

GRID[®]

GRiDCASE 1535 EXP

Owner's Guide

**GRiDCASE 1535 EXP
Owner's Guide**

November 1988

COPYRIGHT © 1988 GRiD Systems Corporation
47211 Lakeview Blvd.
P.O. Box 5003
Fremont, CA 94537-5003
(415) 656-4700

Manual Name: GRiDCASE 1535 EXP Owner's Guide
Order Number: 1535-40
Issue date: November 1988
Revision: A

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopy, recording, or otherwise, without the prior written permission of GRiD Systems Corporation.

The information in this document is subject to change without notice.

Neither GRiD Systems Corporation nor this document makes any expressed or implied warranty, including, but not limited to the implied warranties of merchantability, quality, or fitness for a particular purpose. GRiD Systems Corporation makes no representation as to the accuracy or adequacy of this document. GRiD Systems Corporation has no obligation to update or keep current the information contained in this document.

GRiD System Corporation's software products are copyrighted by and shall remain the property of GRiD Systems Corporation.

Under no circumstances will GRiD Systems Corporation be liable for any loss or other damages arising out of the use of this manual.

GRiD and GRiDCASE are registered trademarks, and GRiD Server and GRiDCASE EXP are trademarks of GRiD Systems Corporation.

IBM and AT are registered trademarks, and XT and PS/2 are trademarks of International Business Machines Corporation.

MS-DOS is a registered trademark of Microsoft Corporation.

Smartmodem 2400 is a registered trademark, and Hayes is a trademark of Hayes Microcomputer Products, Inc.

Electrohome is a registered trademark of Electrohome Corporation.

Sony is registered trademark of Sony Corporation.

Vivid Limelight is a trademark of Vivid Systems.

Black Jack is a trademark of Microperipheral Corporation.

Radio Shack is a registered trademark of Tandy Corporation.

HP is a trademark of Hewlett-Packard Corporation.

Compaq is a registered trademark of Compaq Computer Corporation

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 90 days 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 90-day 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 container or equivalent. Contact an authorized GRiD Systems representative 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 abused, 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

WARNING: This computer has been verified to comply with the limits for a Class A computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals verified to comply with the Class A limits may be attached to this computer.

Potential for Radio and Television Interference

This computer generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference to 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 7, describes some procedures that may correct 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.

CONTENTS

ABOUT THIS BOOK	xiii
HOW THIS MANUAL IS ORGANIZED	xiii
BOOKS YOU MAY NEED	xiv
GRiD Software Publications	xiv
MS-DOS Publications	xiv
Hardware Publications	xv
CHAPTER 1:	
SETTING UP YOUR GRIDCASE 1535 EXP COMPUTER	1-1
CHECKING THE CONTENTS OF THE BOX	1-1
STARTING UP YOUR GRiDCASE 1535 EXP COMPUTER	1-2
STARTING UP THE OPERATING SYSTEM (BOOTING)	1-8
WARM START-UP	1-9
CLOSING YOUR GRiDCASE 1535 EXP COMPUTER	1-10
CHAPTER 2:	
GETTING TO KNOW YOUR GRIDCASE 1535 EXP COMPUTER	2-1
THE TOP VIEW	2-1
THE FRONT VIEW	2-2
Screen	2-2
Contrast/Brightness Control Switch	2-3
Back-Light Brightness Control Switch	2-3
Indicator Lights	2-4
ROM Area	2-5
Keyboard	2-5
Using the Numeric Keypad	2-7
Three Special Key Combinations	2-10
THE SIDE VIEW	2-11
Internal Hard Disk	2-12
Backing Up Files on the Hard Disk	2-12
THE REAR VIEW	2-13
Power Switch	2-13
Keyboard DIN Connector	2-14
Connecting a Keyboard or Keypad to the DIN Connector	2-14
Telephone Connectors (Optional)	2-15

Serial Connector	2-15
Connecting an External Modem to the Serial Connector	2-15
Connecting a Printer to the Serial Connector	2-16
Parallel Connector	2-17
Connecting a Printer to the Parallel Connector	2-18
External Peripheral Connector	2-18
Video Output Connector	2-19
Connecting a Color Monitor to the Video Output Connector	2-19
Connecting a Video Projector to the Video Output Connector	2-20
Power Pack/Accessory Slot	2-20
Power Pack Eject Button	2-21
DC Input Connector	2-21
THE BOTTOM VIEW	2-22
Expansion Bus Connector	2-22

CHAPTER 3:

