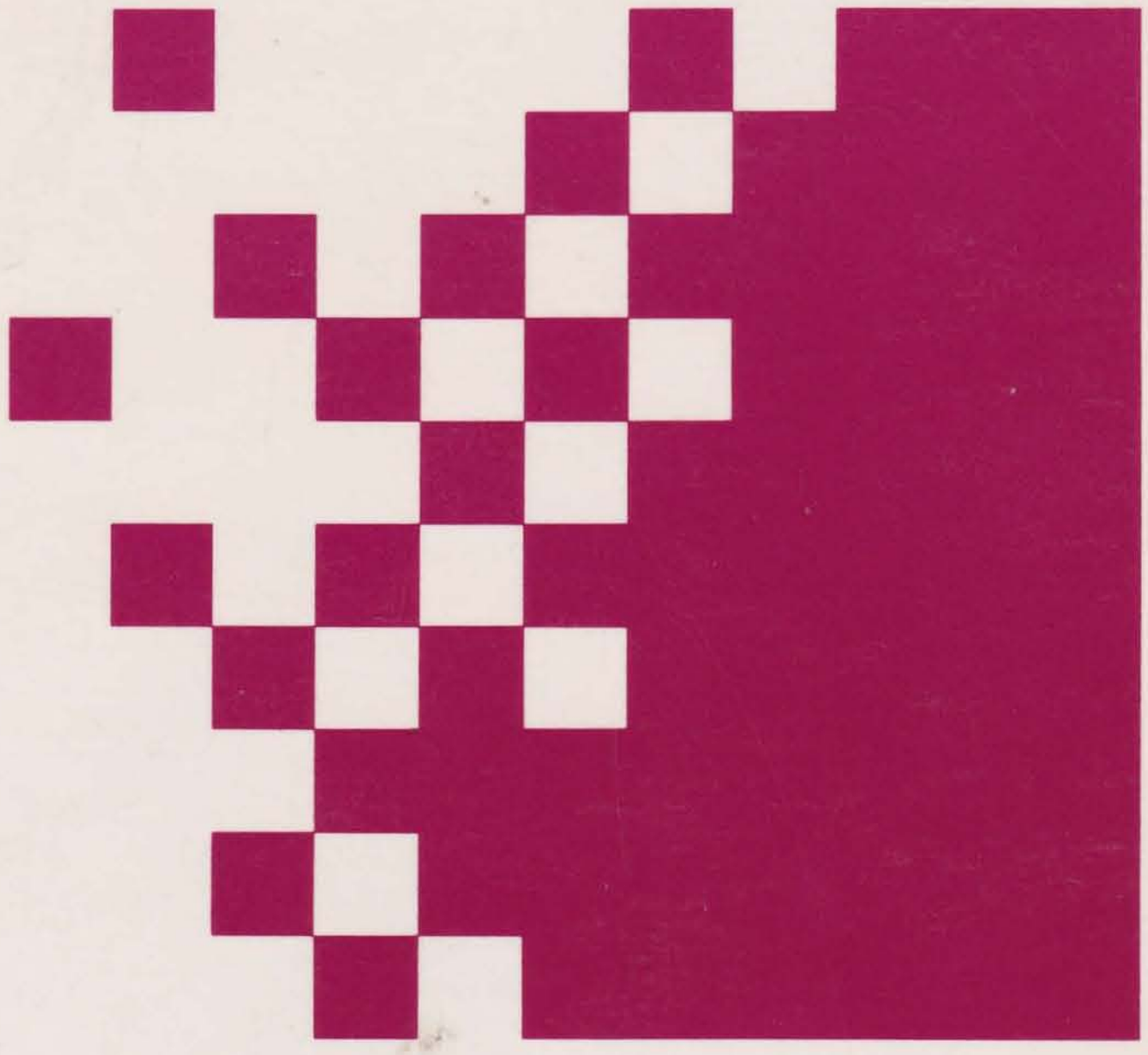
AST Premium™ 286 User's Manual

AST RESEARCH INC.



AST Premium COMPUTER PRODUCTS

AST Premium®/286

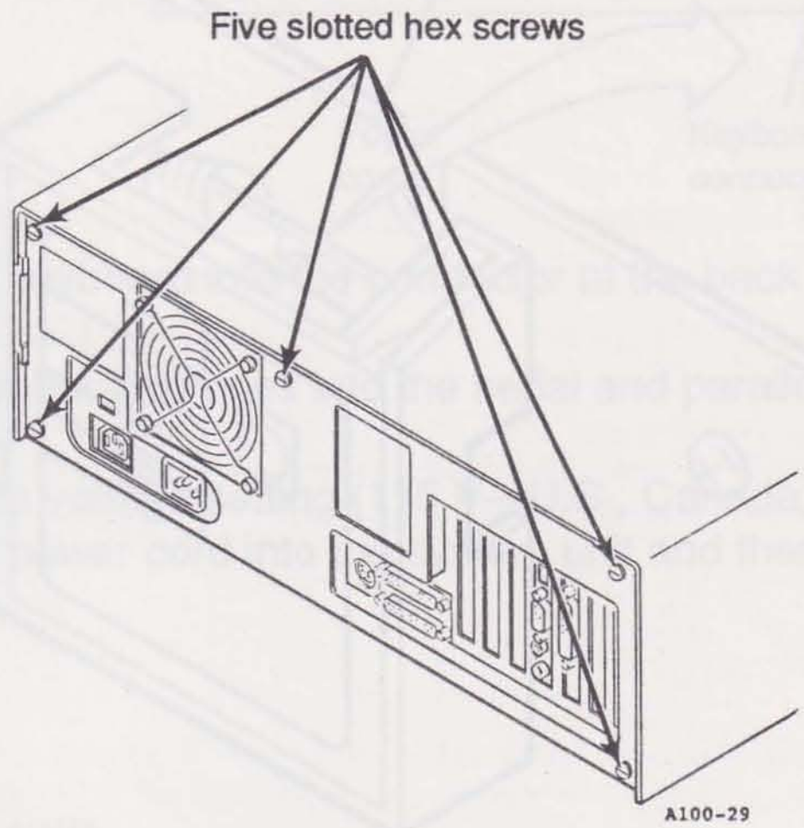
Quick Installation Sheet

This sheet provides you with a quick installation procedure for your AST Premium/286 computer. For more detailed instructions or additional information, refer to the appropriate section in the AST Premium/286 User's Manual.

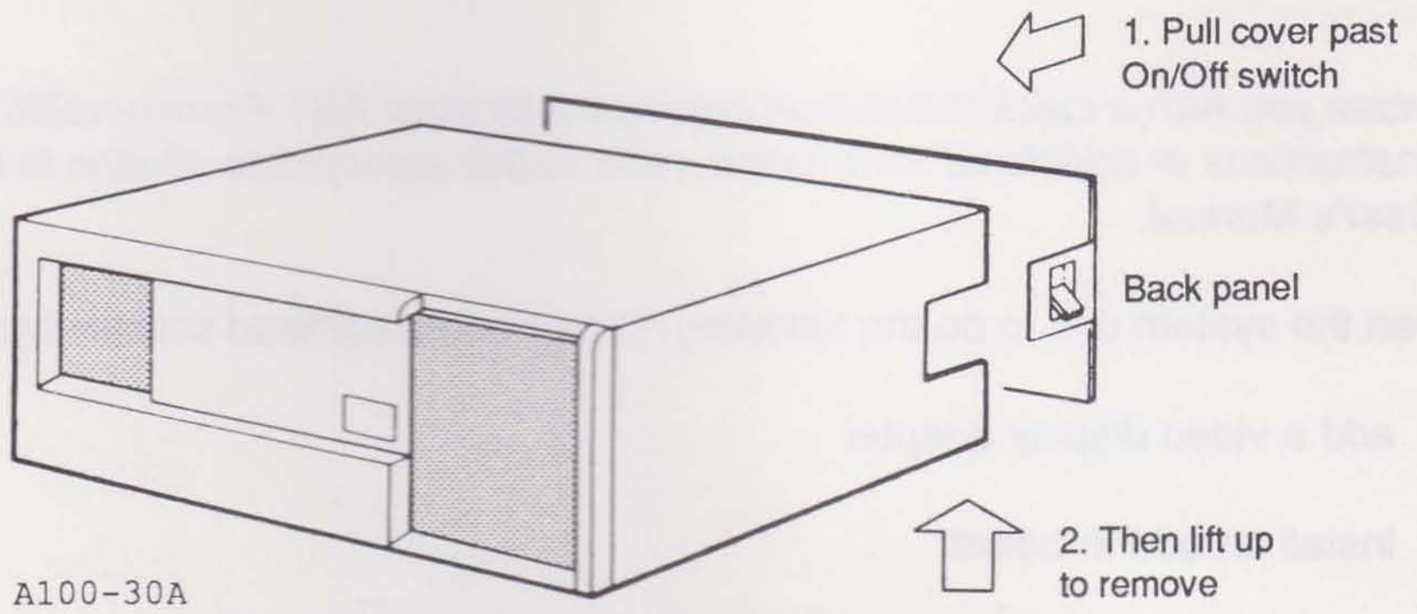
- Open the system unit to do the following: (You need a flathead screwdriver.)
  - — add a video display adapter
  - — install an add-in board
  - — change the setting of the primary video display adapter switch
- Run the ASTSETUP program after you complete the hardware installation

1 *Open the system unit.*

- Set the system unit on a flat surface. Do not plug in the power cord yet.
- Remove the five slotted hex screws from the back panel.



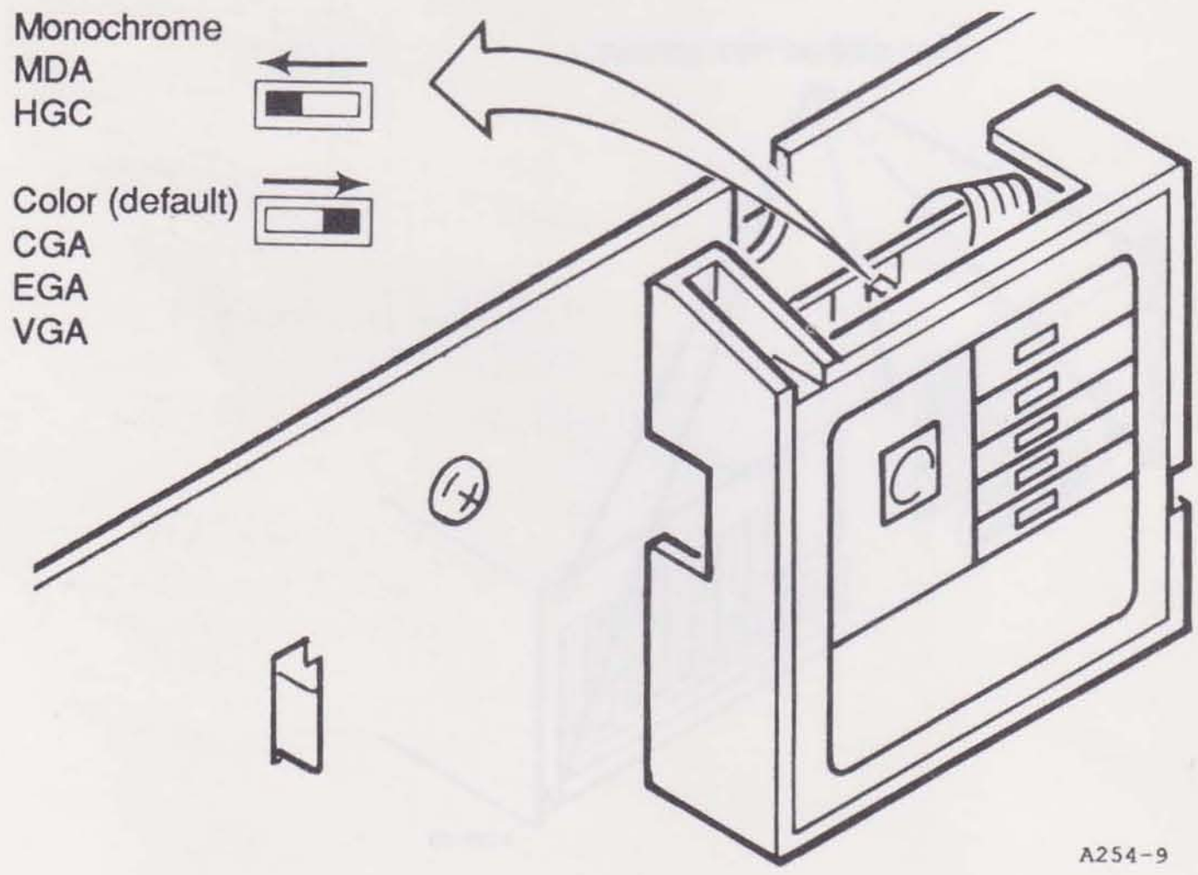
- Standing in front of the system unit, slide the cover toward you half an inch past the On/Off switch, then lift it straight off the unit.



2

Set switches, install options, and close the system unit.

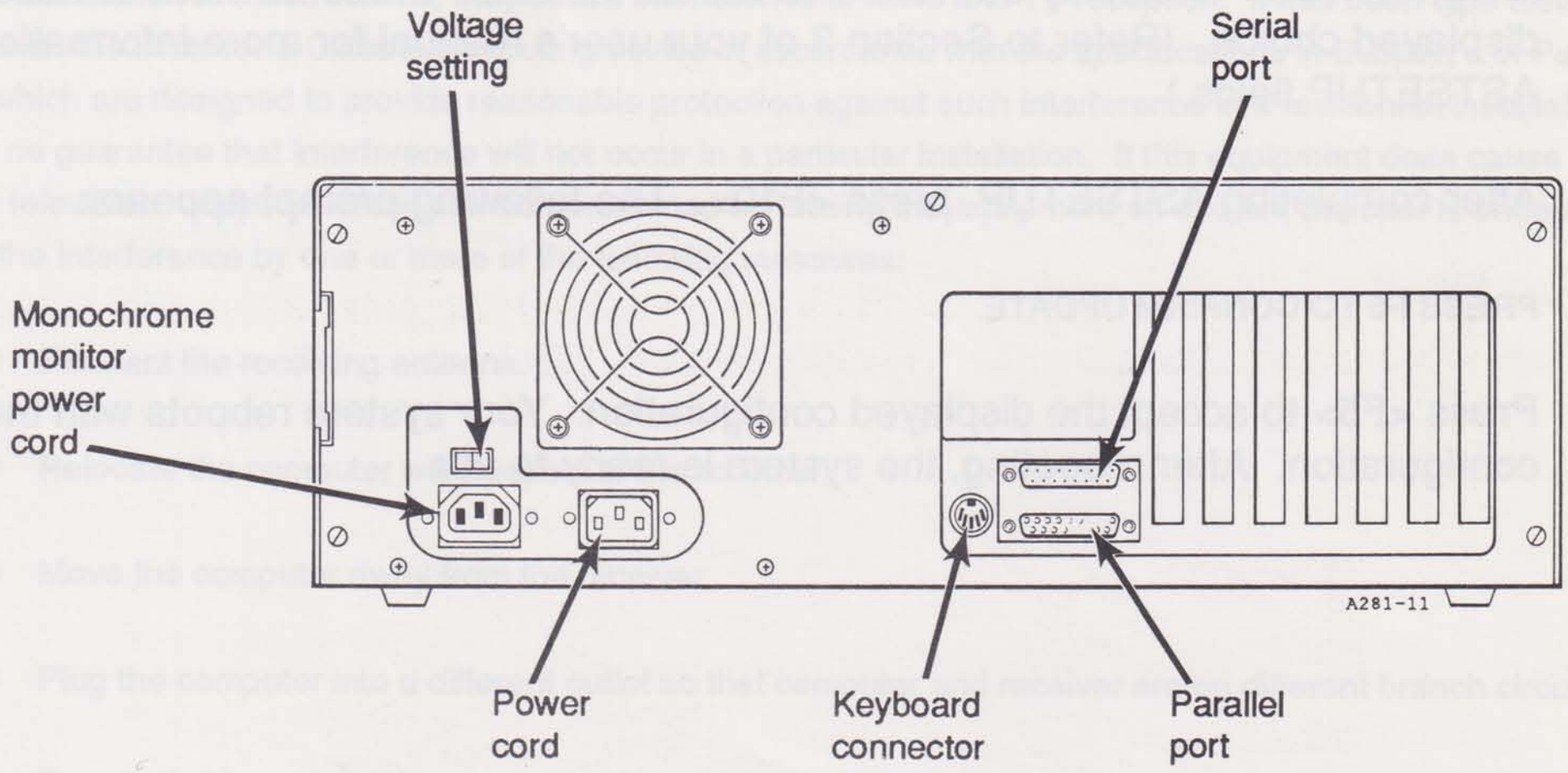
- Find the slide switch located behind the front panel indicators. As you face the front panel, slide this switch to the *left* for an MDA or HGC adapter. Leave the switch on the *right* for a CGA, EGA, or VGA adapter.



- Install and configure the video display adapter (if not already installed) and any other add-in boards or devices. Refer to manufacturer's documentation for installation instructions. Write down the names of all add-in products and their configurations in Appendix F, for easy reference.
- Slide the cover on, and replace the back panel screws.
- Remove the insert from the floppy disk drive.

3 *Attach peripherals to the system unit.*

- Plug the monitor interface cable into the display adapter port on the back panel.
- If you have a monochrome monitor, plug its power cord into the back of the system unit. An enhanced color or VGA monitor power cord plugs into a grounded wall outlet.



- Plug the keyboard into the connector at the back of the system.
- Plug peripheral devices into the serial and parallel ports on the back panel.
- Check the voltage setting (115 V—U.S., Canada, and Mexico, 230 V—International). Plug the power cord into the system unit and then into a grounded wall outlet.

4 *Run ASTSETUP.*

- Turn on the system.
- Press any key and hold it down as the Power-On Self-Test (POST) messages appear.
- The following message appears:

  KEYBOARD ERROR OR NO KEYBOARD PRESENT
  PRESS F1 KEY TO CONTINUE OR CTRL-ALT-ESC FOR SETUP

- Press **<Ctrl>-<Alt>-<Esc>**
- ASTSETUP is displayed.
- Press **<Down Arrow>** to move to the field you want to change. Press **<Left Arrow>** or **<Right Arrow>** to display the valid choices for the field. Press **<Enter>** to accept the displayed choice. (Refer to Section 3 of your user's manual for more information on ASTSETUP fields.)
- After completing ASTSETUP, press **<F10>**. The following prompt appears:

  PRESS F5 TO CONFIRM UPDATE

  Press **<F5>** to accept the displayed configuration. Your system reboots with the new configuration. After rebooting, the system is ready to use.

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 TV 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.

DOC NOTICE

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe B prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

Bescheinigung des Herstellers/Importeurs

Hiermit wird bescheinigt, dass der AST Premium/286 in Übereinstimmung mit den Bestimmungen der Vfg 1046/1984 funkentstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

AST Research, Inc.
2121 Alton
Irvine, CA 92714-4992
USA

Name des Herstellers/Importers

Warning

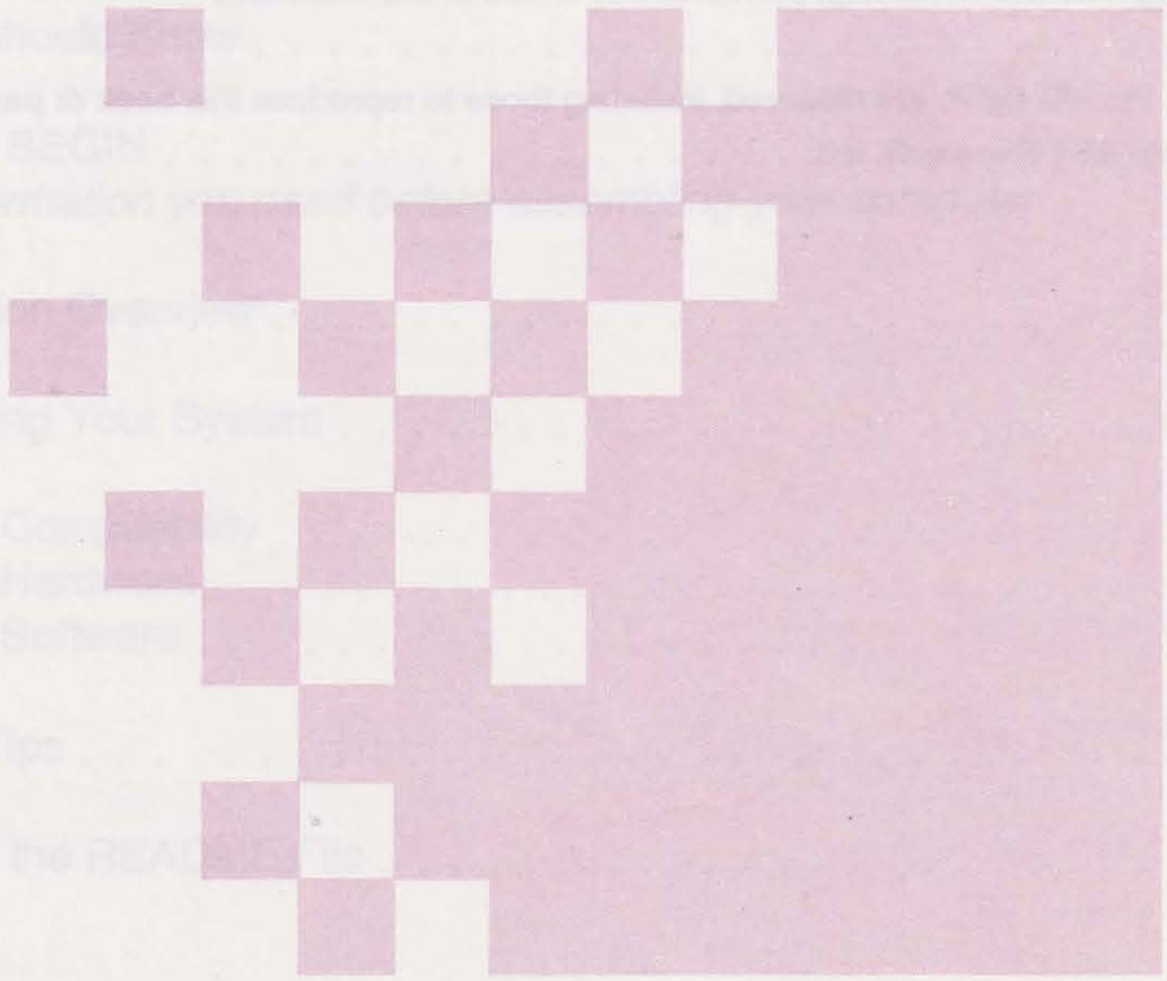
Varning

Replace battery with AST part number 175000-007 (3.6-volt), AST part number 175000-009 (4.5-volt), or AST part number 175000-006 (6-volt) only. Use of another battery may present a risk of fire or explosion. Battery may explode if mishandled. Do not recharge, disassemble, or dispose of in fire.

Vid batteri byte ersätt endast med batteri avsätt for AST 175000-007 (3.6-volt), AST 175000-009 (4.5-volt), eller AST 175000-006 (6-volt). Bruk av andra batteri kan leda till brand eller explosion. Batteriet är ej återuppladdningsbart, utsättbart ej for yttreåverkan. Kast inte i eld.

AST Premium®/286

High-Speed, Advanced Architecture Personal Computer



User's Manual
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AST RESEARCH, INC. Irvine, California (714) 863-1333

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Introducing the AST Premium/286 Computer

1. Before You Begin
2. Setting Up Your System
3. Running ASTSETUP

NOTES

INTRODUCING THE AST PREMIUM/286 COMPUTER

The AST Premium®/286 computer is a versatile, fully IBM®-compatible system based on the Intel® 80286 microprocessor. Premium/286 provides broad hardware compatibility, advanced technology, and reliable performance. A key feature of Premium/286 is enhanced performance due to advanced AST FASTslot™ Architecture. The unique third connector takes over the bus controller chip, providing a high-speed bus interface that eliminates the need for wait states. Other features include:

- 80286 microprocessor chip running at 10 megahertz (MHz) with zero-wait-state memory
- Six 8/16-bit interface slots and one 8-bit interface slot. Two of the 8/16-bit slots are FASTslots, which are compatible with IBM PC and PC AT® add-in boards.
- AST FASTRAM™ memory board that contains at least 512 kilobytes (KB) of memory
- One serial and one parallel port built into the system board
- Battery-maintained clock/calendar
- Standard 101-key keyboard

Hardware Overview

The Premium/286 consists of two standard components: the system unit and the keyboard (Figure 1).

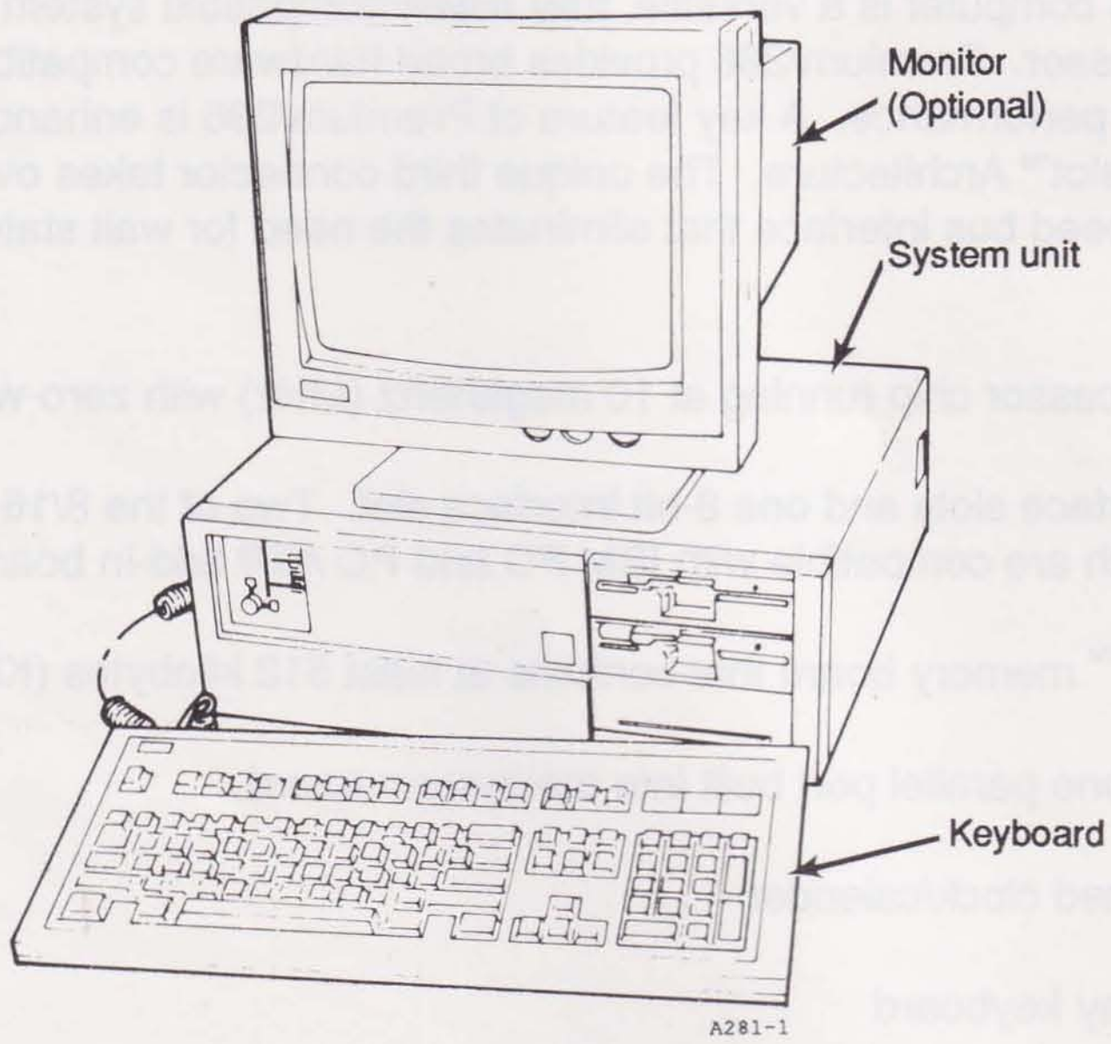


Figure 1. Premium/286.

System Unit

The basic system unit consists of a floppy drive, system board, memory board, and power supply. Other models include hard disks, controller boards or AT driver/adapters, and video display adapters.

Front Panel Lights

The front panel lights on the system chassis (Figure 2) show you the central processor unit (CPU) speed (6, 8, or 10 MHz), whether or not the hard disk is being accessed, and whether or not the system power is on.

A keyboard lock, also on the front panel, enables you to lock the keyboard to prevent unauthorized access to your files.

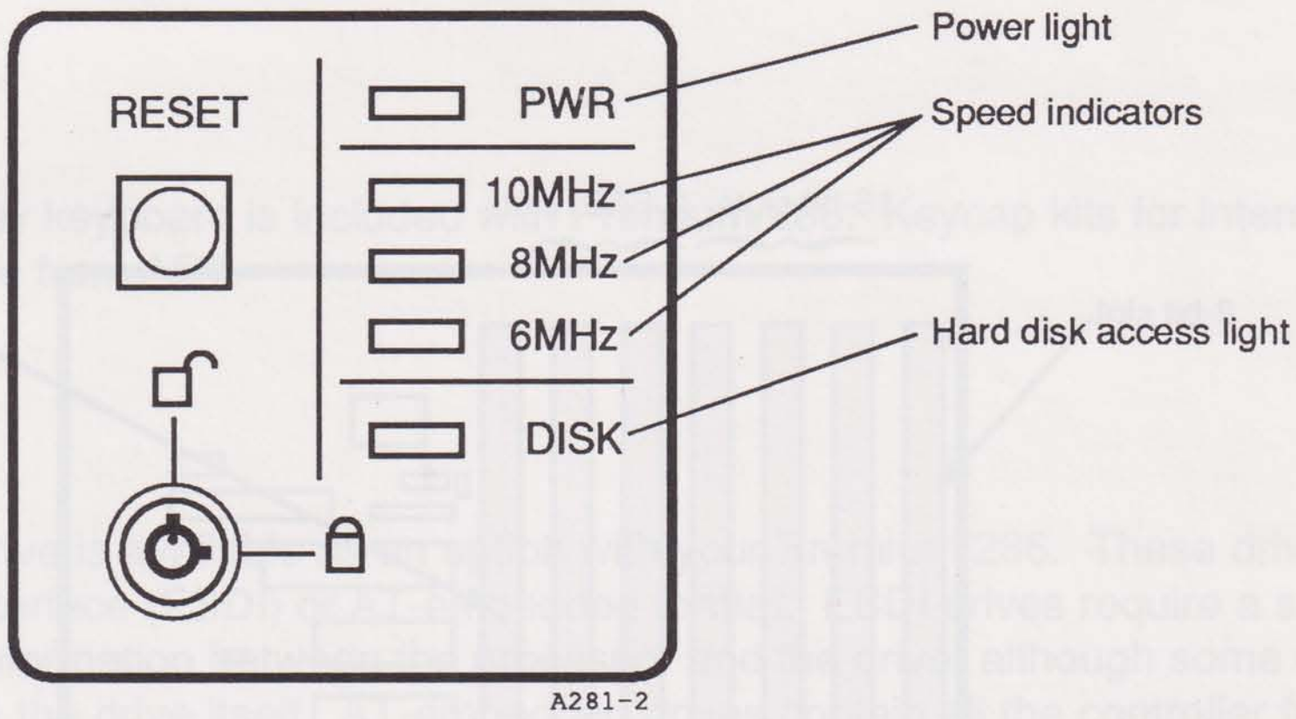


Figure 2. Front Panel Lights.

Floppy Disk Drives

The minimum configuration of Premium/286 is one 1.2-megabyte (MB) 5.25-inch floppy drive. The Premium/286 supports 5.25-inch or 3.5-inch drives.

Memory Board

Inside the Premium/286 system unit is a FASTRAM memory board, seated in a three-connector FASTslot. Each FASTRAM board contains up to 2 MB of memory and can be configured for any combination of expanded, extended, and conventional memory. With two FASTslots on the system board, you can install up to 4 MB of zero-wait-state memory.

System Board

Six 8/16-bit interface slots and one 8-bit interface slot are available on the Premium/286 system board. Two of the 8/16-bit slots are FASTslots, which are fully compatible with PC and PC AT add-in boards. The FASTslots accommodate the FASTRAM memory board.

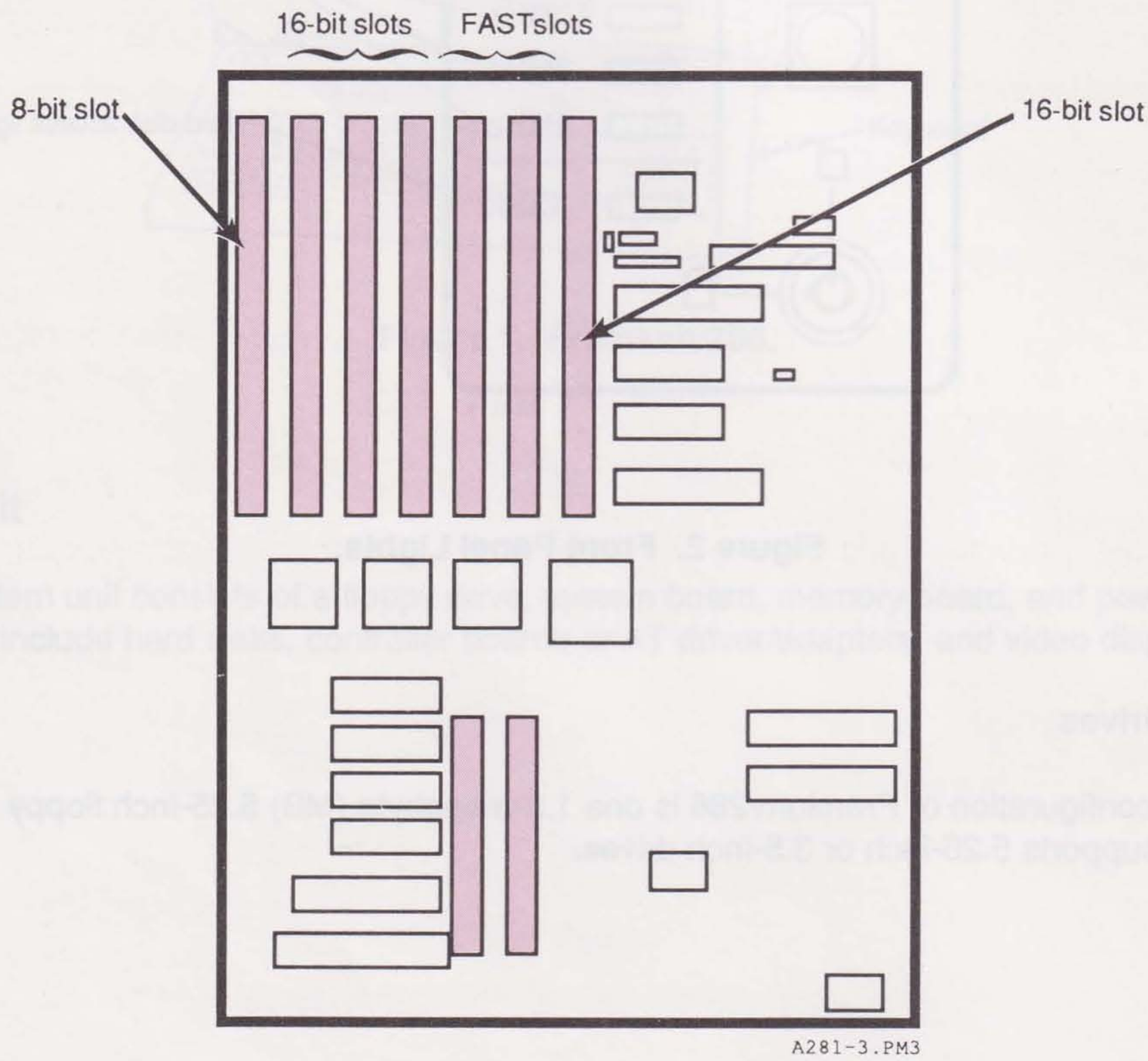


Figure 3. Premium/286 Expansion Slots.

A floppy controller built into the system board supports both 5.25-inch and 3.5-inch floppy drives and floppy-controlled tape units. The controller supports up to three floppy devices with MS-DOS® software drivers supplied by AST.

