# *TeleVideo® AT User's Manual*

*TeleVideo Part Number 128150-00 Rev. B*

*August 1985*

TeleVideo Systems, Inc.

***Disclaimer***
*TeleVideo Systems, Inc. makes no representations or warranties with respect to this manual. Further, TeleVideo Systems, Inc. reserves the right to make changes in the specifications of the product described within this manual at any time without notice and without obligation of TeleVideo Systems, Inc. to notify any person of such revision or changes. All statements, technical information, and recommendations in this document and in any manuals or related documents are believed to be reliable, but the accuracy or completeness thereof is not guaranteed.*

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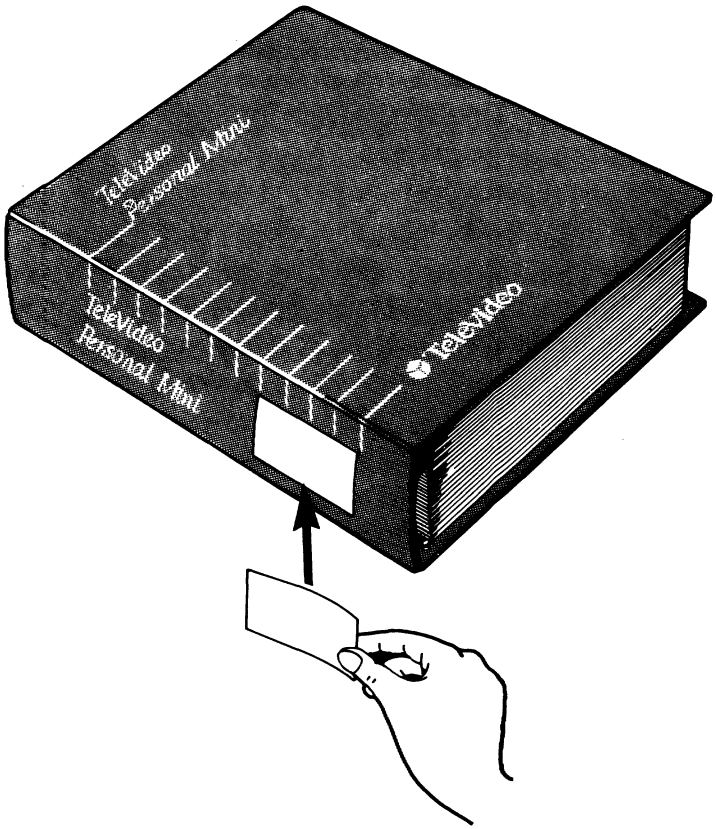
*This device is classified as either a Class A or Class B computing device. Class A devices may only be used in commercial, business, or industrial environments, whereas Class B devices have been approved by the Federal Communications Commission for use in residential areas by the general public. Check the FCC label on the bottom of your terminal to ensure that you have purchased the version appropriate for your end-use environment.*

***Class B Warning***
*This peripheral equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against interference to radio and TV reception when operated in a residential environment. The use of good shielded I/O cables is required.*

*If this equipment does cause interference to radio or television the user is encouraged to correct the interference by reorienting the receiving antenna, relocating the computer with respect to the receiver, moving the computer away from the receiver, or plugging the computer into a different outlet so that computer and receiver are on different branch circuits. If necessary, the user should consult the dealer or qualified radio/television technician for suggestions.*

*Call TeleVideo toll-free (800) 521-4897.*

Please attach this label to the spine of the binder. See the illustration below for the correct location.



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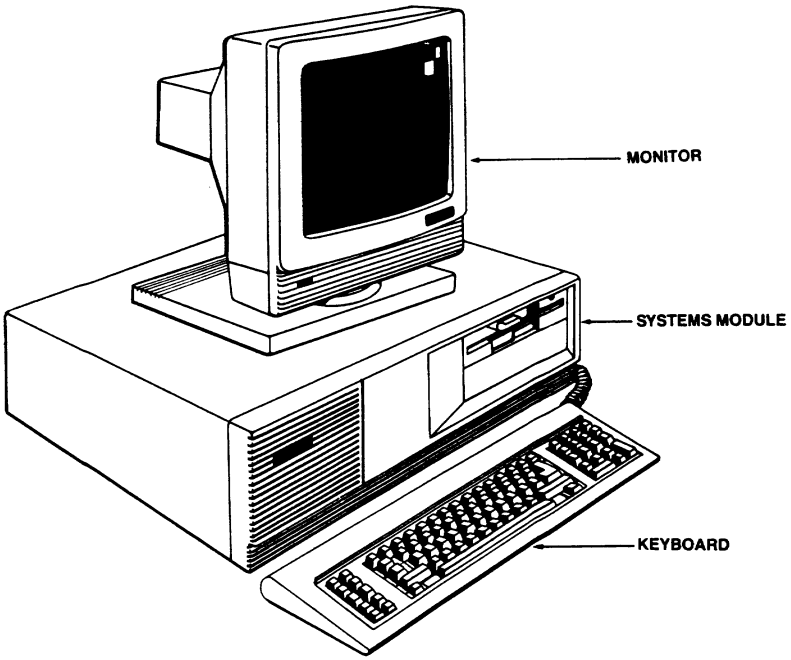
# INTRODUCTION

The TeleVideo AT is a powerful, professional, high-speed computer system designed to function in a standalone or multi-user environment. Fully compatible with the IBM AT, the TeleVideo AT provides performance features that surpass similar systems.

**Figure 1**
**TeleVideo AT**




The TeleVideo AT is designed to provide processing speed and system flexibility available in no other comparable system. A variety of models and configurations are available; a summary of the AT's key features follows:

* Intel 80286 microprocessor (8 MHz, switch-selectable to 6-MHz operation)

* Optional Intel 80287 numeric coprocessor

* Sockets for 640K RAM

* 40-MB or 20-MB hard disk drive

* 1.2-MB or 360-KB diskette drives

* Serial and parallel communications ports

* Eight expansion I/O slots (six IBM PC/AT-compatible 16-bit slots, two IBM PC/AT-compatible 8-bit slots)

* 14-inch, high-resolution, tilt-and-swivel monitor with graphics

* Detached keyboard with LEDs

* Disk controller that supports two fixed and two diskette drives

* Interface card for use in a Personal Mini network

* MS-DOS 3.1

* GW-BASIC

**ABOUT THIS MANUAL**

This manual assumes you are familiar with operating a personal computer, and that you understand the disk operating system (DOS) for the computer.

Contained here is important information that you must know before attempting to operate the AT system. It is arranged in the order you would normally follow in setting up your AT. Follow all instructions carefully.

**Installing the AT** tells how to unpack and install your AT.

**Running The SETUP Program** tells how to perform the setup procedure for your AT.

**Operating the AT** describes the system components and how to load the operating system. **This chapter contains important information on the high-capacity diskettes and must be read before you attempt to use any diskette in your AT.**

**Initializing the Hard Disk** describes the disk initialization procedure, for those systems that are equipped with one or two hard disk drives.

**The Keyboard** describes operating the AT from the keyboard.

**Troubleshooting** provides basic service and maintenance information, plus a list of system error messages.

At the end are appendices for AT Specifications (A), Connector Pin Assignments (B), Changing The Fuse (C), Parallel Printer and Serial Communications Port Address Jumper Configurations (D) and DIP Switch Settings (E).

## SPECIAL NOTES

**NOTE:** emphasizes important information.

**CAUTION!** indicates vital information concerning possible damage to the system or loss of data. Read carefully and follow the instructions.

**STOP! indicates vital information concerning your safety. Follow instructions.**

## OTHER TELEVIDEO AT PUBLICATIONS

**AT Technical Reference Manual**
TeleVideo Part Number 128151-00

**GW-BASIC User's Manual**
TeleVideo Part Number 125681-01

**MS-DOS 3.1 User's Manual**
TeleVideo Part Number 128154-00

# 1 UNPACKING AND INSTALLING THE AT

Your AT was tested and inspected at the TeleVideo factory before it was packed for shipment. Inspect it carefully for possible shipping damage. Make sure you have received all the items checked on the packing list.

After identifying the parts of your computer, follow the directions outlined in this chapter to set it up. They include finding a suitable location, checking and installing the components, attaching cables and installing options.

## UNPACKING

The AT system is shipped in two boxes. One box contains the computer and the other contains the keyboard.

If you purchased the TeleVideo AT monitor with a high-resolution graphics board, they will be shipped in a third box.

**DO NOT USE LONG, SHARP OR POINTED OBJECTS TO OPEN THE BOXES AS THEY MIGHT DAMAGE THE ENCLOSED SYSTEM.**

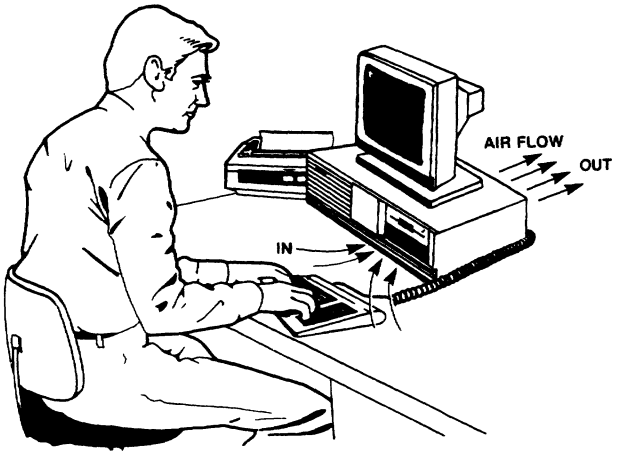
Carefully unpack the boxes and save all packing material and static protective wrappers.

**CAUTION!** The graphics (monitor) board may be damaged by static electricity. Do not remove the static protective wrapper from the board until you are ready to install the board (refer to section on graphics/color - monitor - adapter).

## SELECTING THE RIGHT LOCATION

Select a sturdy, level surface. Leave at least four inches of free space around the computer for proper air flow.

**Figure 1-1**
**Example Work Space**




**ENVIRONMENT**

The AT operates best at temperatures and humidity levels in which you are also comfortable. Sudden and drastic temperature changes may adversely affect your stored data.

Computers require a clean environment, free of contaminants such as dust, smoke, and carpet fuzz. Excessive moisture or oil particles in the air can hinder the performance. Keep your computer away from the floor where dust or carpet fuzz would be more likely to get into the floppy disk drive.

Locate your computer at least five feet from other computing equipment, electrical appliances, or equipment such as elevators, radio transmitters, or telephones, that generate magnetic fields.

## THE BATTERY AND GRAPHICS/COLOR ADAPTER

Your AT system requires that a battery and graphics/color monitor adapter be installed prior to operation. Your system is shipped to you with a battery installed. The following instructions are provided to your technician for installation of the graphics/color monitor adapter, or should the battery ever need replacment.

**STOP! THERE ARE NO USER SERVICEABLE PARTS IN THE UNIT. Refer all service to a qualified technician.**

### General

1. **Turn off the power and unplug the unit.**

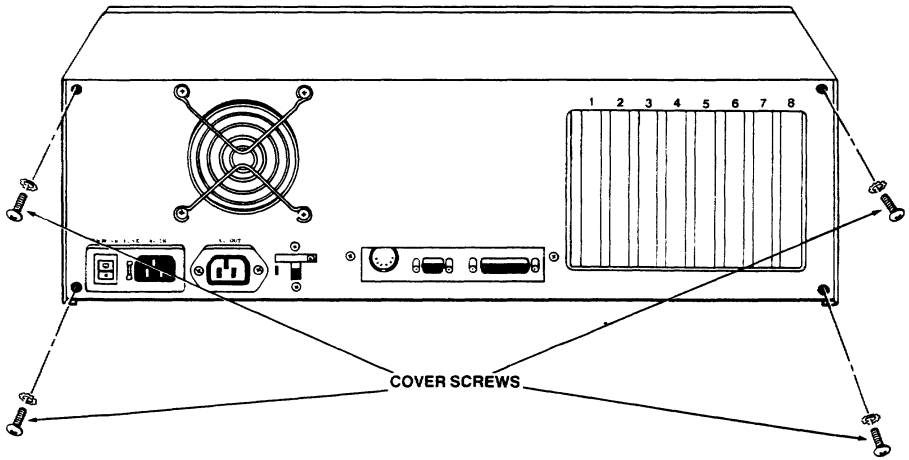
2. Disconnect peripheral devices connected to the computer.

3. Place the AT system on a workbench or table with at least a 3 x 3 foot work area. Position the AT with the disk drive side facing you.

### Removing the Cover

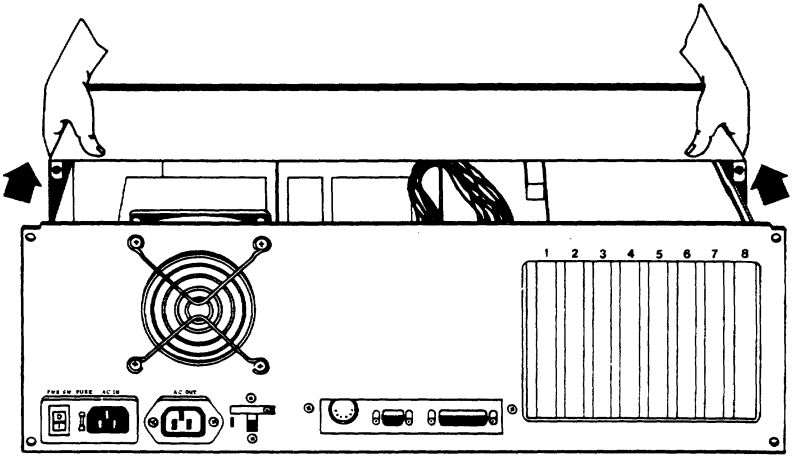
1. Remove the four mounting screws on the rear of the unit.

**Figure 1-2**
**Removing the Rear Screws**



2. With the AT facing you, slide the top cover forward.

**Figure 1-3**
**Removing the Cover**




## Replacing a Battery

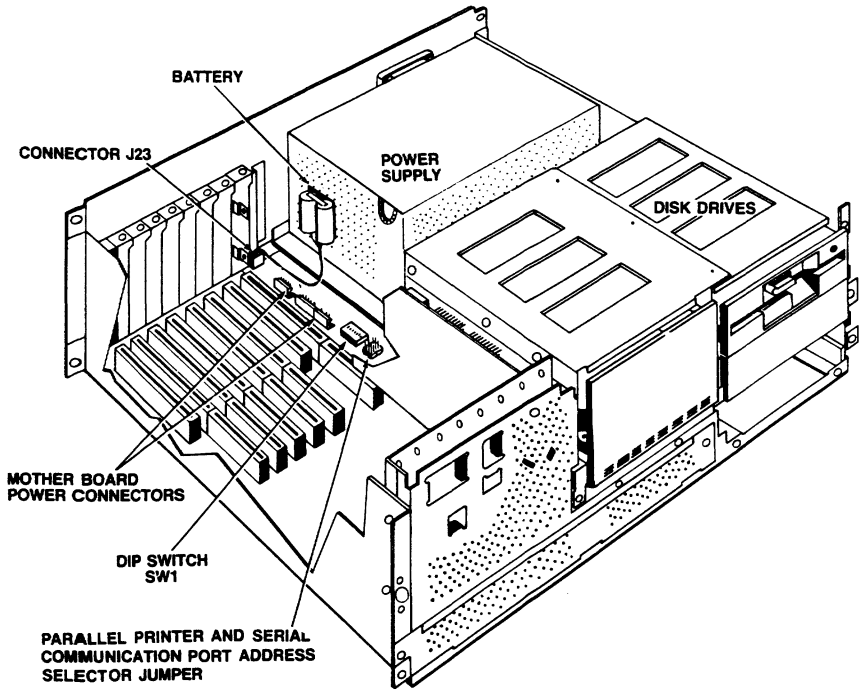
1. Remove the old battery.

2. Connect the battery leads to connector J23 on the mother board. See Figure 1-4.

   **NOTE:** The battery leads may be plugged onto connector J23 in either direction.

3. Mount the battery on the left side of the power supply. See Figure 1-4.

**Figure 1-4**
**Connecting the Battery**




## Installing the Graphics/Color (Monitor) Adapter

1. Locate the second or eighth expansion slot (marked 2 or 8 on the rear panel) to the left of the power supply. See Figure 1-3.

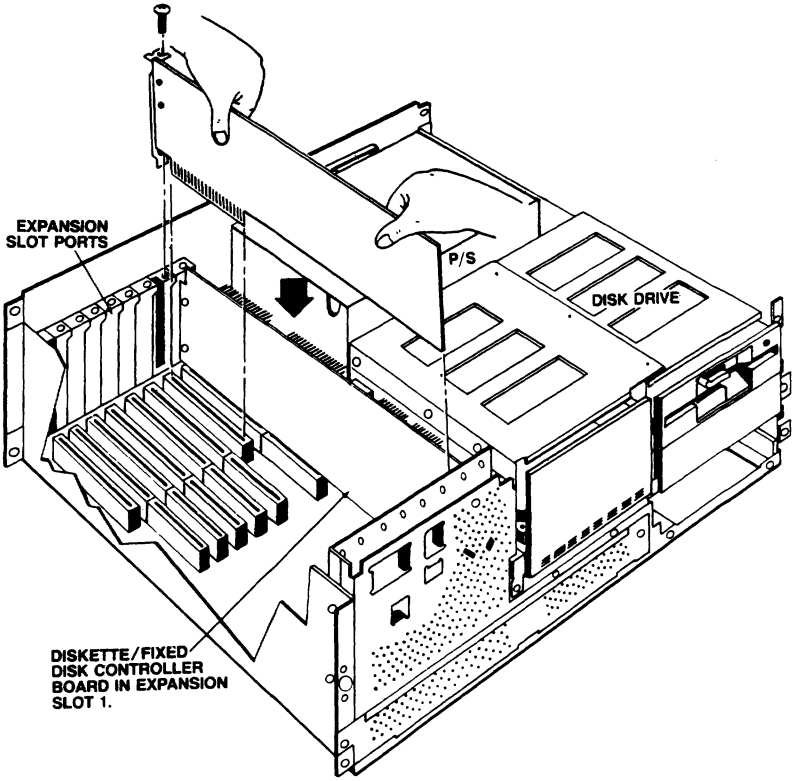
   **NOTE:** You may use any available expansion slot for the adapter, but it is recommended that you use either of the eight bit slots (2 or 8) and reserve the 16-bit slots for those devices.