BUILT-IN OPTIONS	3-1
OPTION SUMMARY	3-1
DISPLAY	3-2
SYSTEM RAM	3-2
ROMS	3-3
MODEM	3-3
FCC Regulations	3-3
Connecting the Telephone Line	3-5
Alternative Telephone Connections	3-6
Using the Modem	3-7
Modem Command Set	3-7
Putting the Modem in the Command State	3-8
Issuing Modem Commands	3-8
Automatic Dialing Commands	3-9
Modem Operation Commands	3-12
NUMERIC COPROCESSOR	3-19

CHAPTER 4:

POWER OPTIONS	4-1
THE POWER OPTIONS	4-1
CONNECTING THE AC POWER PACK EXTERNALLY	4-4
CONNECTING THE AC POWER PACK INTERNALLY	4-5
USING THE INTERNAL BATTERY PACK	4-7
The Life of Your Battery Pack	4-8
Recharging Your Battery Pack	4-9

CONNECTING THE ATTACHABLE BATTERY PACK	4-10
CONNECTING THE AUTO/BOAT ADAPTER	4-13
USING THE EXTERNAL BATTERY CHARGER	4-14
CHAPTER 5:	
CONNECTING EXTERNAL DRIVES	5-1
CONNECTING A 3 1/2-INCH DISKETTE DRIVE	5-1
CONNECTING A 5 1/4-INCH DISKETTE DRIVE	5-3
SWITCH SETTINGS FOR THE EXTERNAL DISKETTE DRIVES	5-5
CONNECTING AN EXTERNAL TAPE DRIVE	5-5
CHAPTER 6:	
USING THE EXPANSION TRAY	6-1
EXPANSION CARD LIMITATIONS	6-1
ACCESSING THE EXPANSION SLOTS	6-3
POSITIONING THE AUXILIARY FAN	6-4
INSTALLING AN EXPANSION CARD	6-8
ATTACHING THE EXPANSION TRAY	6-11
DETACHING THE EXPANSION TRAY	6-13
REMOVING AN EXPANSION CARD	6-14
POWER-SUPPLY CONSIDERATIONS	6-14
Power Consumption	6-15
Heat	6-15
Battery Life	6-16
CHAPTER 7:	
TROUBLESHOOTING	7-1
IDENTIFYING THE PROBLEM	7-1
User Errors in Setting Up the Computer	7-1
Software or Hardware Problems	7-5
THE GRiDSCAN PROGRAM	7-6
DEALING WITH RADIO FREQUENCY INTERFERENCE	7-7
CHAPTER 8:	
MAINTENANCE	8-1
WARNINGS	8-1
CAUTIONS	8-2
CLEANING YOUR GRiDCASE 1535 EXP COMPUTER	8-3
STORING YOUR GRiDCASE 1535 EXP COMPUTER	8-4
TRAVELING WITH YOUR GRiDCASE 1535 EXP COMPUTER	8-4
UPDATING THE CLOCK	8-4

CHAPTER 9:

USING MS-DOS ON GRIDCASE 1535 EXP COMPUTERS 9-1

 WHAT'S DIFFERENT ABOUT GRiDCASE 1535 EXP COMPUTERS? 9-1

 WHY ONLY GRiD MS-DOS ON THE GRiDCASE 1535 EXP COMPUTER? . . 9-2

 USING AN EXTERNAL MONITOR AND KEYBOARD 9-4

 USING THE INTERNAL HARD DISK 9-4

 THE GRiDCASE 1535 EXP KEYBOARD 9-5

 THE GRiDCASE 1535 EXP DISPLAY 9-5

 THE INTERNAL MODEM AND THE SERIAL (RS-232C) PORT 9-5

 READ-ONLY MEMORY (ROM) 9-6

 WHAT'S DIFFERENT ABOUT GRiD MS-DOS? 9-7

 HOW COMMANDS DIFFER 9-7

 FORMAT 9-7

 PCMASTER/PCSLAVE 9-8

 MODE 9-9

 MODE MODEM = switches 9-9

 MODE CURSOR = {LINE|BLOCK} 9-9

 MODE FONT = {1..4} 9-10

 MODE ROM = {d|OFF} 9-10

 MODE {GRID|CRT} 9-10

 MODE SPEED {FAST|SLOW} 9-11

 MODE COLORMAP = {1..6} 9-11

 MODE BACKLITE = {1..60|ON|OFF} 9-12

 MODE DISPLAY = {ON|OFF} 9-13

 MODE NUMPAD = {ON|OFF} 9-13

 MODE HARDDISK = {ON|OFF|1..99} 9-13

 HELP 9-14

 RUNNING BASIC PROGRAMS 9-16

 THE INTERNAL MODEM 9-18

 MOVING APPLICATION PROGRAMS TO A GRiDCASE 1535 EXP
COMPUTER 9-20

 USING A GRiD EXTERNAL DISKETTE DRIVE 9-20

 USING THE PC FILE TRANSFER UTILITIES 9-22

 File Transfer Error Messages 9-28

 File Transfer Troubleshooting 9-29

APPENDIX A:

TESTING THE MODEM A-1

APPENDIX B:	
PRINTER SWITCH SETTINGS	B-1
SETTINGS ON DICONIX 150 PORTABLE PARALLEL PRINTERS	B-1
SETTINGS ON HEWLETT-PACKARD 2225C THINKJET PARALLEL PRINTERS	B-1
APPENDIX C:	
GRIDCASE 1535 EXP SPECIFICATIONS	C-1
APPENDIX D:	
TECHNICAL INFORMATION	D-1
HARDWARE INTERRUPT ASSIGNMENTS	D-1
DMA CHANNEL ASSIGNMENTS	D-3
I/O ADDRESSES	D-4
SYSTEM MEMORY	D-5
SYSTEM RESOURCES USED BY GRID EXPANSION CARTRIDGES	D-7
INDEX	X-1

List of Figures and Tables

Figure 1-1.	Contents of Box	1-1
Figure 2-1.	Top View of the GRiDCASE 1535 EXP Computer	2-1
Figure 2-2.	Front View of the GRiDCASE 1535 EXP Computer	2-2
Figure 2-3.	GRiDCASE 1535 EXP Keyboard	2-6
Figure 2-4.	Side View of the GRiDCASE 1535 EXP Computer	2-11
Figure 2-5.	Rear View of the GRiDCASE 1535 EXP Computer	2-13
Figure 2-6.	Bottom View of the GRiDCASE 1535 EXP Computer	2-22
Figure 3-1.	GRiDCASE 1535 EXP Computer Connected to Phone Jack	3-5
Figure 3-2.	Modem Connected to Telephone System and Phone	3-5
Figure 4-1.	Installing the AC Power Pack Externally	4-5
Figure 4-2.	Installing the AC Power Pack Internally	4-6
Figure 4-3.	Installing the Battery Pack	4-7
Figure 4-4.	Removing Plastic Cap from Rear of Computer	4-10
Figure 4-5.	Attaching Latch Clip to Computer	4-11
Figure 4-6.	Attachable Battery Clipped to Computer	4-12

Figure 4-7.	Installing the Auto/Boat Adapter	4-14
Figure 4-8.	Connecting the External Battery Charger	4-15
Figure 5-1.	Connecting the 3 1/2-Inch External Diskette Drive	5-1
Figure 5-2.	Connecting the 5 1/4-Inch External Diskette Drive	5-3
Figure 5-3.	Connecting the External Tape Drive	5-7
Figure 6-1.	Bottom View of the Expansion Tray	6-4
Figure 6-2.	Removing the Auxiliary Fan	6-5
Figure 6-3.	Auxiliary Fan Screw Hole Locations	6-6
Figure 6-4.	Vent Cover Positions	6-7
Figure 6-5.	Installing a Full-Length Card	6-10
Figure 6-6.	Installing a Short Card	6-10
Figure 6-7.	Preparing to Attach the Expansion Tray to the Computer	6-11
Figure 6-8.	Attaching the Expansion Tray	6-12
Figure 9-1.	GRiDCASE 1535 EXP Computers Require GRiD MS-DOS	9-2
Figure 9-2.	The Help Menu	9-14
Figure 9-3.	MODE Help Information	9-15
Figure 9-4.	MODE Option 16 Information	9-16
Figure 9-5.	Running BASIC Programs on a GRiDCASE 1535 EXP Computer	9-17
Figure 9-6.	Running a Program from the GRiD External Diskette Drive	9-21
Figure 9-7.	Moving Files Using the PC File Transfer Utilities	9-23
Figure 9-8.	PCMASTER/PCSLAVE Cable Connection	9-25
Figure D-1.	Memory Map	D-6
Table 1-1.	Order of Devices Searched During Loading	1-9
Table 2-1.	IBM PC and PC/AT Special Keys and GRiDCASE 1535 EXP Equivalents	2-8
Table 3-1.	Built-in Options Available for the GRiDCASE 1535 EXP Computer	3-1
Table 3-2.	Modem Registers and Values	3-15
Table 3-3.	Result Codes	3-17
Table 3-4.	Result Code Commands	3-18
Table 4-1.	Power Options for Your GRiDCASE 1535 EXP Computer	4-2
Table 6-1.	Vent Cover Positions	6-7
Table 7-1.	Troubleshooting Chart	7-1
Table 9-1.	Color Mapping Modes	9-12
Table 9-2.	Internal Modem Switch Settings (Defaults Shown in Bold)	9-19
Table D-1.	Hardware Interrupt Assignments	D-2
Table D-2.	DMA Channel Assignments	D-3
Table D-3.	I/O Register Addresses	D-4
Table D-4.	System Resources Used by Expansion Cartridges	D-7

ABOUT THIS BOOK

This manual introduces you to the GRiDCASE[®] 1535 EXP computer. 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, such as a modem, they are described here.