Chassis

Premium/286 provides front panel access for up to three half-height, or one half-height and one full-height, floppy drives or tape backup devices. Additionally, flexible configuration enables you to install two half-height or one full-height hard drive internally.

The RESET button, located beside the front panel lights, enables you to restart the computer without turning the power supply off and on. Pressing RESET performs the Power-On Self-Test (POST).

Keyboard

A standard 101- or 102-key keyboard is included with Premium/286. Keycap kits for international language use are available from AST.

Hard Disk Drives

A fast-access hard disk drive is available as an option with your Premium/286. These drives are enhanced small device interface (ESDI) or AT-embedded format. ESDI drives require a separate controller board to pass information between the processor and the drive, although some of the controller functions are on the drive itself. AT-embedded drives contain all the controller functions on the drive, and require a separate driver/adapter to plug into the system board.

All AST drives are formatted and partitioned with MS-DOS at the factory, and are automatically parked when your computer is turned off.

Tape Drives

You can add a tape drive to back up files from a hard disk. AST offers a floppy-controlled tape backup system that copies files from your hard disk to magnetic tape cartridges.

Options

These options also available with the AST Premium/286 system:

- Additional FASTRAM memory board that supports up to 2 MB
- Advanced FASTRAM memory board that supports up to 8 MB
- FASTRAM memory upgrade kits
- AST Premium display/color monitor or display/monochrome (black and white) monitor
- Additional 5.25-inch floppy drives in double-sided (360-KB) or high-density (1.2-MB) capacities
- Additional 3.5-inch floppy drives in double-sided 1.44-MB capacity
- 40-MB hard disk available from AST
- 40-MB tape backup device
- Keycap kits for international applications
- AST display adapter boards
- Hard-disk controller or AT driver/adapter

For more information, contact your authorized AST reseller.

Software Overview

Premium/286 operation is controlled by firmware on the system board and an operating system. MS-DOS and GW-BASIC® are provided with Premium/286, as well as a software disk cache program for disk drives.

Utility software programs provided with your Premium/286 include:

- ASTMENU: Provides a common user interface (CUI) that enables you to install utilities and set up your hard disk

- ASTCache™: Improves the performance of disk-intensive applications on your floppy and hard disks by accumulating copies of recently used disk sectors and storing them in random-access memory (RAM) for future use. Your computer searches the disk cache first for information.

- REMM.SYS and REX.SYS: Enable you to use memory beyond the conventional limit of 640 KB for MS-DOS applications and utilities. REMM.SYS is the expanded memory manager for Premium/286. REX.SYS interacts with the REMM program to enable expanded memory to emulate extended memory.

- ASTDSK: Enables you to install a third floppy drive

- fASTdisk™: Creates a virtual disk in RAM called a RAM disk. Data access speed increases when data files are stored on the RAM disk.

- SuperSpool™: Creates a print spooling buffer in RAM that receives print files and relays them to the printer. Because SuperSpool accepts information faster than the printer and works in the background, your computer is usually available for other tasks while printing.

- SPEED: Enables you to change the CPU speed by entering commands at the disk operating system (DOS) prompt.

- System Confidence Test: Runs diagnostic tests on the hardware modules in your computer. None of the tests require your intervention once they begin. The tests take a limited amount of time and do not destroy any information stored on disk.

The *AST Premium Utility Software User's Manual* explains the installation and use of each program on the CUI.

Format Notation

This manual uses the following format notation:

- *Boldface characters* indicate information you enter.

- *Uppercase characters* indicate items (such as commands) you enter as shown. You may type either upper- or lowercase characters.

- *Lowercase characters* represent parameters you define. These parameters must satisfy the conditions of the command descriptions.

- *Angle brackets (< >)* tell you to press a key. For example, **<Esc>** instructs you to press the Esc key.
- *Hyphens between keys* tell you to press them simultaneously. For example, **<Ctrl>-<Alt>-<Del>** instructs you to press the Ctrl and Alt keys while pressing the Del key.
- *Square brackets ([ ])* indicate an optional term you may omit. Do not enter the brackets.
- *Color* indicates prompts and messages you see on the screen.
- A *trailing lowercase "h"* indicates a hexadecimal number (for example, 02C0h).

Terms You Should Know

The following definitions cover some basic terms used throughout this manual. (For more definitions, see the Glossary.)

AST FASTRAM

The high-speed, three-connector system memory board that is standard in the Premium/286. FASTRAM uses all three connectors of the special FASTslot architecture on the system board. FASTRAM and FASTslot work together to ensure fast, compatible memory function. FASTRAM can be configured for many combinations of expanded and linear memory.

AST FASTslot Architecture

The high-speed slots that use a special third connector as a direct interface to the 80286 microprocessor. The third connector is an addition to the standard AT bus and provides zero-wait-state operation at 6-, 8-, and 10-MHz operating speeds.

ASTMENU

A program of menus and help screens that provides easy access to ASTSETUP and other software programs provided by AST

ASTSETUP

A program you use to identify the system configuration

AT driver/adapter

The adapter into which an AT-embedded drive is plugged

AT-embedded drive

A hard disk drive with controller logic on the hard drive. The drive is connected to an AT driver/adapter.

Conventional (base) memory

Linear memory between 0—640 KB. MS-DOS gives you direct access to all conventional memory. Your computer does not need any special software to use conventional memory.

Enhanced small device interface (ESDI)

A type of hard disk drive with a portion of the disk controller built in to provide faster performance. The data transfer rate of an ESDI drive is at least 10 megabits per second.

Expanded memory

Memory beyond the 640-KB limit with access through memory paging. Special software, conforming to the expanded memory (EMS) or enhanced expanded memory specifications (EEMS), is required to take advantage of expanded memory. Also known as paged memory.

Extended memory

System memory above 1 MB that can be accessed directly by some operating systems such as MS OS/2™ and XENIX®.

Using AST utility software, expanded memory can also emulate extended memory. This extended memory can then be used to create RAM disks and print spoolers under MS-DOS.

Kilobyte (KB)

1024 bytes. An amount of memory such as 8 KB is shorthand for 8192 bytes.

Linear memory

Any sequential memory that can be addressed without *memory paging*. Linear memory includes both *conventional* and *extended memory*.

Megabyte (MB)

1024 kilobytes. An amount of memory such as 2 MB is another way of saying 2048 kilobytes.

Memory paging

The process by which memory management software enables the computer to use *expanded memory*. The memory manager divides expanded memory into pages of 16 KB each. These pages are swapped, four at a time, into windows (areas that are not in use) in the 1-MB address range recognized by DOS.

NOTES

BEFORE YOU BEGIN 1

This section provides information you need before you set up your computer. In this section, you will unpack your system, check system compatibility, and learn some safety tips about computer operation.

1.1 Installation Overview

To set up your AST Premium/286 computer, follow these guidelines:

1. Unpack your system (Section 1.2)
2. Set up your computer (Section 2)
3. Add options, if desired (Sections 7—9)
4. Run ASTSETUP (Section 3)
5. View the README file on the Utility Software disk (Section 1.5)

1.2 Unpacking Your System

In addition to this manual (AST part number 000918-001), your package should contain the following:

- Computer system unit with the following installed:
  - — Memory board
  - — 5.25-inch, 1.2-MB floppy drive

    (An optional hard drive should also be included if you ordered it.)
- Power cord
- Keyboard
- Keys for keyboard lock (attached to the back panel of the computer)
- High-density (1.2-MB) disks: MS-DOS (also contains GW-BASIC) and Utility Software

- *AST Premium Utility Software User's Manual*
- *MS-DOS User's Manual*
- *Microsoft GW-BASIC Interpreter User's Guide*

NOTE

Save the packing materials. If your computer ever needs to be shipped, it must be packed in these special shock-absorbing materials. Computers returned to the factory in non-approved containers may be refused and your warranty may be voided. Contact your authorized AST reseller for replacement shipping containers.

Contact your AST reseller immediately if any components are damaged or missing.

1.3 System Compatibility

The following two sections describe hardware and software compatibility.

1.3.1 Hardware

You can install the following in the Premium/286:

- PC XT- and PC AT-compatible add-in boards
- 3.5- or 5.25-inch floppy drives
- Full- or half-height hard drives
- Tape backup unit

Your system supports ESDI and ST-506 hard disk drive controllers, as well as an AT driver/adapter for embedded drives. Hard drives and controllers, floppy drives, and tape backup systems are available from AST.

Your drive format and controller or adapter interface format must be the same (Table 1-1).

Table 1-1. Drive Format Compatibility.

Drive	Controller or Adapter	How to Identify
ST-506	Controller	"WD-1003" printed on controller board
ESDI	Controller	"WD-1007" printed on controller board
AT-embedded	Driver/adapter	"Driver/adapter" printed on adapter board

T281-1

All hard drives attached to a single controller must be the same format. For example, if you have one ESDI format drive in your system, any hard drive attached to the same controller must be ESDI format.

1.3.2 Software

Premium/286 supports AT-compatible operating systems including MS-DOS, which is included with GW-BASIC.

Certain copy protection routines in application software may prevent the application from being loaded from a floppy disk when the computer operates at 10 MHz. If your application program does not load properly when the computer is running at 10 MHz, change the default speed from 10 to 8 MHz in ASTSETUP.

1.4 Safety Tips

Take the following precautions while setting up and using your computer.

- Keep your computer on a flat, stable work surface with enough space around it for proper air circulation. Use the following minimum clearances:

  Rear of system unit: 3 inches (8 centimeters)
  Left side of system: 3 inches (8 centimeters)
  Right side of system: 6 inches (15 centimeters)
  Top of monitor: 6 inches (15 centimeters)

- If you use peripheral equipment, choose a work surface large enough to accommodate your entire system.
- Protect your equipment from wet weather or liquids.
- Avoid dropping, jarring, or shaking your equipment. When moving the system unit, place a shipping insert in the floppy drive to protect the disk heads.
- Turn your equipment off and unplug it from the wall outlet or power strip if you:
  - — Open the system unit
  - — Expose the equipment to liquid
  - — Drop, jar, or damage the equipment
- Do not open the power supply or the monitor.
- Follow all the instructions and cautions in this manual.

1.5 Viewing the README File

Your Utility Software disk contains a README file that provides the following:

- Two versions of the drive table needed in Section 3 to configure your system using ASTSETUP. One version lists the drives by manufacturer and model number. The other version lists the drives by parameters (cylinders, heads, write precompensation, landing zone, and sectors) that are available in the drive's documentation.
- Information about your computer that was not available when this manual was printed

To view the README file, do the following:

STEP 1
Boot your system with the MS-DOS disk.

STEP 2
Insert the Utility Software disk in drive A.

STEP 3
At the DOS prompt, type the following:

A:<Enter>

STEP 4
To view the drive table by manufacturer, type the following:

README DRIVEMAN<Enter>

To view the drive table by parameters, type the following:

README DRIVENUM<Enter>

To view updates to the manual, type the following:

README INFO<Enter>

The README file you requested appears on the screen, with prompts to press any key to view the next screen.

To print the README files, do the following:

STEP 1
At the DOS prompt, type the following:

A:<Enter>

STEP 2
To print the drive table by manufacturer, type the following:

PRINTME DRIVEMAN<Enter>

To print the drive table by parameters, type the following:

PRINTME DRIVENUM<Enter>

To print updates to the manual, type the following:

PRINTME INFO<Enter>

NOTES

SETTING UP YOUR SYSTEM 2

This section describes how to assemble the components of your computer. Once your computer is set up, you can start using it right away.

This section shows you how to put together your system components. Appendix F contains a configuration listing you can use to record information specific to your system. Fill it out as you complete the installation procedure. The configuration listing can be used to describe your system if you must contact your AST reseller for service or product information.

To assemble your computer, follow the steps in Sections 2.1—2.3.

2.1 Preparing for Installation

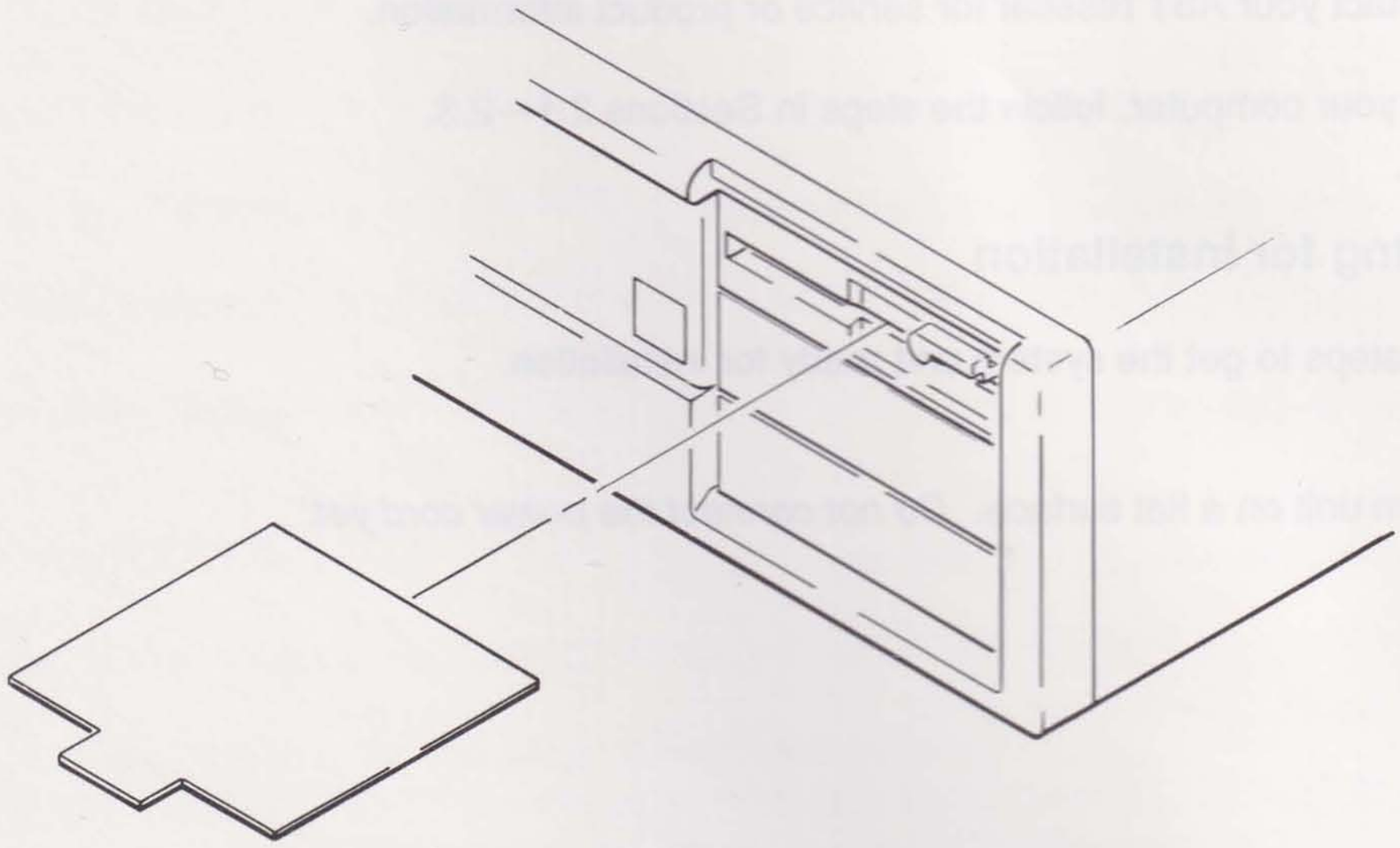
Follow these steps to get the system unit ready for installation.

STEP 1
Set the system unit on a flat surface. *Do not connect the power cord yet.*

STEP 2
Remove the insert from the floppy drive (Figure 2-1). If you have a 3.5-inch drive, press the eject button to remove the insert.

NOTE

Save this insert for future use. Placing it in the drive protects the drive's inner mechanism during shipment.



A100/2

Figure 2-1. Removing the Disk Drive Insert.

2.2 Opening the System Unit

The first time you set up your computer, you must open the system unit to do the following:

- Install a video adapter board if one is not included with your system
- Change the primary video display adapter switch from color to monochrome if you have a Monochrome Display Adapter (MDA) or Hercules™ Graphics Card (HGC)

- Install add-in boards or other devices

If you do not need to open the system unit, skip to Section 2.3.

2.2.1 Removing the System Unit Cover

To remove the system unit cover, follow these steps:

CAUTION

Installing any component while the computer is on can permanently damage your computer and its components.

STEP 1
Using a slotted screwdriver, remove the five hex screws from the back panel (Figure 2-2). Save the screws.

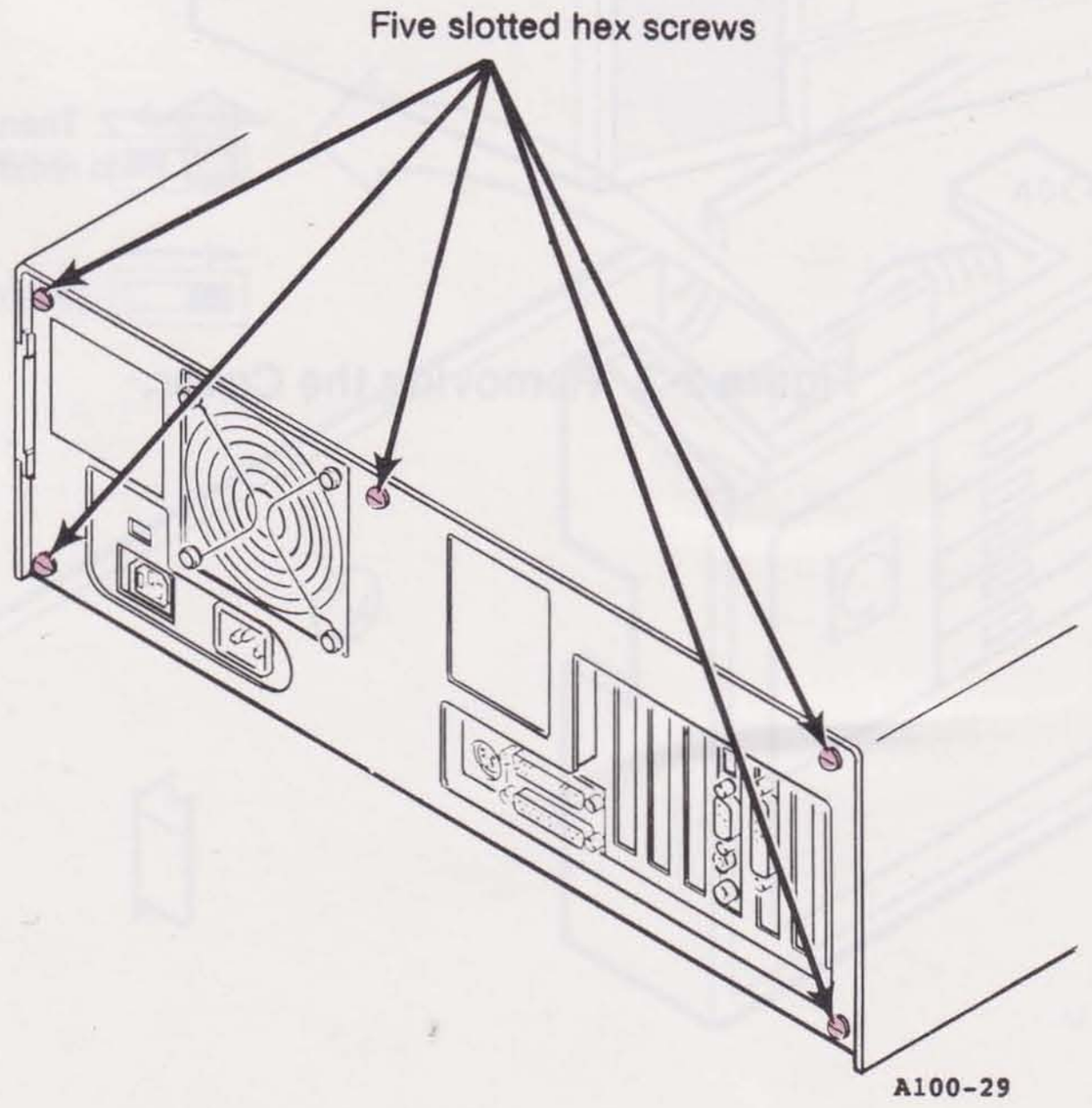


Figure 2-2. Removing the Back Panel Screws.

STEP 2
Standing in front of the computer, pull the cover towards you until the back of the cover is about a half inch past the On/Off switch, then lift the cover straight up and off the computer (Figure 2-3).

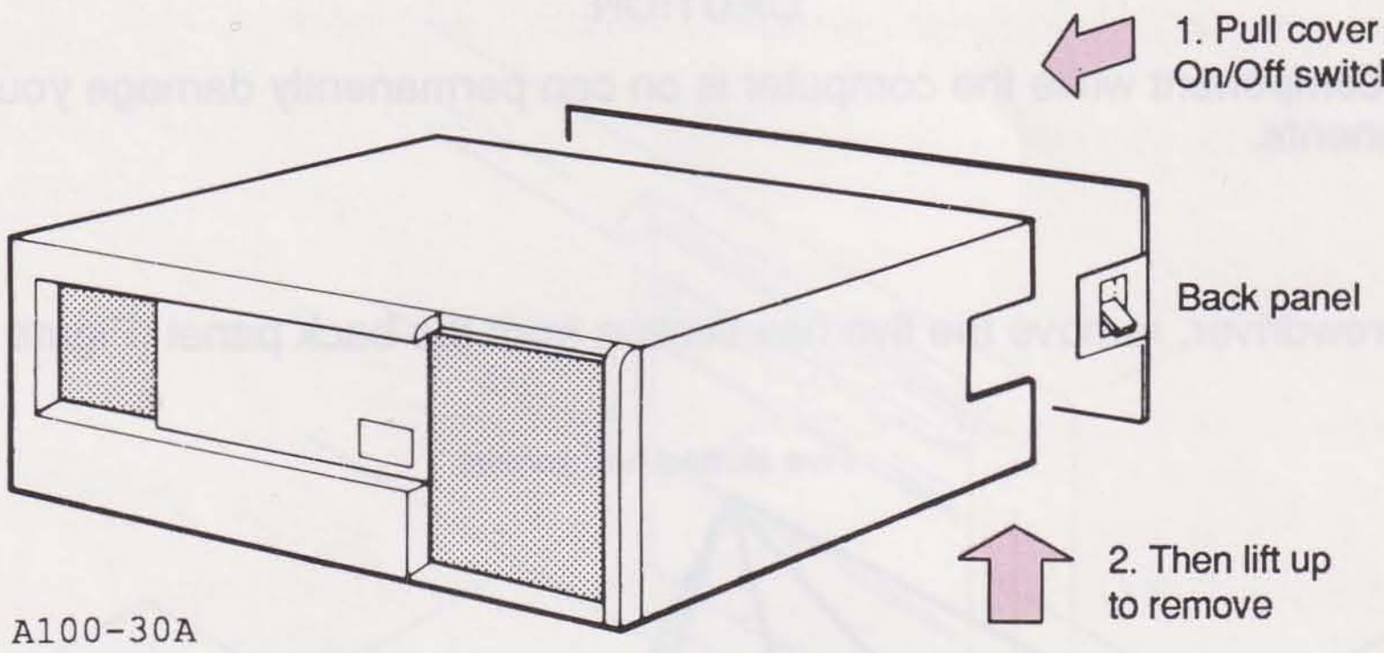


Figure 2-3. Removing the Cover.

2.2.2 Setting the Primary Video Display Adapter Switch

Set the primary video display adapter switch to indicate the type of video adapter you have (Figure 2-4). Use the color setting (default) for a Color/Graphics Adapter (CGA), Enhanced Graphics Adapter (EGA), or Video Graphics Array (VGA). Use the monochrome setting for an MDA or HGC adapter. These settings refer to the type of display adapter you have, not the monitor.

If you are installing a color adapter, leave the switch in its default position (to the right, as you face the front panel). If you are installing a monochrome adapter, slide the switch to the left.

Record the setting of this switch in Appendix F.

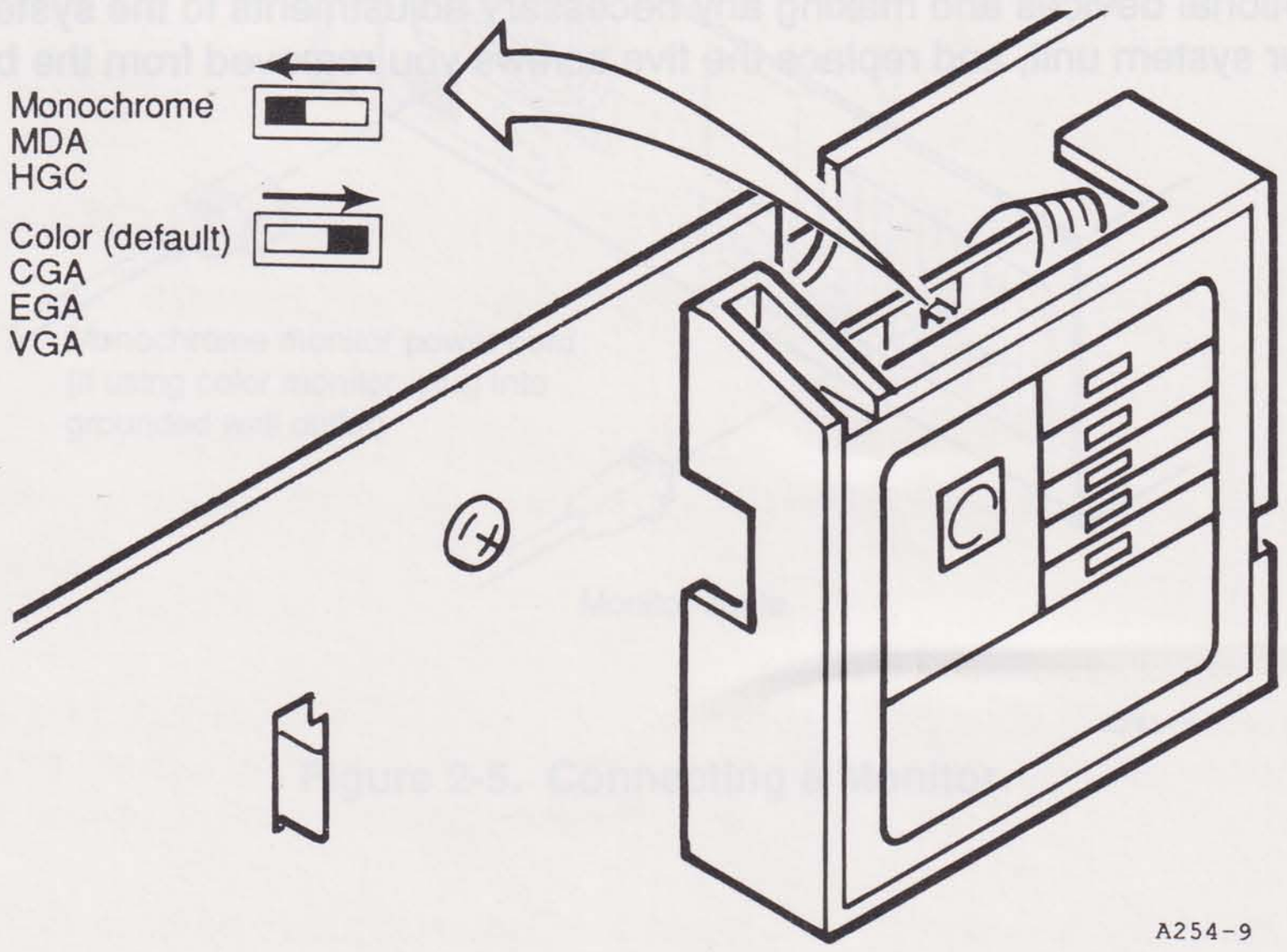


Figure 2-4. Setting the Primary Video Display Adapter Slide Switch.

2.2.3 Installing the Video Adapter and Other Options

Install and configure the video adapter board and any other add-in boards or devices according to the instructions that came with each device. For additional instructions, refer to the following sections:

- Section 7—add-in boards
- Section 8—math coprocessor
- Section 9—disk drives and tape backup systems

Write down the names of all devices installed in your computer in Appendix F. Include all pertinent information about the device, including (as applicable) device type, port or memory location, direct memory access (DMA) channel, interrupt request line (IRQ), and memory size (disk drive only).

2.2.4 Replacing the System Unit Cover

After adding all optional devices and making any necessary adjustments to the system unit, slide the cover back on your system unit, and replace the five screws you removed from the back panel.

2.3 Connecting Computer Components

You are now ready to connect your computer's components together. Follow these steps:

STEP 1
If your system includes an AST monitor, attach the monitor to its base. Attach the monitor cable to the video display adapter (Figure 2-5). (Monochrome and color monitors are available from your AST reseller.) If you are using another manufacturer's monitor, follow the installation instructions that accompanied the monitor.

If you have a monochrome monitor, plug the power cord into the back of the system unit. If you have a color monitor, plug the power cord into a grounded wall outlet.

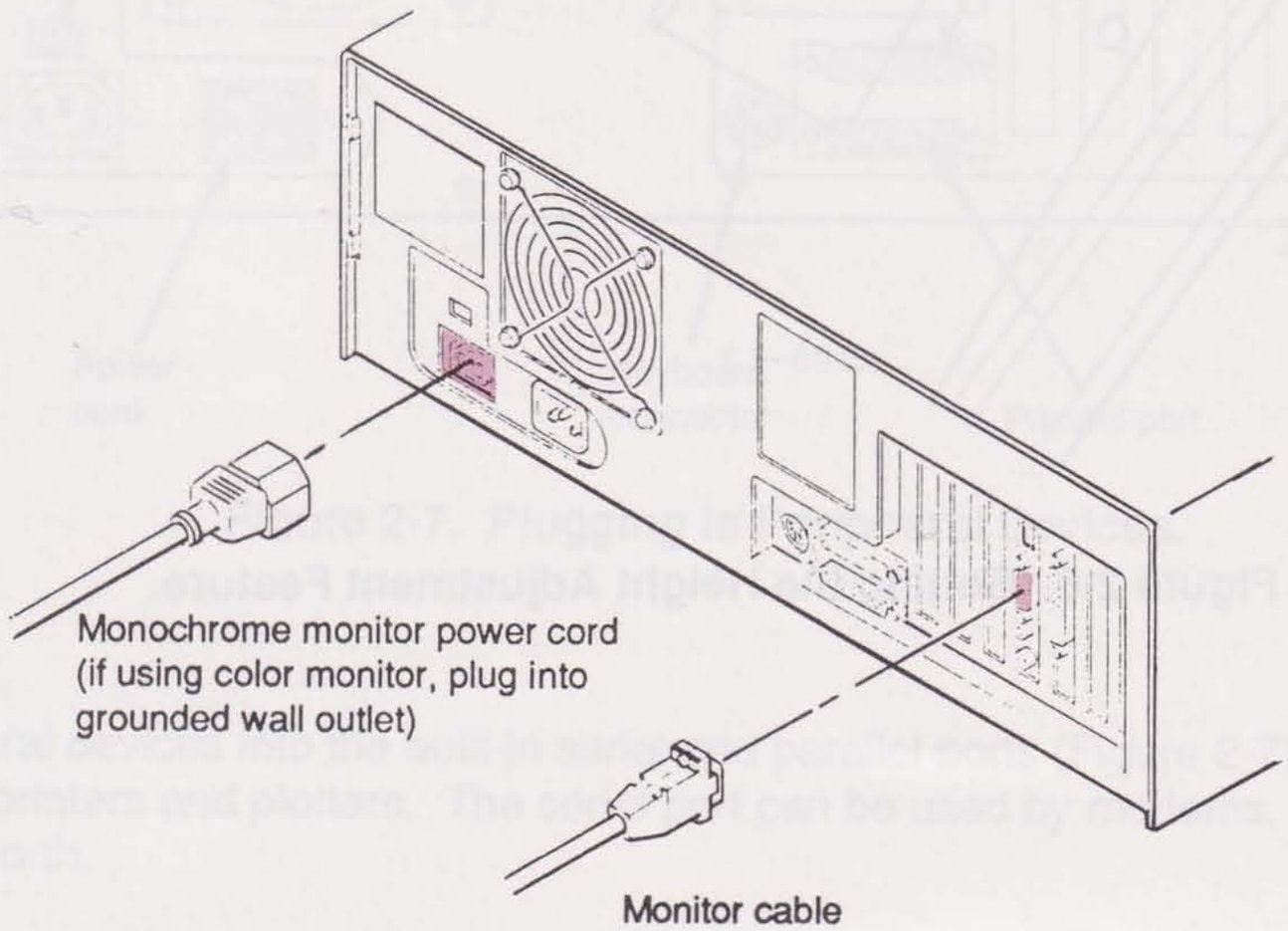


Figure 2-5. Connecting a Monitor.

STEP 2

To raise the keyboard, slide the adjusters toward the outer edges of the keyboard, and allow them to snap up (Figure 2-6).

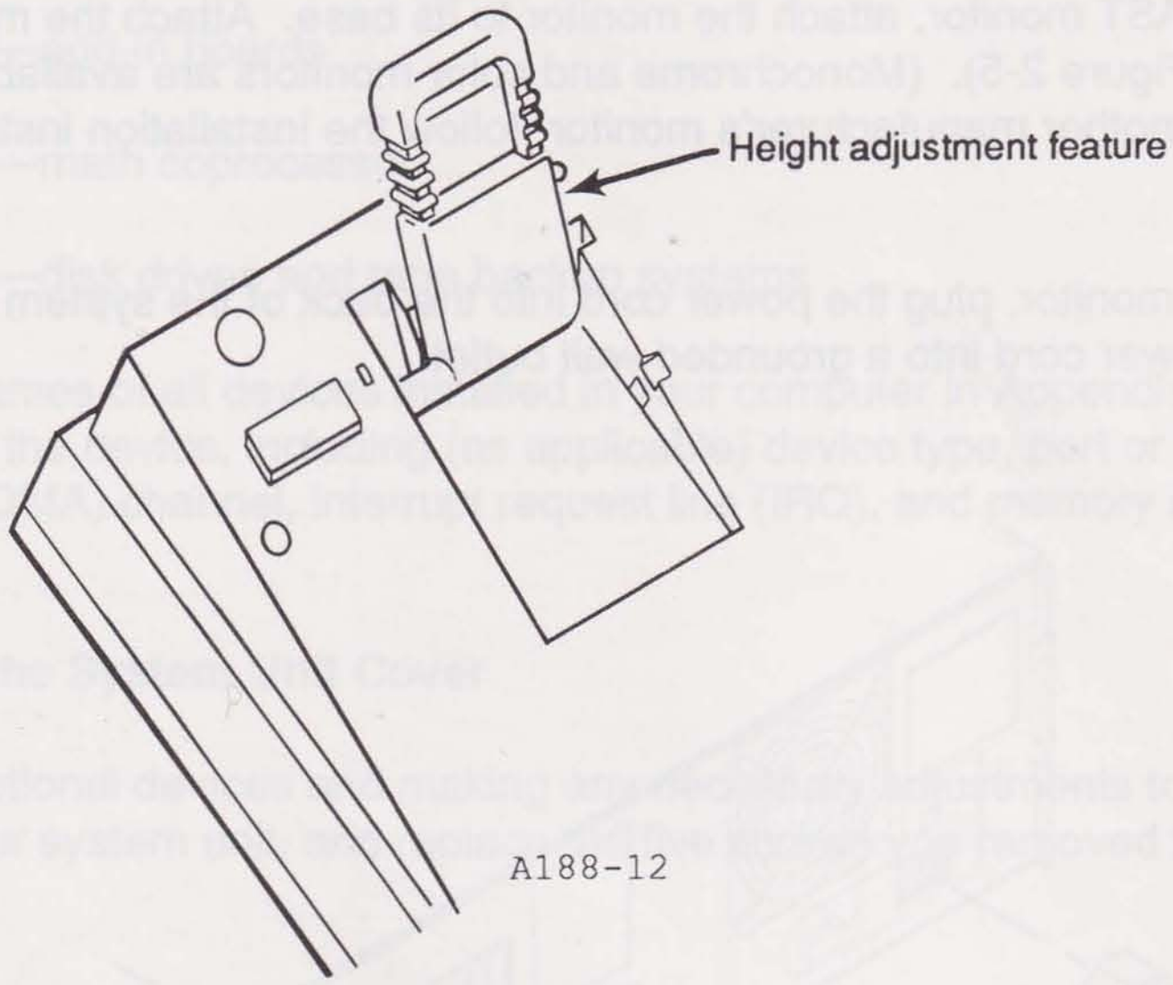


Figure 2-6. Setting the Height Adjustment Feature.