2. Unscrew and remove the metal expansion slot cover.

3. Without removing the static protective wrapper, hold the board in one hand while you touch your other hand to the metal frame of the computer. This will prevent static damage to the board when inserting it into the expansion slot.

4. Remove the plastic wrapper and insert the board into the slot. Secure it in place with the screw removed in step two.

**Figure 1-5**
**Inserting the Graphics Board**




5. Locate the DIP switch SW1 on the mother board (see Figure 1-4) to the left side of the power supply. If the primary display will be used with a graphics/color adapter, set position 2 on the switch to the **CLOSED** position. If the primary display will have monochrome or no graphics capability, set position 2 to the **OPEN** position. Refer to Appendix E for DIP switch settings.

**NOTE:** This switch setting will be reflected in the SETUP menu during execution of the SETUP program in Chapter 2.

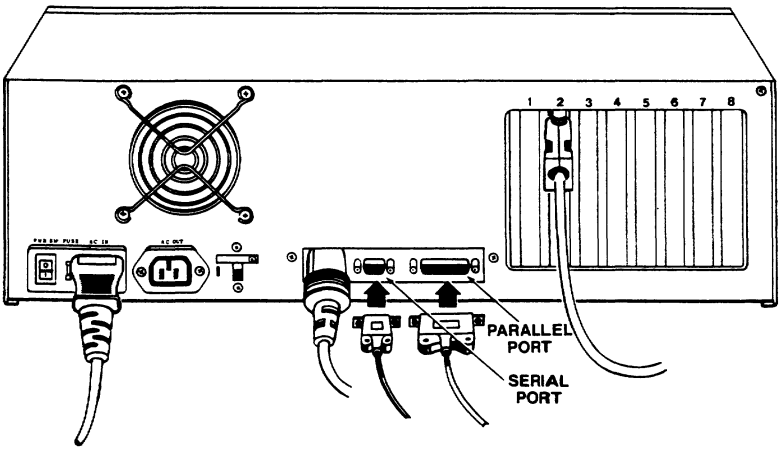
6. If you have further options to install, proceed to the **INSTALLING OPTIONS** section of this chapter.

7. Replace the cover and secure with screws.

## CABLES AND PERIPHERALS

The TeleVideo AT comes equipped with built-in connectors for attaching parallel and serial data communications peripherals. Refer to Appendix B for specifications on these ports.

**Figure 1-6**
**Serial and Parallel Communication Ports**




Adding optional expansion boards can increase the number of peripherals that can be attached to your computer.

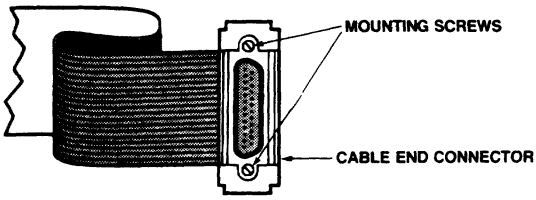
This section provides instructions for connecting these peripheral devices.

## Attaching Cables

Cables are needed to connect peripherals to your computer. The types of cables needed are determined by the requirements of the peripheral devices. Your computer store representative can supply the appropriate cables for attaching peripheral devices.

Many cables have D-shaped end connectors (see Figure 1-7). These fit onto the D-shaped pin connectors on the rear panel of your computer. To install this type of cable, fit the cable connector onto the rear-panel connector. Then gently, but firmly push it on as far as it will go.

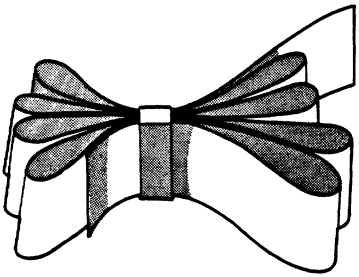
**Figure 1-7**
**D-shaped Cable Connector**




Some connectors come supplied with mounting screws in the flange on the sides of the D-connector housing. These screws line up with the threaded holes in the rear-panel connectors. The screws need only be finger tightened. This prevents a cable from being accidently pulled from the computer.

Leave some slack as you connect the cables. If you are using a round cable, coil it loosely and secure it with a rubberband. If you are using a flat, ribbon cable, fold it accordion-style, as shown in Figure 1-8. Coiling ribbon cable can adversely affect system performance.

**Figure 1-8**
**Correctly Folded Excess Ribbon Cable**



## Parallel Printer

The connector on the back of the AT labeled **PARALLEL PRINTER**, is designed to connect to a Centronix-type parallel printer. The PARALLEL PRINTER connector uses a 25-pin D-shell connector instead of the standard 36-pin parallel printer cable connector (see Appendix B for connector pin assignments); therefore, a special printer cable is needed. Your computer store representative can supply you with the correct cable for connecting your printer to the AT.

When you get the proper printer cable, you can connect the printer by attaching the 25-pin connector end of the cable to the PARALLEL PRINTER connector, and the other end to the connector on the printer.

For information on operating your printer, refer to the user's manual that was supplied with your printer.

The AT's integral parallel connector is set as the primary parallel printer port. Some expansion boards, providing an additional port, are preset as the primary port. In this case, a qualified technician may change the integral parallel port addres to be the secondary port. **STOP! There are no user serviceable parts in the unit.**

To change the port selection, follow the steps outlined for removing the computer cover in the section on the battery and graphics/color adapter. Locate the jumper pins directly in front of the DIP switch on the mother board (Fig 1.4). There will be two columns of jumpers labeled W1 A,B,C,D and W2 A,B,C,D. W2 is the jumper for the parallel printer. Move the two small black jumper connectors from the A and B positions to the C and D positions (Refer to Appendix D). Replace the cover.

**Modem and Serial Printer**

The connector on the back of the AT, labeled **RS-232C**, is designed to connect to a modem or serial printer. The RS-232C connector uses a standard 9-pin D-shell connector (see Appendix B for connector pin assignments). To connect a modem or serial printer, attach one end of an RS-232C cable to the connector labeled RS-232C and the other end to the RS-232C connector on the modem or printer.

To operate the modem, refer to the manuals supplied with the modem and communications software package you are using. In some cases, you may have to use the MS-DOS MODE command to set up a serial port for modem connection (see your MS-DOS User's Manual).

If you are connecting a serial printer, make sure you have set up the operating system to run at the same baud rate and word format (number of data bits, parity, etc.) to interface with the printer or other peripheral device. Consult the MS-DOS User's Manual (MODE command) and the printer user's manual.

The AT's integral serial port address is set as the primary serial port. Some expansion boards, providing an additional port, are preset as the primary port. In this case, a qualified technician may change the integral port address to be the secondary port. **STOP! There are no user serviceable parts in the unit.**

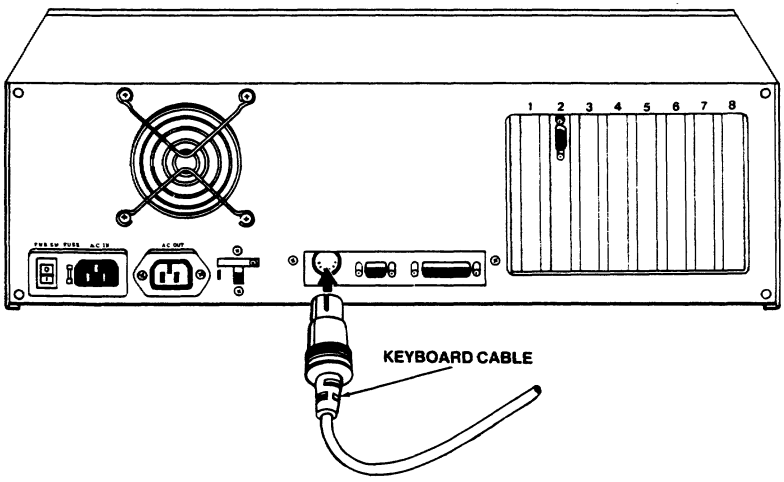
## SETTING UP YOUR COMPUTER

After installing the components and options and selecting a good location, you are ready to set up your AT.

### Attaching the Keyboard

Set the keyboard next to the computer. Insert the end of the coiled cable into the round connector port on the back of the system module. The notched end of the coil connector must be at the top to mate with the port connector.

**Figure 1-9**
**Connecting the Keyboard Cable**



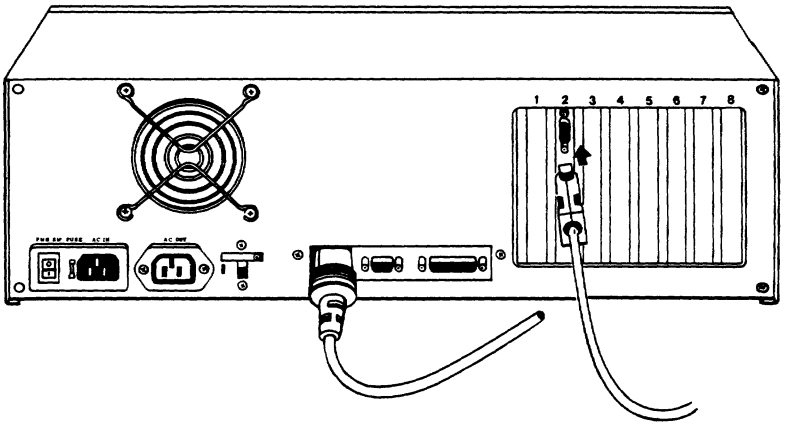

### Attaching the Monitor

1. Place the monitor on top of the system module or in a convenient location nearby.

2. Attach one end of the monitor cable to the monitor (if cable is detachable).

3. Attach the other end of the monitor cable to the connector port for the graphics/color board located in expansion slot 2 or 8.

Figure 1-10
Connecting the Monitor Cable



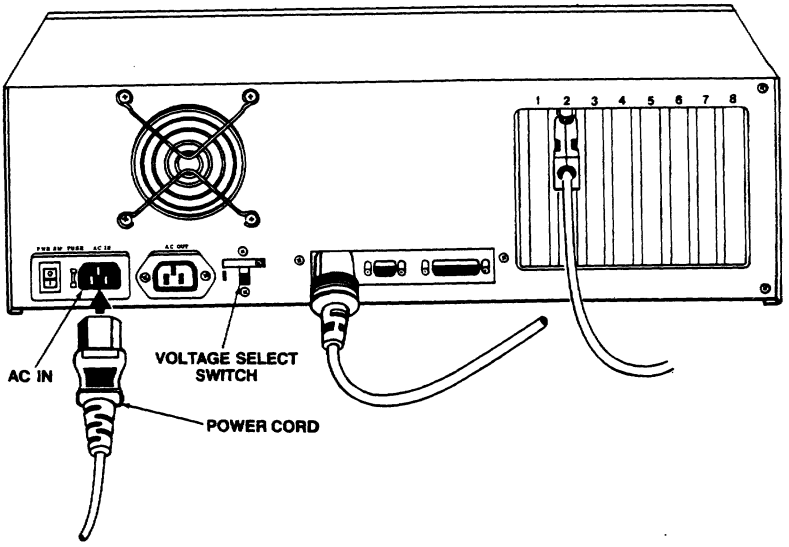
## Attaching the Power Cord

1. Check that the voltage selector switch is set correctly.

2. Locate the **AC IN** attachment on the back of the system module.

3. Plug in the power cord.

Figure 1-11
Connecting the Power Cable



## INSTALLING OPTIONS

Optional boards, memory chips, diskette drives and fixed disk drives can also be installed into the AT as features or enhancements to your computer. Examples are memory boards to expand memory beyond 640K and a Personal Mini AT networking card for connecting the AT into a Personal Mini network system.

**STOP! THERE ARE NO USER SERVICEABLE PARTS IN THE UNIT. Refer all service, including installation of options, to a qualified technician. The following installation instructions are provided for the convenience of your technician.**

Once the installation of all options is complete, run the **SETUP** program outlined in Chapter 2.

**Note:** When installing additional drives, check installation instructions provided with the drive or contact your dealer for the correct jumper connections and terminating resistors settings.

### General

1. **Turn off the power and unplug the unit.**

2. Disconnect peripheral devices connected to the computer.

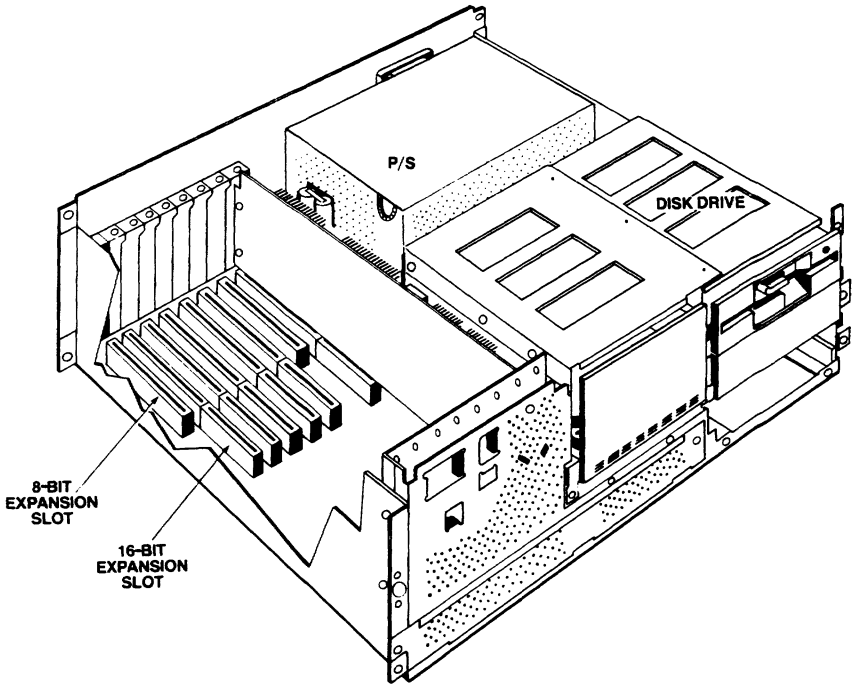
3. Place the AT system on a workbench or table with at least a 3 x 3 foot work area. Position the AT with the disk drive side facing you.

### Removing the Cover

1. Remove the four mounting screws on the rear of the unit. (See Figure 1-2)

2. With the AT facing you, slide the top cover forward. (See Figure 1-3)

**Figure 1-12**
**8-Bit and 16-Bit Expansion Slots**




## Installing Option (Expansion) Boards

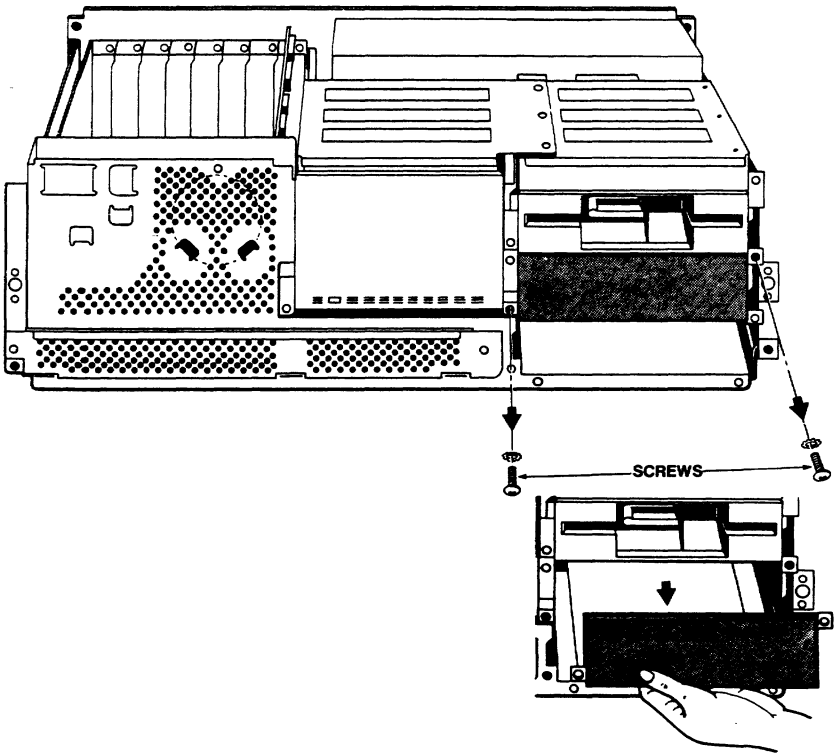
Option boards should be installed in the same manner as the graphics/color board described earlier in this section on page 1.2.