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

Chapter 5 describes the external disk and tape drives that are available for use with the GRiDCASE 1535 EXP computer, and explains how to connect them.

Chapter 6 provides information concerning the use of the Expansion Tray. This chapter is very important to read if you plan to use the Expansion Tray.

Chapter 7 provides troubleshooting information.

Chapter 8 provides maintenance information.

Chapter 9 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.

The appendixes provide information on testing the optional modem, switch settings for printers, computer specifications, and technical information needed when installing expansion cards in the Expansion Tray.

BOOKS YOU MAY NEED

You may want to refer to the following books for further information.

GRiD Software Publications

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 as LIM EMS (Lotus/Intel/Microsoft Expanded Memory Specification) memory or as extended memory.

InteGRiD Software Manual (Order Number: 029600-43), for reference information on GRiD's integrated MS-DOS application environment.

Getting Started: InteGRiD (Order Number: 029600-45), for introductory information on GRiD software.

MS-DOS Publications

MS-DOS Reference: Release 3.2 (Order Number: 029550-40), for reference information on using MS-DOS on GRiDCASE 1535 computers.

Hardware Publications

Model 3401 3 1/2-inch High Density Pocket Diskette Drive Owner's Manual (Order Number: 003401-40), for information on setting up and operating the 3 1/2-inch pocket diskette drive.

Model 3402 5 1/4-inch Pouch Diskette Drive Owner's Manual (Order Number: 003402-40), for information on setting up and operating the 5 1/4-inch pouch diskette drive.

Model 3404 High Density 5 1/4-inch Pouch Diskette Drive Owner's Manual (Order Number: 003404-40), for information on setting up and operating the 5 1/4-inch high-density pouch floppy diskette drive.

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

NOTE: This chapter does not address attaching the expansion tray. For this information, refer to Chapter 6, USING THE EXPANSION TRAY.

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.

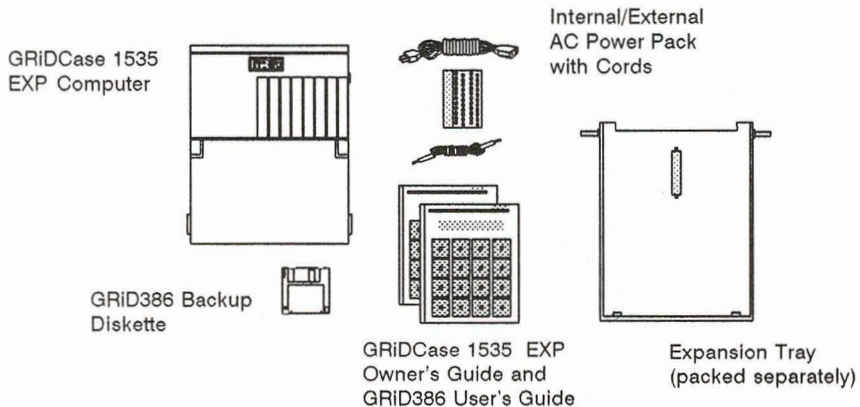


Figure 1-1. Contents of Box

Check for shipping damage or missing parts. If there are any problems, contact the GRiD representative who sold you the computer.

Keep the shipping cartons and all original packing materials in case you need to return your computer for upgrading or service. Do not ship the computer in cartons other than the original shipping cartons, as damage may result.

The internal/external AC power pack shipped with your GRiDCASE computer is one option for powering the computer. In addition, 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 perform any of these operations before starting your computer for the first time, refer to chapters 2, 5, and 6, respectively.

MS-DOS and GRiD386 have already been installed for you on the internal hard disk. 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 handy the power supply 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.

