 Installing the AST Expanded Memory Manager

This option automatically installs REMM.SYS and REX.SYS in your CONFIG.SYS file. REMM.SYS and REX.SYS are the software drivers that provide expanded memory and allow you to dynamically reconfigure expanded memory as extended memory. You must install REMM.SYS in order to use expanded memory with application programs or to use memory beyond 640 KB for RAM disks and spoolers.

NOTE

The expanded memory manager software installed by the INSTALL program is appropriate for most applications. However, software developers who want to edit the REMM and REX command lines in the CONFIG.SYS file can use the parameters described in Appendix B of this manual. Make sure you're using the version of REMM.SYS that came with your Advantage Premium board.

To install or delete AST expanded memory software:

1. Press the left- or right-arrow key to highlight "AST Expanded Memory Manager".

2. Press <**Enter**> to select "REMM.SYS installed" or "REMM.SYS not installed". If you press the down-arrow key, this message will appear at the bottom of the screen:

   Device can only be enabled or disabled

4.2.4 Installing SuperSpool

This option allows you to create one RAM print spooler buffer in RAM (default size: 64 KB). Whether or not you use INSTALL, your computer can accommodate only one SuperSpool.

You must edit the SUPERSPL command in the AUTOEXEC.BAT file if you are spooling to a serial printer port or you are changing any default parameter (see your *SuperPak User's Manual* for more details).

INSTALL will first attempt to create a SuperSpool buffer from available extended memory, then uses conventional memory. If you create a SuperSpool that is larger than available extended memory (the buffer is composed of only one memory type — extended *or* conventional). If you create a SuperSpool that is larger than available physical extended memory, INSTALL will create a buffer from the extended memory that is available. If no extended memory is available, this message is displayed at the bottom of the screen:

> Not enough extended memory — switching to conventional

If no extended or conventional memory is available, this message is displayed at the bottom of the screen:

> Not enough memory for spooler

The SuperSpool buffer is composed of only one memory type (extended *or* conventional). INSTALL allocates available expanded memory as extended memory to create a SuperSpool.

To create a SuperSpool:

1. Press the left- or right-arrow key to highlight "SuperSpool".

2. Press <**Enter**> to create a SuperSpool.

   If you press <**Enter**> again this message will be displayed at the bottom of the screen:

   Maximum of one spooler allowed

To change the device name, size, or memory type of the SuperSpool buffer:

1. Press the left- or right-arrow key to highlight "SuperSpool".

2. Press the down-arrow key to highlight the SuperSpool buffer ("LPT1:" is highlighted in Figure 4-5).

3. Press <**Enter**> to invoke the edit box, shown in Figure 4-5.

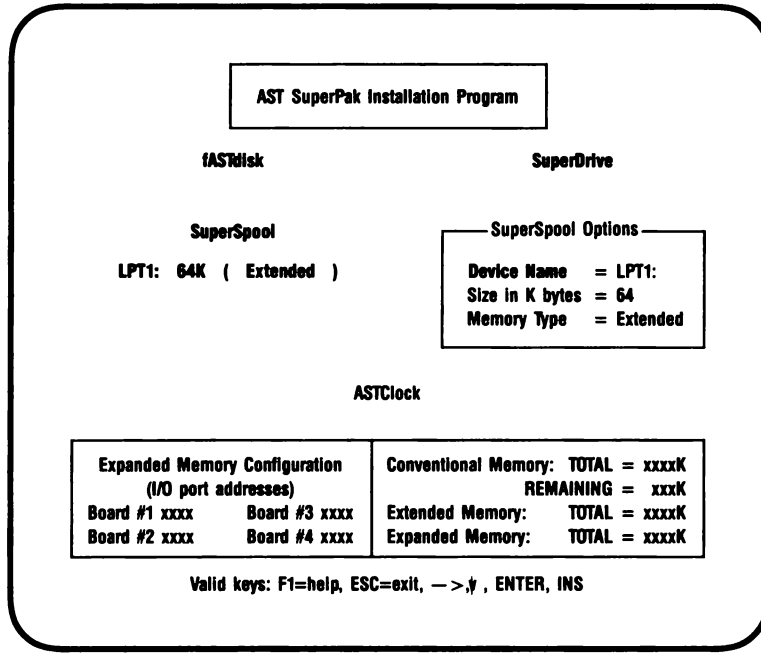


Figure 4-5. INSTALL with SuperSpool Edit Box.

4. Press the up- or down-arrow key to highlight the parameter you want to modify ("Device Name" is highlighted in Figure 4-5).

5. To change the device name: Press the left- or right-arrow key to select "LPT1:" or "LPT2:".

   To change the size: Enter the new size (in KB) of the SuperSpool (from 1 to 999 KB to a maximum of the all available PC-AT memory). Your computer will beep if you enter more than three digits. This message will appear at the bottom of your screen if you enter a non-numeric character:

   Input must be a decimal digit

   To change the memory type: Press the left- or right-arrow key to select extended or conventional memory.

6. Press **Esc**> to exit the edit box. Notice that the memory allocation at the lower right corner of the screen reflects any changes you have just made.

To delete SuperSpool:

1. Press the left- or right-arrow key to highlight "SuperSpool".

2. Press the down-arrow key to highlight "LPTx:".

3. Press <**Del**> to delete the SuperSpool.

4.2.5 Saving the Installation

1. Press <**Esc**>. This question will appear at the bottom of the screen:

   Are you sure you want to quit (y/n)?

   Press **Y** to exit INSTALL. Press **N** to return to the main INSTALL menu.

2. If you press **Y**, this question appears at the bottom of the screen:

   Do you want to save configuration (y/n)?

   Press **Y** to save the SuperPak software you have just configured using the INSTALL program. Pressing **N** exits INSTALL without making any changes.

3. If you save the configuration, these messages flash at the bottom of the screen:

   Writing CONFIG.SYS to x:. . .

   Writing AUTOEXEC.BAT to x:. . .

   where *x:* is the drive containing the boot disk.

4. The screen will then clear and show this message:

   For the configuration process to be complete, the following SuperPak utility files need to be present on your boot disk:

   The above message is followed by a list of the files necessary to install your SuperPak software, and this question is displayed:

   Do you want these files copied to your boot disk (Y/N)?:

5. If you press **Y**, your screen will display this message:

   Enter the letter of the disk drive containing your SuperPak software:

   Enter the letter of the drive that currently contains your SuperPak software. Your screen will then list the appropriate files as they are copied from the SuperPak diskette to your boot disk.

   If there is an error copying SuperPak software to your boot disk, this message will be displayed:

   Error copying utility files to drive x:

   where *x:* is the letter of the drive containing the boot disk.

   Check that the boot disk is not write-protected, that there is enough room on the boot disk for SuperPak files, that the SuperPak software is in the specified drive, and that the disk drives are closed.

6. If you press **N** (do not copy SuperPak files to the boot disk), or once the SuperPak files have been copied, this message appears on your screen:

   Configuration is now complete.

   You will need to reboot the system for your updated configuration to take effect.

7. Press **<Ctrl>-<Alt>-<Del>** to reboot your PC-AT.

For example, you have a PC-AT with 256 KB of RAM and an AST Preview™ video display card installed, and you are installing a 2-MB Advantage Premium board (you entered "640" for conventional memory, "384" for extended memory, and "1024" for expanded memory).

If you install one fASTdisk, one SuperDrive B:, one SuperSpool buffer, and enabled AST memory manager software, your AUTOEXEC.BAT and CONFIG.SYS files will contain the following lines at the end of the file (assuming you did not change any default parameters):

AUTOEXEC.BAT	*CONFIG.SYS*
superdrv b: /extm	device=remm.sys /x=B000-BFFF /x=E000-EFFF
superspl lpt1: /extm	device=rex.sys 936
	device=fastdisk.sys /extm

Run the SETUP program: You must run SETUP whenever you change the amount of conventional or extended memory, or if you change the number of floppy disk drives (for example, when you install a SuperDrive). Appendix C gives several examples of how to run the SETUP program.

SECTION 5

SERIAL PORTS

Advantage Premium comes standard with one serial port for asynchronous communications, and is available with a second serial port. A serial port can connect your PC-AT to a serial printer, modem, or other device which uses an RS-232C interface. The Advantage Premium interface is configured as a Data Terminal Equipment (DTE) device with a male DE9P connector (a nine-pin connector).

This section includes the following information:

- Section 5.1 tells you how to reconfigure the serial ports: changing COM1 to COM2, forcing RS-232C inputs true, disabling the serial ports. You do not need this information unless you have some reason to change the default configuration of the Advantage Premium serial ports.

- Section 5.2 tells you how to add the second serial port to Advantage Premium. You do not need this information unless you are installing the second serial port option (you do not need to read this section if the second serial port is already installed).

The remaining sections are of interest primarily to application software developers and other users with technical backgrounds:

- Section 5.3 discusses serial port programming.

- Section 5.4 gives serial port I/O address assignments and pinouts.

- Section 5.5 discusses serial port diagnostic testing.

5.1 Configuring the Serial Ports

You can install up to two serial ports (called COM1 and COM2) into your PC-AT. The standard Advantage Premium serial port configuration is:

- Serial port operation enabled (jumper E8 installed).
- *First serial port:* Responds as COM1 using IRQ4 (SW3-1 ON, SW3-2 OFF, SW3-7 ON, SW3-8 OFF).

  You can also configure the first serial port as COM2 using IRQ3 (SW3-1 OFF, SW3-2 ON, SW3-7 OFF, SW3-8 ON).

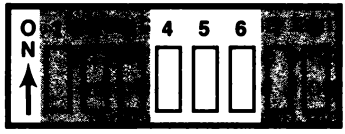
  You can also disable the first serial port (SW3-1, SW3-2, SW3-7, and SW3-8 all OFF).
- *Second serial port:* Responds as COM2 using IRQ3 (SW3-3 ON and SW1-10 ON).

  You can also disable the second serial port (SW3-3 and SW1-10 OFF).

You must not enable the second serial port if that option is not installed. If both the first and second serial ports are configured as COM2, the first serial port will respond as COM2 and the second serial port will be disabled.

Figure 5-1 illustrates Advantage Premium serial port configuration.

SW3



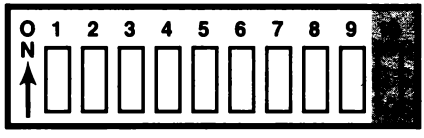
SW3-7	SW3-8
ON	OFF
OFF	ON

IRQ4 enabled for first serial port (COM1)

IRQ3 enabled for second serial port (COM2)

SW3-1	SW3-2	SW3-3	
OFF	OFF	OFF	First and second serial port disabled
ON	OFF	OFF	First serial port = COM1, second serial port disabled
OFF	ON	OFF	First serial port = COM2, second serial port disabled
ON	OFF	ON	First serial port = COM1, second serial port = COM2

SW1



SW1-10	
ON	IRQ3 enabled for second serial port
OFF	IRQ3 disabled for second serial port

Figure 5-1. Serial Port Configuration.

5.1.1 Installing Multiple Serial Ports in a PC-AT

If your PC-AT already has another card with a serial port on it configured to respond as COM1, you must remove or reconfigure one of the devices to avoid a conflict.

Figure 5-1 shows how to change the first serial port on the Advantage Premium to respond as COM2 using IRQ3 as shown in Figure 5-1.

You can only configure the second Advantage Premium serial port (if installed) as COM2. If both the first and second serial ports are configured as COM2, the second serial port will be disabled. To disable the second serial port, set the switches as shown in Figure 5-1. You must disable the second serial port if that option is not installed.

5.1.2 Configuring Serial Port Inputs

Advantage Premium factory configuration: In the standard factory (default) configuration, Advantage Premium expects the connected device(s) to drive all input signals to its serial ports. Unless specifically required by the serial device you connect to the serial port, you do not need to change the Advantage Premium default configuration for this parameter.

The Advantage Premium serial ports conform to the Electronic Industries Association (EIA) RS-232C communication standard. Appendix D describes the RS-232C standard in more detail.

To force certain inputs true: If your serial device does not drive all Advantage Premium serial port inputs, you can "force true" these three inputs to each serial port: clear to send (CTS), data set ready (DSR), and data carrier detect (DCD).

First serial port	*Second serial port*
CTS input (J2 pin 8)	CTS input (P2 pin 6)
DSR input (J2 pin 6)	DSR input (P2 pin 2)
DCD input (J2 pin 1)	DCD input (P2 pin 1)

Figure 5-2 shows how to force one or more of the above signals to always be in the true state. Whether certain inputs should be forced true depends on the particular device you connect to the serial port.

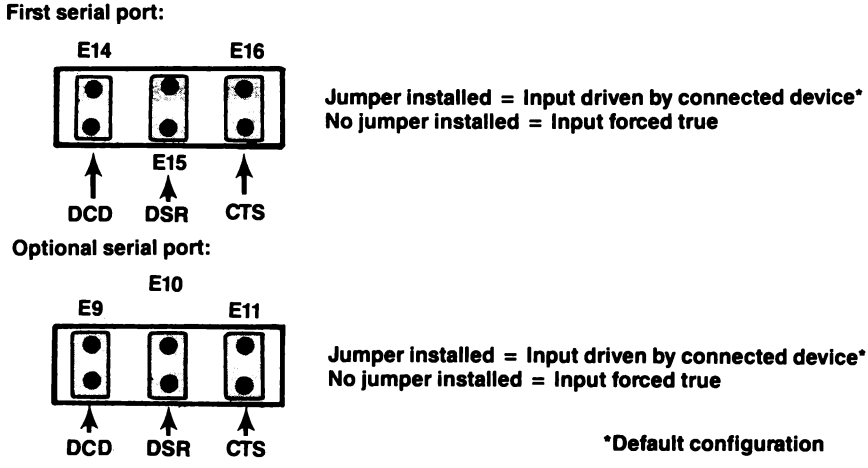


Figure 5-2. Creating a 'Forced True' State.

You might want to leave the shorting plugs in their "normal" configuration and instead build a special cable for the serial device. This would be especially convenient if you will be using different serial devices on the port at different times. In most cases, you can connect your remote device to the Advantage Premium serial port with a cable provided with the device itself. Simply refer to the instructions provided with the device or with the software for driving it.

In some cases, your instructions will specify how your remote device uses RS-232C line signals and which pin numbers supply which signals. With this information, plus the general information in Appendix D, you can construct an interface cable yourself.

NOTE

Serial devices use RS-232C signals in different ways. AST Research cannot tell you how to connect a particular device to your serial port. You must refer to the manufacturer's instructions that came with that device.

Advantage Premium does not support the current loop teletype interface.

5.1.3 Disabling the Serial Port

You can completely disable the Advantage Premium serial ports as shown in Figure 5-1.

Your PC-AT can have a maximum of two serial ports installed. If there are more than two serial ports, you must disable the extra ports to prevent conflicts between ports.

5.2 Adding the Second Serial Port

AST Research offers an upgrade kit for field installation of the second Advantage Premium serial port. To order the serial port upgrade kit: order model number ADV-000S through your AST dealer.

You only need the information in this section if you are installing the second serial port option. You do not need to read this section if two serial ports are already installed on your Advantage Premium.

The upgrade kit consists of three chips (1488, 1489, and NS1645ON). To install the second serial port, follow the procedure described below.

CAUTION

Be sure 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.

STEP 1
Remove the PC-AT system unit cover: Follow the instructions in Section 3.

STEP 2
Remove any devices connected to the board: Remove any serial and/or parallel devices connected to the Advantage Premium board. Also remove the game port ribbon cable (if installed) from the board.