The six sets of tandem (one long, one short) expansion slots are for 16-bit expansion boards. Refer to Appendix B for pin configurations

## Installing the Second Diskette Drive

1. Remove the plastic plate covering the drive opening.

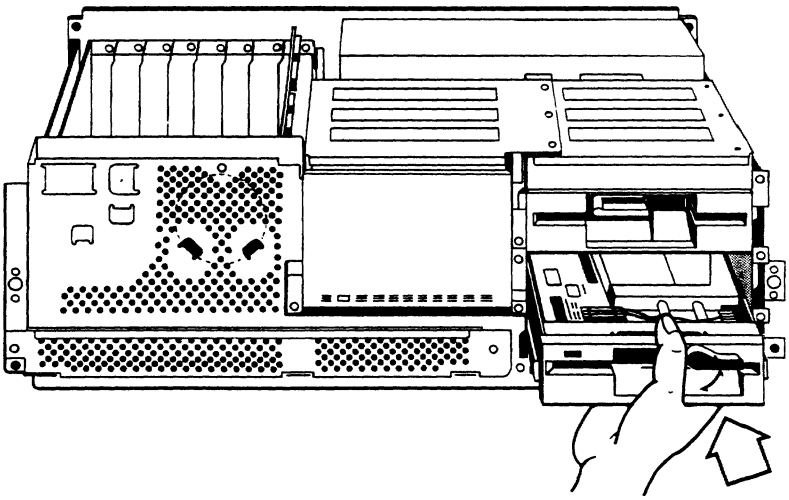
Figure 1-13
Removing the Cover Plate




2. Assemble the plastic guide rails on the sides of the drive using the Drive Mounting Kit (AT). Contact your dealer or sales representative for the drive mounting parts required.

3. Slide the drive into the opening.

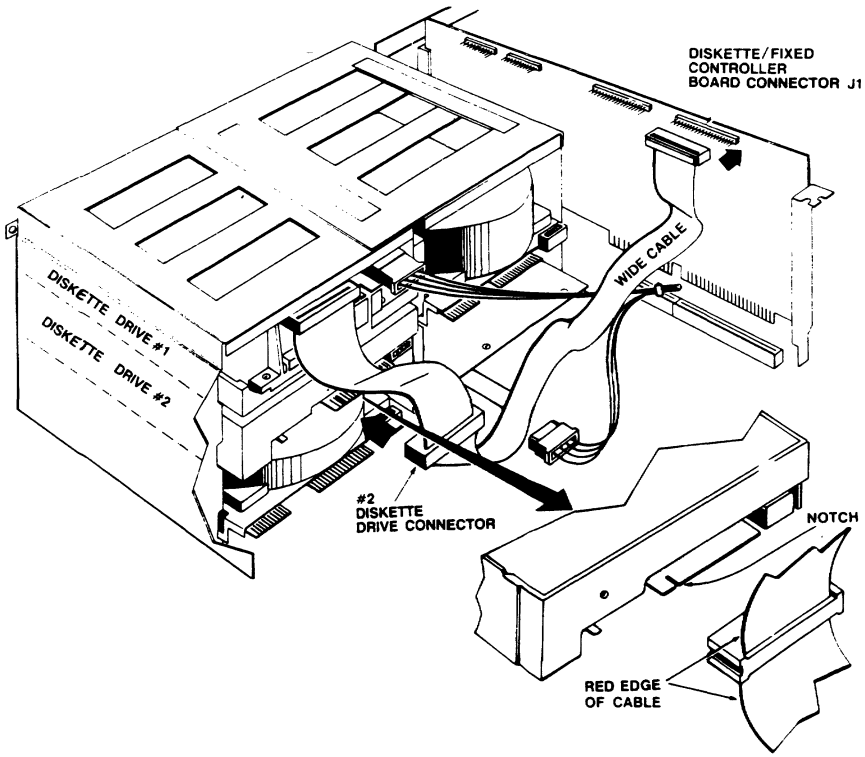
**Figure 1-14**
**Inserting the Diskette Drive**



4. Secure the drive in place using the metal brackets and screws provided with your Drive Mounting Kit and screws.

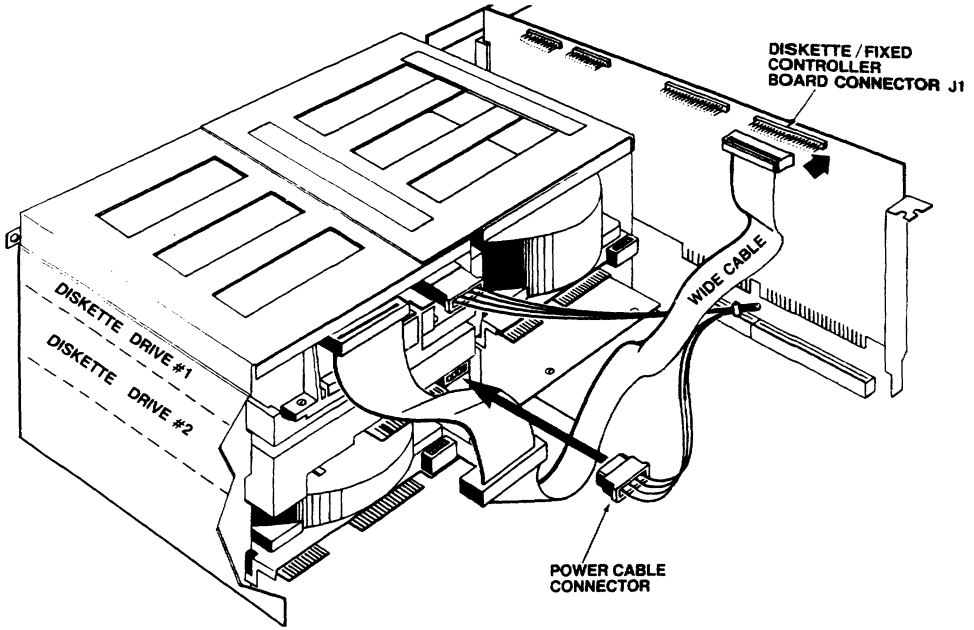
5. Locate the flat ribbon cable attached to the first diskette drive. Find the empty connector midway on the cable. Attach that connector to the connector on the rear of the second drive. As you face the drive, the red edge on the cable must be connected to the number one pin position on the diskette drive. The number one pin position is at the end of the connector closest to the notch.

Figure 1-15
Connecting the Ribbon Cable




6. Locate one of the power cables from the power supply. These are white, four-pin connectors with four wires attached. Attach the cable to the rear of the drive. It will fit in only one direction.

**Figure 1-16**
**Attaching the Disk Drive Power Cable**




7. Locate one of the green grounding wires at the top of the metal disk drive mounting frame and connect it to the rear of the diskette drive.

8. Note the type of diskette drive you are installing, high capacity or double sided, for later updating of the SETUP program.

**Installing the First Fixed Disk Drive**

1. Assemble the plastic guide rails provided in your Drive Mounting Kit to the sides of the fixed drive. Contact your dealer to obtain the proper installation kit.

2. Insert the fixed drive into the large opening to the left of the diskette drives.

3. Secure the drive in place using the screws and brackets provided in your kit.

4. Attach one end of the wide cable provided in your kit to the wide connector on the back of the drive (see Figure 1-17). The red edge of the cable must be attached to the number one pin position on the fixed drive connector. This pin position will be at the notched end of the connector.

   **NOTE:** There will be an extra connector on the wide cable located between the two end connectors. This is reserved for installation of a second fixed drive.

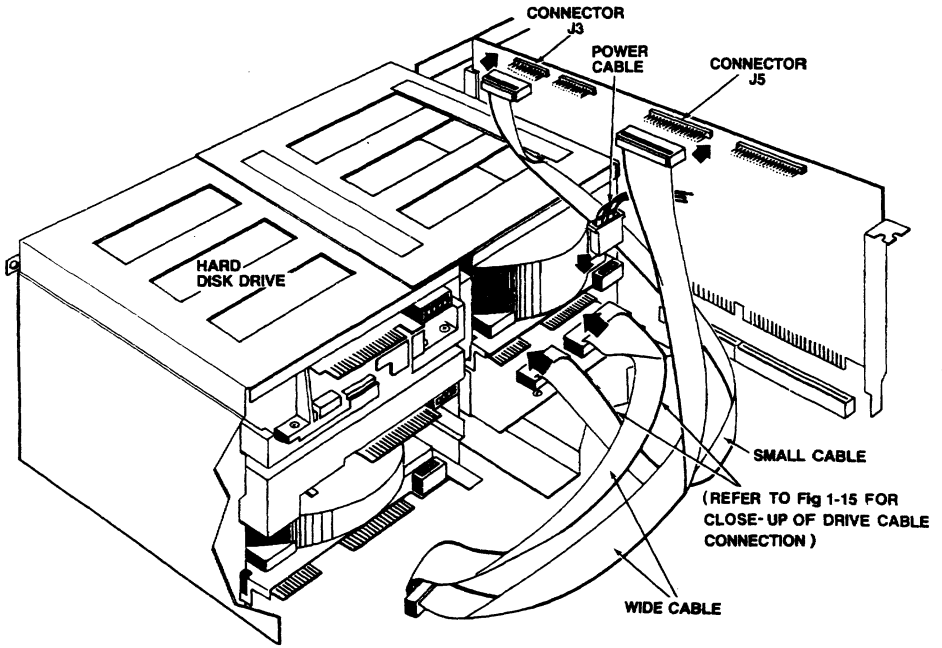
5. Attach the other end of the wide cable to connector J5 on the diskette/fixed disk controller board located in expansion slot 1. The red edge of the cable must be connected to pin 1 of connector J5. This position is marked next to the connector.

6. Attach one end of thin cable provided in your kit to the smaller connector on the back of the drive (see Figure 1-17). The red edge of the cable must be attached to the number one pin position on the connector. This pin position will be at the notched end of the connector.

7. Attach the other end of the small cable to connector J3 located on the diskette/fixed disk controller board. The red edge of the cable must be connected to pin one of connector J3. This position is marked next to the connector.

8. Attach the power cable from the power supply to the rear of the drive (see Fig 1-17). The cable is a white, four-pin connector with four wires attached.

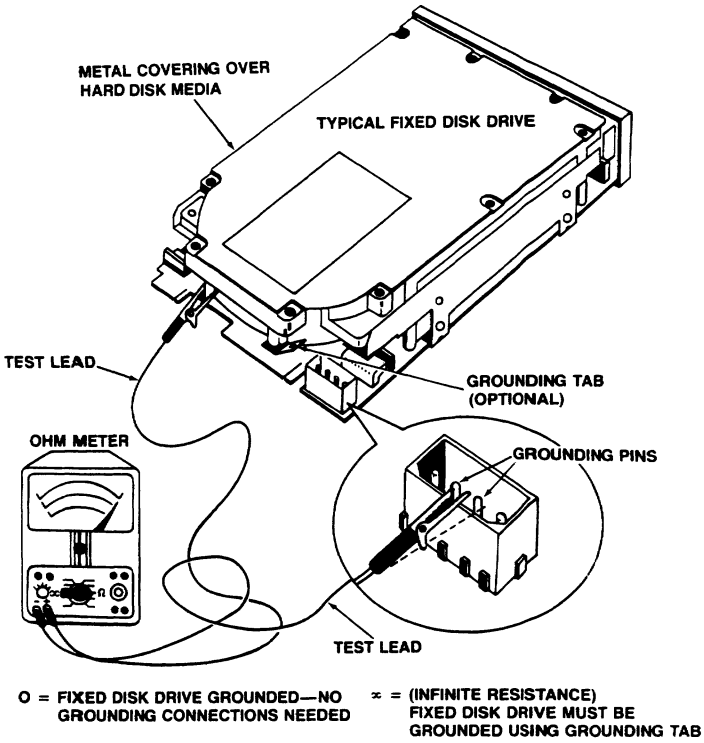
**Figure 1-17**
**Cabling the Fixed Disk Drive**




9. Check the ground connection of the fixed disk drive. The grounding pins of the power connector to the drive must be shorted to the chassis (metal cover) of the fixed disk drive. This can be easily checked using an ohmmeter (Refer to Figure 1-18, Testing the Fixed Disk Ground Connection). If the fixed disk drive has not been grounded, connect the grounding wire to the grounding tab.

10. Write down the bad cylinder and head information from the label provided on the fixed drive for use in initializing the fixed drive in Chapter 3.

Figure 1-18
Testing the Fixed Disk Ground Connection




## Installing the Second Fixed Disk Drive

1. Assemble the plastic guide rails provided in your Drive Mounting Kit to the sides of the fixed drive. Contact your dealer to obtain the proper kit.

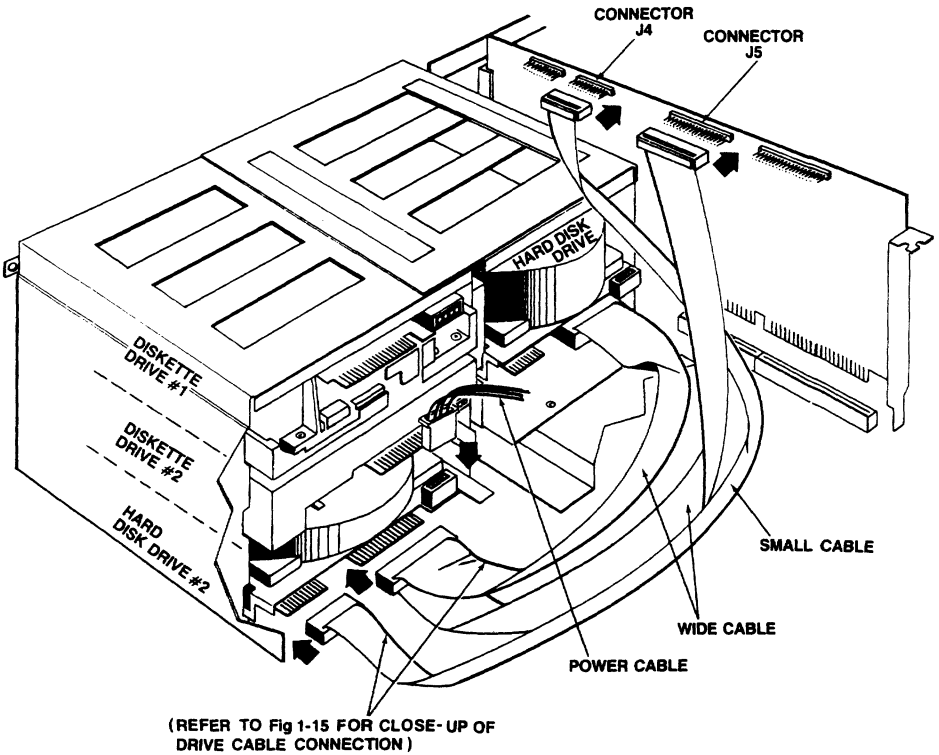
2. Insert the drive into the last opening below the first diskette drive. **NOTE:** The plastic face plate on the front of the drive must be permanently removed prior to reassembly of the AT cover.

3. Secure the drive in place using the mounting brackets and screws provided in your mounting kit.

4. Locate the wide cable on the back of the first fixed disk drive (see Figure 1-19). Locate the loose connector about midway in the cable. Attach that connector to the rear of the second fixed drive. The red edge of the cable must be attached to the number one pin position on the fixed drive connector. This pin position will be at the notched end of the connector.

5. Remove the small cable from the Disk Mounting Kit. Attach one end to the small connector on the rear of the disk drive (see Figure 1-19). The red edge of the cable must be attached to the number one pin position on the fixed drive connector. This pin position will be at the notched end of the connector.

**Figure 1-19**
**Cabling the Second Fixed Drive**



6. Attach the other end of the cable to connector J4 on the diskette/fixed disk controller board located in expansion slot 1. The red edge of the cable must be connected to pin one of connector J4. This position is marked next to the connector.

7. Attach the white, four-pin power cable to the rear of the drive.

8. Check the ground connection of the fixed disk drive. The grounding pins of the power connector to the drive must be shorted to the chassis (metal cover) of the fixed disk drive. This can be easily checked using an ohmmeter (Refer to figure 1-18, Testing the Fixed Disk Ground Connection). If the fixed disk drive has not been grounded, connect the grounding wire to the grounding tab.

9. Write down the bad cylinder and head information labeled on the disk for use when initializing the second drive as indicated in Chapter 3.

**Installing the 256K X 1 RAM Chip Kit**

**(For use only with 256K factory-installed 64K x 1 RAM)**

1. Remove all the expansion boards from the expansion slots. Be careful to handle the boards gently and store them in a safe location.

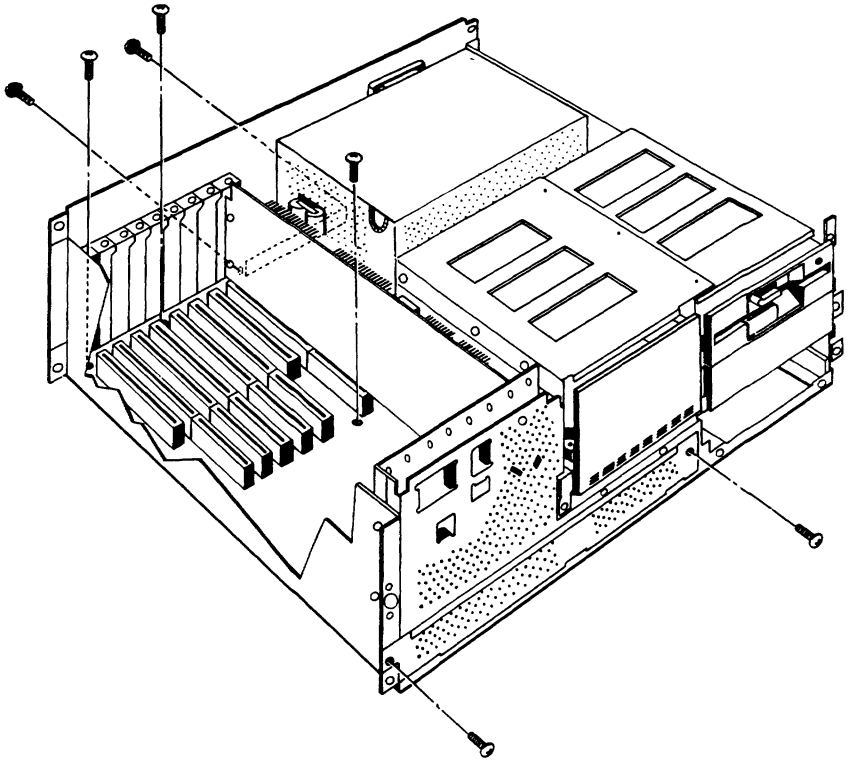
2. Detach the clock/battery connector and mother board power connectors (see Figure 1-4). Remove the speaker connector.

