GRiDCASE 1535 EXP
Owner's Guide

June 1989

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Limited Warranty and Limitation of Liability

You should carefully read the following terms and conditions. You will be deemed to have accepted these terms and conditions if you have not returned the product with your proof of purchase to your GRiD representative within five days of the date of payment.

The term "Products," as used herein, means hardware, hardware parts, and documentation sold by GRiD.

1. Warranty

GRiD warrants that the Products sold hereunder shall be free from defects in materials and workmanship for a period of one year after date of shipment. Defective Products will be repaired or replaced, at GRiD's option, by GRiD during the warranty period. You shall notify GRiD of the defective Product within the one-year period, obtain a Product Repair Order, and return the Product to GRiD along with proof of purchase data. If this Product is delivered by mail, you agree to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to the warranty service location, and to use the original shipping containers or equivalent. Contact an authorized GRiD Systems representative, call the GRiD Resource Center (GRC) at 1-800-284-GRID (4743), or write to: GRiD Systems Corporation, GRiD Resource Center, 47211 Lakeview Blvd., P.O. Box 5003, Fremont, California 94537-5003, for further information.

You are responsible for removing any data or programs or keeping backup copies prior to returning Products to GRiD. GRiD shall not be liable for loss of data contained in any returned equipment.

This warranty is not valid if the Products have been misused, altered, neglected, or if repairs are attempted by unauthorized personnel. **Except as provided above, GRiD makes no warranties, expressed or implied, including any warranty of merchantability or fitness for a particular purpose.**

2. Limitation of Liability

In no event will GRiD be liable for special, incidental, or consequential damages, however caused. GRiD's liability under or for breach of this agreement shall be limited to refund of the purchase price.

3. General

You shall not assign this Agreement nor any rights hereunder without the prior written consent of GRiD. GRiD reserves the right to withhold such consent for any reason whatsoever. Subject to the foregoing, this Agreement shall bind and inure to the benefit of the respective parties hereto and their heirs, personal representatives, successors, and assigns.

The Terms and Conditions of this Limited Warranty and Limitation of Liability and of the Class A Software License Agreement represent the entire Agreement between GRiD and you relating to Product purchases and software licensing and may only be modified in writing, signed by both parties.

By reading this agreement, you acknowledge that you understand it, and agree to be bound by its terms and conditions.

Federal Communications Commission (FCC) Statement

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference with radio and television reception. This computer has been tested and complies with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case you, at your own expense, are required to take whatever measures are necessary to correct the interference (FCC, Part 15.818a).

The section DEALING WITH RADIO FREQUENCY INTERFERENCE, in Chapter 8, describes some procedures that may correct the interference.

If necessary, consult the GRiD Resource Center or an experienced radio/television technician for additional suggestions. You may find helpful the FCC booklet *How to Identify and Resolve Radio-TV Interference Problems*. This booklet (Stock No. 004-000-00345-4) is available from the United States Government Printing Office, Washington, DC 20402.

Canadian Department of Communications (DOC) Statement

This device does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

CONTENTS

List of Figures and Tables

ABOUT THIS BOOK

This manual introduces you to the GRiDCASE® 1535 EXP computer, a powerful, lightweight, portable microcomputer. It shows you how to set up your GRiDCASE 1535 EXP and gives you the basics of how to operate it.

To begin using your GRiDCASE 1535 EXP computer, read the step-by-step setup instructions given in Chapter 1.

HOW THIS MANUAL IS ORGANIZED

This manual is organized as follows:

Chapter 1 explains how to set up and begin using your GRiDCASE 1535 EXP computer. Read this chapter first.

Chapter 2 thoroughly describes the GRiDCASE 1535 EXP computer. Every part of the computer is identified and explained.

Chapter 3 describes all of the built-in options that are available for the GRiDCASE 1535 EXP computer. If you ordered any built-in options for your computer, they are described here.

Chapter 4 describes the options that are available to power your computer.

Chapter 5 describes the use of the internal diskette and the hard disk drives.

Chapter 6 describes the external diskette and tape drives that are available for use with the GRiDCASE 1535 EXP computer and explains how to connect them.

Chapter 7 provides information concerning the use of the expansion tray. Read this chapter if you plan to use the expansion tray.

Chapter 8 provides troubleshooting information.

Chapter 9 provides maintenance information

Chapter 10 describes the special features of the GRiD version of MS-DOS that is available for use on the GRiDCASE 1535 EXP computer. Information is also provided on how to move your application programs and other files from another computer to the GRiDCASE EXP.

The appendixes provide information on modem testing, switch settings for printers, computer specifications, and technical information that may be necessary when installing expansion cards in the expansion tray.

A postage paid Customer Response Card is provided at the end of this manual. Owners and users are encouraged to use the card to comment on the usefulness and readability of the manual.

BOOKS YOU MAY NEED

You may want to refer to the following books for further information on using the GRiDCASE 1535 EXP.

GRiD386 User's Guide (Order Number: 022160-40), for information on how to use the GRiD386 program to configure the memory in your GRiDCASE 1535 EXP computer. The GRiD386 program is included with every GRiDCASE 1535 EXP computer; it allows you to configure memory beyond 640 KB (kilobytes) as LIM EMS (Lotus/Intel/Microsoft Expanded Memory Specification) memory or as extended memory.

Internal Modem User's Guide (Order Number: 965800-00), for information on how to use the 2400 baud modem and the MNP 2400 baud modem. This guide contains detailed information on the command sets for each of these modems.

MS-DOS Reference: Release 3.3 (Order Number: 029517-40), for reference information on using MS-DOS on GRiDCASE 1535 EXP computers.

Model 3401 3½-Inch High Density Pocket Diskette Drive Owner's Manual (Order Number: 003401-40), for information on setting up and operating the 3½-inch pocket floppy diskette drive.

Model 3402 5¼-Inch Pouch Diskette Drive Owner's Manual (Order Number: 003402-40), for information on setting up and operating the 5¼-inch double-density pouch floppy diskette drive.

Model 3403 40 MByte Backup Tape System Owner's Manual (Order Number: 003403-40), for information on setting up and operating the tape drive.

Model 3404 5¼-Inch High Density Pouch Diskette Drive Owner's Manual (Order Number: 003404-40), for information on setting up and operating the 5¼-inch high-density pouch floppy diskette drive.

CHAPTER 1:
SETTING UP YOUR GRiDCASE 1535 EXP COMPUTER

This chapter describes how to prepare your GRiDCASE 1535 EXP computer for use. It covers checking the contents of the shipping box, setting up the computer, starting up (booting) the operating system, setting a password, and closing the computer for travel.

NOTE: This chapter does not address attaching the expansion tray. For this information, refer to Chapter 7.

CHECKING THE CONTENTS OF THE BOX

Figure 1-1 shows the parts included in the computer shipping carton. The expansion tray is packed separately in its own shipping carton.

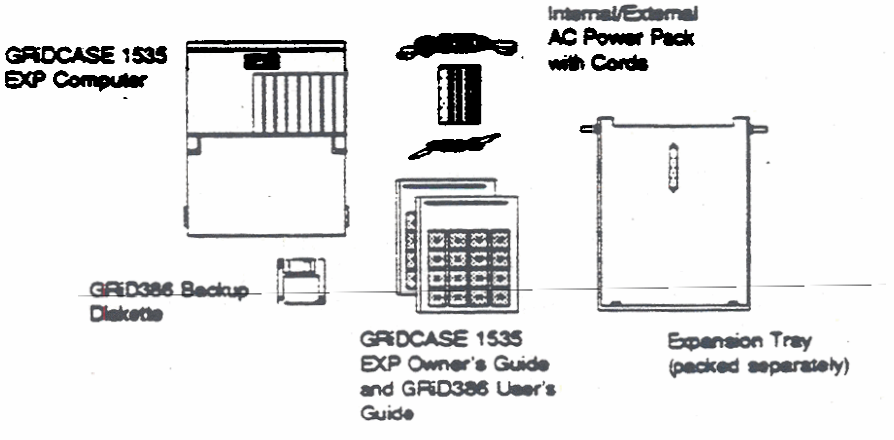


Figure 1-1. Contents of Shipping Carton

Check for shipping damage or missing parts. If any equipment is missing or damaged, immediately contact an authorized GRiD Systems representative, call the GRiD Resource Center (GRC) at 1-800-284-GRID (4743), or write to: GRiD Systems Corporation, GRiD Resource Center, 47211 Lakeview Blvd., P.O. Box 5003, Fremont, California 94537-5003, for further information.

Keep the shipping cartons and all original packing materials in case you need to return your GRiDCASE 1535 EXP for upgrading or service. Do not ship the computer to GRiD Systems until you have received prior authorization from the GRC or your GRiD Systems representative.

The internal/external AC power pack shipped with your GRiDCASE 1535 EXP is used to power the computer. In addition to the power pack, there are other available options for powering your system. Chapter 4 explains all of these options.

STARTING UP YOUR GRiDCASE 1535 EXP COMPUTER

This section explains how to get your computer up and running quickly. It does not cover connecting printers, connecting external drives, or connecting expansion trays. If you want to connect a printer, an external drive, or an expansion tray before starting your computer for the first time, refer to Chapters 2, 6, and 7, respectively.

MS-DOS and GRiD386 have already been installed for you on the internal hard disk, if your system has one. GRiD386 is a program that allows you to configure some or all of the extended memory in your computer as EMS (Expanded Memory Specification) memory. Refer to the *GRiD386 User's Guide* for details.

Begin by clearing a sturdy, flat work surface.

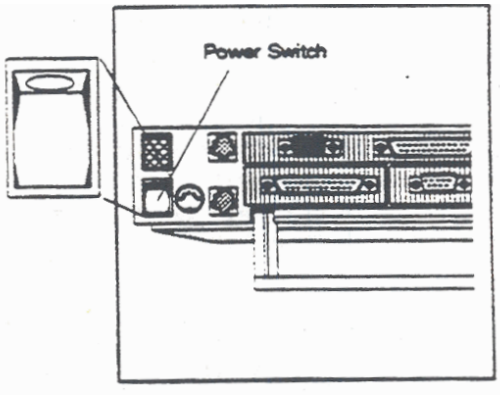
You should have on hand the power pack you plan on using to power the computer. This can be the internal/external AC power pack included with your computer, the optional internal battery pack, or the optional external battery pack. For information on powering your computer, see Chapter 4.

NOTE: If you have attached an expansion tray to your GRiDCASE 1535 EXP, you **cannot** use any internal power supply, or the computer will not start up when you turn it on.

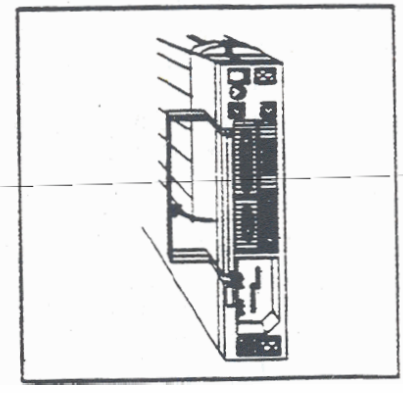
Further, if your computer is equipped with a plasma screen, you **cannot** use the internal/external AC power supply internally. (In this circumstance, you **can** use the internal battery pack if the expansion tray is not attached. See Chapter 4 for the battery power option available with the expansion tray attached.)

To set up and start the computer, follow the steps listed below.

1. **Make sure the power switch is off.**
   The power switch is on the back of the computer at the far left as you face the rear of the computer. Press the bottom of this switch to turn off the computer.



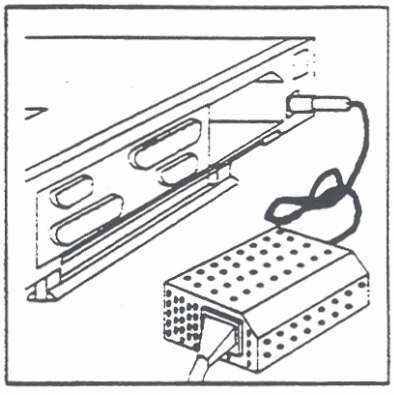
2. **Pull down the computer's handle/leg (optional).**
   You can use the leg to improve your viewing/typing angle. Pivot the handle on the back of the computer down 90° to act as a leg. Do not extend the leg if you intend to attach the expansion tray to the computer.



CAUTION

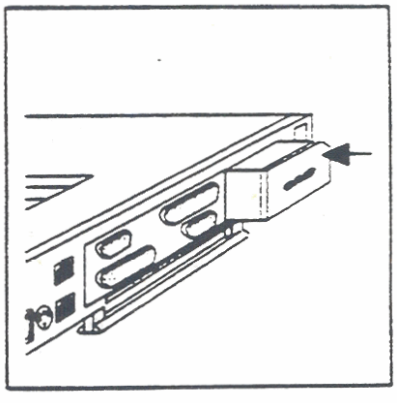
Make sure that the power switch is turned off before connecting the power pack or battery pack.

3a. **If you are using the internal/external AC power pack externally, connect it to the computer and plug it in.** Plug one end of your power pack cord into the DC input connector on the back of the computer and the other end into the AC power pack. Then plug one end of your power cord into the power cord socket on the AC power pack, and the other end into a wall outlet that accepts a three-prong grounded plug. If you use a plug adapter, make sure it is properly grounded. If you have a 100 MB hard disk, you must use the AC power pack externally.

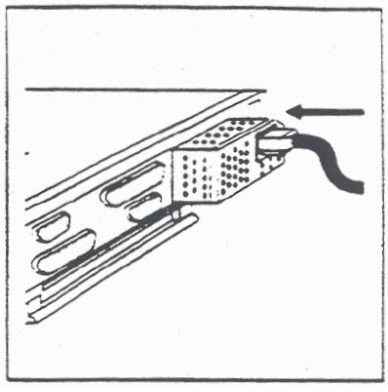


3b. **If you are using the internal battery pack, insert it into the computer.**
NOTE: If you have attached an expansion tray to your computer, you **cannot** use the internal battery pack. The computer will not start up when you turn it on.

Hold the battery pack with the label facing you. Insert it into the power pack/accessory slot on the back of the computer until it clicks into place.



3c. **If you are using the internal/external AC power pack internally, insert it into the computer.**
Hold the AC power pack with the power cord socket facing you. Plug one end of the power cord into the power cord socket on the back of the power pack. Insert the power pack into the power pack/accessory slot on the back of the computer until it clicks into place. Then plug the other end of the power cord into a wall outlet that accepts a three-prong plug. If you use a plug adapter, make sure it is properly grounded.

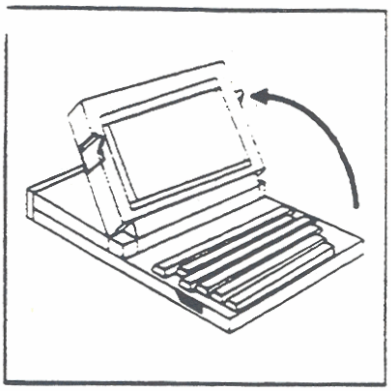


CAUTION

If you have a 100 MB (megabyte) hard disk, a plasma display, or an attached expansion tray, you must use the AC power pack externally. That is, the AC power pack must not be inserted into the computer (see Chapter 4).

4. **Lift up the screen.**
The screen is locked to the frame by one latch on each side. Pull these latches toward you and lift the screen.

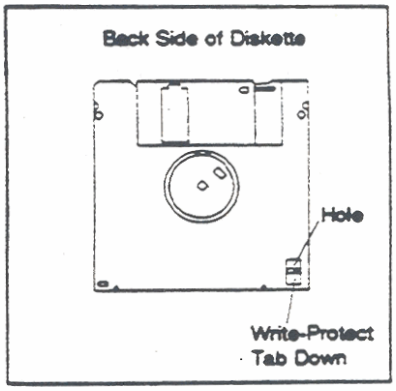
If your computer is equipped with the optional internal hard disk, skip to Step 7.



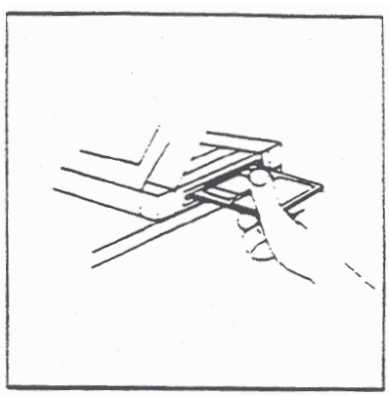
CAUTION

The screen must be treated with care. Never use abrasive substances on the screen. For complete information on cleaning the screen, see the section CLEANING YOUR GRIDCASE 1535 EXP COMPUTER, in Chapter 9.

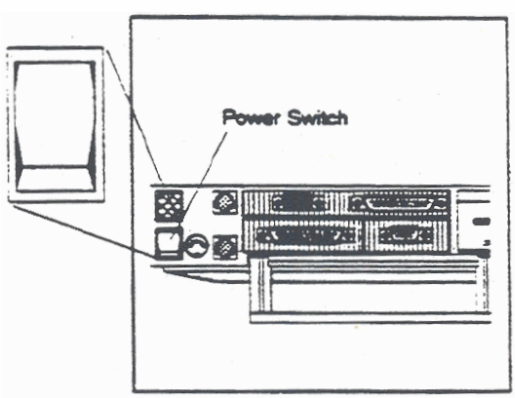
5. **Write protect the operating system diskette (optional).**
To protect the data on your 3½-inch operating system diskette, slide the write-protect tab on the back side of the diskette until the hole is uncovered.



6. **Insert the operating system diskette in the internal diskette drive until it clicks into place. (This step is not required if you have the operating system in ROM.)**
Hold the diskette with the label facing upwards and the metal edge closest to the disk drive opening. Insert it into the internal diskette drive. An arrow on the diskette shows the proper direction for insertion.



7. **Turn the computer on.**
Press the top of this switch to turn on the computer.



When you turn on the power, the computer runs a self-test and loads the MS-DOS operating system into main memory (RAM) from read only memory (ROM), from the 3½-inch diskette in the internal diskette drive, or from the hard disk. This takes between 10 and 20 seconds, depending on your system's configuration.

NOTE: If you have the operating system in ROM, the computer will load it unless you designate otherwise. If you want to use an operating system located on another disk or diskette device, see the section STARTING UP THE OPERATING SYSTEM (BOOTING), below, for instructions.

When the loading is finished, the initial operating system screen is displayed.

You may want to adjust the screen angle by tilting the screen to the desired position. Also, depending on the lighting conditions, you may need to adjust the contrast/brightness of the screen using the contrast/brightness control switch to the right of the screen. Units equipped with LCD screens also have an LCD backlight brightness switch immediately to the left of the screen. Slide this switch up to increase screen readability in areas where ambient lighting is poor.

Note that increasing the brightness of the computer's screen will increase power consumption and, therefore, decrease battery life.

If you want to connect any other devices to your computer, such as a printer or pocket floppy diskette drive, see the section THE REAR VIEW, in Chapter 2, and see Chapter 6.

CAUTION

To avoid damaging your GRiDCASE 1535 EXP computer, before connecting or disconnecting any external device, always turn off the power of both the GRiDCASE and the external device. The GRiDCASE 1535 EXP computer contains low power circuitry, which can be damaged by static discharge. Static discharge occurs any time you connect or disconnect any external device (printer, storage device, power pack, and so on) on the computer when the power is on.

If You Have an Internal Hard Disk

If your GRiDCASE 1535 EXP computer has an internal hard disk, the hard disk is already formatted and contains all the MS-DOS operating system files. You can load MS-DOS from the hard disk simply by turning the computer on.

To load programs and data onto the hard disk, you need either a ROM cartridge or a floppy diskette drive. If you do not have access to an external drive, call your GRiD representative for more information and assistance.

If you should ever need to reload MS-DOS onto the hard disk, use the SYS command to copy the operating system from a diskette in an attached floppy diskette drive to the hard disk.

STARTING UP THE OPERATING SYSTEM (BOOTING)

Whenever you turn on the GRiDCASE 1535 EXP, it loads the MS-DOS operating system from either ROM, the hard disk, or a diskette into main memory (RAM). Loading the operating system in this way is sometimes called a cold start-up or a cold boot.

When you cold start the computer, it follows a specific order when choosing the storage device from which to load the operating system software. This device ordering is shown in Table 1-1. The computer first searches for the operating system software in ROM, and if it does not find the software there, it looks on the hard disk, if your system is equipped with one. If your system does not have a hard disk, the computer looks on drive A (either the internal floppy diskette drive or an attached floppy diskette drive set as drive A).

NOTE: On systems equipped with an external floppy diskette drive and a hard disk (and no MS-DOS ROMs), the operating system is **always** loaded from the hard disk, unless you explicitly override the normal search sequence (see below). This is **unlike** most other PC/AT-compatible computers, which search for the operating system on floppy diskette drive A before looking on the hard disk.

You can override the order in which the computer searches devices and choose the device from which you want the computer to load the operating system software. To start from another device, press the key indicated in Table 1-1 after you turn on the computer and the beep sounds. For example, to start from an external floppy diskette drive A on a system equipped with a hard disk, you would turn on the power, wait for the beep to sound, and then immediately press F. On computers equipped with a hard disk and an external diskette drive, E and F are identical.

NOTE: If the computer does start up from ROM, it executes the CONFIG.SYS and AUTOEXEC.BAT files on the device to which the ROM is appended, if these files are found there. For example, if you start up from ROM, and the ROM is appended to drive C, the CONFIG.SYS and AUTOEXEC.BAT files on drive C are executed. See the section READ ONLY MEMORY (ROM), in Chapter 10, for more information about ROM.

Table 1-1. Order of Devices Searched During Loading

Device	Key
Read Only Memory (ROM)	
Hard Disk	H
Floppy	F (Internal diskette drive, if you have one; otherwise, external diskette drive)
External Floppy	E (External floppy diskette drive, if you have both internal and external drives or external drive only)

WARM RESTART

Once start-up is complete, you may on occasion find it necessary to restart your computer again as you work. For example, it may be necessary to restart your computer if the software you are using locks up the computer.

At this point, you should reboot the computer by pressing and holding the **Ctrl** and **Alt** keys and then pressing the **Del** key:

This method, called a warm restart or warm boot, restarts the operating system while leaving your power supply on. This saves wear and tear on the power supply and power switch, and the booting time is faster than if you pressed the power switch. A warm restart also uses less battery power than a cold start.

To override the normal start-up device search sequence during a warm restart, press the key indicated in Table 1-1 immediately after the computer beeps.

If the warm restart method is unsuccessful, turn the computer off. Then wait several seconds before turning the computer on again. This ensures that the software is loaded properly.

SETTING A PASSWORD

The GRiDCASE 1535 EXP computer provides the ability to protect your file system from unauthorized use by allowing you to set a password. If you set a password on your computer, you will be required to enter the password each time you turn on or restart the computer.

To set or change a password, type the following command at the MS-DOS system prompt:

```
C>SETPASS
```

The password screen is displayed, giving you the ability to add a new password, change an existing password, or disable the password. The password screen provides all the instructions you need to use the password facility. Once you have set (or enabled) a password, you must enter that exact password each time you turn on or restart the computer to gain access to your files and programs. If you enter a wrong password at the password prompt, your computer will restart each time until you enter the correct password. If you forget your password, call the GRiD Resource Center at 1-800-284-GRID (4743) to obtain a new password.

The password screen also allows you to select a message language for your password prompt. The prompt requesting the password each time you turn on or restart your computer is displayed in the language selected as the message language.

CLOSING YOUR GRiDCASE 1535 EXP COMPUTER

To prepare your GRiDCASE 1535 EXP computer for travel, follow the steps listed below:

1. Save any files you are working on. Refer to the documentation for your application program for information on saving files.

   CAUTION

   If you have an internal hard disk, wait until the disk in-use light on the front of the computer goes out before you turn off the power. This ensures that you won't lose any data. The hard disk in-use light indicates when disk access is occurring; turning off the power during disk access could cause loss of data.

2. Turn off any external devices connected to the computer.

3. Remove your working diskette from the internal diskette drive, if your computer is equipped with one.

4. Turn the computer power switch off.

5. Close the screen panel. Press it down gently until you hear it click shut.

6. Disconnect all cords and cables from the computer.

Your GRiDCASE 1535 EXP computer is now ready to move. Don't forget your peripherals, cables, diskettes, manuals, and any accessories you want to take with you.

CHAPTER 2:
GETTING TO KNOW YOUR GRiDCASE 1535 EXP COMPUTER

This chapter introduces you to your GRiDCASE 1535 EXP computer, giving a detailed description of the top, front, side, rear, and bottom views of the computer.

THE TOP VIEW

The top view of the computer is shown in Figure 2-1. Note that the GRiD logo is on the top of the case, toward the rear, and the screen latches are on the sides, toward the front.

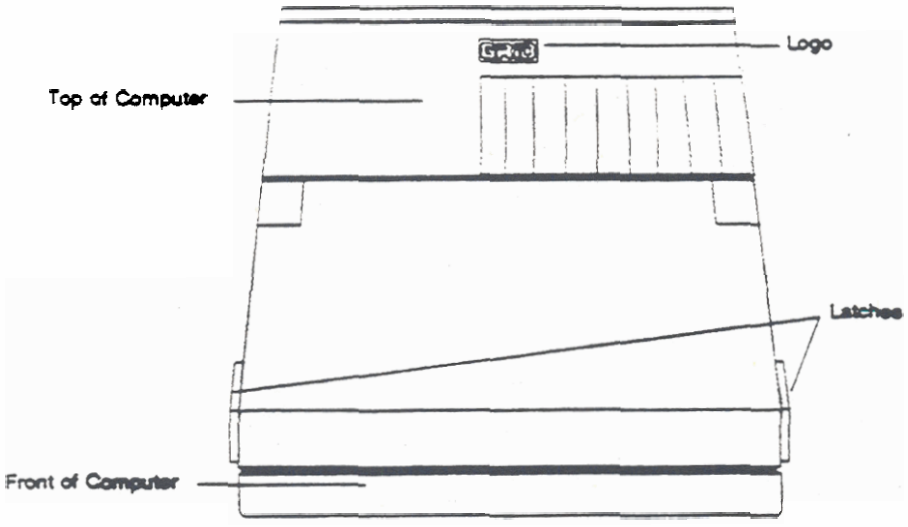


Figure 2-1. Top View of the GRiDCASE 1535 EXP Computer

THE FRONT VIEW

The front view of a GRiDCASE 1535 EXP computer is shown in Figure 2-2.

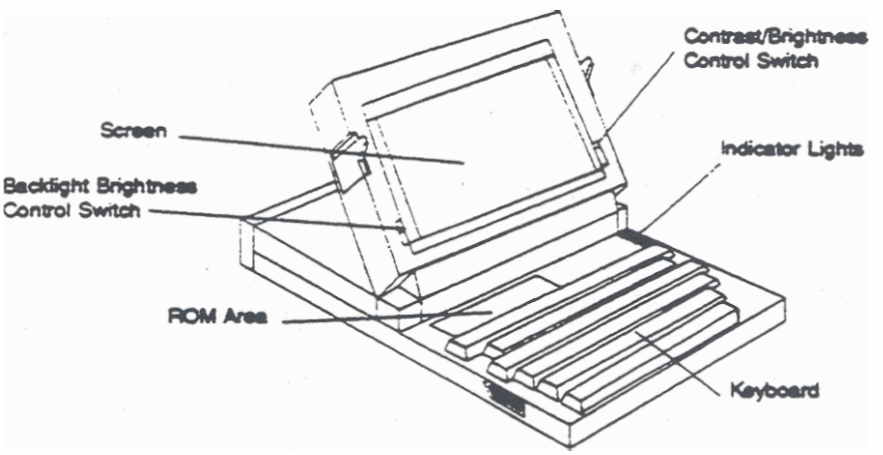


Figure 2-2. Front View of the GRiDCASE 1535 EXP Computer

Screen

The GRiDCASE 1535 EXP computer is equipped with a standard LCD screen. It has a resolution of 640 by 400 pixels, an aspect ratio of 1:1, and a contrast ratio of 11:1. An optional plasma screen is also available (see Chapter 3 for more details).

NOTE: If your computer is equipped with a plasma screen, you **cannot** use the AC power pack internally.