STEP 3
Remove the Advantage Premium board: Remove the retaining screw from the bracket securing the Advantage Premium board to the PC-AT chassis. With a steady, evenly distributed upward tension, remove the Advantage Premium board from its slot.

STEP 4
Install the second serial port chips: Your game port upgrade kit comes with three chips (1488, 1489, and NS1645ON). Each chip is labelled with a notch or a small dot to identify the bottom left. Insert the chips as *shown in Figure 5-3. It is very important that you do not bend any pins when you insert your chips.*

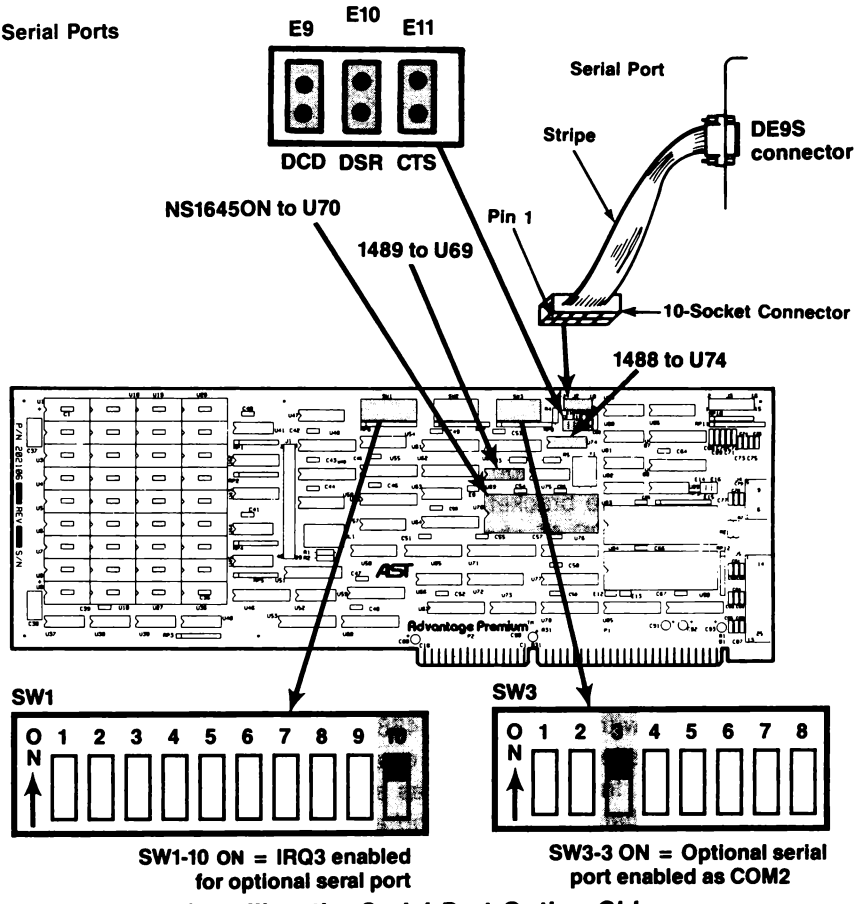


Figure 5-3. Installing the Serial Port Option Chips.

NOTE

If the chip seems too wide to allow the pins to properly line up with their socket receptacles, place the chip on its side on a flat surface and *gently* angle it under both thumbs to *slightly* bend the pins inward. You may find this same technique useful when actually inserting the chip into the socket on the board. Angle the chip, and slightly insert one row of pins, then bring the other row down into position and slightly start its pins in the socket. Once you have both sides started, you can evenly depress the entire chip until it is firmly seated.

STEP 5
Enable the second port: Make sure the switches are set as shown in Figure 5-3 (SW1-10 and SW3-3 ON).

STEP 6
Replace the Advantage Premium Board: Section 3 tells you how to install Advantage Premium into the PC-AT. The second serial port cable plugs onto the 10-pin stake connector (see Figure 5-3).

5.3 Programming the Serial Port

The Advantage Premium serial ports are completely under software control, and must be initialized for correct Baud rate, parity, number of databits, and number of stopbits before it can be used. You or your software must initialize the serial ports each time you turn on the computer.

NOTE

Using SuperSpool with your serial printer eliminates the need to use the DOS MODE command.

Typically, the DOS MODE command initializes the serial ports (refer to your DOS manual for a detailed explanation of this command). A typical MODE command might look like this:

MODE COM1:1200,N,8,1,P<Enter>

The above command initializes serial port COM1 for 1200 Baud, no parity, 8 databits, and 1 stopbit. The "P" is optional and tells DOS that you will be using the port with a serial printer. You can also use a similar command to establish communication parameters for serial port COM2.

Many applications programs (such as word processors) automatically handle port initialization, making it unnecessary to use the MODE command. Refer to your software manual; if it does not mention the MODE command, it is probably safe to assume that you can omit that step. If you are unsure, it will not harm anything to go ahead and use the MODE command anyway.

If you are using the serial port to operate a serial printer, you may also need to redirect printer output from LPT1 to COM1 or COM2. This is because DOS always assumes that printer output goes to parallel port LPT1 unless told otherwise. You can use the MODE command to redirect printer output from a parallel port to a serial port. For example:

MODE LPT1:=COM1:<Enter> For printer output to COM1

MODE LPT1:=COM2:<Enter> For printer output to COM2

A redirection command should follow the first MODE command that sets set up the Baud rate, parity, and so forth. Again, it is possible that your applications program is handling this redirection automatically. If so, you can eliminate this step as well.

5.4 Serial I/O Address Assignments and Pinouts

Advantage Premium serial ports use the system I/O addresses and IRQ interrupt request lines shown in Table 5-1.

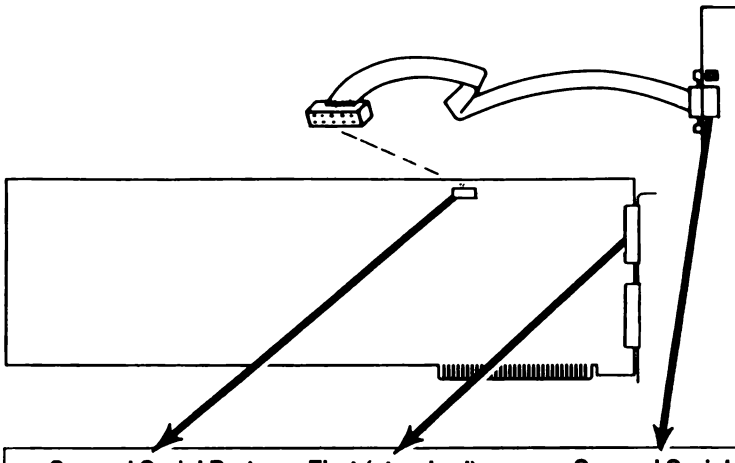
Table 5-1. Serial Port I/O Addresses and IRQs.

Port Configuration	I/O Addresses	IRQ Line
COM1	3F8-3FF Hex	IRQ4
COM2	2F8-2FF Hex	IRQ3

NOTE

The first (standard) Advantage Premium serial port can be configured as COM1 or COM2. The second serial port can be configured as COM2 only. If both the first and second Advantage Premium serial ports are configured as COM2, the second serial port will be disabled.

Figure 5-4 shows the serial port pinouts.



Second Serial Port (10-pin stake)		First (standard) Serial Port (DE9P)		Second Serial Port (DE9P)	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	DCD (Input)	1	DCD (Input)	1	DCD (Input)
2	DSR (Input)	2	RxD (Input)	2	RxD (Input)
3	RxD (Input)	3	TxD (Output)	3	TxD (Output)
4	RTS (Output)	4	DTR (Output)	4	DTR (Output)
5	TxD (Output)	5	Gnd	5	Gnd
6	CTS (Input)	6	DSR (Input)	6	DSR (Input)
7	DTR (Output)	7	RTS (Output)	7	RTS (Output)
8	RI (Input)	8	CTS (Input)	8	CTS (Input)
9	Gnd	9	RI (Input)	9	RI (Input)
10	No connection				

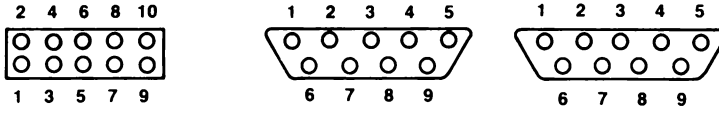


Figure 5-4. Advantage Premium Serial Port Pinouts.

You must use a DE9-to-DB25 adapter cable if your serial device uses a DB25 connector. AST offers a DE9-to-DB25 cable (model number ADV-AC) That remaps DE9 serial pinouts (such as from the Advantage Premium serial ports) to the DB25 configuration, as shown in Figure 5-5.

DE9 Connector		DB25 Connector
1	Carrier Detect DCD	8
2	Receive Data RxD	3
3	Transmit Data TxD	2
4	Data Terminal Ready DTR	20
5	Signal Ground GND	7
6	Data Set Ready DSR	6
7	Request to Send RTS	4
8	Clear to Send CTS	5
9	Ring Indicator RI	22

Figure 5-5. DE9-to-DB25 Adapter Cable Pinout.

Figure 5-6 shows a typical application using the DE9-to-DB25 adapter cable.

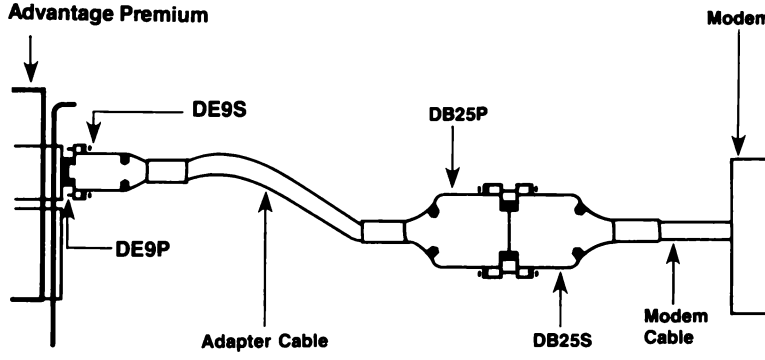


Figure 5-6. Typical DE9-to-DB25 Cable Application.

5.5 Serial Port Diagnostic Testing

Whenever there is any question about the operation of the Advantage Premium serial port, we recommend that you run the IBM diagnostics, preferably the advanced diagnostics supplied with the IBM *Hardware Maintenance Manual*.

For proper diagnostics operation, disconnect any device connected to the Advantage Premium serial port (such as a modem or serial printer). Also, make sure that the CTS, DSR, and DCD jumpers (Figure 5-2) are in the normal (not "forced true") setting.

You can use a *loopback plug* on the serial port connectors to perform a very thorough test of the serial port with the advanced diagnostics. Figure 5-7 shows the loopback plug configuration for Advantage Premium serial ports.

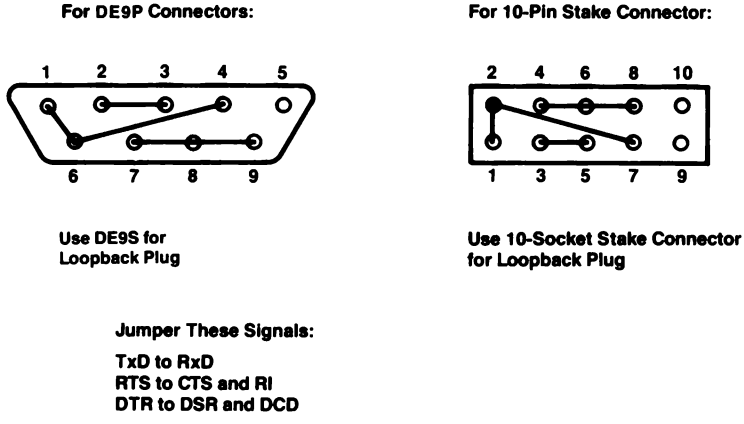


Figure 5-7. Loopback Plug Configuration.

Answer the Advanced Diagnostics loopback plug question with **Y** when this plug is installed on the serial port connector.

NOTE

Certain versions of the IBM diagnostics may fail on the first pass. Ignore the results of the first pass if an error occurs.

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SECTION 6

PARALLEL PRINTER PORT

Advantage Premium comes standard with a parallel port for interfacing the PC-AT to a parallel printer. This port is completely compatible with the IBM PC-AT and uses the same female DB25S connector as an IBM port.

- Section 6.1 tells you how to configure the parallel port. You do not need the information in this section unless you have some reason to change the default configuration for the Advantage Premium parallel port.

The remaining sections are of interest primarily to application software developers and other users with technical backgrounds:

- Section 6.2 discusses parallel port programming.
- Section 6.3 gives parallel port I/O address assignments and pinouts.
- Section 6.4 discusses parallel port diagnostic testing.
- Section 6.5 tells you how to configure your Advantage Premium to allow interrupt-driven parallel printer software to operate correctly.

Section 3 of this manual tells you how to install the parallel port ribbon cable onto your Advantage Premium board, and how to install the board and the parallel port into your PC-AT.

6.1 Configuring the Parallel Port

You can install a maximum of three parallel ports in the IBM PC-AT (called LPT1, LPT2, and LPT3). When looking for parallel ports, the PC-AT polls these hexadecimal I/O addresses in the following order:

1. 03BC-03BEh (display adapters with built-in parallel ports).
2. 0378-037Ah (used by AST's ColorGraphPlus parallel port).
3. 0278-027Ah.

If there is a parallel port at I/O addresses 03BC-03BEh (the address space occupied by display adapters with built-in parallel ports), that port responds as LPT1. A port at 0378-037Ah responds as LPT2, and a port at 0278-027Ah responds as LPT3.

NOTE

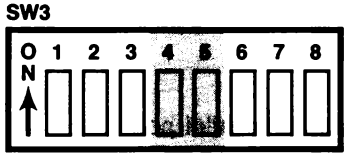
Interrupt-driven I/O for LPT3 is not supported in the PC-AT. Printer port LPT3 is not supported if your PC-AT includes a color display card.

If there is no parallel port at the first I/O address range, the parallel port at the second address responds as LPT1 and the parallel port at the third address responds as LPT2.

The parallel port on the Advantage Premium has been configured at the factory to respond as LPT1 — or LPT2 when a display card with built-in parallel port is present (see Section 6.1.2). You can confirm LPT1 configuration by checking that a shorting plug is installed as shown in Figure 6-1.

NOTE

If you have a ColorGraphPlus installed in your computer and you also want to use the Advantage Premium parallel port, reconfigure the Advantage Premium port as LPT2. The ColorGraphPlus port can only reside at I/O addresses 0378-037Ah or be disabled.



SW3-4	SW3-5	
ON	OFF	Parallel port enabled as LPT1 (I/O 378-37F)
OFF	ON	Parallel port enabled as LPT2 (I/O 278-27F)
OFF	OFF	Parallel port disabled

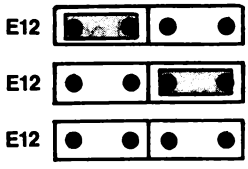


Figure 6-1. Parallel Port Configuration.

6.1.1 Installing Multiple Parallel Ports in a PC-AT

If your PC-AT already has another card with a parallel port that occupies the same I/O address range as the Advantage Premium parallel port (AST's ColorGraphPlus, for example), you must change one of the devices to avoid conflicts between the two ports. Figure 6-1 shows how to configure Advantage Premium as LPT1 (I/O addresses 0378-037Ah) or LPT2 (I/O addresses 0278-027Ah).