3. Remove the three screws inside the computer which secure the mother board. (see Figure 1-20).

4. Remove the two screws on the back of the computer located on each side of the peripheral ports. (see Figure 1-20).

5. Remove the two screws on the front of the computer on each side of the long metal panel located bottom left (see Figure 1-20).

**Figure 1-20**
**Removing the Mother Board Screws**



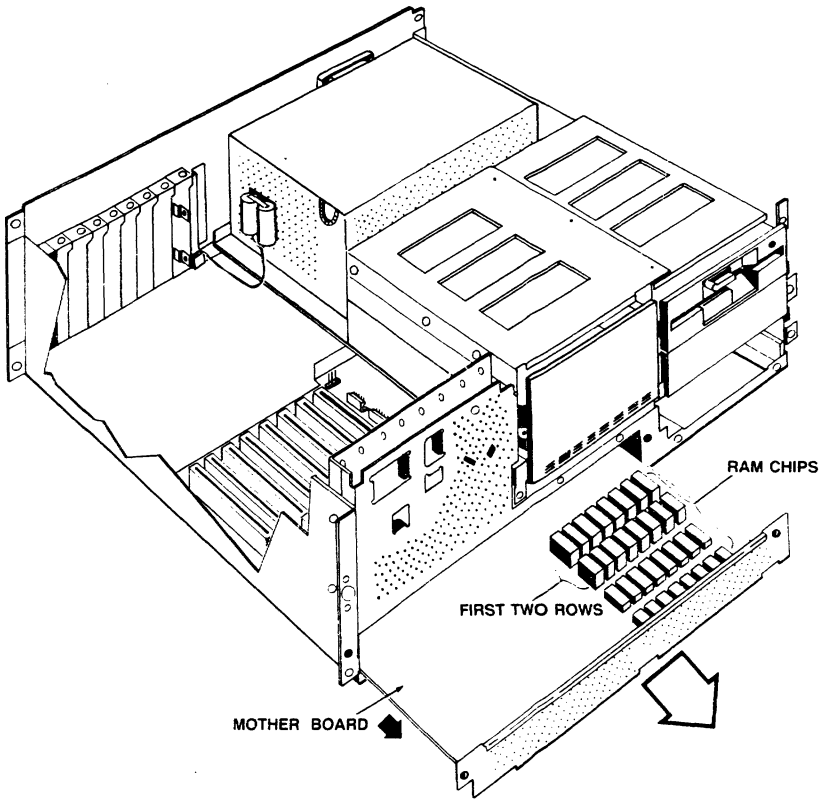
6. Grasp the long metal panel located bottom left on the front of the unit, and slide the mother board out of the computer (See Figure 1-21).

   There will be four rows of 9 RAM chips located on the right side of the mother board.

7. Using a thin, flat-head screwdriver carefully pry off the first two rows of chips (18 total).

   **NOTE:** These chips may be saved and reused in the AT Model II to increase RAM memory from 512 Kbytes to 640 Kbytes.

**Figure 1-21**
**Removing the Mother Board and Chip Location**




8. Align the notch in each 256K X 1 chip with the notch in each now empty connector and press them firmly into place. Check each connection carefully to ensure the correct alignment and that no pins have been bent.

   **NOTE:** Installation of this chip set increases the size of RAM memory to 640 Kbytes. Write this figure down for later updating of the SETUP program as outlined in Chapter 2.

9. Set positions 3, 4, and 5 on DIP switch SW1 (See Figure 1-4 for location):

| Position | Setting |
|---|---|
| 3 | Closed |
| 4 | Closed |
| 5 | Open |

Refer to Appendix E for a description of switch settings.

10. Replace the mother board and expansion boards.

# 2 RUNNING THE SETUP PROGRAM

The SETUP program will set up or change the system configuration information stored in the memory of the real-time clock. This information includes:

* Current date
* Current time
* The primary display adapter (graphics board)
* Number and type of diskette drives
* Number and type of fixed disk drives
* Base memory (256 - 640 KB) installed
* Expansion memory (over 1 MB) installed

The SETUP program must be run the first time you turn on the AT System. Additionally, perform SETUP anytime options are added to the system or if the the real-time clock memory loses power from the battery.

If data in the memory is lost or changed, the system displays a message indicating that SETUP must be executed.

## OVERVIEW

SETUP defines the configuration of the hardware installed in the system for the disk operating system.

When started, SETUP checks for certain error conditions. If errors exist, SETUP provides the means for identifying the configuration problem.

## USING SETUP

SETUP is displayed as a single menu, showing all the configuration information on a single screen. Instructions are provided on the screen for changing the configuration values.

When the SETUP menu is displayed, items found in error are indicated by an arrow to the left of the item. The name of the selected item is highlighted in reverse video.

To select a menu item, use the UP and DOWN arrows on the numeric keypad (keys 8 and 2). Instructions specific to the current selection item appear in a message window at the bottom of the screen.

To abort the SETUP program, press the ESC key. Abort causes date and time entries to be saved, but all other changes will be ignored.

To save changes and exit the program, use the F1 function key. This updates the memory values with the configuration information currently on the menu screen.

The following procedure shows you how to use SETUP when configuring your AT System.

**NOTE:** Check that your AT system is properly installed before continuing. Check that the system display switch is set for the type of primary display adapter (color graphics or monochrome) installed in your unit (see installation chapter of this manual).

1. Turn the power on. After a short time the monitor will display a message:

```
00512K System Memory OK
00000K Expansion Memory OK
Run Setup (error message)
Strike F1 key to continue
```

**NOTE:** Your error message may differ depending on the type of hardware installed in your system.

2. Insert the system diskette into disk drive A with the label facing up and the exposed magnetic portion first. Close the latch.

3. Press the F1 function key located in the upper left corner on the keyboard. Display:

```
Current date is (  DATE  )
Enter new date (mm-dd-yy):
```

4. **Do not** enter the date. Press the return key.

5. Display:

```
Current time is (  TIME   )
Enter new time:
```

6. **Do not** enter the time. Press the return key.

7. The system will display:

```
TeleVideo Personal Computer DOS Version 3.10
(c) Copyright TeleVideo Systems, Inc. 1985
(c) Copyright Microsoft Corp. 1981, 1985
A>
```

8. Remove the system diskette. Insert the Supplemental Program Diskette and close the latch.

9. Type in:

   SETUP

   and press the return key. The monitor will display the SETUP menu. Errors are flagged with arrows. Errors indicate the values stored in the system memory do not match the configuration of hardware installed in the system. The following steps allow you to change the values stored in the system memory.

   **NOTE:** The first time the system is turned on or if the clock battery loses power, all items are flagged as errors and need to be changed.

```
TeleVideo Systems, Inc.  Tele-AT SETUP Program

->   Current Date                                  - -
->   Current Time                                  : :

->   Primary Display Adapter        Color/Graphics (80 columns)

->   Diskette Drive 1                          not installed
->   Diskette Drive 2                          not installed
->   Fixed Disk Drive 1                        not installed
->   Fixed Disk Drive 2                        not installed

->   Base Memory                               256 KB
->   Expansion Memory (above 1 MB)             0 KB

use (UP arrow) and (DOWN arrow)  F1 to save & exit  ESC to Abort
     to select an item

Enter new Date (MM-DD-YYYY)
```

10. Enter the date in the following format:

    MM-DD-YYYY

    Where:

    MM is a 1- or 2-digit number from 1 to 12 indicating the current month.

    DD is a 1- or 2-digit number from 1 to 31 indicating the current day of the month

    YYYY is a 4-digit number greater than 1980 indicating the current year.

    Press the return key.

11. Enter the time:

    HH:MM (:SS)

    Where:

    HH is a 1- or 2-digit number from 0 to 23 indicating the current hour. 0:00 indicates midnight, and 23:00 indicates 11:00 p.m.

    MM is a 1- or 2-digit number from 0 to 59 indicating the current minute.

    SS is a 1- or 2-digit number from 0 to 59 indicating the current second. The seconds value is optional.

    Press the return key

12. Use the UP or DOWN arrows to select the **Primary Display Adapter.** Press the T key on the keyboard to select either 40 or 80 columns as the initial display mode. The new value is displayed in the far right hand column.

13. Move to the first **Diskette Drive** selection. Press the T key to change the value of the disk drive configuration:

    not installed
    double density (360 Kbytes, 48 tpi)
    high capacity (1.2 Mbytes, 96 tpi)

    **NOTE:** Diskette drive 1 is normally called drive A:, and drive 2 is normally called drive B:. The SETUP program will not save a value for drive 2 if drive 1 is listed as not installed.

14. Repeat step 13 for the second diskette drive.

15. Move to the first **Fixed Disk Drive** item. Press the T key to select either not installed or one of the 15 types of drives listed in the following table. If your AT is equipped with a 20-Mbyte fixed disk drive, select type 2 from the list. If your AT is provided with a 40-Mbyte drive, select type 12 from the list. Otherwise, check your disk technical specifications for the proper type.

Fixed Disk Types

| Type | Cylinders | Heads | Capacity (MB) |
|---|---|---|---|
| *1 | 306 | 4 | 10 |
| *2 | 615 | 4 | 20 |
| *3 | 615 | 6 | 31 |
| *4 | 940 | 8 | 61 |
| *5 | 940 | 6 | 47 |
| *6 | 615 | 4 | 20 |
| *7 | 462 | 8 | 31 |
| *8 | 733 | 5 | 31 |
| *9 | 900 | 15 | 114 |
| 10 | 977 | 5 | 41 |
| *11 | 855 | 5 | 36 |
| 12 | 640 | 8 | 43 |
| 13 | 1024 | 8 | 69 |
| 14 | 1024 | 5 | 43 |
| 15 | reserved | | |

* IBM AT compatible

16. Repeat step 15 for the second fixed drive.

**NOTE:** SETUP will not save a value for drive 2 if drive 1 is listed as not installed.

17. Enter the **Base Memory** information. Use the T key to select the amount of random access memory (RAM) installed in the system. Base memory values range from 256 KB to 640 KB in 64-KB increments.

18. Enter any **Expansion Memory** revisions. Select the amount of expansion memory installed in your system. Expansion memory values range from 0 to 15360 KB in 64-KB increments.

19. Press the F1 function key on the left side of the keyboard to save any changes and exit from the program. The monitor displays:

```
THE NEW SETUP CONFIGURATION HAS BEEN
SAVED.  IF ITEMS OTHER THAN THE DATE
OR TIME WERE CHANGED, RESET THE
SYSTEM BY PRESSING CTRL/ALT/DEL.
```

20. Press the **CTRL, ALT, DEL** keys simultaneously to complete the SETUP procedure. If error messages are displayed on the monitor, check to see that you have the correct system hardware installed and repeat the SETUP procedure.

21. Proceed to the initialization chapter of this manual.

# 3 INITIALIZING THE HARD DISK

The following procedure is for an AT system with a hard disk. The procedure initializes and formats the hard disk, and then transfers over the operating system and its support programs.

If you are using an AT that does not have a hard disk, go to Chapter 4 for instructions on copying the AT Master Diskettes.

**NOTE:** This procedure assumes that all of the options have been installed in the AT, such as floppy and hard disk drives and the SETUP program (Chapter 2) has been executed. If this has not been done, do not continue. Go to the beginning of this installation manual and install the options.

## INITIALIZING THE FIRST HARD DISK

1. Locate the AT ON/OFF switch on the back panel.

2. Turn the AT ON.

3. Insert the AT System Diskette into the floppy disk drive. The disk is inserted into the drive with the label facing up and the exposed magnetic portion first.

4. The monitor displays:

```
Current date is Fri  5-17-1985
Enter new date (mm-dd-yy):
```

5. Press the return key. The date is not necessary.

6. The monitor displays:

```
Current time is  0:02:47.00
Enter new time:
```

7. Press the return key. The time is not necessary.

8. The monitor displays copyright information and the following prompt:

```
A>
```

9. Remove the AT System Diskette from the floppy drive and insert the AT Supplemental Disk.

10. Type

    IDISK

    and press the return key.

11. The monitor displays:

```
Type 1:  for First fixed disk drive
Type 2:  for Second fixed disk drive
Select the fixed disk to be formatted:
```

12. Type

    1<CR>

13. Displays:

```
Select sector Interleave factor: (1 to 9) or
type <CR> for using default value:
```

14. Type

    1

    and press the return key. The interleaving factor defines the way sectors are setup on the disk. When using the standard TeleVideo combined hard disk and floppy disk controller, the best performance is obtained by selecting interleave factor 1. Other disk controllers may require a different interleave factor. Check the specifications for your controller.

15. Displays:

```
Enter bad cylinder/head or <CR> if none:
```

16. Type

    (cylinder)/(head) <CR>

    from the information located on your disk drive or from the notes you took while installing the drive (refer to the Unpacking and Installation chapter). Bad cylinders are areas on the disk where information should not be stored.

17. Displays:

```
W A R N I N G

All data on the fixed disk #1 will be destroyed
with no chance of recovery if you continue.

Do you wish to continue (y/n)?
```

18. Type

    **Y<CR>**

    for yes.

19. Displays:

```
Initializing fixed disk media.
```

20. After approximately seven minutes, depending on the size of the drive, the monitor displays:

```
Now execute the following programs in order:
 1. FDISK (to install MS-DOS partition)
 2. FORMAT (to map out bad spots)
```

**Note:** If you have two fixed disk drives installed, repeat steps 10 through 20 except at step 12 type "2" to select the second fixed disk drive.

21. Remove the supplemental diskette and reinsert the system diskette.

**NOTE:** If any fixed disk drive will be partitioned into more than one logical drive, you must use the TeleVideo FDISK utility program.

22. Type

**FDISK<CR>**

23. Displays:

```
FDISK Options:

Choose one of the following:

1. Create a DOS Partition
2. Change Active Partition
3. Delete DOS Partition
4. Display Partition Data
5. Select Next Fixed Disk Drive

Enter selection: [1]
```

**NOTE:** Option 5 is displayed when two fixed disk drives are installed.

24. Press the RETURN key.

25. Displays:

```
Current Fixed Disk Drive: 1
Create DOS Partition
No Partitions Defined
Do you wish to use the entire fixed
disk for DOS (Y/N).....[Y]

Total disk space is XXX cylinders,
Total size of partition is 0 cylinders.
```

The drive number is displayed only when the second fixed disk is installed.

**NOTE:** The DOS partition can manage up to 32 Mbytes. By entering the default value [Y], DOS will automatically partition the disk space into 32-Mbyte sections. Partitioning will create what are called **logical drives.** For example, DOS will partition a 40-Mbyte drive into one 32-Mbyte section and one 8-Mbyte section, creating logical drives C and D. If you wish to manually partition the disk space into predetermined sizes, enter "N" for step 26 and follow the instructions.

26. Type

**<CR>**

to enter the default value "Y" if you wish to have the disk space automatically partitioned. The monitor will display the partition information. Press the ESC key until the system prompt appears and continue with step 27. **NOTE:** If you have two fixed disk drives installed, when the FDISK Options menu appears, type "5" to select the second fixed disk drive, and repeat steps 24 through 26.

If you wish to manually partition the disk space into predetermined sizes, enter "N" and conduct the steps below.

Displays:

```
Total disk space is XXX cylinders,
Total size of partition is 0 cylinders.
Maximum available space for this partition
is XXX cylinders starting at cylinder 0.

Enter partition size.............: [  0]
```

Now, enter the number of cylinders you wish to use for partitioning without exceeding the total number of cylinders in the total disk space.

Displays:

```
Enter starting cylinder number...:[  0]
```

Enter the number of the cylinder where you wish to start the partition.

**NOTE:** The starting cylinder number for the first partition of the first fixed disk drive must be 0. If you have a second fixed disk drive, you may start at any cylinder number to partition that drive.

Displays:

```
 Create DOS Partition

 Partition  Status  Drive Type  Start  End  Size
    1         N       C     xDOS   X     XXX   XXX
    2         N       D     xDOS   X     XXX   XXX

Total disk space is XXX cylinders,
Total size of partition is XXX cylinders.
Maximum available space for this partition is XXX
cylinders starting at cylinder XXX.

Enter partition size.............: [    0]

Press ESC to return to FDISK options
```

If you wish to create additional DOS partitions, enter the next partition size and repeat the partitioning process. If you do not wish to create additional partitions, press the **ESC** key twice.

Displays:

```
FDISK Options:

Choose one of the following:

1. Create a DOS Partition
2. Change Active Partition
3. Delete DOS Partition
4. Display Partition Data
5. Select Next Fixed Disk Drive

Enter selection: [1]
```

Type **"2"** <CR> to change the active partition.