The screen is used to display your data. You should treat it with care. For complete instructions on cleaning the screen, see the section CLEANING YOUR GRIDCASE 1535 EXP COMPUTER in Chapter 9. For instructions on changing the color mapping mode, see the section Changing the Color Map later in this chapter.

You can also connect an external color monitor to your computer, as described in the Video Output Connector section at the end of this chapter.

The GRiDCASE 1535 EXP screen has a resolution of 640 by 400 pixels and supports the CGA (Color Graphics Adapter) display standard. However, many software applications are able to take advantage of the high-resolution screen if they are installed with the proper screen driver. If your application includes an option to install it for an AT&T 6300 Monochrome (640x400) display, choose that option. The GRiDCASE 1535 EXP screen is compatible with the AT&T 6300 monochrome display standard. If this option is not available or does not work properly, try installing the application for a Compaq 640x400 display. If neither of these screen driver choices operates properly, contact the GRiD Resource Center for information about custom high-resolution screen drivers that GRiD may have available for your particular application (for example, Windows/386 and AutoCAD).

Contrast/Brightness Control Switch

The contrast/brightness control switch, at the right of the screen, controls the brightness of the optional plasma screen or the contrast of the standard LCD screen. This switch increases the contrast or brightness of the screen when pushed toward the top of the screen, and decreases the contrast or brightness when pushed toward the bottom of the screen.

NOTE: If you have a plasma screen, the brightness of the screen affects power consumption—the brighter the screen, the greater the power consumption. Increasing the brightness of an LCD screen's back light also increases power consumption. Therefore, it is a good idea to decrease the brightness to conserve power when using a battery pack.

Backlight Brightness Control Switch

GRiDCASE 1535 EXP computers equipped with the standard LCD screen also have a slide switch controlling the brightness of the screen's backlight. Push this switch all the way to the bottom position to turn the backlight off; push the switch all the way to the top position for maximum brightness.

Indicator Lights

The indicator lights above the keyboard near the right side of the computer are defined as follows:

- **Upper Disk in Use:** Not used on the GRiDCASE 1535 EXP.

- **Lower/External Disk in Use:** In-use light for the internal hard disk and an external disk drive, if attached. When this indicator is green, file access is taking place on the internal hard disk. When this indicator is red, file access is taking place on an external drive. (If both drives are being accessed, the light appears orange.) Do not turn off or move the computer or remove a diskette while this light is lit.

- **Processor Speed Low:** Processor speed indicator. The GRiDCASE 1535 EXP is equipped with a dual-speed microprocessor. The computer ordinarily runs at 12.5 MHz; however, it can be slowed to 6.25 MHz. There is generally no reason to do this except in rare cases when a piece of software cannot run at the faster speed. When you switch to the slower clock speed, the processor speed indicator lights to remind you that the computer is running at the slower speed. **Running the processor at low speed is NOT recommended when the expansion tray is attached to the computer; some expansion cards may not be able to operate correctly when the computer is running at low speed.**

- **Battery Charging/Battery Low:** When a battery pack is charging inside the computer, this indicator turns green. When the computer is being powered by an internal battery pack, and the battery pack's charge becomes very low, this indicator turns red. This indicates that you have about 5 minutes of operation left. You should save any files you are working on and then either supply AC power or turn the computer off and change battery packs.

  If you have a low battery in the power pack/accessory slot, and you connect the AC power pack externally, the AC power pack begins to recharge the battery pack. While the battery pack's charge remains low, the indicator appears orange (actually a combination of red, to indicate a low battery, and green, to indicate charging is taking place). When the battery pack's charge is no longer low, the indicator turns green; however, the battery pack is still being charged.

NOTE: If you have attached the expansion tray to your computer, you **cannot** power the computer with an internal battery pack, although you can charge the battery pack internally.

ROM Area

The ROM area contains mounting positions for ROMs. A ROM is a storage device for programs. Each ROM can hold up to 256 KB (about 262,000 characters). You can install up to two ROMs, giving you 512 KB of additional storage space. Refer to the *Read Only Memory (ROM) Installation and Use* guide that came in your ROM package for information on installing ROMs.

CAUTION

Always turn off the power before attempting to install or remove ROMs.

Keyboard

Figure 2-3 shows the GRiDCASE 1535 EXP keyboard. The keyboard provides you with all the functionality of the IBM PC/AT keyboard. The keys marked in green and blue provide the additional functions found on the IBM keyboard.

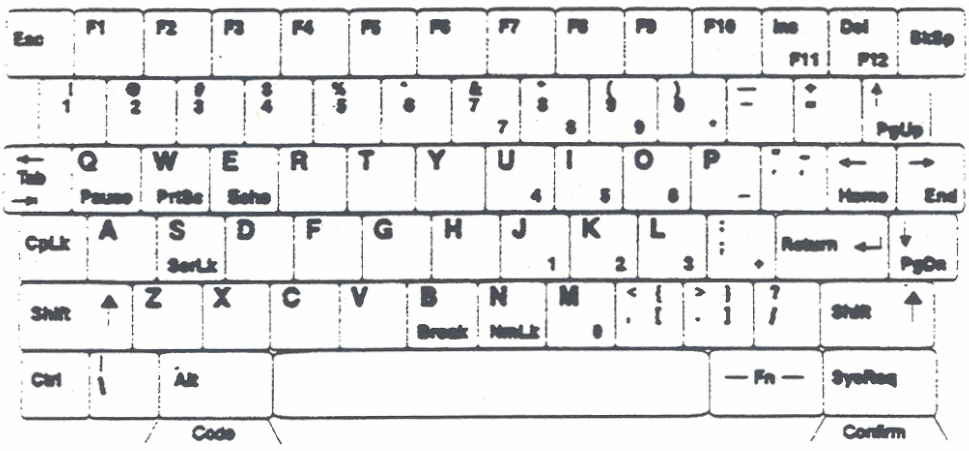


Figure 2-3. GRiDCASE 1535 EXP Keyboard

To use the **F11** IBM PC function key, hold down the **Fn** key (in the lower right-hand corner of the keyboard) and press the **F11** key. To use the **F12** function key, hold down the **Fn** key and press the **F12** key. To use function keys **F13** through **F20**, hold down the **Shift** key and press one of the keys **F3** through **F10**, where **F3** corresponds to **F13**, and so on.

Using the Numeric Keypad

To conserve space, the GRiDCASE 1535 EXP keyboard overlays the numeric keypad keys on the regular alpha-numeric keyboard (refer to Figure 2-3.)[1].

To use the numeric keypad keys, you must first put the computer in NumLock mode. To do so, press the **Fn** and **NmLk** keys simultaneously.

While the computer is in NumLock mode, the numeric keypad keys return numeric values only; you cannot use the key's alphabetic values. To return the keys to their standard alpha-numeric values, press the **Fn-NmLk** combination again.

You can also access the numeric keypad keys when the computer is not in the NumLock mode. To do so, press the **Fn** key and the desired keypad key simultaneously.

Table 2-1 lists IBM PC/AT special keys and their GRiDCASE 1535 EXP equivalents.

1 Note that the cursor-movement keys found on the IBM numeric keypad are separate keys on the GRiDCASE keyboard.

Table 2-1. IBM PC/AT Special Keys and GRiDCASE 1535 EXP Equivalents

Function Keys

Function Key	IBM Key	GRiDCASE 1535 EXP Key
F1	F1	F1
F2	F2	F2
F3	F3	F3
F4	F4	F4
F5	F5	F5
F6	F6	F6
F7	F7	F7
F8	F8	F8
F9	F9	F9
F10	F10	F10
F11	Shift-F1	Fn-F11
F12	Shift-F2	Fn-F12
F13	Shift-F3	Shift-F3
F14	Shift-F4	Shift-F4
F15	Shift-F5	Shift-F5
F16	Shift-F6	Shift-F6
F17	Shift-F7	Shift-F7
F18	Shift-F8	Shift-F8
F19	Shift-F9	Shift-F9
F20	Shift-F10	Shift-F10

Cursor-Control Keys

IBM Key	GRiDCASE 1535 EXP Key
RightArrow	RightArrow
LeftArrow	LeftArrow
DownArrow	DownArrow
UpArrow	UpArrow
End	Fn-End
Home	Fn-Home
PgDn	Fn-PgDn
PgUp	Fn-PgUp

Table 2-1 (continued)

Typewriter Keyboard Keys

IBM Key	GRiDCASE 1535 EXP Key
Alt	Alt
Backspace	BkSp
Break	Fn-Break
Caps Lock	CpLk
Ctrl	Ctrl
Ctrl-C	Ctrl-C
Ctrl-PrtSc (Ctrl-P)	Fn-W
Ctrl-S	Ctrl-S
Echo	Fn-Echo
Enter	Return
Esc	Esc
Pause	Fn-Pause
Shift-PrtSc	Fn-PrtSc
Right Shift	Right Shift
Left Shift	Left Shift
Tab	Tab
Shift-Tab	Shift-Tab

Special Characters

IBM Key	GRiDCASE 1535 EXP Key
[	Fn-[
]	Fn-]
{	Fn-Shift-{
}	Fn-Shift-}
~	Fn-Shift-~
`	Fn-`

Table 2-1 (continued)

Numeric Keypad Keys

IBM Key	GRiDCASE 1535 EXP Key
Del	Del
Ins	Ins
Num Lock	Fn-NmLk (N)
Gray +	numeric keypad + (;)
Gray -	numeric keypad - (P)
Gray *	numeric keypad * (0)
1	numeric keypad 1 (J)
2	numeric keypad 2 (K)
3	numeric keypad 3 (L)
4	numeric keypad 4 (U)
5	numeric keypad 5 (I)
6	numeric keypad 6 (O)
7	numeric keypad 7 (7)
8	numeric keypad 8 (8)
9	numeric keypad 9 (9)
0	numeric keypad 0 (M)
Scroll Lock	Fn-ScrLk (S)

Consult the *MS-DOS Reference* manual to learn how the keys function on a GRiDCASE 1535 EXP computer.

Changing the Color Map

The built-in LCD screen is a monochrome screen; it does not display colors. However, it is compatible with all software that uses the CGA (color graphics adapter) standard. Colors displayed by software are changed to various shades of blue on the LCD screen. This is called color mapping. Some software looks better in one mode than in another. The GRiDCASE 1535 EXP supports six different color mapping modes.

The key combinations shown below change the current color mapping mode. The default is mode 1.

increments the color mapping mode to the next higher numbered mode

decrements the color mapping mode to the next lower numbered mode

You can also use the MODE command to set the color mapping mode—see the section on the MODE command in Chapter 10 for details on color mapping.

Changing the Video Output

Pressing the following three keys simultaneously toggles video output between the built-in display and an external monitor attached to the video output connector:

Changing the Processor Speed

The key combinations shown below switch between high and low processor speeds.

You can also use the MODE command to change the processor speed—see the section on the MODE command in Chapter 10 for details on changing the processor speed.

sets the processor to low speed (6.25 MHz)

sets the processor to high speed (12.5 MHz)

THE SIDE VIEW

Figures 2-4 and 2-5 show side views of the GRiDCASE 1535 EXP computer in various configurations.

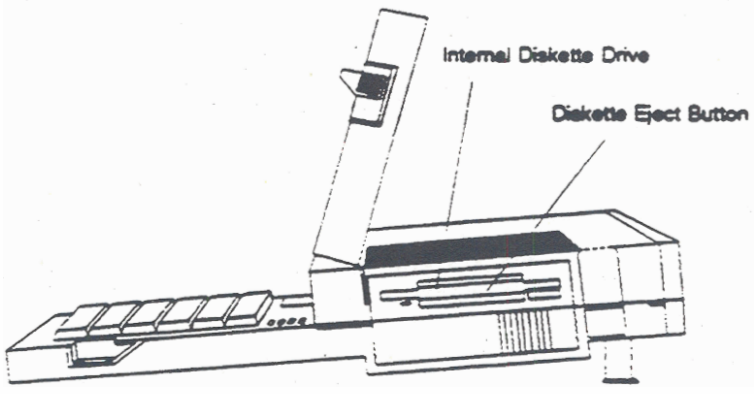
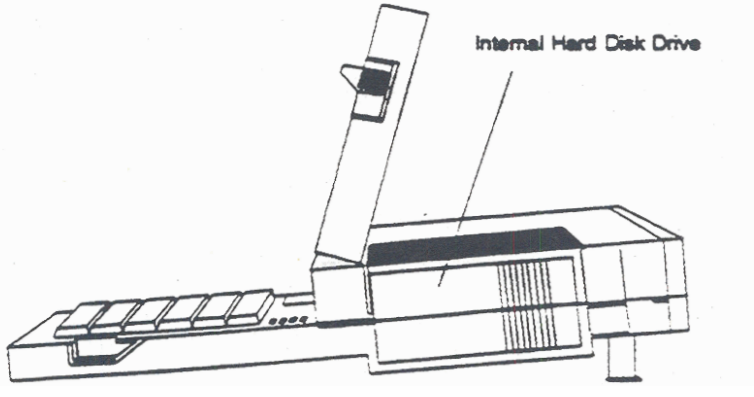


Figure 2-4. Side View of the GRiDCASE 1535 EXP Computer Equipped with a Standard 3½-Inch Floppy Diskette Drive



rigure 2-5. Side View of the GRiDCASE 1535 EXP Computer Equipped with an Optional Hard Disk Drive

Internal Diskette Drive

The internal diskette drive uses 3½-inch double-sided, high-density floppy diskettes capable of storing 1.4 MB of data each. This drive can also read, write, and format double-density 720 KB (kilobyte) diskettes. Chapter 1 contains a brief description of how to insert diskettes in the drive. For more detailed information about the drive and about floppy diskettes, refer to Chapter 5.

Diskette Eject Button

The diskette eject button, below and to the right of the diskette slot, is used to eject the floppy diskette currently in the diskette drive. To remove a diskette, push in the diskette eject button until the floppy diskette pops out.

Internal Hard Disk Drive (Optional)

GRiDCASE 1535 EXP computers can be equipped with an optional internal hard disk. The hard disk is factory formatted and comes with the MS-DOS operating system files already loaded. For more information about the internal hard disk, see Chapter 5.

THE REAR VIEW

The rear view of a GRiDCASE 1535 EXP is shown in Figure 2-6. You will use many of the items shown here when setting up your computer. Each item is explained on the following pages. To help you with setting up, a label containing all the connector names appears on the handle.

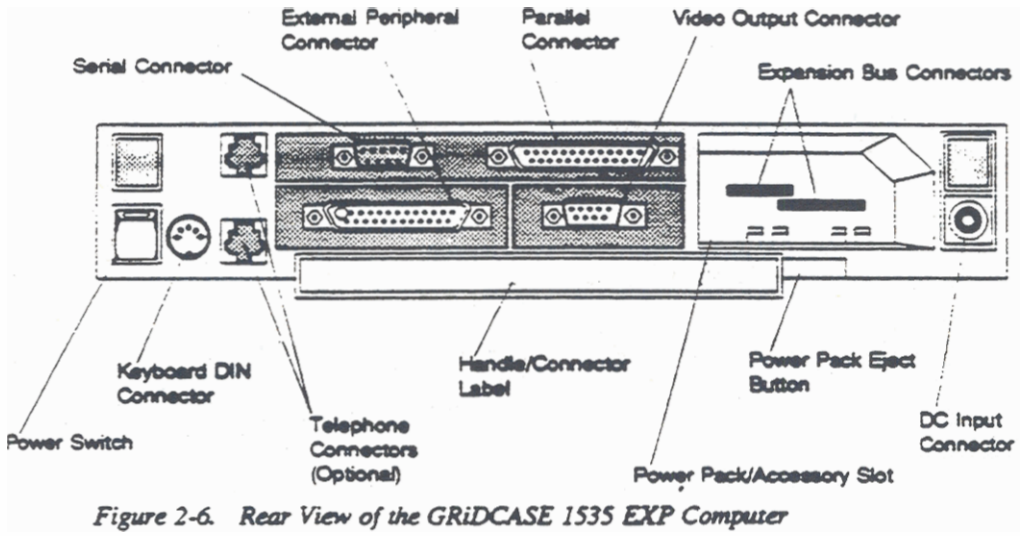


Figure 2-6. Rear View of the GRiDCASE 1535 EXP Computer

Power Switch

The power switch, on the far left, turns the computer on and off. To turn on the computer, press the top of the switch. To turn it off, press the bottom of the switch. You can also use this switch to restart the computer. See the section WARM START-UP in Chapter 1 for details.

CAUTION

Never turn off the computer when the disk in-use light for the internal drive or any other storage device is on. The disk in-use light means that file access may be taking place; turning off the computer at this time can destroy data.

Shielded Cables

The GRiDCASE 1535 EXP computer has been tested for electromagnetic interference potential using shielded I/O cables. If you purchase or replace I/O cables, they should be shielded cables to minimize interference to radio, television, and other communication services. Telephone cables do not require shielding.

Keyboard DIN Connector

The keyboard DIN connector connects the GRiDCASE EXP to an external IBM PC/AT-compatible keyboard or a keypad.

NOTE: IBM PC/XT-compatible keyboards **cannot** be connected to the GRiDCASE 1535 EXP.

Connecting a Keyboard or Keypad to the DIN Connector

You can connect an IBM PC/AT keyboard, any other 100% compatible keyboard, or a GRiD-supplied keypad to your GRiDCASE 1535 EXP computer by following the steps listed below.

1. Turn off the computer and any other peripherals.

CAUTION

Before connecting or disconnecting a keyboard, keypad or any other external device, turn off the power to both the computer and (if applicable) the external device. Failure to do so may damage your unit.

2. Plug the keyboard or keypad cord into the keyboard DIN connector on the back of the computer. The cord fits into the connector in only one way. Be sure to correctly match up the end of the cord with the connector pins.

3. Turn on the computer and any peripherals.

You can now use either the external keyboard, the keypad, or the GRiDCASE keyboard.

Telephone Connectors (Optional)

The telephone connectors let you access the optional internal modem. The connectors are standard modular jacks. One jack is for the cord that ordinarily plugs into the back of your telephone. The other jack is for an optional cord to connect your telephone to the computer. That is, one jack connects the modem to the phone system, and the other connects the modem to your telephone. If you use both jacks, you can switch back and forth between modem and telephone use without moving the cord from the modem to the telephone and vice versa. You cannot, however, use the modem and the telephone at the same time. It does not matter which connector you use for which cord. For more information on using the internal modem, see Chapter 3 and the *Internal Modem User's Guide*.

Serial Connector

The serial connector allows you to connect your computer to external modems, serial printers, and other serial devices. Only one peripheral at a time can be connected to the computer through the serial connector. This connector is a 9-pin RS-232C connector.

You can use the MS-DOS MODE command to change the serial port's default settings. For instructions on using the MODE command, refer to Chapter 10.

Connecting an External Modem to the Serial Connector

You can connect any external modem that is compatible with the software you are using (with a Model 6400 serial cable or equivalent) to the serial connector on the rear panel of the computer. Consult the manual that accompanies the software for the correct switch settings for your modem.

After the switches are set, you are ready to connect your modem to the computer. Follow the steps listed below.

1. Turn off the computer, modem, and any other peripherals.

CAUTION

Before connecting or disconnecting a modem or any other external device, turn off the power to both the computer and the external device. Failure to do so may damage your unit.

2. Attach the Model 6400 serial cable to the serial connector on the back of your modem.

3. Attach the other end of the cable to the serial connector on the back of the computer.

4. Plug in the power cord from the modem into a wall outlet.

5. Turn on the modem (and any other peripherals), and then turn on the computer.

Connecting a Printer to the Serial Connector

You can connect a serial printer (using a Model 6400 serial cable or equivalent) to the serial connector on the rear panel of the computer.

Before using a printer for the first time with a particular software program, you must make sure that the software is properly configured for your printer (refer to the documentation for the software program and the printer for configuration details). Generally, software configuration consists of installing the appropriate printer driver software for your printer. A printer driver is a program that allows the computer to communicate with a particular make and model of printer. Most application programs include printer drivers for a variety of different printers.

Before connecting the printer, make sure that the configuration switches on the printer are set properly. These switches determine how the printer operates.

After the switches are set correctly and the appropriate printer driver is installed, you are ready to connect the printer to the computer. To connect a serial printer to the computer, follow the steps listed below.

1. Turn off the computer, the printer, and any other peripherals.

CAUTION

Before connecting or disconnecting a printer or any other external device, turn off the power to both the computer and the external device. Failure to do so may damage your unit.

2. Attach the serial cable to the serial connector on the back of the computer.

3. Attach the other end of the serial cable to the serial connector on the back of the printer.

4. Check your printer manual for instructions on loading the ribbon, paper, and other supplies into the printer.

5. Position your paper so that the print head is at the top of the page.

6. Make sure all power cords are plugged in.

7. Turn on the printer (and any other peripherals), and then turn on the computer.

Parallel Connector

The parallel connector connects the computer to printers and other parallel devices using a Model 6220 parallel printer cable. Note the trapezoidal or "D" shape; it makes an improper connection impossible. Only one peripheral at a time can be connected to the computer through the parallel connector.

NOTE: The parallel connector is physically similar to the external peripheral connector. Do not connect a GRiD external drive to the parallel connector. A drive connected in this way will not work.

Connecting a Printer to the Parallel Connector

Read the previous section, Connecting a Printer to the Serial Connector. You must follow the same prerequisites before connecting a printer to the parallel connector. To connect a parallel printer to the computer, follow the steps listed below.

1. Turn off the computer, the printer, and any other peripherals.

CAUTION

Before connecting or disconnecting a printer or any other external device, turn off the power to both the computer and the external device. Failure to do so may damage your unit.

2. Attach the parallel printer cable to the parallel connector on the back of the computer.

3. Attach the other end of the parallel printer cable to the parallel connector on the back of the printer.

4. Check your printer manual for instructions on loading the ribbon, paper, and other supplies into the printer.

5. Position your paper so that the print head is at the top of the page.

6. Make sure all power cords are plugged in.

7. Turn on the printer (and any other peripherals), and then turn on the computer.

External Peripheral Connector

You can connect one of the following external devices to the external peripheral connector on your GRiDCASE 1535 EXP computer:

- Model 3401 3½-inch High Density Pocket Diskette Drive (1.4 MB)
- Model 3402 5¼-inch Pouch Diskette Drive (360 KB)
- Model 3404 5¼-inch High Density Pouch Diskette Drive (1.2 MB)
- Model 3403 40 MB Backup Tape System

NOTE: The 3½-inch pocket diskette drive receives its power through the external peripheral connector. The 5¼-inch pouch diskette drives and the tape drive receive their power from their own AC power packs.

Though this port looks like the parallel port, it supports only GRiD external diskette and tape drives. You cannot plug the cable for any other device into this connector—one of the pin holes not used by the drive cable connector is blocked to prevent an improper connection. Do not attempt to force any cable onto this connector. For more information on connecting an external drive, see Chapter 6.

Video Output Connector

The video output connector connects your GRiDCASE 1535 EXP computer to a color monitor or video projector.

Connecting a Color Monitor to the Video Output Connector

You can connect any IBM PC color monitor to your GRiDCASE 1535 EXP computer, provided it is compatible with the IBM Color Graphics Adapter (CGA) standard. To connect the color monitor to the computer, follow the steps listed below.

1. Turn off the computer, the monitor, and any attached devices.

CAUTION

Before connecting or disconnecting a color monitor or any external device, turn off the power to both the computer and the external device. Failure to do so may damage your unit.

2. Attach the cable from the monitor to the video output connector on the back of the computer.

3. Plug the power cord from the monitor into a properly grounded outlet.

4. Turn on the monitor (and any other peripherals), and then turn on the computer.

Note that you cannot display data simultaneously on the built-in screen and on an external monitor. To switch back and forth between internal and external displays, press the **Ctrl**, **Alt**, and **Tab** keys simultaneously.

Connecting a Video Projector to the Video Output Connector

You can connect the following color and monochrome video projectors to your GRiDCASE 1535 EXP computer:

- Sony Model VPH-1020Q or Electrohome ECP1000 Color Video Projector. This requires the Electrohome 38-800307-61 PC color interface, which outputs a separate signal for red, green, blue, and external synchronization via coaxial connectors.

- Electrohome EDP-58 Monochrome Video Projector. This requires the Electrohome 38-800003-60 Model IM-56 monochrome interface and Model 800-037 wiring harness, which outputs a monochrome signal.

- Vivid Systems Vivid LimeLight Computer Projector Model LLCP. This requires the Vivid Systems Model VARGB IBM PC/XT Color Adapter, which outputs a monochrome signal with shading.

See your local Electrohome or Vivid Systems dealer for assistance in connecting these projectors.

Power Pack/Accessory Slot

The internal/external AC power pack or battery pack fits into the power pack/accessory slot. See Chapter 4 for a description of these items and how to use them.

This slot also contains expansion bus connectors that allow you to add GRiDCASE 1500 Series™ expansion products to your GRiDCASE 1535 EXP computer.

CAUTION

Expansion cartridges can only operate properly with the expansion tray detached from the computer.

The expansion bus connectors are accessible only when you power the computer externally.

NOTE: These expansion bus connectors are in addition to the expansion bus connector provided on the bottom of the computer (see Figure 2-7).

Power Pack Eject Button

The power pack eject button, immediately below the power pack/accessory slot, ejects the battery pack or the internal/external AC power pack. (Expansion products are equipped with their own pull knobs for easy ejection from the power pack/accessory slot.)

CAUTION

Always save your work and turn the computer off before ejecting the battery pack from the power pack/accessory slot; any data in RAM (main memory) is lost if there is no other source of power to the computer.

Also, never remove the battery pack when the in-use light for the internal drive or any other storage device is lit. The in-use light means that file access may be taking place; removing power at this time can destroy data.

DC Input Connector

The DC input connector connects the computer to an internal/external AC power pack as described in Chapter 4.

THE BOTTOM VIEW

The bottom view of the GRiDCASE 1535 EXP computer is shown in Figure 2-7, below.

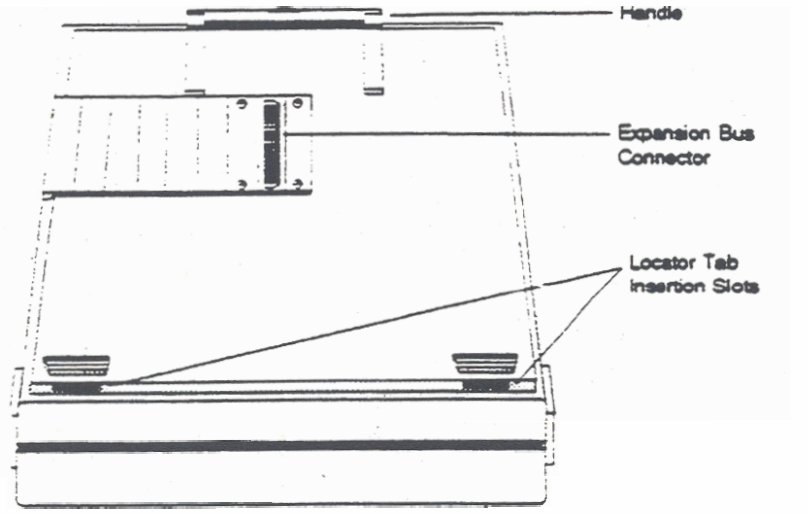


Figure 2-7. Bottom View of the GRiDCASE 1535 EXP Computer

Expansion Bus Connector

The expansion bus connector on the underside of the GRiDCASE 1535 EXP computer connects the computer to an expansion tray. For information on attaching an expansion tray to the computer, refer to Chapter 7.

CHAPTER 3:
BUILT-IN OPTIONS

This chapter describes the built-in options available from GRiD Systems Corporation to enhance the performance of your GRiDCASE 1535 EXP computer.

THE OPTIONS

The built-in options are listed in Table 3-1.

Table 3-1. Built-in Options Available for the GRiDCASE 1535 EXP Computer

Option/Model Number	Description
Display:	
Plasma Display Option 282	This display replaces the standard backlit LCD and provides a 640-pixel by 400-pixel light-emitting gas plasma display. Measures 10" diagonally.
System RAM:	
2 MB System RAM Option 302	2 MB of main memory in place of the standard 1 MB.
4 MB System RAM Option 304	4 MB of main memory in place of the standard 1 MB.
8 MB System RAM Option 308	8 MB of main memory in place of the standard 1 MB.