6.1.2 Display Adapters with Built-in Parallel Ports

The built-in parallel port on certain display adapter boards (such as the IBM Monochrome Display/Printer Adapter and the AST Research MonoGraphPlus™ or *Preview!*™) always responds as LPT1 and cannot be changed. If you have such a board in your PC-AT, the Advantage Premium parallel port will automatically respond as LPT2 in its factory default configuration. You do not need to reconfigure the Advantage Premium to respond as LPT2. If you do reconfigure the Advantage Premium for LPT2 when a parallel port that always responds as LPT1 is installed in your PC-AT, the Advantage Premium parallel port will respond as LPT3.

6.1.3 Disabling the Parallel Port

You can disable the Advantage Premium parallel port by removing the shorting plug shown in Figure 6-1. You can disable the parallel port to avoid conflicts when you have several parallel adapters installed in your PC-AT. Save the shorting plug for possible future use.

6.2 Programming the Parallel Port

The IBM PC-AT always sends printer output to parallel port LPT1 unless specifically told otherwise. Appendix E tells you how you can cause the PC-AT to redirect printer output from LPT1 to LPT2 or LPT3.

Although it is not required, you can use the DOS MODE command to set the line width and the number of lines per page. Refer to your IBM *DOS Manual* for more information.

6.3 Parallel Port I/O Addresses and Pinouts

The Advantage Premium parallel port uses the PC-AT I/O addresses listed in Table 6-1.

Table 6-1. Parallel Port I/O Addresses.

Port Configuration	I/O Addresses
LPT1	0378-037Ah
LPT2	0278-027Ah
NOTE When you use a display adapter with a built-in parallel port, DOS sees an Advantage Premium parallel port configured for LPT1 as LPT2, and a Advantage Premium parallel port configured for LPT2 as LPT3.	

You can use the standard IBM Parallel Printer Cable to connect the Advantage Premium to an IBM or IBM-compatible printer. You can also use the information in Table 6-2 to help build a cable for your parallel printer.

Table 6-2. Parallel Port Pinouts.

Line Name	Output DB25S	AST Adapter Cable IBM Matrix Printer Centronics Interface
-STROBE	1	1
D0	2	2
D1	3	3
D2	4	4
D3	5	5
D4	6	6
D5	7	7
D6	8	8
D7	9	9
-ACK	10	10
BUSY	11	11
PE	12	12
SLCT	13	13
-AUTOFD	14	14
-ERROR	15	32
-INIT	16	31
-SLCT IN	17	36
GROUND	(18-25)	(16,19-30,33)

NOTE

A dash in front of the line name denotes lines which are functionally active when low.

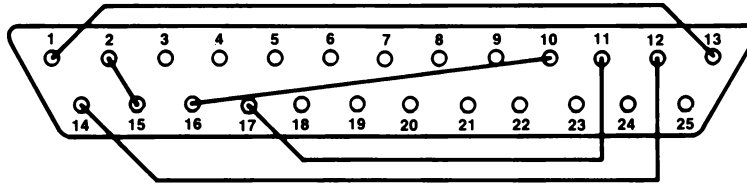
6.4 Parallel Port Diagnostic Testing

The Advantage Premium parallel port is completely compatible with IBM's diagnostics. However, you must configure the parallel port as LPT1 so that the port can be recognized by the diagnostics.

NOTE

If there is a display card installed in your PC-AT that always responds as LPT1 (I/O addresses 03B0-03BFh), the IBM diagnostics cannot recognize the Advantage Premium parallel port.

For proper diagnostics operation, disconnect any device connected to the Advantage Premium parallel port. You can use a loopback plug to perform a very thorough test of the parallel port with the IBM diagnostics. Figure 6-2 shows the loopback plug configuration for the Advantage Premium parallel port.



Use DB25P for loopback plug
Jumper these pins: 1 to 13
2 to 15
10 to 16
11 to 17
12 to 14

Figure 6-2. Loopback Plug Configuration.

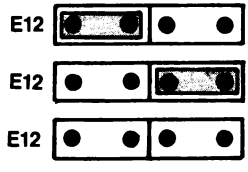
NOTE

If you run the matrix printer test, your printer must be 100% compatible with an Epson FX-80 or errors can be generated.

6.5 Interrupt Driven Parallel Printer Software

In the PC-AT, parallel printer port LPT1 uses IRQ7, and LPT2 uses IRQ5. An IRQ line is not assigned to LPT3 (LPT3 is not supported when a color video card is installed in the PC-AT).

To ensure that your interrupt-driven parallel printer software operates correctly, you must enable its interrupt line on the Advantage Premium board as shown in Figure 6-3. It will not harm anything to enable the interrupt even if you do not run interrupt-driven software for your parallel printer.



IRQ7 enabled for parallel port

IRQ5 enabled for parallel port

No interrupt line enabled for parallel port

NOTE

The PC-AT does not support an IRQ line for LPT3.

Figure 6-3. IRQ Enable Settings

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SECTION 7

GAME PORT

The optional game port provides an interface for connecting one or two joysticks to your PC-AT. With appropriate software, the joystick can be used for cursor control, as well as graphics development and interactive games.

This section includes the following:

- Section 7.1 tells you how to enable or disable the game port. You do not need the information in this section unless you have some reason to change this setting.

- Section 7.2 tells you how to add the game port to Advantage Premium. You do not need to read this section unles you are adding the game port option. You do not need this information if your Advantage Premium already has the game port installed.

The remaining sections are primarily of interest to application program software developers and other users with technical backgrounds:

- Section 7.3 discusses software compatibility.

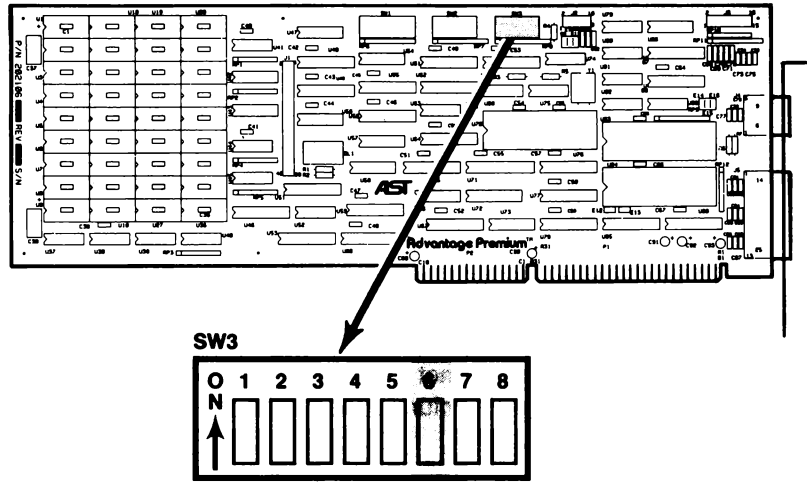
- Section 7.4 gives the I/O address assignment and pinouts for the game port.

- Section 7.5 discusses game port diagnostic testing.

7.1 Configuring the Game Port

To enable the game hardware: The game port ribbon cable must be installed on your Advantage Premium board and the shorting plug must be installed as shown in Figure 7-1.

The game port hardware must be installed on the board (Section 7.2 provides information on adding the port to your Advantage Premium).



SW3-6 ON = Game port enabled
SW3-6 OFF = Game port disabled

Figure 7-1. Game Port Enable/Disable.

To completely disable the game port: Turn off switch SW3-6 as shown in Figure 7-1.

7.2 Adding the Game Port to Your Advantage Premium

You only need to read this section if you are adding the game port option to Advantage Premium. You do need this information if your Advantage Premium already has a game port installed.

AST Research offers an upgrade kit for field installation of the Advantage Premium game port. To order the game port upgrade kit: order model number ADVP-000G through your AST dealer.
The upgrade kit consists of two chips and a cable assembly. To install the game port, follow the procedure described below.

CAUTION

Be sure 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.

STEP 1
Remove the PC-AT system unit cover: Follow the instructions in Section 3.

STEP 2
Remove any devices connected to the board: Remove any serial and/or parallel devices connected to the Advantage Premium board. Also remove the second serial port ribbon cable (if installed) from the board.

STEP 3
Remove the Advantage Premium board: Remove the retaining screw from the bracket securing the Advantage Premium board to the PC-AT chassis. With a steady, evenly distributed upward tension, remove the Advantage Premium board from its slot.

STEP 4

Install the game port chips: Your game port upgrade kit comes with three chips. Each chip is labelled with a notch or a small dot to identify the bottom left. Insert the chips as *shown in Figure 7-2. It is very important that you do not bend any pins when you insert your chips.*

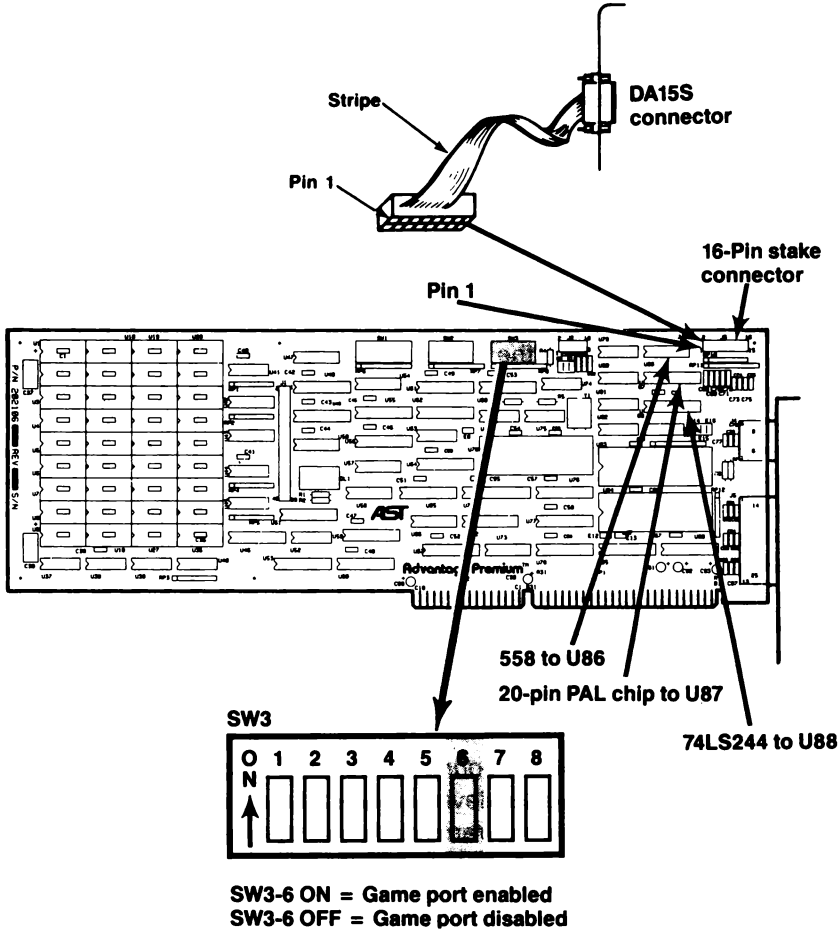


Figure 7-2. Installing the Game Port Chips.

NOTE

If the chip seems too wide to allow the pins to properly line up with their socket receptacles, place the chip on its side on a flat surface and *gently* angle it under both thumbs to *slightly* bend the pins inward. You may find this same technique useful when actually inserting the chip into the socket on the board. Angle the chip, and slightly insert one row of pins, then bring the other row down into position and slightly start its pins in the socket. Once you have both sides started, you can evenly depress the entire chip until it is firmly seated.

STEP 5
Enable the game port: Make sure the switch is set as shown in Figure 7-2 (SW3-6 ON).

STEP 6
Replace the Advantage Premium Board: Section 3 tells you how to install Advantage Premium into the PC-AT. The game port cable plugs onto the 16-pin stake connector (see Figure 7-2).

7.3 Software Compatibility

The game port is totally software-compatible with the IBM game adapter. Because joysticks are analog devices, the function of some software can vary with the joystick used, even though the game port is functioning properly. To compensate for differences between joysticks, use software that includes a joystick-centering function.

You can use the program listing in Section 7.5 to test the correct operation of the Advantage Premium game port.

7.4 Game Port Technical Information

This section provides the I/O address assignment and pinouts for the Advantage Premium game port.

7.4.1 Game Port I/O Address Assignment

The game port uses I/O address 200-207 hex. This information is for technical reference only; you do not need to know the I/O address to use the game port.

7.4.2 Game Port Pinouts

The Advantage Premium game port cable uses a DA15S (socket or female) connector to enable the connection of up to two joysticks. Table 7-1 summarizes the game port cable connector pinout.

Table 7-1. Advantage Premium Game Port Pinout.

Advantage Premium P3 Pin No.		DA15S Pin Number	Signal Name
Joystick A	1	1	+5VDC
	3	2	Button 1
	5	3	X Axis
	7	4	Ground
	9	5	Ground
	11	6	Y Axis
	13	7	Button 2
	15	8	+5VDC
Joystick B	2	9	+5VDC
	4	10	Button 3
	6	11	X Axis
	8	12	Ground
	10	13	Y Axis
	12	14	Button 4
	14	15	+5VDC

You can connect one joystick directly to the DA15S connector. To connect two joysticks, you will need a Y-connector adapter cable. The adapter cable should have one DA15S connector (to the Advantage Premium game port) and two DA15P (pin, or male) connectors (to the joysticks). Pins 1 through 8 on the DA15S should connect to one DA15P connector, and pins 9 through 15 to the other, as shown in Figure 7-1. Consult your dealer for further information.

7.5 Game Port Diagnostic Testing

You can use the IBM diagnostics to test the Advantage Premium game port. Because of a problem in the diagnostic program, however, the port may not always show up on the listing of installed devices. You might prefer to use the program below to test out the port. This program requires the use of BASICA (not BASIC).

```
10 DEFINT A-Z:KEY OFF:CLS:STRIG ON:SCREEN 2
20 PRINT " X1";" Y1";" S1";" S3"
30 X1=STICK(0):Y1=STICK(1)
40 A=STRIG(1):C=STRIG(5)
50 LOCATE 3:PRINT X1,Y1,A;C
60 GOTO 30
```

When you run the above program, moving the joystick in the X-plane (left-right) causes a change in the "X1" readout, while moving the joystick in the Y-plane (up-down) causes a change in the "Y1" readout. The values for "X" and "Y" differ according to the type of computer (6- or 8-MHz PC-AT) and joystick you are using. Pressing the switch (either one or two, depending on your joystick) causes a change in the "S1" or "S3" readouts from 0 to -1. Note that, depending on the quality of your joystick, you may not be able to get a zero reading in the X and Y planes when running the program. This is normal and no cause for alarm.

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SECTION 8

MEMORY CONFIGURATION

This section tells you how to install additional memory on Advantage Premium and Premium-Pak AT. You do not need this information unless you are adding to the memory already installed on your Advantage Premium board.

Section 2 of this manual tells you how to configure Advantage Premium (for linear memory already installed, linear memory size, and parity error checking enable/disable) before installing it into your PC-AT.

If your Advantage Premium or Premium-Pak AT is not fully populated — if less than 1 megabyte (MB) of memory is installed on either board — you can plug in 256-kilobyte (KB) random access memory (RAM) chips to upgrade memory. You can remove Advantage Premium memory simply by unplugging RAM chips. Figure 8-1 shows which memory banks must be populated for each Advantage Premium memory size.