Displays:

```
Change Active Partition

Partition  Status  Drive Type  Start  End  Size
   1         N       C     xDOS   X     XXX   XXX
   2         N       D     xDOS   X     XXX   XXX

Total disk space is XXX cylinders,
Total size of partition is XXX cylinders.

Enter partition number you
want to make active.................: [1]
```

Press the return key.

**NOTE:** The active partition must be the **first** partition of each fixed disk drive.

Displays:

```
Change Active Partition

Partition   Status   Drive Type   Start   End   Size
   1          A       C    DOS     X     XXX    XXX
   2          N       D    xDOS    X     XXX    XXX

Total disk space is XXX cylinders,
Total size of partition is XXX cylinders.
```

The value of the status column, for the first partition, will reflect an A, for active. An N, indicates non-active. The active partition designates the logical drive from which the system will boot. Press the ESC key to return to the FDISK menu.

**NOTE:** When the FDISK menu appears, if you have two fixed disk drives installed, type "5" to select the second fixed disk drive and repeat steps 24 through 26. Otherwise, press the ESC key to continue with step 27.

27. Displays:

```
Logical drive of fixed disk start from C to X

The system will now reboot.

Insert DOS diskette in drive A:
Press any key when ready....
```

**NOTE:** Do not insert another diskette. The diskette presently in the drive contains the DOS program. Hit any character key or <CR>.

28. The system will ask for the new date and time. Do not enter the new values. Press the return key until the system prompt, **A>**, reappears.

29. Type

**FORMAT C:/S <CR>**

30. Displays:

```
WARNING, ALL DATA ON NON-REMOVABLE DISK
DRIVE C: WILL BE LOST!
Proceed with Format (Y/N)?
```

31. Type

**Y<CR>**

for yes.

32. Displays:

```
Formatting...
```

33. Displays when the format operation is completed:

```
Formatting...Format complete
System transferred

       XXXXXXXX bytes total disk space
          XXXXX bytes used by system
          XXXXX bytes in bad sectors
       XXXXXXXX bytes available on disk

A>
```

If you have created more than one MS-DOS logical drive by partitioning the disk space (see step 25), you must format each logical drive. For each additional logical drive on your fixed disk, type **FORMAT X: <CR>**, where X is the character value of the next logical drive (D, E, F...) on the fixed disk drive, and repeat steps 30 through 33.

34. Type

    **COPY *.* C:<CR>**

35. The files on the AT System Diskette are copied one at a time onto the hard disk. A filename will appear on the screen as each file is transferred. Once all files have been transferred, the system prompt reappears:

36. Remove the AT System Diskette and insert the AT Supplemental Disk.

37. Type

    **COPY *.* C: <CR>**

38. The files on the supplemental disk will now be transferred onto the fixed disk. Wait for the system prompt to reappear.

39. Remove the supplemental diskette from the diskette drive.

40. Store both the AT System Diskette and the AT Supplemental Diskette in a safe place. If something should happen to the software on the fixed disk, these diskettes can be used to initialize it again.

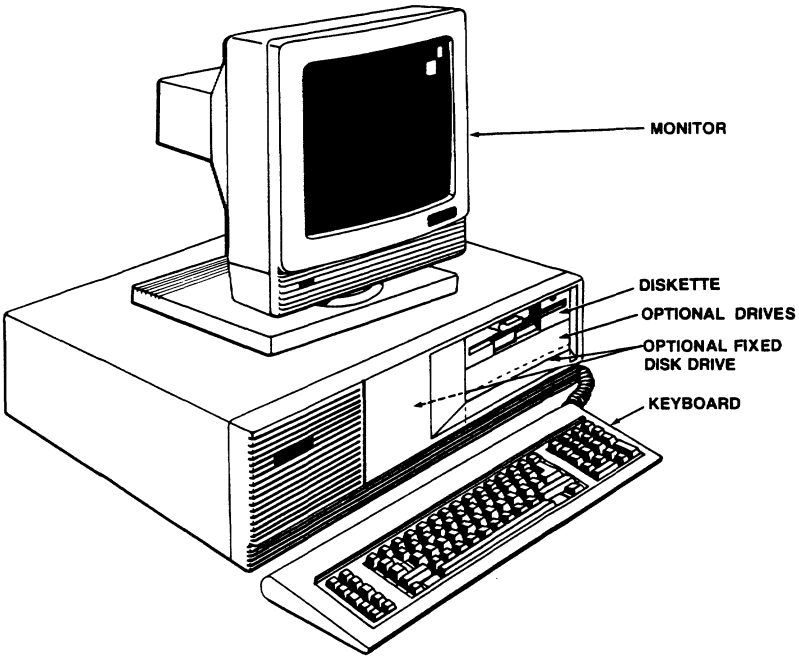
41. Press the <CTRL>/<ALT>/<DEL> keys simultaneously to reset the AT.

# 4 OPERATING YOUR AT

This chapter provides a general overview of the AT and its operation.

**NOTE:** Read carefully the sections Disk Drives and Suggestions On Using High-Capacity Drives before inserting a diskette into the AT. They contain important information about the AT's high-capacity drives. **Improper use of the high-capacity drives can destroy data on diskettes.**

**Figure 4-1**
**AT Computer**



## OVERVIEW OF MAJOR COMPONENTS

The TeleVideo AT has three major components:

* **System module** Contains the hardware of the AT system, including the microprocessor, memory, disk drive(s), expansions slots, communication ports, parallel printer port and connector sockets.

* **Keyboard** Where you enter data and control operations

* **Monitor** The screen that displays information

The keyboard and monitor both connect to the system module, but you can position the units any variety of ways. Figure 4-2 shows a sample arrangement.

Your AT system comes with three diskettes:

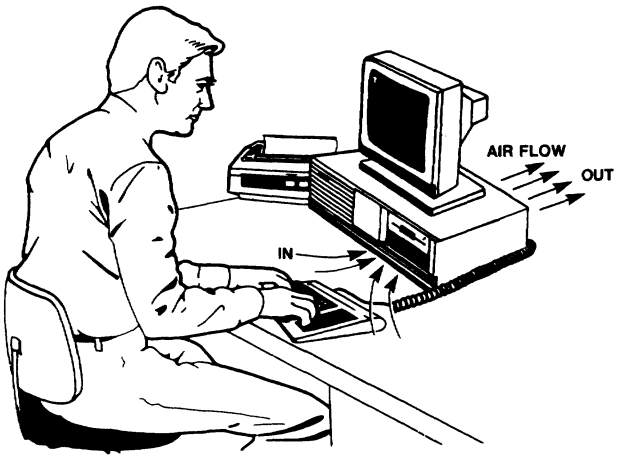
* MS-DOS 3.1 operating system

* GW-BASIC and other utility programs

* Demonstration programs

Including this manual, you should find the diskettes and the MS-DOS and GW-BASIC User's Manuals packed with your system.

**Figure 4-2**
**Sample AT Arrangement**



## The System Module

Figures 4-3 and 4-4 show the AT system module.

**Figure 4-3**
**System Module, Front View**

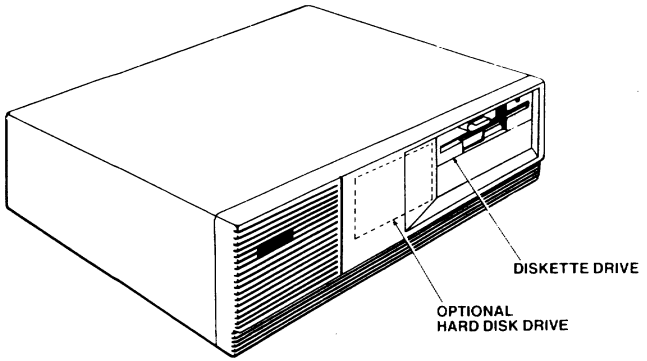
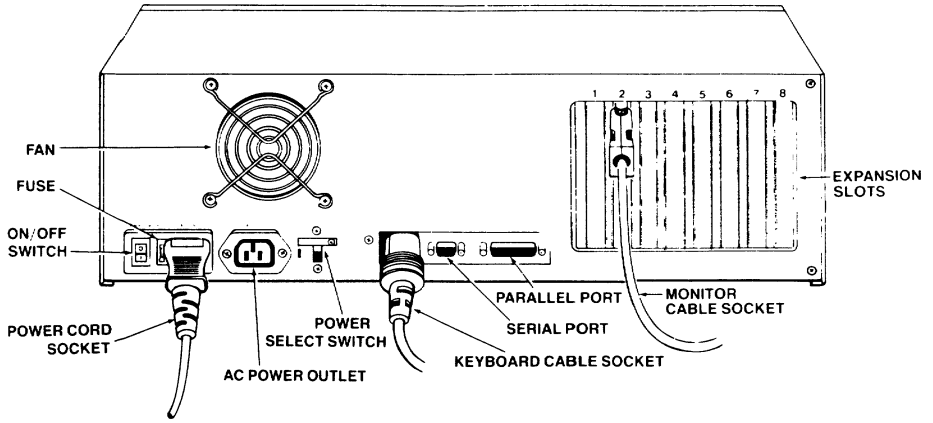



**Figure 4 4**
**System Module, Rear View**



The system module contains:

* An Intel 80286 16-bit, 8-MHz microprocessor (DIP-switch selectable to 6 MHz), with a socket for an optional 80287 coprocessor

* 256K RAM; additional 256K with hard disk drive (total 512K); sockets for user-installed optional RAM up to 640K total

* 32K EPROM containing power-on diagnostic routines, and Basic Input Output System (BIOS) modules; sockets for upgrade to 64K total

* Disk drive(s), described in a separate section

* Expansion slots:
  Six 16-bit IBM PC/AT compatible
  Two 8-bit IBM PC/XT compatible

* Nine-pin IBM AT-compatible asynchronous serial port for a modem or printer

* 25-pin Centronix-type parallel port for a printer, DB25 and IBM PC compatible

* Keyboard and monitor sockets; ac outlet

* Internal clock and calendar with battery backup

The eight expansion slots accommodate IBM AT-compatible peripherals such as additional RAM (up to 15 MB total), hard disk and diskette drives, tape back up, Personal Mini networking interface, and modem.

Consult your TeleVideo dealer for information about memory expansion and other options.

## Disk Drives

The disk drives **read** and **write** programs and data to a disk file.

Four types of disk drives are available in the TeleVideo AT:

* 1.2-MB, 96-tpi (tracks-per-inch), high-capacity diskette drive

* 360-KB, 48-tpi, dual-sided diskette drive

* 22-MB, half-height, Winchester hard disk (25 MB unformatted)

* 44-MB, full-height, Winchester hard disk (approximately 53 MB unformatted)

The TeleVideo AT supports up to two diskette drives and two hard drives. Model I has one high-capacity, 1.2-MB diskette drive and 256 Kbytes of motherboard RAM. Model II is provided with one high-capacity, 1.2 Mbyte diskette drive, one 53-Mbyte fixed disk drive and 512 Kbytes of mother board RAM. If you are unsure of your system's configuration, use the MS-DOS SETUP command to determine the disk drives.

The logical drive designators for the diskette drives are **A:** and **B:**. The designators for the hard disk drives are **C:** and **D.**

## Using High-Capacity Disk Drives

The TeleVideo AT high-capacity diskette drive reads and writes data on 96-tpi, 5.25-inch diskettes. Most other MS-DOS or PC DOS-compatible systems use 48-tpi diskettes.

The following suggestions will help you avoid possible problems that can arise from using incompatible diskettes and drives.

1. The AT high-capacity, 1.2-MB diskette drive can read data from a 48-tpi diskette but cannot safely write data to one. You can load programs and copy data from 48-tpi diskettes, but cannot modify data on one. **Trying to write data on a 48-tpi diskette can damage the diskette and destroy data.**

2. You cannot reformat 48-tpi diskettes for 96-tpi applications. You must get 96-tpi diskettes.

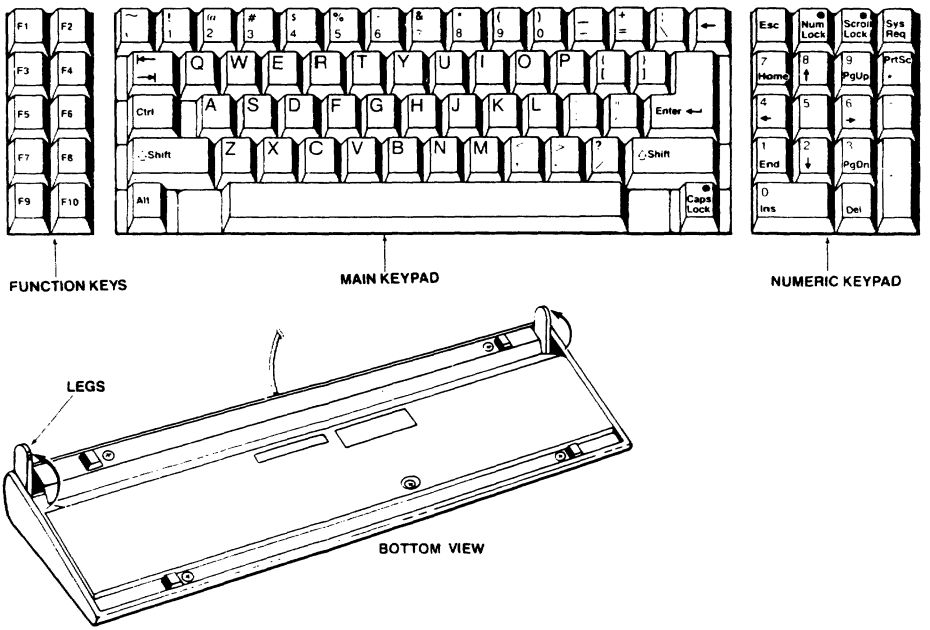
3. Copy the data on 48-tpi diskettes onto 96-tpi diskettes before modifying data. See **Copying Diskettes** or refer to the MS-DOS manual for instructions.

4. Never use a 96-tpi diskette in a 48-tpi diskette drive.

**The Keyboard**

The keyboard, shown in Figure 4-5, has three sections: the main keypad, the numeric keypad, and the function keys. Three keys -- Caps Lock, Num Lock, and Scroll Lock -- have a green light-emitting diode (LED) that glows when the key's function is turned on.

**Figure 4-5**
**The Keyboard**



Chapter 5 explains in detail how the keys operate. Refer to Chapter 1 for instructions on attaching the keyboard to the system module.

Avoid fatigue by placing the keyboard lower than the monitor. You can adjust the angle of the keyboard (see Figure 4-5) for typing comfort.

**The Monitor**

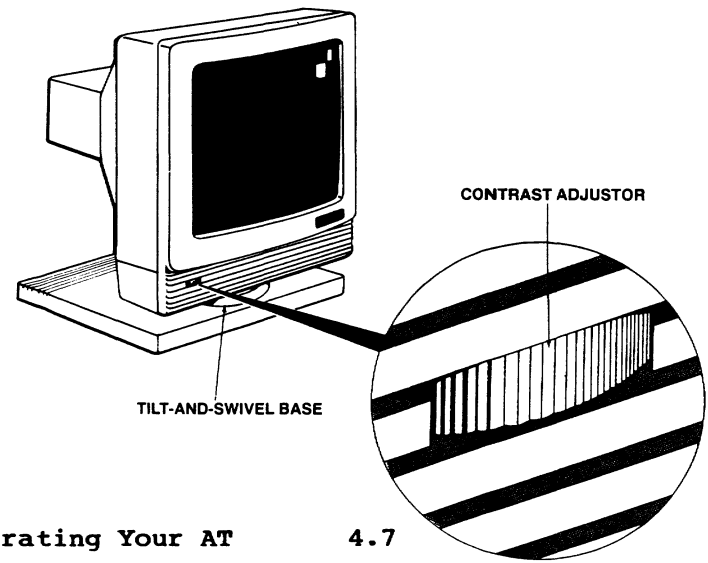
The monitor displays information from your programs and the characters you type from the keyboard.

The TeleVideo AT enhanced graphics monitor (Figure 4-6) has a 14-inch, high-resolution nonglare screen that tilts and swivels to almost any viewing angle. To avoid eyestrain, choose a site with indirect lighting, away from windows and other sources of bright light, and place the monitor at eye level.

Adjust the screen contrast to the best level for the lighting conditions at your workstation.

The monitor attaches to the rear of the system module, as described in Chapter 1. If you do not have a TeleVideo AT monitor, see your monitor manual for operating details. For versatility of desk top arrangements, the six-foot cord provided with the AT monitor can be extended to 10 feet with a compatible extension cord.

**Figure 4-6**
**The AT Monitor**



## USING THE AT

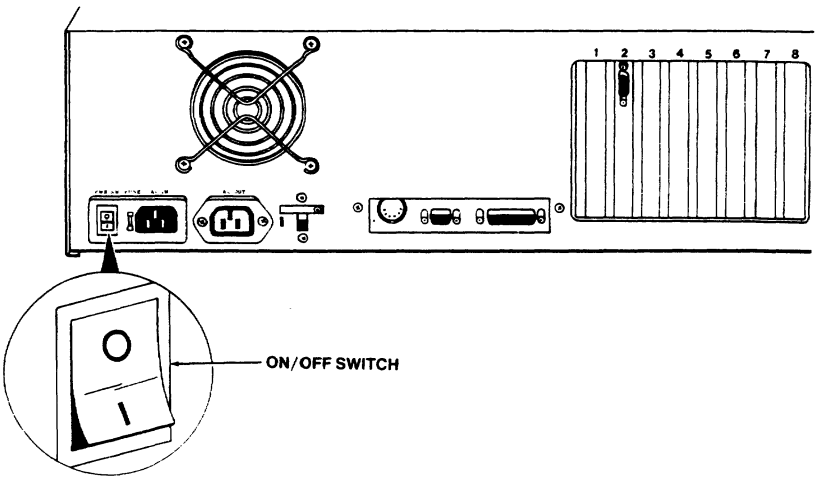
Before you follow the instructions in this section, read the section titled **Disk Drives**.