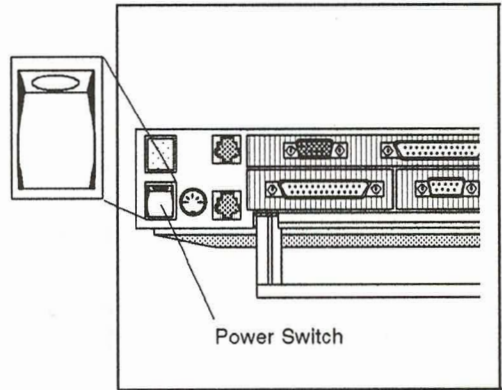
NOTE: If you have attached an expansion tray to your GRiDCASE 1535 EXP, you **cannot** use any internal power supply, or the computer will not start-up when you turn it on.

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, however, if the expansion tray is not attached.)

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

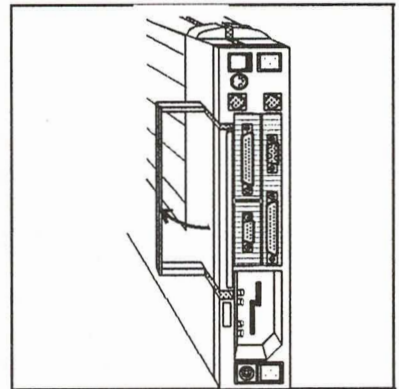
1. **Make sure the power switch is off.**

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.

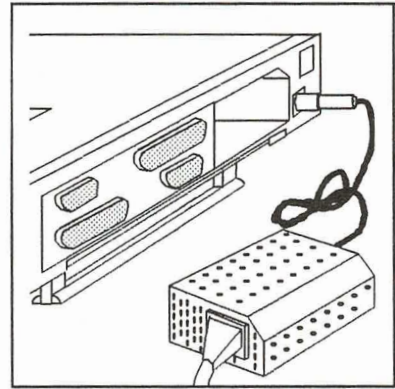


2. **Pull down the computer's handle/leg (this step is optional).**

You can use the leg to improve your viewing/typing angle. Pull the handle straight out from the back of the computer and then pivot it down 90° to act as a leg. Do not extend the leg if you intend to attach the expansion tray to the computer.

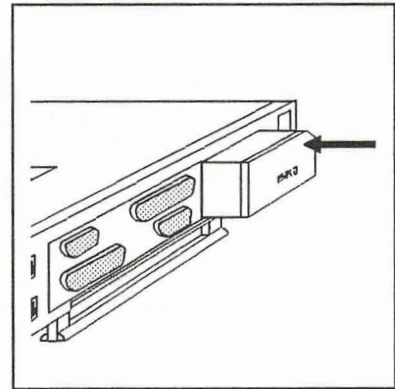


- 3a. **If you are using the internal/external AC power pack externally, connect it to the computer and plug it in.** Plug the end of your power pack cord into the DC input connector on the back of the computer. Then plug one end of your power cord into the power cord socket on the AC power pack, and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



- 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, or the computer will not start-up when you turn it on.

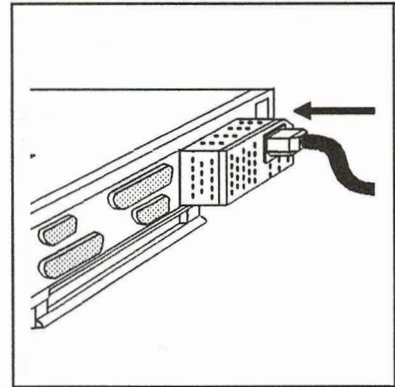
Hold the battery pack with the label facing outward. Insert it into the power pack/accessory slot on the back of the computer until it clicks into place.



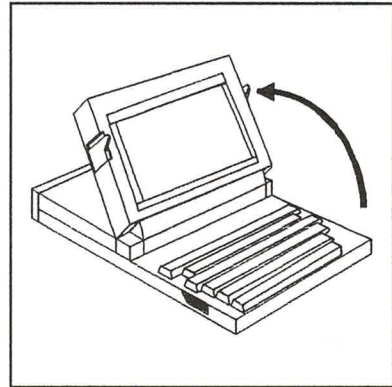
- 3c. If you are using the internal/external AC power pack internally, insert it into the computer.

NOTE: If you have attached an expansion tray to your computer, or if your computer is equipped with a plasma screen, you **must** use the AC power pack externally.

Hold the AC power pack with the power cord socket facing outward. 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.