Rules for adding or subtracting memory:

- For each memory size, all specified rows of chips must be populated entirely with 256-KB chips (120 nanosecond (ns) access time).

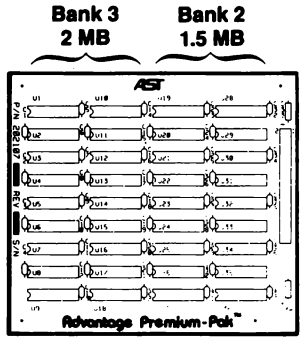
NOTE

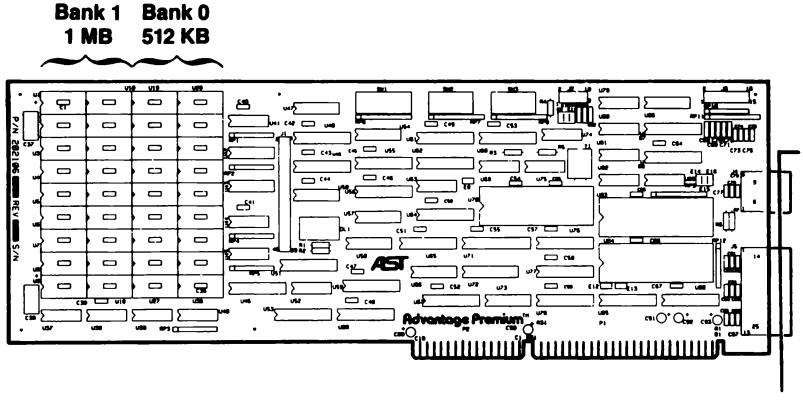
To ensure compatibility with 8-megahertz (MHz) PC-ATs, you must use 120-ns RAM chips to upgrade Advantage Premium memory.

- You must add or subtract Advantage Premium memory in 512-KB increments — possible memory capacities for the Advantage Premium board only (not including Premium-Pak AT) are 512 KB and 1 MB. Possible memory capacities for Advantage Premium plus Premium-Pak AT are 1.5 and 2 MB.

- Whenever you add or remove memory, be sure to reset the switches if the memory configuration changes (including the linear memory already installed or Advantage Premium linear memory size parameters).

- You must run the INSTALL and SETUP programs whenever you add or remove Advantage Premium memory. Section 4 tells you how to run the INSTALL program, and Appendix B gives several examples of how to run the SETUP program when you install Advantage Premium in your PC-AT.





If Advantage Premium memory size is:	These memory banks must be fully populated:
512 KB	0
1 MB	0, 1
1.5 MB	0, 1, 2
2 MB	0, 1, 2, 3

Figure 8-1. Advantage Premium and Premium-Pak AT Memory Configuration.

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APPENDIX A

SWITCH AND JUMPER SETTING SUMMARY

This appendix summarizes all of the switch and jumper settings for the Advantage Premium board.

A.1 Advantage Premium Conventional/Extended Memory Size

Figure A-1 shows the Advantage Premium maximum conventional/extended memory size settings. Conventional memory is the user-addressable memory between 0 and 640 KB. Extended memory is the non-paged memory above 1 MB, and can be added until the PC-AT's limit of 16 MB is reached. Conventional or extended memory cannot be allocated in the 640-KB to 1-MB range.

Each enabled 128-KB block of conventional/extended memory is allocated as conventional memory until a total of 640 KB of conventional memory is present. Any additional conventional/extended Advantage Premium memory is then allocated as extended memory. All remaining Advantage Premium memory is then allocated as expanded (paged) memory.

For example, your PC-AT has 256 KB of conventional memory already installed on the system board, and you are installing an Advantage Premium and Premium-Pak AT (for a total of 2 MB of Advantage Premium memory). If you allocate 1024 KB (1 MB) of that memory as linear memory (SW1-1 ON, and SW1-2, SW1-3, and SW1-4 OFF):

- 384 KB is used to round out conventional memory to its 640-KB limit.

- 768 KB is allocated as extended memory.

- The remaining 1 MB of Advantage Premium memory is allocated as expanded (paged) memory.

NOTE

To prevent parity errors, do not set Advantage Premium conventional/extended memory size for more memory than is actually installed on Advantage Premium. For example, if 512 KB is installed on Advantage Premium, do not set the conventional/extended memory size to 640 KB.

To allocate all Advantage Premium memory as expanded (paged) memory, simply set the starting address (Section A.3) to 16 MB. This ensures that no Advantage Premium memory is allocated as conventional or extended memory, regardless of the conventional/extended memory size setting.

Advantage Premium Conventional/Extended Memory Size	SW1-1	SW1-2	SW1-3	SW1-4
* 128 KB	ON	ON	ON	ON
256 KB	ON	ON	ON	OFF
384 KB	ON	ON	OFF	ON
512 KB	ON	ON	OFF	OFF
640 KB	ON	OFF	ON	ON
768 KB	ON	OFF	ON	OFF
896 KB	ON	OFF	OFF	ON
1024 KB	ON	OFF	OFF	OFF
1152 KB	OFF	ON	ON	ON
1280 KB	OFF	ON	ON	OFF
1408 KB	OFF	ON	OFF	ON
1536 KB	OFF	ON	OFF	OFF
1664 KB	OFF	OFF	ON	ON
1792 KB	OFF	OFF	ON	OFF
1920 KB	OFF	OFF	OFF	ON
2048 KB	OFF	OFF	OFF	OFF

* Default setting.

NOTE

If Advantage Premium is configured for all of its memory to be used as expanded memory (for example, switches SW2-1 through SW2-7 OFF) the above linear memory size settings will be ignored.

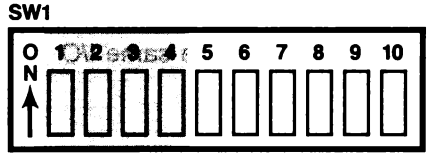


Figure A-1. Advantage Premium Conventional/Extended Memory Size.

NOTE

You can use the REX.SYS program to configure Advantage Premium expanded memory as extended (for RAM disks and print spoolers only) memory without resetting Advantage Premium hardware switches. However, the reverse is not true: you cannot override the setting for conventional/extended memory size to allocate extended memory as expanded memory.

To reconfigure Advantage Premium expanded memory as extended memory without resetting board switches, you must add or modify the DEVICE=REX.SYS statement in your CONFIG.SYS file, or use the INSTALL program (described in Section 4).

A.2 Base I/O Address

Figure A-2 shows the Advantage Premium base I/O address settings. This setting defines the base I/O address used by Advantage Premium to communicate with the PC-AT, so that it can make use of expanded memory.

NOTE

If more than one AST expanded memory board is installed in a PC-AT, each must use a different I/O address. To prevent I/O address conflicts, make sure that no other devices in your PC-AT use the same I/O address.

Base I/O Address	Advantage Premium Switch Settings SW1-5	SW1-6	SW1-7	SW1-8
0208	ON	ON	ON	ON
*0218	ON	ON	ON	OFF
O258	ON	OFF	ON	OFF
0268	ON	OFF	OFF	ON
02A8	OFF	ON	OFF	ON
O2B8	OFF	ON	OFF	OFF
02E8	OFF	OFF	OFF	ON

*Default setting

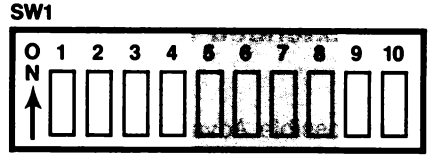
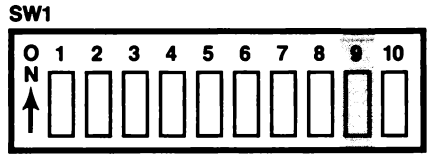


Figure A-2. Advantage Premium Base I/O Address Settings.

A.3 Dual Page Mode

Figure A-3 shows how to enable or disable Dual Page mode. Dual Page mode allows expanded memory to maintain two set of mapping registers, which ensures best proper multitasking operation. Unless you have a special reason to do otherwise, leave Dual Page mode enabled.



SW1-9 ON = Dual Page mode enabled
SW1-9 OFF = Dual Page mode disabled

Figure A-3. Dual Page Mode Configuration.

A.4 Conventional/Extended Memory Already Installed

Figure A-4 shows the possible Advantage Premium settings for linear memory already installed. This setting tells Advantage Premium how much conventional and extended memory is already installed in your PC-AT, and prevents parity errors at power on during memory sizing.

Please note that this parameter does not include the memory between 640 KB and 1 MB. For example, if your PC-AT includes 640 KB of conventional memory and 128 KB of extended memory, the setting for linear memory already installed is 768 KB (SW2-1 through SW2-4 ON, SW2-5 through SW2-7 OFF).

NOTE

For most efficient multitasking operation under DESQview, set Advantage Premium linear memory already installed at *256 KB* (if Advantage Premium has enough memory installed). The more Advantage Premium memory that is allocated in the area from 0-640 KB, the greater the enhancement of DESQview's performance.

SW2

Conventional/ Extended Memory Already Installed	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6	SW2-7
0 KB	ON	ON	ON	ON	ON	ON	ON
128 KB	ON	ON	ON	ON	ON	ON	OFF
256 KB	ON	ON	ON	ON	ON	OFF	ON
384 KB	ON	ON	ON	ON	ON	OFF	OFF
512 KB*	ON	ON	ON	ON	OFF	ON	ON
640 KB	ON	ON	ON	ON	OFF	ON	OFF
768 KB	ON	ON	ON	ON	OFF	OFF	ON
896 KB	ON	ON	ON	ON	OFF	OFF	OFF
1024 KB	ON	ON	ON	OFF	ON	ON	ON
1152 KB	ON	ON	ON	OFF	ON	ON	OFF
1280 KB	ON	ON	ON	OFF	ON	OFF	ON
1408 KB	ON	ON	ON	OFF	ON	OFF	OFF
1536 KB	ON	ON	ON	OFF	OFF	ON	ON
1664 KB	ON	ON	ON	OFF	OFF	ON	OFF
1792 KB	ON	ON	ON	OFF	OFF	OFF	ON
1920 KB	ON	ON	ON	OFF	OFF	OFF	OFF
2048 KB	ON	ON	OFF	ON	ON	ON	ON
2176 KB	ON	ON	OFF	ON	ON	ON	OFF
2304 KB	ON	ON	OFF	ON	ON	OFF	ON
2432 KB	ON	ON	OFF	ON	ON	OFF	OFF
2560 KB	ON	ON	OFF	ON	OFF	ON	ON
2688 KB	ON	ON	OFF	ON	OFF	ON	OFF
2816 KB	ON	ON	OFF	ON	OFF	OFF	ON
2944 KB	ON	ON	OFF	ON	OFF	OFF	OFF
3072 KB	ON	ON	OFF	OFF	ON	ON	ON
3200 KB	ON	ON	OFF	OFF	ON	ON	OFF
3328 KB	ON	ON	OFF	OFF	ON	OFF	ON
3456 KB	ON	ON	OFF	OFF	ON	OFF	OFF
3584 KB	ON	ON	OFF	OFF	OFF	ON	ON
3712 KB	ON	ON	OFF	OFF	OFF	ON	OFF
3840 KB	ON	ON	OFF	OFF	OFF	OFF	ON
3968 KB	ON	ON	OFF	OFF	OFF	OFF	OFF
4096 KB	ON	OFF	ON	ON	ON	ON	ON
4224 KB	ON	OFF	ON	ON	ON	ON	OFF
4352 KB	ON	OFF	ON	ON	ON	OFF	ON
4480 KB	ON	OFF	ON	ON	ON	OFF	OFF
4608 KB	ON	OFF	ON	ON	OFF	ON	ON
4736 KB	ON	OFF	ON	ON	OFF	ON	OFF
4864 KB	ON	OFF	ON	ON	OFF	OFF	ON
4992 KB	ON	OFF	ON	ON	OFF	OFF	OFF
5120 KB	ON	OFF	ON	OFF	ON	ON	ON
5248 KB	ON	OFF	ON	OFF	ON	ON	OFF
5376 KB	ON	OFF	ON	OFF	ON	OFF	ON
5504 KB	ON	OFF	ON	OFF	ON	OFF	OFF
5632 KB	ON	OFF	ON	OFF	OFF	ON	ON
5760 KB	ON	OFF	ON	OFF	OFF	ON	OFF
5888 KB	ON	OFF	ON	OFF	OFF	OFF	ON
6016 KB	ON	OFF	ON	OFF	OFF	OFF	OFF
6144 KB	ON	OFF	OFF	ON	ON	ON	ON
6272 KB	ON	OFF	OFF	ON	ON	ON	OFF
6400 KB	ON	OFF	OFF	ON	ON	OFF	ON
6528 KB	ON	OFF	OFF	ON	ON	OFF	OFF
6656 KB	ON	OFF	OFF	ON	OFF	ON	ON
6784 KB	ON	OFF	OFF	ON	OFF	ON	OFF
6912 KB	ON	OFF	OFF	ON	OFF	OFF	ON
7040 KB	ON	OFF	OFF	ON	OFF	OFF	OFF
7168 KB	ON	OFF	OFF	OFF	ON	ON	ON
7296 KB	ON	OFF	OFF	OFF	ON	ON	OFF
7424 KB	ON	OFF	OFF	OFF	ON	OFF	ON
7552 KB	ON	OFF	OFF	OFF	ON	OFF	OFF
7680 KB	ON	OFF	OFF	OFF	OFF	ON	ON
7808 KB	ON	OFF	OFF	OFF	OFF	ON	OFF
7936 KB	ON	OFF	OFF	OFF	OFF	OFF	ON
8064 KB	ON	OFF	OFF	OFF	OFF	OFF	OFF

* Default setting

640/896
128 0 512
1280/1 12
1536/512
512 1 12

NOTE

Do not count memory in the 640 KB-1 MB range when determining this total.

Figure A-4. Conventional/Extended Memory Already Installed.