### Turning On the AT

The AT's power switch, shown in Figure 4-7, is at the rear of the system module.

**WARNING!** Do not turn the AT on or off with a diskette inserted in the disk drive. You could damage the diskette and destroy data.

**Figure 4-7**
**Power Switch**




1. Press I for power on.
   Press O for power off.

   The system performs a power-on self test. The screen should display:

```
   Tele PC AT (Rev n)
XXXXX K System Memory OK
XXXXX K Expansion Memory OK
```

If the screen displays an error message, turn to Chapter 6 for instructions.

2. Adjust the screen contrast, if desired.

**Inserting a Diskette**

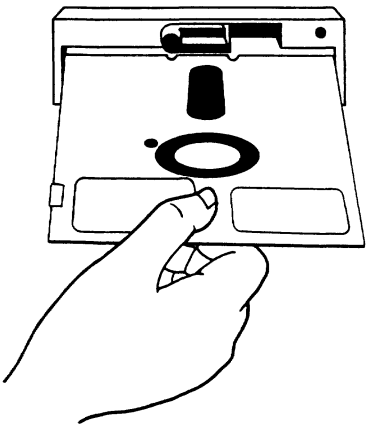
**WARNING!** Read the section **Disk Drives** before inserting any diskette in the AT. Using an incompatible diskette could damage the diskette and destroy data.

1. Turn on the AT; remove the diskette from its dust jacket.

2. Insert the diskette gently into the diskette drive, with the labeled side UP. Do not force or bend it.

3. Turn the drive latch DOWN (clockwise), from horizontal to vertical.

**Figure 4-8**
**Inserting a Diskette**



## Loading the Operating System

You can boot the operating system directly from the MS-DOS diskette that comes with your AT. The next section, Copying Diskettes, explains how to back up the operating system on a high-capacity diskette.

1. Turn on the AT. If the operating system is not on your hard disk, insert the MS-DOS system diskette.

**NOTE:** Make sure the write-protect tab is in place over the write-protect notch.

2. After the power-on self test runs, the following message should appear on your monitor:

```
Current date is Fri 6-07-1985
Enter new date  (mm-dd-yy):
```

**NOTE:** The battery-backed internal calendar/clock is set during the SETUP program and continues to run, even when you turn off the AT. Should you wish to set the system's temporary clock, enter a new date and time. Otherwise, just press RETURN twice.

3. Type month-day-year, with a slash or dash between the digits.

   Below are a few examples:

   ```
   6/7/85
   12-17-85
   1-2-86
   ```

   The monitor displays:

```
Current time is  0:01:30.40
Enter new time:
```

4. Enter the time as hour:minutes:seconds, separated by colons (:). Then press RETURN.

   Since this is a 24-hour clock, the hours from midnight to noon are 0 to 12, while 1 p.m. to 11 p.m. are 13 to 23. Below are some examples of valid time entries:

   | | |
   |---|---|
   | **10:32** | (10:32 a.m.) |
   | **14:00** | (2:00 p.m.) |
   | **17:05** | (5:05 p.m.) |

5. The monitor displays copyright information and the **system prompt:**

```
A>
```

   If the operating system booted up from the hard disk, the prompt is **C>** instead of **A>**.

6. If your AT has a hard disk and you have not yet copied the operating system to it, do so now. See Chapter 3 for instructions.

Once the operating system is loaded, you are ready to run programs. See the MS-DOS and program manuals for specific instructions.

**Copying Your System Diskette**

The following procedure shows how format a high-capacity, 96-tpi diskette and copy the operating system from the 48-tpi diskette with the MS-DOS FORMAT command.

1. Insert the 48-tpi MS-DOS master diskette in the diskette drive.

   **NOTE:** Place a write-protect tab on 48-tpi diskettes before reading them in the AT's high-capacity diskette drive.

2. At the A> prompt, type

   FORMAT A:/S<CR>

The screen displays

```
Insert new diskette for drive A:
and strike ENTER when ready
```

3. Remove the master diskette and insert a high-capacity, 96-tpi diskette.

4. Press ENTER to continue the FORMAT program. Follow the directions in the program prompts.

Your high-capacity diskette now contains the COMMAND.COM program, plus certain hidden files (files that do not appear on the directory).

**Copying Data and Program Diskettes**

Most programs and data files, including the MS-DOS operating system and supplemental programs (GW-BASIC) supplied with the AT, are on double-sided 48-tpi diskettes.

If your AT has a 1.2-MB, high-capacity diskette drive, you should copy your 48-tpi diskettes to high-capacity, 96-tpi diskettes before you write data or execute a program. You may want to purchase an optional 48-tpi diskette drive available from TeleVideo. It will allow you to write to 48-tpi diskettes or the popular PC library of software.

Use the COPY command to transfer diskette contents. Appendix A of the MS-DOS 3.1 User's Manual contains instructions for running the COPY command with only one diskette drive. **Specify logical drive A: for the source diskette and logical drive B: for the target diskette.**

**NOTE!** Format diskettes before copying data or programs onto them. See your MS-DOS User's Manual for instructions. **Do not use the MS-DOS DISKCOPY command to copy from one type of disk to another type.**

## Turning Off the AT

**WARNING!** Always exit your program **before** turning the AT off. Turning off the AT in the middle of a program could damage your data files.

1. If you are running an applications program, exit from the program to the system prompt (e.g., **C>**).

2. **NOTE:** If your AT does not have a hard disk, skip this step and go to Step 3.

   Type the command

   **C:PARK**

   and press **RETURN**.

   This command protects the hard disk from possible damage by moving the read and write heads to a safe location on the disk. You must run this program before moving or transporting the AT.

**NOTE!** The PARK utility program is on the Supplemental Program Diskette supplied with the AT. If you have not copied the programs onto your hard disk, see Chapter 3 for instructions.

The monitor displays:

```
The fixed disk r/w heads are now parked
at the inner most cylinder.

Remove any diskette and power down the system
```

3. If a diskette is in the disk drive, flip the drive latch UP and remove the diskette from the drive.

4. Turn the AT off.

## CARING FOR DISKETTES

Figures 4-9 and 4-10 show the parts of a diskette.

**Figure 4-9**
**Diskette Parts**

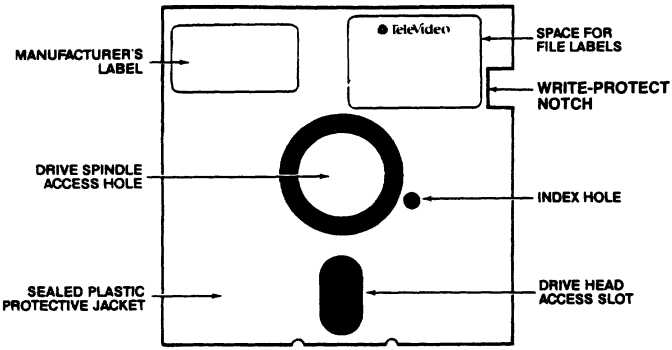
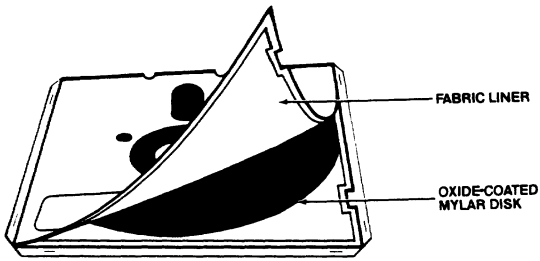


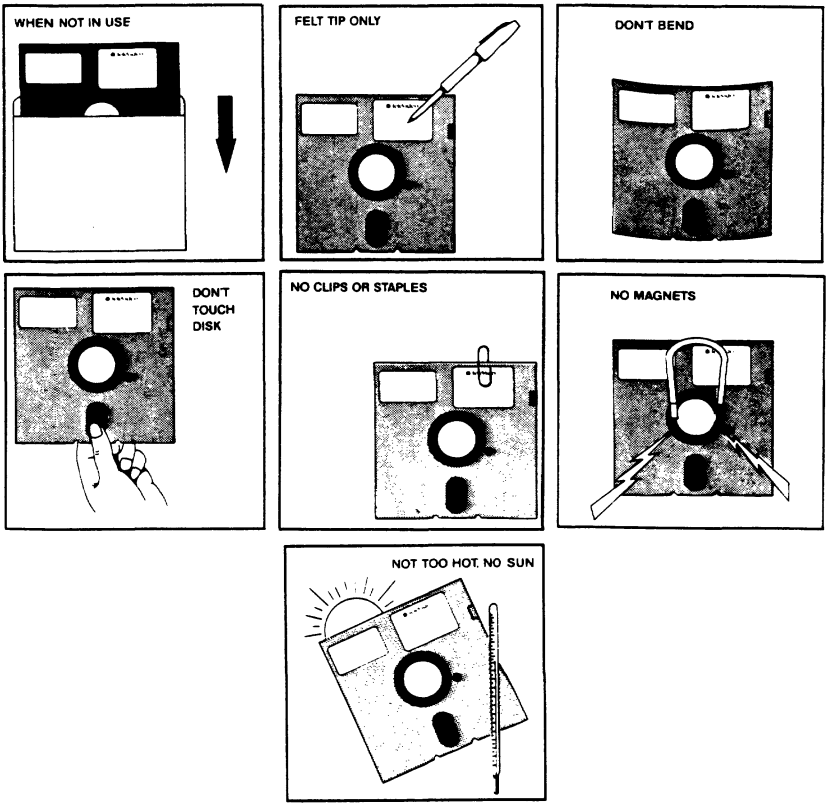

**Figure 4-10**
**Diskette and Cover**



Always handle diskettes carefully and back up data regularly. See your MS-DOS Manual for information about backing up diskettes.

To protect important data on a diskette, place a **write-protect** tab ove the write-protect notch (see Figure 4-9).

Improper handling and storage can damage diskettes and destroy data:



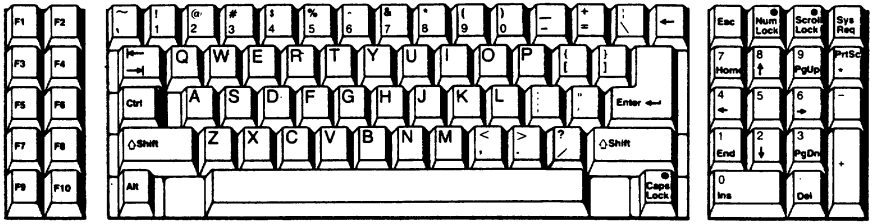
# 5 THE KEYBOARD

The AT keyboard is divided into three sections:

* The main keyboard
* The numeric keypad
* The function keys

The main keyboard looks very similar to a typewriter keyboard, with the addition of some keys that perform special computer functions. The numeric keypad provides easy numeric data entry while using accounting applications programs.

**Figure 5-1**
**The Keyboard**



## THE MAIN KEYBOARD

Key positions in the main keyboard are similar to a standard typewriter. Unlike a typewriter, the alphanumeric and punctuation keys automatically repeat when pressed for more than one-half second. The main keyboard also contains keys that perform special control functions for the AT. Many of the special functions are defined by the operating system or applications program, and therefore may vary with the program being used. Table 5-1 lists the functions of these special keys, starting at the <TAB> key and moving counterclockwise around the main keyboard.

**Figure 5-2**
**Main Keyboard Area**

Table 5-1
Main Keyboard Special Keys

| Key | Description |
|---|---|
| TAB ⇤ ⇥ | The <TAB> key moves the cursor to the next program-defined tab position. |
| CTRL | The <CTRL> (control) key is used by programs for many special control functions. These functions are defined by the program being used. |
| ⇧ SHIFT | The main keyboard has two <SHIFT> keys. Pressing either of the <SHIFT> keys shifts the alphanumeric and punctuation keys to the uppercase mode. Alphabet characters are displayed as capital letters. All other character keys when pressed with the <SHIFT> key, display the character shown on the upper portion of the key. If the uppercase mode has been set with the <CAPS LOCK> key, the <SHIFT> keys shift the alphabet characters to lowercase. |
| ALT | The <ALT> (alternate) key is used for special program control functions. These functions are defined by the program being used. |
| SPACE BAR | The <SPACE BAR> is used to add a blank character. The computer treats a blank like an alphanumeric character. |
| CAPS LOCK | The <CAPS LOCK> key locks characters A through Z in the uppercase mode. Pressing <CAPS LOCK> again returns you to the lowercase mode. This key is provided with a LED status indicator. |

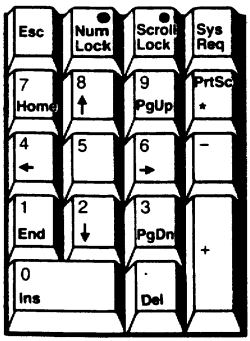
**Table 5-1 Continued**
**Main Keyboard Special Keys**

| Key | Description |
|---|---|
| (ENTER)↵ | Using the <ENTER> or <CR> (carriage return) key is defined by the operating system or applications program being used. In MS-DOS, the enter key is used to send a command to the operating system for execution. Refer to the appropriate applications manual for its specific function. |
| (BACKSPACE)← | The <BACKSPACE> key erases the character to the left of the cursor and moves the cursor one position to the left. |

## NUMERIC KEYPAD

The AT has numeric keypad keys that can be operated in two ways: as typical numerical keys for accounting applications, or as cursor movement and editing keys. You can use the <NUM LOCK> key to toggle between the two modes.

**Figure 5-3**
**Numeric Keypad**




**NOTE:** MS-DOS does not use the cursor movement or editing key functions of the numeric keypad. However, these key functions may be used by particular applications programs. Table 5-2 lists the intended functions of these keys when they are used by applications programs.

**Table 5-2**
**Numeric Keypad Descriptions**

| Key | Description |
|---|---|
| ESC | The <ESC> (escape) key is used for special program control functions. These functions are defined by the program being used. |
| NUM LOCK | The <NUM LOCK> (number lock) key toggles the numeric keypad between the numeric key functions and the cursor movement/editing key functions. This key is provided with a LED status indicator. |

Table 5-2 Continued
Numeric Keypad Descriptions

| Key | Description |
|---|---|
| SCROLL LOCK | The <SCROLL LOCK> or <BREAK> key is used for special program control functions. These functions are defined by the program being used. This key is provided with a LED status indicator. |
| SYSREQ | The <SYSREQ> (system request) key is used for special program control functions. These functions are defined by the program being used. |
| HOME | The <HOME> key moves the cursor to the upper-left corner of the screen, called the Home position. |
| (CURSOR UP) | The <CURSOR UP> key moves the cursor to the character position one line above its current position. |
| PGUP | The <PGUP> (page up) key scrolls the screen up one screen display. |
| PRTSC | Pressing the <SHIFT> key and <PRTSC> (print screen) key simultaneously (<SHIFT>/<PRTSC>) sends a copy of the information displayed on the screen to the printer. |
| (CURSOR LEFT) | The <CURSOR LEFT> key moves the cursor one character position to the left without deleting any characters. |
| (CURSOR RIGHT) | The <CURSOR RIGHT> key moves the cursor one character position to the right without deleting any characters. |
| END | The <END> key moves the cursor one character position to the right of the last character on the line the cursor is currently on. |

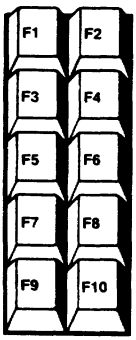
Table 5-2 Continued
Numeric Keypad Descriptions

| Key | Description |
|---|---|
| (CURSOR DOWN) | The <CURSOR DOWN> key moves the cursor to the character position one line below the current cursor position. |
| PGDN | The <PGDN> (page down) key scrolls the screen down one screen display. |
| - and + | The plus and minus keys have no program-defined functions. When pressed, they enter a plus or minus character on the screen. |
| INS | The <INS> (insert) key switches or toggles between the insert and replace modes. In the insert mode, a character typed at the keyboard is inserted into the current line at the cursor position. All characters to the right of the cursor are moved one position to the right. In the replace mode, a character typed at the keyboard replaces the character at the cursor position. |
| DEL | The <DEL> (delete) key deletes the character at the current cursor position. All characters to the right of the deleted character are moved one position to the left. |

## FUNCTION KEYS

The function keys, labeled F1 through F10, are always controlled by the program being used. Many (but not all) applications programs use the function keys to perform special functions to make the program easier to use. To find out the functions assigned to the function keys, refer to the user's manual for that particular program.

**Figure 5-4**
**Function Keys**



## SPECIAL KEY COMBINATIONS

Certain key combinations, when pressed simultaneously, perform special functions for the AT regardless of the program being used. Table 5-3 lists the key combinations and their functions.