STEP 3
Plug the keyboard into the round connector at the back of the computer (Figure 2-7).

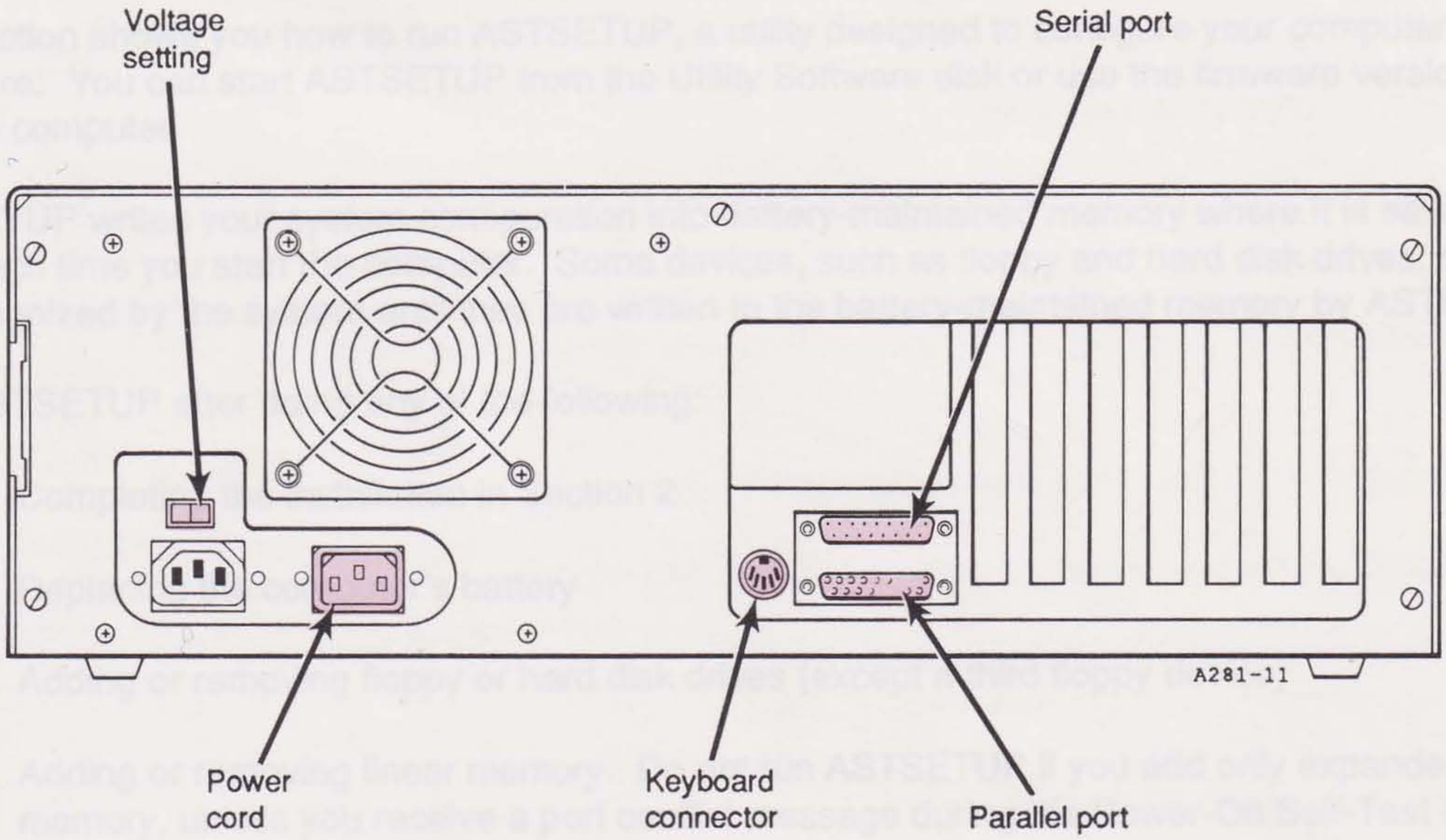


Figure 2-7. Plugging in Peripheral Devices.

STEP 4
Plug any peripheral devices into the built-in serial and parallel ports (Figure 2-7). The parallel port is usually used for printers and plotters. The serial port can be used by modems, printers, mouse devices, and so forth.

STEP 5
Check the voltage setting (Figure 2-7). The setting should be 115 volts (V) for operation in the United States, Canada, and Mexico and (usually) 230 V for use elsewhere. Plug the power cord into the system unit and then into a grounded wall outlet.

Refer to Section 3 for detailed information on how to get your computer started with ASTSETUP.

NOTES

RUNNING ASTSETUP 3

This section shows you how to run ASTSETUP, a utility designed to configure your computer's hardware. You can start ASTSETUP from the Utility Software disk or use the firmware version built into the computer.

ASTSETUP writes your system configuration into battery-maintained memory where it is saved and read each time you start the computer. Some devices, such as floppy and hard disk drives, cannot be recognized by the system until they are written to the battery-maintained memory by ASTSETUP.

Run ASTSETUP after doing any of the following:

- Completing the installation in Section 2
- Replacing the computer's battery
- Adding or removing floppy or hard disk drives (except a third floppy device)
- Adding or removing linear memory. Do not run ASTSETUP if you add only expanded memory, unless you receive a port conflict message during the Power-On Self-Test (POST).
- Replacing the video board

ASTSETUP also controls many Premium/286 features. Run ASTSETUP if you want to change or enable/disable the following:

- Date and time
- Amount of conventional memory
- Amount of extended memory
- Hard disk type
- System's default operating speed
- Numeric keypad lock (Num Lock) when the computer is turned on
- Booting without keyboard plugged into computer

3.1 Starting ASTSETUP

Select one of the following procedures to start ASTSETUP. When you finish, the ASTSETUP screen appears (Figure 3-1).

Boot Without Keyboard field disabled:

Use this method if you have not previously disabled the Boot Without Keyboard field in ASTSETUP.

STEP 1
Press the RESET button on the front panel, or turn your system off and then on.

STEP 2
Hold down any key as the POST messages appear.

After the following message appears, press **<Ctrl>-<Alt>-<Esc>**:

```
KEYBOARD ERROR OR NO KEYBOARD PRESENT
PRESS F1 KEY TO CONTINUE OR CTRL-ALT ESC FOR SETUP
```

The ASTSETUP screen appears.

Boot Without Keyboard field enabled:

Use this method if you previously disabled the Boot Without Keyboard field in ASTSETUP.

STEP 1
If the keyboard is attached to the system unit, press the RESET button on the front panel, or turn your system off and then on.

If no keyboard is attached to the system unit, turn off the system, attach a keyboard (see Section 2), and turn on the system power.

STEP 2
After the following message appears, press **<Ctrl>-<Alt>-<Esc>**:

```
TO ACCESS SETUP PROGRAM, PRESS CTRL-ALT-ESC NOW.
```

The ASTSETUP screen appears.

Disk version of ASTSETUP:

This is an alternative method of starting ASTSETUP, and can be used regardless of the Boot Without Keyboard setting. This method is convenient if you want to look at your current configuration without making changes; you are returned directly to DOS without restarting the computer.

STEP 1
Start up your system with DOS.

STEP 2
Insert your Utility Software disk into drive A.

STEP 3
At the DOS prompt, type the following:

A:<Enter>

ASTMENU<Enter>

STEP 4
Select the ASTSETUP option from the ASTMENU. The ASTSETUP screen appears.

```
                    AST SETUP UTILITY
        Copyright (c) 1987 AST Research Inc. All Rights Reserved

DATE (MM/DD/YY)                 08/17/88
TIME (HH:MM:SS)                 09:00:00

DISKETTE A                      1.2 MB
DISKETTE B                      NONE
                                TYPE  CYLS. HEADS SECTORS PRECOMP
FIXED DISK 1                     47   1024    5      17     NONE
FIXED DISK 2                    NONE

VIDEO ADAPTER                   EGA/VGA
PRIMARY VIDEO                   COLOR

CONVENTIONAL MEMORY             640
EXTENDED MEMORY                 0

DEFAULT SPEED                   10 MHz
NUM LOCK AFTER BOOT             ENABLE
BOOT WITHOUT KEYBOARD           DISABLE

↑↓↵moves between items,←→selects values
          F10 records changes, F1 exits setup
```

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Figure 3-1. ASTSETUP Screen (Example).

3.2 Using ASTSETUP

Except where indicated, each field in ASTSETUP uses the same keystrokes: **<Up Arrow>**, **<Down Arrow>**, or **<Enter>** to move between fields. To see the valid choices for the current field, press **<Left Arrow>** or **<Right Arrow>**. Each field is described in the following pages.

Date

Establishes the date maintained by the system's battery. Enter the current date in a month/day/year format (you cannot use the directional arrows). For example, enter June 17, 1989 as 6/17/89.

Time

Establishes the time maintained by the system's battery. Enter the current time in an hour:minute:seconds format using a 24-hour clock (you cannot use the directional arrows). For example, enter 1:00 pm as 13:00.

Diskette A

Identifies the type of floppy disk for drive A. The five choices are NONE, 360 KB (5.25-inch standard), 1.2 MB (5.25-inch high-density), 720 KB (3.5-inch standard), or 1.44 MB (3.5-inch high-density).

Diskette B

Identifies the type of floppy disk for drive B. The five choices are NONE, 360 KB (5.25-inch standard), 1.2 MB (5.25-inch high-density), 720 KB (3.5-inch standard), or 1.44 MB (3.5-inch high-density).

Fixed Disk 1

Designates the disk type of your first hard disk. If your new system includes an AST hard disk, the drive type has been entered at the factory; *do not change it.* If you do not have a hard disk, this field should be NONE. Press the directional arrows to scroll through the drive types, or enter the drive type with the numeric keys (press 0 to select NONE).

NOTE

Write down the drive type in Appendix F for future reference. If the drive type is accidentally changed, the data on the disk may be corrupted.

If you are installing a hard disk, use the drive table in the README file on your Utility Software disk to determine your disk type. Follow the instructions in Section 1 for viewing the README file.

Fixed Disk 2

Designates the disk type of your second hard disk. If your new system includes a second AST hard disk, the drive type has been entered at the factory; *do not change it.* If you do not have a second hard disk, this field should be NONE. Press the directional arrows to scroll through the drive types, or enter the drive type with the numeric keys (press 0 to select NONE).

NOTE

If you have two hard disk drives, both drives must be either ESDI format, ST-506 format, or AT-embedded; you cannot mix formats.

Write down the drive type in Appendix F for future reference. If the drive type is accidentally changed, the data on the disk may be corrupted.

If you are installing a second hard disk, use the drive table in the README file on your Utility Software disk to determine your disk type. Follow the instructions in Section 1 for viewing the README file.

Video Adapter

Identifies your primary video display adapter type. Valid types are as follows:

Specify:	
MONO	for an MDA or HGC adapter
EGA/VGA	for an EGA or VGA adapter
COLOR 80	for a CGA adapter

Primary Video

Displays the setting of the primary adapter switch; *for reference only*. If your Video Adapter field is set to COLOR 80 or EGA/VGA, your primary display adapter switch should be set to the right, and this field should be COLOR.

Conventional Memory

Establishes the amount in KB of conventional memory. MS-DOS can directly access all conventional memory. If your system has 512 KB conventional memory, select 512 KB. If your system has 640 KB or more conventional memory, select 640 KB unless you have a software package that requires a maximum of 512 KB of conventional memory.

Extended Memory

Establishes the amount of extended linear memory addressable above 1 MB. (Note that the 384 KB of linear memory between 640 KB—1 MB is reserved for system functions.) Extended memory does not include expanded or video memory.

If you have 1 MB or more memory installed, and some or all of the memory is configured as extended, select the corresponding amount.

Default Speed

Indicates the default CPU speed: low (6 MHz), medium (8 MHz), or high (10 MHz). Most users should select 10 MHz. Typically, 6 and 8 MHz are needed only by some application and game software.

Num Lock After Boot

Determines whether <Num Lock> is on or off when your system is turned on. If you select ENABLE, the numeric keys on your keyboard enter numbers when the system is booted. If you select DISABLE, the numeric keys are cursor controls.

Boot Without Keyboard

Enables you to boot your computer without a keyboard plugged in. If you disable this field, the computer does not start successfully unless a keyboard is plugged in. If you enable this field, the keyboard check and tests are not performed during POST. This feature is especially useful in network environments.

After completing ASTSETUP, press **<F10>**. The following prompt appears:

PRESS F5 TO CONFIRM UPDATE

To verify your responses and save your new configuration, press **<F5>**.

Press any other key to return to the first field on the screen, or press **<F1>** to exit ASTSETUP without saving your changes.

Press **<F5>**, and your system automatically reboots with the new configuration and is ready to use.

NOTES

PART II. USING YOUR COMPUTER

4. Premium/286 Hardware
5. Speed Commands
6. Maintaining Your System

NOTES

PREMIUM/286 HARDWARE 4

This section provides information on various types of disks, your computer's keyboard and monitor, and how to restart your computer. Whether you are a new or experienced computer user, you should read this section.

4.1 Using Disks

A computer uses disks to store and retrieve information. The following is basic information on disks and compatibility.

4.1.1 Disk Types

"Disk" is a generic term for *floppy disks*, *hard disks*, and *RAM disks*.

- *Floppy disks* (also called *floppies* or *diskettes*) are removable disks. Your computer accommodates four different floppy disk drive types:

  — 360-KB (5.25-inch standard)

  — 1.2-MB (5.25-inch high-density)

  — 720-KB (3.5-inch standard)

  — 1.44-MB (3.5-inch high-density)

  The capacity of each disk is limited, but you can use as many disks as you want. You can store different information on individual disks, then insert a particular disk whenever you need it. Once information is saved to a disk, it remains there until it is overwritten, formatted, or damaged; turning off your computer does not affect the data.

- *Hard disks* (also called *fixed* or *Winchester* disks) are installed inside your computer. You can add or remove hard disks, but normally you do not interchange them like floppy disks. You can read or write to a hard disk, but its total capacity is finite. Once information is stored on a hard disk, it remains there until it is overwritten; turning off your computer after saving your data does not affect the data.

- *RAM disks* (also called *virtual* disks) use system memory as if it were a disk drive while the computer is on. RAM disks are not limited by the speed of a mechanical drive, so they work faster than floppy and hard disks. The biggest drawback of RAM disks is that you lose the information stored on them when you turn off your computer. Even a brief electrical power outage will cause all information in a RAM disk to be lost. To use a RAM disk, copy the program and data files you want to use to the RAM disk when you turn on the computer. Then, before turning off the computer, copy the data files from the RAM disk to a floppy or hard disk.

Additional information on disks is provided in your *MS-DOS User's Manual* and *AST Premium Utility Software User's Manual*.

4.1.2 Disk Compatibility

Premium/286 includes a floppy disk drive. Your computer can accommodate 3.5-inch or 5.25-inch drives.

5.25-inch drives and disks come in two capacities: 360-KB (double-density) and 1.2 MB (high-density). For reliable performance, always format and use the same type of disk and drive. For example, use a high-density disk in a high-density drive. However, if you need to use different capacities of disks and drives, use the following guidelines:

In a 360-KB drive (5.25-inch double density):

- 360-KB disks can be formatted, read, and written.
- 1.2-MB disks cannot be formatted, read, or written.

In a 1.2-MB drive (5.25-inch high-density):

- 360-KB disks can be read and formatted (using the MS-DOS command FORMAT *drive:*/4). Data written on 360-KB disks in a 1.2-MB drive may not be readable in a 360-KB drive.
- 1.2-MB disks can be formatted, read, and written.

3.5-inch drives and disks come in two capacities: 720-KB (double-density) and 1.44-MB (high-density). As with 5.25-inch disks, always format and use the same type of disk and drive. However, if you need to use different capacities of disks and drives, use the following guidelines:

In a 720-KB drive (3.5-inch double-density):

- 720-KB disks can be formatted, read, and written.
- 1.44-MB disks cannot be formatted, read, or written.

In a 1.44-MB drive (3.5-inch high-density):

- 720-KB disks can be read, written, and formatted (using the MS-DOS command FORMAT *drive:*/N:9/T:80.)
- 1.44-MB disks can be formatted, read, and written.

Additional information on disk compatibility and the FORMAT command is provided in your *MS-DOS User's Manual*.

4.2 Using Your Keyboard

The keys on the your keyboard can be grouped into the following categories (Figure 4-1).

- *Typewriter keys*. These keys are arranged like a standard typewriter keyboard and are used for text entry.
- *Function keys*. These keys can be programmed to perform complex operations.
- *Cursor-control keys*. These keys move the cursor and may function differently depending on your software.
- *Numeric keys*. These keys provide a calculator keypad when <Num Lock> is enabled. When <Num Lock> is disabled, these keys function like the cursor control keys.

The function of many of these keys is software dependent. For specific functions, see your application or operating system software user's manual.

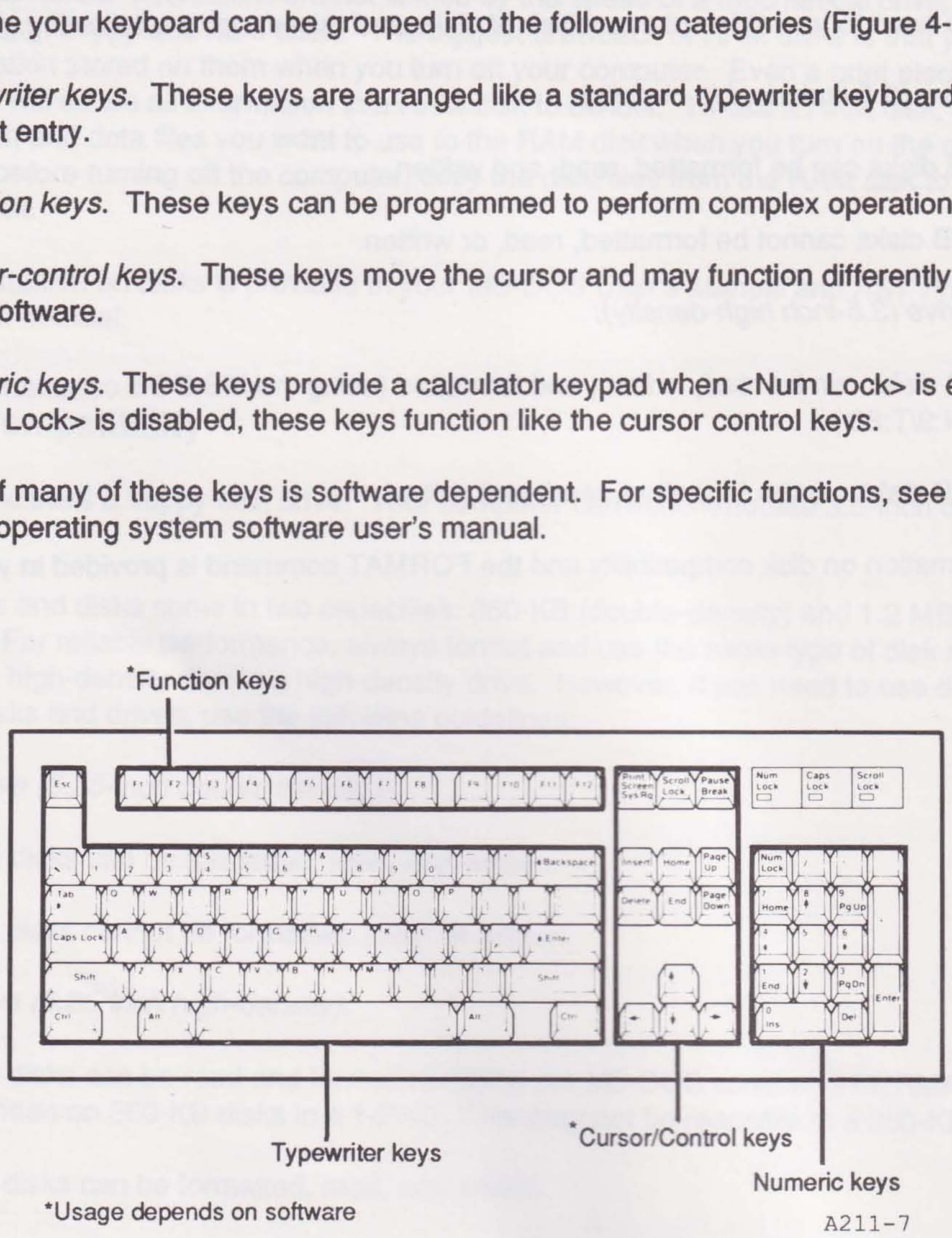

Figure 4-1. Enhanced 101-Key Keyboard.

4.2.1 Setting the Operating Speed

You can use simple keyboard commands to set the operating speed of your system to high, medium, or low. The lights on the front of the system unit (Figure 4-2) represent the current operating speed.

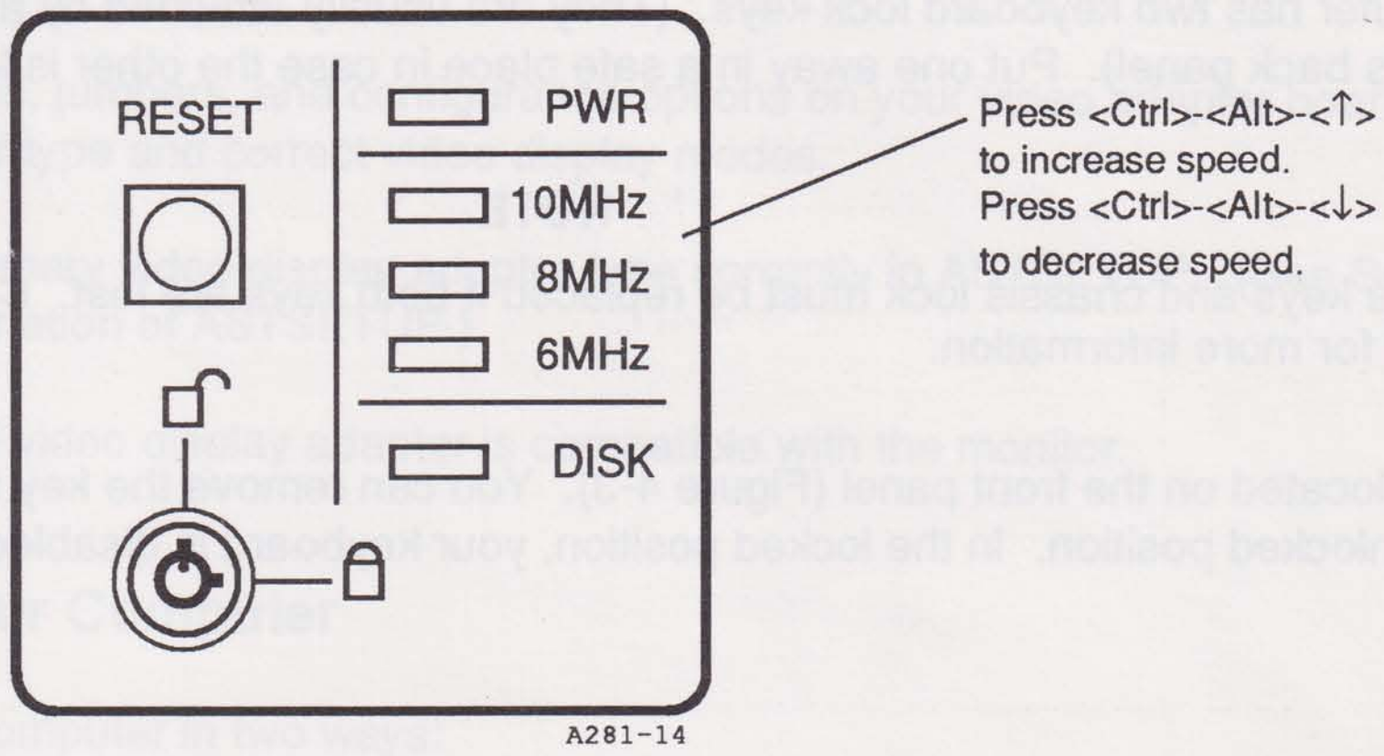

Figure 4-2. Front Panel Lights—CPU Speed.

By changing the system's operating speed, you change how fast the computer has access to information and executes commands. Use the low speed for time-sensitive software that requires a low speed, such as certain game programs. The fastest speed is 10 MHz.

Press **<Ctrl>-<Alt>-<Up Arrow>** to increase speed or **<Ctrl>-<Alt>-<Down Arrow>** to decrease speed.

You can also use SPEED commands (Section 5) or ASTSETUP (Section 3) to change the CPU speed.

NOTE

Certain copy protection routines in application software prevent the application from being loaded when the computer operates at 10 MHz. If your application program does not load or install properly from a floppy drive when the computer is running at 10 MHz, change the default speed in ASTSETUP.

4.2.2 Locking Your Keyboard

Your computer has two keyboard lock keys. (They are usually attached by a ring to the fan cover on the system's back panel). Put one away in a safe place in case the other is lost or damaged.

NOTE

Both the keys and chassis lock must be replaced if both keys are lost. Contact your AST reseller for more information.

The lock is located on the front panel (Figure 4-3). You can remove the key from the lock in the locked or unlocked position. In the locked position, your keyboard is disabled and will not accept input.

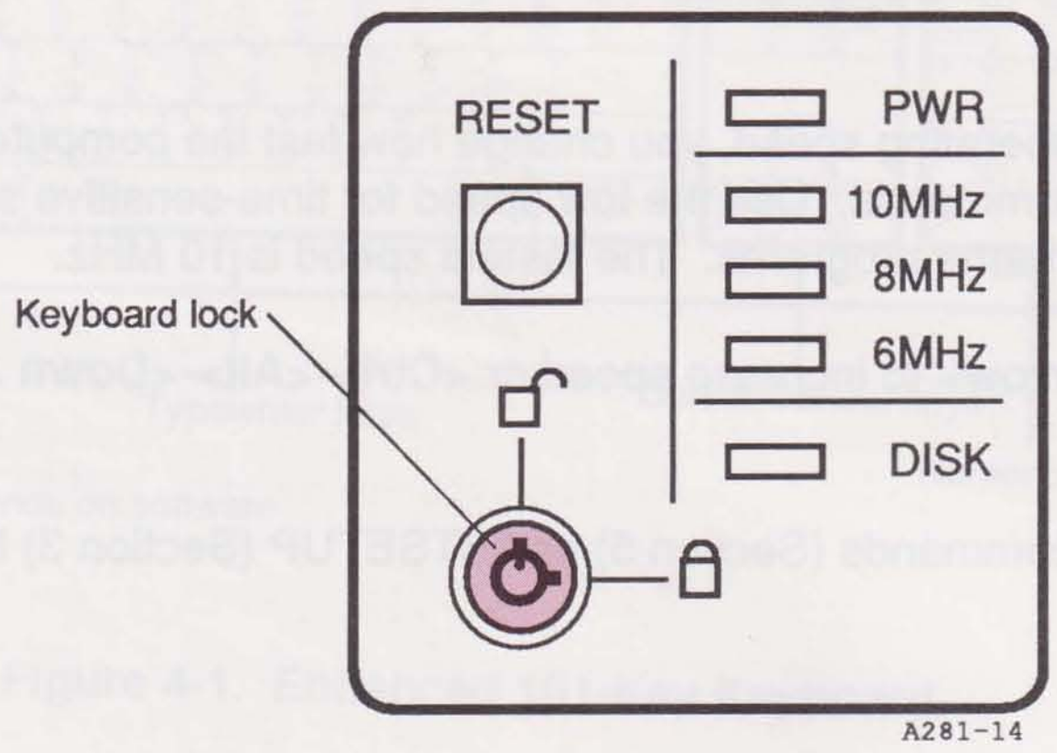

Figure 4-3. Locking the Keyboard.

4.3 Using a Monitor

The following optional AST monitors can be used with your computer: monochrome, enhanced color, or VGA color. All monitors tilt and swivel to any position you choose, and include an On/Off button and adjustable contrast and brightness controls.

To make sure your computer runs correctly with your monitor and video adapter:

- Set the computer's primary video display adapter switch correctly. (See Section 2 for details on the switch setting.)
- Set all switches, jumpers, and configuration options on your video adapter board for the proper monitor type and correct video display modes.
- Identify the primary video display adapter type correctly in ASTSETUP. (See Section 3 for a detailed explanation of ASTSETUP.)
- Make sure the video display adapter is compatible with the monitor.

4.4 Restarting Your Computer

You can restart your computer in two ways:

- *Warm* or *soft boot*: A warm boot clears system memory and starts your computer without running the Power-On Self-Test (POST). Press **<Ctrl>-<Alt>-<Del>** to perform a warm boot.
- *Cold* or *hard boot*: A cold boot clears system memory, runs POST to check basic system integrity, then starts your computer. A cold boot is necessary if your computer does not respond to keyboard input.

  To perform a cold boot, press the RESET button on the front panel or turn the system unit power switch off and on. Unless you are opening or moving your system unit, you should use the RESET button instead of the power switch; it is easier on the system's components. If you do use the power switch, leave the system off for 10 seconds before turning it on again.

CAUTION

If possible, do not reset the system while a file is open. Doing so erases any data entered since opening the file, and can even corrupt the file (make it inaccessible).

Restarting the system erases any data stored in RAM. If possible, back up RAM data onto a disk before restarting the system.

NOTES

SPEED COMMANDS

You can change your computer's operating speed in three ways:

- Run ASTSETUP to set the default speed (Section 3)
- Use key combinations to increase or reduce the speed (Section 4)
- Use SPEED.EXE commands while in your MS-DOS operating system

This section shows you how to use the SPEED.EXE utility to change the central processing unit (CPU) speed. SPEED.EXE is provided on your AST Utility Software disk.

To make SPEED.EXE commands available to you whenever you use your computer, copy SPEED.EXE from your Utility Software disk to your boot disk.

Table 5-1 gives the SPEED.EXE commands you can enter from your operating system prompt.

Table 5-1. SPEED Commands.

Command	Action
SPEED	Displays current speed and help screen
SPEED D	Changes to default speed defined in ASTSETUP
SPEED HI	10 MHz
SPEED MED	8 MHz
SPEED LO	6 MHz

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For example, to display the current operating speed, type the following:

SPEED<Enter>

To change the current speed to 10 MHz, type the following:

SPEED HI<Enter>

NOTES

MAINTAINING YOUR SYSTEM 6

This section provides information on how to maintain your computer. If you follow the basic principles of this section, your system should give you years of efficient operation.

6.1 Maintaining Your Computer

Follow these guidelines to ensure best operation of your computer:

- Keep the computer away from heaters and out of direct sunlight. Exposure to excessive heat may damage computer components.
- Do not drop or jar your computer.
- Do not eat, drink, or smoke while working at the keyboard.
- Keep dust, magnets, and static electricity away, especially when the cover is off.
- Never open your computer with the power on.
- Do not use your system if a vacuum cleaner or other motorized device is using the same circuit.
- To clean the outside of your computer, use a damp, lint-free cloth.

CAUTION

Avoid getting the computer wet. Do not clean inside the computer.

6.2 Maintaining Your Monitor

- Do not use the monitor if there are cracks in the screen or monitor case.
- Do not open the monitor, drop, or jar it.
- Do not block the ventilation slots on top of the monitor. Even a piece of paper placed over the slots can cause the monitor to overheat.

- Do not set a clock or any other electrically motorized device near your monitor.

- If you leave your computer on for long periods of time, dim the monitor to avoid permanent damage to the screen. Otherwise, the image on the screen may "burn in" to the screen permanently.

- To clean the monitor, use a damp, lint-free cloth as with the system unit. If the screen is dirty, use a household glass cleaner and a clean cloth to wipe the screen. Spray the cleaner on the cloth, not directly on the screen.

6.3 Maintaining Your Keyboard

Do not spill anything on your keyboard. If you do spill something, unplug the computer and keyboard immediately, drain as much of the liquid from the keyboard as possible, and allow the keyboard to sit at room temperature for a full day before trying to use it.

If the keyboard does not work well after drying, replace the keyboard.

NOTE

Sweet liquids leave a sticky residue that may jam the keyboard despite your efforts to dry it.

To clean the keyboard, use damp cotton swabs. Scrub the keys and the surface around the keys. Do not allow liquid to drip into the keyboard.

6.4 Maintaining Your Floppy Disks

- Keep disks away from excessive heat, direct sunlight, and liquids.

- Keep magnets and any device that contains a magnet (like the telephone) away from your disks.

CAUTION

Magnetic fields can destroy the information on a disk.

- Do not write directly on your disk; instead, write on a disk label first and attach the label to the disk.

- Make copies of all your important disks.

6.5 Replacing the Computer's Battery

A 3.6-V or 6-V lithium or 4.5-V alkaline battery preserves system configuration memory and provides power to the system clock/calendar chip. The 3.6-, 4.5-, and 6-V batteries are interchangeable on all versions of the Premium/286.

WARNING

Replace battery only with AST part number 175000-007 (3.6-V), AST part number 175000-009 (4.5-V), or AST part number 175000-006 (6-V), available from your AST reseller. Use of another battery may present a risk of fire or explosion.

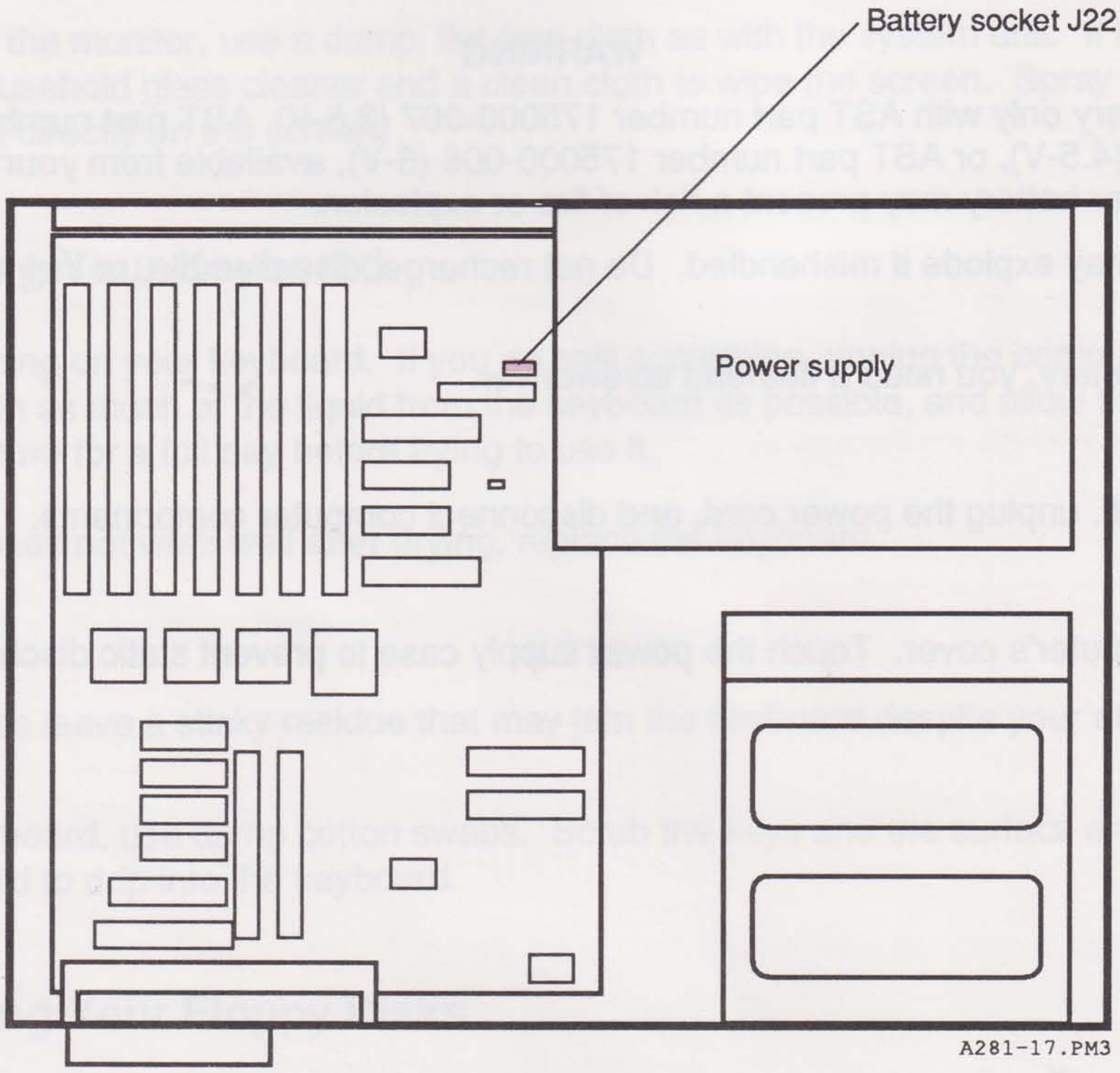
The battery may explode if mishandled. Do not recharge, disassemble, or incinerate.