SW2

Conventional/ Extended Memory Already Installed	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6	SW2-7
8192 KB	OFF	ON	ON	ON	ON	ON	ON
8320 KB	OFF	ON	ON	ON	ON	ON	OFF
8448 KB	OFF	ON	ON	ON	ON	OFF	ON
8576 KB	OFF	ON	ON	ON	ON	OFF	OFF
8704 KB	OFF	ON	ON	ON	OFF	ON	ON
8832 KB	OFF	ON	ON	ON	OFF	ON	OFF
8960 KB	OFF	ON	ON	ON	OFF	OFF	ON
9088 KB	OFF	ON	ON	ON	OFF	OFF	OFF
9216 KB	OFF	ON	ON	OFF	ON	ON	ON
9344 KB	OFF	ON	ON	OFF	ON	ON	OFF
9472 KB	OFF	ON	ON	OFF	ON	OFF	ON
9600 KB	OFF	ON	ON	OFF	ON	OFF	OFF
9728 KB	OFF	ON	ON	OFF	OFF	ON	ON
9856 KB	OFF	ON	ON	OFF	OFF	ON	OFF
9984 KB	OFF	ON	ON	OFF	OFF	OFF	ON
10112 KB	OFF	ON	ON	OFF	OFF	OFF	OFF
10240 KB	OFF	ON	OFF	ON	ON	ON	ON
10368 KB	OFF	ON	OFF	ON	ON	ON	OFF
10496 KB	OFF	ON	OFF	ON	ON	OFF	ON
10624 KB	OFF	ON	OFF	ON	ON	OFF	OFF
10752 KB	OFF	ON	OFF	ON	OFF	ON	ON
10880 KB	OFF	ON	OFF	ON	OFF	ON	OFF
11008 KB	OFF	ON	OFF	ON	OFF	OFF	ON
11136 KB	OFF	ON	OFF	ON	OFF	OFF	OFF
11264 KB	OFF	ON	OFF	OFF	ON	ON	ON
11392 KB	OFF	ON	OFF	OFF	ON	ON	OFF
11520 KB	OFF	ON	OFF	OFF	ON	OFF	ON
11648 KB	OFF	ON	OFF	OFF	ON	OFF	OFF
11776 KB	OFF	ON	OFF	OFF	OFF	ON	ON
11904 KB	OFF	ON	OFF	OFF	OFF	ON	OFF
12032 KB	OFF	ON	OFF	OFF	OFF	OFF	ON
12160 KB	OFF	ON	OFF	OFF	OFF	OFF	OFF
12288 KB	OFF	OFF	ON	ON	ON	ON	ON
12416 KB	OFF	OFF	ON	ON	ON	ON	OFF
12544 KB	OFF	OFF	ON	ON	ON	OFF	ON
12672 KB	OFF	OFF	ON	ON	ON	OFF	OFF
12800 KB	OFF	OFF	ON	ON	OFF	ON	ON
12928 KB	OFF	OFF	ON	ON	OFF	ON	OFF
13056 KB	OFF	OFF	ON	ON	OFF	OFF	ON
13184 KB	OFF	OFF	ON	ON	OFF	OFF	OFF
13312 KB	OFF	OFF	ON	OFF	ON	ON	ON
13440 KB	OFF	OFF	ON	OFF	ON	ON	OFF
13568 KB	OFF	OFF	ON	OFF	ON	OFF	ON
13696 KB	OFF	OFF	ON	OFF	ON	OFF	OFF
13824 KB	OFF	OFF	ON	OFF	OFF	ON	ON
13952 KB	OFF	OFF	ON	OFF	OFF	ON	OFF
14080 KB	OFF	OFF	ON	OFF	OFF	OFF	ON
14208 KB	OFF	OFF	ON	OFF	OFF	OFF	OFF
14336 KB	OFF	OFF	OFF	ON	ON	ON	ON
14464 KB	OFF	OFF	OFF	ON	ON	ON	OFF
14592 KB	OFF	OFF	OFF	ON	ON	OFF	ON
14720 KB	OFF	OFF	OFF	ON	ON	OFF	OFF
14848 KB	OFF	OFF	OFF	ON	OFF	ON	ON
14976 KB	OFF	OFF	OFF	ON	OFF	ON	OFF
15104 KB	OFF	OFF	OFF	ON	OFF	OFF	ON
15232 KB	OFF	OFF	OFF	ON	OFF	OFF	OFF
15360 KB	OFF	OFF	OFF	OFF	ON	ON	ON
15488 KB	OFF	OFF	OFF	OFF	ON	ON	OFF
15616 KB	OFF	OFF	OFF	OFF	ON	OFF	ON
15744 KB	OFF	OFF	OFF	OFF	ON	OFF	OFF
15872 KB	OFF	OFF	OFF	OFF	OFF	ON	ON
All	OFF	OFF	OFF	OFF	OFF	ON	OFF
Advantage	OFF	OFF	OFF	OFF	OFF	OFF	ON
Premium	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Memory Paged							

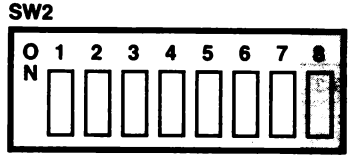
NOTE

Do not count memory in the 640 KB-1 MB range when determining this total.

Figure A-4. Conventional/Extended Memory Already Installed (Continued).

A.5 Parity Checking

Figure A-5 shows how to enable or disable parity error checking. To ensure the most reliable memory operation, leave parity checking enabled.



SW2-8 ON = Parity checking enabled (default setting).
SW2-8 OFF = Parity checking disabled.

Figure A-5. Parity Error Checking.

A.6 Serial Port (COM1/COM2)

Figure A-6 shows the possible Advantage Premium serial port assignments.

If the second serial port is not installed, it must be disabled to avoid I/O address conflicts.

For more information on serial ports, see Section 5.

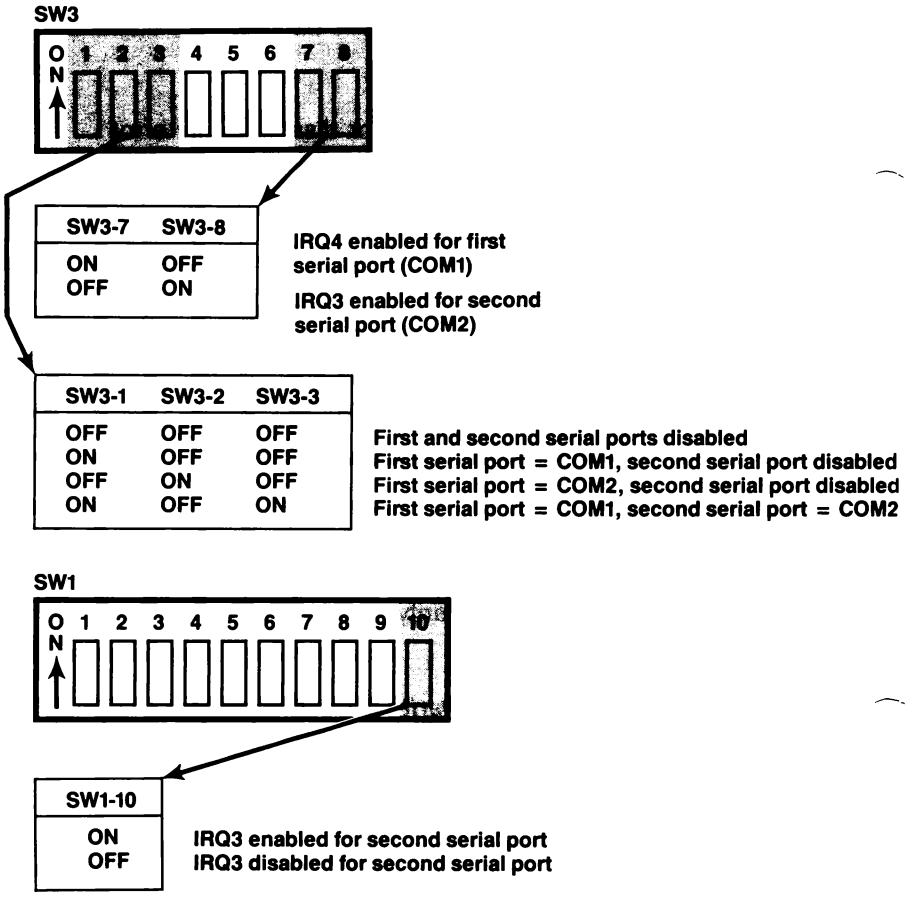


Figure A-6. Serial Port COM Assignments.

A.7 Serial Port Inputs

Figure A-7 shows how to configure serial inputs CTS, DSR, and DCD to be driven by the connected device or "forced true". This parameter provides a convenient means of reconfiguring the serial port for special requirements of certain serial devices (the documentation for the serial device will tell you if you need to force any of the serial inputs true).

For more information on serial ports, see Section 5. Appendix D also provides more information on serial interfaces.

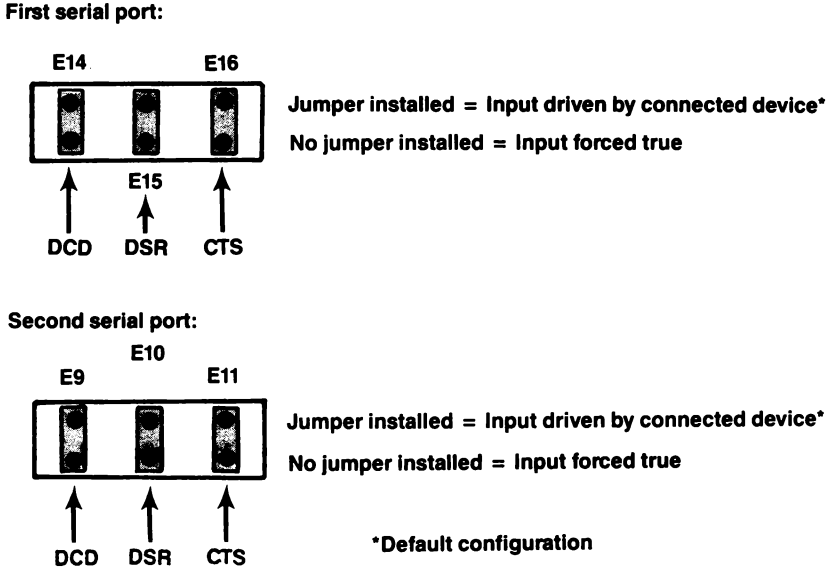


Figure A-7. Serial Port Input Configuration.

A.8 Parallel Port

Figure A-8 shows how to configure the Advantage Premium parallel port as LPT1, LPT2, or disabled.

NOTE

If a display adapter with a built-in parallel port is installed in your PC-AT, Advantage Premium LPT1 will respond as LPT2, and LPT2 will respond as LPT3.

If your computer has a ColorGraphPlus installed, you must reconfigure the Advantage Premium parallel port as LPT2 or disable one of the parallel ports. (The ColorGraphPlus always resides at the same I/O addresses, and can only be enabled or disabled.)

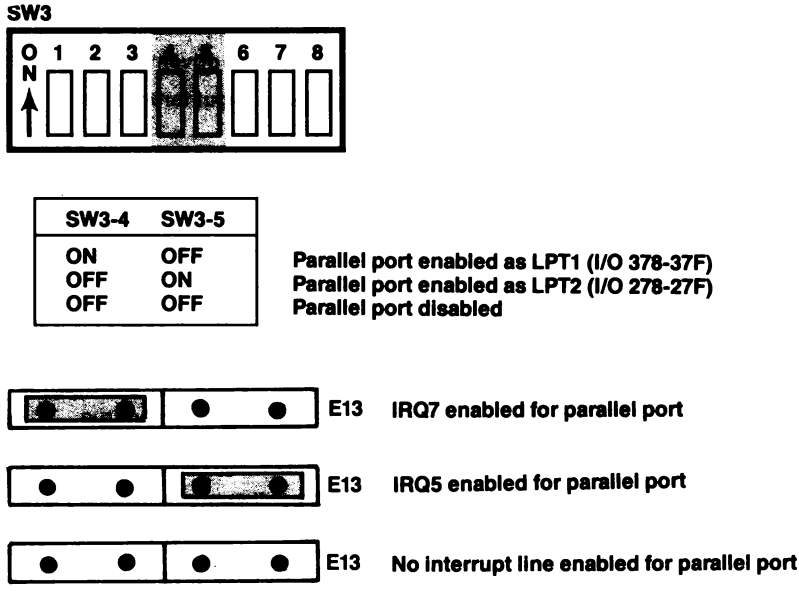


Figure A-8. Parallel Port Configuration.

A.9 Game Port

Figure A-9 shows how to enable or disable the Advantage Premium game port.

If the optional game port is not installed, it should be disabled to avoid I/O address conflicts.

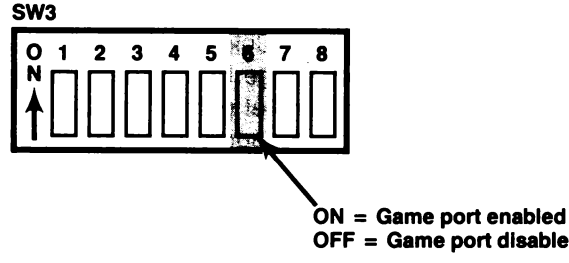


Figure A-9. Game Port Configuration.

APPENDIX B

HOW ADVANTAGE PREMIUM WORKS

This appendix gives a brief overview of how Advantage Premium works, including memory paging and descriptions of AST expanded memory software modules (REMM.SYS and REX.SYS), and how to modify them if necessary. Although you do not need this information to use Advantage Premium, it is provided for those who want some background on how the product functions.

NOTE

Important! To use expanded memory, your boot disk *must* contain REMM.SYS. REX.SYS is also required (along with REMM.SYS) to run RAM disks and print spoolers from expanded memory.

B.1 Memory Paging

By using a technique called *memory paging*, Advantage Premium allows your PC-AT to use *expanded memory* — memory beyond the normal PC-AT memory map.

The IBM PC-AT can address up to 16 megabytes (MB) of memory. The normal memory map (shown Figure B-1) allocates the first 640 kilobytes (KB) of PC-AT memory as user memory. The memory from 1 to 16 MB (which is accessed when running the PC-AT in Protected mode) is called extended memory. Some of the PC-AT memory between 640 KB and 1 MB is used for such purposes as video RAM and ROM to support PC housekeeping functions — but there are large unused areas.

Each Advantage Premium board can contain up to 2 MB of physical memory (when Premium-Pak AT is installed). Advantage Premium physical memory is divided into 16-KB blocks called *pages*. Advantage Premium software (along with your expanded memory applications software) swaps memory pages in and out of open *windows* in the area between 640 KB and 1 MB. To further enhance performance, the AST expanded memory manager can also take advantage of Advantage Premium memory *below* 640 KB. This process — memory paging — allows your PC-AT to access up to 2 MB Advantage Premium physical memory at RAM speeds, completely transparent to the user.

You can allocate any portion of Advantage Premium memory as conventional/extended memory anywhere on a 128-KB boundary (except for the area between 640 KB and 1 MB) in the 0- to 16-MB PC-AT address space. Whatever Advantage Premium memory is left will be used by the REMM software (if installed) as paged memory.

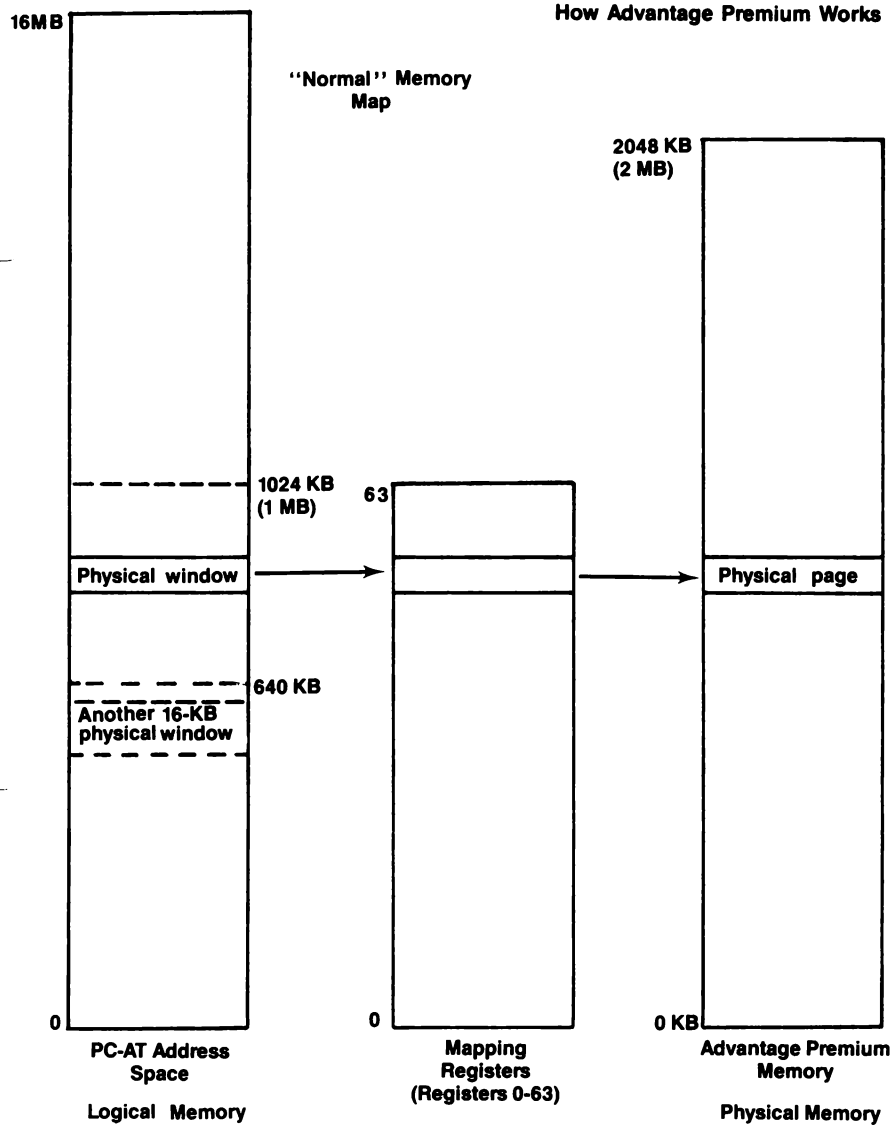


Figure B-1. Paging Technique.