**Table 5-3**
**Special Key Combinations**

| Keys | Description |
|---|---|
| <CTRL>/<ALT>/<DEL> | Reset: Stops all program activity and the computer loads the operating system from the diskette in drive A or from the hard disk. |
| <CTRL>/<NUM LOCK> | Pause: Stops the scrolling of the screen display so you can read the screen. Press any character key to continue. |
| <CTRL>/<SCROLL LOCK> | Break: Interrupts current program activity and returns to the operating system or applications program (the return point is determined by the program or operating system). |

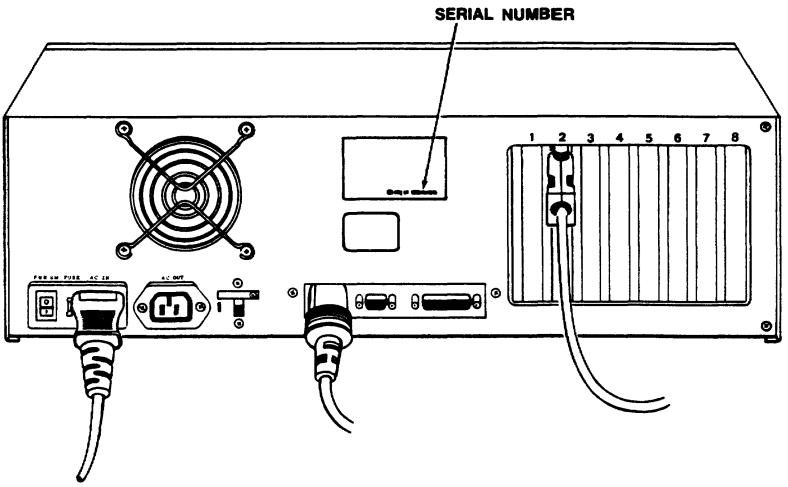
# 6 TROUBLESHOOTING

This chapter contains instructions on how to troubleshoot the AT and repack the unit should you need to ship it.

## THE SERIAL NUMBER

The serial number is on a label on the back of the computer. For future reference, write the number, the date you took delivery, and the name and phone number of your authorized dealer and service center on the inside of the rear cover of this manual. If you need to call your authorized service center, be ready to supply the serial number.

**Figure 6-1**
**Serial Number**



## SHIPPING THE AT

Should you need to ship the AT, follow these steps:

1. Open the drive latch of the floppy disk drive.

2. If you kept the cardboard insert that was in the drive when the AT was shipped, reinsert it now. If you did not keep the insert, place a blank diskette in the drive.

3. Turn the drive latch DOWN to the vertical position to close the drive.

4. Pack the unit in the original shipping container or use other suitable materials.

**NOTE:** Place the graphics/color monitor board inside a static protective wrapper before repacking (see Figure 6-3).

**Figure 6-2**
**Repacking the System Module**

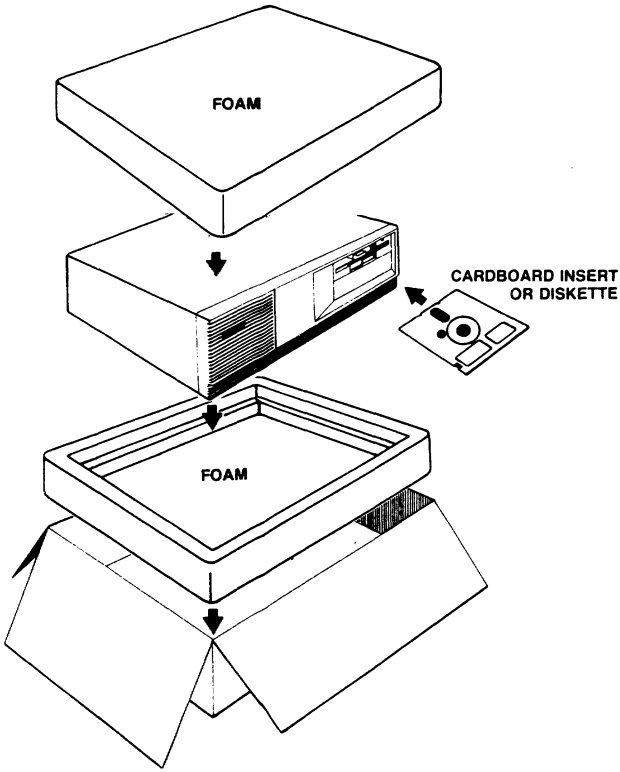


Figure 6-3
Repacking the High-Resolution Graphics Board and Monitor

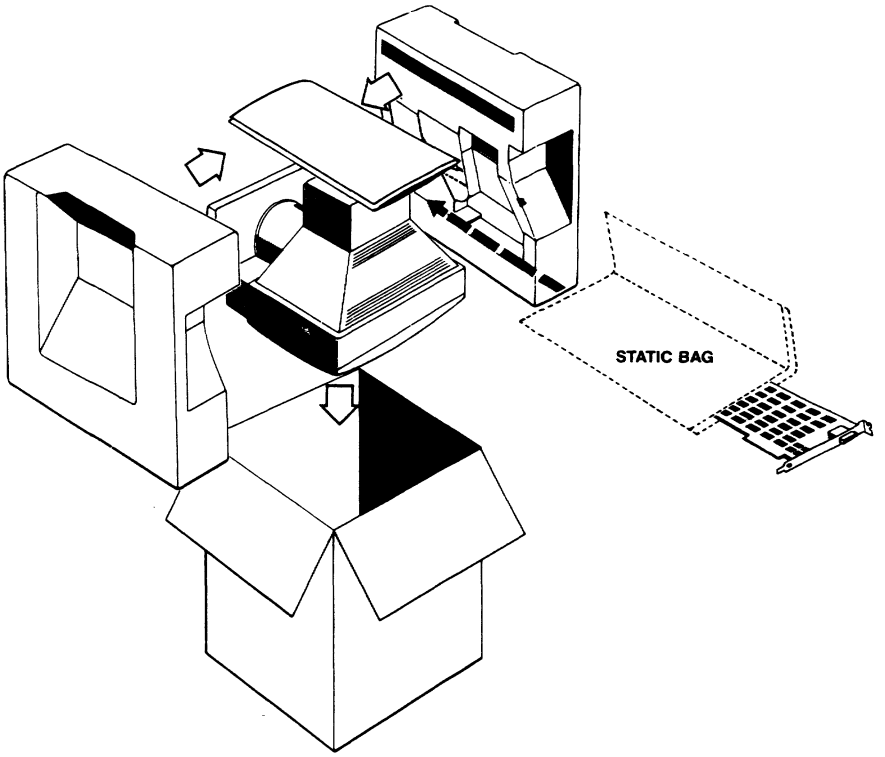
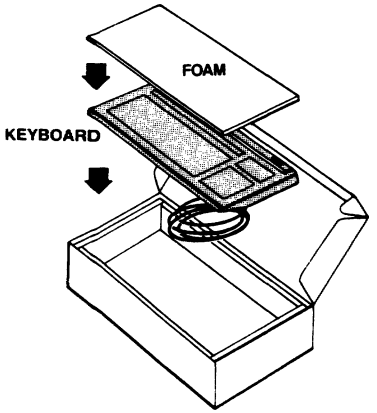



Figure 6-4
Repacking the Keyboard



## TROUBLESHOOTING

The information in Table 6-1 may help you resolve operating problems without placing a service call. If your computer does not work properly after you have followed the suggestions given here, call your dealer or service center.

**Table 6-1**
**Troubleshooting Procedures**

| Problem | Action |
|---|---|
| Nothing happens when the AT power is turned on. | Unplug the power cord and plug it in again.<br><br>Test for power by plugging something else in the same electrical outlet.<br><br>Check the fuse (as described in Appendix C) and replace it if necessary. **If the fuse blows again, call your authorized service center.** |
| Date prompt does not appear after loading the operating system. | If you are loading the operating system from a floppy disk, check to see the disk is inserted in the drive correctly (refer to Chapter 4). Reset the system by pressing the <CTRL>/<ALT>/<DEL> keys simultaneously.<br><br>Make sure the monitor is properly connected to the system module.<br><br>Remove the system module cover and check the connection of the monitor adapter board.<br><br>Turn the screen contrast up.<br><br>Try using the master system diskette. If that works, make a new working copy. |

Table 6-1 Continued
Troubleshooting Procedures

| Problem | Action |
|---|---|
| | If you are loading the operating system from a hard disk, make sure the floppy drive door is open (latch in horizontal position) and reset the system by pressing <CTRL>/<ALT>/<DEL> simultaneously. If that does not work, insert the master system diskette into the floppy drive. Turn the drive latch to the vertical position and reset the system by pressing <CTRL>/<ALT>/<DEL> simultaneously. If it works, reinstall the operating system onto the hard disk. |
| The system prompt appears, but the AT does not respond to commands. | If you are using a floppy disk drive, check to see that the appropriate diskette is in the active drive.<br><br>Be sure the latch on the active floppy disk drive is in the vertical position.<br><br>Make sure the keyboard is properly connected.<br><br>Reset the system by pressing <CTRL>/<ALT>/<DEL> simultaneously. |
| The AT seems to be running, but the cursor does not appear | Adjust the monitor controls.<br><br>Make sure the monitor cable is plugged in at both ends. |

**Table 6-1 Continued**
**Troubleshooting Procedures**

| Problem | Action |
|---|---|
| The AT locks up and does not respond to the keyboard. | Make sure the keyboard is properly connected.<br><br>Reset the AT by turning the power off and then back on. |
| Nothing appears on the screen. | Turn off and unplug the computer; check the fuse (refer to Appendix C).<br><br>Check the cable connections between the monitor and the computer. |
| Printer does not print. | Reconnect printer cable.<br><br>Check printer cable configuration.<br><br>Check for printer fault (out of paper or ribbon).<br><br>Run the printers self test procedure. |
| The modem does not respond or transmit to a remote processor. | Unplug the modem and plug it in again. Turn its power on and off and reconnect the modem cable to the RS-232C port.<br><br>Make sure the modem and computer are operating at the same baud rate.<br><br>Run any modem dianostics. |

## ERROR MESSAGES

When you turn on or reset the AT, it goes through a power-on self test (POST) routine. If the tests detect a problem, the screen may display one of the error messages in Table 6-2.

If the screen displays a **failure** error message (e.g., system board, memory, display, keyboard, diskette), call your dealer or service technician for assistance. Usually the system can proceed no further with the power-on routine after generating this type of message.

When the message displays **Run Setup**, you may be able to correct the condition by running the SETUP program. See Chapter 2 for instructions. If the system is able to continue through the power-on routine after encountering an error, the screen displays **Strike F1 key to continue.**

The two-digit code that starts some error messages corresponds to the last value output to the status port (port address 80h). This code indicates execution position and can be used to debug the system.

**Table 6-2**
**Error Messages**

| Test | Status Port = | Message |
|---|---|---|
| 8042 and keyboard | 20, 21, 22, 23 | ?? System Board Failure |
| Monochrome or Color display | 34 or 36 | ("beep": one long and two short) |
| Interrrupt Controller | 39 | 39 System Board Failure |
| 8254 timer channels Ø and 2 | 40 | 40 System Board Failure |
| Check Most Significant Bit (MSB) of channel 2 count register | 44 | 44 System Board Failure |

**Table 6-2 (continued)**
**Error Messages**

| Test | Status Port = | Message |
|---|---|---|
| Check DMA 1 temporary register | 48 | 48 System Board Failure |
| Check DMA 1 registers | 49 | 49 System Board Failure (data bus error) |
| | 4A | 4A System Board Failure (address error) |
| Check DMA 2 temporary register | 4B | 4B System Board Failure |
| Check DMA 2 registers | 4C | 4C System Board Failure (data bus error) |
| | 4D | 4D System Board Failure (address bus error) |
| Check DMA page registers | 50 | 50 System Board Failure |
| Word I/O | 52 | 52 System Board Failure |
| System memory | 5A, 5B | 5B System Memory Failure<br>?????K System Memory Detected<br>?????K System Memory OK |
| Expansion memory | 68, 6C | 6C Expansion Memory Failure<br>?????K Expansion Memory Detected<br>?????K Expansion Memory OK |
| Protect mode | 60 | 60 Protected Mode Failure (exception interrupt Ø detected) |
| | 61 | 61 Protected Mode Failure (exception interrupt 1 detected) |
| | 6E | 6E Protected Mode Failure (any other exception interrupt detected) |

**Table 6-2 (continued)**
**Error Messages**

| Test | Status Port = | Message |
|---|---|---|
| Display video | 70 | Monochrome Display Failure |
| | 70 | Color Display Failure |
| Keyboard | 71, 72, 73 | 73 Keyboard Failure (keyboard error) |
| | | 73 System Board Failure (8042 error) |
| Disable A20 | 76 | 76 System Board Failure |
| 8272 floppy | 80, 81 | 81 Diskette Failure |
| Floppy type and number | 82, 88 | 82 Diskette Failure |
| | | Run Setup - Diskette Type Incorrect |
| Hard disk controller | 8D | 8D Fixed Disk Failure |
| Configure hard disk 1 | 8E | 8E Fixed Disk Failure |
| Configure hard disk 2 | 8F | 8F Fixed Disk Failure |
| Display CMOS | 90 | Run Setup - Bad Battery |
| | | Run Setup - Checksum Incorrect |
| | | Run Setup - Primary Display Incorrect |
| | | Run Setup - Memory Size Incorrect |
| Time configuration | A0 | Run Setup - Time and Date Incorrect |

# APPENDIX A SPECIFICATIONS

## MICROPROCESSOR/MEMORY

| | |
|---|---|
| CPU | Intel 80286 16-bit microprocessor (processor speed 6 or 8 Megahertz) socketed for Intel 80287 numeric coprocessor (jumper-selectable coprocessor speed: 4 MHz and 4.77 MHz, 5.3 MHz and 4.77 MHz) |
| MEMORY | Model I: 256-Kbytes dynamic RAM<br><br>Model II: 512-Kbytes dynamic RAM<br><br>The AT is expandable to 15 Mbytes of memory with expansion cards<br><br>32-Kbytes EPROM with bootstrap loader and hardware diagnostics routines |

## DISKETTE DRIVE

| | |
|---|---|
| TYPE | 5 1/4-inch diskette |
| DISKETTES | 5 1/4-inch, double-sided, high density, soft-sectored, 96 or 48 tpi |
| STORAGE CAPACITY (formatted) | 1.2 Mbyte at 96 tpi<br>360 Kbytes at 48 tpi (optional) |
| TRANSFER RATE 96-tpi diskette drive | 500 Kbits/second at 96 tpi<br>300 Kbits/second at 48 tpi |
| ACCESS TIME 96-tpi diskette drive | 94 milliseconds average<br>18 milliseconds track to track |
| ROTATION SPEED | 360 rpm (96-tpi diskette drive) |

**FIXED DISK DRIVE**

| | |
|---|---|
| TYPE | One full-height, 5 1/4-inch Winchester hard disk |
| STORAGE CAPACITY | 40 Mbytes formatted<br>53 Mbytes unformatted |
| TRANSFER RATE | 5 Mbits per second |
| ACCESS TIME | 8 milliseconds, track to track<br>55 milliseconds, average |
| VENDOR | Rodime (other sources may be used) |

**INPUT/OUTPUT**

| | |
|---|---|
| SERIAL I/O | RS-232C asynchronous 9-pin serial port; configured as DTE. Eight baud rates (110, 150, 300, 600, 1200, 2400, 4800, 9600) |
| PARALLEL I/O | Parallel (Centronix-type) printer port (DB-25S connector) |
| EXPANSION SLOTS | Six PC AT-compatible, 16-bit slots, two PC-compatible 8-bit slots |

**POWER REQUIREMENTS**

| | |
|---|---|
| U.S.<br>INTERNATIONAL | 115 Vac (+/- 10%) 50/60 hertz<br>115/230 Vac (+/- 10%) 50/60 hertz |
| POWER CONSUMPTION | 2.5 amp maximum at 115 Vac<br>1.25 amp maximum at 230 Vac<br>220 watts |
| POWER CORD | NEMA standard 5-15R, 3-prong receptacle (United States only) |

**ENCLOSURES**

| | |
|---|---|
| COMPUTER DIMENSIONS | Height: 6 1/4 inches<br>Width: 20 3/4 inches<br>Depth: 16 1/2 inches |
| COMPUTER COMPOSITION | Top, bottom: Sheet steel<br>Bezel: ABS plastic |
| KEYBOARD DIMENSIONS | Height: 1 1/2 inches<br>Width: 18 1/4 inches<br>Depth: 8 1/2 inches |
| KEYBOARD COMPOSITION | Top, bottom: ABS plastic |

**ENVIRONMENT**

| | |
|---|---|
| OPERATING | 50 to 85 degrees Fahrenheit<br>10 to 30 degrees Celsius<br>Maximum humidity 95 percent relative, noncondensing<br>Maximum altitude 10,000 ft. above sea level |
| NONOPERATING (SHIPPING) | 32 to 120 degrees Fahrenheit<br>0 to 50 degrees Celsius |

**OPTIONAL HARD DISK UPGRADE**

| | |
|---|---|
| TYPE | One half-height 5 1/4-inch Winchester hard disk |
| STORAGE CAPACITY | 20 Mbytes formatted<br>24 Mbytes unformatted |
| TRANSFER RATE | 5 Mbits per second |
| ACCESS TIME | 15 milliseconds, track to track<br>85 milliseconds, average |
| VENDOR | Miniscribe (other sources may be used). |

**OPTIONAL 360-KBYTES DISKETTE DRIVE**

| | |
|---|---|
| TYPE | 5 1/4-inch diskette |
| DISKETTES | 5 1/4-inch, double-sided, high density, soft-sectored, 48 tpi |
| STORAGE CAPACITY (formatted) | 360 Kbytes at 48 tpi |
| TRANSFER RATE | 250 Kbits/second at 48 tpi |
| ACCESS TIME | 95 milliseconds, average<br>20 milliseconds, track to track |
| ROTATION SPEED | 300 rpm (48-tpi diskette drive) |
| VENDOR | Toshiba (other sources may be used) |