Mass Storage:	
40 MB Hard Disk Option 354	40 MB hard disk drive replaces the standard floppy diskette drive.
100 MB Hard Disk Option 355	100 MB hard disk drive replaces the standard floppy diskette drive.
MS-DOS ROM Option 372	Version 3.3 of the MS-DOS operating system stored in a single 128 KB Read Only Memory (ROM) chip. The operating system is always available, but requires no disk storage.
Modems:	
2400 Baud Option 331	Built-in Hayes-compatible modem allows data transmission up to 2400 baud.
MNP 2400 Baud Option 332	Built-in Hayes-compatible modem with MNP error detection, correction, and data compression allows data transmission up to 2400 baud.
Coprocessor:	
80387 Numeric Coprocessor Option 341	Provides faster operation for math-intensive applications (for example, spread sheets, vector graphics, etc.).

DISPLAY

A gas plasma display is available in place of the standard backlit LCD screen. Gas plasma displays, unlike LCDs, are light emitting and may therefore be more appropriate when ambient lighting conditions are poor or variable.

The gas plasma display measures 10 inches diagonally. Its resolution is 640 by 400 pixels, and its aspect ratio is 1:1. The display has a contrast ratio of 20:1. For information on how to take full advantage of the high-resolution 640 by 400 display, see the section Screen in Chapter 2.

SYSTEM RAM

GRiDCASE 1535 EXP computers are available in 1 MB (standard), 2 MB, 4 MB, and 8 MB system RAM configurations. RAM above 640 KB is user configurable as any combination of EMS (Lotus/Intel/Microsoft standard) memory and IBM PC/AT-compatible extended memory; additionally, some of the extra memory can be used to extend standard MS-DOS memory from 640 KB up to 736 KB. Refer to the *GRiD386 User's Guide* for RAM configuration information.

MASS STORAGE

The internal hard disk options provide either 40 MB or 100 MB of permanent storage. Both hard disks come formatted for use with MS-DOS.

ROMS

Read Only Memory (ROM) chips are a permanent storage device for programs. By using programs in ROM, you no longer need to carry these programs on floppy diskettes or any other storage device. ROMs are also the most rugged storage medium available.

You can install ROMs in the ROM mounting positions located just above the keyboard (see Figure 2-2). You can install either one or two ROMs, giving you up to 512 KB of additional space for programs. For information on installing and removing ROMs, see the *Read Only Memory (ROM) Installation and Use* guide that accompanies your ROM package.

CAUTION

Always turn off the power before attempting to install or remove ROMs.

NUMERIC COPROCESSOR

An 80387 numeric coprocessor is available for the GRiDCASE 1535 EXP.

The coprocessor is designed for faster display of graphics and calculation of worksheets and other kinds of files.

Check your application documentation to see if an 80387 coprocessor is required or recommended.

MODEM

An internal modem is available for GRiDCASE 1535 EXP computers. The internal modem transmits and receives data through the telephone system. Because the internal modem resides inside the computer, it provides greater convenience than an external modem when you are traveling or moving your equipment. The internal modem operates through most standard telephone systems in the U.S.A. or Canada. The 2400 baud modem (Option 331) and the MNP 2400 baud modem (Option 332) can both transmit and receive data at 300, 1200, or 2400 baud. The MNP modem also provides MNP (Microcom Networking Protocol) level 5 error detection, correction, and data compression. See the *Internal Modem User's Guide* for more information on these modem options.

Connecting the Telephone Line

Assuming your telephone uses a standard, plug-in modular jack, your phone cord plugs directly into the telephone connector on the back of the computer. Most offices and residences now use the standard plug-in jack connector. If you have a different kind of telephone connector, see the section Alternative Telephone Connections below.

To connect a GRiDCASE 1535 EXP computer to the telephone system, unplug the cord from the back of your telephone and plug it into one of the telephone connectors on the back of the computer (see Figure 3-1).

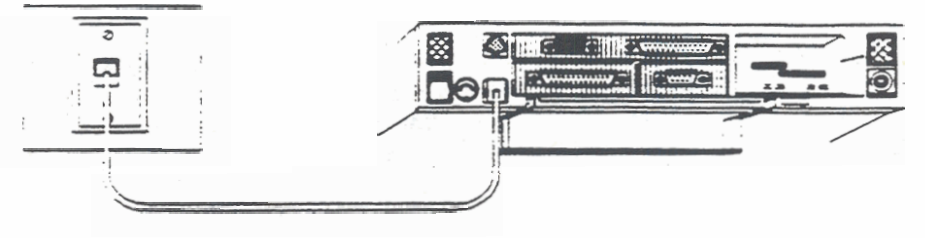


Figure 3-1. GRiDCASE 1535 EXP Computer Connected to Phone Jack

To use your telephone while your computer is connected to the same phone line, you will need another telephone cord. Connect the computer to the phone jack and then use the second telephone cord to connect the telephone to the other connector, as shown in Figure 3-2.

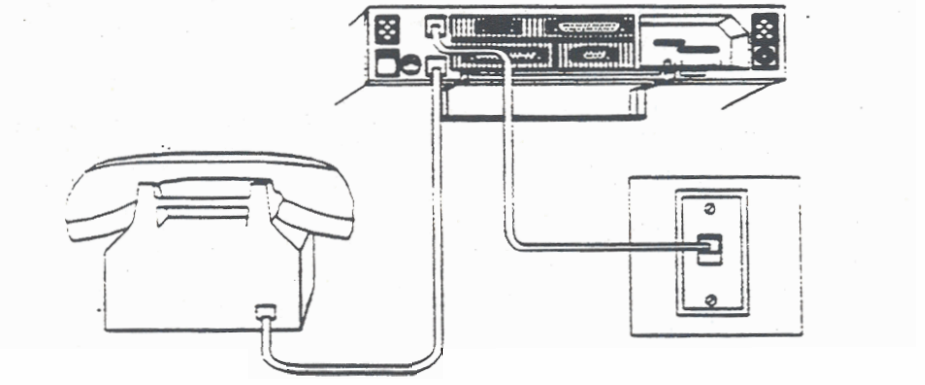


Figure 3-2. Modem Connected to Telephone System and Phone

With the appropriate software, you can now use the same telephone line either to speak on the phone or to transmit and receive data from another computer. (You cannot talk and send data at the same time.)

NOTE: When connecting to a remote computer, the modem speaker is turned off immediately after the connection is made.

If your internal modem is not working properly, see Appendix A to determine if it is your modem or the telephone line that is causing the problem.

NOTE: The computer modem will not function with digital PBX telephone systems that use digital telephone sets. If you are unsure whether your internal modem will work with your PBX telephone system, contact your local GRiD representative.

Alternative Telephone Connections

Some telephone systems do not use the modular plug-in jack connector. Some use different types of connectors, and others are permanently wired. Read this section if you find that there is no modular connector available to plug into your computer's telephone connector.

Some older telephone systems use four-prong connectors. These require an adapter available from most electronics stores. (One such adapter is the Radio Shack Model 279-351.)

Some offices use large Amphenol connectors for phones that have several lines coming in. Many adapters are available to tap into these connectors. (Radio Shack Models 43-271 and 43-270 are two commonly available adapters.)

In situations where the telephones are permanently wired, the simplest solution is to use a special coupler that attaches to the handset of the telephone and provides a modular connector for plugging into your computer. The following couplers are available at many electronics dealers or computer stores. (These couplers may not function in all situations.)

- The Konexx Modem Connection Adapter (GRiD Model 34022), which allows direct electronic connection to telephones not equipped with modular connectors. This adapter plugs into the handset jack on the phone base and supports both voice and data modes, all baud rates, and several different types of phones.

- The GRiD Acoustic Modem Adapter (GRiD Model 32180), which attaches to almost any size and shape handset. This adapter supports 300 baud communications and, in some cases, can be used in 1200 baud communications.

- The Black Jack (from the Microperipheral Corporation), which attaches to telephone handsets with round mouthpieces that can be unscrewed.

There are also many models of acoustic couplers available with built-in modems. These attach to the serial connector of the computer. Most can transmit at 300 baud, and some can transmit at 1200 baud. These are available at many computer stores.

Using the Modem

Your MS-DOS application program may require you to change the modem switch settings. Because the modem is internal, there are no physical switches to set; however, the Hayes Smartmodem switch settings are emulated in software. If your application requires settings different from these, you can use the MODE command to change them. For details on using the MODE command to change the switch settings or the baud rate, refer to Chapter 10.

The MNP modem must be communicating with another MNP modem to take advantage of the MNP features. In order for your application to use the MNP modem, MNP must be enabled in the application, if the feature is available.

Refer to the *Internal Modem User's Guide* for more information on using the modem and the modem command set.

CHAPTER 4:
POWER OPTIONS

This chapter describes the options available for powering your GRiDCASE 1535 EXP computer and the external devices attached to it. You may already have some of these items. If not, you can obtain them by contacting a GRiD representative.

THE POWER OPTIONS

Table 4-1 summarizes the power options available. Each option is explained in greater detail following the table.

Table 4-1. Power Options for Your GRiDCASE 1535 EXP Computer

Power Source	Description
Internal/External AC Power Pack Model 34170	When used **internally**, the AC power pack fits into the power pack/accessory slot on the back of the computer and powers the computer, its internal drive, and an external 3½-inch drive (optional). **NOTE:** The computer's AC power pack **cannot** power a 5¼-inch external diskette drive or a tape drive. Each of these devices must be powered by its own power pack. **CAUTION** If you have a 100 MB hard disk, a plasma screen, or an attached expansion tray, you **must** use the AC power pack **externally**. When used **externally**, the AC power pack powers the computer from an AC wall outlet and can simultaneously recharge a battery pack currently in the power pack/accessory slot. A cord connects the AC power pack to the DC input connector on the back of the computer and to an ordinary wall outlet. When used externally, the AC power pack provides adequate power for the computer, its internal drive, an optional external 3½-inch drive, and the expansion tray. (See Chapter 7 for power consumption considerations concerning the expansion tray.) The AC power pack automatically senses the voltage (110 or 220) that your AC wall outlet supplies and sets its internal circuitry accordingly.

Power Source	Description
Internal Battery Pack Model 32111	Powers computer, its internal drive, and optional 3½-inch external floppy drive (optional). NOTE: You cannot use the internal battery pack to provide power for the expansion tray. Actual battery life depends on your system configuration. You must use a separate AC power pack to provide power for an external 5¼-inch floppy drive or external tape drive. The battery pack fits into the power pack/accessory slot on the back of the computer. See the section Recharging Your Battery Pack, below, for methods of recharging the battery pack.
External Attachable Battery Pack Model 32161	Powers computer, its internal drive, optional 3½-inch external floppy drive, and expansion tray. Battery life depends on your system configuration as well as how your system is used. This attachable battery pack clips to the top of the computer at the rear. CAUTION When the expansion tray is attached, do not plug the AC power pack into the DC connector on the battery pack to recharge the battery unless the computer is turned off.
Cigarette Lighter Adapter Cable Model 32136	Powers computer from the cigarette lighter socket of a car. Provides adequate power for the computer, its internal drive, the expansion tray, and an optional 3½-inch diskette drive.
External Battery Charger Model 32115	Recharges internal battery pack in about 12 hours.

IMPORTANT SAFETY INSTRUCTIONS

This computer is intended to be electrically grounded when connected through its power pack to an external source of AC power.

The power pack is equipped with a three-wire grounding type AC power receptacle and is supplied with a mating power cable that has a plug at each end. Both plugs have a third (grounding) pin that fits only a grounding-type AC power receptacle. This is a safety feature.

If you are unable to insert the plug into an AC outlet, contact a licensed electrician to replace the outlet with one that is properly grounded.

Do not defeat the purpose of the grounding-type plugs.

WARNING

Electrical equipment may be hazardous if misused. Operation of this product, or similar products, must always be supervised by an adult. Do not allow children access to the interior of any electrical product or permit them to handle any cables.

Be certain that the power plug is disconnected (disconnect by pulling the plug and not the cord):

- If the power cord/plug is frayed or otherwise damaged.
- If anything is spilled into the case.
- If the computer or power pack is exposed to rain or other excess moisture.
- If the computer or power pack has been dropped, or the case has been otherwise damaged.

- If the computer or power pack performs in a way that makes you suspect that they need servicing or repair.

- Whenever you clean the case, using only the cleaning procedures given in the following paragraphs.

Be certain to:

- Keep the computer or power pack away from sources of liquids such as wash basins, bath tubs, shower stalls, etc. Any electrical apparatus may be HAZARDOUS in such surroundings.

- Never expose the computer or power pack to the weather, such as rain, snow, etc.

- Read all installation instructions carefully before you plug in the power pack to a wall outlet.

- Save these instructions for reference by you and others.

- Follow all instructions and warnings dealing with the computer or power pack.

Cleaning the case:

- Disconnect the power plug from the wall outlet. (Pull the plug and not the cord.)

- Use a clean, lint-free cloth that has been dampened and wrung out as dry as possible. Use only clean water to dampen the cloth. Wipe the case surface lightly.

- When cleaning the display, use only a dry, soft cloth. A cloth made especially for cleaning glass is best.

CONNECTING THE AC POWER PACK EXTERNALLY

The AC power pack provides power for the GRiDCASE 1535 EXP computer from both 110-volt and 220-volt wall outlets and recharges the battery pack (if installed). Recharging the batteries takes about 12 hours and occurs whether or not your computer is turned on. When used externally, power from the AC power pack will adequately support the computer, its internal drive, an external 3½-inch floppy diskette drive attached to the external peripheral connector, and an expansion tray. If you have a 100 MB hard disk, a plasma screen, or an attached expansion tray, you must use the AC power pack externally.

The AC power pack comes with an AC power cord and a DC output cable.

To install the AC power pack externally, follow the steps listed below.

1. Turn off any attached external devices.
2. Turn off the computer.

CAUTION

Before connecting or disconnecting the AC power pack or any other external device, turn off the power. Failure to do so may damage your unit.

3. Plug one end of the DC output cable into the power pack and the other end into the DC input connector on the back of the computer.
4. Attach the female end of the AC power cord to the power cord socket on the back of the power pack.
5. Plug the male end of the AC power cord into a wall outlet that accepts a three-prong plug (see Figure 4-1). If you use a plug adapter, make sure it is properly grounded. Ensure that the power pack is resting on its bottom so that none of the air vents on the sides or top are blocked.
6. Turn on any attached external devices.
7. Turn on the computer.

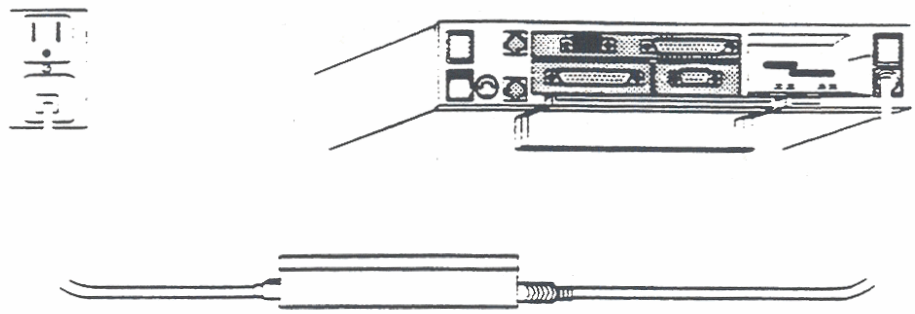


Figure 4-1. Installing the AC Power Pack Externally

NOTE: For best results, do not continually recharge a battery for more than 48 hours at a time.

CONNECTING THE AC POWER PACK INTERNALLY

The AC power pack, when used internally, provides power for your GRiDCASE 1535 EXP computer with LCD screen from either a 110-volt or 220-volt wall outlet. When used internally, the AC power pack supplies power adequate for a computer equipped with an LCD screen, its internal drive, and a 3½-inch external diskette drive (if attached).

NOTE: When used internally, the AC power pack cannot power an attached expansion tray, a 100 MB hard disk, or any peripherals other than the 3½-inch pocket floppy diskette drive. Further, you cannot use the AC power pack internally if your computer is equipped with a plasma screen.

To install the AC power pack internally, follow the steps listed below.

1. Turn off any attached external devices.

2. Turn off the computer.

CAUTION

Before connecting or disconnecting the power pack or any external device, turn off the power. Failure to do so may damage your unit.

3. Remove the DC output cable from the power pack.
4. Hold the power pack with the socket for the power cord facing you.
5. Attach the female end of the AC power cord to the power cord socket on the back of the power pack.
6. Insert the power pack into the power pack/accessory slot on the back of the computer until it clicks into place (see Figure 4-2).

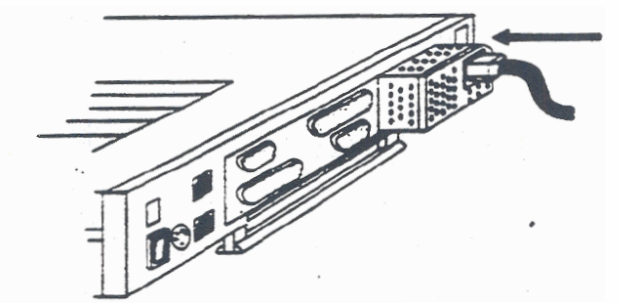


Figure 4-2. Installing the AC Power Pack Internally

7. Plug the male end of the AC power cord into a wall outlet that accepts a three-prong plug. If an adapter is used, make sure it is properly grounded.
8. Turn on any attached external devices.
9. Turn on the computer.

To remove the power pack, push the power pack eject button (below and to the right of the power pack/accessory slot) until the power pack pops out.

WARNING

During use, the AC power pack can become quite warm, particularly when it is installed internally. When you eject the power pack, touch it lightly to test its temperature before you grasp it firmly to remove it. You may have to let it sit for several minutes before you can handle it comfortably.

USING THE INTERNAL BATTERY PACK

The Model 32111 internal battery pack provides power to your GRiDCASE 1535 EXP computer from rechargeable batteries permanently sealed inside the battery pack.

NOTE: You **cannot** use the internal battery pack to provide power for a 5¼-inch diskette drive, a tape drive, or an expansion tray.

To install the battery pack, follow the steps listed below.

1. Turn off the computer.
2. Hold the battery pack with the label facing you.
3. Insert it into the power pack/accessory slot on the back of the computer until it clicks into place (see Figure 4-3).
4. Turn on the computer.

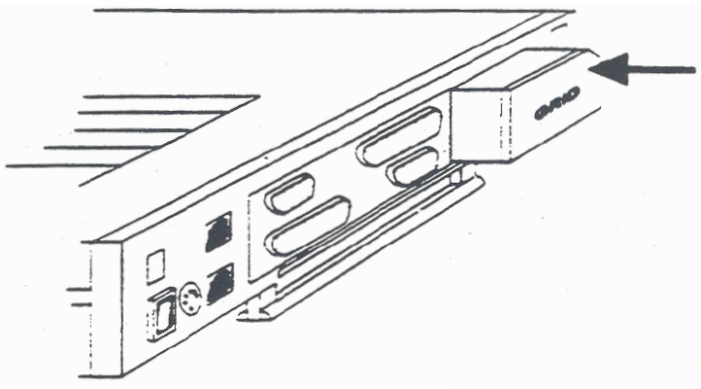


Figure 4-3. Installing the Battery Pack

To remove the battery pack, push in the power pack eject button (below and to the right of the power pack/accessory slot) until the battery pack pops out.

The Life of Your Battery Pack

The battery life you can expect varies, depending on the configuration and use of your system. You will get the maximum capacity out of your battery pack after you have fully discharged and recharged it about three times. The life of your battery pack depends on the following factors:

- The type of screen—if your computer has a plasma screen, you can increase battery life by lowering the intensity of the display. This decreases the power drain on the battery. If your computer has an LCD screen, you can increase battery life by dimming or turning off the back light when you don't need it (contrast of an LCD screen has no effect on battery life). Overall, computers with plasma screens consume more power than those with LCD screens.

- Display mode—if your computer has the optional 10-inch diagonal plasma screen, it draws about 20% more power when in the 640 by 400 graphic display mode than when in the 640 by 200 mode. The graphic display mode is controlled by the software you run; you cannot explicitly control it.

- The number of processors—if your computer has an optional numeric coprocessor, it requires more power than if it has only the standard 80386 microprocessor.

- The use of the internal diskette drive—to minimize power consumption and maximize battery life, the GRiDCASE 1535 EXP supplies power to the internal floppy diskette drive only when data is being read from or written to the drive. You can therefore extend the working time you achieve on a single battery charge by avoiding unnecessary file access, such as frequent saves, switching back and forth between files, and so on.

- The use of the internal hard disk option—the hard disk uses more power than an internal diskette drive.

- Storage temperature—if the battery pack is stored at temperatures in excess of 90° F for two months or more without recharging, you may have to use and recharge the battery several times before it is again able to hold a full charge.

- Cold starting the computer—turning the computer off and then back on again to reload the operating system consumes considerably more power than performing a warm restart. To perform a warm restart, press and hold the **Ctrl** and **Alt** keys and then press the **Del** key.

NOTE: Do not use any operating system other than that supplied for your GRiDCASE 1535 EXP computer. Other operating systems are not designed to optimize battery life.

Recharging Your Battery Pack

You should always wait for the battery to become fully discharged before recharging your battery pack. The battery charging/battery low indicator turns red or the optional low power beep sounds when it is time for you to recharge the battery. If you frequently recharge your battery pack before it is fully discharged, the batteries may lose some of their capacity.

When the battery charging/battery low indicator turns red, indicating the power in your battery pack is low, don't immediately remove the battery pack. First, save any data you are working with and then turn off the computer and remove the battery pack or supply AC power, if available. Any data currently in main memory is lost.

If you do not have access to AC power, you can install a fresh battery pack.

Once you have supplied dependable power to the computer, you should recharge your battery pack. The method you use to recharge the battery pack depends on the power options available to you, as summarized below.

If you have an:	**Then:**
Internal/External AC Power Pack	Leave the discharged battery pack in the power pack/accessory slot and connect the AC power pack to the computer externally, as explained above. The batteries recharge in about 12 hours regardless of whether the computer is on or off. While the battery pack is charging, the battery charging/battery low indicator turns green.
External Battery Charger	Insert the battery pack into the charger as explained below in the section USING THE EXTERNAL BATTERY CHARGER. The batteries recharge in about 12 hours.

CONNECTING THE ATTACHABLE BATTERY PACK

The Model 32161 external attachable battery pack provides two to three times as much power as the internal battery pack. The attachable battery pack attaches to the top of the GRiDCASE 1535 EXP computer at the rear.

To connect the attachable battery pack, follow the steps listed below.

1. Turn off the computer.

CAUTION

Before connecting or disconnecting the battery pack or any external device, turn off the power. Failure to do so may damage your unit.

2. Remove the two plastic caps (see Figure 4-4) from the rear of the computer. Insert the blade of a small flat-head screwdriver along the edge of a cap to pop it off. A phillips-head screw is visible under each cap.

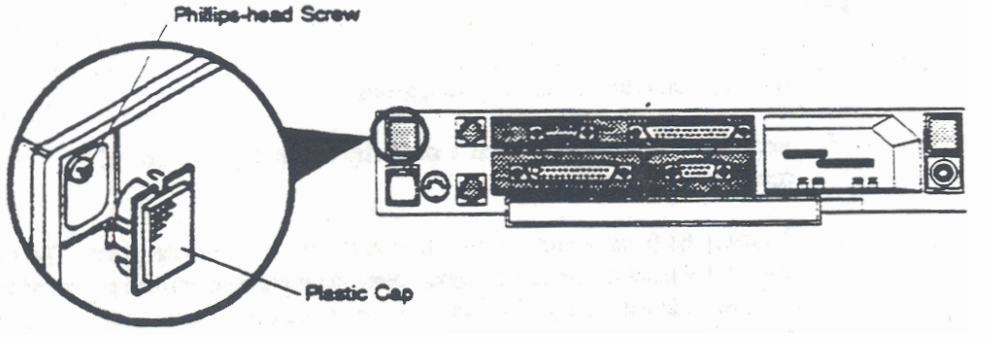


Figure 4-4. Removing Plastic Cap from Rear of Computer

3. Unscrew and remove one of the phillips-head screws.

4. Insert one of the washers and plastic latch clips into the hole, making sure that the concave end of the washer faces towards the computer. Then insert one of the phillips-head screws supplied with the battery pack and gently tighten the screw. Figure 4-5 shows the correct position of the washer and the latch clip. Note that the screws supplied with the battery pack are longer than those originally in the computer.

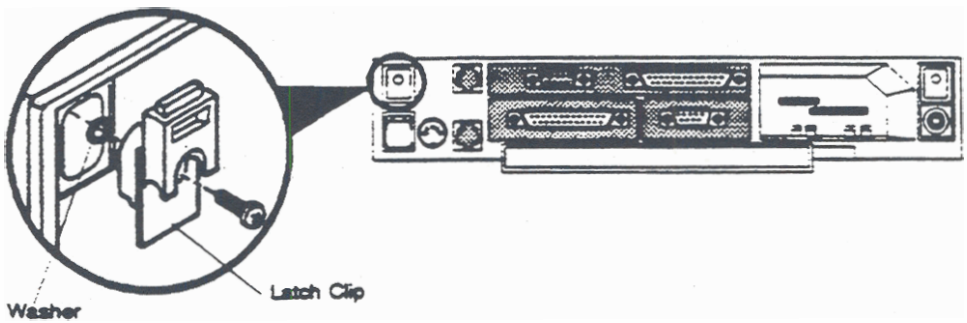


Figure 4-5. Attaching Latch Clip to Computer

5. Repeat steps 3 and 4 to attach a latch clip to the opposite side of the computer's rear panel.

6. Position the front of the battery towards the front of the computer. The metal tabs at the front of the battery hook over the top of the computer behind the display. Tilt the display forward in order to hook the metal tabs over the top edge of the computer.

7. Attach the latches on the battery to the latch clips on the computer by hooking the bottom of each latch over the latch clip and gently pushing the top end of the latch towards the computer (see Figure 4-6).

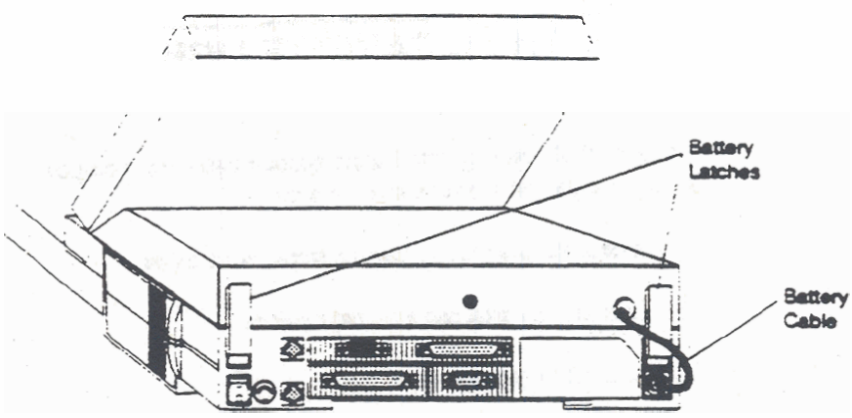


Figure 4-6. Attachable Battery Clipped to Computer

8. Plug the DC cable on the back of the battery pack into the DC power connector on the back of the computer.

9. Turn on the computer.

To conserve battery pack power, follow the guidelines given in the earlier section on the internal battery pack. When the external battery pack begins to lose power, the red battery low indicator on the front of the computer will light. When this happens, save your data immediately. Then supply AC power to your computer or use an internal battery pack. You can recharge the attachable battery pack by plugging it into the AC power pack shipped with your computer. Refer to the information provided with the attachable battery pack for more detailed recharging instructions.

CAUTION

If you have an expansion tray attached, **do not** plug the AC power pack into the battery pack to recharge the battery when the computer is turned on. The battery pack can only be recharged when the computer is turned off.