To change the battery, you need a flathead screwdriver.

STEP 1
Turn the power off, unplug the power cord, and disconnect computer components.

STEP 2
Remove the computer's cover. Touch the power supply case to prevent static discharge.

STEP 3
Unplug the battery connector from J22 on the system board (Figure 6-1). Pull the battery off the fastener strip on the power supply.



Top view

Figure 6-1. Replacing the Battery.

STEP 4
Plug the new battery's connector into J22 on the system board. Pull off the adhesive backing from the new battery. Place the new battery on the fastener strip on the power supply.

STEP 5
Replace the cover, plug in the power cord, and turn on the system.

STEP 6
Run ASTSETUP to set the system configuration. Follow the instructions in Section 3 to ensure that your system configuration is correct.

6.6 Moving Your Computer

You need to take special care of your computer during a move. Use the following steps to move your computer to a new work area or to return it to your AST reseller for service.

STEP 1
Verify that the hard drive heads are parked.

AST hard drives park the drive heads automatically whenever you turn the computer off. If you have installed a hard drive from another manufacturer, use the disk parking utility provided with the drive.

STEP 2
Turn off your system, including the monitor, computer, and any peripherals.

STEP 3
Disconnect all computer components. Remove the power cord from the system unit, monitor, and other peripherals. Unplug power cords from the wall outlet or power strip.

STEP 4
To protect the floppy drive heads, place the shipping insert in the drive.

STEP 5
Move or ship the system in its original packing materials. If you did not save the packing materials, contact your AST reseller for replacements.

NOTE

Units returned for service in packaging not approved by AST may be refused, and your warranty may be voided. Contact your AST reseller for replacement shipping containers.

NOTES

PART III. INSTALLING OPTIONS

NOTES

INSTALLING AN ADD-IN BOARD 7

Add-in boards can provide your system with additional memory, an additional serial or parallel port, enhanced video capability, and many other features.

NOTE

Before purchasing an add-in board for this computer, be sure the board is PC AT-compatible. Before beginning this installation, make sure the board is properly configured for your system.

Before installing an add-in board, check the board's current rating. Your computer's power supply provides the +5 and +12 V required by each of the add-in board slots. Current loading capacity is rated as follows:

Table 7-1. Expansion Slot Current Ratings.

Voltage	Individual Slot Rating	Total Slot Rating
+5	2.0A	12A
+12	0.5A	3A

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Record the name and slot location of each add-in board you are installing in Appendix F. If available, also record the port or memory address, direct memory access (DMA) channel, and interrupt request line (IRQ).

Follow this procedure to install an add-in board.

STEP 1

Turn the computer power off, unplug the power cord, and open your computer (see Section 2 for detailed instructions).

CAUTION

Installing any component while the computer is on can permanently damage your computer and its components.

STEP 2

Select an unused expansion slot. There are seven expansion slots on the system board (Figure 7-1).

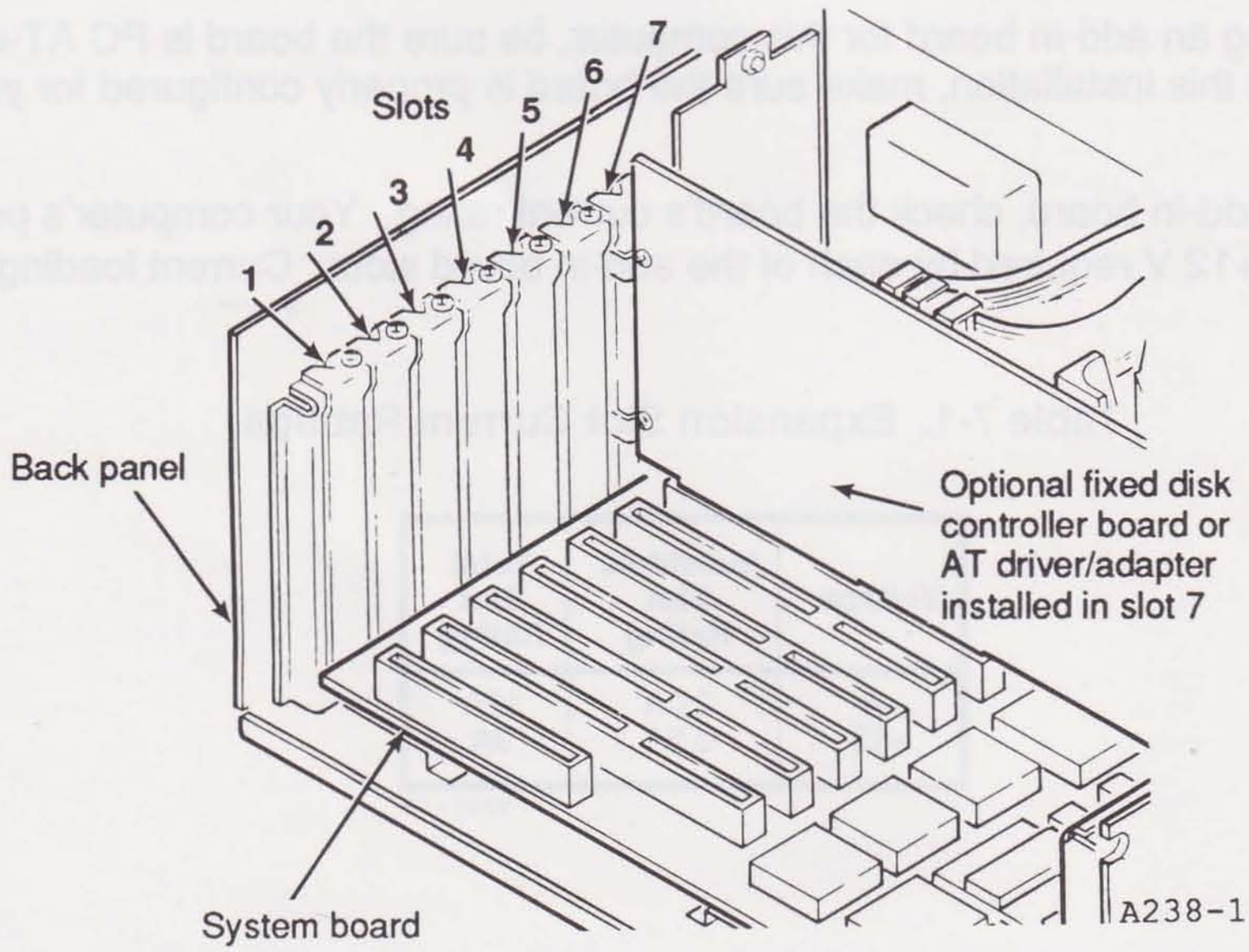


Figure 7-1. Choosing an Expansion Slot.

Slot 1 is a standard PC XT-compatible expansion slot. Only single-connector (8-bit) boards can be installed in this slot. If slot 1 is filled, one-connector boards can be placed in any unused slot.

Slots 2 through 4 and 7 are standard AT-compatible expansion slots. Two-connector (8/16-bit) boards can be put in these slots. If you have a hard disk, you must install the hard disk controller or AT driver/adapter in slot 7.

Slots 5 and 6 are 16-bit FASTslots that accommodate FASTRAM boards. One of these slots must be dedicated to the first FASTRAM board; the other can be used for a second FASTRAM board or FASTboard/386. You can also install standard AT-compatible boards in these slots.

STEP 3

Locate the bracket for the selected expansion slot (Figure 7-2). Remove and save the bracket screw. Pull out the bracket.

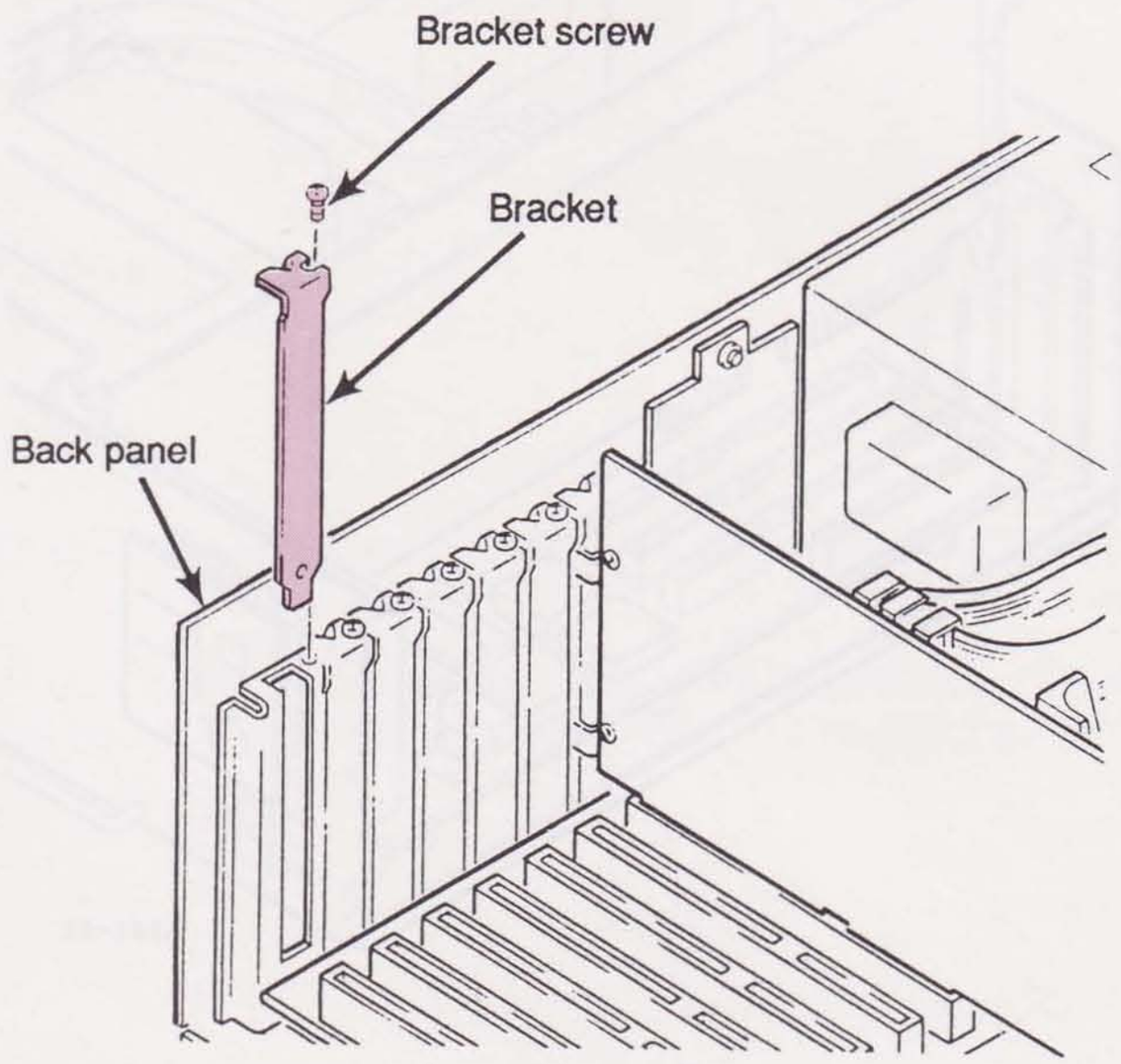


Figure 7-2. Removing an Expansion Slot Bracket.

STEP 4

Line up the board with the expansion slot. Lower the board until each of its edge connectors rests on an expansion slot receptacle. Using evenly distributed pressure, push the board straight down until it is fully inserted in the expansion slot (Figure 7-3).

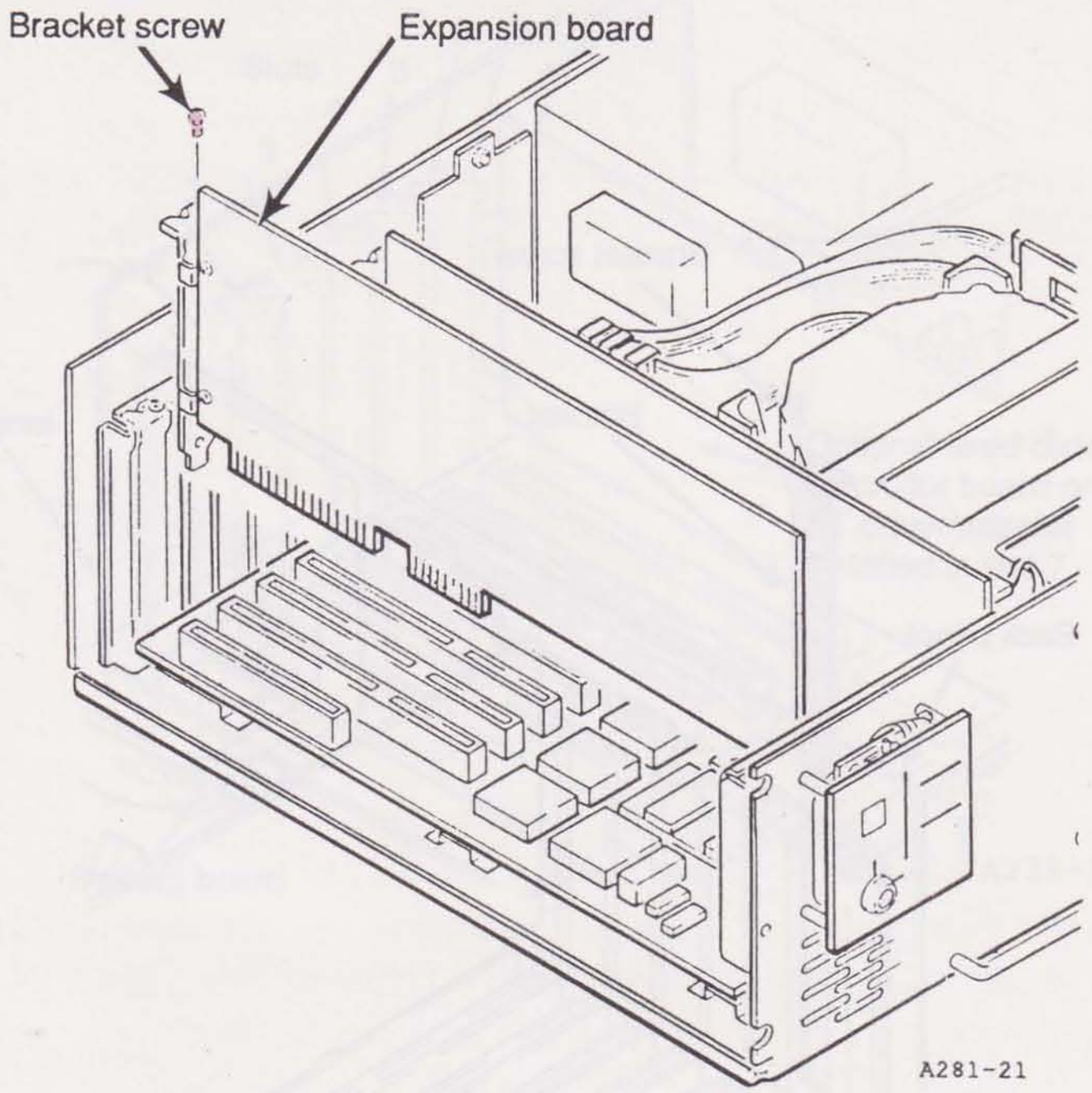


Figure 7-3. Installing a Board.

STEP 5
Secure the board to the chassis. Reinstall the bracket screw you removed earlier.

If you installed a video adapter board, follow the instructions in Section 2 for changing the primary video adapter switch.

STEP 6
Close the computer's cover and reassemble the components. After you have reconnected all of the computer components, you can turn on the system.

NOTES

INSTALLING A MATH COPROCESSOR 8

This section explains how to install an 80287 math coprocessor.

Math coprocessors are specialized chips that perform arithmetic, logarithmic, and trigonometric functions. They are coprocessors because they offload work from the microprocessor, allowing it to perform other work while mathematical functions are completed. However, not all application software programs support a math coprocessor, and some programs may need to be configured specifically to support the coprocessor.

You can use an Intel 80287 coprocessor chip, available from computer outlets, in your computer. It should be rated for a clock speed of 8 MHz or faster (actual clock speed will be 8 MHz).

To install the math coprocessor, follow these steps:

STEP 1
Turn the system off, and disconnect attached devices. Remove the power cord, and unlock and remove the system unit cover. Save the screws.

CAUTION

Installing any component while the computer is on can permanently damage your computer and its components.

Before handling the processor board or coprocessors, discharge any static electricity by touching a grounded surface, such as a metal portion of your computer's chassis.

STEP 2

Locate socket U9 on the system board (Figure 8-1). A small, plastic protective plug is seated in the socket; this is the dummy plug, and must be present when no math coprocessor is installed. Remove the dummy plug by inserting a flat screwdriver between the plug and socket, or use an integrated circuit (IC) extractor to pull the plug out of the socket.

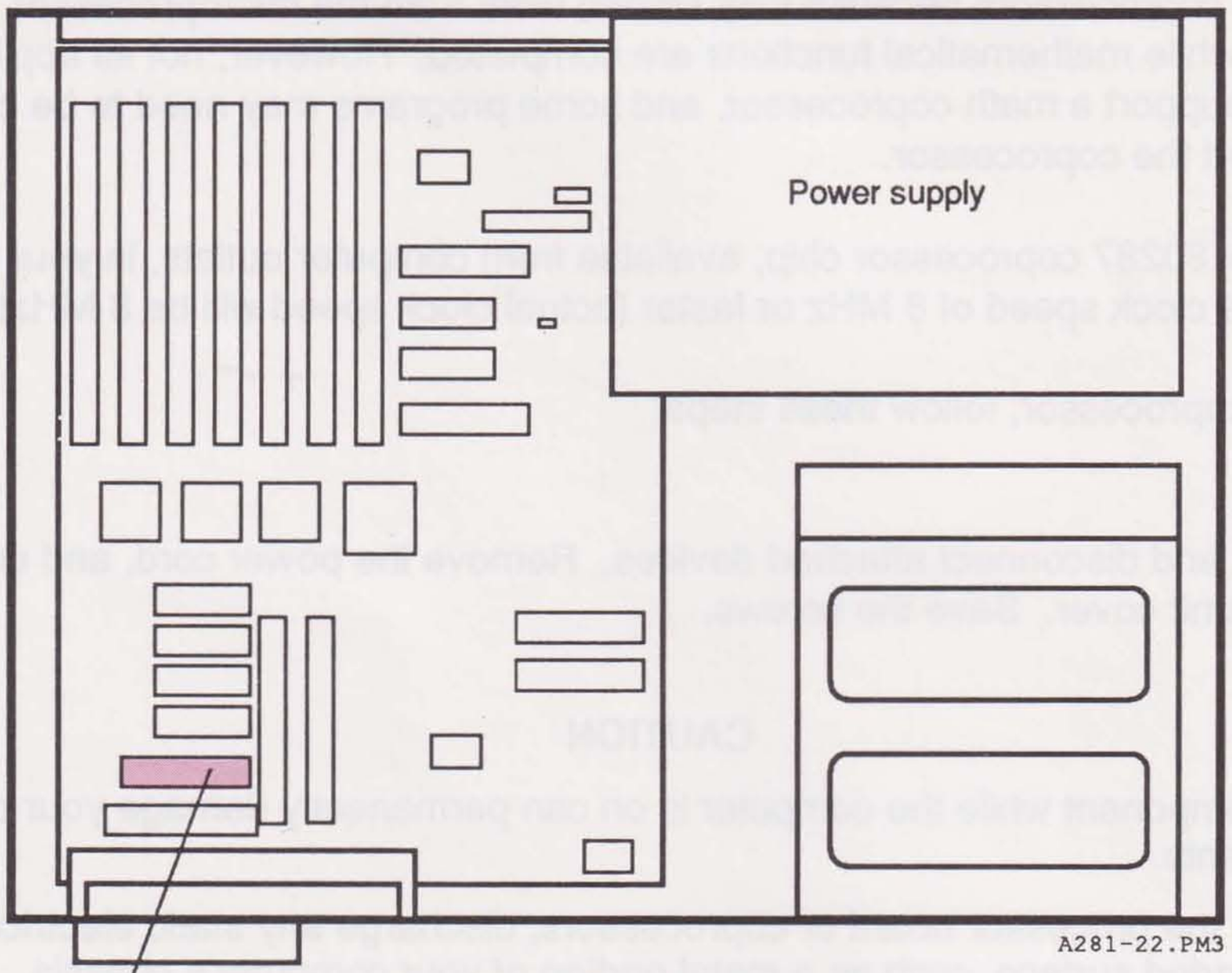


Figure 8-1. Locating Socket U9.

STEP 3
Align the coprocessor with the socket (Figure 8-2).

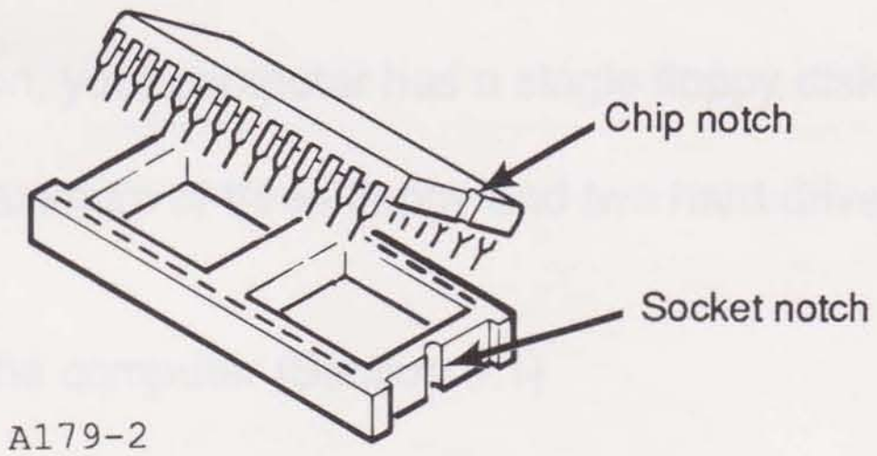


Figure 8-2. Aligning the Coprocessor.

STEP 4
Carefully insert the coprocessor into the socket. Be careful not to bend any of the pins during insertion.

STEP 5
Push down on the coprocessor until it is fully inserted in the socket.

STEP 6
Replace the cover and connect computer components. Turn on the system.

NOTES

INSTALLING DISK DRIVES 9

In the minimum configuration, your computer has a single floppy disk drive and no hard disk drive.

Your system can have a maximum of three floppy and two hard drives. To install and configure a drive, you must:

- Install the drive in the computer (Section 9.1)
- Run ASTSETUP (Section 3) to configure hard drives and the second floppy drive
- Install software commands (Section 9.2) to configure the third floppy drive
- If you are installing a combination floppy and hard disk controller board, disable the on-board floppy controller (Section 9.3)

If you plan to add a 3.5-inch disk drive with 1.44-MB capacity, check your operating system for compatibility. If you are using MS-DOS, you must have Version 3.3 or later.

If the battery-maintained memory is lost, such as when you change the battery, and a 3.5-inch disk drive is installed as drive A, you may need to reidentify the drive in ASTSETUP (Section 3).

NOTE

Illustrations in this section are examples only. Components on your drive may be positioned differently.

9.1 Basic Installations

Floppy drives (3.5-inch or 5.25-inch) and tape drives must be installed in the right cage (Figure 9-1).

ST-506 and ESDI format hard drives are usually installed in the left cage, but can be installed in the right cage if there is room. AT-embedded drives can only be installed in the left cage. You can install full- or half-height hard disks including AST fast-access hard disks ranging from 20—320-MB.

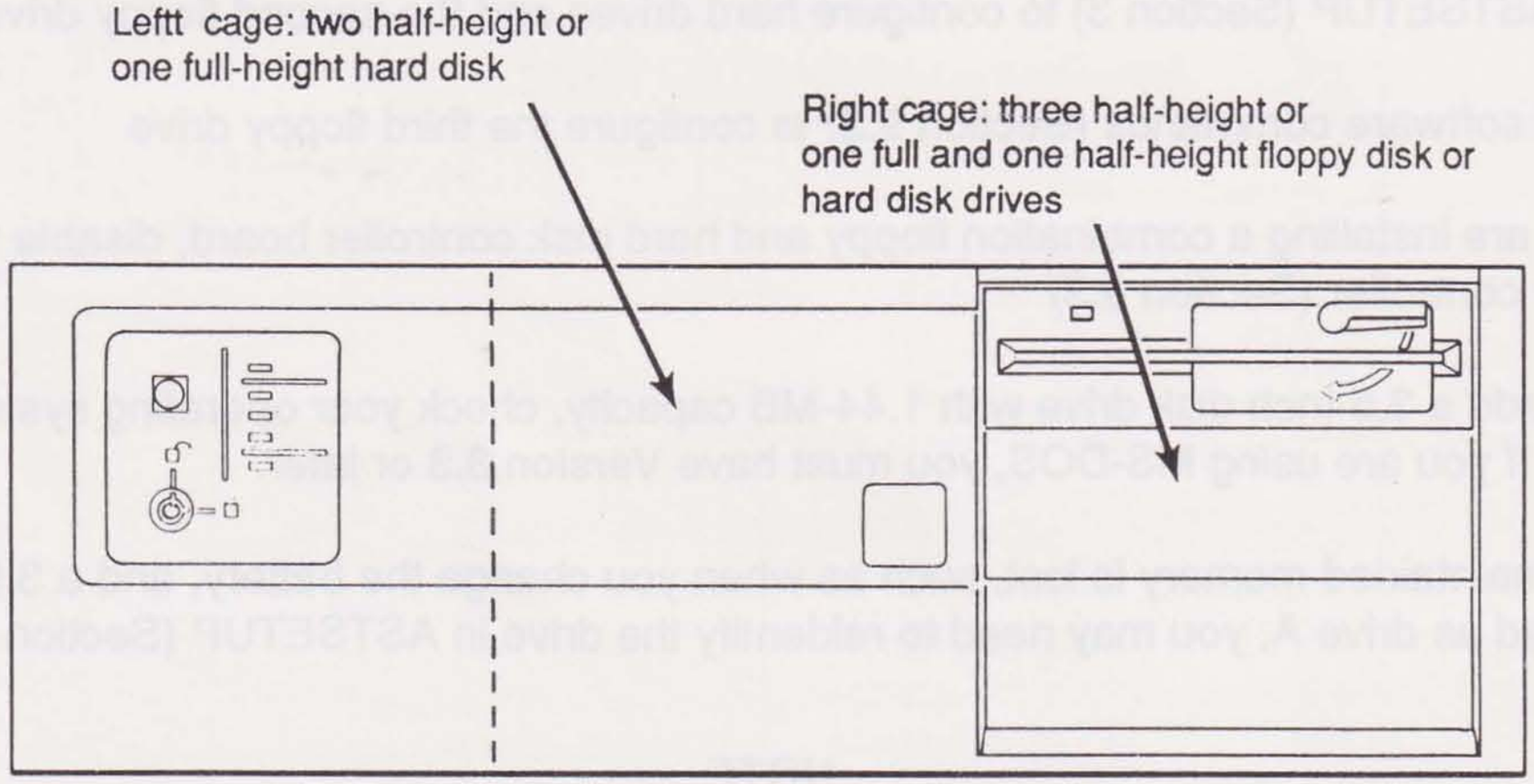


Figure 9-1. Full- and Half-Height Disk Drives.

CAUTION

If you have an ESDI hard disk drive, you must use an ESDI format hard disk controller. If you have an ST-506 hard disk drive, you must use an ST-506 format hard disk controller. If you have an AT-embedded hard disk drive, you must use an AT driver/adapter.

As you install drives, keep the following in mind:

- All drives sold by AST are qualified for use in AST computers and are therefore recommended for use in this system.

- Each floppy drive must be connected to three cables: a disk controller ribbon cable, a power cable, and a ground clip (Figure 9-2).

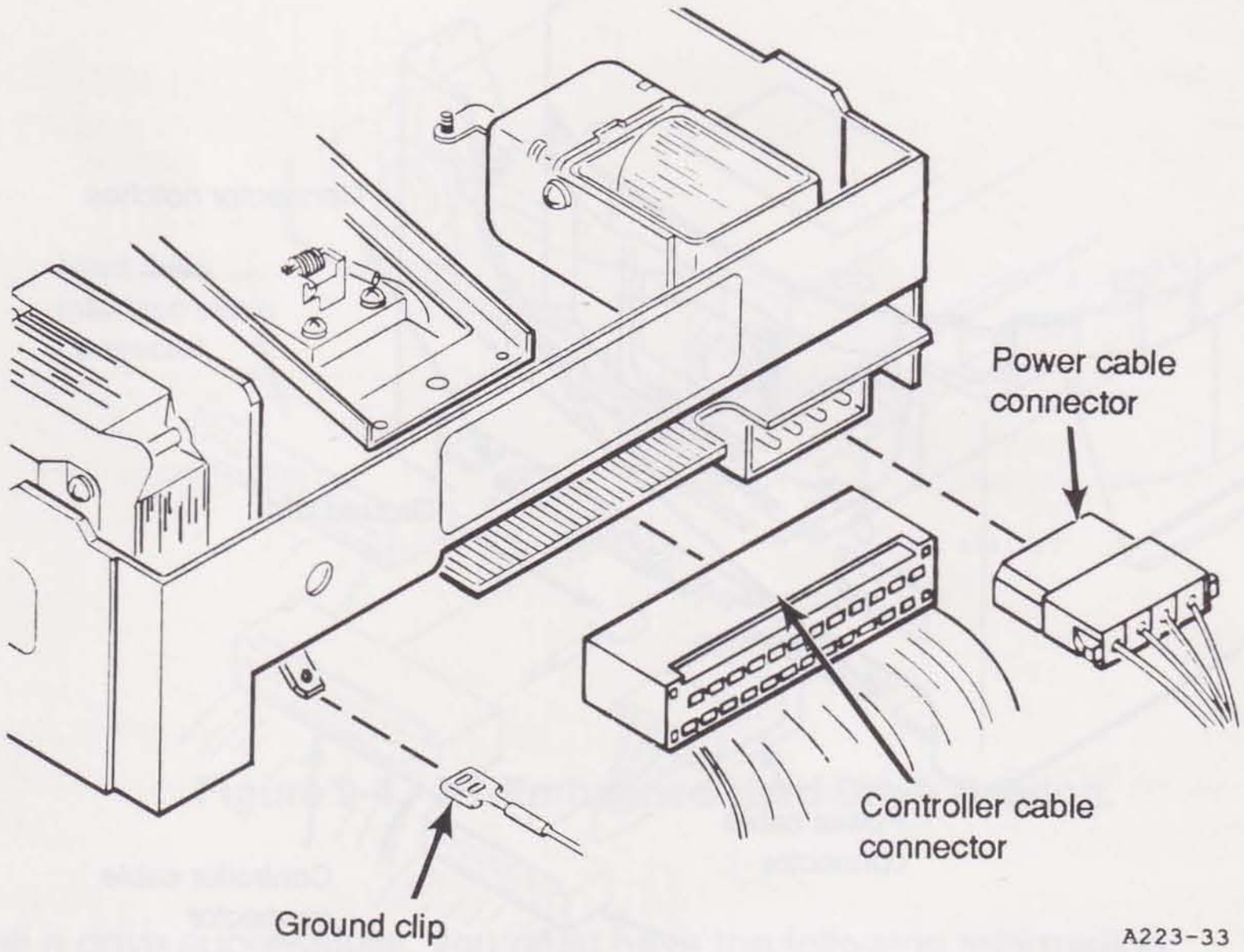


Figure 9-2. Floppy Drive Cabling.

- ST-506 and ESDI format hard disk drives are connected to four cables: a disk controller ribbon cable, a data ribbon cable, a power cable, and a ground clip (Figure 9-3).

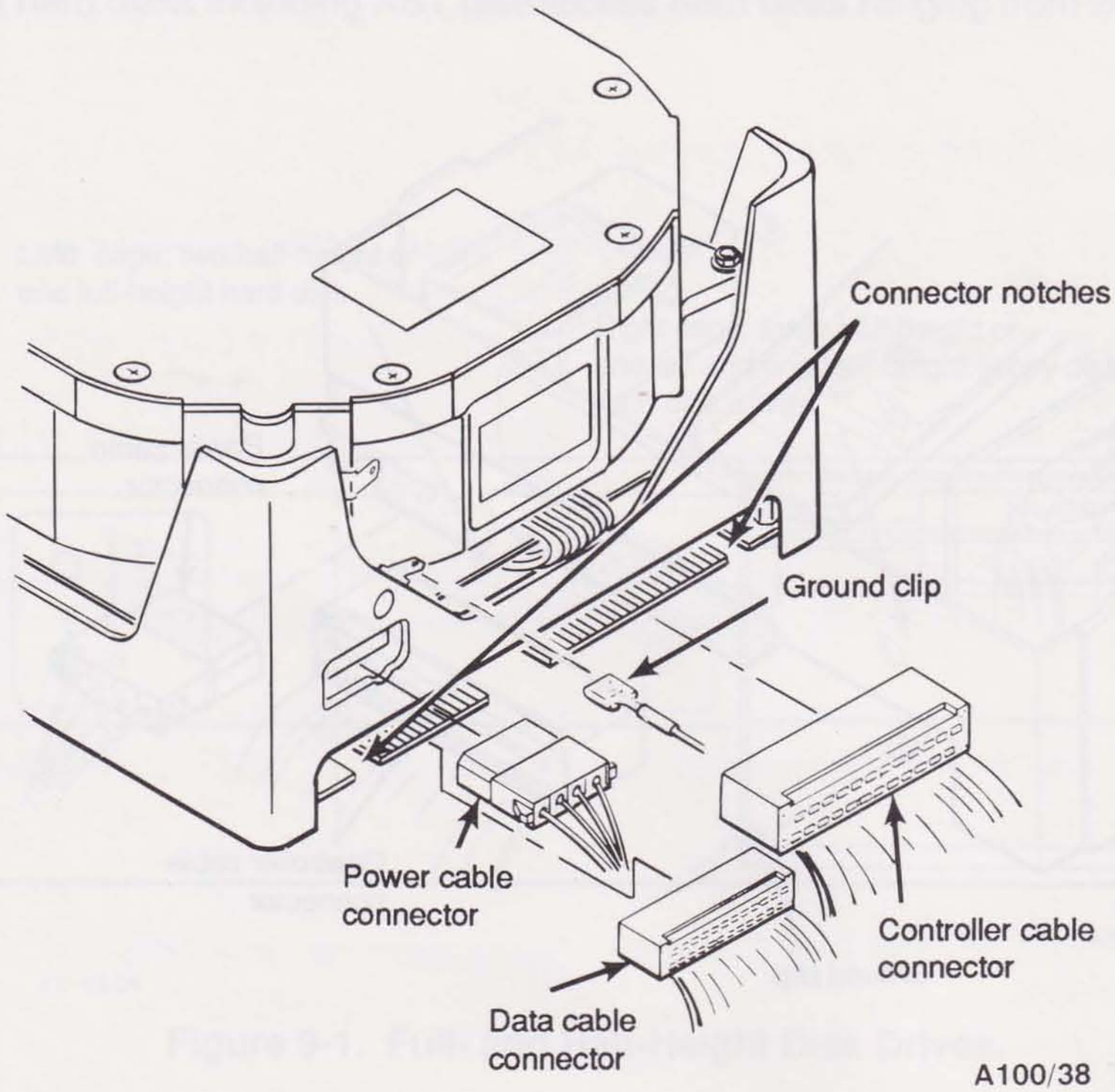


Figure 9-3. ST-506 and ESDI Format Hard Drive Cabling.

- AT-embedded drives have a metal frame for mounting in the left cage. These drives are connected to two cables: an interface cable and a power cable (Figure 9-4). Some AT-embedded drives may also have a ground clip.