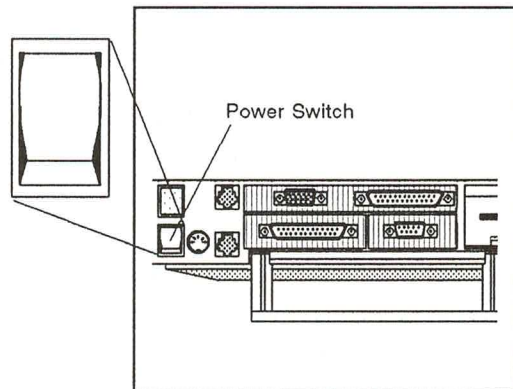
- Lift up the screen.**
The screen is locked to the frame by one latch on each side. Pull these latches toward you and lift the screen.



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 8.

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



Wait for the software to load. When you turn on the power, the computer runs a self-test and loads software from the hard disk into main memory (RAM).

If you have the operating system in Read Only Memory (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 back-light 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 decreasing the brightness of the computer's screen will increase battery life.

NOTE: To load programs and data onto the hard disk, you need 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 want to connect any other devices to your computer, such as a printer or diskette drive, see the section **THE REAR VIEW** in Chapter 2, and Chapter 5, **CONNECTING EXTERNAL DRIVES**.

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.

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

STARTING UP THE OPERATING SYSTEM (BOOTING)

The computer 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 looks for the operating system software in ROM, and if it does not find the software there, it looks on the hard disk.

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 normal search sequence 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, you would turn on the power, wait for the beep to sound, and then immediately press F.

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 9, for more information about ROM.

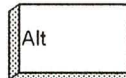
Table 1-1. Order of Devices Searched During Loading

Device	Key
Read Only Memory (ROM)	
Hard Disk	H
Floppy (External)	F

WARM START-UP

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 the following keys simultaneously:



This method, called a warm start-up, 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 start also uses less battery power than a cold start.

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

If the warm start-up method is unsuccessful, you should press the power switch. When you use the power switch to restart the computer, always wait a few seconds before turning the computer on again. This ensures that the computer starts-up properly.

CLOSING YOUR GRIDCASE 1535 EXP COMPUTER

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

1. Save your files. For information on saving files, consult the *MS-DOS Reference* manual.

CAUTION

Wait until the hard disk in-use light 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 the power switch off.
3. Close the screen panel. Press it down gently until you hear it click shut.
4. Disconnect all cords.

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.