CONNECTING THE CIGARETTE LIGHTER ADAPTER CABLE

The Model 32136 cigarette lighter adapter cable lets you power your computer from the cigarette lighter socket of a car.

To connect the adapter, follow the steps listed below.

1. Turn off any attached external devices.
2. Turn off the computer.

CAUTION

Before connecting or disconnecting the cigarette lighter adapter or any external device, turn off the power. Failure to do so may damage your unit.

3. Plug the cigarette lighter end of the adapter cable into the cigarette lighter socket of the car.
4. Plug the smaller end of the adapter cable into the DC input connector on the back of the computer (see Figure 4-7).
5. Turn on any attached external devices.
6. Turn on the computer.

CAUTION

Many automobiles cause voltage surges or sags to the cigarette lighter socket when the engine is started. If the computer is connected to the cigarette lighter socket when you start the engine, the computer may reboot, causing the loss of any data currently in main memory. If you are powering your computer from a car cigarette lighter socket, and the vehicle's engine is not running, save any files you are working on before starting the vehicle's engine.

The plug on the cigarette lighter adapter cable contains a 5-amp fast blow fuse. Should this fuse blow, replace it with a fuse of the same value to prevent damage to your computer.

You can avoid possible power interruption by keeping a charged battery pack in the computer while operating from a car. As long as power is being received through the cigarette lighter adapter cable, there is no drain on the internal battery. The adapter will, in fact, provide sufficient power to partially recharge the battery. If power from the adapter is cut off, however, the battery ensures continuous power to the computer, thus preventing any loss of data.

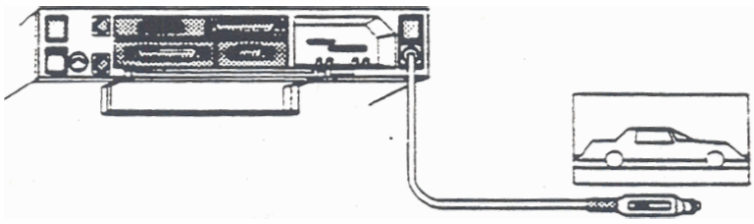


Figure 4-7. Connecting the Cigarette Lighter Adapter Cable

NOTE: As mentioned above, the battery pack receives only a partial charge when you power the computer from the cigarette lighter adapter cable. To fully recharge a battery pack, you must supply AC power to the computer.

USING THE EXTERNAL BATTERY CHARGER

The Model 32115 external battery charger fully recharges your internal battery pack in about 12 hours. The external battery charger comes with a Y cable that has three DC jacks, two male and one female. The third connector on this cord allows you to run your computer while the battery is recharging (see Figure 4-8). To recharge the battery pack, follow the steps listed below.

1. Place the battery pack inside the charger and secure it with the elastic strap.
2. Connect one male connector on the Y cable to the battery charger.
3. Plug the female connector on the Y cable into the DC jumper cable supplied with the AC power pack.
4. Plug the other end of the DC jumper cable into the AC power pack.
5. If you want to run your computer while the battery is recharging, plug the second male connector on the Y cable into the back of the computer.

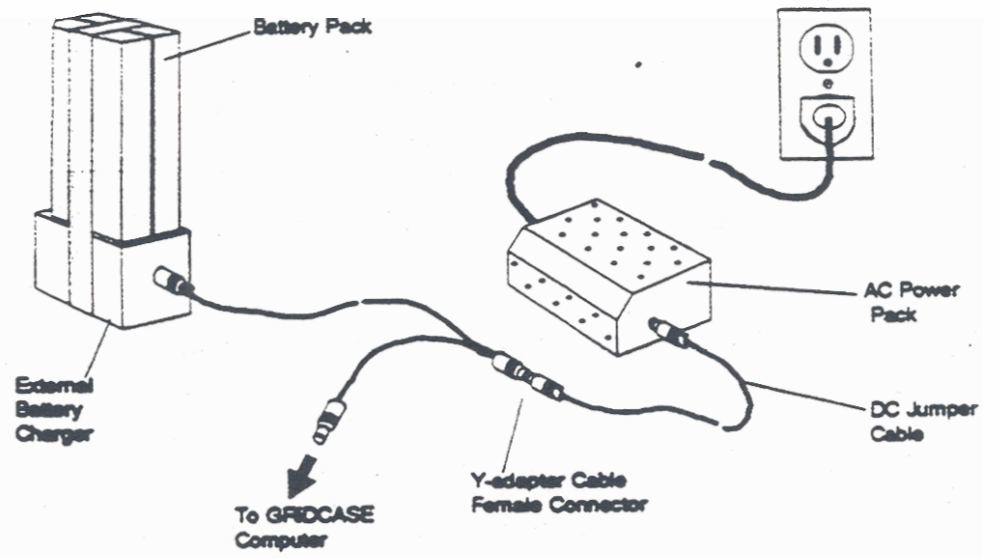


Figure 4-8. Connecting the External Battery Charger

CHAPTER 5:
USING THE INTERNAL DISKETTE AND HARD DISK DRIVES

This chapter describes how to use the internal floppy diskette and hard disk drives. Your system can be equipped with either an internal 3½-inch floppy diskette drive or a hard disk drive. The diskette drive, if installed, is located on the side of your computer and accepts both double-density and high-density 3½-inch floppy diskettes. The hard disk, if installed, is also located on the side of the computer.

TAKING CARE OF THE DISKETTE DRIVE(S)

Observe the following rules for taking care of the internal floppy diskette drive:

- Only use high-quality double-sided, high-density 135 track-per-inch (TPI) 3½-inch floppy diskettes or double-sided, double density 135 TPI 3½-inch floppy diskettes. High-density diskettes store 1.4 MB of data per diskette. Double-density diskettes store 720 KB of data each. Diskettes from the following manufacturers are recommended: Sony, Fuji.

- Never put a damaged or dirty diskette in a drive.

- Never put anything other than a diskette in a drive.

If you follow the rules listed above, you should never need to clean the internal floppy diskette drive. If you don't follow these rules, however, the diskette drive's read/write heads may become dirty.

FLOPPY DISKETTES

Floppy diskettes are mylar plastic disks that have been coated with magnetic material (much like the coating on audio recording tape). The diskette spins within a protective plastic case. The mylar disk is designed to remain within its protective case at all times. Never attempt to remove a diskette from its case. One 3½-inch floppy diskette stores up to 1.4 MB of data.

Two kinds of 3½-inch floppy diskettes are available: double-density and high-density. High-density diskettes have a storage capacity of 1.4 MB. Double-density diskettes have a storage capacity of 720 KB. The diskette drives used in GRiDCASE 1535 EXP computers can read, write, and format diskettes of both kinds. You must be careful, however, not to try to format a 720 KB diskette as a 1.4 MB diskette—see FORMAT in Chapter 10.

Floppy diskettes should be removed from the drive when not being used. By changing diskettes you can store and retrieve information for many different applications.

All diskettes you use in your GRiDCASE 1535 EXP computer must have the following characteristics:

- Double-sided
- High-density or double-density
- Soft-sectored
- 135 TPI

Figure 5-1 shows the front and back side of a 3½-inch floppy diskette. An arrow on the front side shows the direction in which to insert the diskette into the drive. The write-protect tab is used to protect your floppy diskettes from being overwritten.

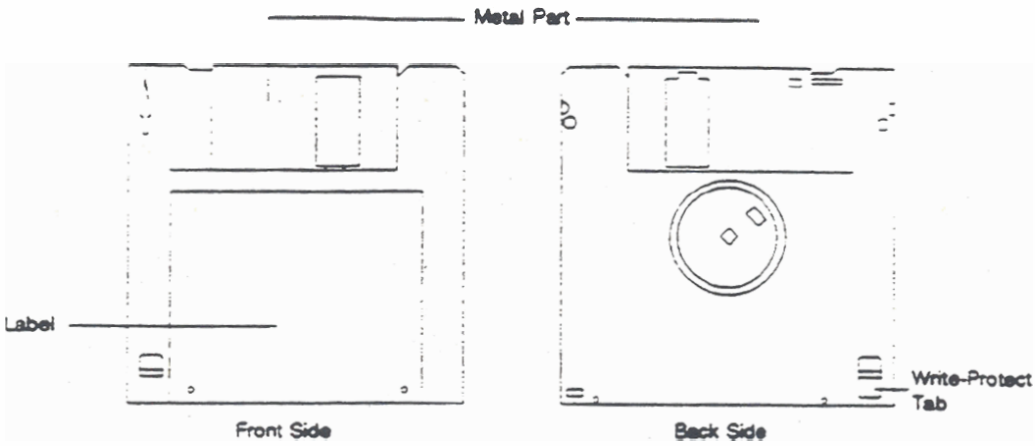


Figure 5-1. Front and Back Sides of Floppy Diskette

Inserting and Removing Floppy Diskettes

To insert a floppy diskette in a drive, follow the steps listed below.

1. If you do not want to inadvertently write over the floppy diskette, write protect the diskette by sliding the write-protect tab on the back-side of the diskette until it uncovers the hole. (See the next section, Write Protecting Floppy Diskettes.)

2. Hold the diskette so that the side with the larger label is up. An arrow on the diskette points in the direction you should insert the diskette. The metal part goes in first (see Figure 5-2).

3. Push the diskette gently into the drive until it clicks into place. Never jam a diskette into the drive. If you have trouble inserting the diskette, press the eject button on the drive and try again.

To remove a floppy diskette, push the diskette eject button until the diskette pops out of the drive.

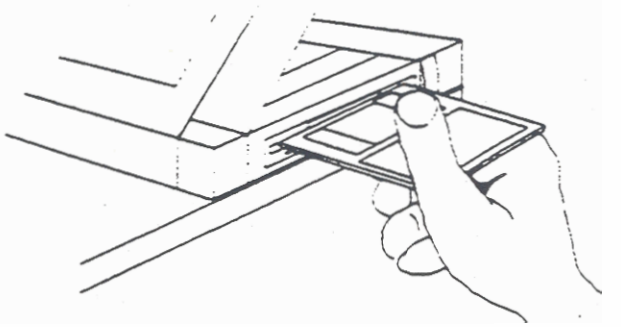


Figure 5-2. Inserting a Floppy Diskette into the Drive

CAUTION

Never release a floppy diskette when the in-use light is on, unless prompted to do so. The in-use light indicates that file access may be taking place. Releasing the floppy diskette at this time, when not prompted to do so, could destroy files.

Write Protecting Floppy Diskettes

Under most circumstances, you want the diskette drive to be able to read data from a diskette and write data to the diskette. Sometimes, however, it is important that the drive not be able to write to a diskette, for instance, when a diskette contains only application software that must not be erased or altered.

Most 3½-inch floppy diskettes are equipped with a write-protect tab and write-protect hole that allow you to block any attempt to write data to that diskette (see Figure 5-1). To write protect the diskette, slide the write-protect tab toward the edge of the diskette so that you can see clear through the write-protect hole. Once you have done so, it is physically impossible for the diskette drive to write data to the diskette. While the write-protect tab is in this position, you cannot create, alter, or erase files on the diskette.

If at some later time you want to remove write protection from the diskette, just slide the write-protect tab away from the edge of the diskette so that the write-protect hole is covered.

Formatting Floppy Diskettes

The diskette drive can read a floppy diskette only when the data on that diskette is organized into a specific pattern of tracks and sectors. To create that pattern, you must format each new floppy diskette before you can use it.

CAUTION

Do not attempt to format your operating system diskette or any application program diskette. Formatting a diskette erases all data stored on it. Therefore, use extreme caution when formatting diskettes.

To format a diskette, run the MS-DOS FORMAT command as described in Chapter 10 and in the *MS-DOS Reference* manual.

CAUTION

High-density and double-density diskettes require different formats. For example, a high-density format will not work on a double-density diskette. See the FORMAT command in Chapter 10 for more information on performing the format properly.

Taking Care of Floppy Diskettes

To prevent loss of data on your floppy diskettes, treat them with care. Below are a few tips for handling floppy diskettes:

- Do not touch the surface of the diskette by moving the metal slide. This slide protects the recording surface while the diskette is not being used. An invisible scratch on the surface of the diskette, or even a fingerprint, can cause errors.
- Keep diskettes away from magnetic office items such as paper clip dispensers, magnetic paper holders, telephones, etc.
- Do not set diskettes on top of a television, color monitor, speaker, or CRT.
- Do not carry a diskette and a calculator together in your pocket.

- Do not expose diskettes to microwaves or infrared rays.
- Do not expose diskettes to temperatures below 50° F (10°C) or above 140° F (60° C).
- Keep diskettes away from wall adapters.
- For optimum long-term storage, keep diskettes at a temperature between 60° and 70° F (15° to 20° C).
- Never use a damaged diskette.
- Do not remove a diskette from the drive while the in-use light is on, unless prompted to do so. Removing the diskette during file access may destroy data.
- Do not leave a program or data diskette in the drive while traveling. Doing so may seriously damage the diskette.
- Keep your diskettes away from cigarette smoke.
- Label and date all diskettes. This is especially important when making back-up copies.

Backing Up Files on Floppy Diskettes

It is very important that you make back-up copies of all floppy diskettes that contain important data. Then, if you lose or damage a working diskette, you can make another copy from the back-up diskette.

You can make back-up copies using the XCOPY or DISKCOPY command as described in the *MS-DOS Reference* manual.

TAKING CARE OF YOUR HARD DISK

Although the internal hard disk in your GRiDCASE 1535 EXP computer is ruggedly built to withstand the shocks that come with transporting your system, you should treat the hard disk with the same care you would give any valuable piece of equipment.

The hard disk has an auto "parking" mechanism that moves the disk heads to a part of the disk that does not contain data. This safety feature ensures that neither your data nor the disk is damaged when the computer is moved. Whenever the computer is turned off, the disk heads are parked, and it is then safe to move your computer.

CAUTION

Never move your computer when the hard disk in-use indicator light is on; this could cause loss of data.

Backing Up Files on the Hard Disk

It is a good idea to make back-up copies of important files that you use on your computer no matter what storage device you use. Because a hard disk can hold so much information, it is even more important to regularly back up the files on the hard disk.

To copy the files to diskettes, use the MS-DOS COPY, XCOPY, or BACKUP command. Unless you use XCOPY or BACKUP, you will need to build the same directory structure on the diskette as you have on the hard disk before copying the files. If you have many files, keep in mind that you will need to monitor the copying process so that you can insert a new diskette as one becomes full. See the *MS-DOS Reference* manual for information about the COPY, XCOPY, and BACKUP commands.

GRiD supplies the software to simplify hard disk back-up with diskettes. Call your GRiD representative for more information.

If your system is equipped with the pouch tape drive, Model 3403, you can back up your hard disk to tape. Using a tape drive greatly speeds up the back-up process. The tape drive comes with its own software and documentation.

CHAPTER 6:
CONNECTING EXTERNAL DRIVES

This chapter describes how to connect an optional external diskette drive or tape drive to your GRiDCASE 1535 EXP computer and describes how to set the correct switch settings for these devices. For more detailed information on how to use these drives, consult the manual that accompanies each drive.

CONNECTING A 3 1/2-INCH POCKET DISKETTE DRIVE

The external Model 3401 3½-inch diskette drive (also called the "pocket floppy") is equipped with its own diskette drive cable. You must connect the drive to the external peripheral connector (located on the back of the computer) using this special drive cable. The pocket drive receives both its data and its power through the drive cable connected to the computer. Figure 6-1 shows how to properly connect the pocket diskette drive to the computer.

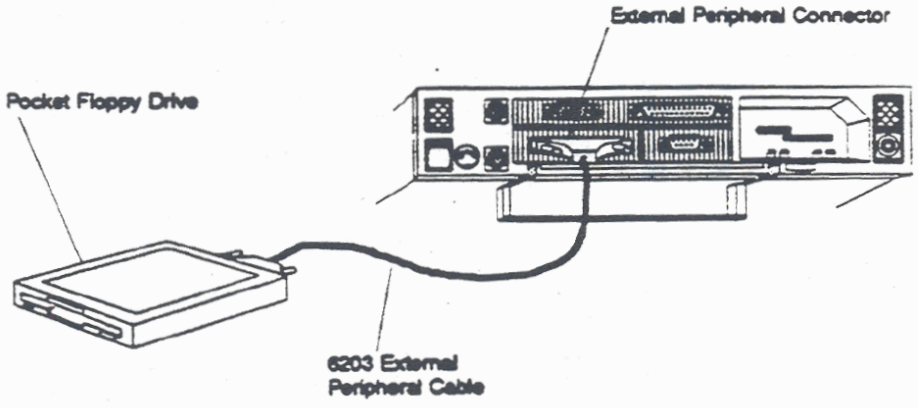


Figure 6-1. Connecting the 3½-inch Pocket Diskette Drive

The pocket diskette drive works with any power option; an AC power source is not necessary to use the pocket diskette drive.

NOTE: If you have attached an expansion tray to your computer, you cannot use an internal power pack, or the computer will not start-up when you turn it on. If your computer is equipped with a plasma screen, you **cannot** use the internal/external AC power pack internally.

To connect a pocket diskette drive to the computer, follow the steps listed below.

1. Turn off the computer and any other external devices.

CAUTION

Before connecting or disconnecting any external device, always turn off the computer and all external devices. Failure to do so may damage your equipment.

2. Set the two DIP switches on the back of the drive to the correct setting for the configuration you want. These switches set the device's address, allowing the computer to exchange data with it. Refer to the section SWITCH SETTINGS FOR THE EXTERNAL DRIVES later in this chapter for more information on setting the switches.

3. Attach one end of the pocket diskette drive cable to the external peripheral connector on the back of the computer. If it doesn't fit easily the first time, turn the end of the cable over. (The connectors are D-shaped, and so can only be connected one way.) Tighten the thumbscrews on each side of the connector to attach the cable securely to the computer. Do not overtighten the thumbscrews.

CAUTION

Make sure you connect the cable to the external peripheral connector. It is physically possible to attach the cable to the printer connector. However, the external drive will not work when connected to the printer connector and may be damaged by such a connection.

4. Attach the other end of the pocket diskette drive cable to the pocket diskette drive.

5. Turn on the computer.

For instructions on how to use the pocket diskette drive, consult the manual that accompanies the drive.

CONNECTING A 5 1/4-INCH POUCH DISKETTE DRIVE

Two types of external 5¼-inch diskette drives are available for use with the GRiDCASE 1535 EXP: the Model 3402 360 KB drive and the Model 3404 1.2 MB drive. The instructions contained in this section apply to both drives.

The external 5¼-inch diskette drive (also called the "pouch floppy") is equipped with its own diskette drive cable. You must connect the drive to the external peripheral connector (located on the back of the computer) using this special drive cable. The pouch diskette drive must be powered by a separate AC power pack. Each pouch drive comes with an AC power pack, an AC power cord, and a DC cable. Figure 6-2 shows how to properly connect the pouch diskette drive to the computer.

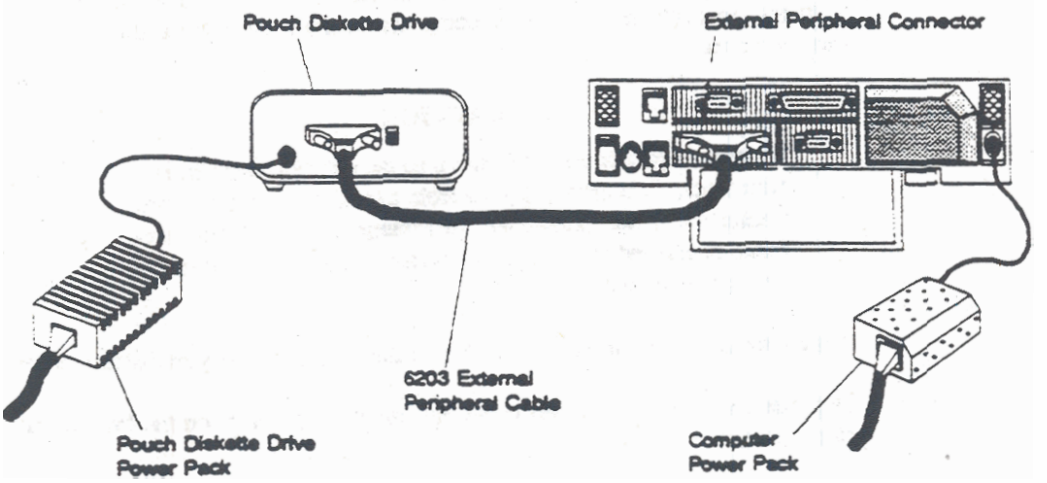


Figure 6-2. Connecting the 5¼-inch Pouch Diskette Drive

To connect the external 5¼-inch diskette drive to the computer, follow the steps listed below.

1. Turn off the computer and any other external devices.

CAUTION

Before connecting or disconnecting any external device, always turn off the computer and all external devices. Failure to do so may damage your equipment.

2. Set the two DIP switches on the back of the drive to the correct setting for the configuration you want. These switches set the device's address, allowing the computer to exchange data with it. Refer to the section SWITCH SETTINGS FOR THE EXTERNAL DRIVES, later in this chapter, for specific information on setting the switches.

3. Attach one end of the pouch drive cable to the external peripheral connector on the back of the computer. If it doesn't fit easily the first time, turn the end of the cable over. (The connectors are D-shaped, and so can only be connected one way.) Tighten the thumbscrews on each side of the connector to attach the cable securely to the computer. Do not overtighten the thumbscrews.

CAUTION

Make sure you connect the cable to the external peripheral connector. It is physically possible to attach the cable to the printer connector. However, the external drive will not work when connected to the printer connector and may be damaged by such a connection.

4. Attach the other end of the drive cable to the back of the pouch diskette drive.

5. Plug one end of the DC power cable into the DC connector on the back of the diskette drive.

6. Plug the other end of the DC power cable into the diskette drive power pack.

7. Plug one end of the AC power cord into the power cord socket on the back of the diskette drive power pack.

8. Plug the other end of the power cord into a wall outlet that accepts a three-prong plug. If a plug adapter is used, make sure it is properly grounded. Ensure that the power pack is resting on its bottom so that none of the air vents on the sides or top are blocked.

9. Turn on the computer.

For instructions on how to use the external 5¼-inch diskette drive, consult the manual that accompanies the drive.

SWITCH SETTINGS FOR THE EXTERNAL DRIVES

The pocket or pouch floppy diskette drives' address switches are located on the back of the drive to the right of the cable connector. The address switches are shown in Figure 6-3. The setting of these switches determines whether the drive is drive A or drive B.

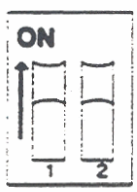


Figure 6-3. Floppy Diskette Drive Address Switches

Table 6-1 shows the possible settings for the floppy diskette drive's address switches.

Table 6-1. Floppy Diskette Drive Address Switch Settings

Computer Configuration	Switch Positions S1	S2	External Floppy Acts As:
Internal Floppy	DOWN/OFF	DOWN/OFF	drive A
	UP/ON	DOWN/OFF	drive B
Internal Hard Disk	DOWN/OFF	DOWN/OFF	drive A

The internal floppy diskette drive, if installed, is drive A when the external floppy diskette drive is set as drive B. The internal floppy diskette drive is drive B when the external drive is set as drive A.

CONNECTING AN EXTERNAL TAPE DRIVE

The Model 3403 external tape drive is equipped with its own tape drive cable. You must connect the drive to the external peripheral connector (located on the back of the computer) using this special drive cable. The tape drive must be powered by a separate AC power pack. Each tape drive comes with an AC power pack, an AC power cord, and a DC cable. Figure 6-4 shows how to properly connect the tape drive to the computer.

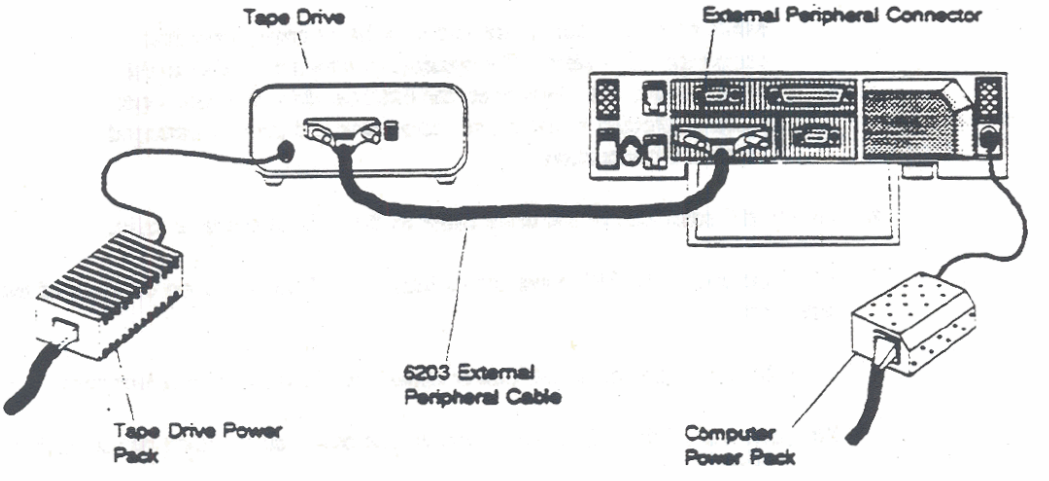


Figure 6-4. Connecting the External Tape Drive

To connect the external tape drive to the computer, follow the steps listed below.

1. Turn off the computer and any other external devices.

CAUTION

Before connecting or disconnecting any external device, always turn off the computer and all external devices. Failure to do so may damage your equipment.

2. Set the two DIP switches on the back of the tape drive to the DOWN or OFF position for the hard disk configuration. These switches set the device's address, allowing the computer to exchange data with it.

3. Attach one end of the drive cable to the external peripheral connector on the back of the computer. If it doesn't fit in easily the first time, turn the end of the cable over. (The connectors are D-shaped, and so can only be connected one way.) Tighten the thumbscrews on each side of the connector to attach the cable securely to the computer. Do not overtighten the thumbscrews.

CAUTION

Make sure you connect the cable to the external peripheral connector. It is physically possible to attach the cable to the printer connector. However, the external drive will not work when connected to the printer connector and may be damaged by such a connection.

4. Attach the other end of the drive cable to the back of the tape drive.

5. Plug one end of the DC power cable into the DC connector on the back of the tape drive.

6. Plug the other end of the DC power cable into the tape drive power pack.

7. Plug one end of the AC power cord into the power cord socket on the back of the tape drive power pack.

8. Plug the other end of the power cord into a wall outlet that accepts a three-prong plug. If a plug adapter is used, make sure it is properly grounded. Ensure that the power pack is resting on its bottom so that none of the air vents on the sides or top are blocked.

9. Turn on the computer.

For instructions on how to use the external tape drive, consult the manual that accompanies the drive.

CHAPTER 7:
USING THE OPTIONAL EXPANSION TRAY

This chapter describes how to use the optional expansion tray (Model 32300). It describes how to attach and detach the expansion tray, as well as how to insert and remove expansion cards. This chapter also explains expansion card limitations and power supply considerations that arise out of the use of expansion cards with the GRiDCASE 1535 EXP computer.

For specific technical information, such as system interrupt and DMA channel assignments, that may be helpful when installing an expansion card, see Appendix D.

The basic configuration of the expansion tray includes mounting brackets for two expansion cards. One of the expansion slots is IBM PC/AT-compatible; the other is IBM PC/XT-compatible. The two slots accommodate full-size expansion cards. Support brackets are also provided for shorter cards.

An auxiliary removeable fan is included. When installed, the fan occupies part of one of the expansion slots. The auxiliary fan must be installed if the card(s) installed in the expansion tray draw a total of more than three watts of power.

EXPANSION CARD LIMITATIONS

The following restrictions govern the use of PC/AT and PC/XT expansion cards with the GRiDCASE 1535 EXP. Read these restrictions carefully.

- Cards that require electrical connections to components other than the expansion bus are not supported (e.g., some card-mounted hard disks require a direct connection to the computer's main power supply; such cards cannot be installed in the GRiDCASE 1535 EXP).

- Cards that attempt to take over the functions of the CPU are not supported. This includes cards that explicitly use the "Master" line on the bus.

- Cards that contain additional extended or expanded (EMS) memory are not supported. Up to 8 MB of memory is available as an internal option.