## OPTIONAL GRAPHICS CARD AND MONITOR

| | |
|---|---|
| MONITOR | 14-inch, tilt-and-swivel, green screen |
| GRAPHIC RESOLUTION | IBM PC-compatible graphics mode<br>- 640 x 200 monochrome<br>- 320 x 200 4-color graphics<br>- 320 x 200 monochrome<br><br>Extendable graphics mode<br>- 640 x 400 monochrome<br>- 320 x 400 four colors |
| TEXT | Alphanumeric mode<br>- 80 x 25 screen (or 40 x 25)<br>- 256-character set<br>  - 15 special characters for game support<br>  - 16 for word processing support<br>  - 96 for the standard ASCII code set<br>  - 48 for the foreign language support<br>  - 48 for the business block graphics<br>  - 16 for selected Greek characters<br>  - 15 for selected scientific notations<br>- 8 x 16 dot matrix (7 x 9 font size with two descenders)<br>- Hidden attributes (intensity, blinking, reverse, blank, underline)<br>- 16 colors on RGB color monitor<br>- 16 different gray scales for monochrome monitor |
| MEMORY | 32 Kbytes of RAM |

# APPENDIX B CONNECTOR PIN ASSIGNMENTS

This appendix contains diagrams of the pin connector assignments for the following ports:

* Serial port
* Parallel port
* 8-bit expansion slots
* 16-bit expansion slots

**Figure B-1**
**Serial Port Pin Assignments**

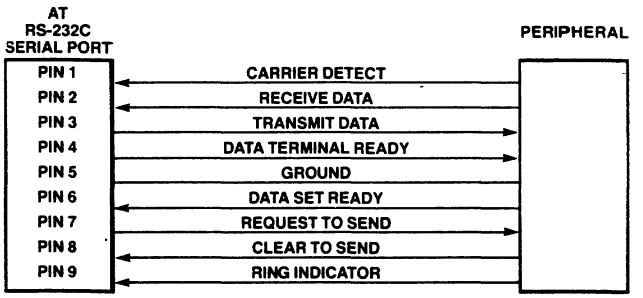


**Figure B-2**
**Parallel Port Pin Assignments**

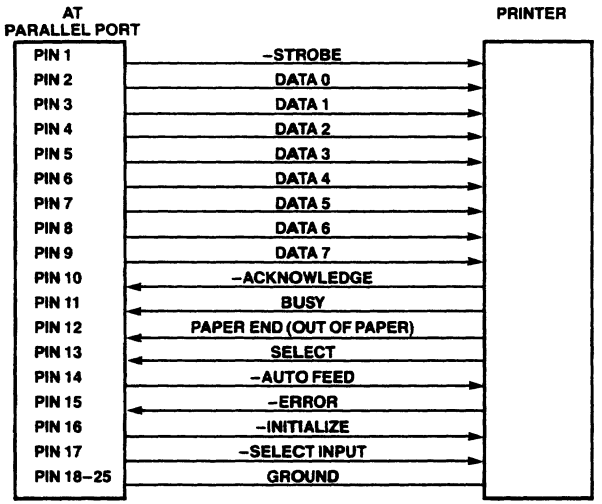


**Figure B-3**
**8-Bit Expansion Slot**

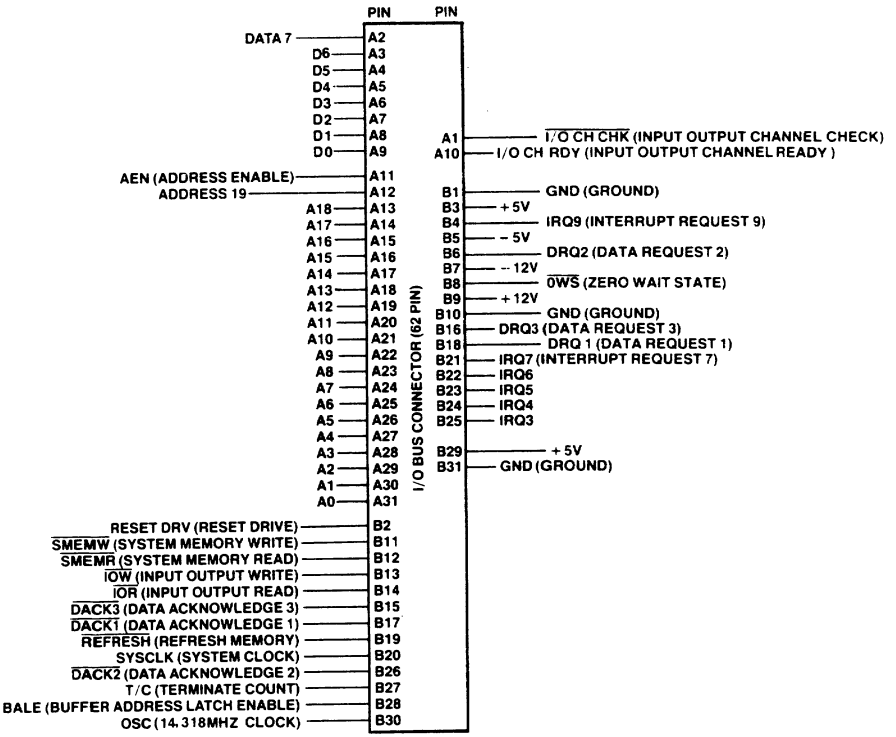
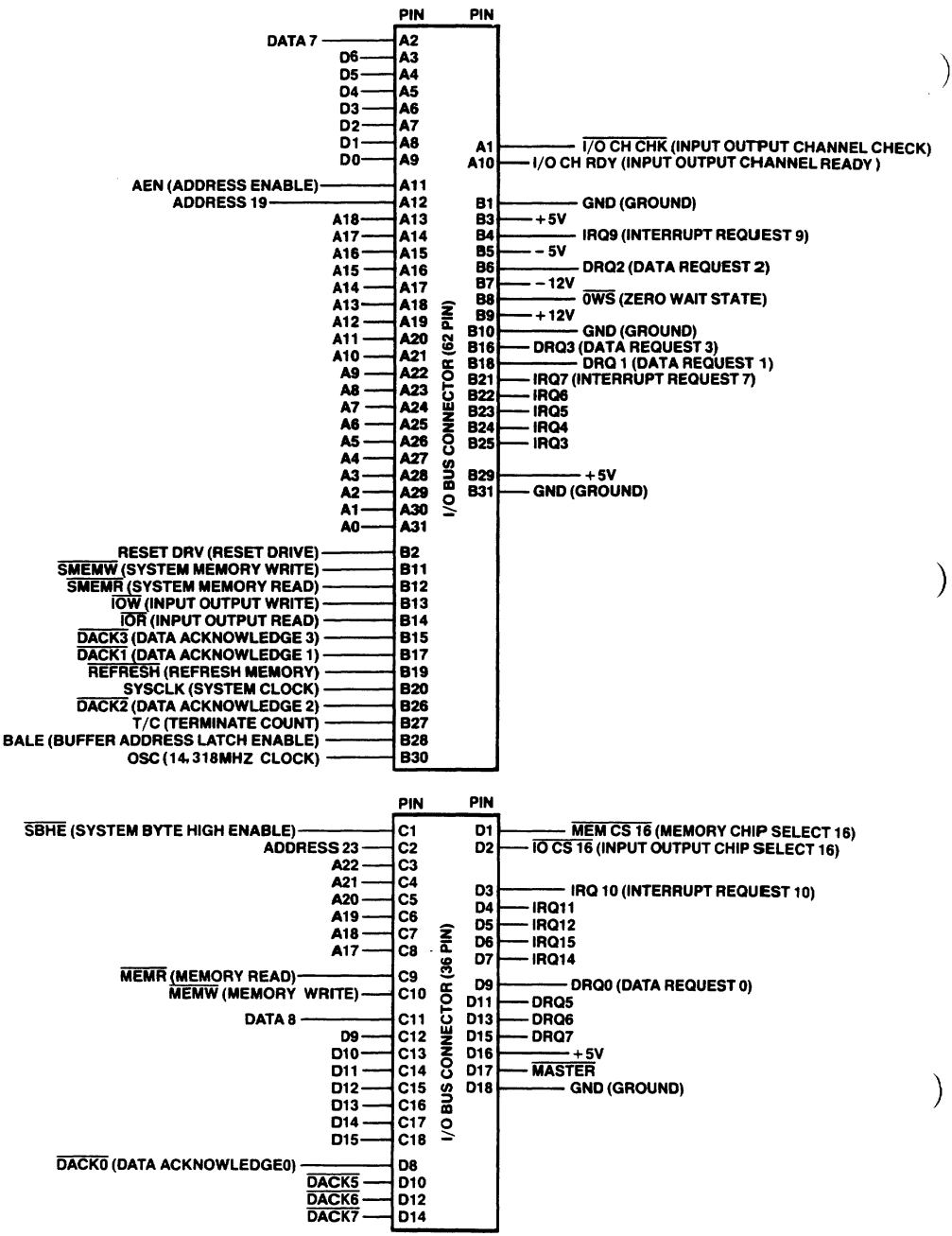


**Figure B-4**
**16-Bit Expansion Slot**



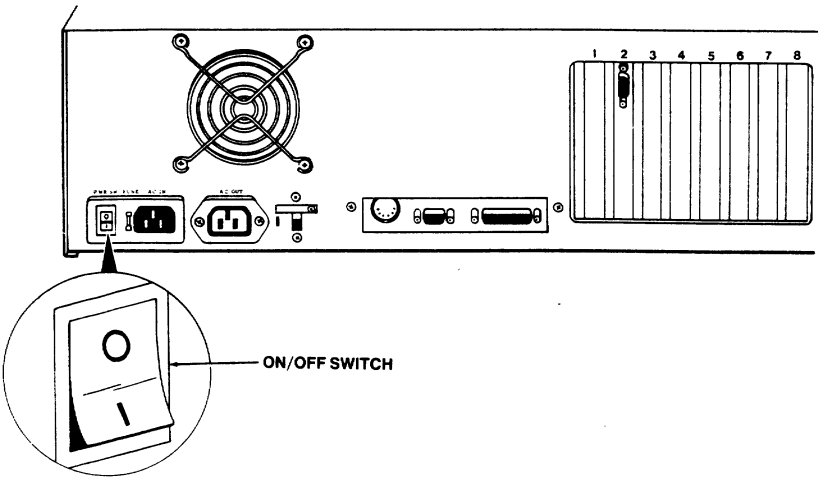
## APPENDIX C CHANGING THE FUSE

**WARNING!** IF THE NEW FUSE BURNS OUT AFTER REPLACEMENT, DISCONNECT THE POWER AND HAVE YOUR COMPUTER SERVICED IMMEDIATELY!

Perform this procedure to check or change the AT fuse.

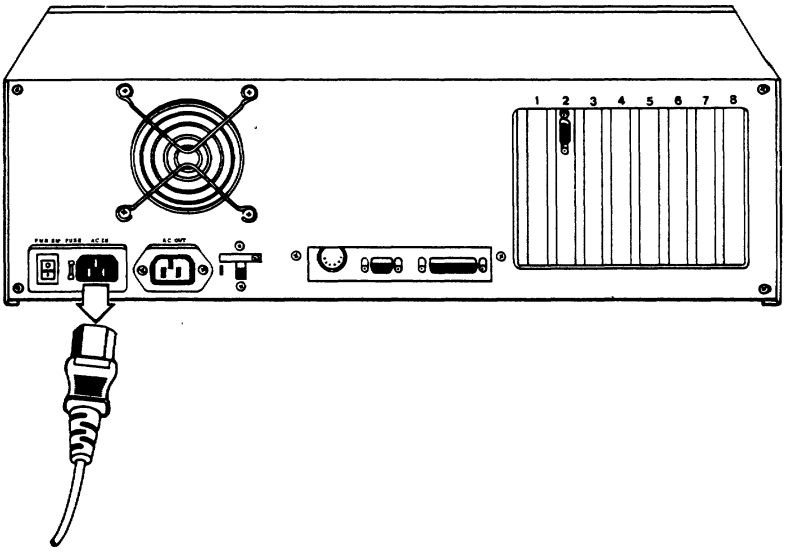
1. Check to see that the ON/OFF switch is in the OFF position. (The switch is OFF when the '0' is down.)

**Figure C-1**
**Turning Power OFF**



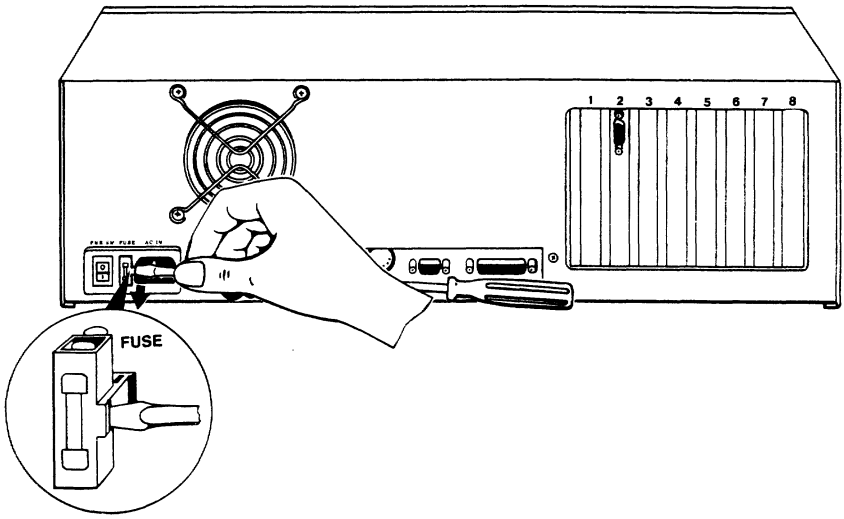
2. Disconnect the power cord from the rear of the AT.

**Figure C-2**
**Disconnecting the Power Cord**



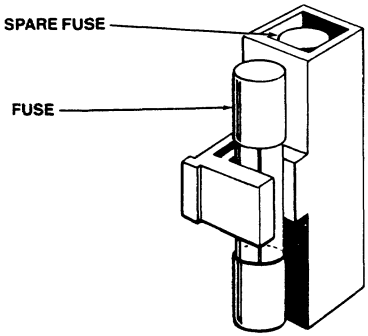
3. Use a small flat screwdriver to gently pry the fuse assembly out.

**Figure C-3**
**Removing The Fuse Assembly**




4. Remove the active fuse from the assembly and inspect it for damage.

**Figure C-4**
**Inspecting the Fuse Assembly**

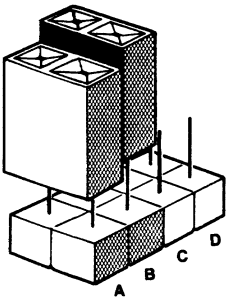


5. If the fuse is blown, replace it with the spare fuse. Remove the spare fuse from its protective container by gently pushing it out with the screwdriver. Then clamp it in the active fuse position.

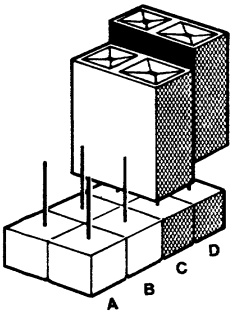
6. Install the fuse assembly back into the AT.

## APPENDIX D - PARALLEL PRINTER AND SERIAL COMMUNICATIONS PORT ADDRESS JUMPER CONFIGURATIONS

**Figure D-1**
**Serial Port Jumper (W1)**



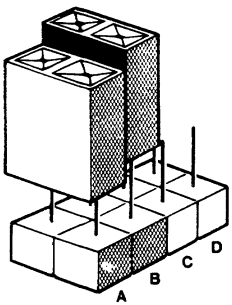

Serial Port 1



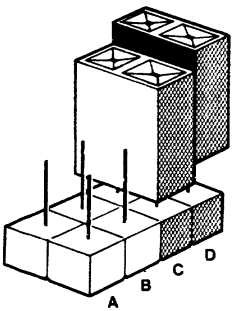

Serial Port 2

Your AT system is shipped with the serial port address configured as port 1. If you add an additional serial port, refer to the installation instructions provided with that device before making the serial port 2 jumper connection.

**Figure D-2**
**Parallel Printer Port (W2)**




Parallel Port 1




Parallel Port 2

Your AT system is shipped with the parallel port address configured as port 1. If you add an additional parallel port, refer to the instructions provided with that device before making the port 2 jumper connection.

## APPENDIX E - DIP SWITCH SETTINGS

The DIP switch settings are defined as follows:

| Switch Number | Switch position | Function |
|---|---|---|
| 1 | ON | 6MHz operation (CPU) |
| | OFF | 8MHz operation (CPU) |
| 2 | ON | Primary display attached to color/ graphics card |
| | OFF | primary display attached to monochrome card |
| | Settings for 256K motherboard RAM | |
| 3 | OFF | |
| 4 | ON | |
| 5 | ON | |
| | Settings for 512K motherboard RAM | |
| 3 | ON | |
| 4 | OFF | |
| 5 | ON | |

| | Settings for 640K motherboard RAM |
|---|---|
| 3 | ON |
| 4 | ON |
| 5 | OFF |
| 6 - 8 | Not used |

**NOTE:** ON = CLOSED
OFF = OPEN

To change a setting on the switch, use a ball point pen and gently push the switch lever to the desired position. Always give the lever a second push to make certain that it is seated properly in the position you have chosen.

**STOP! DO NOT USE A PENCIL! Pencil lead is an electrical conductor, and any small grains of lead falling into the switch sections may cause a malfunction.**

## Information Needed for Service

When you call for service, you will be asked for the serial number of your system. The serial number is located on the back of the system. For future reference, note the serial number, the date you took delivery, and the name and phone number of your computer store and service center in the space below.

Serial No. _____ Delivery Date _____

Computer Store _____ Phone No. _____

Service Center _____ Phone No. _____