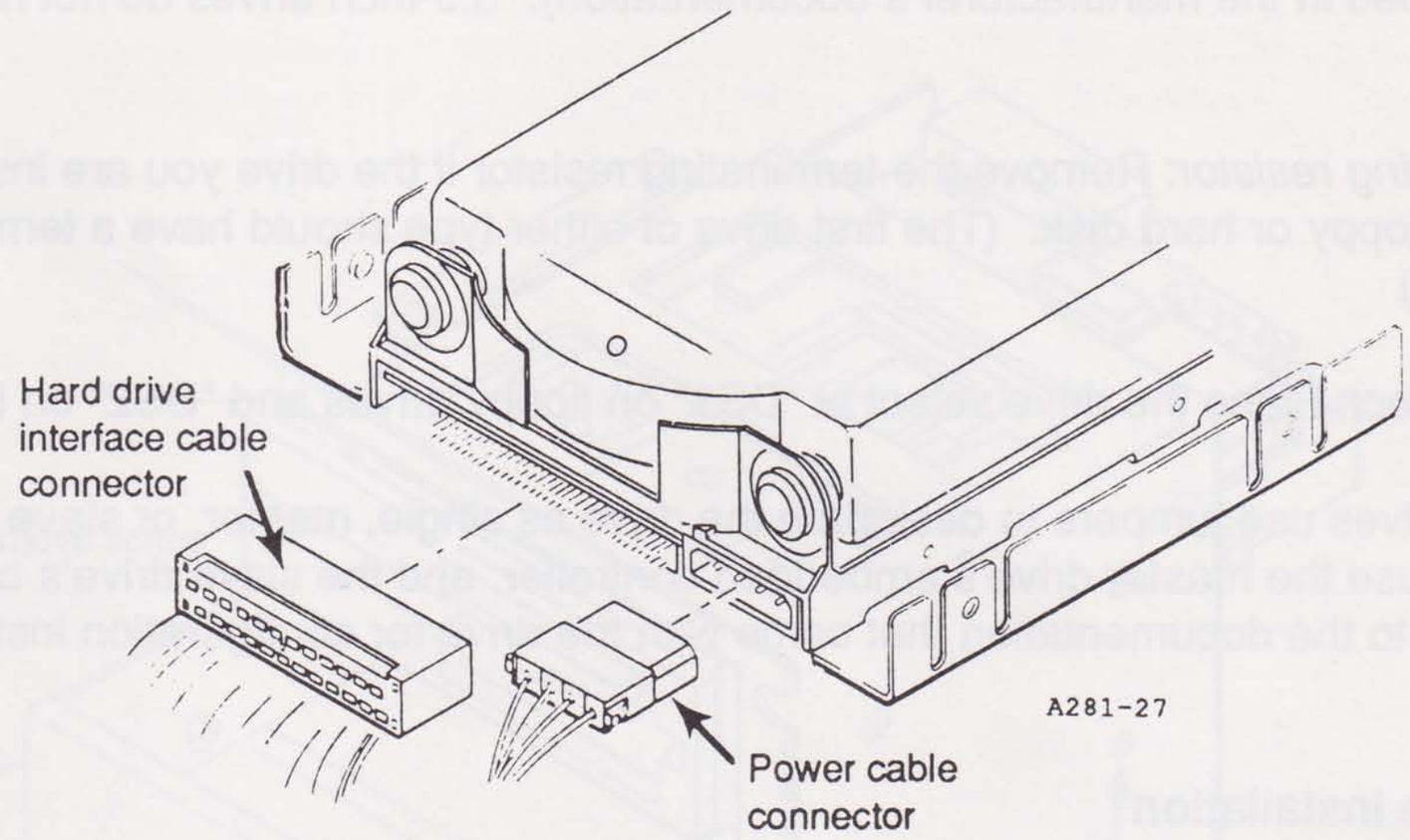


Figure 9-4. AT-Embedded Hard Drive Cabling.

- To install a drive successfully, you must have the following information:
  - — Drive type
  - — Media defect list, if supplied with the disk by the manufacturer

  If you must partition your drive and perform physical and logical formats, refer to your *AST Premium Utility Software User's Manual.*

CAUTION

AT-embedded drives sold by AST have been low-level formatted at the factory. Do not perform a low-level format on an AT-embedded drive; you may damage the data.

- All ribbon cables are constructed to ensure proper installation on the disk drive edge connectors. The red stripe on the ribbon cable should be closest to the notch on the edge connector. If the cable connector does not fit easily on the edge connector, check that the red stripe is in the correct position. Do *not* force the cable connector.

Before installing any drive, check the hardware configuration. Hard drives, 5.25-inch floppy drives, and tape drives include a terminating resistor and a drive select (their locations and configuration should be described in the manufacturer's documentation). 3.5-inch drives do not have terminating resistors.

Terminating resistor: Remove the terminating resistor if the drive you are installing is the *second* floppy or hard disk. (The first drive of either type should have a terminating resistor installed.)

Drive select: Place the drive select at "DS1" on floppy drives and "DS2" on hard drives.

AT-embedded drives use jumpers to designate the drive as single, master, or slave (when there are two drives, both use the master drive's embedded controller, and the slave drive's controller is disabled). Refer to the documentation that came with the drive for configuration instructions.

9.1.1 Right Cage Installation

Before installing a floppy or hard drive, note its capacity in KB or MB. If you are installing a hard drive, also write down the drive type number (usually found on a label attached to the drive) and remove the defect list (if any) from the drive.

STEP 1
Turn the power off, unplug the power cord, disconnect computer components, and open the computer (see Section 2 for details).

CAUTION

Installing any component while the computer is on can permanently damage your computer and its components.

STEP 2

Remove the screws securing the face plate to the front panel of the system unit (Figure 9-5). There are two screws on the right side, and one at the left front support bracket. Save the screws. Remove one plate to make room for a floppy disk, tape, or half-height hard disk drive. Remove two plates for a full-height hard disk drive.

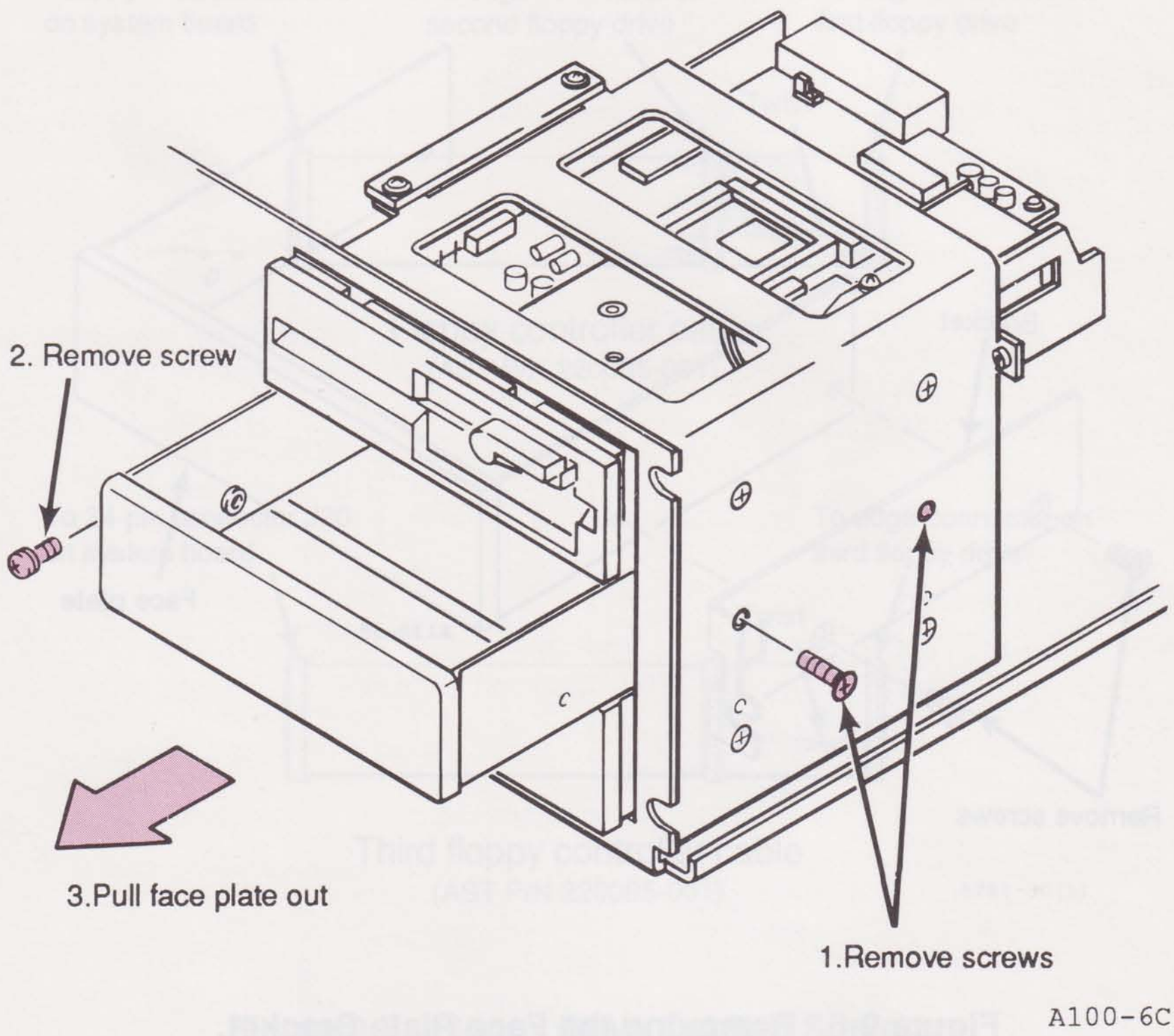


Figure 9-5. Removing the Face Plate.

STEP 3

Remove the two screws holding the side bracket to the face plate (Figure 9-6). Pull the bracket off the face plate and place it at the same location on the new drive. Reinstall the bracket screws.

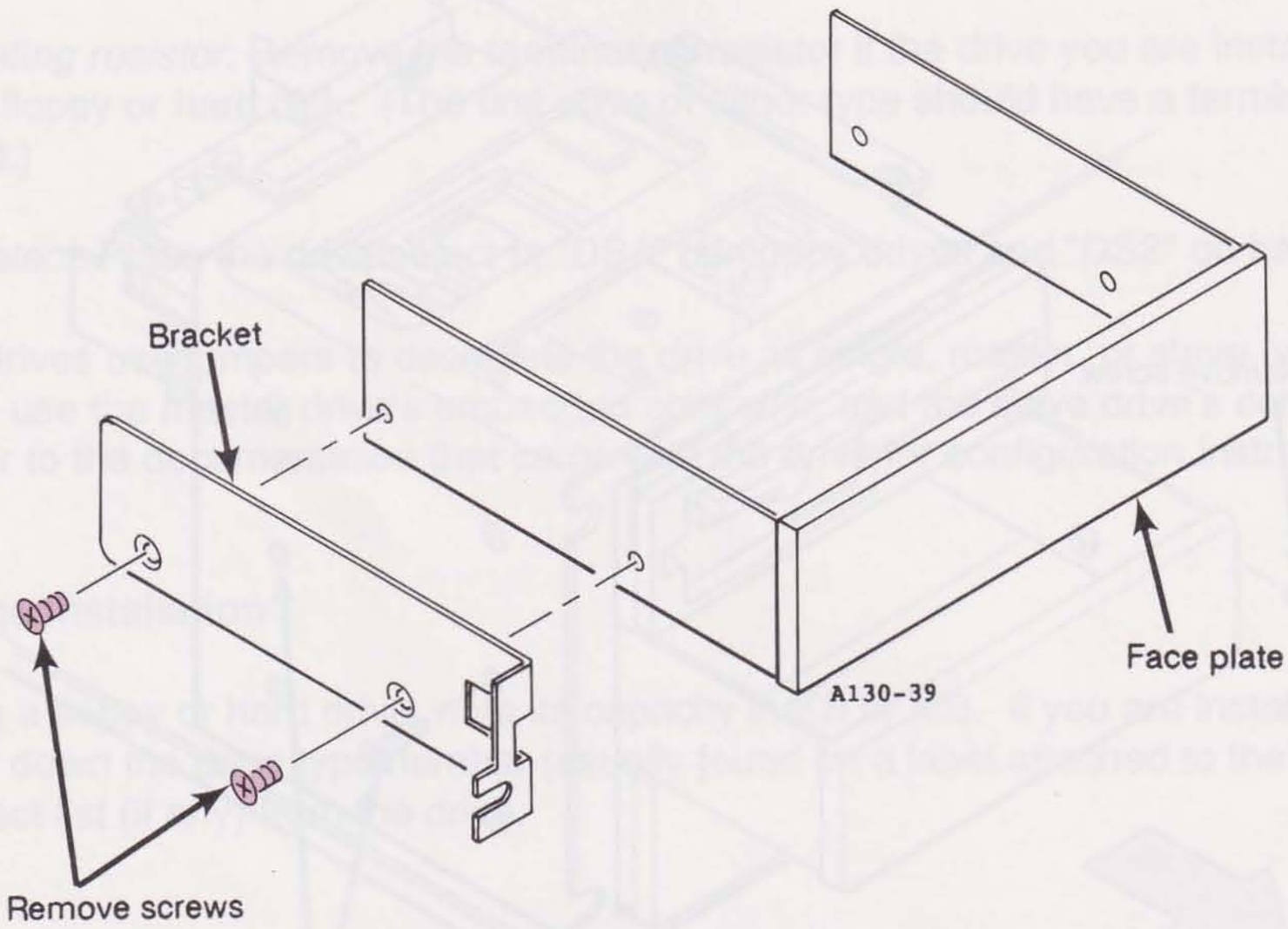
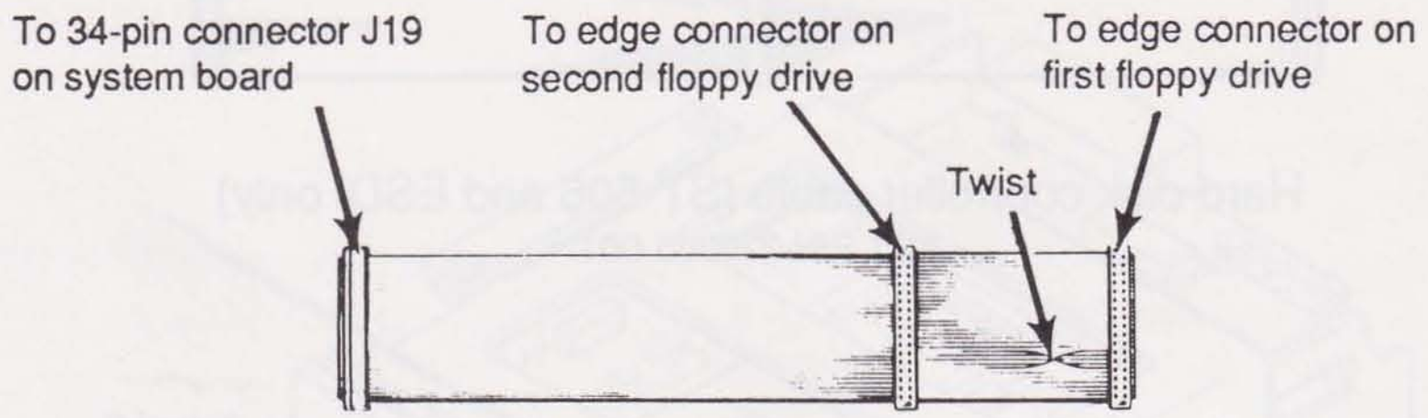


Figure 9-6. Removing the Face Plate Bracket.

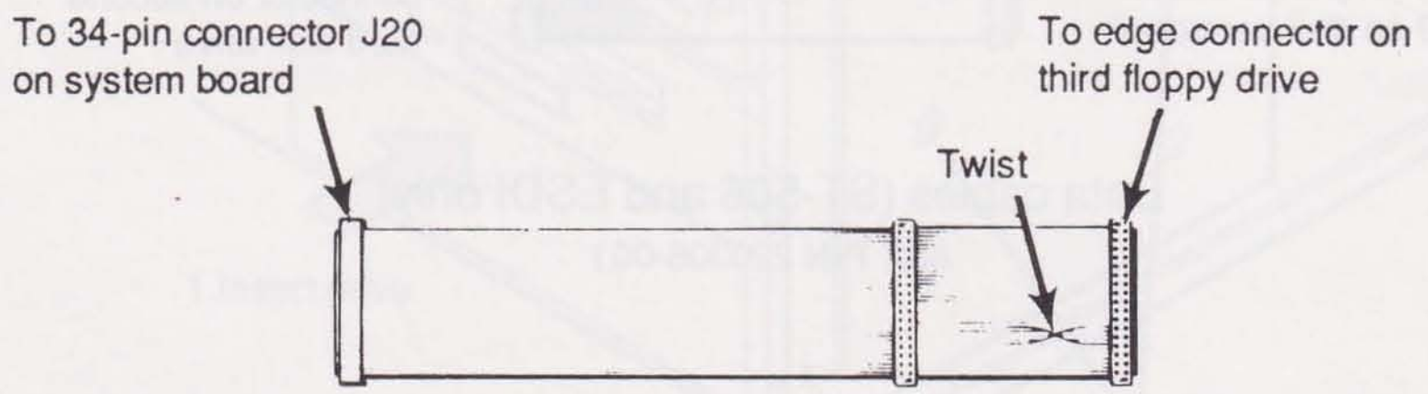
STEP 4

Slide the drive partially into the opening in the cage.

STEP 5
With the drive partially inserted in the cage, attach cables to the drive (Figure 9-7 for floppy drives, Figure 9-8 for hard drives).



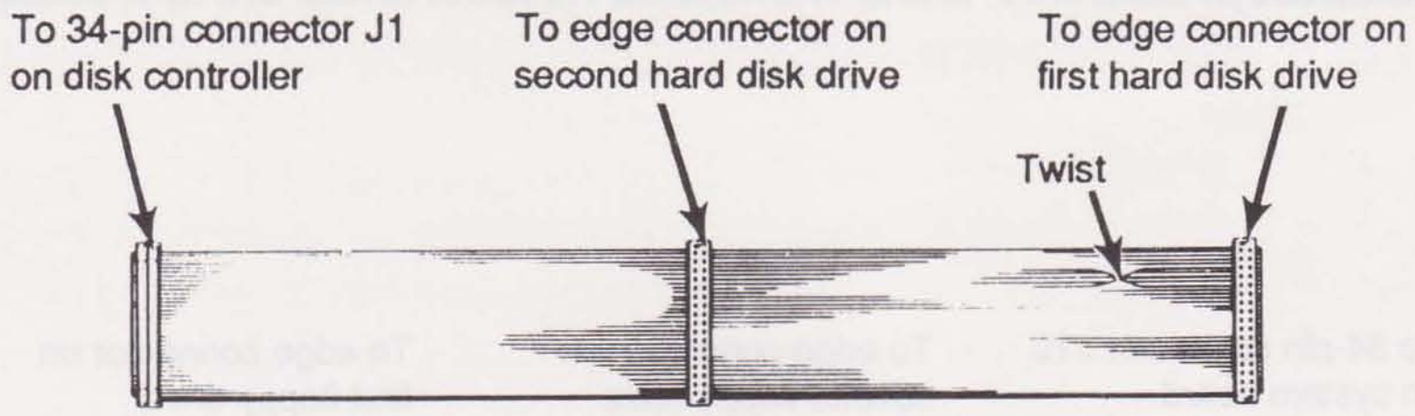
Floppy controller cable
(AST P/N 220085-001)



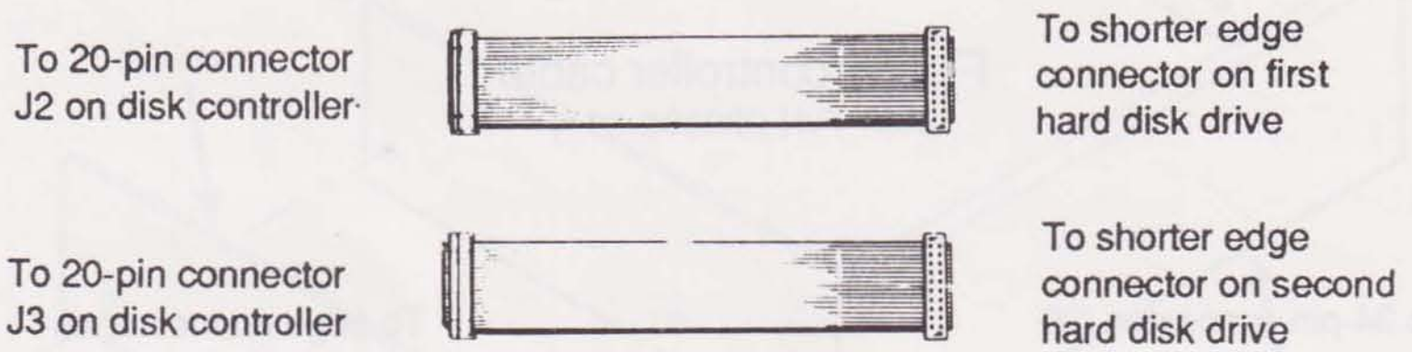
Third floppy controller cable
(AST P/N 220085-001)

A281-30(1)

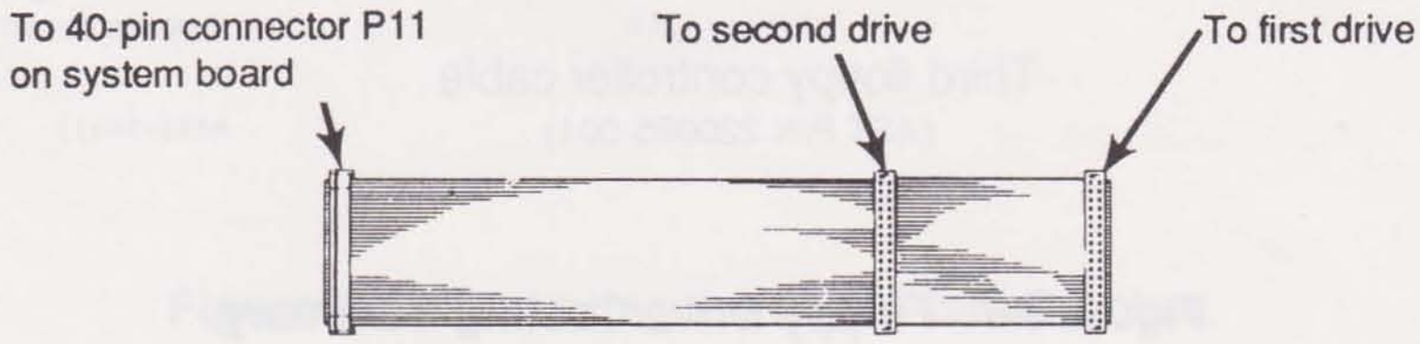
Figure 9-7. Floppy Drive Cabling Summary.



Hard disk controller cable (ST-506 and ESDI only)
AST P/N 220305-001



Data cables (ST-506 and ESDI only)
AST P/N 220306-001



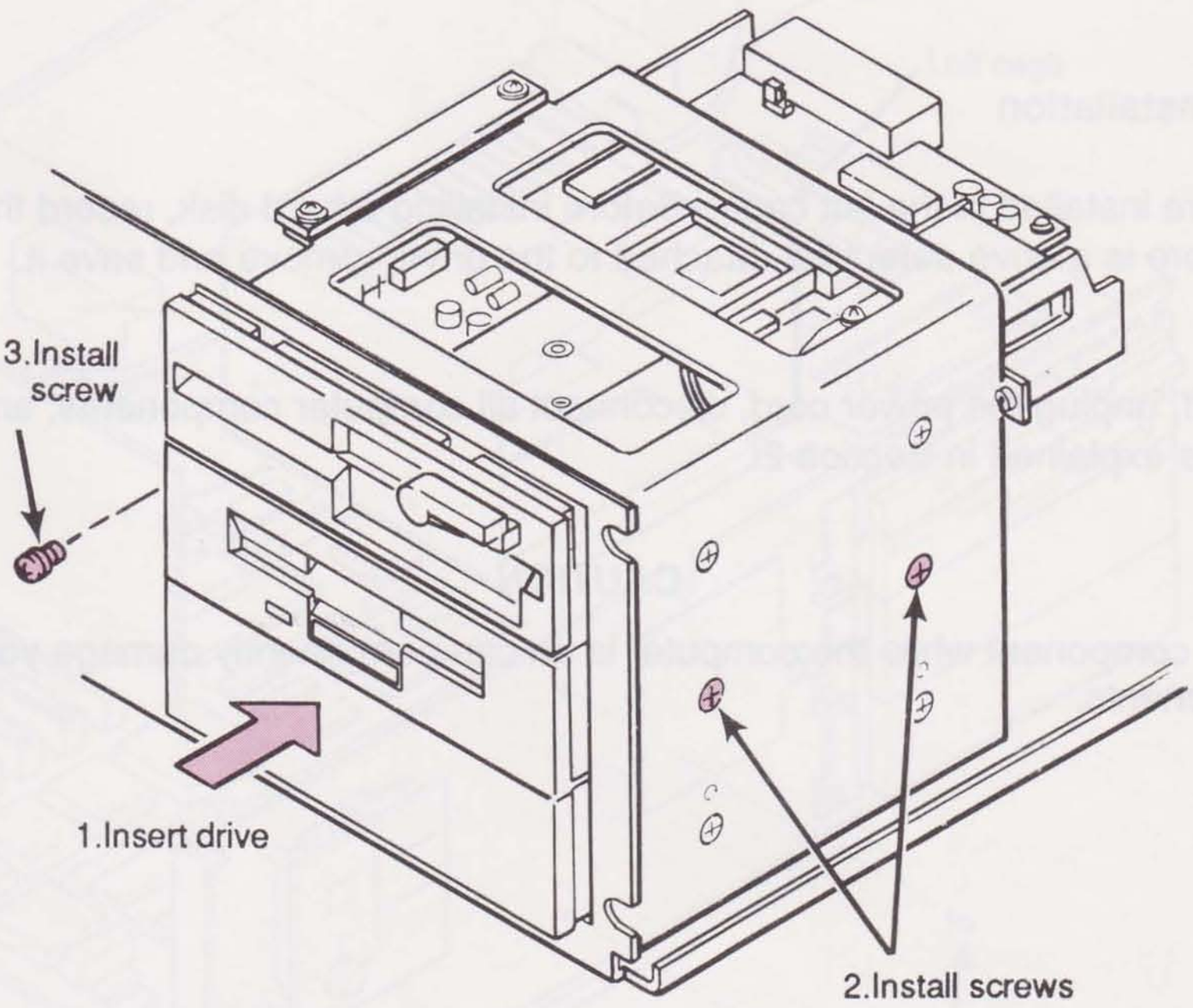
Interface cable (AT-embedded controller only)
AST P/N 220341-002

A281-30(2)

Figure 9-8. Hard Drive Cabling Summary.

STEP 6

Insert the drive all the way into the cage. Holding the drive in place, install the face plate screws removed in Step 2 to secure the drive to the front panel (Figure 9-9).



A100-7C

Figure 9-9. Inserting the Drive.

STEP 7

Insert a power supply plug into the power connector. If you are installing a hard drive, insert the light emitting diode (LED) cable from the control panel into the connector on the controller board or AT driver/adapter. Connect the ground cable from the right side of the cage to the device.

Finishing the Installation

Replace the computer cover, reconnect computer components, and turn on the computer. Run ASTSETUP to tell the computer the new drive is installed (Section 3). You do not need to run ASTSETUP if you installed a tape drive or third floppy drive.

If you are installing a non-AST hard disk, refer to your *AST Premium Utility Software User's Manual* to format and partition it.

9.1.2 Left Cage Installation

Only hard disks are installed in the left cage. Before installing a hard disk, record the disk type in Appendix F. If there is a drive defect list attached to the drive, remove and save it.

STEP 1
Turn the power off, unplug the power cord, disconnect all computer components, and remove the computer cover as explained in Section 2.

CAUTION

Installing any component while the computer is on can permanently damage your computer and its components.

STEP 2
Remove the two screws from the top cage bracket. Support the cage by holding the bottom. Remove the two screws securing the cage to the front of the chassis. Save the screws. Carefully lift out the cage (Figure 9-10).

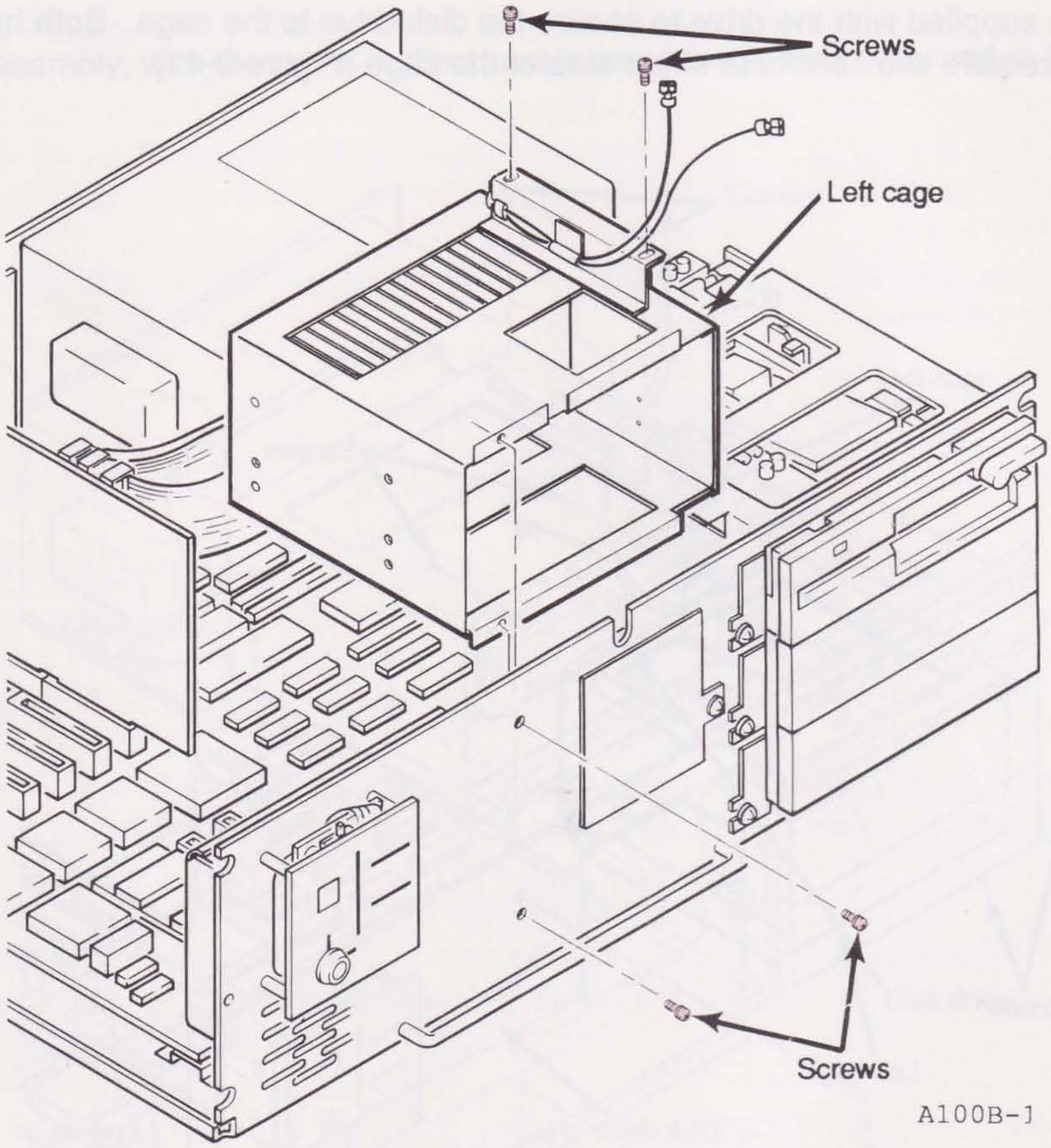


Figure 9-10. Removing the Left Cage.

STEP 3
Remove the face plate, if present, from the hard drive.

For ESDI and ST-506 format drives, make sure the drive select is set to DS2. If this is your second hard disk, also make sure the terminating resistor has been removed. Refer to the documentation that came with the drive for more information.

For AT-embedded drives, make sure that one drive is configured as the master and the other drive is configured as the slave. If you have only one drive, make sure it is configured as a single drive. Refer to the documentation that came with the drive for configuration instructions.

STEP 4
Install the screws supplied with the drive to secure the disk drive to the cage. Both half- and full-height drives require two screws at either side of the cage (Figure 9-11).

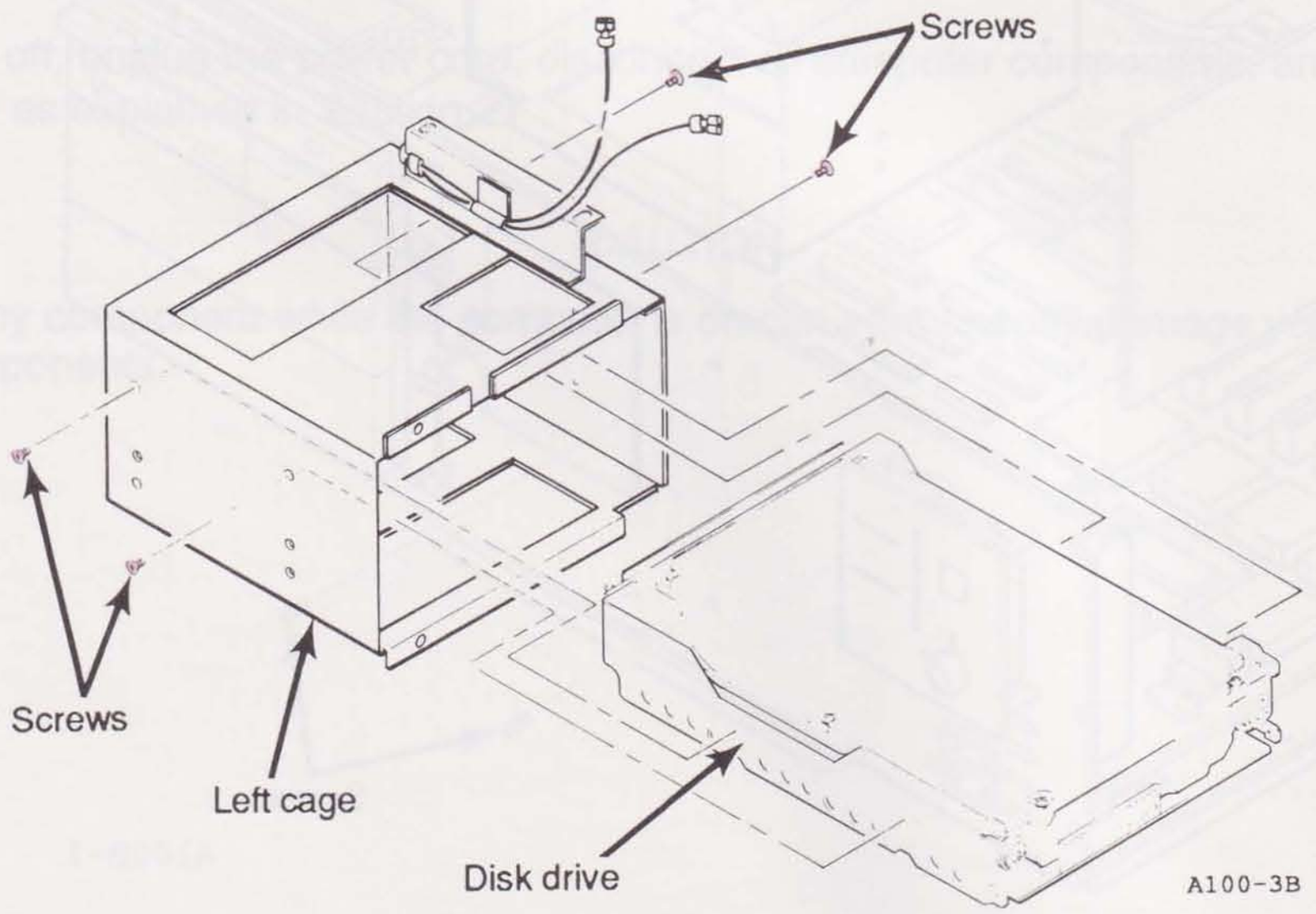


Figure 9-11. Securing the Drive to the Cage.

If you are installing an AT-embedded drive, attach the drive frame to both sides of the cage.