- Cards that are wider than a single standard expansion slot are not supported (e.g., some card-mounted hard disks are 1-1/2 or even 2 slots wide; such cards cannot be installed in the GRiDCASE 1535 EXP).

- A video card installed in the expansion unit (e.g., an EGA or VGA card) will drive an appropriate external monitor. It will not, however, drive the computer's built-in screen.

- A card that acts as the MS-DOS COM1 or COM2 device will not operate when installed in a GRiDCASE 1535 EXP computer. This is because COM1 and COM2 are both used by built-in devices. If the card can be set to COM3 or COM4, it will work.

- For systems equipped with the standard LCD screen, the total power consumption of expansion cards installed in the expansion tray cannot exceed 25 watts.

- For systems equipped with the optional plasma screen, the total power consumption of expansion cards installed in the expansion tray cannot exceed 10 watts.

- If the total power consumption of expansion cards installed in the expansion tray exceeds three watts, the auxiliary fan must be installed in the expansion tray.

CAUTION

Do not use a card or a combination of cards that exceeds the wattage limit (see above). Using a card or a combination of cards that draws too much power may damage the expansion tray and the computer.

- Running the processor at low speed is NOT recommended when the expansion tray is attached to the computer; some expansion cards may not be able to operate correctly when the computer is running at low speed.

ACCESSING THE EXPANSION SLOTS

This section explains how to access the expansion slots inside the expansion tray. You can access the expansion slots whether or not the expansion tray is attached to the computer.

To gain access to the expansion slots, remove the expansion tray cover, as explained below:

1. Turn the expansion tray upside down (its "feet" should point up) and place it on a firm, flat surface.

2. If the expansion tray is attached to the computer, release the two side latches. If a latch doesn't completely release, press down firmly on that corner with one hand while disengaging the latch with the other hand.

3. Remove the five phillips-head screws that secure the expansion tray cover and lift off the expansion tray cover.

Figure 7-1 shows the expansion tray with its cover removed.

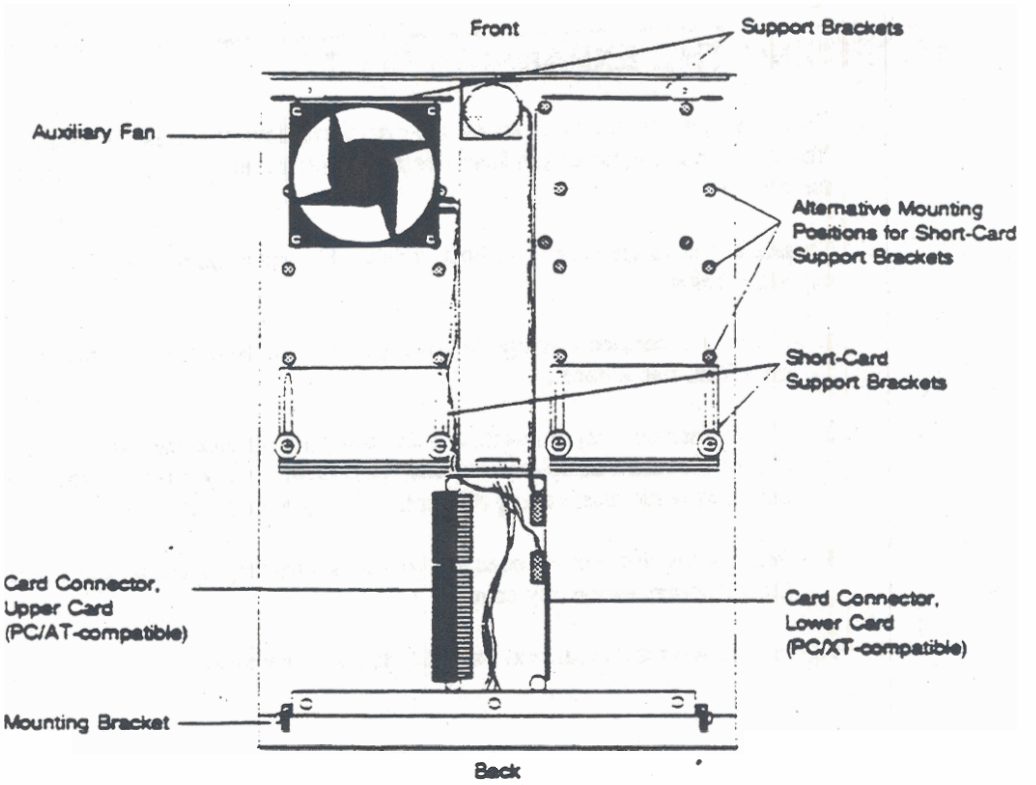


Figure 7-1. Bottom View of the Expansion Tray

POSITIONING THE AUXILIARY FAN

The auxiliary removable fan included inside the expansion tray must be installed if the total power consumption of all expansion cards exceeds three watts. If the total power consumption of all expansion cards is less than three watts, you may remove the fan to provide more space.

The auxiliary fan can be positioned on either side of the expansion tray; this provides flexibility for installing full-length expansion cards on either side of the expansion tray. When the fan is repositioned or removed, it is also important to change the position of the plastic vent covers inside the expansion tray cover. If the vent covers are improperly positioned, the expansion tray is not effectively cooled.

NOTE: The small fan in the middle of the expansion tray is not removeable. Do not attempt to remove this fan.

To reposition or remove the auxiliary fan, follow the steps below:

1. Loosen the four phillips-head screws that secure the auxiliary fan to the expansion tray (see Figure 7-2). (You don't need to remove these screws from the fan, just completely loosen them.)

2. Lift up the fan. Take care not to lose the four standoffs under the fan that keep it elevated above the expansion tray.

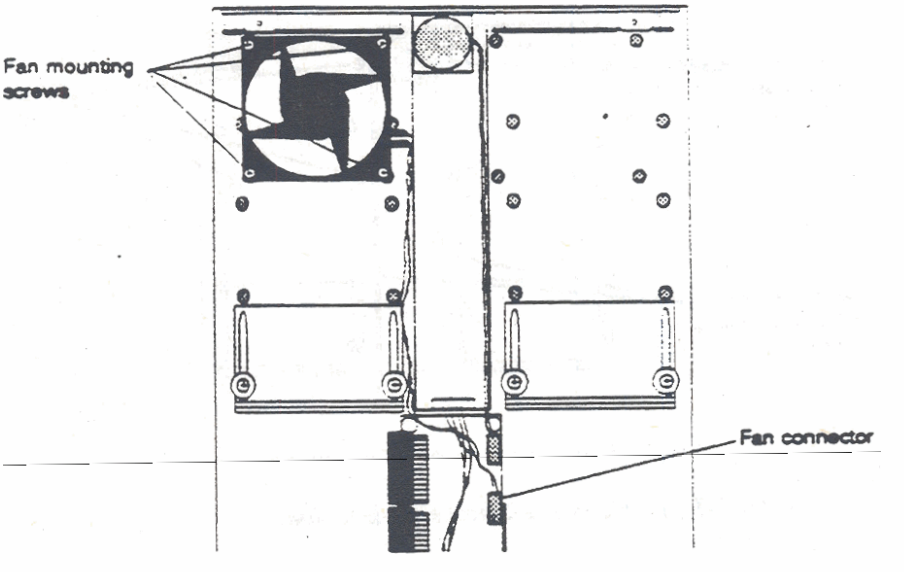


Figure 7-2. Removing the Auxiliary Fan

3. If you are removing the auxiliary fan, unclip the fan connector from the circuit board in the center of the expansion tray. Keep the fan, the four screws, and the four standoffs for later use.

4. If you are repositioning or reinstalling the auxiliary fan, place the four standoffs over the fan screw holes on the opposite side of the expansion tray Figure 7-3 shows the location of the fan screw holes on each side of the expansion tray.

5. Carefully place the auxiliary fan over the standoffs so that the four screws go through the standoffs and into the screw holes in the expansion tray. Tighten the four screws, but don't over-tighten them.

6. Ensure that the wires carrying power to the auxiliary fan do not cross over the two metal shields on either side of the circuit board in the center of the expansion chassis. Route the fan wires around the edge of these metal shields. If the fan wires cross over the metal shields, they could be pinched between the shields and the expansion tray cover.

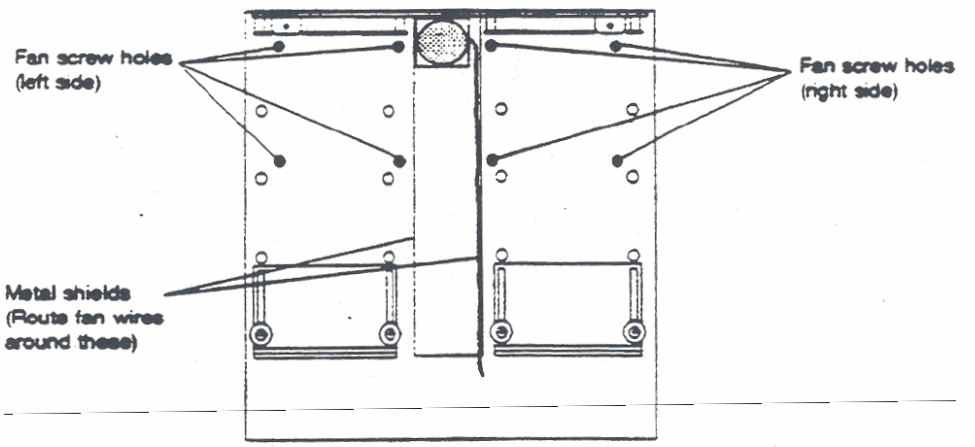


Figure 7-3. Auxiliary Fan Screw Hole Locations

7. If you are reinstalling the auxiliary fan, plug the fan wires into the fan connector on the circuit board in the center of the expansion tray.

8. Change the positions of the plastic vent covers inside the expansion tray cover so that the expansion tray is properly cooled. Table 7-1 summarizes the proper vent cover positions, depending on how the auxiliary fan is positioned. The diagram in Figure 7-4 shows which vents must be covered; this diagram matches the one inside the expansion tray cover. Note that the small vent in the center should never be covered.

Table 7-1. Vent Cover Positions

Fan Position	Cover These Vents
Right side	Bottom left vent (opposite side from fan) Side right vent (same side as fan)
Left side	Bottom right vent (opposite side from fan) Side left vent (same side as fan)
No auxiliary fan	Both bottom vents (both side vents should be left open)

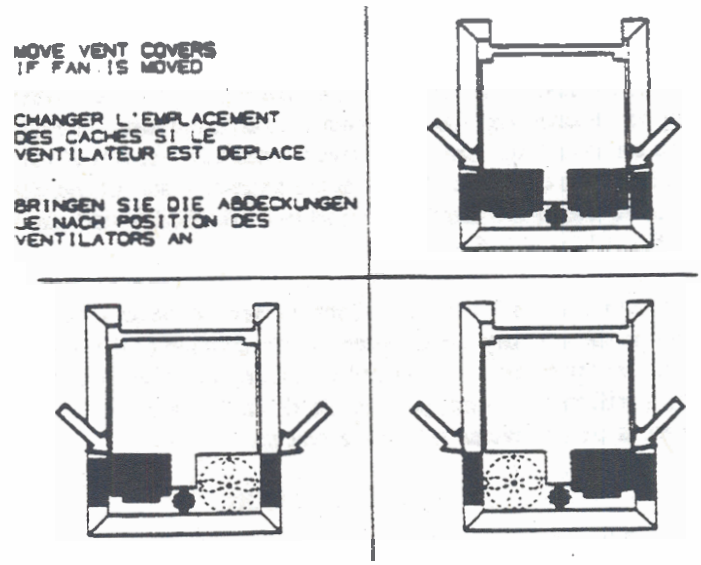


Figure 7-4. Vent Cover Positions

INSTALLING AN EXPANSION CARD

Figure 7-1 shows the card connectors in the expansion tray.

The two card connectors face in opposite directions. One is above the circuit board and one below. The slot above the circuit board accommodates both IBM PC/AT-compatible expansion cards and IBM PC/XT-compatible expansion cards, whereas the slot below accommodates only IBM PC/XT-compatible expansion cards.

To install an expansion card, follow the steps listed below:

1. Make sure any DIP switches and/or jumpers on the expansion card are set correctly, as specified in the card manufacturer's documentation. See Appendix D for information that may be helpful when configuring the card.

2. Using a phillips-head screwdriver, remove the screw from the mounting bracket on the expansion tray. Don't lose the screw; you will need it later to secure the mounting bracket of the expansion card.

3a. If you are installing a full-length card, remove the short-card support bracket. Save the bracket and the screws for possible reinstallation later.

3b. If you are installing a short card, loosen the two screws securing the short-card support bracket and slide the bracket to accommodate the length of the card you are installing. Leave the screws loose until the rest of the installation procedure is complete. Note that the short-card support bracket can be moved to three alternative mounting points to accommodate odd-size expansion cards (refer to Figures 7-5 and 7-6).

You can install a 3/4-length expansion card on the same side of the expansion tray as the auxiliary fan by reversing the position of the support bracket. Remove the support bracket and turn it around so that the bracket edge is near the auxiliary fan. Also, pull the plastic card support off of the bracket and place it on the reverse side of the bracket.

CAUTION

Make sure that the components on the card are not in contact with the metal part of the support bracket. If they are, this may cause damage to the card.

4. Orient the expansion card so that its edge connector (the striped flange that protrudes from one edge of the card) points inward toward the expansion slot and is aligned with the expansion slot.

5. Align the plain end of the expansion card with the support bracket (either the short-card support bracket or the support bracket at the front of the expansion tray). Then slide the card into the computer.

6. Make sure the edge connector is completely inserted in the expansion slot. Press gently but firmly on both ends of the expansion card, rocking it back and forth slightly until the connector is fully inserted. At this point, the plain end of the card should be fully inserted in the support bracket, and the mounting bracket at the other end of the card should be pressed firmly against the flange to which it attaches.

7. Using the screw you removed at Step 2, secure the expansion card's mounting bracket to the flange that protrudes from the back of the expansion tray.

8. If you are installing a short card, make sure the card is firmly seated in the short-card support bracket, and then tighten the two screws that secure that bracket.

9. Reattach the expansion tray cover with the five phillips-head screws.

CAUTION

When reattaching the expansion tray cover, ensure that the latches on either side of the cover are not caught between the cover and the expansion tray when the cover is screwed down. Hold the latches away from the expansion tray when placing the cover onto the expansion tray.

Figure 7-5 shows the installation of a full-length card. Figure 7-6 shows the installation of a short card.

For GRiDCASE 1535 EXP technical information that may be helpful when installing an expansion card, see Appendix D.

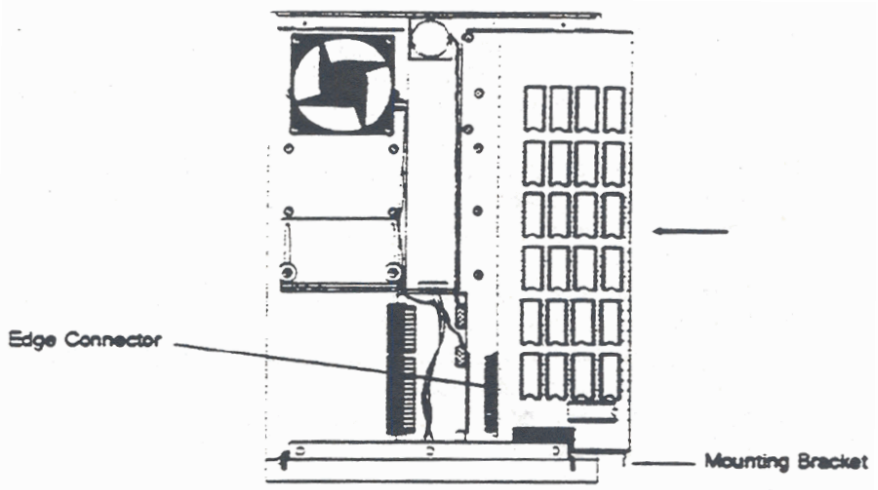


Figure 7-5. Installing a Full-Length Card

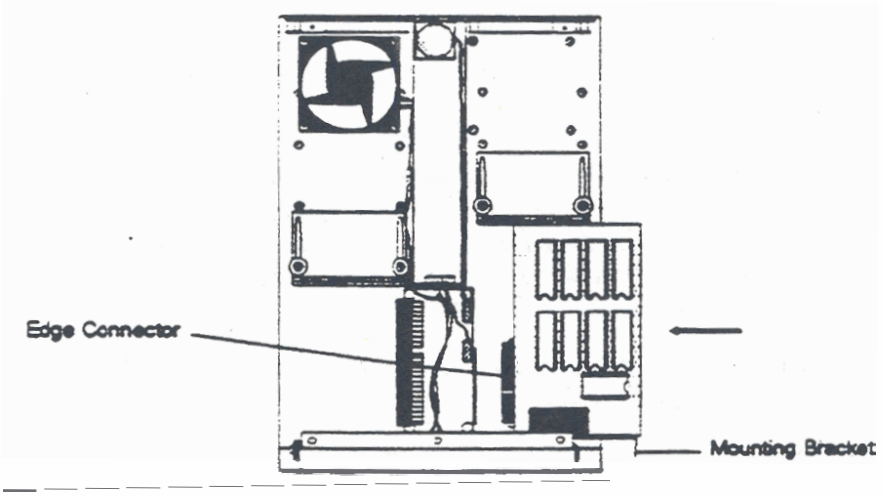


Figure 7-6. Installing a Short Card

ATTACHING THE EXPANSION TRAY

This section explains how to attach the expansion tray to your GRiDCASE 1535 EXP computer.

CAUTION

Before you attach the expansion tray to your GRiDCASE 1535 EXP computer, make sure that the computer is turned off and power to the computer is disconnected.

To attach the expansion tray to your GRiDCASE 1535 EXP computer, follow these steps:

1. Turn the expansion tray right side up and place it on a firm, flat surface. (The bus connector should be visible on the top of the tray.)

2. Position the tray so that the end of the tray with latches faces away from you and the end with locater tabs faces towards you (see Figure 7-7). Push the top of the latches away from the tray so that they are hanging outward.

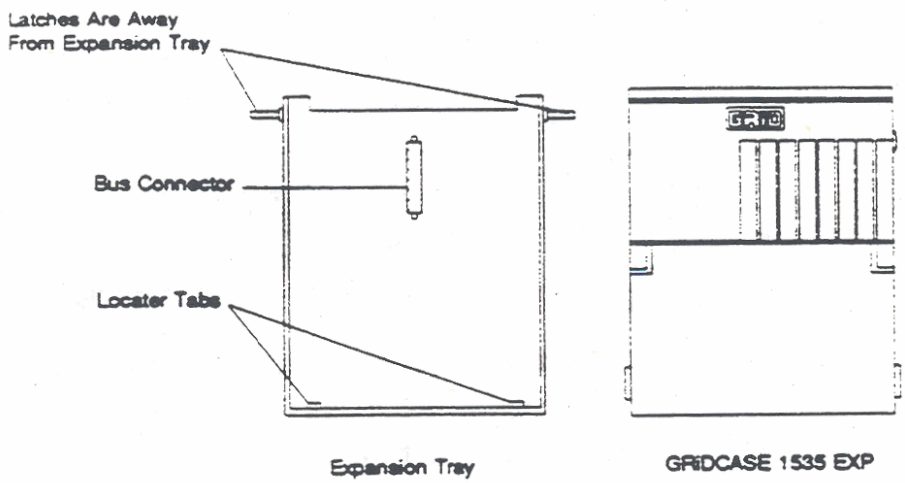


Figure 7-7. Preparing to Attach the Expansion Tray to the Computer

3. If the computer leg is extended, close it.

4. Remove the connector cap from the bus connector located on the underside of the computer and store the cap for future use.

5. Close the screen of the computer, and pick it up with the keyboard end facing you. The computer should be right side up.

6. Lower the keyboard end of the computer onto the expansion tray at about a 15° angle and slide it towards you until the locater tabs on the expansion tray slip into the matching slots on the computer (see Figure 7-8).

7. Carefully lower the back end of the computer, making sure that the hard disk projection is aligned with the corresponding cutout in the expansion tray. Press firmly on the back end of the computer so that the computer rests flat against the expansion tray.

8. Fasten the two side latches that secure the expansion tray to the computer.

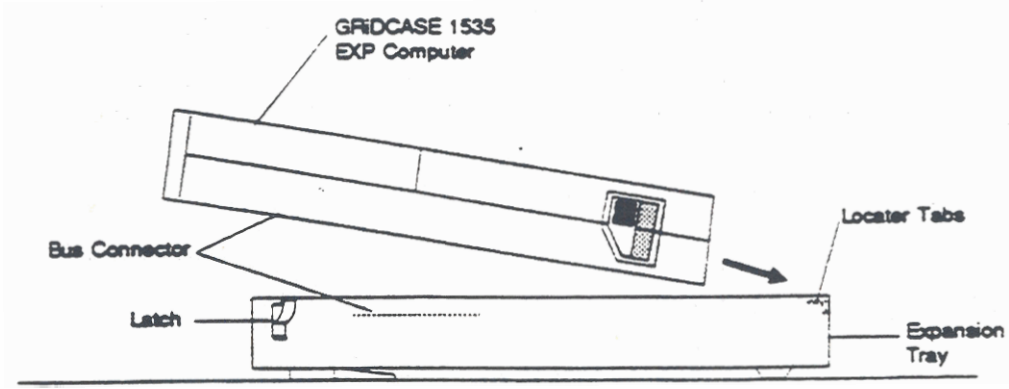


Figure 7-8. Attaching the Expansion Tray

The expansion tray has two collapsible legs on its bottom at the rear. Pull these legs open to prop up the rear of the computer; this provides a better typing angle for the keyboard.

DETACHING THE EXPANSION TRAY

This section explains how to detach the expansion tray from the GRiDCASE 1535 EXP computer.

CAUTION

Before you detach the expansion tray from your GRiDCASE 1535 EXP computer, make sure that the computer is turned off and power to the computer is disconnected.

To detach the expansion tray from your computer, follow these steps:

1. Place the computer right side up on a firm, flat surface. The screen should be closed.
2. Position the computer so that the end with latches is facing away from you, then undo both latches. If a latch doesn't completely release, press down firmly on that corner with one hand while disengaging the latch with the other hand.
3. Pull out the handle from the rear of the computer.
4. Push down firmly on the handle to pop the computer up from the expansion tray.
5. Using the handle, slide the computer away from you, out from under the locater tabs at the front of the expansion tray, then lift it off of the expansion tray.
6. Replace the connector cover on the bus connector on the underside of the computer.

REMOVING AN EXPANSION CARD

This section explains how to remove an expansion card from a slot in the expansion tray. You don't need to detach the expansion tray from the computer to remove an expansion card.

Follow the steps listed below to remove an expansion card.

1. Disconnect the power and any cables attached to the computer or to the expansion cards.

2. Close the computer screen and turn the unit upside down.

3. Remove the expansion tray cover by removing the five phillips-head screws and undoing the two side latches. Lift off the expansion tray cover and set it aside.

4. Using a phillips-head screwdriver, remove the screw that secures the card's mounting bracket to the expansion tray.

5. Slide the card out of the slot, toward the edge of the computer. If necessary, use a gentle, end-to-end rocking motion to loosen the card from the edge connector. You may find it helpful to loosen the support bracket before pulling the card out. Handle the card by its edges only.

   CAUTION

   Do not extract the card by prying against the mounting bracket with a screwdriver or other instrument. This may bend or break the mounting bracket.

6. Reinstall the expansion card mounting screw so that it doesn't get lost.

7. Reinstall the expansion tray cover with the five phillips-head screws.

8. Close the latches.

POWER SUPPLY CONSIDERATIONS

This section provides information concerning power consumption, heat generation, and battery life.

Power Consumption

The actual power consumption of expansion cards varies tremendously. Knowing the actual power requirements of your expansion card(s) is important, because it determines whether or not you can use a particular card or combination of cards in the expansion tray, and whether or not you must use the auxiliary fan.

For systems equipped with standard LCD screens, the total power consumption of expansion cards installed in the expansion tray cannot exceed 25 watts. For systems equipped with optional plasma screens, the total power consumption cannot exceed 10 watts.

In any case, if the total power consumption of expansion cards installed in the expansion tray exceeds three watts, the auxiliary fan must be used.

CAUTION

Do not use a card or a combination of cards that exceeds the wattage limit (see above). Using a card or a combination of cards that draws too much power, or neglecting to use the auxiliary fan may damage the expansion tray and the computer.

NOTE: When using the expansion tray with the GRiDCASE 1535 EXP computer, you cannot use an internal power supply. If you use an internal power supply by mistake, the computer will not start up when you turn it on. If your machine is equipped with a plasma screen or a 100 MB hard disk, you cannot use the internal/external AC power pack internally under any circumstances.

Heat

Vent holes in the bottom of the expansion tray allow the passage of heated air from the expansion tray. As long as these vent holes remain unobstructed, you should not encounter any heating problems.

Observe the following precautions to ensure that the expansion tray does not overheat:

- The auxiliary fan must be installed if the total power consumption of all expansion cards installed in the expansion tray exceeds three watts.
- The two side vents and the two large bottom vents must be selectively covered on the inside of the expansion tray cover, depending on the position of the auxiliary fan. See Table 7-1 and Figure 7-4 for details on covering these vents.
- Do not remove the feet from the bottom of the expansion tray cover. These feet provide enough clearance between the vent holes and your work surface to allow the passage of heated air from the expansion tray.
- Do not stack the computer on top of any smaller object, such as a book, leaving the expansion tray's feet hanging over the edges of the object. This has the same effect as removing the feet; that is, no clearance remains under the computer for the expulsion of heated air from the expansion tray.
- If the expansion tray cover becomes hot to the touch, as soon as you safely can (i.e., after saving any files you are working on), turn off the computer. After the expansion tray cover has cooled, turn the computer back on. Make sure the expansion tray vent holes are unobstructed. If checking and—if necessary—correcting those conditions does not solve the overheating problem, your expansion card(s) may be overloading the power supply. Contact the GRiD Resource Center at 1-800-284-GRID (4743) for help in isolating your problem.

Battery Life

The battery life of the external attachable battery depends almost entirely on the power consumption of the card(s) you install in the expansion tray. Cards that have a higher power consumption cause the battery to discharge faster.

CHAPTER 8: TROUBLESHOOTING

This chapter describes problems that might arise as you use your GRiDCASE 1535 EXP computer and suggests possible solutions to those problems.

IDENTIFYING THE PROBLEM

Initial system setup is the time when you are most likely to encounter problems. Setup problems may be due to actual defects in hardware or software, but are much more often caused by easily corrected mistakes made during the setup process. It is important to determine what kind of problem you have.

User Problems in Setting Up the Computer

Table 8-1 lists common problems you might encounter when setting up your computer system. Before you decide that you have a serious hardware or software problem, try to solve the problem using the troubleshooting chart. To use the chart, look for your problem under the heading Symptom, identify the Cause, and follow the suggested Remedy.

Table 8-1. Troubleshooting Chart

Symptom	Cause	Remedy
No response when computer is turned on	External AC power pack	Check that AC power pack is firmly connected to the computer and to a live wall outlet. The power pack must be used externally if you have a 100 MB hard disk, a plasma screen, or an attached expansion tray.
	Internal battery not usable	You cannot power the computer with the internal battery if the expansion tray is attached.
	Battery needs recharging	Recharge batteries using AC power pack or battery recharger.
Computer unable to boot	Wrong diskette in internal diskette drive	If booting from floppy, make sure diskette has correct operating system software.
	Wrong diskette in pocket or pouch drive	If booting from pocket or pouch drive, make sure operating system software is correct.
	Insufficient power	Provide sufficient power to the computer and peripherals (see Chapters 4 and 6).
	Expansion card incompatibility	Turn off computer. Remove expansion card(s). Turn computer on. If computer boots, the problem is caused by an expansion card or by the combination of expansion cards. Try booting the computer with only one card installed. Try changing address or interrupt settings of card(s).
	Expansion card set to operate as COM1 or COM2	Set card to operate as COM3 or COM4, if possible. Otherwise, this card cannot be used with a GRiDCASE 1535 EXP computer.