B.2 Expanded Memory Manager — REMM.SYS

The REMM software driver swaps memory between the Advantage Premium board and PC-AT memory by creating pointers, loading the registers, and mapping PC-AT windows to Advantage Premium expanded memory. REMM also conducts an integrity test on the expanded memory when the PC-AT is turned on. This prevents and Advantage Premium memory that is not working properly from being used.

Your applications program must keep track of what page of Advantage Premium memory holds a particular element of data, in order to retrieve it. According to parameters supplied by the applications program, REMM links windows in logical PC-AT memory to pages of Advantage Premium physical memory by means of the 64 Mapping registers, the Map Control register and the Page registers.

REMM also allocates Advantage Premium memory to several *Process IDs* (also known as *expanded memory manager (EMM) handles*). Each Process ID is allocated to a particular applications program, and has certain pages of memory allocated to it. Process IDs aid in multitasking.

Before memory mapping is enabled, REMM automatically maps any of the 16-KB pages that are to fill out the 640 KB on the PC-AT. You can circumvent this automatic allocation by setting Advantage Premium switches to indicate that 640 KB is already installed in the PC-AT. Using the INSTALL program to select the AST memory manager installs REMM.SYS and automatically configures it for your system.

B.3 Extended Memory Emulator — REX.SYS

REX interfaces with the REMM program to make Advantage Premium expanded memory act like PC-AT extended memory. This allows you to use AST's fASTdisk, SuperDrive, and SuperSpool (also IBM's DOS 3.x VDISK.SYS utility with the "/E" option) to create RAM disks or a print spooler in Advantage Premium expanded memory — even when you've set the Advantage Premium board switches to allocate all Advantage Premium memory as expanded (paged) memory.

NOTE

REX must be installed after the REMM software, and it cannot function without REMM software.

REX intercepts calls on read-only memory basic input/output system (ROM BIOS) functions designed for extended memory use, and interfaces them to the REMM software so that they can use Advantage Premium expanded memory.

As with applications that use the REMM software, program code portions of the SuperPak programs must reside in the 640 KB of PC-AT memory. However, data associated with SuperPak utilities can use Advantage Premium expanded memory.

B.4 Modifying REMM and REX

As installed with AST's SuperPak INSTALL program, REMM and REX should not require further modification. However, the information in this section is provided as a reference for programmers.

You can add these statements to your CONFIG.SYS file to change the default REMM and REX software drivers:

DEVICE=REMM.SYS [/X] [/P] [/S] [/D] [/C] [/N]

and/or

DEVICE=REX.SYS [nnnn]

This section describes the parameters you can use with each of these statements.

B.4.1 DEVICE=REMM.SYS Parameters

You can append multiple parameters to the DEVICE=REMM statement. Separate parameters with one blank space. This section describes the following REMM parameters:

DEVICE=REMM.SYS [/X] [/P] [/S] [/D] [/C]

With the exception of the "/X" parameter, the following are intended for software developer use.

/X= — Exclude

The /X parameter allows you to exclude certain ranges of memory from REMM mapping. REMM will never map into memory space that is already occupied, but you may have an application for which you would like to reserve certain memory ranges.

NOTE

If you will be using software designed for the enhanced expanded memory specification (EEMS), AST recommends excluding the area used by video memory from mapping.

The INSTALL program automatically installs the appropriate "/X" parameter. (INSTALL excludes the 0B000-0BFFFh range for an IBM monochrome adapter, Hercules graphics adapter, or compatible; 0B800-0BFFFh for an IBM color graphics adapter or compatible; 0A000-0BFFFh for an IBM enhanced graphics adapter or compatible, or for other types of video cards.)

For PC-AT installations, the INSTALL program also automatically excludes memory addresses 0E000-0EFFFh (the area used by the PC-AT extended BIOS).

Format: **/X=nnnn-nnnn**

where *n* is a hexadecimal digit. The first *nnnn* is the starting address of the range, and the second *nnnn* is the ending address.

You can specify multiple ranges as long as you separate each address range with one blank.

Default: None excluded.

Example: **DEVICE=REMM.SYS /X=B000-BFFF**

This is the standard statement for a system that includes a Hercules graphics adapter.

Example: **DEVICE=REMM.SYS /X=C140-CA00**
/X=DDDD-DDFF

Notes: You must leave at least one contiguous 64-KB segment of memory available for mapping by REMM starting in the range C000 through E000. In other words, you may not use the /X parameter to exclude all contiguous 64-KB segments that start in that range.

/PIDS= or /P= — Process IDs

The /P parameter limits the number of process IDs that REMM will allow. A *process ID* is the identification assigned to each user or application on the system.

Format: **/PIDS=n** or **/P=n** (short form)

where *n* is a decimal number from 2 to 256.

Default: The default value is 32.

Example: **DEVICE=REMM.SYS /PIDS=12**

Notes: Increasing the number of process IDs increases the amount of memory used by REMM.

/START= or /S= — Start

The /S parameter tells REMM to put logical page 0 of the mapping window at the specified segment address. This hexadecimal address must be on a 16-KB boundary, and must be within the 0C000-0E000h range.

Format: **/START=nnnn**

where *n* is a hexadecimal digit.

Default: Determined dynamically by REMM.

Example: **DEVICE=REMM.SYS /START=C000**

/DEPTH= or /D= — Depth

The /D parameter specifies the maximum number of mapping register contexts per process ID that REMM can save. Unless you are developing software, the default value should be adequate.

Format: **/DEPTH=nn**

where *nn* is any decimal number from 1 to 32.

Default: The default value is 5.

Example: **DEVICE=REMM.SYS /DEPTH=15**

/CONTEXTS= or /C= — Total Contexts

The /C parameter specifies the total number of mapping register contexts that can be saved for all process IDs combined. Unless you are developing software, the default value should be adequate.

Format: **/CONTEXTS=nnn**

where *n* is a decimal digit.

Default: The value of DEPTH plus the value of PIDS minus one.

Example: **DEVICE=REMM.SYS /CONTEXTS=36**

Notes: The value of CONTEXTS cannot be less than the value of PIDS.

/N — Nomenclature

The /N parameter causes an informational message similar to the following to be displayed at bootup:

```
RAMpage Expanded Memory Manager                    Version 3.00
© Copyright AST Research, Inc. 1985, 1986          All Rights Reserved.
KB ok  Board at Port  Bank Number ..........................0123
1152   0268           O=OK, X=Bad or Empty, P=Parity Err . .OOOO
1024   0258           O=OK, X=Bad or Empty, P=Parity Err . .OOXX

          Expanded Memory Pages:          136
          Windows START at:               C000h
          Process IDs:                     32
          Contexts:                        36
          Depth:                            5
          Mode:                            1F
```

B.4.2 DEVICE=REX.SYS Parameters

The AST SuperPak INSTALL program automatically configures and installs the appropriate command statement for REX.

Format: **DEVICE=REX.SYS [nnnn]**

where *nnnn* is a decimal number indicating the amount of memory (in KB) allocated for use by REX.

Default: The default value is 512 (KB).

Example: **DEVICE=REX.SYS 1024**

Notes: The amount of memory allocated to REX must be at least as much as the sum of all extended memory used by fASTdisk, SuperDrive, SuperSpool, IBM's VDISK, and any other RAM disks and print spoolers set up to use memory outside the 0-to 640-KB area. If you do not express this value as a multiple of 16 KB, it will automatically be rounded up to the next highest multiple.

B.4.3 Modifying CONFIG.SYS for fASTdisk

If you intend to use fASTdisk for virtual disk software, be sure to add the appropriate statement to your CONFIG.SYS file as described in your IBM *SuperPak User's Manual*. The DEVICE=FASTDISK.SYS statement must follow the REMM and REX statements in the CONFIG.SYS file to enable fASTdisk to use Advantage Premium memory.

APPENDIX C

RUNNING SETUP

You must run the SETUP program (included on the advanced diagnostics diskette that comes with your PC-AT) whenever you add or subtract conventional/extended memory (also called *linear or* non-paged memory) from your PC-AT. This appendix provides several examples of how to run the SETUP program when you install Advantage Premium in your PC-AT.

NOTE

> You will also need to run SETUP to change the number of floppy disk drives to include any SuperDrive(s) you create.

To run the SETUP program, follow this procedure (specific examples follow):

STEP 1
Reboot: Insert the IBM PC-AT advanced diagnostics diskette in drive A:. Press <**Ctrl**>-<**Alt**>-<**Del**> to reboot your PC-AT. Unless your SETUP program happens to be configured for the new amount of memory in your PC-AT, the screen will display a message similar to this:

> xxxxx KB OK
>
> yyy-Memory Size Error-(Run SETUP)
>
> Press F1 to resume
>
> where *xxxxx* is the amount of conventional/extended memory installed in the PC, and *yyy* is an error code.

STEP 2
Enter SETUP: Press <**F1**> to enter the SETUP program. Follow the instructions on the screen. SETUP will ask you to specify the disk drive and display adapter types for your PC-AT — do not change those parameters unless you have changed your PC-AT's configuration.

STEP 3
Enter the amount of base memory: When your screen displays:

```
-256KB on the system board or,
-512KB on the system board or,
-640KB of Base memory consisting
of 512KB on the system board,
and 128KB on the 128KB Memory
Expansion Option.

Base memory size is xxxKB

Is this correct(Y/N)
?_
```

where *xxx* is the total amount of base (conventional) memory installed in your PC-AT.

Base memory includes any Advantage Premium memory you decide to allocate as conventional memory. If the amount shown is correct, press **Y**.

If the amount shown is not correct press **N**. Your screen will then display:

```
Enter correct Base Memory size
(256, 512, or 640).

?_
```

Enter the correct amount of conventional (base) memory.

Press <**Enter**> to proceed with the program.

STEP 4
Enter the amount of "expansion" memory: Your screen will display:

The Expansion Memory size is
composed of additional memory
adapters not including the 128KB
Memory Expansion option.

Expansion memory size is xxxxxKB

Is this correct(Y/N)
?__

SETUP calls the memory installed above 1 megabyte (MB) "expansion" memory. This manual calls memory above 1 MB "extended" memory. Press **Y** if the amount shown is correct.

Press **N** if the amount shown is not correct. Your screen will then display:

EXPANSION MEMORY SIZE
0
512
1024
1536
2048
.
.
.

Enter correct Expansion Memory size
(0, 512, 1024, 1536. . .).
?__

Enter the amount of memory installed above 1 MB (the amount does not necessarily have to be expressed in 512-KB increments, as implied in the display above). Press **<Enter>** to proceed with SETUP.

STEP 5
Verify that all SETUP options are set correctly: SETUP will then display the options for disk type, memory size, and adapter type. If all options are correct press **Y** to reboot.

This concludes the SETUP procedure.

C.1 SETUP Examples

This section gives several sample Advantage Premium configurations and provides the appropriate SETUP parameters.

Example 1: Your PC-AT has 256 KB of conventional memory installed, and you have a 512-KB Advantage Premium board. You want to use 384 KB of Advantage Premium memory to fill out conventional memory to 640 KB, and you want to allocate 128 KB as extended memory (memory above 1 MB). Specify:

Base memory size: 640
Expansion memory size: 128

Example 2: Your PC-AT has 512 KB of conventional memory installed, and you have a 512-KB Advantage Premium board. You want to use 128 KB of Advantage Premium memory to fill out conventional memory to 640 KB, and you want to allocate 384 KB as extended memory. Specify:

Base memory size: 640
Expansion memory size: 384

Example 3: Your PC-AT has 512 KB of conventional memory installed, and you have a 2-MB Advantage Premium board. You want to use 128 KB of Advantage Premium memory to fill out conventional memory to 640 KB, and you want to allocate all remaining memory (1920 KB) as expanded memory. Specify:

Base memory size: 640
Expansion memory size: 0

Example 4: Your PC-AT has 512 KB of conventional memory installed, and you have a 2-MB Advantage Premium board. You want to use 128 KB of Advantage Premium memory to fill out conventional memory to 640 KB, 384 KB as extended memory, and all remaining memory (1536 KB) as expanded memory. Specify:

Base memory size: 640
Expansion memory size: 384

Example 5: Your PC-AT has 256 KB of conventional memory installed, and you have one 2-MB Advantage Premium board and one 2-MB Advantage! board. You want to use 384 KB of Advantage Premium memory to fill out conventional memory to 640 KB, 1 MB as expanded (paged) memory, and all remaining memory (2688 KB) as extended memory.

NOTE

EEMS software (such as DESQview) works best when Advantage Premium memory (not memory from the PC-AT system board or an Advantage! board) is allocated in the 256-640 KB range.

Specify:

Base memory size: 640
Expansion memory size: 2688

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APPENDIX D

SERIAL INTERFACES

This appendix provides general information on wiring the Advantage Premium serial port to other serial devices (such as printers, plotters, or modems). The information in this section is primarily of interest to users with technical backgrounds:

- The RS-232C serial interface standard (Section D.1).
- Interfacing DTE to DCE (Section D.2).
- Interfacing DTE to DTE — "null modem" (Section D.3).
- Designing your own serial interface (Section D.4).

The Advantage Premium serial port is completely IBM-compatible. In most cases, you can connect your remote device to the Advantage Premium serial port with a cable provided with the device itself. Simply refer to the instructions provided with the device or with the software for driving it.

In some cases, your instructions will specify how your remote device uses RS-232C line signals and which pin numbers supply which signals. With this information, plus the information in this appendix, you can construct an interface cable yourself.

NOTE

Serial devices use RS-232C signals in different ways. AST Research cannot tell you how to connect a particular device to your serial port. You must refer to the manufacturer's instructions that came with that device.

The Advantage Premium serial port does not support the current loop teletype interface.

D.1 RS-232C Interface Standard

Advantage Premium connects to other serial devices according to the Electronic Industry Association (EIA) RS-232C interface standard.

The RS-232C standard describes the sequence of signals that travel between two serial devices. The signals control the exchange of data between serial devices. RS-232C defines 21 signals (although few applications use all 21), and each signal travels separately on a predefined wire.

The RS-232C standard classifies communications devices as:

- *Data terminal equipment (DTE):* Equipment associated with the user, such as a PC-AT or a mainframe computer. Advantage Premium serial ports are DTE devices.