STEP 5

If you are installing an ESDI or ST-506 format drive, connect the controller cable and data cable to the drive. (Figures 9-3 and 9-8). If you are installing an AT-embedded drive, connect an interface cable to the drive (Figures 9-4 and 9-8).

STEP 6

Install the cage assembly, with the drive, in the chassis using the screws removed in Step 2 (Figure 9-12).

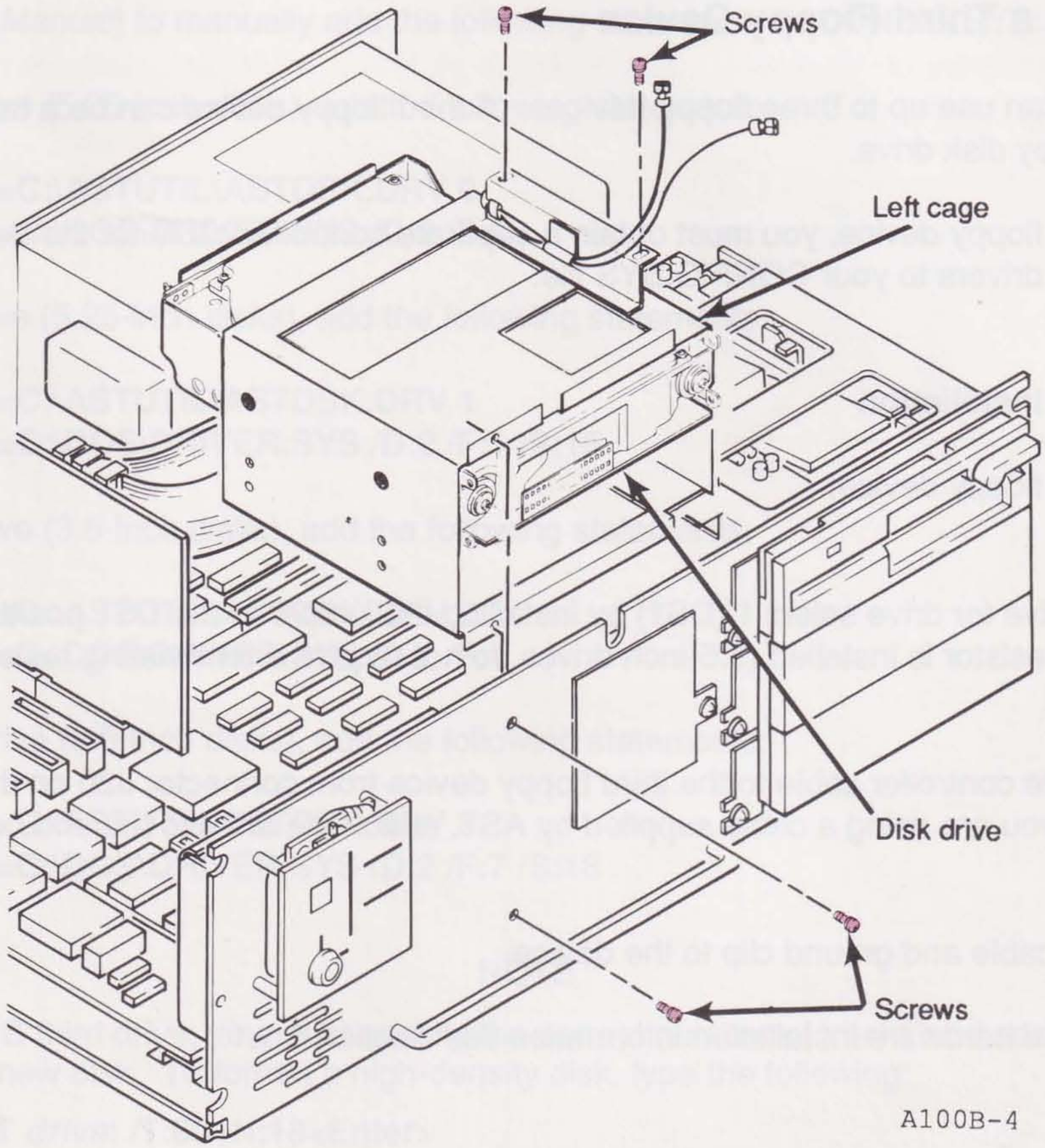


Figure 9-12. Installing the Cage and Drive in the System Chassis.

STEP 7

Connect the power cable and ground clip to the drive (Figure 9-3). Connect the LED cable from the control panel into the connector on the controller board or AT driver/adapter.

Finishing the Installation

Replace the computer cover, reconnect computer components, and turn on the computer. Run ASTSETUP (Section 3). Enter your drive type number in the Fixed Disk 1 or Fixed Disk 2 field.

If you are installing a non-AST hard disk, refer to your *AST Premium Utility Software User's Manual* to format and partition it.

9.2 Installing a Third Floppy Device

Your computer can use up to three floppy devices. A third floppy device can be a tape backup system or a floppy disk drive.

To install a third floppy device, you must obtain a separate controller cable for the device and add certain software drivers to your CONFIG.SYS file.

9.2.1 Hardware Installation

To install a third floppy device:

STEP 1
Configure the drive for drive select 1 (DS1) by installing the jumper in the DS1 position. Check that the terminating resistor is installed (3.5-inch drives do not require a terminating resistor).

STEP 2
Attach a separate controller cable to the third floppy device from connector J20 on the system board (Figure 9-8). If you are using a cable supplied by AST, attach the drive to the end connector.

STEP 3
Attach a power cable and ground clip to the device.

For more detailed hardware installation information see Section 9.1.1.

9.2.2 Software Installation

After cabling a tape backup drive, use the software provided with the drive to install and configure the backup system.

After cabling a third disk drive, verify that the ASTDSK.DRV and DRIVER.SYS device drivers reside on the ASTUTIL and DOS subdirectories, respectively, on drive C. To add the appropriate statements to your CONFIG.SYS file, run the "Install/Change/Delete Third Floppy Driver" option on ASTMENU (see your *AST Premium Utility Software User's Manual*), or use the EDLIN utility (see your *MS-DOS User's Manual*) to manually add the following statements to CONFIG.SYS:

For a 360-KB drive (5.25-inch disks), add the following statements:

```
DEVICE=C:\ASTUTIL\ASTDSK.DRV 0
DEVICE=C:\DOS\DRIVER.SYS /D:2 /F:0
```

For a 1.2-MB drive (5.25-inch disks), add the following statements:

```
DEVICE=C:\ASTUTIL\ASTDSK.DRV 1
DEVICE=C:\DOS\DRIVER.SYS /D:2 /F:1 /S:15
```

For a 720-KB drive (3.5-inch disks), add the following statements:

```
DEVICE=C:\ASTUTIL\ASTDSK.DRV 2
DEVICE=C:\DOS\DRIVER.SYS /D:2 /F:2
```

For a 1.44-MB drive (3.5-inch disks), add the following statements:

```
DEVICE=C:\ASTUTIL\ASTDSK.DRV 3
DEVICE=C:\DOS\DRIVER.SYS /D:2 /F:7 /S:18
```

NOTE

For a 1.44-MB third drive, you must specify the correct number of tracks and sectors when formatting a new disk. To format a high-density disk, type the following:

FORMAT *drive*: /T:80 /N:18<Enter>

drive is the floppy drive in which the disk to be formatted is located.

To format a double-density disk, type the following:

FORMAT *drive*: /T:80 /N:9<Enter>

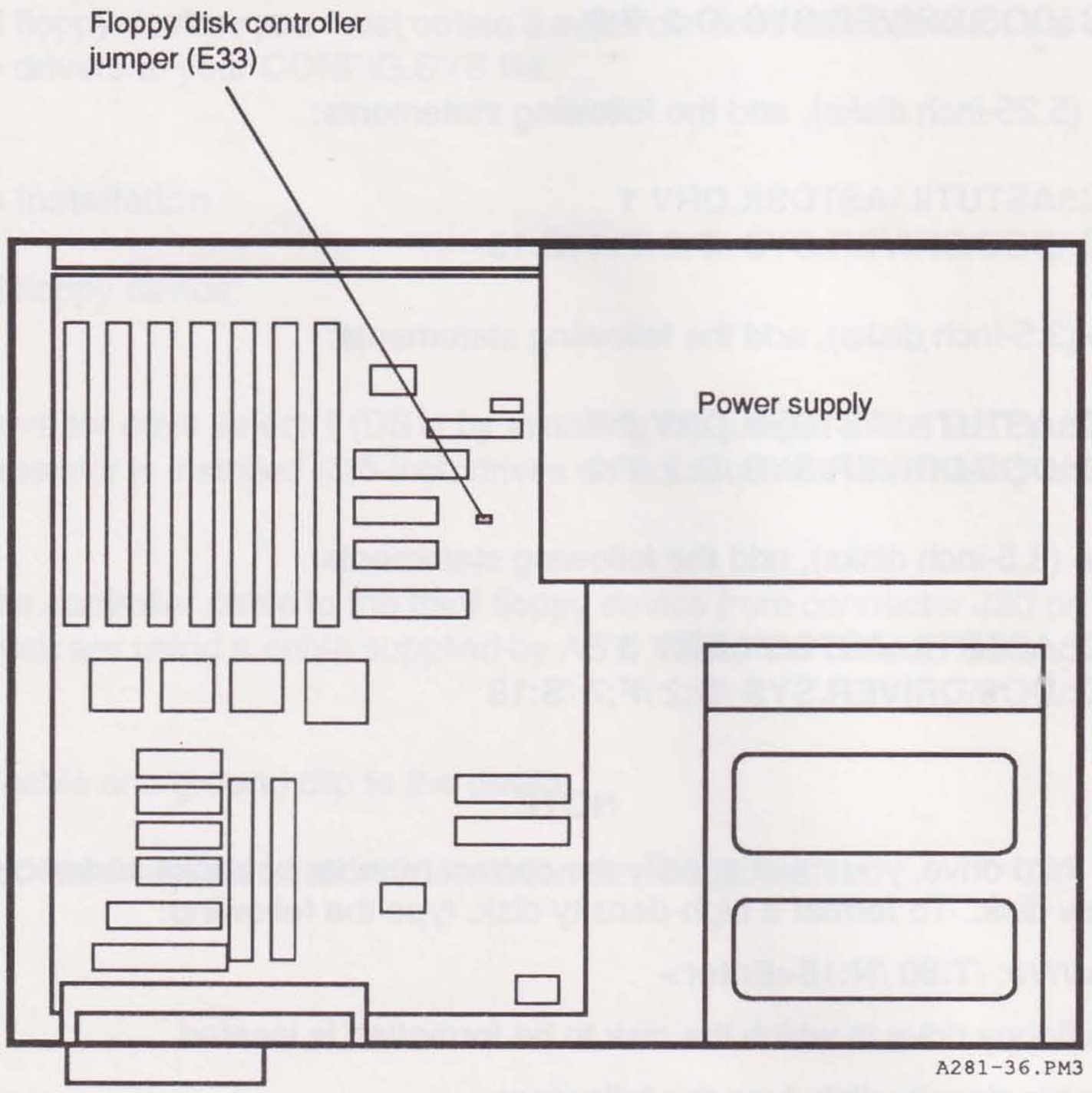
drive is the floppy drive in which the disk to be formatted is located.

As your computer boots, the logical drive letter assigned to the third floppy device appears on the screen. The third device is generally assigned the letter following the last hard disk or volume. For example, if you have two hard disk volumes, C and D, the third floppy drive is assigned as drive E.

You *do not* need to run ASTSETUP to use a third floppy device.

9.3 Disabling the Floppy Disk Controller

If you are installing a combination floppy and hard disk controller expansion card, you must disable the floppy disk controller on the system board. To do so, place a jumper (available from your AST reseller) at jumper position E33 (Figure 9-14).



Top view

Figure 9-14. Locating Jumper E33.

PART IV. APPENDICES

A. Troubleshooting

B. AST FASTRAM

C. Serial and Parallel Ports

D. Premium/286 Memory

E. Technical Specifications

F. Configuration Listing

NOTES

TROUBLESHOOTING A

NOTE

If you use this AST product outside the United States, please see the *Customer Service Supplement* in your product package for special instructions regarding International Product Support services.

If you ever have difficulty running your computer, follow these steps:

STEP 1
Consult this appendix for advice on how to handle operating problems or error messages.

STEP 2
Run the system confidence test (contained on the Utility Software disk included with your system).

STEP 3
If reading this appendix and running the system confidence test do not resolve the problem, contact your AST reseller for technical support.

This section includes the following troubleshooting information:

- Operating problems: what to do when you have problems running your computer (Appendix A.1)
- Error messages: what to do about messages, which are communicated via beeps and text messages displayed on your screen (Appendix A.2)
- System confidence test: How to run the system test contained on the Utility Software disk (Appendix A.3)

A.1 Operating Problems

This section tells you what to do if you ever have problems running your system. If a problem persists after you take corrective action, contact your AST reseller for assistance.

PROBLEM

The computer does nothing when you turn it on.

ACTION

Make sure everything is plugged in. Check that the voltage setting (on the back panel of the system unit) is correct for your location. Try turning on the computer again.

PROBLEM

The monitor does not display anything when you turn on the system.

ACTION

Make sure you turned on the monitor power knob (at the front of the monitor). Make sure the brightness knob (at the front of the monitor) is correctly adjusted.

Make sure the monitor power cable is properly installed and the video cable is attached to the graphics adapter. (For monochrome monitors, the power cord goes into the connector at the back of the system unit. For color monitors, the power cord plugs into a grounded wall outlet.)

If the monitor still does not display anything, open the system unit and make sure your video adapter board is properly installed. Check the switch and jumper settings on the board. Refer to the manufacturer's instructions for details.

PROBLEM

The monitor displays a cursor, but nothing happens when you press the keyboard keys.

ACTION

Check that the cable is properly installed between the keyboard and the rear panel of the system unit.

PROBLEM

The monitor shows flashes or waves.

ACTION

Make sure the cables between the monitor and the rear panel of the system unit are properly installed. Make sure the switches and jumpers on the video adapter board are set correctly.

PROBLEM

The monitor displays this message when you boot up your computer:

EQUIPMENT CONFIGURATION ERROR—RUN SETUP

ACTION

Run ASTSETUP as described in Section 3, and save any new configuration information.

PROBLEM

Pressing the **<Caps Lock>**, **<Num Lock>**, and **<Scroll Lock>** keys does not light the corresponding lights on the keyboard. Pressing **<Ctrl>-<Alt>-<Up Arrow>** or **<Ctrl>-<Alt>-<Down Arrow>** does not change the operating speed lights on the front of the system unit.

ACTION

Make sure the keyboard cable is properly installed between the keyboard and the connector on the back panel of the system unit.

PROBLEM

A floppy disk drive you installed in the system does not work correctly.

ACTION

Make sure you run ASTSETUP whenever you add or remove a first or second floppy drive. If you add or remove a third floppy drive, make sure the appropriate device driver is installed.

If the drive still does not work correctly, open the computer and make sure the cable is properly installed between the disk drive and the system board. Make sure the drive power cable is attached correctly and the signal cable is not backward.

If it is the second floppy drive, make sure the terminator has been removed. Usually, the terminator is a resistor pack. Refer to the drive manufacturer's instructions for the location of the terminator and the proper configuration of the drive.

PROBLEM

A hard disk you installed in the system does not work correctly.

ACTION

Make sure you run ASTSETUP to set up the hard drive type. If the drive still does not work correctly, open the computer and make sure cables between the hard disk drive and the disk controller board or AT driver/adapter (the circuit board closest to the disk drives) are properly installed. If you installed the hard disk yourself, check the manufacturer's instructions to make sure the drive is properly configured and the partition is active.

PROBLEM

A serial or parallel device attached to the serial or parallel ports on the rear panel of the system unit does not work properly.

ACTION

Make sure the attached device is turned on, and the cable is properly installed between the device and the port.

For serial devices, set the serial port to use the same parameter values as the attached device (baud rate, parity, data bits, start bits, and stop bits). If you are using MS-DOS, use the MODE command to set these parameters. See the documentation for the serial device for the correct parameter values.

If the device still does not work, check the serial or parallel port pinouts for the computer (see Appendix C) and the device (see the manufacturer's documentation). The pinouts for the port must match those for the attached device.

PROBLEM

Certain software programs do not work properly.

ACTION

Certain copy-protected programs will not boot at medium or high speed, and some programs are not written to run at faster clock speeds. Try installing and running the programs at a slower speed. Press **<Ctrl>-<Alt>-<Up Arrow>** or **<Ctrl>-<Alt>-<Down Arrow>** to change the operating speed. The current speed is indicated by the lights on the front panel of the system unit. If necessary, change the default operating speed of your computer, using ASTSETUP (Section 3).

A.2 Error Messages

Error messages appear when the Power-On Self-Test (POST) has failed. (POST is a series of programs that run when you turn on your system and tests your system components.) There are two kinds of error messages:

- *Beep codes* communicate an error condition by beeps.
- *Text messages* display information on the screen.

A.2.1 Beep Code Messages

Beep code messages (Table A-1) are a series of audible tones reporting errors detected during POST. For example, you might hear one long beep, followed by two short beeps. When you hear a beep code, write it down. Make sure the device the beep code has indicated is properly connected to your system. If necessary, contact your AST reseller for assistance.

Table A-1. Beep Codes.

Beeps		Check this Component
Long	Short	
0	1	System board
0	3	System board
0	4	System board
0	5	System board
0	7	System board
0	9	System board
0	11	System board
0	12	System board
0	13	System board
0	14	System battery
0	15	System board
1	0	System board
1	1	System board
1	2	System board
1	3	System board
1	4	System board
1	5	Memory board
1	7	Memory board
1	8	Video board

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A.2.2 Text Messages

When an error is detected during POST, an error message and the following prompt appear:

PRESS F1 KEY TO CONTINUE OR CTRL-ALT ESC FOR SETUP...

At the prompt, you can press **<F1>** and continue normal processing, or press **<Ctrl>-<Alt>-<Esc>** and rerun ASTSETUP.

The following text messages may appear during POST.

CMOS RAM ERROR, CHECK BATTERY/RUN SETUP

Explanation: Configuration information in ASTSETUP has been corrupted.

Action: This message appears intermittently near the end of the battery's life cycle. Make sure the battery is correctly installed in the computer. If it is, replace the battery and run ASTSETUP to set the clock and calendar.

DISK BOOT FAILURE, INSERT SYSTEM DISK AND PRESS ENTER

Explanation: The computer did not find the required system files on the boot disk.

Action: Retry the boot with a different system disk in drive A. Run ASTSETUP and make sure your drives are configured correctly.

DISKETTE DRIVES OR TYPES MISMATCH ERROR—RUN SETUP

Explanation: The floppy drives found do not match the floppy drives identified in ASTSETUP.

Action: Run ASTSETUP and correct the Diskette A or Diskette B fields.

EQUIPMENT CONFIGURATION ERROR—RUN SETUP

Explanation: There is a conflict between the equipment installed and the ASTSETUP configuration.

Action: Run ASTSETUP. Be sure you save any changes.

ERROR ENCOUNTERED INITIALIZING HARD DRIVE

Explanation: The hard disk, the disk controller board or AT driver/adapter, or the cables from the board to the hard disk may not be properly installed. The hard drive type may be incorrectly identified in ASTSETUP. The drive may be incorrectly formatted.

Action: Rerun ASTSETUP and verify the Disk 1 and Disk 2 fields. Retry the disk access. If necessary, reseat the hard disk controller board in its expansion slot. Reattach both ends of the disk controller board cables. Retry the disk access.

If the message appears the first time you boot after installing a hard disk, the disk may have been formatted incorrectly. Set partitions and perform logical formats on the drive. Do not perform a low-level format on an AT-embedded drive.

ERROR INITIALIZING HARD DISK CONTROLLER

Explanation: The hard-disk controller board or the cable from the board to the hard disk may not be properly installed.

Action: Retry the disk access. If necessary, reseat the hard disk controller board in its expansion slot. Reattach both ends of the hard disk controller cable. Retry the disk access.

FLOPPY DISK CNTRLR ERROR OR NO CNTRLR PRESENT

Explanation: No floppy disk controller is present, the floppy controller is not configured correctly, or jumper E33 is removed.

Action: Verify the installation of your floppy drive cable connections. After running ASTSETUP, retry the disk access. Check that jumper E33 on the system board is not installed; installing a jumper disables the floppy controller (Section 9).

KEYBOARD ERROR OR NO KEYBOARD PRESENT

Explanation: POST is unable to verify the keyboard functions.

Action: Be sure the keyboard cable is properly installed between the keyboard and the system unit, and none of the keys are jammed.

MEMORY ADDRESSING ERROR AT *nnnn* or MEMORY ERROR AT *nnnn* or WROTE 0A5A5 BUT READ *nnnn*

Explanation: POST is unable to verify the memory in your computer.

Action: Turn off your computer. Make sure all memory chips and modules are properly installed. Reseat the memory boards.

MEMORY SIZE ERROR—RUN SETUP

Explanation: The amount of memory found by POST is different from the amount defined in ASTSETUP.

Action: Run ASTSETUP and define the amount of conventional and extended memory correctly.

PARITY ERROR IN SEGMENT *nnn*

Explanation: POST is unable to verify the memory in your computer.

Action: Turn off your computer. Make sure all memory chips and modules are properly installed. Reseat the memory boards.

RAM PARITY ERROR. CHECKING FOR SEGMENT ADDRESS...

followed by either:

OFFENDING ADDRESS NOT FOUND or
OFFENDING SEGMENT:*nnnn*

Explanation: POST is unable to verify the memory in your computer.

Action: Turn off your computer. Make sure memory chips and modules are properly installed. Reseat the memory boards.

REAL TIME CLOCK ERROR

Explanation: The real-time clock is not operating as expected.

Action: Replace the system battery and run ASTSETUP to reconfigure the system.

REFRESH TIMING ERROR

Explanation: An error has occurred during the system board test.

Action: Contact your AST reseller for assistance.

SYSTEM KEY IS IN LOCKED POSITION - KEYBOARD IS LOCKED OUT. TURN KEY TO UNLOCKED POSITION...

Explanation: The lock on the system unit's front panel is in the locked position.

Action: Unlock the keyboard.

TESTING CMOS BATTERY... FAILED

Explanation: The system battery level is low.

Action: Replace the system battery and run ASTSETUP to reconfigure the system.

TESTING CMOS CHECKSUM... FAILED

Explanation: The ASTSETUP file is corrupted or the system battery level is low.

Action: Replace the system battery and run ASTSETUP to reconfigure the system.

TESTING INTERRUPT CONTROLLER #*n*... FAILED

Explanation: The system board has a problem. *n* is the number of the interrupt controller that failed POST.

Action: Contact your AST reseller for assistance.

TESTING MEMORY....*nnnn*

Explanation: This is an informational message. *nnnn* is the number of KB of functional RAM.

Action: None required.

TESTING PROTECTED MODE... FAILED

Explanation: There is a problem with the system board.

Action: Contact your AST reseller for assistance.

TESTING UNEXPECTED INTERRUPTS AND STUCK NMI... FAILED

Explanation: There is a problem with the system board.

Action: Contact your AST reseller for assistance.

A.3 Running the System Confidence Test

If, after reading Appendix A.1 and A.2, you are unable to resolve a problem, run the system confidence test on the Utility Software disk, which tests the hardware modules installed in the system. None of the tests require your intervention once they begin. The tests take a limited amount of time, and do not destroy any information stored on disk.

To run the confidence test, insert the Utility Software disk into your floppy drive and press **<Ctrl>-<Alt>-<Del>** (or press the RESET button). The test determines the system's hardware configuration, including the amount of memory installed, and displays its findings (Figure A-1).

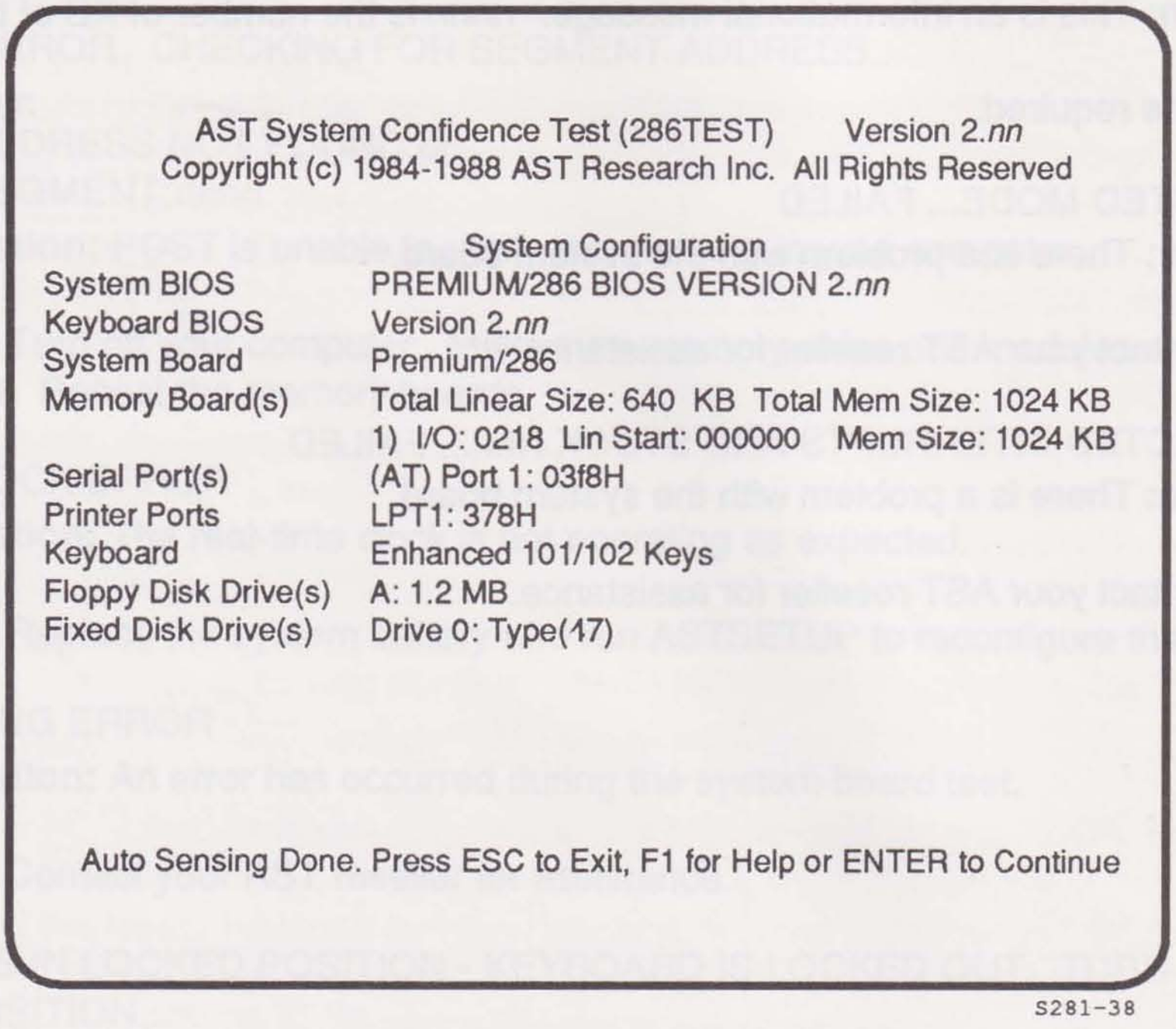


Figure A-1. System Autosense Screen (Example).

If a device does not appear on the screen, it is not installed, not identified in ASTSETUP, or is functionally nonexistent for test purposes. If any of the displayed information is incorrect, rerun ASTSETUP.

Press **<Enter>** to run the confidence test. The following question appears:

How many times do you want to run the test?

If you have a problem that occurs consistently, press **<Enter>** to run the test once. If you have an intermittent problem, let the test run overnight. To do so, type **3500** and press **<Enter>**.

If no error appears during the testing of a component, the screen displays the component and the following message:

[Test Completed Successfully]

If a component passes the confidence test, its minimum functionality has been verified. However, it is possible for a component that malfunctions intermittently to pass the test. (If a component malfunctions intermittently, be sure to run the test overnight to try and pinpoint the problem.)

If an error appears, the confidence test identifies the suspect component. Make sure the suspect component is properly installed and configured. If you need to replace a component, or you are still unsure of how to solve the problem, contact your AST reseller.

NOTE

If you installed an AST Premium FASTboard/386, Advanced FASTRAM board, or AST video product, you may need to run the version of diagnostics supplied with each of these products.

NOTES

AST FASTRAM B

This appendix tells you how to perform the following:

- Determine if the default configuration of the FASTRAM board is correct for your system
- Configure FASTRAM boards for use in your system
- Install additional memory on a FASTRAM board

B.1 Default Configuration

In its default configuration, the FASTRAM board is configured as follows:

- The first FASTRAM board installed in your computer. If your computer has been factory-equipped with two FASTRAM boards, the second board should also be correctly configured.
- *For 512-KB FASTRAM boards*: 512 KB allocated as conventional memory
- *For 1-MB FASTRAM boards*: 640 KB of memory allocated as conventional and 384 KB as expanded (not extended) memory
- Base I/O address 0218h. FASTRAM uses the I/O address for access to expanded memory. No two devices in your computer can use the same I/O addresses.
- Parity checking and zero-wait-state memory access enabled

B.2 Configuring FASTRAM Boards

In general, you should not need to change the configuration of a FASTRAM board. If you add a second FASTRAM board in your system or change the amount of linear (conventional and extended) memory, however, you may need to change the configuration.

This section takes you through a step-by-step configuration of every switch and jumper on the FASTRAM board.

B.2.1 Changing Linear Memory Size

Linear memory is memory which can be directly addressed by the 80286 processor. It consists of conventional and extended memory.

Conventional memory is the amount of linear memory recognized by MS-DOS. The maximum conventional memory is 640 KB. Your AST Premium/286, however, can sequentially address up to 16 MB of linear memory, although this additional amount of memory is still not accessible by MS-DOS. The additional linear memory above 640 KB is called *extended memory*.

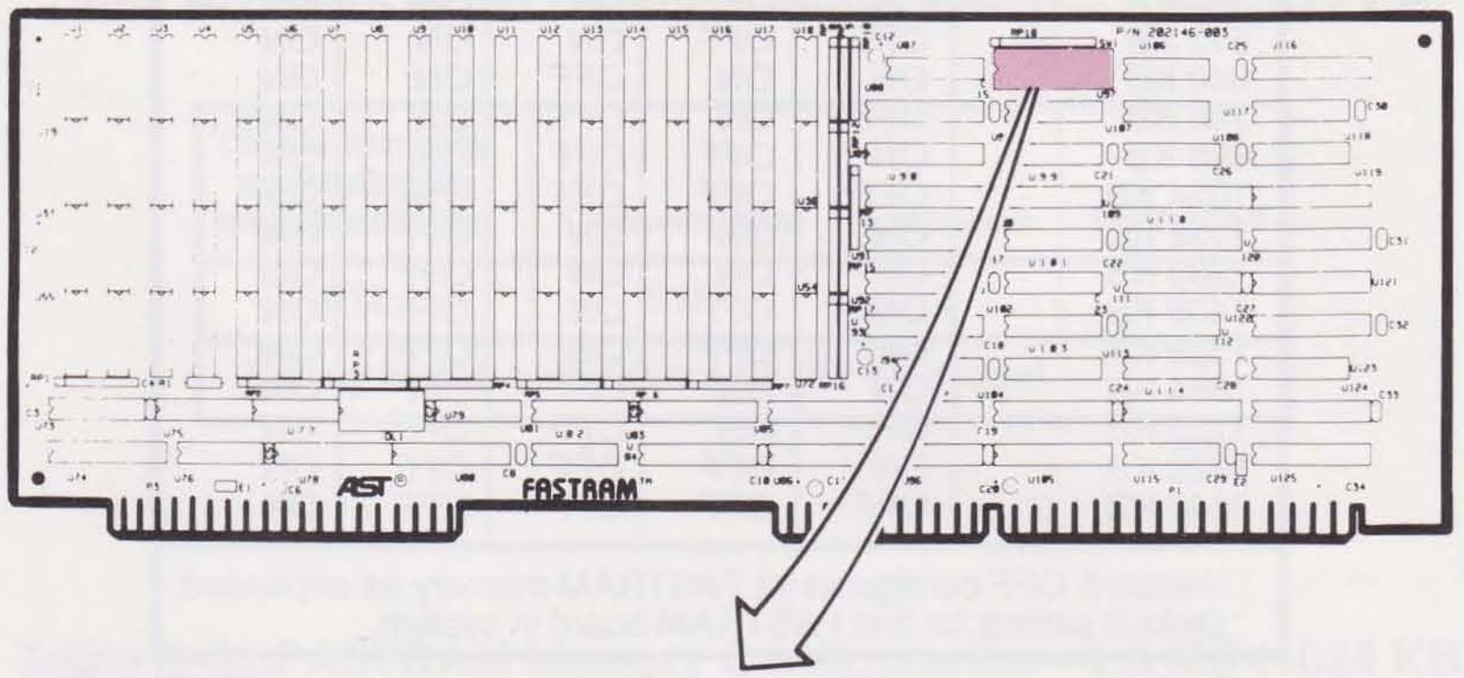
There are two ways to use extended memory:

- Running an operating system such as MS-OS/2 from AST or XENIX, which have direct access to extended memory
- Using AST utilities such as fASTdisk and SuperSpool that have provisions for access to extended memory

Before you change the amount of memory allocated as linear, you should consider first if you will be using the additional memory as extended or expanded (EEMS).

AST's expanded memory manager, REMM.SYS, enables you to use memory above 640 KB on the FASTRAM board as expanded for MS-DOS applications with EEMS capability. Programs that can benefit from expanded memory include Lotus® 1-2-3® Release 2, dBase III Plus®, and DESQVIEW™. Expanded memory allows these programs to handle larger spreadsheets, data bases, and so forth, than would normally be possible under MS-DOS.

To change your linear memory size, follow the table for setting the switches on your FASTRAM board (Figure B-1 and Table B-1). Note that setting the switches to recognize memory above the 640-KB MS-DOS limit means dedicating this memory as extended. Using this setting, memory becomes inaccessible to AST's expanded memory manager.



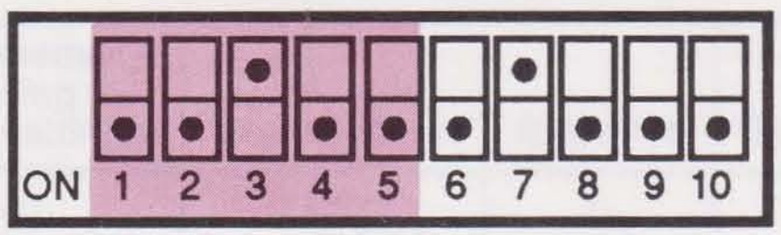


Figure B-1. Linear Memory Size Switches.

Table B-1. FASTRAM Linear Memory Size.

Linear Memory	SW1-1	SW1-2	SW1-3	SW1-4	SW1-5
0 KB*	-	-	-	-	OFF
128 KB	ON	ON	ON	ON	ON
256 KB	OFF	ON	ON	ON	ON
384 KB	ON	OFF	ON	ON	ON
512 KB	OFF	OFF	ON	ON	ON
640 KB**	ON	ON	OFF	ON	ON
768 KB	OFF	ON	OFF	ON	ON
896 KB	ON	OFF	OFF	ON	ON
1024 KB	OFF	OFF	OFF	ON	ON
1152 KB	ON	ON	ON	OFF	ON
1280 KB	OFF	ON	ON	OFF	ON
1408 KB	ON	OFF	ON	OFF	ON
1536 KB	OFF	OFF	ON	OFF	ON
1664 KB	ON	ON	OFF	OFF	ON
1792 KB	OFF	ON	OFF	OFF	ON
1920 KB	ON	OFF	OFF	OFF	ON
2048 KB	OFF	OFF	OFF	OFF	ON

* Switch 5 OFF configures all FASTRAM memory as expanded.
** Default setting for first FASTRAM board in system.

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NOTE

If this is the second FASTRAM board in your computer, and less than 2 MB from the first board is allocated as linear memory, none of the memory on the second board will be allocated as linear.

To use the expanded memory manager, reserve some or all of the additional memory for the purpose. Set the switches on your FASTRAM board for a linear memory size that is less than the actual amount of memory installed.