Symptom	Cause	Remedy
Computer boots, but battery low indicator is lit	Battery needs recharging	Recharge batteries using external AC power pack or external battery recharger, or install new battery.
No response from external diskette or tape drive	Incorrect switch settings	Check to see that the configuration switch settings are correct (see Chapter 6).
	Bad cable	Call the GRiD Resource Center at 1-800-284-GRID (4743).
	Not powered correctly	The 5¼-inch diskette drives and the tape drive must be powered separately from the computer.
Expansion card doesn't work	Card installed incorrectly	Check to see that card is properly installed. (See Chapter 7.)
	Bad card	Contact card's manufacturer.
	Overheating	Ensure that expansion unit is vented properly and that auxiliary fan is installed if expansion cards draw more than 3 watts of power.
	Card set to operate as COM1 or COM2	Set card to operate as COM3 or COM4, if possible. Otherwise, this card cannot be used with a GRiDCASE 1535 EXP computer.
	Incorrect card configuration	See Appendix D for help in eliminating system conflicts.
"Bad or Missing Command Interpreter" error message	Loading MS-DOS from ROM with a non-DOS diskette in the internal drive	Remove the non-DOS diskette from the internal diskette drive and leave the drive empty.

Symptom	Cause	Remedy
No response when printer is turned on	Not plugged in	Make sure printer is plugged into a live AC outlet.
	Printer is defective	Run a self-test (refer to printer manual).
	Cable not hooked up correctly	Connect cable securely and properly (see Chapter 2).
	Switches set incorrectly	Check that configuration switches are set properly (see Appendix B and/or printer manual).
Printer won't print or prints incorrectly	Printer is not on line	Put printer on line (refer to printer
	Printer not supported	Check the software manual to make sure the program is configured for and supports the attached printer.
	Switches set incorrectly	Check printer DIP switch settings as described in printer manual. Check that configuration switches are set properly (see Appendix B).
Installed ROMs don't show up in directory or title list	ROMs seated improperly or backwards	Turn off the computer and peripherals, leaving power cord plugged in. Make sure that ROMs are seated correctly, or try a different socket.
	ROMs off or appended to other drive	Turn the ROMs on or append them to the correct drive using the MODE ROM command (see Chapter 10).

Symptom	Cause	Remedy
Incorrect date or time on screen	Time-of-day clock set incorrectly	Set correctly (refer to the *MS-DOS Reference* manual).
Internal modem doesn't function	Telephone line bad	Check telephone line by making a phone call on that line (see Appendix A) or connect computer to another phone outlet.
	Switch settings are incorrect under MS-DOS	MS-DOS users set software switches correctly using MODE command (refer to Chapter 10 or to the *MS-DOS Reference* manual).
External modem doesn't function	Telephone line bad	See remedy above.
	Switches set incorrectly	Check that modem configuration switches are set properly (see modem manual).
	Bad cable	Replace the cable.
External monitor screen blank	Not plugged in	Check that cable is firmly connected to computer and monitor's power cord is plugged into wall outlet.
	Not turned on	Check that monitor's power switch is on.
	Output is directed to built-in screen	Press the **Ctrl**, **Alt**, and **Tab** keys simultaneously to switch output to the external monitor.
	Brightness control knob turned down	Check that brightness control knob is turned up sufficiently.
	Not compatible color monitor	Connect a compatible color monitor.

Symptom	Cause	Remedy
Built-in screen blank	Output is directed to external monitor	Press the **Ctrl**, **Alt**, and **Tab** keys simultaneously to switch output back to the built-in screen.
	Contrast switch set incorrectly.	Adjust contrast switch at right of screen.
External keyboard doesn't function or there is continuous beeping.	Not connected to computer	Check that cord is firmly connected to computer's rear panel (see Chapter 2).
	Incorrect keyboard	Connect an IBM PC/AT or 100% compatible keyboard only.

If you encounter a problem that you cannot resolve using the troubleshooting chart, you may have a software or hardware problem.

Software or Hardware Problems

If you encounter problems with specific software, try erasing your working copy of the problem software and replacing it with a different copy of the same version. Do not erase your master copy of any software.

If the software still does not function properly, and if you have ordered a GRiD Customer Support Service (CSS) contract with your computer, call the GRiD Resource Center at 1-800-284-GRID (4743) for help with diagnosing the problem. Make sure you know the tracking number of your computer; it is located on the back of the computer, under the handle (it is visible only when the handle is pulled out).

If you decide your problem is not a setup or software problem, then it may be a hardware problem. Call the GRiD Resource Center for help in problem diagnosis.

THE GRiDSCAN PROGRAM

The GRIDSCAN program is a utility program that reports the status of input/output devices attached to your computer and lists the factory-installed hardware options present. Use GRIDSCAN under the following circumstances:

- When you need to provide information to GRiD personnel responsible for analyzing a possible malfunction in your system.
- When you want to find out if your GRiDCASE 1535 EXP computer is equipped with the options your application programs require.

GRIDSCAN is provided on the MS-DOS system diskette or on the hard disk. To invoke GRIDScan, enter the command **GRIDSCAN** in response to the system prompt. The information provided by the GRIDSCAN program is summarized below.

- System BIOS date
- Processor type
- Coprocessor type, if installed
- Amount of conventional RAM installed and free
- Amount of expanded and/or extended memory installed and free
- Type and size of internal and external diskette drives
- Type of other external devices attached
- Keyboard firmware date
- GRiD VGA cartridge BIOS date, if installed
- Modem type and PROM checksum, if installed
- Serial port number (COM1 or COM2)
- Color mapping method
- Information on installed ROMs

DEALING WITH RADIO FREQUENCY INTERFERENCE

If you suspect that your computer is interfering with another electronic device (such as a TV or radio), do the following:

- With the system turned on, watch and/or listen to the device that seems to be picking up radio frequency interference. Turn off the computer. If interference subsides significantly, you may confidently trace your problems to the computer. If no change occurs, the problem lies elsewhere (possibly in the other electronic device itself).

If the computer seems to be the cause, try these methods for lessening interference. Make sure the computer and the other electronic device are turned on to determine if one or more of these suggestions work.

- Change the position of the electronic device's antenna. In the case of radios, this may mean moving the radio itself.

- Move the computer around so it faces a new direction.

- Move the computer farther away from the other electronic device. If this means unplugging the computer, be sure to turn it off before you unplug it.

- Plug either the computer or the electronic device into a different wall outlet. If possible, plug the two instruments into outlets on different wiring circuits.

- If peripheral devices are connected to the computer, disconnect the devices and their I/O cables one at a time. If the interference stops, it is caused by the device or cable that was disconnected last. All peripheral devices require shielded I/O cables (except for telephone cords). GRiD-supplied cables are shielded. For non-GRiD-supplied peripherals and I/O cables, contact the manufacturer or dealer for assistance.

If these solutions still do not produce satisfactory reception, contact your GRiD representative. If problems are caused by a non-GRiD product, contact the product manufacturer for that product.

CHAPTER 9: MAINTENANCE

This chapter describes how to care for your GRiDCASE 1535 EXP computer. Although the GRiDCASE 1535 EXP is basically durable, you should treat it as you would any other precision instrument—with care.

WARNINGS

This product is designed and tested to comply with various national and international safety agency standards that reflect the current state-of-the art at the time of manufacture. Use and application of the product requires exercising common sense. It is an electrical device.

Always observe the following warnings. Ignoring these warnings could lead to physical injury.

- Do not operate the computer in a dirty or dusty environment.
- Do not get the computer wet; electrical equipment should not be operated in a moist environment.
- Do not operate your computer in any potentially flammable atmosphere. It is not approved for hazardous locations.
- Do not attempt to open the computer case; it contains no user-serviceable parts. Such action voids your warranty and service contract and can damage the computer. (The ROM area is excluded from this warning.)
- Arrange any power cords or other cords so they can't be pulled out or tripped over when the computer is in use.

- If you are using an external drive, make sure its cable is securely attached at both ends and is not likely to be bumped or pulled.
- Make sure you properly ground any power-plug adapter.
- Do not eject the internal/external AC power pack without first removing the power cord from the wall socket, as a shock could result.
- Always turn off the computer before unplugging it.

CAUTIONS

Always observe the following cautions. Ignoring these cautions could damage your computer.

- Before you connect any device to your computer or disconnect any device from your computer, turn off both the device and the computer, in that order.
- Operate the computer only when the surrounding temperature is between 41° F and 95° F (5° C and 35° C).
- Operate the computer only when the relative humidity is between 20% and 80% noncondensing.
- Store the computer where the surrounding temperature remains between -4° F and 149° F (-20° C and 65° C).
- Do not store or set up the computer or any of its peripheral devices in direct sunlight.
- Do not subject the computer to unnecessary shock or vibration.
- When cleaning the computer, never use any cleaning agent such as dust wax, spray cleaner, or any abrasive substance.
- Never turn off the computer when the in-use light for any diskette or hard disk drive is lit. Turning off the computer at these times can destroy data on the disk.

- When using the expansion tray, you must install the auxiliary fan in the expansion tray if the total power consumption of expansion cards exceeds three watts.

CLEANING YOUR GRiDCASE 1535 EXP COMPUTER

Before cleaning your computer, turn it off and disconnect the power cord from the outlet.

To clean the case, use a slightly damp, soft cloth and, if necessary, a mild, nonabrasive detergent.

CAUTION

Never use any cleaning agent such as dust wax, spray cleaner, or any abrasive substance.

Wipe the case clean and then dry it.

To clean the screen, slightly dampen a soft cloth with an ammonia-based glass cleaner and gently wipe the screen. Use the cleaner sparingly so that no fluid runs down the screen and into the frame.

If necessary, dust the rear panel of your computer with a dry cloth.

WARNING

To prevent shock hazard, never apply any liquid to the rear panel of your computer or inside a diskette drive opening.

STORING YOUR GRiDCASE 1535 EXP COMPUTER

Always store your computer between -4° F and 149° F (-20° C and 65° C). To keep it free from dust and dirt, store it in a protected location.

TRAVELING WITH YOUR GRiDCASE 1535 EXP COMPUTER

When traveling with your computer, keep it in a protective case and carry it instead of checking it as luggage. Many transportation carriers do not cover the replacement cost of your computer should they lose or damage it. If you do check it as luggage, always pack it in the original shipping carton(s) and packing materials. Any damage incurred due to improper shipping is considered abuse and will not be covered under your computer's warranty.

It should be safe to x-ray the computer or any peripherals in airport security checks, but you can have it hand-checked, if you wish.

CAUTION

If you are carrying the battery pack inside the computer, make sure that the power switch is off. If it is left on, the battery pack will discharge during transportation. As an extra precaution, you may want to remove the battery pack from the computer and carry it separately.

UPDATING THE CLOCK

The computer's internal time-and-date clock, which displays the time and date on your screen, is not intended to replace your wristwatch. Its precision over a long period may vary because of temperature changes and other factors. You should check its accuracy periodically. Also note that you must change the year when going from December to January.

Refer to the TIME and DATE commands in the *MS-DOS Reference* manual for instructions on setting the clock.

CHAPTER 10:
USING MS-DOS ON THE GRiDCASE 1535 EXP COMPUTER

This chapter explains how operating a GRiDCASE 1535 EXP computer and an IBM PC/AT differ; how the GRiD version of MS-DOS differs from PC-DOS; how to move and then run applications currently in use on the IBM PC-compatible computer to the GRiDCASE 1535 EXP computer, and how to create a CONFIG.SYS file.

This chapter is not a tutorial for the novice. You may not understand the information in this chapter unless you've operated a personal computer using an MS-DOS application. If you require training in basic MS-DOS skills, inquire at a local computer store on the availability of MS-DOS classes, and about the many tutorials and computer-based training programs available for purchase.

WHAT'S DIFFERENT ABOUT THE GRiDCASE 1535 EXP COMPUTER?

You should be aware of the following differences between operating a GRiDCASE 1535 EXP computer and an IBM PC/AT before starting up your system.

- The GRiDCASE 1535 EXP computers use a different operating system—you must use GRiD MS-DOS on GRiDCASE 1535 EXP computers—not PC-DOS or an MS-DOS operating system made for other computers.

- You can plug in an IBM color monitor and keyboard to your GRiDCASE 1535 EXP computer, and use it just as you would an IBM PC/AT. When you travel, simply disconnect the monitor and keyboard, and use the GRiDCASE display and keyboard instead.

- The GRiDCASE 1535 EXP keyboard has fewer keys, but all the functions of an IBM PC/AT keyboard.

- The GRiDCASE 1535 EXP computer displays text and images in blue and gray, or black and red (depending on the configuration); many monitors connected to an IBM PC/AT display text and images in full color, if the software supports color.

- MS-DOS and CrossTalk software are available on ROM cartridges for the GRiDCASE 1535 EXP computer.

WHY ONLY GRiD MS-DOS ON THE GRiDCASE 1535 EXP COMPUTER?

GRiD MS-DOS is the only MS-DOS operating system that should be run on the GRiDCASE 1535 EXP computer. Although the GRiDCASE 1535 EXP is fully compatible with the IBM PC/AT, it is not desirable to run PC-DOS on the GRiDCASE 1535 EXP.

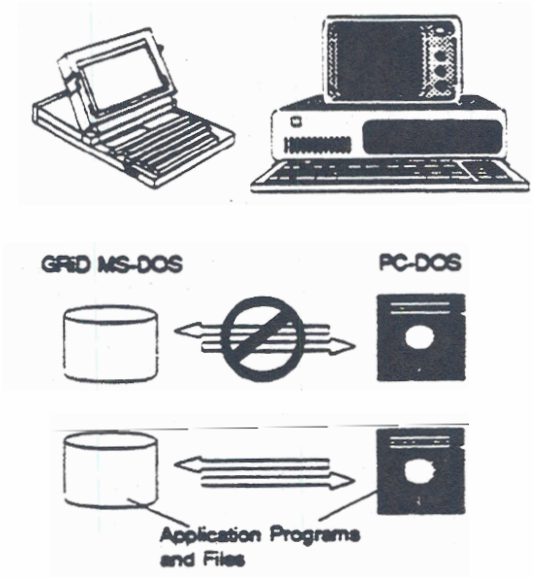


Figure 10-1. The GRiDCASE 1535 EXP Computer Requires GRiD MS-DOS

PC-DOS is licensed to run only on an IBM personal computer, and GRiD MS-DOS to run only on GRiDCASE models. Although you can interchange application programs, subject to the licensing agreement you have with the software publisher, you cannot interchange operating systems (Figure 10-1).

Moreover, GRiD MS-DOS offers the following facilities not available in PC-DOS:

- Only the GRiD MS-DOS MODE command supports GRiD input/output devices and allows you to control unique GRiD hardware features. The PC-DOS MODE command cannot control GRiDCASE hardware features.

- GRiD MS-DOS supports Read Only Memory (ROM). ROM increases the amount of permanent storage available for data files and programs. Use of programs in ROM also somewhat increases battery life by reducing disk accesses.

- GRiD MS-DOS has the HELP command for instant, on-line reference information on system commands and facilities.

- GRiD MS-DOS provides the PCMASTER and PCSLAVE commands for easy file transfer between a GRiDCASE 1535 EXP computer and an IBM PC-compatible computer.

- GRiD MS-DOS includes the GRIDSCAN command, which shows the status of input/output devices attached to your GRiDCASE 1535 EXP computer and lists the factory-installed hardware options.

- GRiD MS-DOS includes the device driver file LOWPOWER.SYS. If you reference LOWPOWER.SYS in your CONFIG.SYS file, the computer will beep when battery power is low.

You'll learn more about these facilities throughout this chapter.

USING AN EXTERNAL MONITOR AND KEYBOARD

The GRiDCASE 1535 EXP computer works like an IBM PC/AT. You can use the GRiDCASE 1535 EXP computer's built-in keyboard, or you can plug in an IBM PC/AT keyboard or any other 100% compatible keyboard. You can also plug an IBM color monitor into your GRiDCASE 1535 EXP computer.

With both the IBM keyboard and IBM color monitor connected, you can operate your GRiDCASE 1535 EXP computer just as you would an IBM PC/AT. When you travel or take your work elsewhere, simply unplug the external keyboard and monitor, and use the GRiDCASE keyboard and display. This arrangement gives you a desktop and a portable computer in one.

USING THE INTERNAL HARD DISK OPTION

If your GRiDCASE 1535 EXP computer has an internal hard disk, the hard disk is already formatted for use with MS-DOS, and the current version of MS-DOS has been loaded onto the disk. Because you cannot have a built-in diskette drive with the hard disk, you must use one of the following GRiD products to load programs onto the hard disk:

- **Model 3401 3½-inch Pocket Diskette Drive (1.4 MB).** The pocket diskette drive can be attached to the external peripheral connector on the back of your computer, allowing access to files stored on 3½-inch diskettes.

- **Model 3402 5¼-inch Pouch Diskette Drive (360 KB).** If your programs are stored on 5¼-inch floppy diskettes, this drive can be used to access them.

- **Model 6401 PCMaster/PCSlave Serial Cable.** This cable can be used to connect a GRiDCASE 1535 EXP computer to an IBM PC-compatible computer through the serial ports on each computer. Working with software supplied on your GRiDCASE hard disk, you can transfer files from storage devices on an IBM PC-compatible computer to your hard disk.

THE GRiDCASE 1535 EXP KEYBOARD

In order to conserve space and weight, the GRiDCASE keyboard contains fewer keys than the IBM PC/AT keyboard. Consequently, you may need to press slightly different GRiDCASE keys to invoke equivalent IBM PC/AT functions. GRiDCASE keys with green keycaps correspond to function and other special keys on the IBM keyboard—**PgUp**, **PgDn**, **Break**, **Home**, etc. For additional information on the GRiDCASE keyboard, refer to Chapter 2.

THE GRiDCASE 1535 EXP DISPLAY

There are two notable exceptions in how the GRiDCASE 1535 EXP display functions in relation to an IBM color monitor:

- On the GRiDCASE display, text and images appear in blue and gray, or black and red, depending on your screen option. A color monitor displays text and graphics in full color.

- On the GRiDCASE display, text and images cannot be highlighted by your application as they can on a color monitor. Text designated as bold by a word processor command appears highlighted on the color monitor, but appears in a different type font on the GRiDCASE display. Additionally, the GRiDCASE display supports a four-level gray scale, which is sometimes used to display colors.

Other differences are hardly noticeable and rarely seen.

THE INTERNAL MODEM AND THE SERIAL (RS-232C) PORT

The internal modem of a GRiDCASE 1535 EXP computer so equipped is the MS-DOS COM1 device. The serial (RS-232C) port is the MS-DOS COM2 device. For more information on MS-DOS COM1 and COM2 devices, refer to the *MS-DOS Reference* manual.

READ ONLY MEMORY (ROM)

GRiDCASE 1535 EXP computers have mounting positions or sockets for removable Read Only Memory (ROM) cartridges, which give permanent storage for MS-DOS programs. (The two ROM sockets are under a removable cover above the keyboard.)

A single ROM cartridge containing the MS-DOS operating system and its utility files is available from GRiD. Also available is a two-cartridge set containing the MS-DOS operating system, its utility files, and the popular CrossTalk communications program.

NOTE: You should carefully read the booklet that comes with each ROM cartridge before inserting or removing a cartridge.

If your computer is equipped with an external floppy diskette drive, MS-DOS treats files on the ROM cartridge as though they resicle on floppy diskette drive A, and thus as an extension of the diskette in drive A. (If your computer has an internal hard disk and does not have an external diskette drive attached, ROM files are treated as an extension of drive C.) If you use an MS-DOS system ROM, you needn't include the MS-DOS system files on the hard disk with your application and data files. This increases the space available for data files on the hard disk.

You can change the device to which ROM files are appended by using the MODE ROM command, described later in this chapter.

When you install an application program on a GRiDCASE 1535 EXP computer that has an MS-DOS ROM, note the following:

- There is no need to specify the /S option when using the FORMAT command. (This option copies the MS-DOS system files to the diskette after completing the formatting process.)

- There is no need to use the SYS command to copy the MS-DOS system files to an application diskette or to the hard disk.

ROM files differ from diskette files in the following ways:

- You cannot delete programs from ROM; nor can you store additional programs or data in ROM.

- You cannot specify a ROM file as a target file in an MS-DOS COPY command. MS-DOS issues the message "File Creation Error" and the command fails.

- If the diskette in drive A contains a file with the same name as a file in ROM, MS-DOS always uses the file on the diskette. If your system has no floppy drives and if the hard disk contains a file with the same name as a file in ROM, MS-DOS always uses the file on the hard disk.

- When copying files, you cannot specify a target file for drive C (drive A if your system has an internal or external floppy drive) that has the same name as a ROM file, unless you remove the ROM cartridge, temporarily rename the ROM file, or turn off the ROM by issuing the command MODE ROM=OFF (see MODE command later in this chapter). The power must be off before you remove the ROM cartridge.

The next procedure shows how to copy a file from hard disk C to a diskette in drive A, when the file in drive C has the same name as an existing ROM file.

To copy a duplicate ROM file from drive C to drive A, follow the steps listed below.

1. If the diskette in drive A already contains a file with the same name as the file you want to copy from drive C, remove the diskette from drive A. Otherwise, you will inadvertently rename the diskette file instead of the ROM file.

2. Rename the ROM file; for example, the following command

   ```
   A>REN COMMAND.COM COMMAND.TMP
   ```

   temporarily renames the COMMAND.COM file in ROM to COMMAND.TMP. (The temporary name remains in effect until the system is restarted or the file is renamed again.)

3. Insert the desired diskette in drive A, and then copy the file. For example

   ```
   A>COPY C:COMMAND.COM A:
   ```

copies the COMMAND.COM file from drive C to the diskette in drive A.

After the next start-up, the COMMAND.TMP file in ROM resumes the name of COMMAND.COM. A directory listing will now show two COMMAND.COM files in drive A, one on disk and one in ROM.

WHAT'S DIFFERENT ABOUT GRiD MS-DOS?

GRiD MS-DOS is an operating system specifically written for computers manufactured by GRiD Systems Corporation. If you are accustomed to using PC-DOS or MS-DOS on another computer, you must learn how using GRiD MS-DOS differs from those operating systems. This section discusses these differences under the following points:

- How GRiD MS-DOS commands and PC-DOS commands differ
- How to run BASICA programs on a GRiDCASE 1535 EXP computer
- Special procedures when using the internal modem

HOW COMMANDS DIFFER

Several GRiD MS-DOS commands provide functions not available in PC-DOS. These commands are described below.

FC (File Comparison)

The File Comparison (FC) utility in GRiD MS-DOS is used to compare the contents of two files. The FC utility is described in Chapter 10 of the *MS-DOS Reference* manual.

In PC-DOS, the COMP command is used to compare files. The COMP command is also contained in version 3.3 and later versions of GRiD MS-DOS.

FORMAT

The FORMAT command provided with GRiD MS-DOS is funtionally identical to the PC-DOS FORMAT command provided with newer IBM machines that use high-density, 1.4 MB, 3½-inch floppy diskette drives. It is documented here, however, because many users moving to a GRiDCASE 1535 EXP computer with a 3½-inch floppy diskette drive will not be familiar with using FORMAT on such drives.

When you issue a FORMAT command for a high-density, 3½-inch diskette drive like those used in GRiDCASE 1535 EXP computers, the drive formats the diskette for 1.4 MB. **If the diskette in the drive is not a high-density diskette, it cannot reliably be formatted for 1.4 MB.** The format operation itself may fail, or even worse, the format operation may seem to succeed, resulting in a completely unreliable diskette.

CAUTION

Do not format a diskette for 1.4 MB unless you are sure it is a high-density diskette. Failure to heed this warning may result in the irretrievable loss of your data.

You can format 720 KB, double-density diskettes in a high-density drive, but you must use the following special form of the FORMAT command to do so:

```
C>FORMAT A:/N:9 /T:80
```

A special batch file called FORMATLD.BAT is supplied on your GRiD MS-DOS diskette or hard disk. This batch file contains the necessary switches to perform a low-density (i.e., double-density) format. It also allows you to use any additional switches (e.g., /S) just as you would with the standard FORMAT command. To use this batch file, just enter the command, FORMATLD, instead of FORMAT.

PCMASTER/PCSLAVE

The PCMASTER and PCSLAVE commands (also called the PC file transfer utilities) transfer files from IBM PC storage devices to GRiDCASE 1535 EXP storage devices and vice versa. The transfer takes place over a cable attached to the serial port of each computer. More information on PCMASTER and PCSLAVE is presented later in this chapter.

MODE

The GRiD MS-DOS MODE command offers the same functions as the PC-DOS MODE command, plus the ability to control GRiD devices that cannot be used with an IBM PC/AT. GRiD-specific MODE command options are described below.

In the examples that follow, curly brackets ({}) indicate that you must select one of the items enclosed within the brackets. A vertical bar (|) separating two items indicates an either/or choice between the two items. Square brackets ([]) indicate that the item is optional. Two dots (..) indicate a range of choices (for example, "1..6" means that you can enter any number from 1 to 6).

MODE MODEM=[RESET] [,*addressSwitch*] [,ON|OFF]

This command allows you to change the settings of the software switches in either of the optional internal modems. Both the 2400 baud modem and the MNP modem emulate the Hayes Smartmodem software switches.

The optional **RESET** parameter resets the modem to the factory settings. This parameter is only valid for the MNP modem and must be used by itself on the command line.

The *addressSwitch* parameter represents the Hayes Smartmodem switches that are emulated in software. It consists of eight *U* or *D* characters (for *Up* or *Down*, meaning the switch is on or off, respectively). For example, the initial setting, UDDDDUUD, means that switches 1, 6, and 7 are on and switches 2, 3, 4, 5, and 8 are off. Switches 1 through 8 are supported for the 2400 baud modem. Only switches 1 through 6 are supported for the MNP modem. For more details, see the section THE INTERNAL MODEM later in this chapter.

The last parameter controls the speaker while the internal modem is dialing and waiting for a connection. The default, ON, turns the speaker on while the modem is dialing so that you can hear what is happening on the phone line. The speaker always automatically turns off when a connection is established. You can specify OFF to keep the speaker off at all times.

MODE CURSOR=[LINE|BLOCK]

This command allows you to select the cursor appearance. Specify LINE (the default) to select a short, horizontal underline cursor. Specify BLOCK to select a solid rectangle cursor.

MODE FONT={1..4}

This command allows you to specify the current active alpha-mode font. Four fonts are available:

1 = English
2 = French Canadian
3 = Norwegian
4 = Hebrew

MODE ROM={*d*|OFF}

This command allows you to specify a disk drive to which all ROM files are appended. The *d* parameter specifies a device letter. ROMs can be appended to any device. If you specify the hard disk on your system, this setting is saved, even when the computer is powered off. If you select any other device, this setting is reset to A every time the computer is rebooted. To turn off all ROM files, specify OFF. This is useful for copying files when some of the files being copied have the same name as ROM files.

MODE {GRID|CRT|VGA=[VGA|EGA|MDA|HERC]}

This command allows you to switch the video output of your computer to an external monitor. The GRiDCASE 1535 EXP computer cannot simultaneously display output on the internal screen and an external monitor. The initial setting is GRID. Specify GRID to display all screen output on the internal GRID display. Specify CRT to display all screen output in CGA mode on an external monitor connected to the video output connector. Specify VGA=VGA to display all screen output in VGA mode on an external monitor connected to the GRiD VGA cartridge or a VGA adapter card installed in an external expansion chassis.

The modes VGA=EGA, VGA=MDA, and VGA=HERC can only be used with the GRiD VGA cartridge. They are used to emulate EGA, MDA, or Hercules video modes, respectively. Refer to the *GRiDCASE 1500 Series VGA Cartridge Owner's Guide* for further details. You can toggle between the GRID and CRT display modes directly by pressing the **Ctrl-Alt-Tab** keys simultaneously.

MODE SPEED={FAST|SLOW}

This command allows you to select between the two processor speeds available on the GRiDCASE 1535 EXP computer. The fast speed, which is the initial setting, is 12.5 MHz. The slow speed is 6.25 MHz. If some programs do not seem to work properly at the faster speed, try switching to the slow speed.