- *Data communciations equipment (DCE):* Equipment associated with transmission facilities, such as a modem.

The RS-232C standard describes the ideal case, where a DTE device connects to a DCE device. Before sending data, the Advantage Premium serial port must send and receive RS-232C signals in this order:

1. Some DCE devices use the Ring Indicator (RI) signal to alert Advantage Premium that incoming data is due.

2. Advantage Premium sends Data Terminal Ready (DTR) to signal a request for a communications link.

3. Advantage Premium receives Data Carrier Detect (DCD) and Data Set Ready (DSR) — these signals indicate that the DCE is ready.

4. Advantage Premium sends Ready to Send (RTS) — this signal tells the DCE that Advantage Premium is ready to send data.

5. Advantage Premium receives Clear to Send (CTS) — a signal from the DCE to go ahead and transmit data.

6. Advantage Premium then starts transmitting data via the Transfer Data (TxD) signal. Advantage Premium receives data via the Receive Data (RxD) signal.

To prevent damage to either device, the ground signals must always be connected.

You can think of certain pins on one side of the interface as "functional pairs":

DTE		*DCE*
DTR	_____	DSR and DCD
RTS	_____	CTS
TxD	_____	RxD

D.2 Interfacing DTE to DCE

An example of a DTE-to-DCE interface that conforms to the RS-232C standard would be to connect the Advantage Premium serial port (DTE) to a telephone modem (DCE). A correctly configured DCE/DTE interface is wired straight across: DTE pin 4 wired to DCE pin 4, pin 2 to pin 2, and so forth.

Two serial devices interact in a certain sequence — called "handshaking" — to function properly:

1. Some modems (DCE) has an automatic answer mode that uses the signal RI to alert the DTE that incoming data is due. Advantage Premium (the DTE) would then use DTR to respond to RI.

2. When the Advantage Premium serial port (DTE) wants to send or receive data it raises the voltage on the pin that carries the DTR (Data Terminal Ready) signal. This voltage travels to the DCE where the modem interprets it to mean that a communications link is being requested by the DTE device.

3. If an open phone line exists, the DCE brings up two lines on its side of the interface: DSR and DCD.

4. When the DTE sees high voltage at its DSR and DCD inputs, it can then bring up RTS. RTS tells the DCE that the DTE has data to transmit to it.

5. The DCE checks that it is ready to receive data; if so, it brings up CTS.

6. Once the DTE sees voltage at CTS, it can transmit data on the wire connected to TxD — or it can receive data via RxD (Receive Data).

CAUTION

To help protect your equipment from damage, be sure to connect the ground wires between the Advantage Premium serial ports and your external serial devices.

Figure D-1 shows an ideal DTE to DCE interface, including signals, signal directions, and sequence (top to bottom). The interface must handle these signals before the DTE can transmit or receive data:

- DCD, DSR, CTS, and RxD are input signals to the Advantage Premium.
- DTR and RTS are output signals from the Advantage Premium.

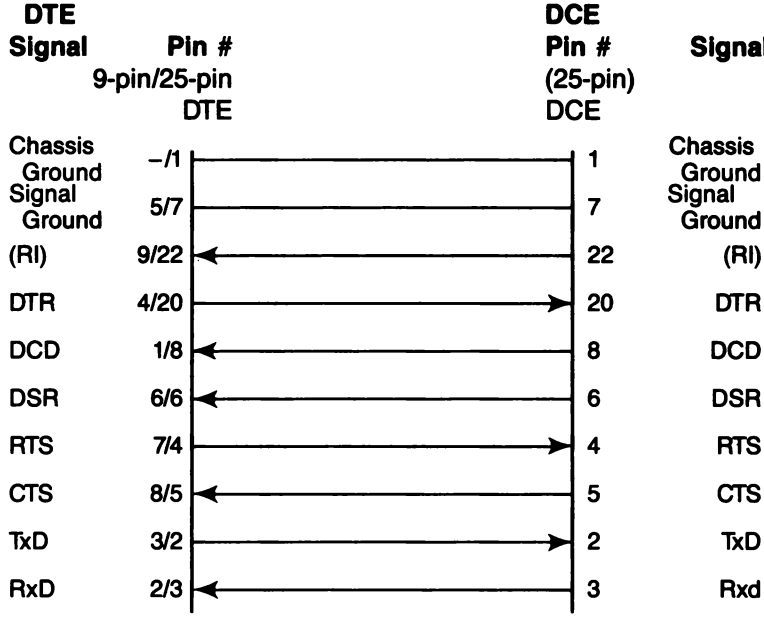


Figure D-1. DTE-to-DCE Interface.

Figure D-1 shows the interface signals in order of occurrence (top to bottom). From the DTE's standpoint, it must send DTR, see DCD, see DSR, send RTS, and see CTS before transmitting or receiving data.

The DTE inputs must have voltage applied to them for the interface to become operational (the DTE outputs are necessary only because they are inputs to the DCE side of the interface). The DTE hardware does not release data to the communications link until it has received the proper set and sequence of signals.

D.3 Interfacing DTE to DTE ("Null Modem")

Many devices (such as serial printers) are set up as DTE. To output data from the Advantage Premium serial port (also DTE) to another DTE serial device, you must wire a DTE to DTE (or "null modem") interface. A DTE to DTE interface is also called a *null modem* connection because it does not include a DCE device such as a modem. Other examples of null modem connections include connecting two PCs, or connecting a PC-AT to a mainframe.

A null modem interface must provide "response" inputs to either side of the interface — just as if a DCE device were present. The input voltages to each DTE device must occur in the correct sequence (the correct sequence varies from device to device).

Each side of a null modem interface acts like the DTE side of a DTE to DCE interface. Both sides of the null modem interface must send and receive these signals in this sequence before sending or receiving data:

Send DTR
Receive DCD and DSR
Send RTS
Receive CTS

Figure D-2 shows a standard null modem configuration, including signal directions and sequence.

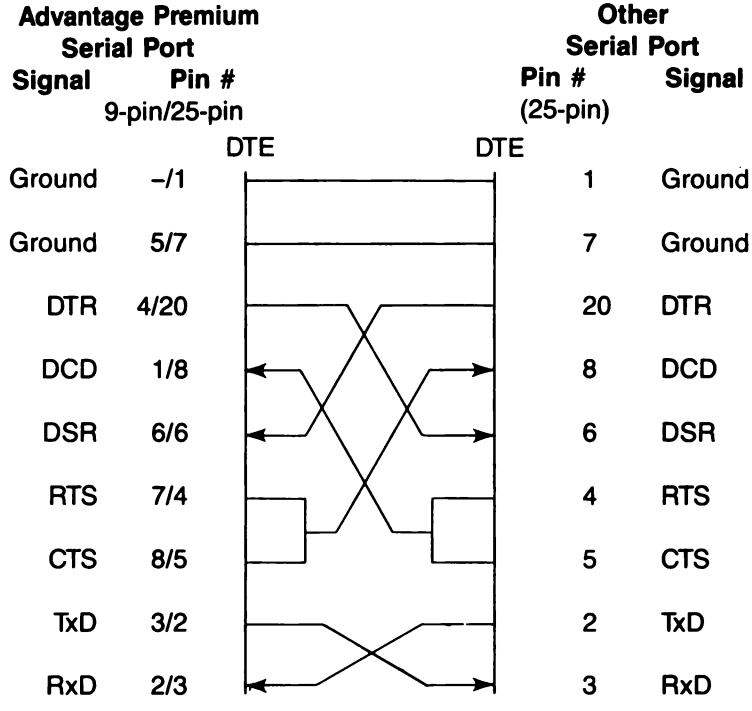


Figure D-2. Example #1: Null Modem (DTE-to-DTE) Interface.

Figure D-3 illustrates another null modem interface, including the direction and sequence of the signals.

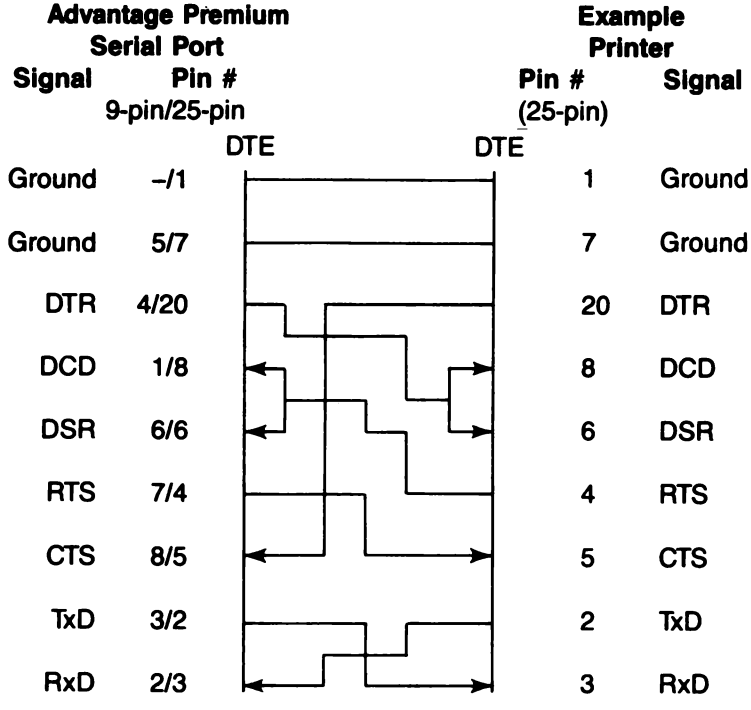


Figure D-3. Example #2: Null Modem Interface.

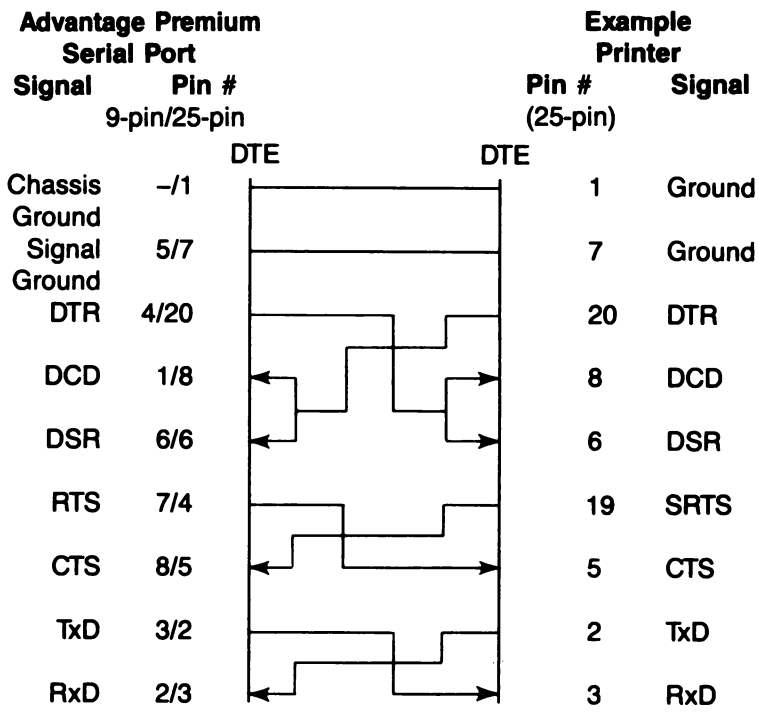
Notice that the necessary input signals are supplied to both sides. DCD, DSR, and CTS have voltage applied to them on either side.

The example shown in Figure D-3 changes the ideal sequence by having the printer DTR signal drive PC-AT signal CTS. The chip that controls the Advantage Premium serial port (an 8250 UART chip) is fairly flexible in reading the sequence of inputs.

The input sequence in Figure D-3 is changed because the printer in the example drops its DTR signal when its receive buffer is about to fill up. To avoid losing data when the printer's receive buffer overflows, the interface halts PC-AT

data output immediately by dropping the CTS input to the PC-AT side immediately. The remainder of the interface then "idles" until the printer raises DTR again. Remember that this is a specific case for this particular printer.

Figure D-4 shows another example of how to interface a serial printer to a Advantage Premium serial port.



In this case, the printer uses SRTS (Secondary Request to Send, pin 19) instead of pin 4 (RTS); apart from that exception, Figure D-3 follows the ideal DTE input and sequence rules.

The advantage of the interface shown in Figure D-4 is that every pin is driven by its functional counterpart on the other side of the interface; the functionally related signal pairs include DTR/DSR, RTS/CTS, and TxD/RxD. This should also hold true for the interface you design.

D.4 Design Aids

Your serial device manual tells you how the device uses the RS-232C line signals and which pin numbers supply which signals. You can also contact the device manufacturer for further information on interfacing to an IBM PC-AT asynchronous serial port. Serial ports on all AST Research boards are IBM-compatible.

Your dealer can direct you to a parts store that carries the products you need to construct an interface cable. You must use the correct type of connectors (male or female) to connect both ends properly. The Advantage Premium serial port end plugs into a DE9S (female/socket type) connector. You must use a DE9-to-DB25 adapter cable if your serial device uses a DB25 connector. AST offers a DE9-to-DB25 cable (model number ADV-AC) that remaps DE9 serial pinouts (such as from the Advantage Premium serial ports) to the DB25 configuration.

To wire your serial interface signals properly, we suggest you use the form shown in Figure D-5 as a design aid.

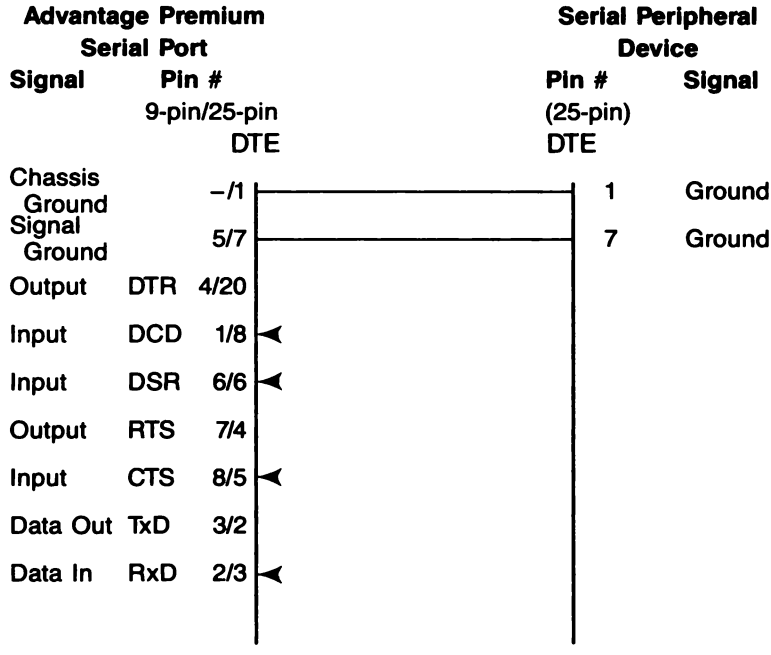


Figure D-5. Serial Interface Form.

If you plan to use several different serial devices on your serial port, you can make a separate interface assembly for each device. That way you can use the same long cable to connect your PC-AT to any of these devices.

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APPENDIX E

SWITCHING BETWEEN PARALLEL PRINTER PORTS

This appendix gives you programs you can use in a batch file to direct printer output normally designated for the device attached to port LPT1, to instead be routed to the device attached to port LPT2 or LPT3. (The program also directs output, normally designated for the device attached to port LPT2 or LPT3, to instead be routed to the device attached to port LPT1.) For more information on creating a batch file, see your IBM *DOS Manual*.