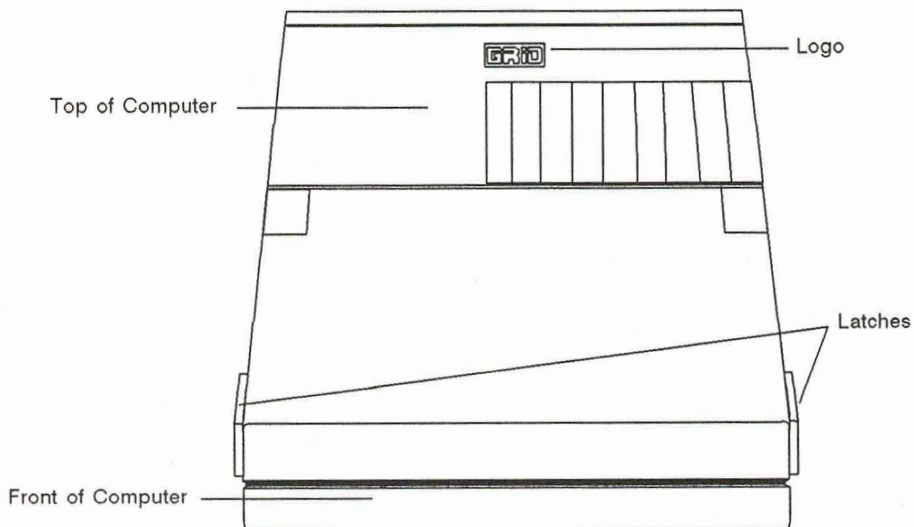


Figure 2-1. Top View of the GRiDCASE 1535 EXP Computer

THE FRONT VIEW

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

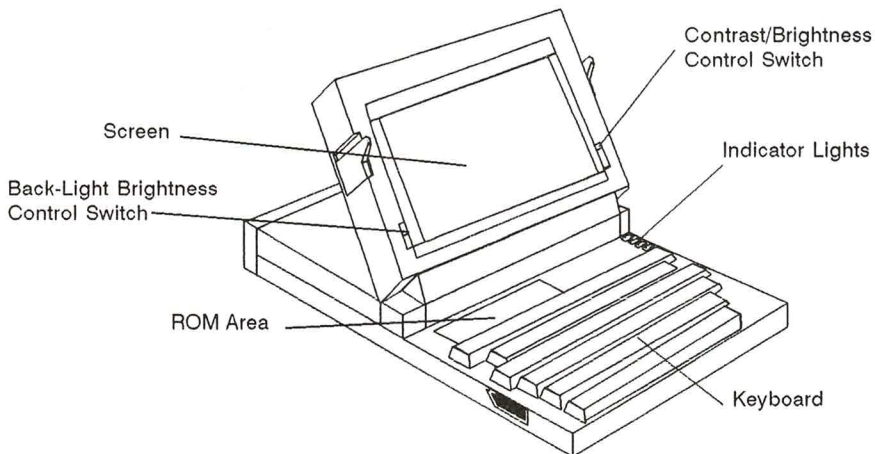


Figure 2-2. Front View of the GRiDCASE 1535 EXP Computer

Screen

The GRiDCASE 1535 EXP is equipped with a standard LCD screen. An optional plasma screen is also available.

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 8.

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.

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.

Back-Light 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 back light. Push this switch all the way to the bottom position to turn the back light off; push the switch all the way to the top position for maximum brightness. Increasing the brightness of an LCD screen's back light also increases power consumption.

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 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 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 between 5 and 10 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. This indicates that, although the charge is no longer very low, 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, though 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 256K (about 262,000 characters). You can install up to two ROMs, giving you 512K 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 keyboard. The keyboard provides you with all the functionality of the IBM PC/AT keyboard.

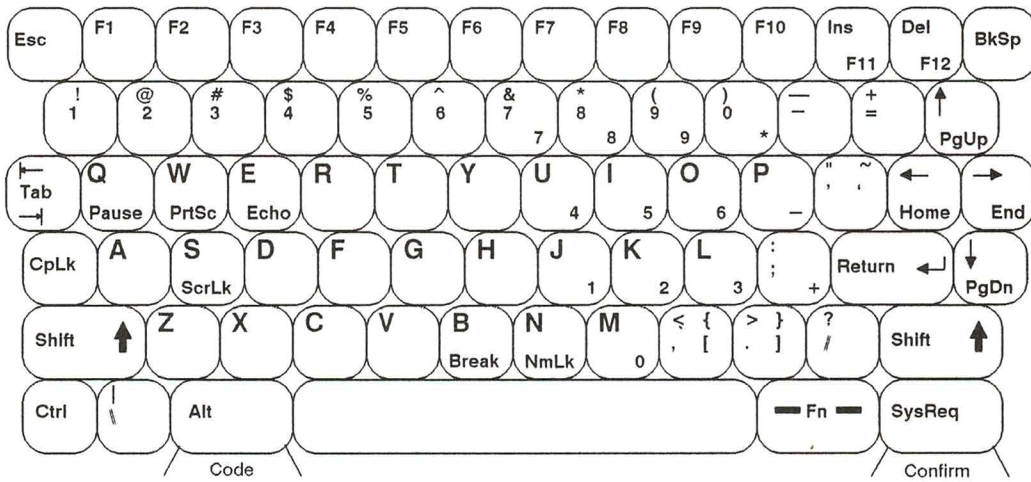


Figure 2-3. GRiDCASE 1535 EXP Keyboard

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 **Ins** key. To use the **F12** function key, hold down the **Fn** key and press the **Del** 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 **Fn-NmLk**.

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 **Fn-NmLk** 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 and 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 and 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

Typewriter Keyboard Keys

IBM Key	GRIDCASE 1535 EXP Key
Break	Fn-Break
Echo	Fn-Echo
Enter	Return
Pause	Fn-Pause
Shift-PrtSc	Fn-PrtSc
Right Shift	Right Shift
Left Shift	Left Shift
Tab	Tab
Shift-Tab	Shift-Tab

Numeric Keypad Keys

IBM Key	GRIDCASE 1535 EXP Key
Del	Del
Ins	Ins
Num Lock	Fn-NmLk
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

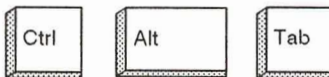
Special Characters

IBM Key	GRIDCASE 1535 EXP Key
[Fn-[
]	Fn-]
{	Fn-Shift-{
}	Fn-Shift-}
~	Fn-Shift-~
‘	Fn-‘

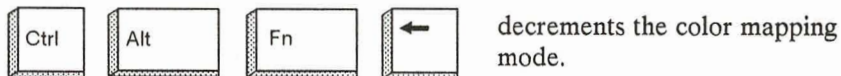
Consult the *MS-DOS Reference* manual to learn how the keys function on a GRIDCASE 1535 EXP computer.