Running the processor at slow speed is NOT recommended when the expansion tray is attached to the computer; some expansion cards may not be able to operate correctly when the computer is running at slow speed.

You can also change processor speeds by using the keystrokes **Ctrl-Alt-Fn-↓** for slow speed and **Ctrl-Alt-Fn-↑** for fast speed.

MODE COLORMAP={1..6}

This command allows you to set the color mapping on the internal display. Six color maps are predefined. The initial setting is mode 1. Some programs designed for color displays may be more readable with a color mapping mode other than the default (1). You can select any one of the six color maps by specifying the color map number with this MODE option. You can also switch among the color mapping modes using the keystrokes **Ctrl-Alt-Fn-←** and **Ctrl-Alt-Fn-→**. Repeatedly pressing one of these keystrokes cycles through all six color mapping modes.

Table 10-1. Color Mapping Modes

	Mode					
Color	1	2	3	4	5*	6*
Black	off	off	off	off	off	off
Blue	off	2/3	2/3	off	full	full UL
Green	2/3	2/3	1/3	1/3	full	full
Cyan	2/3	2/3	1/3	1/3	full	full
Red	1/3	1/3	2/3	2/3	full	full
Magenta	1/3	1/3	2/3	2/3	full	full
Brown	full	full	full	full	full	full
White	full	full	full	full	full	full

Legend:
off = nothing displayed
1/3 = one third brightness
2/3 = two thirds brightness
full = full brightness
full UL = full brightness and underlined

* If the background color is white, modes 5 and 6 display in inverse video (black is full brightness and all other colors are off).

MODE BACKLITE={ON|OFF|1..60}

This command allows you to control the backlight on GRiDCASE 1535 EXP computers equipped with LCD screens. Specify either ON, OFF, or the parameter 1 to 60. A number from 1 to 60 specifies the time, in minutes, that the system waits after the last keyboard access before it turns off the backlight. The default is 2 minutes. After the backlight is off, any keyboard input will turn it back on. Specifying OFF turns the backlight off until you give the ON command. Specifying ON turns the backlight on until you change the setting. This MODE setting is remembered by the computer even after the power is turned off, so you do not need to reset it each time you start up the computer.

MODE DISPLAY={ON|OFF}

This command allows you to disable and enable the internal display hardware inside the computer. The initial setting is ON. Specify OFF to turn off the internal display hardware if you are using an external monitor that is plugged into its own card (not the video output connector or VGA cartridge). Specify ON to turn the internal display hardware back on if you are no longer using an external monitor plugged into its own card. If your external monitor is plugged into the video output connector or the GRiD VGA cartridge, do not turn off the display hardware.

See MODE GRID|CRT|VGA for information on how to switch between the internal display and an external monitor when the monitor is a VGA monitor or is a CGA monitor plugged into the computer video output connector.

MODE NUMPAD={ON|OFF}

This command allows you to disable and reenable the numeric keypad embedded in the internal keyboard. This MODE option only applies to GRiDCASE 1535 EXP computers with a keyboard firmware date of 5/19/88 or later (see GRiDSCAN). Normally, the internal numeric keypad is enabled and disabled by the NUMLOCK key; however, some applications may erroneously force the keyboard into NUMLOCK mode. In such cases, you can specify OFF to disable the internal numeric keypad. You can still access the internal numeric keypad by holding down the **Fn** key while pressing a numeric keypad key. Specify ON to reenable the internal numeric keypad.

Note that if a GRiD external numeric keypad is connected to the system, the internal numeric keypad is automatically disabled.

MODE HARDDISK={ON|OFF|1..99}

This command allows you to control power to the internal hard disk. This option is useful for saving battery power by allowing you to turn off power to the internal hard disk when it is not being used. The default is ON, meaning that the hard disk is always powered on. Specify OFF to turn off power immediately to the hard disk. For automatic control, specify a number of minutes (between 1 and 99) after which the hard disk is turned off if it has not been accessed. In any case, the hard disk is automatically powered on when disk access is required.

Each type of hard disk has a different maximum interval that can be set. If you specify a number of minutes greater than the maximum allowed, the interval is set to the maximum, and you are alerted by a message to the actual number of minutes set.

This MODE option does not apply to all types of hard disks. Currently, disk types 5, 6, and 9, as reported by GRiDSCAN, support this option. (See the section THE GRiDSCAN PROGRAM in Chapter 8.) All of these disk types have a maximum interval of 18 minutes.

CAUTION

This MODE option is designed to help extend battery life. Do not use this option when operating the computer on AC power; doing so causes unnecessary wear on the hard disk and could shorten its life.

HELP

The HELP facility displays online answers to many questions you may have about MS-DOS commands and functions. Normally, you find such information only in a reference manual. However, using GRiD MS-DOS, you can type in the following command and press **Return** to obtain help.

```
HELP
```

The GRiD Help Facility displays the topics on which help is available. Help is available for all MS-DOS commands as well as some specific GRiD utilities. You can select any command or function from the Help menu and press **Return** to obtain more information about it.

The Help menu displays all the topics for which help is available. It also displays all the information you need to use the GRiD Help Facility. Press the **F1** key to display instructions on how to use help.

NOTE: You can also enter the topic name following the HELP command on the MS-DOS command line to obtain help for a specific topic. For example,

```
C>HELP APPEND
```

directly displays help on the APPEND command.

RUNNING BASIC PROGRAMS

Programs written in IBM's BASIC or BASICA run on your GRiDCASE 1535 EXP computer if you use GRiD'S GW-BASIC instead of IBM's BASIC (refer to Figure 10-2). If you use a batch file that references BASIC or BASICA, rename the GWBASIC.EXE file to BASIC.EXE or BASICA.EXE, depending on the name specified in the batch file.

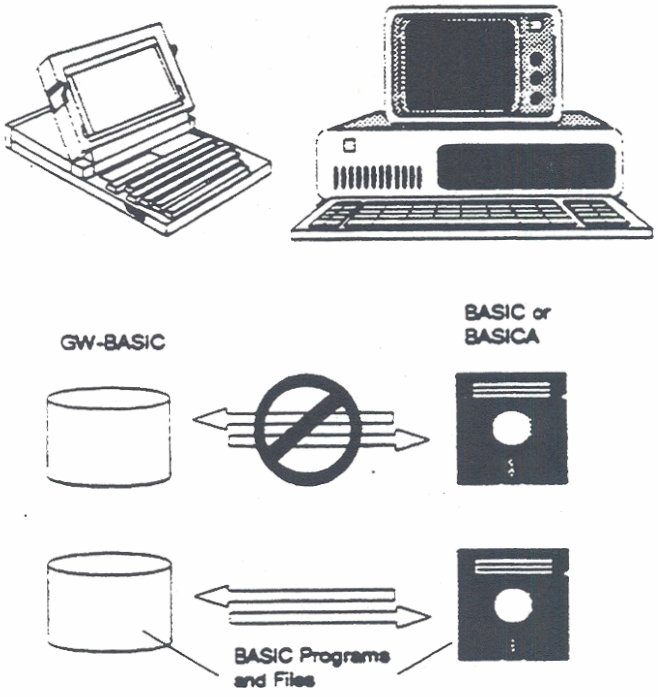


Figure 10-2. Running BASIC Programs on a GRiDCASE 1535 EXP Computer

The GRiDCASE 1535 EXP computer doesn't support light pens, joy sticks, or cassettes; consequently, BASIC programs that require those devices cannot run on a GRiDCASE 1535 EXP computer.

THE INTERNAL MODEM

The GRiDCASE 1535 EXP internal modem (2400 baud modem or MNP 2400 baud modem) permits communications through the telephone system. The internal modem behaves just like a Hayes Smartmodem; it has symbolic software switches that correspond to the Hayes switches. You can change the symbolic switches to match any setting of the Hayes switches. The MNP modem also provides MNP level 5 for error detection, correction, and data compression. For more information on using the internal modem installed in your computer, see the *Internal Modem User's Guide*.

If your application requires different switch settings than the defaults, you can reset the switches using the MODE command. For example, the following command sets the switches to the factory setting for the 2400 baud modem (only switches 1 through 6 are supported for the MNP modem):

```
MODE MODEM=UDDDDUUD
```

The *D* and *U* characters in the above command stand for "down" and "up," respectively, indicating the position of the switch. The switches in the internal modem now indicate the following settings:

Switches 2, 3, 4, 5, and 8 are down (off)

Switches 1, 6, and 7 are up (on).

The meaning of each of the switch settings is given in Table 10-2.

Table 10-2. Internal Modem Switch Settings (Defaults Shown in Bold)

Switch	Position	Meaning
	Up	Modem requires DTR active
	Down	Modem does not require DTR active
2	Up	Result codes sent as English words
	Down	Result codes sent as single digits
3	Up	No result codes are sent
	Down	Result codes are sent
4	Up	Echo characters when in command mode
	Down	No echo
5	Up	Auto answer on first ring
	Down	Don't answer
6	**Up**	Carrier detect real
	Down	Carrier detect forced
7	**Up**	Always up
8	Up	Disables command recognition
	Down	Enables command recognition

MS-DOS restores the initial (default) settings when you restart the operating system (either by pressing **Ctrl-Alt-Del** or by turning the computer off and back on).

MOVING APPLICATION PROGRAMS TO A GRiDCASE 1535 EXP COMPUTER

If you run application programs on an IBM PC-compatible computer using 5¼-inch diskettes and want to run these same programs on your GRiDCASE 1535 EXP computer, there are two methods of moving the programs and data files:

- Executing programs you currently use on an IBM PC from the original diskettes placed in a GRiD external 5¼-inch pouch diskette drive.

- Copying programs and files from IBM PC 5¼-inch diskette drives to the GRiDCASE 1535 EXP internal drive using the PC File Transfer Utilities (PCMASTER/PCSLAVE)—for use when an external 5¼-inch diskette drive isn't available.

Before using either procedure, read the caution about copy-protected application programs below.

A Caution About Copy-Protected Application Programs

You can take greatest advantage of the full portability of your GRiDCASE 1535 EXP computer when your application programs and data files reside on 3½-inch diskettes. This allows you to operate from an internal drive and leave your pouch floppy diskette drive behind when you leave your work area.

You can make a back-up copy of an application program from a 5¼-inch to a 3½-inch diskette if the program isn't copy-protected. A copy-protected program contains an encoded lock that makes duplication impossible. Attempting to duplicate a copy-protected program results in an error.

To find out if an application is copy protected, read the installation instructions that come with it. If it is protected, either try running the program diskette from a pouch floppy diskette drive, as described below, or contact a GRiD representative to find out if a version of the program is available on 3½-inch diskettes.

Using A GRiD External Diskette Drive

This procedure describes how to run IBM PC application programs on 5¼-inch diskettes from an external diskette drive. The procedure applies equally to external 5¼-inch diskette drives and external 3½-inch diskette drives, although Figure 10-3 only shows a 5¼-inch diskette drive. Device letter assignments are shown in Figure 10-3. (The 5¼-inch pouch drive must be powered by a separate power pack.) This procedure assumes that your system is equipped with a hard disk.

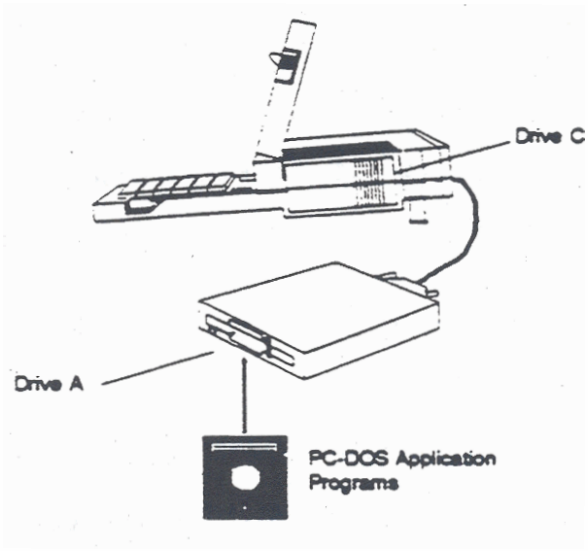


Figure 10-3. Running a Program from the GRiD Model 3402 5¼-inch Pouch Diskette Drive

To run an application program from a GRiD external diskette drive, follow the steps listed below.

1. Set the switches on the back of the external drive to 00 (both switches are in the DOWN or OFF position); this causes the external drive to be assigned device letter A.

CAUTION

Be sure to turn off power to the external drive and the computer before changing the switch settings; otherwise, damage to your equipment could result. In addition, MS-DOS recognizes the new settings only after a "cold" start—when you turn on the power switch of the computer.

2. Insert the application program diskette into the pouch diskette drive.

3. Start up (boot) the computer. MS-DOS is automatically loaded from the hard disk.

   After start-up, the system prompt appears, indicating the internal drive:

   C>

   MS-DOS assigns the device letter A to the external drive.

4. Change the default device from Drive C to Drive A by entering:

   C>A:

5. The system prompt appears, indicating the external drive:

   A>

Enter the name you normally use to invoke your application program and try using it.

Using The PC File Transfer Utilities

This procedure describes how to use the PC file transfer utilities (described in detail in Chapter 12 of the *MS-DOS Reference* manual) to move files from storage devices on an IBM PC-compatible computer to GRiDCASE 1535 EXP storage devices. These utilities are most useful for transferring files when an external diskette drive is unavailable. You can also transfer files from your GRiDCASE 1535 EXP computer to an IBM PC.

The PC File Transfer utilities consist of two programs, PCMASTER and PCSLAVE. The programs run concurrently, one on a GRiDCASE 1535 EXP computer and one on an IBM PC connected by a cable attached to a serial port on each computer.

Figure 10-4 shows a typical PCMASTER/PCSLAVE configuration; the procedure that starts below assumes this configuration of storage devices, although many others are possible.

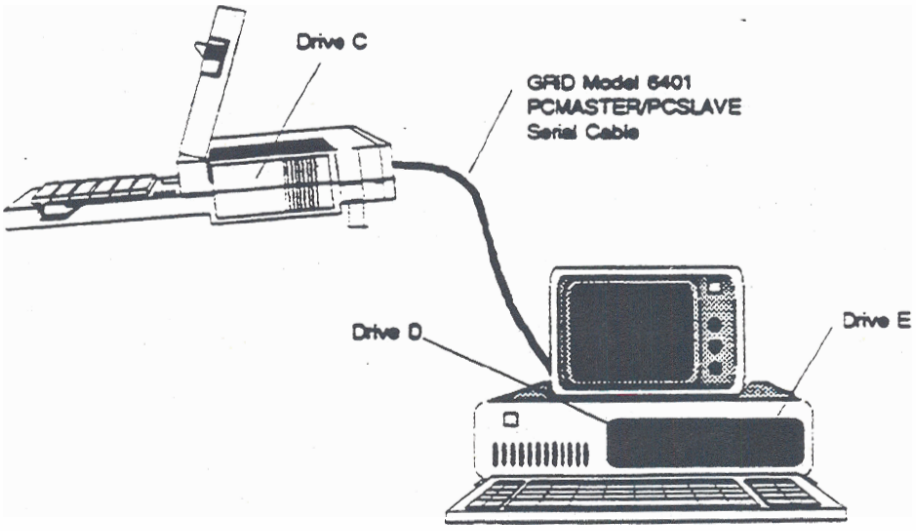


Figure 10-4. Moving Files Using the PC File Transfer Utilities

As shown in Figure 10-4, GRiD MS-DOS assigns the letter C to the GRiDCASE internal hard disk drive, and D and E respectively to the drives on the IBM PC. (Normally, PC-DOS assigns A and B to these two drives.)

If the PC had one diskette drive (instead of two as shown in Figure 10-4) and a hard disk, GRiD MS-DOS would have assigned drive D to the diskette drive and drive E to the hard disk.

To use the transfer procedure, you need the following:

- Access to the GRiD MS-DOS PCMASTER.SYS file, which can be on the MS-DOS diskette, in ROM, or on the hard disk.
- The GRiD-supplied 5¼-inch diskette that contains the PCSLAVE.EXE file.
- A PC-DOS boot diskette for your IBM PC.
- The GRiD Model 6401 **PCMASTER/PCSLAVE** Serial Cable, which connects the serial ports of the two computers. (If a null-modem cable is available, you can try to use it instead, though not all null modem cables will work. See Chapter 12 of the *MS-DOS Reference* manual for details.)
- If you are using the standard serial port on an IBM PC, you will need a 9-pin-to-25-pin adapter cable, included with your PC or available from your computer dealer.

NOTE: The computer system that is running the most current version of MS-DOS must be the master station. For example, if you are using an IBM PC/AT running PC-DOS 3.1 and a GRiDCASE 1535 EXP computer running MS-DOS 3.3, then the GRiDCASE must be the master station.

Below are the steps to follow in transferring files from an IBM PC with two diskette drives, to the GRiDCASE internal hard disk drive. In this example, the GRiDCASE is the master station and the IBM PC is the slave station. To reverse the master/slave stations, follow the same steps listed below, except perform all of the actions that you would normally perform at the GRiDCASE station on the IBM PC, and vice versa.

1. Turn off the power to both the IBM and GRiDCASE computers.

2. Connect the serial ports of the two computers using the GRiD Model 6401 cable or your own null modem cable as shown in Figure 10-5.

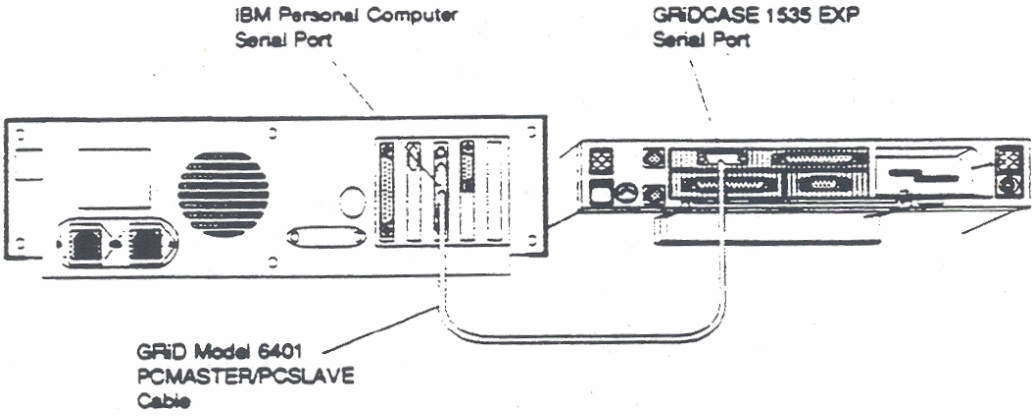


Figure 10-5. PCMASTER/PCSLAVE Cable Connection

3. At the IBM PC:

- Insert the PC-DOS boot diskette into the first diskette drive and start up PC-DOS by turning on the power.

- Replace the boot diskette with the 5¼-inch diskette that contains PCSLAVE.EXE.

- To indicate transfer through the COM1 serial port, enter the following command:

```
A>PCSLAVE
```

If you already have a device attached to the COM1 serial port, you can use the COM2 serial port. To indicate transfer through the COM2 serial port, enter the following command:

```
A>PCSLAVE 2
```

The following messages are displayed after you enter either PCSLAVE command:

```
Slave station ready
Enter commands at master station
Enter Ctrl-C upon completion
```

NOTE: It may take several seconds for the above messages to appear. Don't go to the next step until you see the messages.

4. At the GRiDCASE 1535 EXP computer:

- Turn on the power to the computer and start MS-DOS from the hard disk.

NOTE: Always start up MS-DOS at the master station after start-up of the slave station (Step 3). This allows MS-DOS to accurately assign letters to the storage devices at the slave station.

- Create a CONFIG.SYS file on the GRiDCASE start-up device that contains the following statement (or add the statement to an existing CONFIG.SYS file):

```
DEVICE=PCMASTER.SYS 2
```

(If this statement is already in CONFIG.SYS, disregard this step and go to Step 5.) Instructions on creating or modifying a CONFIG.SYS file are given later in this chapter.

NOTE: If the IBM PC is the master station and you want to use the COM1 serial port, use the statement DEVICE=PCMASTER.SYS.

- Restart MS-DOS by performing a warm restart (**Ctrl-Alt-Del**).

5. At the IBM PC, insert into Drive E the source diskette containing the files to be copied (see Figure 10-4).

6. At the GRiDCASE EXP computer, you can specify any device on either the GRiDCASE (drive C) or the PC (drives D and E) in all MS-DOS commands except the following:

   FORMAT
   DISKCOPY
   DISKCOMP
   FDISK

   You can execute the above commands successfully only when they refer to devices at the master station.

   For example, if you want to look at the directory of drive E on the PC (see Figure 10-4), enter

   ```
   C>DIR E:
   ```

   and the directory of files appears on the GRiDCASE screen.

   To copy all the files from the diskette in drive E to the GRiDCASE internal hard disk, enter the following command:

   ```
   C>COPY E:*.* C:
   ```

7. Continue copying files as required from drive E. Upon completion of file transfer operations, go to the next step to disconnect the two computers.

8. At the IBM PC, press **Ctrl-C** after completing the file transfer.

9. At the GRiDCASE EXP computer, continue normal operations. If you don't intend to use PCMASTER/PCSLAVE again, you may want to delete CONFIG.SYS or, if applicable, restore the original CONFIG.SYS file. (If you do reinstall a former CONFIG.SYS file, you must restart MS-DOS before it takes effect.)

File Transfer Error Messages

During a file transfer, messages that require action on your part may appear. Here are the messages you can receive and what you should do about them.

Message: Serial port specified does not exist on system

What to Do: You issued a PCSLAVE command. Either the serial port you specified doesn't exist, or your computer doesn't have a serial port. To use the COM1 serial port, enter either of the following commands:

```
PCSLAVE
```

or

```
PCSLAVE 1
```

To use the COM2 serial port, enter the following command:

```
PCSLAVE 2
```

Message: Data error reading drive *x*

Abort, retry, ignore?

What to Do: Make sure that the null modem cable connecting the serial ports of the two computers is firmly attached and try again (enter *R*, for *retry*).

Message:	Not ready error reading drive *x*
What to Do:	Check the following:

- Make sure the diskette is properly inserted.
- Make sure the diskette is in the drive that corresponds to the device letter you specified in the command.

File Transfer Troubleshooting

If you have problems with the file transfer utilities, be sure to check the following items:

- Make sure that you have the most current versions of PCMASTER.SYS and PCSLAVE.EXE.
- Make sure that the system running the highest numbered version of MS-DOS or PC-DOS is the master station.
- Make sure that you are using a GRiD Model 6401 cable, or equivalent, such as an INMAC null modem serial cable. Refer to Chapter 12 of the *MS-DOS Reference* manual for cable details.
- If more than one serial port exists on the IBM PC system, make sure that the card switches are set correctly and the cable is plugged into the correct serial port.
- Make sure that the serial port specified in the PCSLAVE command is the port that the cable is plugged into.
- At the PCMASTER station, make sure that the CONFIG.SYS file on the boot device contains the statement DEVICE=PCMASTER.SYS [1|2] (always specify 2 on the GRiDCASE 1535 EXP). Also, make sure that the serial port configuration hasn't been changed from the system default. (This can be changed by the MODE command, printer drivers, or communications programs.) You can reset the serial port by rebooting.

- Some programs bypass the file system and access disks directly. Trying to access a slave device from the master station does not work when using one of these programs. For example, FORMAT, FDISK, DISKCOPY, and DISKCOMP will not recognize devices at the slave station.

- The file transfer utilities transfer data at 115,200 baud. If you encounter frequent errors during file transfer, you may be able to correct the problem by slowing the data transfer rate to 9600 baud. To do so, use the following form of the DEVICE statement in your CONFIG.SYS file:

```
DEVICE=PCMASTER.SYS ,9600
```

or

```
DEVICE=PCMASTER.SYS 2,9600
```

CREATING A CONFIG.SYS FILE

This section gives a procedure for creating a CONFIG.SYS file using the COPY command.

To create a CONFIG.SYS file using the COPY command, follow the steps listed below.

1. If you have an existing CONFIG.SYS file, save it as follows:

```
A>COPY CONFIG.SYS CONFIG.TMP
```

2. Enter the COPY command as shown below and press **Return**.

```
A>COPY CON CONFIG.SYS
```

This statement makes MS-DOS place all characters you enter from the keyboard into the CONFIG.SYS file.

3. Enter any statements that you want to insert into the CONFIG.SYS file (note that the system prompt will **not** appear after Step 2). Press **Return** after each statement, including the last one.

   Examples are:

```
FILES = 20
BUFFERS = 15
DEVICE=PCMASTER.SYS
```

4. Enter **Ctrl-Z** (or press **F6**) and press **Return**.

Step 4 halts the insertion of characters into the CONFIG.SYS file, saves the file, and returns you to the system prompt.

After you complete the above steps, you can display the CONFIG.SYS file using the TYPE command to check the accuracy of your entries.

NOTE: The CONFIG.SYS file must be present in the root directory of the diskette or hard disk from which you boot the computer. You must warm restart your system for the new statements in the CONFIG.SYS file to be recognized.

APPENDIX A:
TESTING THE MODEM

If you suspect that your modem is not working properly, run the GRIDSCAN program (see Chapter 8) to ensure that your computer recognizes the modem as a valid device. If the modem is recognized, do the following test to see whether your modem or your telephone line is causing the problem. This procedure can be used for either the 2400 baud modem or the MNP modem.

MS-DOS users can use any data communications software that runs under MS-DOS to perform the test. You cannot perform this test if you need telephone operator assistance to make a phone call.

To test your modem, follow the steps listed below.

1. Run your communications software according to the instructions supplied with it. Enter the phone number (415) 657-2448 to connect to a loopback modem at the GRiD Resource Center. This modem is used for testing; any data you send to it is automatically transmitted back to you.

2. Set the Baud Rate to its maximum value (2400 baud).

   It should take less than 30 seconds to connect to the modem at the GRiD Resource Center. If you don't make a connection within that time, disconnect and call again. You may have a bad phone line. If you still can't connect to the modem after five more attempts, your modem is probably faulty. Try the test again from a different phone line to make sure that the problem is with the modem and not the phone line.

   If you do establish a connection to the modem at the GRiD Resource Center, you will see a message on the screen indicating that you have made a successful connection. Once you have established a connection, perform the next step to make sure your modem is working properly.

3. Type a few characters on the keyboard. If your modem is working properly, the characters you typed should be echoed back to your screen from the modem at the GRiD Resource Center. If your communications software is set to echo characters to the screen as you type them, you may see each character twice. If you get an error message, see characters other than those you typed, or see a different number of characters than you typed, disconnect and try the test again. You may have a bad phone line. If you still get unsatisfactory results after several attempts, try another phone line. If that does not correct the problem, your modem is probably faulty.

If you complete all of the above steps successfully, you can be fairly sure your modem functions properly. If you have any trouble with the test and you have ordered a GRiD Customer Support Service (CSS) contract with your GRiDCASE 1535 EXP computer, call the GRiD Resource Center at 1-800-284-GRID (4743). Make sure you know the tracking number of your computer; it is stamped on the back of the computer, under the handle.

APPENDIX B:
PRINTER SWITCH SETTINGS

This appendix gives the switch settings for two printers commonly used with GRiDCASE 1535 EXP computers.

NOTE: The switch settings on external devices are read when the computer starts up. If you change the switch settings after your computer has started up, you must restart it for the new settings to take effect.