The programs in this appendix are particularly useful if your applications program (a word processing program, for example) is capable of sending print output to only one parallel port. You might also use this program when your LPT1 printer (call it printer #1) is down for service, or when you want to take advantage of the type style or speed of the printer attached to LPT2 or LPT3 (call it printer #2 or #3). This program allows you to quickly switch between outputs without having to alter your hardware interface or change each line in programs where LPT1, LPT2, or LPT3 appear as your output port designation.

If your printers are not configured to the same parameters, as defined in the DOS MODE command, you must add two MODE statements when switching devices.

Notice that the "swap" program below is written in BASIC. Since the printer port swap is best handled in DOS, BASIC is invoked within the .BAT file. No RUN command is required when the BASIC call and the program file name occur on the same line (**BASIC LPTSWAP**). Consult your IBM *BASIC Manual* if you have any questions about entering and saving the LPTSWAP.BAS program.

E.1 Switching Between LPT1 and LPT2

The following DOS batch file and BASIC program will redirect printer output from LPT1 to LPT2 or vice versa, depending on which port is being used at the time.

LPTSWAP.BAT (or a name of your choosing) with the following:

```
MODE LPT1:[parameters for printer #2 (if needed)]
MODE LPT2:[parameters for printer #1 (if needed)]
BASIC LPTSWAP
```

LPTSWAP is a BASIC program, as shown below. The comments are included for clarification and need not be included in the actual program

```
10 DEF SEG=&H40                          ' finds port address table
20 A=PEEK (8): B=PEEK (9)                ' save LPT1 address
30 POKE 8,PEEK (10): POKE 9,PEEK (11)    ' LPT2 address to LPT1
40 POKE 10,A: POKE 11,B                  ' LPT1 address to LPT2
50 SYSTEM                                ' return to DOS
```

Omit statement 50 if you will be LPRINTing from BASIC.

E.2 Restoring LPT1 to LPT1 and LPT2 to LPT2

Use the same program, LPTSWAP, to restore your parallel printer ports to their original arrangement. Be sure to restore the proper parameters using a new batch file and MODE statements.

LPTRSTR.BAT is as follows:

```
MODE LPT1:[parameters for printer #1 (if needed)]
MODE LPT2:[parameters for printer #2 (if needed)]
BASIC LPTSWAP
```

E.3 Switching Between LPT1 and LPT3

The following DOS batch file and BASIC program will redirect printer output from LPT1 to LPT3 or vice versa, depending on which port is being used at the time.

LPTSWAP.BAT (or a name of your choosing) with the following:

```
MODE LPT1:[parameters for printer #3 (if needed)]
MODE LPT3:[parameters for printer #1 (if needed)]
BASIC LPTSWAP
```

LPTSWAP is a BASIC program, as shown below. The comments are included for clarification and need not be included in the actual program:

```
10 DEF SEG=&H40                          ' finds port address table
20 A=PEEK (8): B=PEEK (9)                ' save LPT1 address
30 POKE 8,PEEK (12): POKE 9,PEEK (13)    ' LPT3 address to LPT1
40 POKE 12,A: POKE 13,B                  ' LPT1 address to LPT3
50 SYSTEM                                ' return to DOS
```

Omit statement 50 if you will be LPRINTing from BASIC.

E.4 Restoring LPT1 to LPT1 and LPT3 to LPT3

Use the same program, LPTSWAP, to restore your parallel printer ports to their original arrangement. Be sure to restore the proper parameters using a new batch file and MODE statements.

LPTRSTR.BAT is as follows:

```
MODE LPT1:[parameters for printer #1 (if needed)]
MODE LPT3:[parameters for printer #3 (if needed)]
BASIC LPTSWAP
```

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APPENDIX F

TROUBLESHOOTING

This section outlines some simple procedures for troubleshooting if you have a problem with your Advantage Premium. It also tells you how to return your Advantage Premium to the factory should it require repairs.

F.1 Solving Common Problems

The following outlines some suggestions for solving common problems with the Advantage Premium.

PROBLEM: Parallel port doesn't work.

ACTION: Check the following:

- The device connected to the port works and is powered on.
- Cable connections are secure. Check the cables between the parallel port and peripheral device. Also check that the parallel port ribbon cable connector is securely attached to the Advantage Premium board.
- The software you are using is sending output to the correct device. Advantage Premium is usually configured so that the parallel port responds as LPT1 (unless you changed the default configuration or a display adapter with a built-in parallel port is installed in your PC-AT — see Section 6). Check your software to see to which device it is sending output.
- Make sure the parallel port and its IRQ line are enabled. Go over the procedures in Section 6 to make certain the port is configured properly.

PROBLEM: Serial port doesn't work.

ACTION: Check the following:

- The device connected to the serial port is powered on and working.

- Cable connections are secure. Check the cabling between the serial port and the peripheral device (Appendix D provides general serial port cabling information). Also check that the ribbon cable to the serial port connector is securely attached to the Advantage Premium board.

- The software you are using is sending output to the correct device. If you are using a serial printer, you may need to direct printer output from LPT1 to COM1 or COM2 (see Section 5).

- The serial port(s) is configured properly. In its default configuration, the first Advantage Premium serial port is configured as COM1 (using IRQ4), and the second serial port (if installed) is configured as COM2 (using IRQ3). Unless configured otherwise, both ports expect the connected device to drive all serial inputs.

  Section 5 shows the default configuration and tells you how to change it.

- The serial port is correctly initialized (Section 5.3). Check that the Baud rate, parity, number of data bits, and number of stop bits for the peripheral device match what you specified in your DOS MODE command, or what your software specified for you.

PROBLEM: Game port doesn't work.

ACTION: Check the following:

- The device connected to the game port is powered on and working.
- Cabling is secure. Check the cabling between the game port and the peripheral device. Also check that the ribbon cable to the game port connector is securely attached to the Advantage Premium board.
- The game port is installed and enabled as described in Section 7. If you installed the game port option yourself, recheck the procedure described in Section 7.

PROBLEM: Memory errors.

ACTION: Check the following:

- The Advantage Premium memory parameters (including starting memory address, parity checking, conventional memory size, and Dual Page mode), which are described in Section 2 (Appendix A also discusses those parameters in detail).
- The Premium-Pak AT piggyback board (if installed) is installed properly, as described in Section 3.
- The PC-AT system board is configured properly (for 256 or 512 KB of system board memory), as described in Section 3.

F.2 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.*

3. *If the product is not covered under a warranty:* Contact your dealer or AST Research Technical Support for instructions on obtaining service for your product.

4. *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.

5. *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.

6. *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
   Irvine, CA 92715

   where *xxxx* is your assigned Return Authorization Number.

7. 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.

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APPENDIX G

MEMORY ALLOCATION WITH DESQVIEW

This section tells you how to enhance the performance of the DESQview program that comes with Advantage Premium. If you plan to use DESQview, you will want to allocate system memory and Advantage Premium memory to maximize DESQview's performance. (The *DESQview User's Manual* provides additional detailed information.)

G.1 Advantage Premium Memory Allocation

For optimum performance with DESQview, allocate as much Advantage Premium memory as conventional memory (memory in the 0-to 640-KB range) as possible.

DESQview takes advantage of the enhanced expanded memory specification (EEMS) — it can swap application programs very rapidly into Advantage Premium memory in the 0- to 640-KB range used by the IBM PC disk operating system (DOS). This allows concurrent execution of programs that together use more than 640 KB of memory. For most effective operation, allocate at least 384 KB of Advantage Premium memory as conventional memory.

The PC-AT system board can be set to recognize either 256 or 512 KB of system board memory. To achieve the best possible DESQview performance, set the system board to recognize 256 KB, and set Advantage Premium to allocate 384 KB as conventional/extended memory (see Figure G-1). (Assuming your Advantage Premium has at least 384 KB installed.) Any remaining Advantage Premium memory should be allocated as *expanded memory* for best use with DESQview.

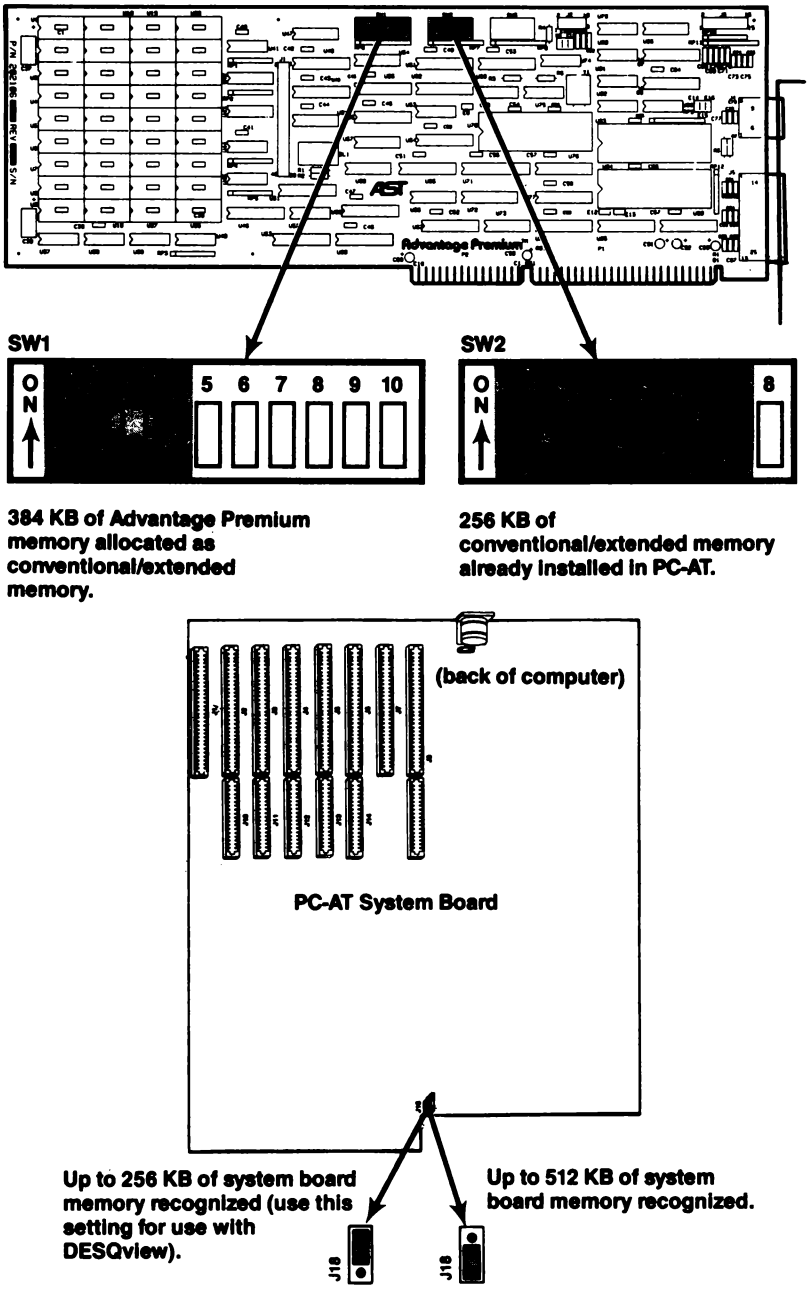

Figure G-1. Switch Settings for Best DESQview Performance.

G.2 PC-AT System Board Allocation

For best operation with DESQview, make sure that the jumper on the PC-AT system board is in the 256-KB position (as shown in Figure G-1) — even if your PC-AT system board has 512 KB of memory installed.

If your PC-AT includes an add-on memory board (such as AST's *Advantage!*), you can remove it or allocate its memory as *extended memory*, above Advantage Premium memory. Extended memory is memory in the 1-to 16-megabyte (MB) range.

To reallocate an add-on board, set its starting address so that it does not conflict with Advantage Premium memory. For example, if your Advantage Premium board is configured as shown in Figure G-1 (384 KB allocated as conventional/extended memory, and the remainder as expanded memory), then set the add-on board for a starting address of 1 MB (1024 KB).

G.3 Running SETUP

If you have configured your Advantage Premium as described in this section for greatest DESQview efficiency, supply the following parameters when you run the SETUP program:

Base memory size: 640.

Expansion memory size: Any memory allocated as extended memory (for example, memory on an *Advantage!* board).

For more information on running the SETUP program, see Appendix C.

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APPENDIX H

GLOSSARY

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

AUTOEXEC.BAT File

A batch file of IBM PC disk operating system (DOS) commands with the file name AUTOEXEC.BAT that your PC automatically executes when you boot or reboot the computer. The commands in this file install software each time your PC boots up.

For example, if you want to create a SuperDrive RAM disk whenever you use your PC, you would place the command that creates the SuperDrive in your AUTOEXEC.BAT file. You can use the SuperPak INSTALL program described in Section 4 to create an AUTOEXEC.BAT file that initiates the SuperPak utilities you install.

CONFIG.SYS

A file of commands that configure your computer and install software device drivers. Device drivers are programs that allow your PC to communicate with hardware devices (such as the Advantage Premium board). The commands in the CONFIG.SYS file are automatically executed when you boot or reboot your PC, before the AUTOEXEC.BAT file commands.

For example, if you want to use any Advantage Premium memory as expanded memory, you must place a command in your CONFIG.SYS file to install the REMM device driver. You can use the SuperPak INSTALL program descirbed in Section 4 to create a CONFIG.SYS file that automatically installs the device drivers required to use Advantage Premium expanded or extended memory.

Conventional Memory
Memory used to fill up PC-AT system memory, up to the maximum of 640 kilobytes (KB) recognized by DOS.

DESQview
A multitasking/windowing software product that allows you to run several programs at once, and view them through several windows on your PC display screen.

Device Driver
A program that allows your PC to use hardware in the system. REMM.SYS and REX.SYS are both device driver programs that allow your PC to use Advantage Premium memory as expanded memory.

Expanded Memory
Also called paged memory. Expanded memory is memory provided on the Advantage Premium board that is not allocated as conventional or extended memory. It is swapped in and out of windows in the 1-MB PC-AT address space, using the AST enhanced expanded memory (EEMS) manager software driver.

Extended Memory
Linear memory in the 1-to 16-MB range. This memory is available to the PC-AT 80286 central processing unit (CPU) when running in Protected mode. The SuperPak REX.SYS program can also cause AST expanded memory to *emulate* extended memory.

Kilobyte (KB)
A unit of memory space. One KB is equal to 1024 bytes of memory.

Linear Memory
All directly-addressable memory in the PC-AT. It includes conventional (0-640 KB) and extended (1-16 MB) memory. Linear memory does *not* include expanded memory, which is outside of PC-AT directly-addressable memory.

Megabyte (MB)
A unit of memory space. One MB is equal to a thousand kilobytes — about one million bytes — of memory.

REMM.SYS
Also called "REMM." A device driver program that enables your PC-AT to use Advantage Premium memory with application programs.

REX.SYS
Also called "REX." A device driver program that enables your PC-AT to use expanded memory with RAM disks and print spooler software that are designed for extended memory.

SETUP
The IBM PC-AT program that you must run when you add or remove memory, disk drives, or other system components. Running SETUP is part of the Advantage Premium installation procedure. Appendix C gives examples of the parameters you must supply when running SETUP.

VDISK
An IBM software product that allows you to create simulated fixed disks in random access memory (RAM).

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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 2 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 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 2 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**

Advantage Premium™
User's Manual
000336-001 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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