For example, if your FASTRAM board has 1 MB of memory and you want to configure your system for expanded memory, set the switches to show that you have only 640 KB of memory installed. The additional 384 KB will be recognized and used by REMM.SYS when you install it. For information on how to install REMM.SYS, refer to your *AST Premium Utility Software User's Manual.*

If you plan to change your memory environment frequently, set your switches to show only conventional memory (640 KB). Then you can use AST's utilities REMM.SYS and REX.SYS to change your memory allocation dynamically, rather than opening your computer to change switch settings each time.

For more information on configuring memory, see Appendix D.

Tables B-2—B-5 display examples of typical FASTRAM memory configurations. Depending on the amount of FASTRAM memory installed, other configurations are possible by selecting other linear memory sizes in the switch settings.

Table B-2. FASTRAM Memory Configuration—.5 MB (512 KB).

Linear memory according to switch settings	Conventional	Extended	Expanded
512	512*	0	0
* Factory default configuration for 512 KB system.			

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Table B-3. FASTRAM Memory Configuration—1.0 MB (1024 KB).

Linear memory according to switch settings	Conventional	Extended	Expanded
640	640*	0	384
768	640	128	256
1024	640	384	0
* Factory default configuration for 1 MB system.			

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Table B-4. FASTRAM Memory Configuration—1.5 MB (1536 KB).

Linear memory according to switch settings	Conventional	Extended	Expanded
640	640	0	896
1024	640	384	512
1280	640	640	256
1536	640	896	0

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Table B-5. FASTRAM Memory Configuration—2.0 MB (2048 KB).

Linear memory according to switch settings	Conventional	Extended	Expanded
640	640	0	1408
1024	640	384	1024
1536	640	896	512
2048	640	1408	0

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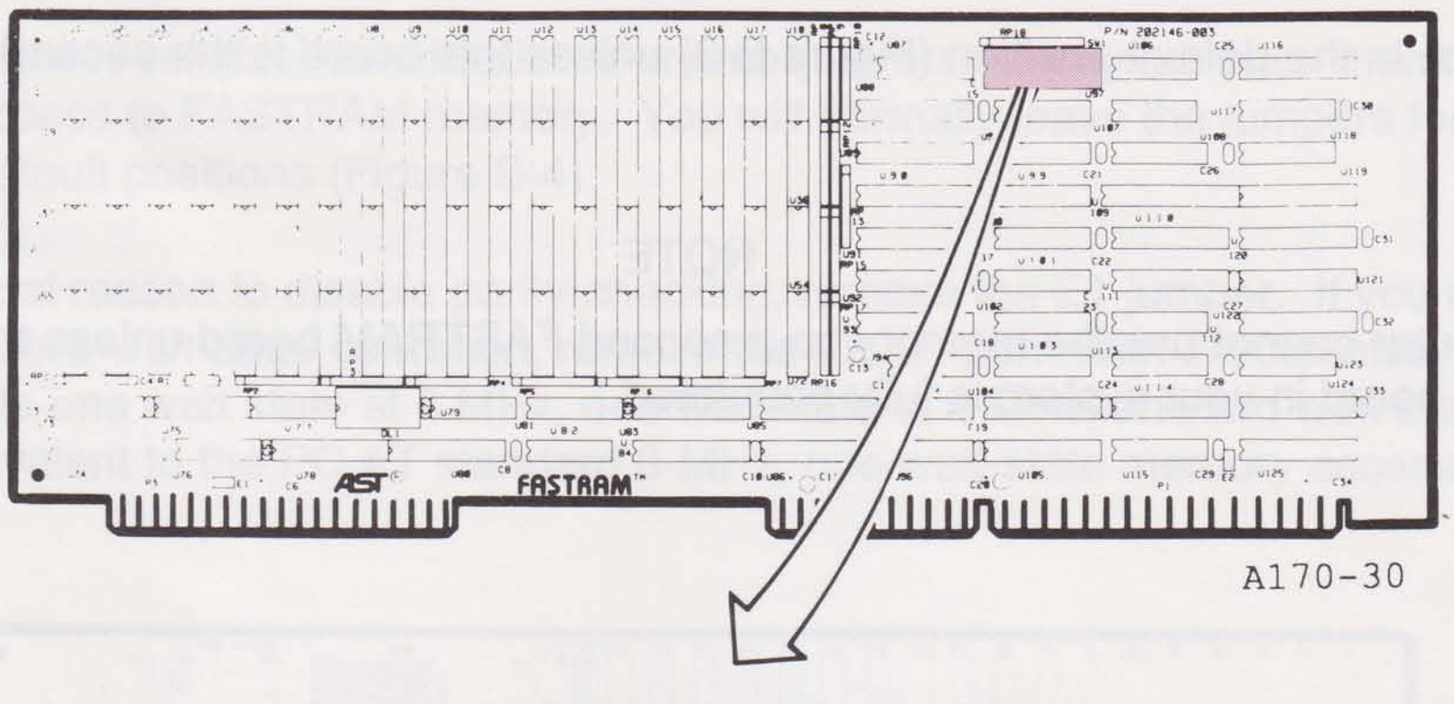
B.2.2 Base I/O Address

Setting the I/O address defines the address your computer uses to communicate with FASTRAM memory. Leave the switches in their default positions (Figure B-2 and Table B-6), except in the following cases:

- You add a second FASTRAM board to your system.
- Another device in your system uses the same I/O address, and you cannot change the I/O address of the other device.

NOTE

If there is another AST EEMS board (such as Rampage®Plus 286) installed in your computer, you must set it to use a different base I/O address from FASTRAM boards installed in your system. To ensure compatibility, use only AST EMS or EEMS products, rather than other manufacturer's expanded memory boards.



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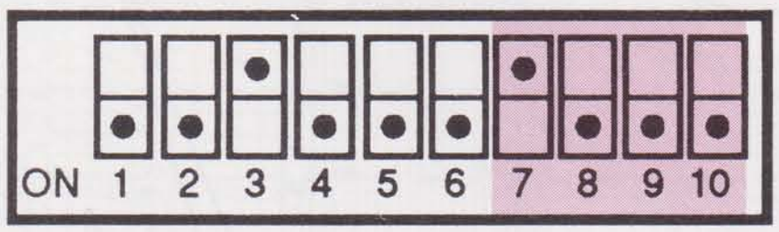

Figure B-2. Base I/O Address Switches.

Table B-6. FASTRAM Base I/O Address.

Base I/O Address	SW1-7	SW1-8	SW1-9	SW1-10
0208	ON	ON	ON	ON
0218*	OFF	ON	ON	ON
0258**	OFF	ON	OFF	ON
0268	ON	OFF	OFF	ON
02A8	ON	OFF	ON	OFF
02B8	OFF	OFF	ON	OFF
02E8	ON	OFF	OFF	OFF

* Default setting for first FASTRAM board.
** Recommended setting for second FASTRAM board.

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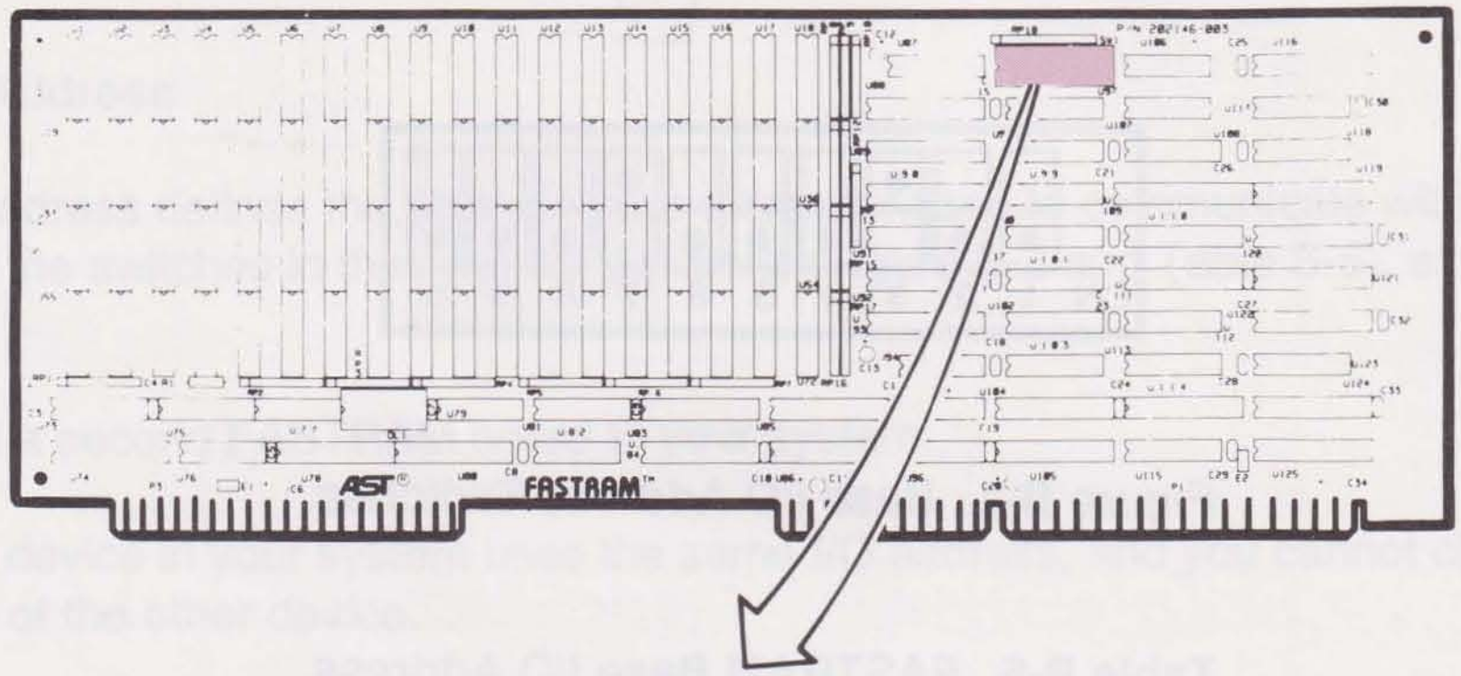
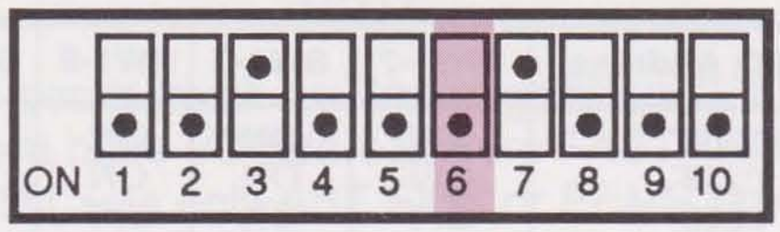
B.2.3 First or Second FASTRAM Board Installed

Leave the switch in the default position (Figure B-3) unless this board is the second installed in your system.

NOTE

Your computer cannot use the memory on a second FASTRAM board unless the first FASTRAM board in your system is fully populated.





SW1-6 on: First FASTRAM board in system (can address linear memory between 0-640 KB and between 1024-2432 KB)

SW1-6 off: Second FASTRAM board (can address linear memory between 2432-4480 KB)

Figure B-3. FASTRAM First/Second Board Installed Setting.

B.2.4 Parity Checking and Zero Wait State

Parity checking ensures reliable identification of memory errors. Zero-wait-state memory allows the fastest possible access to FASTRAM memory. You will normally leave the jumpers for these features installed in their default positions (Figure B-4).

If you have a special reason to disable parity checking, remove the E1 jumper. If you run a program incompatible with zero-wait-state operation, remove the E2 jumper. With E2 disabled, FASTRAM memory will include one wait state at 6 MHz, one wait state at 8 MHz, and two wait states at 10 MHz. This timing is equivalent to the PC AT standard 8-MHz, one-wait-state memory access speed.

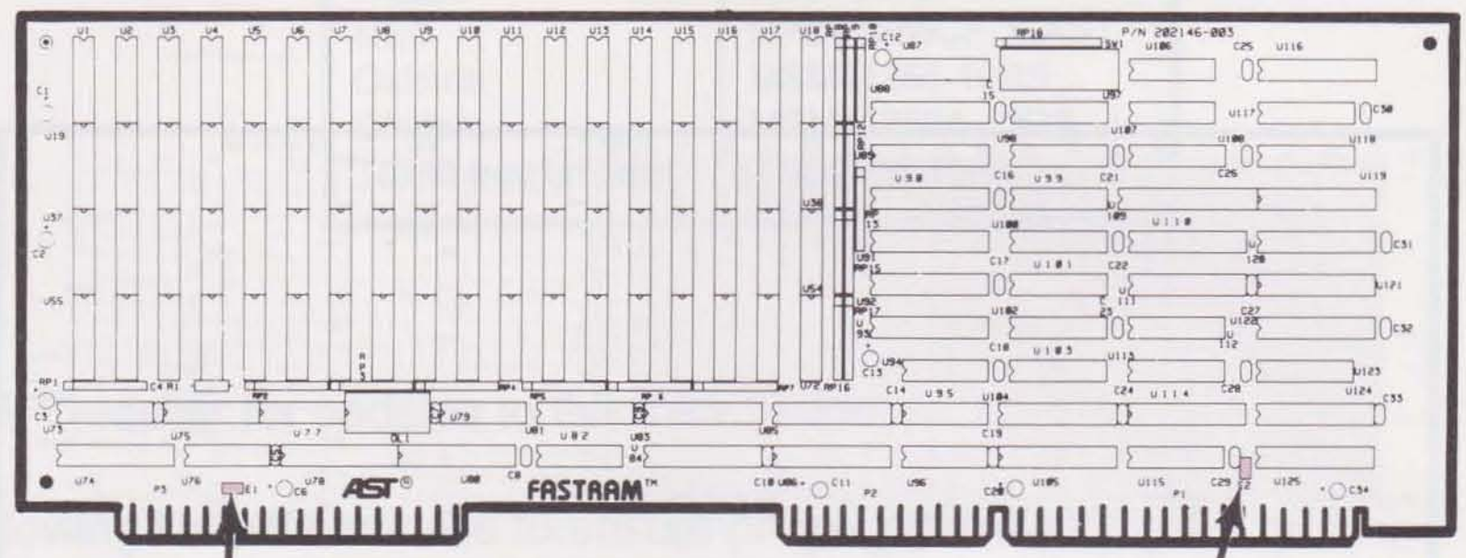


Figure B-4. Parity Checking and Zero-Wait-State Memory Access.

B.3 Installing Additional FASTRAM Memory

This section tells you how to install additional memory on a FASTRAM board. You need this information only when you add to the memory already installed on a FASTRAM board.

If a FASTRAM board is not fully populated—that is, if less than 2 MB is already installed—you can add 100-nanosecond (ns) 256-KB RAM chips to increase memory in 512-KB increments. Memory banks must be populated sequentially for each FASTRAM memory increment (Figure B-5 and Table B-7).

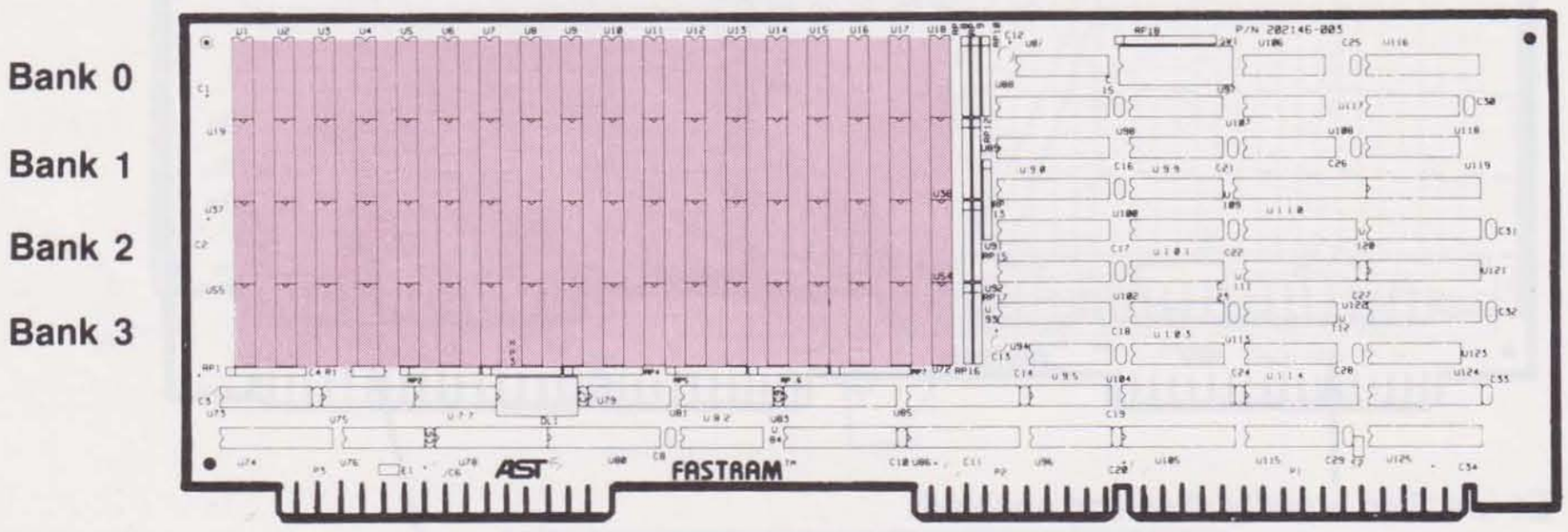


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Figure B-5. Memory Banks.

Table B-7. Adding FASTRAM Memory.

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

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Rules for Adding or Subtracting Memory

The following 100-ns, 256-KB RAM chips are currently qualified for use on the FASTRAM board (Table B-8).

Table B-8. RAM Chips Qualified for Use on the FASTRAM Board.

Manufacturer	Part No.
Fujitsu	MB81256-10P
Micron	MT1259-10
Mitsubishi	M5M4256P-10
Mitsubishi	M5M4256AP-10
Toshiba	TMM41256AP-10
Hitachi	HM51256LP-1D
NEC	UPD41256CF-10AST
Okidata	MSM41256-10RS
Okidata	MSM41256A-10RS
Texas Instruments	TMS4256-10NL

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Contact your AST reseller for updates to this information.

Observe the following installation rules to ensure proper operation:

- For each memory size, populate each bank entirely with 256-KB chips (100-ns access time).
- Add or subtract FASTRAM memory in 512-KB increments. 512-KB RAM upgrade kits are available from AST (model number 500396-001).
- Be sure the first FASTRAM board in your system is fully populated (2 MB installed) before you add a second FASTRAM board.
- Re-run ASTSETUP if you change the amount of linear memory installed in your system. You do not need to run ASTSETUP if you are only adding expanded memory.

NOTES

SERIAL AND PARALLEL PORTS C

Your computer includes serial and parallel ports. They are built into the system board, so they do not take up an expansion slot in the computer.

The serial port can connect your computer to a serial printer, modem, or other device that uses an RS-232C interface. The parallel port can connect the computer to a parallel printer.

This appendix tells you how to change the configuration of the ports and provides reference information.

C.1 Serial Port

The Premium/286 serial port conforms to the Electronic Industries Association (EIA) RS-232C communication standard.

The serial port is configured as a Data Terminal Equipment (DTE) device. It has a DB25P connector (25-pin male).

This appendix tells you how to change the device name of the serial port from COM1 to COM2, and how to disable the serial port. You only need this information when you have some reason to change the serial port's default configuration.

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

- Serial port programming
- Serial port I/O address assignments and pinouts

C.1.1 Changing the Serial Port Configuration

Your computer can accommodate one or two serial ports. The device names for the serial ports are COM1 (for the primary serial port) and COM2 (for the secondary serial port). Typically COM1 uses interrupt request line 4 (IRQ4), and COM2 uses IRQ3. An IRQ is the signal a device uses to tell the computer that it needs attention.

Unless you reset the jumpers on the computer system board, the built-in serial port is enabled as COM1 using IRQ4.

To change the device name and associated IRQ of the serial port on the AST Premium/286, reset the jumpers (Figure C-1). Settings include the following:

- Serial port COM1 using IRQ4 (default configuration)
- Serial port COM2 using IRQ3
- Serial port disabled

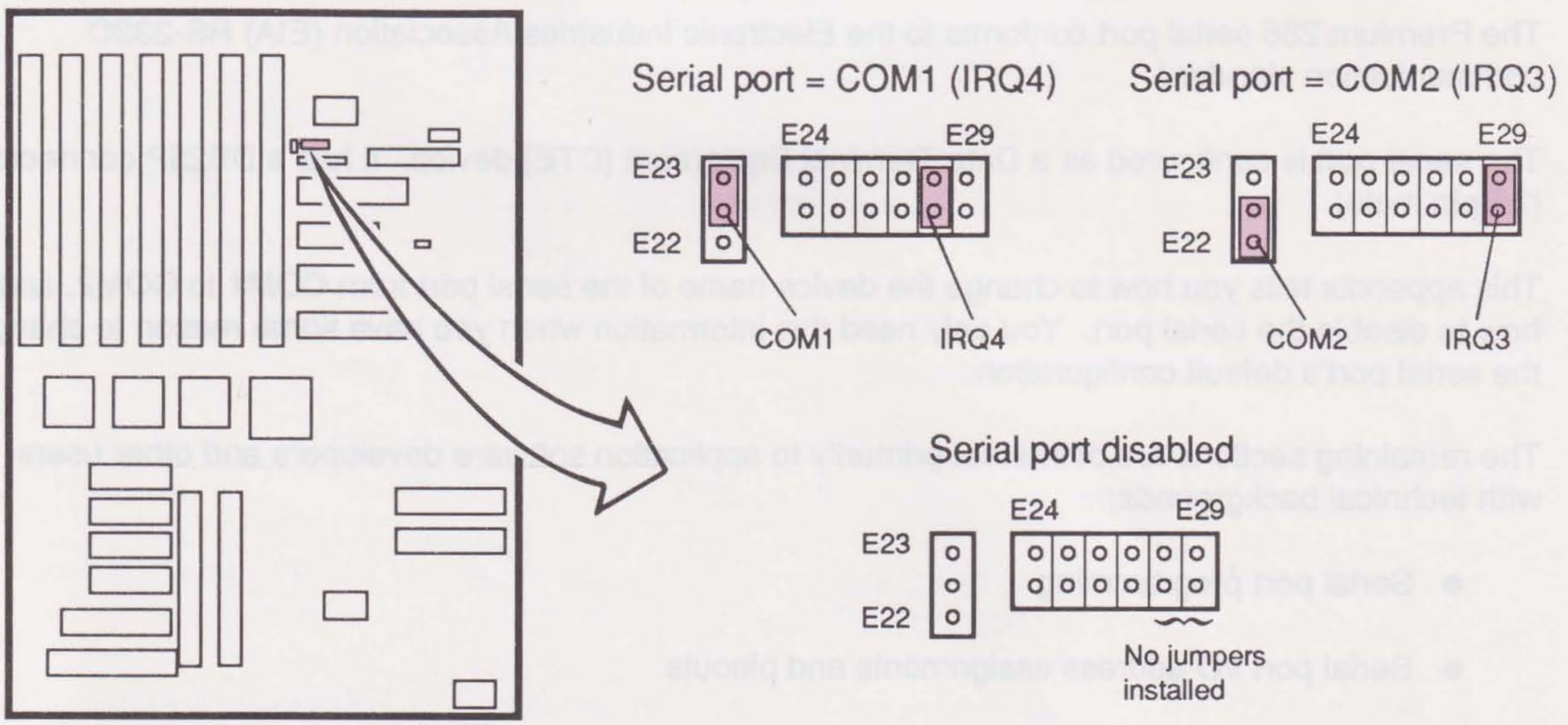

Figure C-1. Serial Port Configuration.

C.1.2 Installing Multiple Serial Ports in Your Computer

MS-DOS Version 3.3 and later versions accommodate up to four serial ports (COM1—COM4). AST Premium/286 serial ports can be configured as COM1 or COM2 (the default is COM1). If you add a board with another serial port on it, you must configure it to avoid conflict.

You can usually connect your serial device to the computer's serial port with the cable supplied with that device. Refer to instructions provided with the device or with the software for driving it.

In some cases, your instructions specify how your remote device uses RS-232C line signals and which pin numbers supply which signals.

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 for the device.

C.1.3 Programming the Serial Port

Your computer's serial port is completely under software control and must be initialized for correct baud rate, parity, number of data bits, and number of stop bits before they can be used. You (using a MODE command in your AUTOEXEC.BAT file, for example) or your application software must initialize the serial port each time you turn on the computer.

NOTE

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

Typically, the MS-DOS MODE command initializes the serial port (refer to your *MS-DOS User's 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 example command initializes serial port COM1 for 1200 baud, no parity, 8 data bits, and 1 stop bit. The "P" is optional and tells MS-DOS to continue retrying transmissions on timeouts. You can also use a similar command to establish communication parameters for any other serial ports installed.

Many application programs (such as word processors) automatically handle port initialization, making it unnecessary to use the MODE command. If you are unsure, it does not harm anything to use the MODE command.

If you are using the serial port to operate a serial printer, you may also need to redirect printer output from the parallel port, LPT1, to a serial port, COM1—COM4. This is because MS-DOS always assumes printer output goes to LPT1 unless told otherwise. Use the MODE command to redirect printer output from a parallel port to a serial port. For example:

```
MODE LPT1:=COM1:<Enter>
```

A redirection command, like the one above, should follow the first MODE command that sets the baud rate, parity, and so forth. Again, your application program might handle this redirection automatically. If so, you need not issue a redirection command yourself.

C.1.4 Serial Port I/O Addresses and Pinouts

Your computer's serial port uses the system I/O addresses and IRQs shown in Table C-1.

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

Device Name	IRQ Line	I/O Addresses
COM1	IRQ4	03F8-03FFh
COM2	IRQ3	02F8-02FFh

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The pinouts for the AST Premium/286 serial port are described in Table C-2 and shown in Figure C-2.

Table C-2. Serial Port Pinout.

Pin	Description	Signal Direction
1	Protective ground	NA
2	Transmit data (TX)	Output
3	Receive data (RX)	Input
4	Request to send (RTS)	Output
5	Clear to send (CTS)	Input
6	Data set ready (DSR)	Input
7	Signal ground	NA
8	Carrier detect (CD)	Input
9-19	No connection	NA
20	Data terminal ready (DTR)	Output
21	No connection	NA
22	Ring indicator (RI)	Input
23-25	No connection	NA

NA=not applicable

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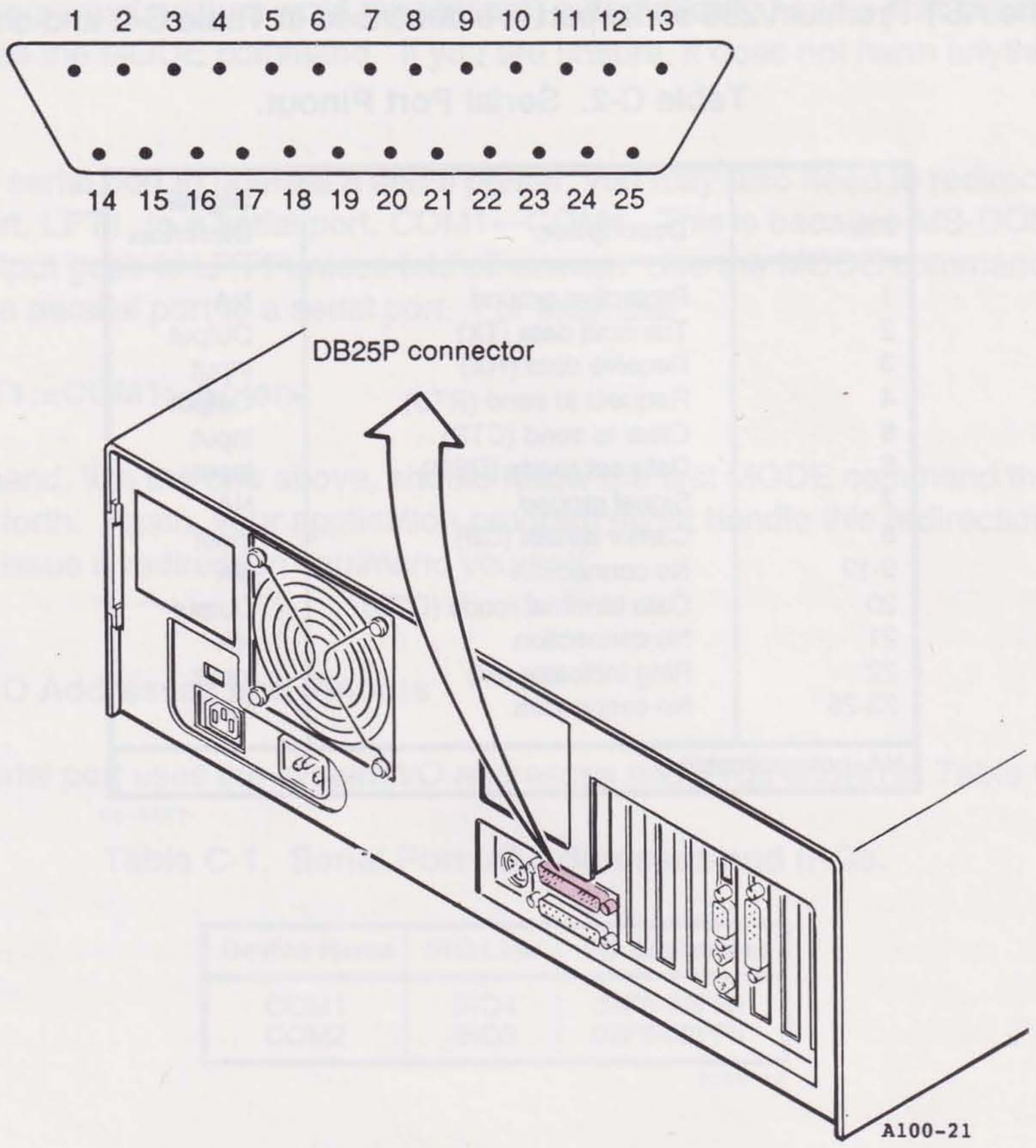

Figure C-2. Serial Port Location.

C.2 Parallel Port

Your computer has one built-in parallel port. The port is completely compatible with the AT and uses the same DB25S (female 25-socket) connector as an IBM port.

This section tells you how to change the configuration of the parallel port. You only need this information if you change the default setting.

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

- Parallel port programming
- Parallel port I/O address assignments and pinouts

C.2.1 Configuring the Parallel Port

You can install a maximum of three parallel ports in your computer. The device names for the parallel ports are LPT1, LPT2, and LPT3. When looking for parallel ports, the computer polls these hexadecimal I/O addresses in the following order:

1. 03BCh: this is the address usually occupied by the parallel ports built into video display adapter boards. If your computer includes a port configured for this address, it will be called LPT1.

2. 0378h: (The Premium/286 parallel port occupies this address as the default, although you may change it.) If another port is configured to 03BCh (above), then 0378h is assigned to LPT2; otherwise it is assigned to LPT1.

3. 0278h: (The Premium/286 parallel port occupies this address if you change the port's configuration to do so.) This port is assigned to LPT3 if both 03BCh and 0378h are installed; LPT2 if either 03BCh or 0378h is installed; and LPT1 if neither 03BC nor 0378h is installed.

The computer assigns the device name LPT1 to the first parallel port it finds (in the order of polling), LPT2 to the second parallel port, and LPT3 to the third parallel port (if any). For example, if the computer finds parallel ports at the first and third possible I/O address ranges, it assigns the device names LPT1 and LPT2 to those ports. If there are parallel ports installed at the second and third possible I/O addresses, they are called LPT1 and LPT2, respectively.

NOTE

If there is an LPT3 in your system, an IRQ for that port is not supported.

Unless your computer includes a video adapter board with a built-in parallel port occupying I/O addresses 03BC-03BEh (such as the one on an IBM monochrome video board), a printer port LPT3 is not supported.

The parallel port on the AST Premium/286 has been configured at the factory to respond as LPT1. You can verify the configuration of the built-in parallel port by checking that jumpers are installed as shown in Figure C-3.

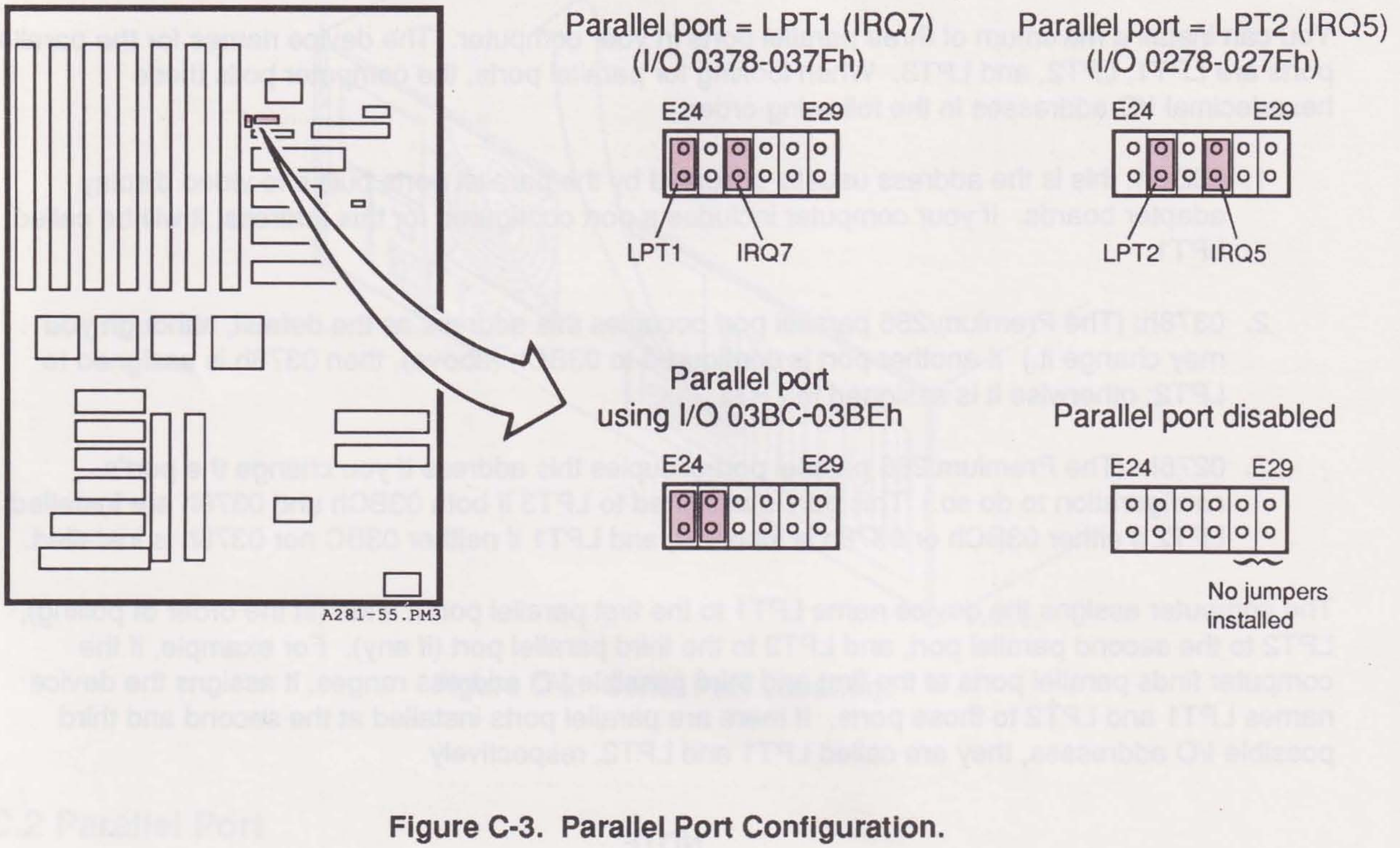

Figure C-3. Parallel Port Configuration.

C.2.2 Installing Multiple Parallel Ports

If your computer includes another board with a parallel port that occupies the same I/O address as the built-in parallel port, you must change one of the devices to avoid conflicts between the two ports. Set jumpers to configure the computer's parallel port to occupy I/O addresses for LPT1 or LPT2 (Figure C-3).

C.2.3 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) always responds as LPT1 (using I/O addresses 03BCh—03BEh) and cannot be changed.

When such a board is installed in your computer, the built-in parallel port automatically responds as LPT2 in its default configuration. You do *not* need to reconfigure the built-in port to respond as LPT2.