SETTINGS ON DICONIX 150 PORTABLE PARALLEL PRINTERS

The switch settings for the mother board in the Diconix 150 printers are as follows:

Switches 1 through 10 down (0)

SETTINGS ON HEWLETT-PACKARD 2225C THINKJET PARALLEL PRINTERS

The switch settings for the Hewlett-Packard 2225C ThinkJet printer are as follows:

2, 5, 6 up (on)

1, 3, 4, 7, 8 down (off)

APPENDIX C:
GRiDCASE 1535 EXP SPECIFICATIONS

Microprocessors	
Main microprocessor	80386 CPU, operating at 12.5 MHz
Numeric coprocessor (Option 341)	80387 numeric coprocessor (optional)
Displays	
Backlit LCD (standard)	10" diagonal, backlit LCD; 640 x 400-pixel PC-compatible display, with an aspect ratio of 1:1 and a contrast ratio of 11:1
Gas Plasma (Option 282)	10" diagonal, 640 x 400-pixel PC-compatible display, with an aspect ratio of 1:1 and a contrast ratio of 20:1
Memory	
RAM	1 MB standard; 2, 4, or 8 MB optional

Modems	
2400 Baud (Option 331)	2400 bits-per-second Hayes Smartmodem 1200 compatible; auto dial, auto answer
MNP 2400 Baud (Option 332)	2400 bits-per-second Hayes Smartmodem 2400 compatible; auto dial, auto answer; Microcom Networking Protocol (MNP) level 5 error detection, correction, and data compression
Mass Storage	
Internal Diskette Drive (standard)	3½-inch high-density (1.4 MB) diskette drive included in base configuration; can read, write, and format both 1.4 MB and 720 KB diskettes
3½-inch External Diskette Drive (Model 3401)	3½-inch high-density (1.4 MB) diskette drive connected by cable to computer's external peripheral connector; can read, write, and format both 1.4 MB and 720 KB diskettes
5¼-inch External Diskette Drive (Model 3402)	5¼-inch 360 KB diskette drive connected to external peripheral connector
Tape Backup System (Model 3403)	40 MB capacity; backs up internal hard disk
5¼-inch High-Density External Diskette Drive (Model 3404)	5¼-inch 1.2 MB diskette drive connected to external peripheral connector.
Read Only Memory (ROM)	Two 32-pin ROM sockets provided in base configuration

Mass Storage (continued)	
40 MB Hard Disk (Option 354)	Hard disk replaces internal diskette drive
100 MB Hard Disk (Option 355)	Hard disk replaces internal diskette drive
Interfaces	
Serial	RS-232C 9-pin, 9600 baud, PC-compatible
Parallel	Centronics 25-pin, PC-compatible
External peripheral connector	Access to external diskette and tape drives
Video output	RGB output, 9-pin, CGA compatible
Keyboard	5-pin DIN plug for IBM PC/AT-compatible keyboard or GRiD 10-key keypad
Phone jacks (optional)	Two modular telephone jacks for internal modem and telephone
Other Features	
Expansion Tray (Model 32300)	Includes 2 mounting slots for IBM PC/AT- and IBM PC/XT-compatible expansion cards
Audio	Built-in transducer
Keyboard	72 keys (alphanumeric), IBM PC/AT-compatible, tactile feedback. Standard typewriter keyboard spacing.
Clock/calendar	Powered by internal lithium battery

Power Sources	
Internal/external AC power pack (Model 34170)	110 - 240 VAC, autosensing
Internal battery pack (Model 32111)	Removable NiCad rechargeable battery pack
External attachable battery pack (Model 32161)	Attachable NiCad rechargeable battery pack provides 2-3 times life of internal battery

Physical Characteristics	
Case	Magnesium (Expansion Tray is aluminum)
Weight	12.1 lbs (5.5 Kg) 15.9 lbs (7.2 Kg) with Expansion Tray
Height	2.5 inches (6.3 cm) With Expansion Tray attached: 3.7 inches (9.4 cm) not including legs 4.3 inches (11 cm) including legs
Width	11.5 inches (29.2 cm) w/o projections 11.9 inches (30.2 cm) with projections
Length	15.1 inches (38.4 cm)
Operating temperature	41° F to 95° F (5° C to 35° C)
Storage temperature	-4° F to 149° F (-20° C to 65° C)
Operating humidity	20% to 80% relative humidity
Storage humidity	5% to 95% relative humidity

Physical Characteristics (continued)	
Shock tolerance, operating	5 Gs
Shock tolerance, nonoperating	80 Gs
Vibration tolerance, operating	3-200 Hz @ 1.0 G
Vibration tolerance, nonoperating	3-200 Hz @ 1.5 G

APPENDIX D:
TECHNICAL INFORMATION

This appendix contains information about hardware interrupt assignments, DMA channels, I/O addresses, memory usage, and expansion tray output specifications in the GRiDCASE 1535 EXP computer. This information may be needed if you are attaching expansion cards or external devices to the AT-compatible GRiDCASE 1535 EXP computer. For more detailed information about these and other technical topics related to the GRiDCASE 1535 EXP computer, refer to the *GRiDCASE 1500 Series Hardware Technical Reference Manual* (Order Number: 1500-50).

HARDWARE INTERRUPT ASSIGNMENTS

The GRiDCASE 1535 EXP supports 16 levels of hardware interrupts for the 80386 microprocessor. The hardware interrupt assignments are shown in table D-1 in decreasing level of priority.

Table D-1. Hardware Interrupt Assignments

Interrupt	Assignment
IRQ0	Timer Output
IRQ1	Keyboard (Output Buffer Full)
IRQ2	Cascade to Slave Controller
IRQ8	Real Time Clock
IRQ9	Software Redirected to INT 0Ah
IRQ10	Unused
IRQ11	Unused
IRQ12	Unused
IRQ13	Unused
IRQ14	Hard Disk Controller
IRQ15	Unused
IRQ3	Serial Port (COM2)
IRQ4	Modem, if installed (COM1)
IRQ5	Unused
IRQ6	Floppy Disk Drive Controller
IRQ7	Parallel Printer Port (LPT1)

DMA CHANNEL ASSIGNMENTS

The eight DMA channels available in the GRiDCASE 1535 EXP are assigned as shown in Table D-2.

Table D-2. DMA Channel Assignments

DMA Channel	8-bit/ 16-bit	System Function
0	8	Unused (Highest Priority)
1	8	Reserved (SDLC)
2	8	Floppy Disk Drive Controller
3	8	Unused
4	—	Cascade to Master Controller
5	16	Unused
6	16	Unused
7	16	Unused (Lowest Priority)

Channels 0-3 support 8-bit to 8-bit data transfers between I/O adapters and memory locations. Each channel transfers data in blocks of up to 64 KB throughout the 16M system address space.

Channels 5-7 support 16-bit transfers between 16-bit I/O adapters and memory locations. These channels cannot transfer data on odd byte boundaries. Each channel transfers data in blocks of up to 128 KB throughout the 16M system address space.

I/O ADDRESSES

The GRiDCASE 1535 EXP uses I/O registers to configure the system (including memory) and to control the computer input/output ports. The I/O registers can be used to bypass the ROM BIOS and provide direct access to the I/O device interfaces.

I/O addresses 100 to 3FF are available on the I/O bus (to the expansion tray and expansion cartridges). Table D-3 shows the I/O registers within this range that are used in the GRiDCASE 1535 EXP computer. The I/O registers are identified by their memory addresses, which are given in hexadecimal (h).

Table D-3. I/O Register Addresses

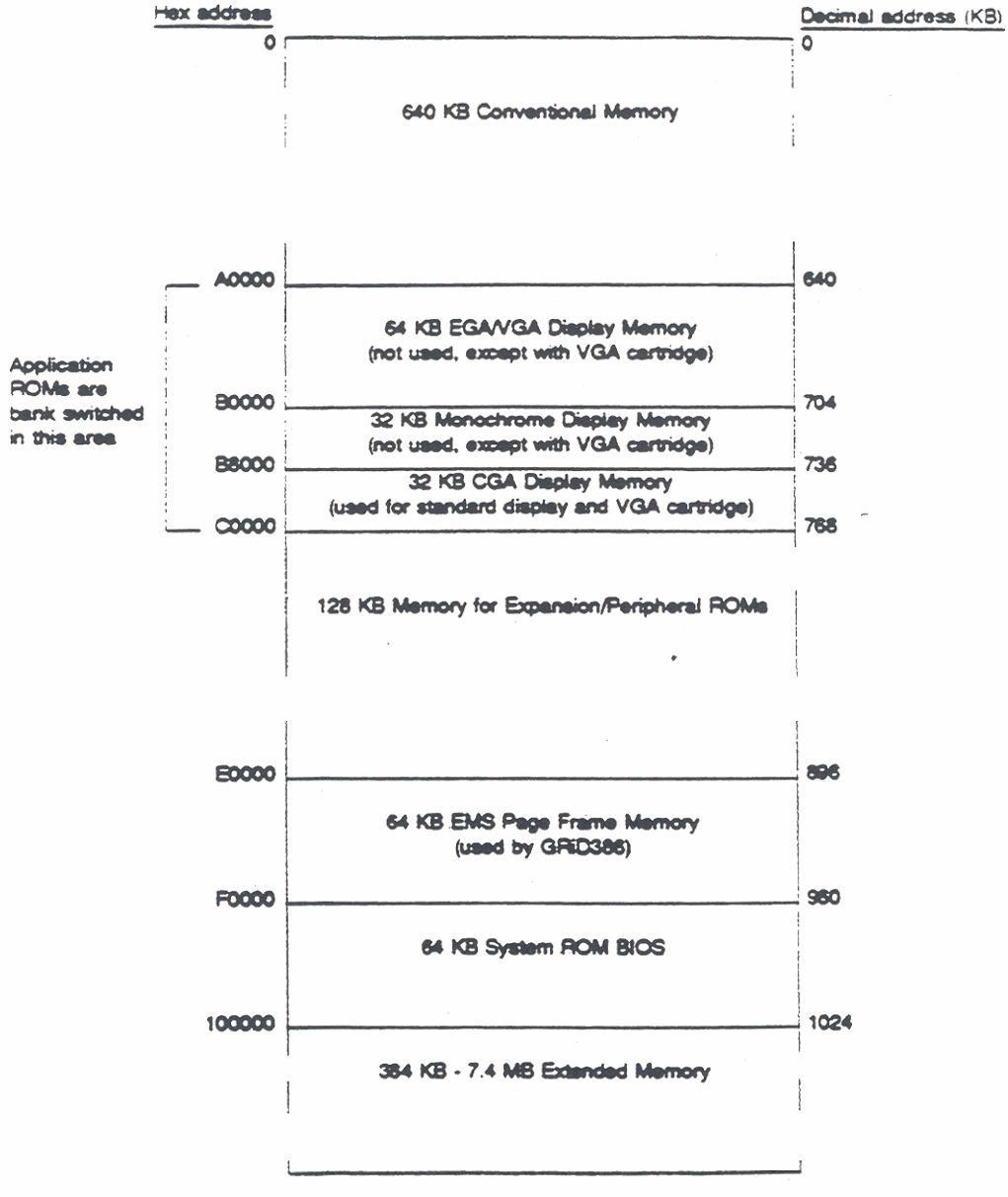
I/O Register Address (Hex)	Register Name
2F8 - 2FF	Serial port (COM2)
320 - 323	Hard disk interface
378 - 37A	Parallel port
379 - 37A	External device flags
3D0 - 3DF	Display controller
3F0 - 3F7	Floppy drive
3F8 - 3FF	Modem interface (COM1)

SYSTEM MEMORY

Main memory for the standard GRiDCASE 1535 EXP computer system is 1 MB of dynamic RAM. The main memory can be optionally increased to 2 MB (Option 302), 4 MB (Option 304), or 8 MB (Option 308).

Main memory is allocated starting at the low end of the available address space (address 0h). The standard 1024 KB (1 MB) of user memory is split into two sections, located from address 0h to FFFFh (640 KB) and from 100000h to 160000h (384 KB). This first 1 MB portion of main (user) memory is allocated in the same way for all configurations as shown in Figure D-1. (The 384 KB of memory mapped from address A0000h to FFFFFh is not user memory.)

Table D-4. Memory Map



SYSTEM RESOURCES USED BY GRID EXPANSION CARTRIDGES

This section summarizes the system resources used by GRiDCASE 1500 Series expansion cartridges. Such system resources include DMA channels, hardware interrupts, and I/O register addresses. The information is shown in Table D-4.

Table D-5. System Resources Used by Expansion Cartridges

Cartridge	Hardware Interrupt	DMA Channel	I/O Register Addresses (hex)
Model 34010 High Speed Serial Cartridge	9		
Model 34012 3270 Interface Cartridge			3EE; 220-227 (with IRMA driver)
Model 34013 VGA Video Controller Cartridge	—	—	3C6-3C9
Model 34014 Ethernet Interface Cartridge	2	—	360

EXPANSION TRAY SPECIFICATIONS AND ENGINEERING DRAWINGS

This section provides DC/DC output specifications and environmental requirements for the expansion tray as well as detailed technical drawings of the various connectors on the tray for engineering purposes.

Input	9 to 18 VDC

Output

Voltage	Current	Noise	Tolerance
+5V	3.50 Amps	50MV	2%
-5V	.20 Amps	50MV	5%
+12V	.75 Amps	75MV	5%
-12V	.50 Amps	75MV	5%

Efficiency	>75%
Over-voltage protection	5V output has over-voltage protection. The range for over-voltage protection to be activated is between 5.6V and 6.2V.
Operating temperature	0° C to 50° C
Storage temperature	-40° C to 75° C
Operating humidity	-5% to 95% without condensation
Storage humidity	-5% to 95% with minor condensation

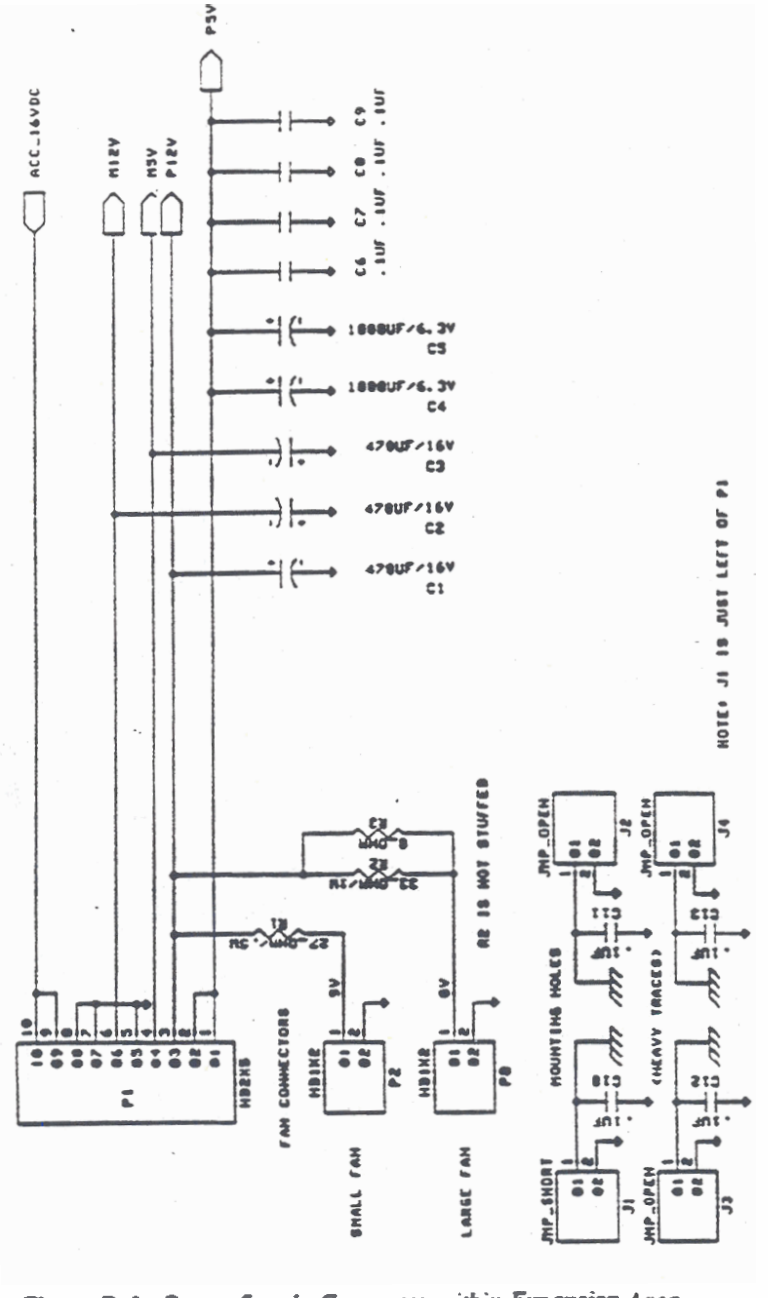


Figure D-1. Power Supply Connector within Expansion Area

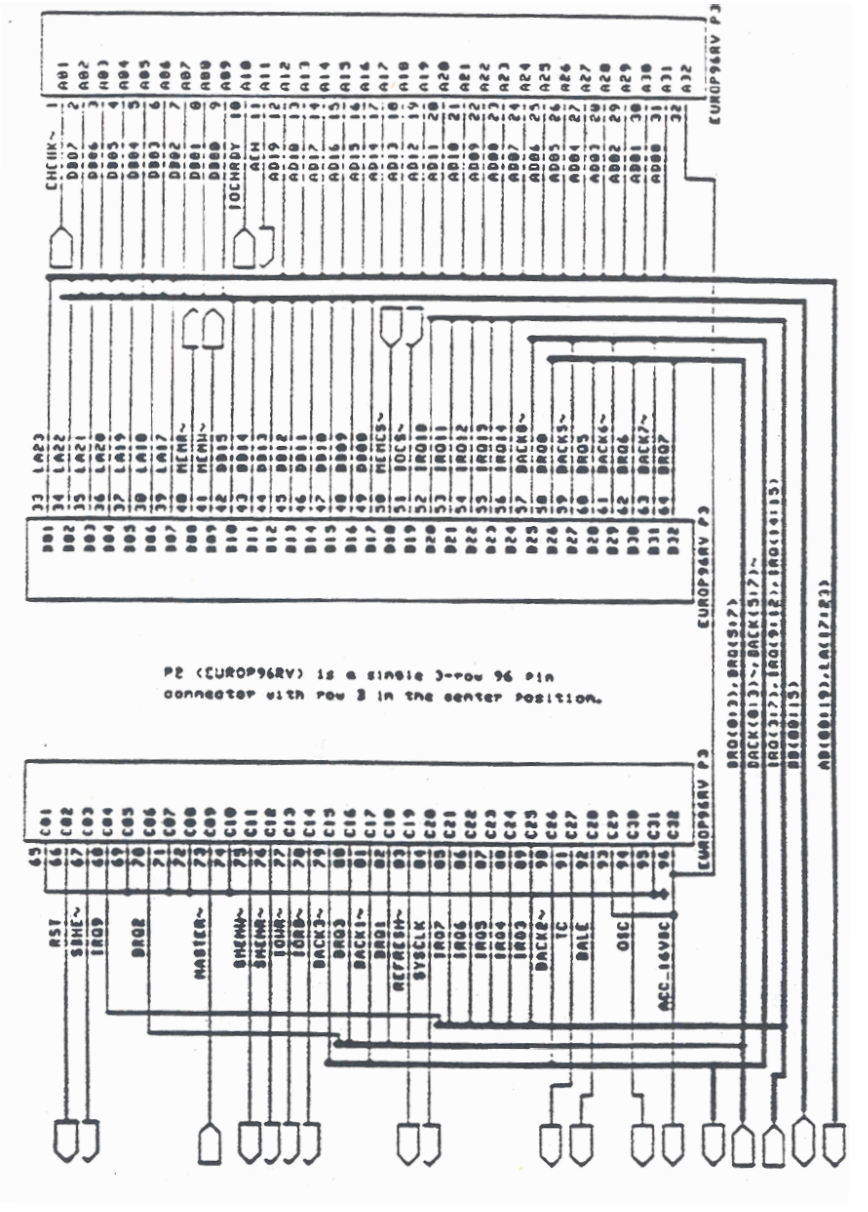


Figure D-2. Expansion Tray Connector to Host (External)

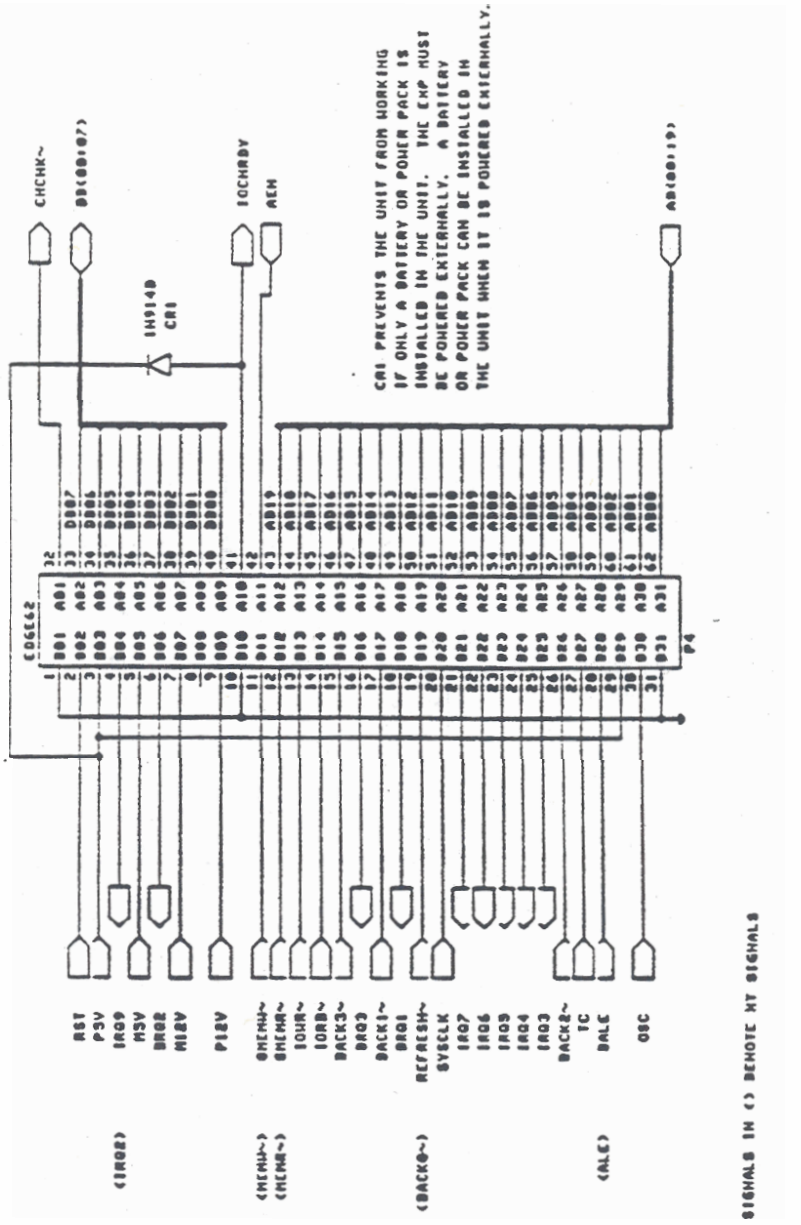


Figure D-3. XT Card Connector

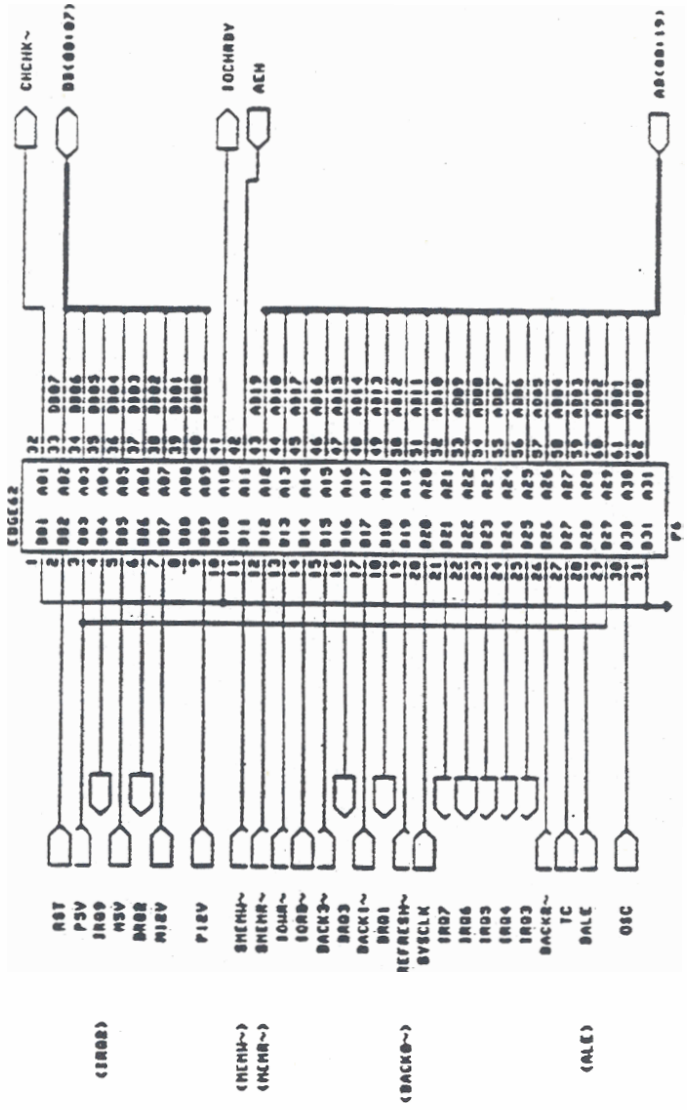


Figure D-4. AT Card Connector (Long Slot)

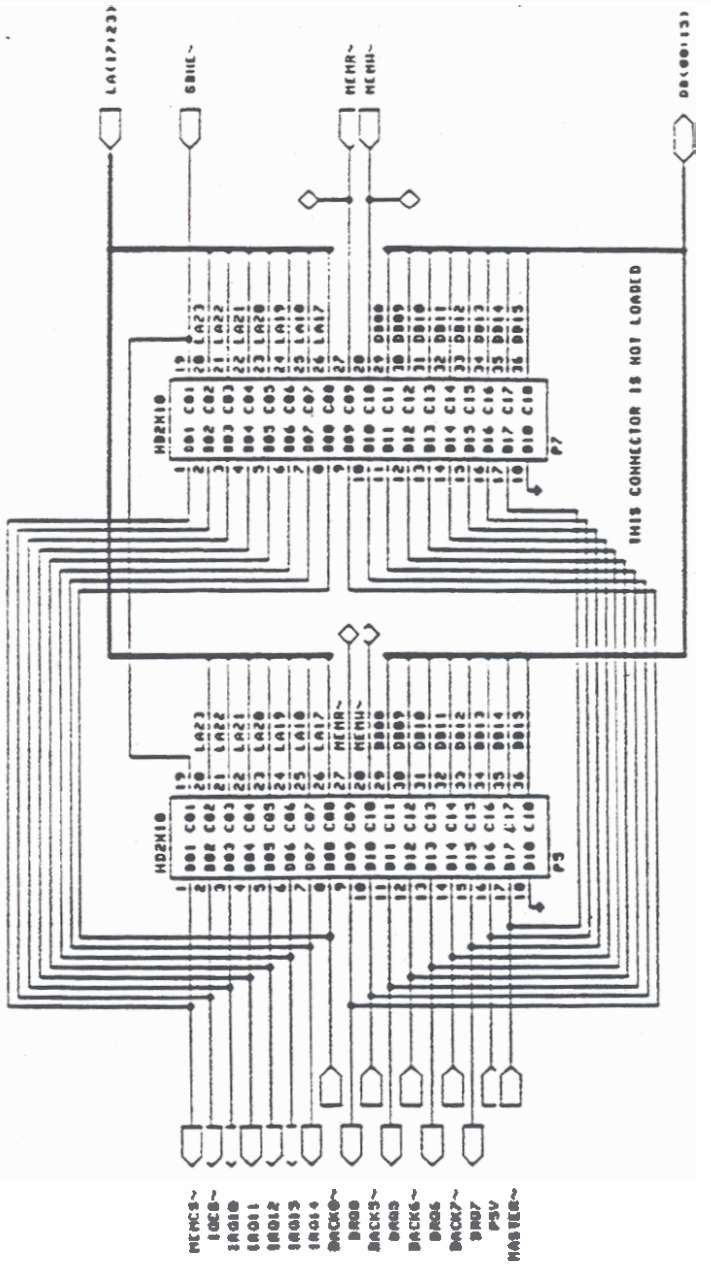


Figure D-5. AT Card Connector (Short Slot)

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