C.2.4 Disabling the Parallel Port

You must disable a parallel port to avoid conflicts when you have several parallel ports installed in your system. Disable the built-in parallel port by removing the jumpers (Figure C-3).

C.2.5 Programming the Parallel Port

Under MS-DOS, your computer always sends printer output to parallel port LPT1 unless specifically told otherwise.

C.2.6 Parallel Port I/O Addresses and Pinouts

The built-in parallel port uses the I/O addresses listed in Table C-3.

Table C-3. Parallel Port I/O Addresses.

Port Configuration	I/O Addresses
LPT1	0378-037Ah
LPT2	0278-027Ah

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NOTE

When you use a display adapter with a built-in parallel port fixed as LPT1, MS-DOS sees the Premium/286 parallel port configured for LPT1 as LPT2.

You can use the standard IBM Parallel Printer Cable to connect the Premium/286 to an IBM or IBM-compatible printer. You can also use the information in Table C-4 and Figure C-4 to help build a cable for your parallel printer.

Table C-4. Parallel Port Pinouts.

Line Name	DB25S Output	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

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NOTE

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

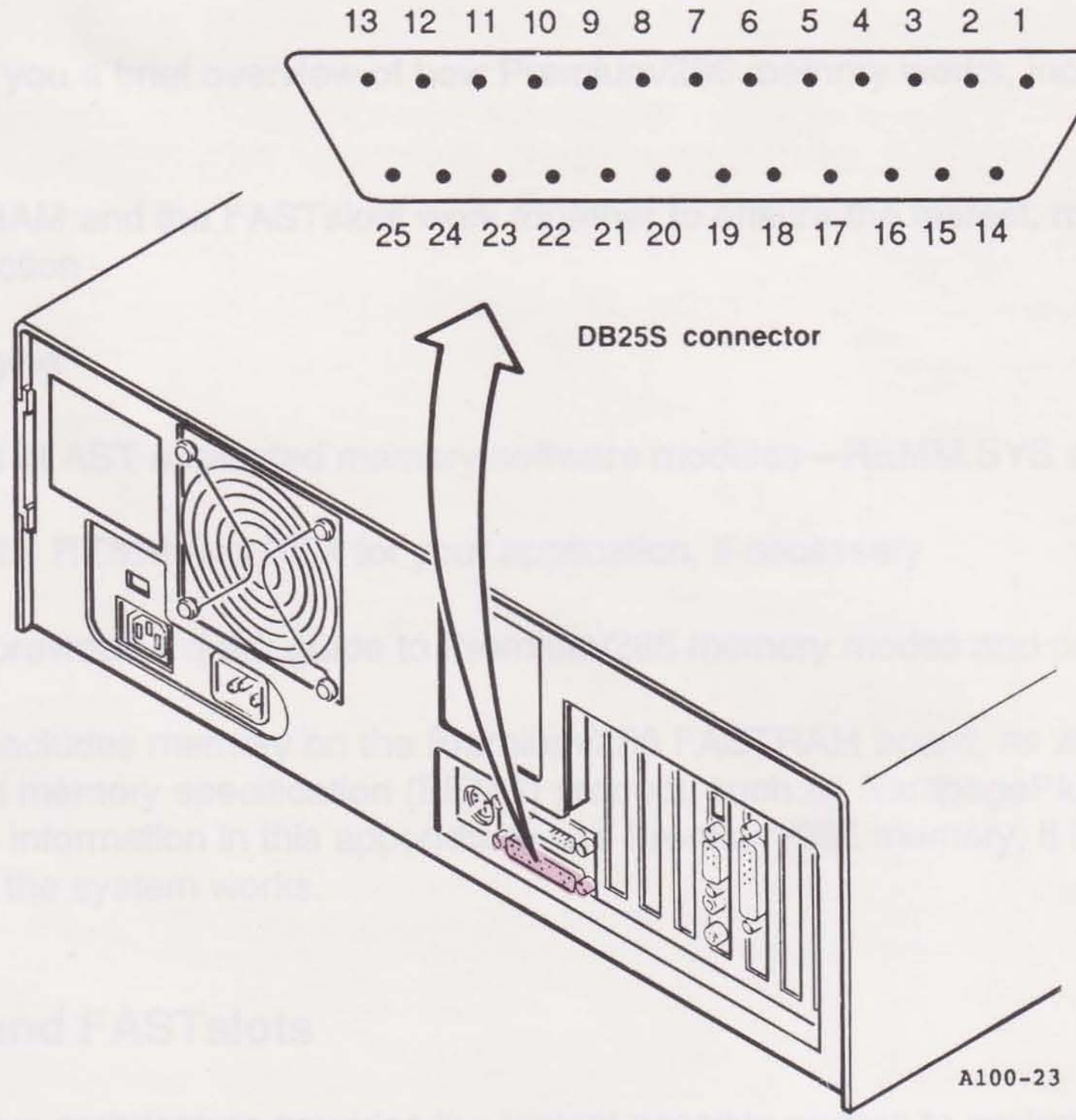

Figure C-4. Parallel Port Location.

C.2.7 Interrupt-Driven Parallel Printer Software

Unless you specifically change the configuration of the computer's parallel port, it responds as LPT1 (using IRQ7). (You can also configure the port to respond as LPT2 and use IRQ5.)

For interrupt-driven parallel printer software to operate correctly, an IRQ must be enabled by the appropriate jumper on the system board (Figure C-3). It does not harm anything to enable an IRQ even if you are not running interrupt-driven software for your parallel printer, as long as no other device in your computer uses this interrupt.

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PREMIUM/286 MEMORY D

This appendix gives you a brief overview of how Premium/286 memory works, including the following areas:

- How FASTRAM and the FASTslots work together to ensure the fastest, most compatible memory function
- Memory paging
- Descriptions of AST expanded memory software modules—REMM.SYS and REX.SYS
- How to modify REMM and REX for your application, if necessary

This appendix also provides a quick guide to Premium/286 memory modes and parameters.

Expanded memory includes memory on the Premium/286 FASTRAM board, as well as any other AST enhanced expanded memory specification (EEMS) product, such as RampagePlus 286. Although you do not need the information in this appendix to use Premium/286 memory, it is provided as background on how the system works.

D.1 FASTRAM and FASTslots

Premium/286's unique architecture provides the fastest possible access to system memory, yet ensures that your application software remains compatible with FASTRAM.

To understand how Premium/286 memory works, keep in mind the basics of memory access.

A computer's *memory bus cycle time* is the time required to request and receive data. Typically, a bus cycle consists of these parts:

- Time required for the processor to request data
- Time required to wait for the computer's memory to respond. This period of time is called *access time*. The access time can be extended by adding more processor states to the memory cycle. The additional states are called *wait states*.

In FASTRAM, wait states are eliminated when the request for memory access comes directly from the microprocessor to the third connector of the FASTRAM board. On the other hand, default wait states are used when the access is performed by the direct memory access (DMA) controller or a *master device* on the 8/16-bit bus.

A master device uses the master signal to take control of command lines, and supersedes requests from the 8237 DMA controller or the 80286 microprocessor. Non-FASTRAM memory boards are master devices.

The wait states used in Premium/286 FASTslots are different from normal 8- and 16-bit slots (Table D-1).

Table D-1. Number of Wait States per CPU Speed.

Slot Type	Wait States per CPU Speed		
	6 MHz	8 MHz	10 MHz
8-bit	1	1	2
8/16-bit *	1	1	2
FASTSLOT **	0	0	0

* Timing also applies to non-FASTRAM boards installed in FASTSLOTs.
** For FASTRAM and other boards that use the third FASTSLOT connector as a direct interface to the 80286 bus.

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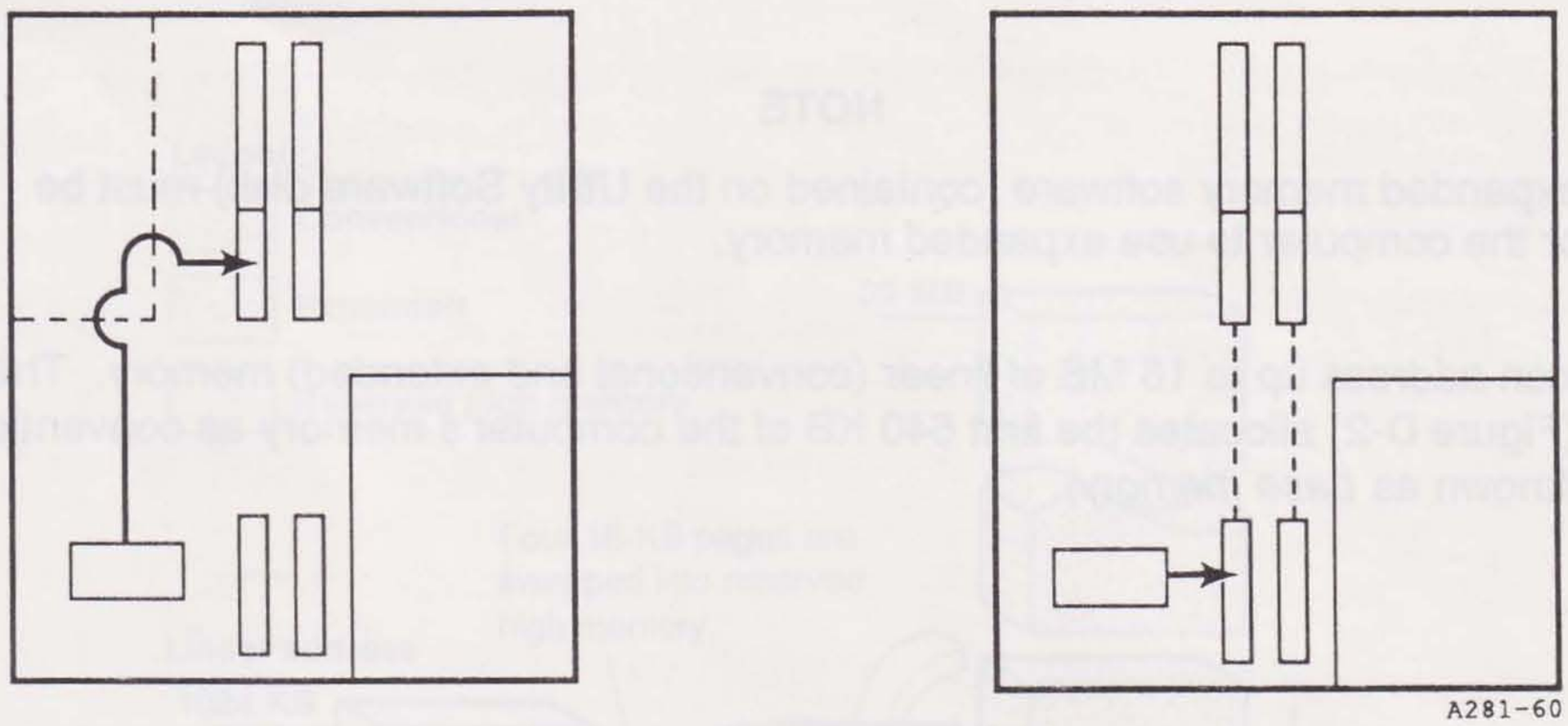
FASTRAM memory determines the insertion of wait states in FASTslot operation (Figure D-1).



Wait states inserted with access through standard system board.

No wait states inserted when access is directly from microprocessor to FASTSLOT.

Figure D-1. Memory Access in the Premium/286 System.

In personal computers, wait states are inserted into a bus cycle. They allow the computer's microprocessor time to generate signals that travel to a bus controller chip, where the signals are refined before they enter the memory bus.

The FASTslot architecture in a Premium/286 offers a unique third connector that takes over the function of the bus controller chip—eliminating the need for wait states. By eliminating the time required to refine the microprocessor signals using a separate bus controller, AST FASTRAM offers the fastest possible memory access by the microprocessor.

However, if the access is performed by the DMA controller or a master device (such as an 8/16-bit memory card, the floppy drive controller, or a graphics controller), the timing defaults to the standard wait states on the 8/16-bit bus. Using the standard wait states ensures compatibility with the device on the I/O channel.

FASTRAM operation has no effect on other memory installed in the system. The Premium/286 system board can also accommodate standard 16-bit memory (such as RampagePlus 286).

D.2 Memory Paging

A technique called memory paging allows your Premium/286 to use expanded memory—memory beyond the normal PC AT memory map.

NOTE

The AST expanded memory software (contained on the Utility Software disk) must be installed for the computer to use expanded memory.

Premium/286 can address up to 16 MB of linear (conventional and extended) memory. The normal memory map (Figure D-2) allocates the first 640 KB of the computer's memory as conventional memory (also known as *base memory*).

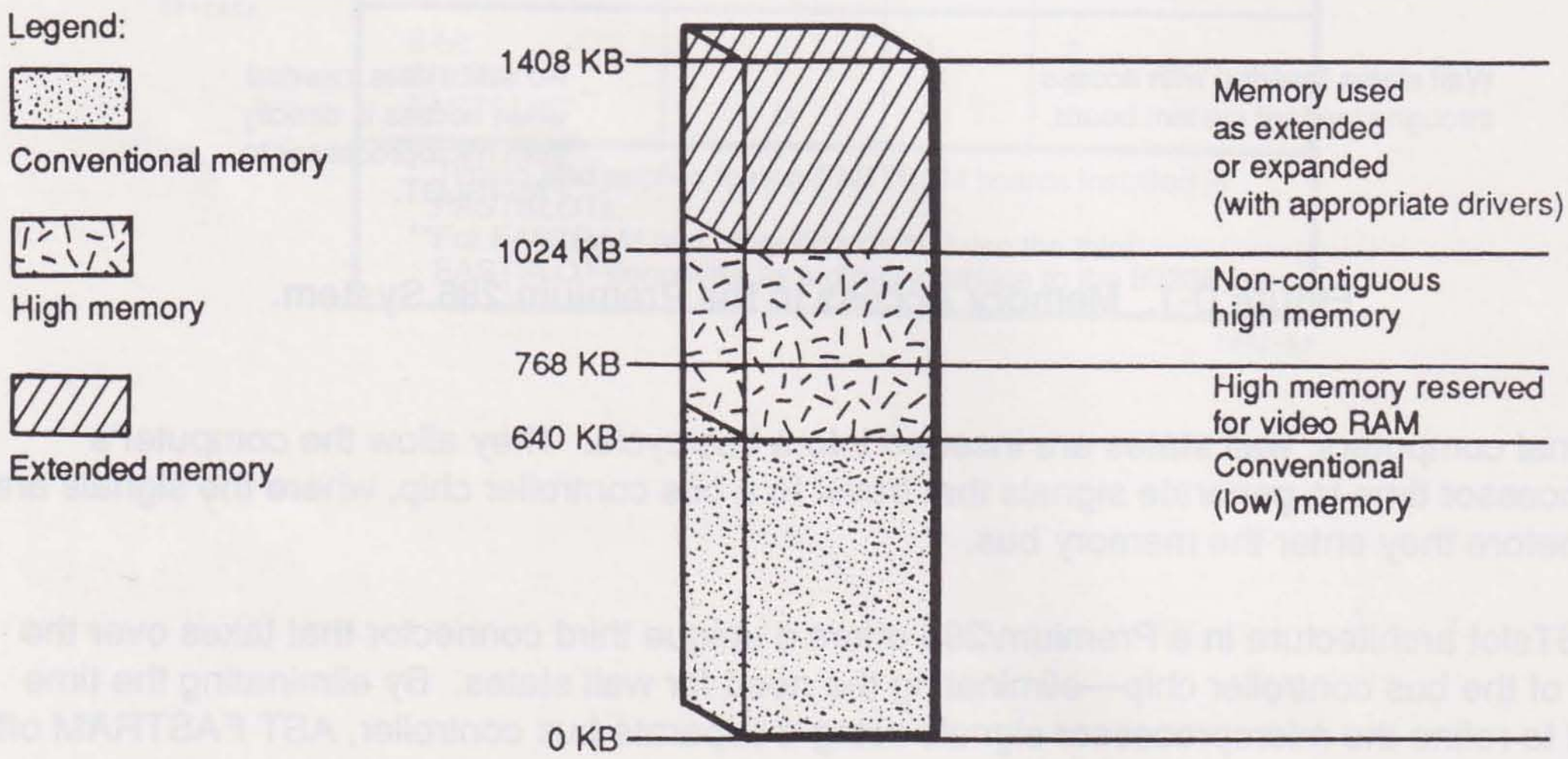


Figure D-2. Premium/286 Memory Map.

Memory from 1 to 16 MB, to which protected mode gives you access, is called *expansion memory*, which may be used as expanded or extended. Some of the memory between 640 KB and 1 MB supports PC housekeeping functions, such as video RAM and ROM, but there are large unused areas.

When you allocate physical memory on an AST EEMS board as expanded memory, AST EEMS software divides it into 16-KB memory blocks called *pages*. EEMS memory manager software, along with EEMS or EMS application software, swaps memory pages in and out of open *windows* in the area between 640 KB and 1 MB (Figure D-3).

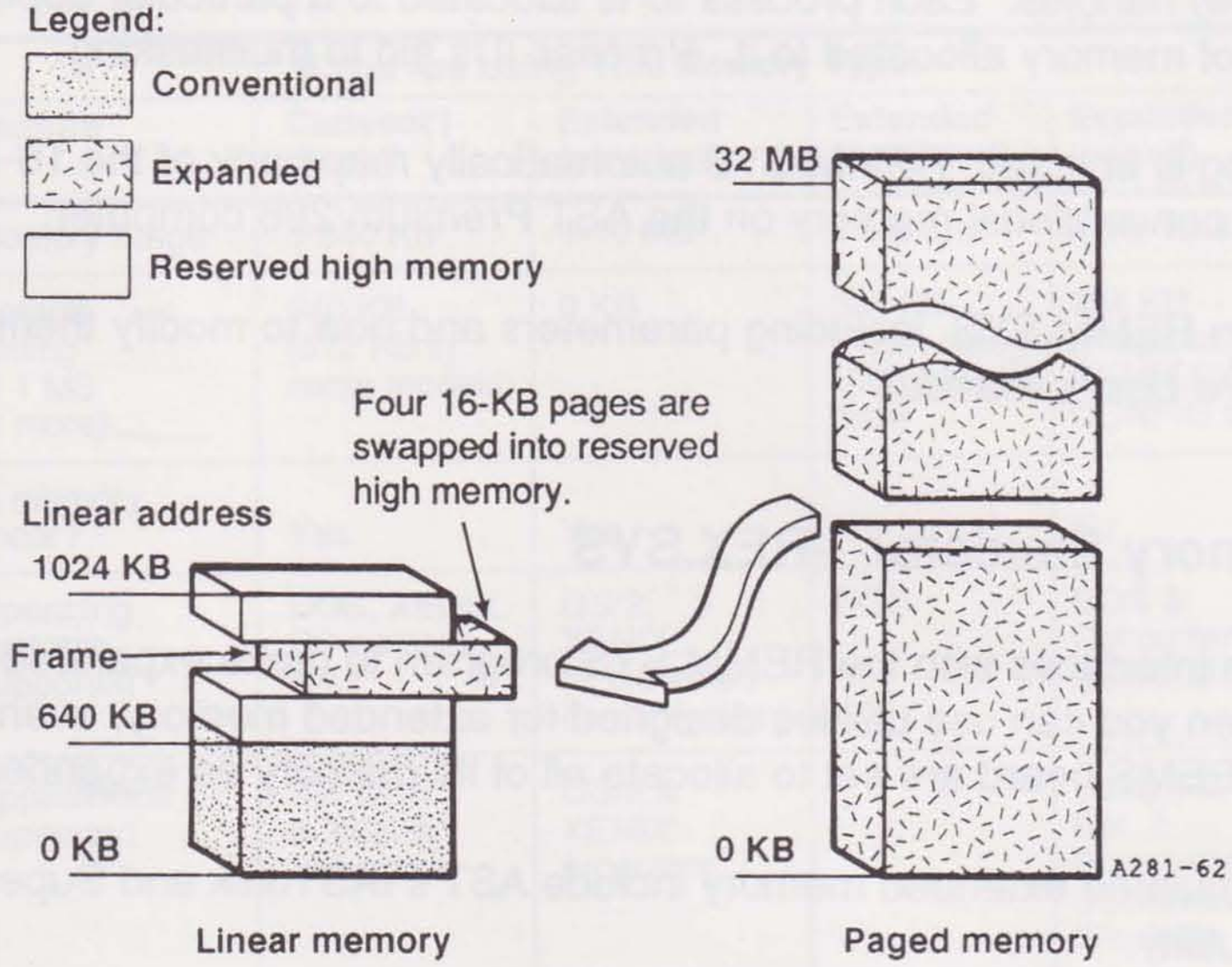


Figure D-3. Memory Paging Example.

To enhance performance further, the AST enhanced expanded memory manager can also take advantage of EEMS memory installed below 640 KB (such as FASTRAM memory). Memory paging allows your computer access to several MB of physical memory at RAM speeds.

You can allocate any portion of AST EEMS memory in 128-KB increments as linear memory. Any memory not allocated as linear is used by REMM software (if installed) as paged memory.

D.3 Expanded Memory Manager—REMM.SYS

The REMM.SYS software driver swaps memory between the AST EEMS board and computer memory by creating pointers, loading registers, and mapping windows from Premium/286 to expanded memory. REMM.SYS also conducts an integrity test on the expanded memory when the computer is turned on. This prevents memory that is not working properly from being used.

In order to retrieve a particular element of data, your application program must keep track of what page of expanded memory holds it. According to parameters supplied by the application program, REMM.SYS links windows in logical computer memory to pages of EEMS physical memory by means of the 64 mapping registers, the map control register, and the page registers.

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

Before memory mapping is enabled, REMM.SYS automatically maps any of the 16-KB pages that are to fill out the 640 KB of conventional memory on the AST Premium/286 computer.

For more information on REMM.SYS, including parameters and how to modify them, see your *AST Premium Utility Software User's Manual.*

D.4 Extended Memory Emulator—REX.SYS

The REX.SYS program interfaces with the REMM.SYS program to make expanded memory act like extended memory. Then you can use utilities designed for extended memory, even if the hardware switches on your AST EEMS board are set to allocate all of its memory as expanded memory.

Utilities that can use emulated extended memory include AST's fASTdisk and SuperSpool, and the MS-DOS VDISK.SYS utility.

REX.SYS intercepts calls on functions of the ROM basic input/output system (BIOS) that are designed for extended memory use. Then REX.SYS creates an interface to the REMM.SYS software so you can use expanded memory. For REX.SYS to function properly, REMM.SYS must also be installed and must precede REX.SYS in the CONFIG.SYS file.

For more information on REX.SYS, including parameters and how to modify them, see your *AST Premium Utility Software User's Manual.*

D.5 Memory Guide

Several types of memory may be used with Premium/286. Refer to Table D-2 to determine how best to use your memory.

Table D-2. Memory Guide.

	If You Are Using This Memory Type:			
Feature	**Convent'l (base)**	**Extended (physical)**	**Extended (emulated)**	**Expanded (paged)**
Memory range	0-640 KB	1-16 MB	8 MB total	8 MB total
Default setting (if 1 MB or more)	640 KB (512 KB in some models)	0 KB	384 KB (Avail. using Util. Software disk)	384 KB (Requires only REMM.SYS in CONFIG.SYS)
Is memory linear?	Yes	Yes	No	No
Operating systems supported	DOS, XENIX, PC-compat-ibles	OS/2, XENIX, all protected mode systems	DOS	DOS & Concurrent DOS/XM
Applications supported	Std DOS & XENIX programs	OS/2 & XENIX programs	–	Lotus 1-2-3 Rel. 2, Framework II, DESQview, Windows
Utilities supported	fASTdisk, SuperSpool, VDISK	fASTdisk, SuperSpool, VDISK	fASTdisk, SuperSpool, VDISK	–
REMM required?	No	No	Yes	Yes
REX required?	No	No	Yes	No
Need to set FASTRAM switches?	Yes	Yes	No	No
Need to run ASTSETUP?	Yes	Yes	No	No
AST memory expansion products	FASTRAM, Rampage Plus 286, Advantage®, Ramvantage®	FASTRAM, Rampage Plus 286, Advantage, Ramvantage	FASTRAM, Rampage Plus 286,	FASTRAM, Rampage Plus 286,

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TECHNICAL SPECIFICATIONS

The following abbreviations are used in this appendix:

alternating current	AC	inch	in
ampere	A	kilogram	kg
Centigrade	C	megahertz	MHz
centimeter	cm	milliampere	mA
direct current	DC	millimeter	mm
Fahrenheit	F	pound	lb
hertz	Hz	volt	V

System Unit			
Dimensions			
Width	19.25 in		(489 mm)
Height	6.25 in		(159 mm)
Depth	16.50 in		(419 mm)
Weight*	33.4 lb		(12.46 kg)
Operating Temperature	50—95°F		(10—35°C)
Humidity	20%—90% at 95°F (35°C) noncondensing		

* Weight of Premium/286 Model 70

220 Watt Power Supply

AC Input	47 Hz—63 Hz	
Voltage	Current (A)	Range (V)
115	Max 5.0	90—132
230	Max 3.0	180—264

DC Output	
Nominal Output (V)	Load Current (A)
+5	7.0—23.0
-5	0.0—0.5
+12	1.0—8.0
-12	0.0—0.5

Keyboard

Dimensions		
Width	19.25 in	(489 mm)
Height	1.5 in	(38 mm)
Depth	8.25 in	(210 mm)
Weight	4.12 lb	(183 kg)
Volts	5 V DC ± 5%	
Current	350 mA maximum	
Cable		
length retracted	50 in	(127 cm)
length extended	72 in	(183 cm)
interface	5-pin circular DIN-type connector located on the system back	

CONFIGURATION LISTING F

This appendix provides space in which to record information about devices installed in your computer.

Floppy disks

Floppy disk 1 Manufacturer/Model_____

❑ 5.25-inch ❑ 360-KB ❑ 1.2-MB
❑ 3.5-inch ❑ 720-KB ❑ 1.44-MB

Floppy disk 2 Manufacturer/Model_____

❑ 5.25-inch ❑ 360-KB ❑ 1.2-MB
❑ 3.5-inch ❑ 720-KB ❑ 1.44-MB

Floppy disk 3 Manufacturer/Model_____

❑ 5.25-inch ❑ 360-KB ❑ 1.2-MB
❑ 3.5-inch ❑ 720-KB ❑ 1.44-MB

Hard disks

Hard disk 1 Manufacturer/Model_____

Size (MB)_____
Drive type #_____
Controller format:
❑ ESDI ❑ AT-embedded
❑ ST-506 ❑ Other_____
Controller or driver/adapter installed in slot_____

Hard disk 2 Manufacturer/Model_____

Size (MB)_____
Drive Type #_____

Tape Backup System

Manufacturer/Model_____
Capacity (MB)_____
Cartridge Size_____
Software_____

Math Coprocessor

❑ Intel 80287

Add-in Boards

Primary Video Display Adapter Board
Manufacturer/Model Zymos SW 1 2 ON 3 4 5 OFF
Type of board (EGA, VGA, etc.) VGA
❑ 8-bit ☑ 16-bit
Installed in slot 3
Primary Video Display Adapter Switch Setting
❑ MONO ☑ COLOR

FASTRAM Memory Board #1
Amount of memory (KB or MB) 1 MB (01-37 FW)
Installed in slot 5
SW1 -1, 2, 3, 7 off SW1-4, 5, 6, 8, 9, 10 - on

FASTRAM Memory Board #2
Amount of memory (KB or MB)
Installed in slot

Other Board Mouse 4. LOGITECH
Manufacturer/Model LOGITECH
Type of board 8 bit
Port address 23C
DMA channel
IRQ 5
Memory address range
Installed in slot 4

Other Board Modem
Manufacturer/Model BT/424X (COM2)
Type of board 8 bit
Port address
DMA channel
IRQ
Memory address range
Installed in slot 1

Other Board
Manufacturer/Model_____
Type of board_____
Port address_____
DMA channel_____
IRQ_____
Memory address range_____
Installed in slot_____

Other Board
Manufacturer/Model_____
Type of board_____
Port address_____
DMA channel_____
IRQ_____
Memory address range_____
Installed in slot_____

Other Board
Manufacturer/Model_____
Type of board_____
Port address_____
DMA channel_____
IRQ_____
Memory address range_____
Installed in slot_____

ASTSETUP Selections

Conventional Memory:_____
Extended Memory:_____
Default Speed:
❑ 10 MHz ❑ 8 MHz ❑ 6 MHz
Boot Without Keyboard:
❑ Enable ❑ Disable
Num Lock After Boot:
❑ Enable ❑ Disable

Operating System_____
Version_____

Record the device drivers in your CONFIG.SYS file:

_____

_____

_____

_____

_____

_____

_____

Record the statements in your AUTOEXEC.BAT file:

_____

_____

_____

_____

_____

_____

_____

Record any other information about your system:

_____

_____

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NOTES

GLOSSARY

AST FASTRAM

The high-speed, three-connector system memory board that is standard in the Premium/286. FASTRAM uses all three connectors of the special FASTslot architecture on the system board. FASTRAM and FASTslot work together to ensure fast, compatible memory function. FASTRAM can be configured for many combinations of expanded and linear memory.

AST FASTslot architecture

The high-speed slots that use a special third connector as a direct interface to the 80286 microprocessor. The third connector is an addition to the standard AT bus and provides zero-wait-state operation at 6-, 8-, and 10-MHz operating speeds.

ASTMENU

A program of menus and help screens that provides easy access to ASTSETUP and other software programs provided by AST

ASTSETUP

A program you use to identify the system configuration

AT driver/adapter

The adapter into which an AT-embedded drive is plugged

AUTOEXEC.BAT file

A file on your boot disk that contains commands to be carried out automatically whenever you boot the computer.

Base I/O address

The address the computer uses to communicate with a device attached to it. Unless otherwise specified, each device installed in or attached to the computer uses its own unique I/O address.

Base memory

Memory up to 640 KB that is directly accessible by MS-DOS. Also called *conventional memory*.

Boot

To start your computer, by turning on the power or pressing the reset button on the front panel (a cold boot), or by pressing the <Ctrl>-<Alt>-<Del> keys while the computer is on (a warm boot).

Byte

The basic unit of measure for computer memory. A character—such as a letter, number, or punctuation mark—uses one byte of memory. Computer memory is often measured in *kilobytes* (approximately one thousand bytes) or *megabytes* (about one million bytes).

Each byte is made up of eight bits. For more information on bytes and bits, see an introductory book on computers.

CMOS

Complementary metal-oxide semiconductor memory. The memory that stores the configuration information entered when you run the ASTSETUP program. CMOS memory, which is battery-powered, uses very little power and stores the configuration even when the computer is turned off.

CONFIG.SYS file

A file on your boot disk that configures MS-DOS. The commands in a CONFIG.SYS file (if one exists on your boot disk) are carried out before those in an AUTOEXEC.BAT file.

A CONFIG.SYS file containing appropriate DEVICE commands must be present on your boot disk if you want to use expanded memory or create a fASTdisk (AST's hard-disk emulation in RAM).

Conventional memory

Linear memory between 0—640 KB. MS-DOS gives you direct access to all conventional memory. Your computer does not need any special software to use conventional memory. Also called *base memory*.

Default

For hardware, the way a switch or jumper is set at the factory. For software, the assumed value of a parameter unless specified otherwise.

Disk

The device used by the computer to store and retrieve information. "Disk" can refer to floppy disks, hard disks, and RAM disks.

Disk operating system (DOS)

The system that supervises the computer's operation, including handling input/output (I/O). MS-DOS is the most common operating system for the Premium/286. Application programs and users can request MS-DOS services. A user might request MS-DOS services to copy files or to format a disk. An application program might use MS-DOS to obtain keyboard input, write data to a file, or write data to a screen.

Because different versions of MS-DOS request services differently, it is important to be sure that your application software is compatible with the version of MS-DOS you are using.

Display adapter

The part of the computer that runs the monitor. AST Premium/286 display adapters support monochrome or enhanced color monitors.

Embedded drive

A hard disk drive with controller logic on the hard drive. The drive is connected to an AT driver/adapter.

Enhanced Small Device Interface (ESDI)

A type of hard disk drive with a portion of the disk controller built in to provide faster performance. The data transfer rate of an ESDI drive is at least 10 megabits per second.

Expanded memory

Memory beyond the 640-KB limit with access through *memory paging*. Special software, conforming to the EMS or EEMS specifications, is required to take advantage of expanded memory. Also known as paged memory.

Expanded memory manager

The program that performs *memory paging* for expanded memory. AST's expanded memory manager is called *REMM.SYS*.

Extended memory

System memory above 1 MB that can be directly accessed by some operating systems such as MS OS/2 and XENIX.

Using AST utility software, expanded memory can also emulate extended memory. This extended memory can then be used to create RAM disks and print spoolers under MS-DOS.

fASTdisk

AST's program that uses RAM to emulate a hard disk

Hard disk

Also called fixed or Winchester disks. Hard disks are attached to the computer, and can be installed or removed. Data written to a hard disk remains until it is overwritten.

Floppy disk

Removable disks, also called floppies or diskettes. The AST Premium/286 system can accommodate 360-KB (double-density) or 1.2-MB (high-density) 5.25-inch disks and 720-KB (double density) or 1.44 MB (high density) 3.5-inch disks.

I/O

Input/output. Refers to peripheral devices, such as printers, with access through an I/O address. (*See also base I/O address.*)

Jumper, Jumper block

A jumper is a wire, usually encased in plastic, that makes an electrical connection with other wires on a jumper block. A jumper block is a set of bare (uninsulated) pins on a circuit board.

Kilobyte (KB)

1024 bytes. An amount of memory such as 8 KB is shorthand for 8192 bytes.

Linear memory

Any sequential memory that can be addressed without *memory paging*. Linear memory includes both *conventional* and *extended memory*.

Master

An AT-embedded controller that directs input to and from the master drive and a second *slave* drive. The master is the default boot drive, and is designated by a jumper on the embedded controller.

Megabyte (MB)

1024 kilobytes. An amount of memory such as 2 MB is another way of saying 2048 kilobytes.

Memory paging

The process by which memory management software enables the computer to use *expanded memory*. The memory manager divides expanded memory into pages of 16 KB each. These pages are swapped, four at a time, into windows (areas that are not in use) in the 1-MB address range recognized by DOS.

Multitasking

The ability to perform two or more tasks at the same time, as when printing one file while entering data in another.

Parity checking

A method of double-checking the accuracy of information stored in the computer's memory. This feature should not be disabled unless there is a special reason to do so.

Power-On Self-Test (POST)

A test performed by the computer to check system integrity whenever you turn on power

Print spooler

A program that frees your computer for other tasks while you print a file. AST's *SuperSpool* program is a print spooler.

A print spooler sends the file to be printed to a reserved area of memory called a buffer, rather than the printer. The spooler then sends the file from the buffer to the printer. Once the file is stored in a buffer, the computer does not have to wait for the printer to finish printing the file; it is immediately available for other work.

Random-access memory (RAM)

The computer system's memory, including *conventional, expanded*, and *extended memory*. You can write data to and read it from RAM. (See also *read-only memory*).

RAM disk

A program that enables you to use part of the computer's memory as if it were a disk drive. AST's *fASTdisk* program is a disk emulator.

Reading and writing in RAM is faster than on a literal disk. Storing information on a RAM disk can speed up applications that use disk information frequently.

RAM disks are erased when the computer is turned off or rebooted. This means that you must save any data you want to keep on a *floppy* or *hard disk*.

REMM.SYS

AST's enhanced expanded memory manager program. REMM.SYS performs the *memory paging* that allows software to work with expanded memory. REMM.SYS is compatible with EMS 3.2, EEMS, and LIM 4.0 expanded memory specifications.

REX.SYS

AST's extended memory emulator. REX.SYS allows expanded memory to emulate extended memory.

Read-only memory (ROM)

Permanent computer memory that can be read but not overwritten. It is dedicated to a particular function, for example, the instructions for starting the computer when you first turn on power.

Slave

An AT-embedded drive controller that is disabled, and thus receives direction from a *master* drive controller. A slave drive is designated by a jumper on the embedded controller.

Starting memory address

For access to memory, the computer must specify a particular location—the memory address. The first memory addresses are assigned to system memory. System memory starts at 0 KB.

Starting addresses for devices added later depend on how much memory is already installed in the computer. For example, if your AST Premium/286 already includes 2 MB of system memory, the starting address for a second memory board would be 2 MB.

SuperSpool

The AST program that enables you to use part of computer memory as a *print spooler*.

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