Three Special Key Combinations

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

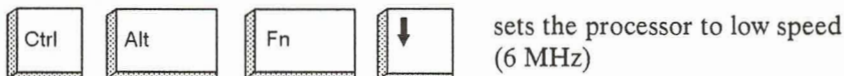


The key combinations shown below change the current color mapping mode (the way in which color output is displayed on the built-in screen). There are six color mapping modes. The default is mode 1.



You can also use the **MODE** command to set the color mapping mode—see the section on the **MODE** command in Chapter 9 for details on color mapping.

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 9 for details on changing the processor speed.

THE SIDE VIEW

Figure 2-4, below, shows the side view of the GRiDCASE 1535 EXP computer.

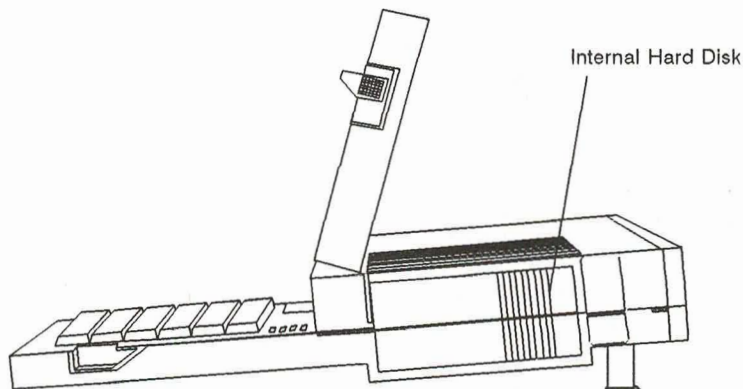


Figure 2-4. Side View of the GRiDCASE 1535 EXP Computer

Internal Hard Disk

The standard 40-megabyte internal hard disk in your GRIDCASE 1535 EXP computer is ruggedly built to withstand the shocks that come with transporting your system. Nevertheless, 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 power is off, the disk heads are parked and it is 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 backup 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 in an external drive, use the MS-DOS COPY, XCOPY, or BACKUP commands. Unless you use XCOPY, 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 new diskettes as required. See the *MS-DOS Reference* manual for information about these commands.

GRiD supplies software to simplify hard disk drive backup with diskettes. Call your GRiD representative for more information.

An external tape drive is also available from GRiD. Using a tape drive greatly speeds the backup process. Contact your GRiD representative for more information.

THE REAR VIEW

The rear view of a GRiDCASE 1535 EXP is shown in Figure 2-5. 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.

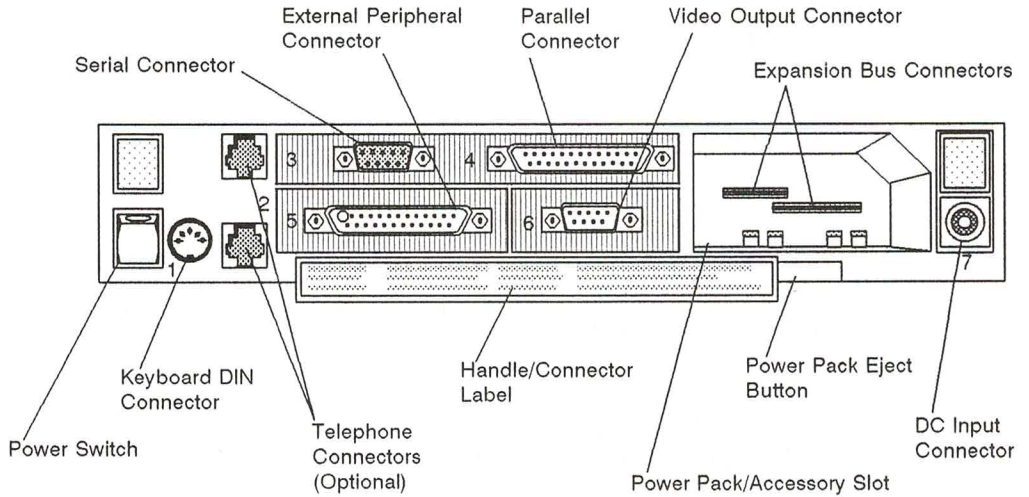


Figure 2-5. Rear View of the GRiDCASE 1535 EXP Computer

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 STARTING UP THE OPERATING SYSTEM (BOOTING), 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.

Keyboard DIN Connector

The keyboard DIN connector connects the GRiDCASE to an external IBM PC/AT keyboard or GRiD keypad, or any other 100% compatible keyboard.

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 RJ-11 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.

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 9.

Connecting an External Modem to the Serial Connector

You can connect an external modem (using a Model 6400 serial cable or equivalent) to the serial connector on the rear panel of the computer. You can connect any modem that is compatible with the software you are using. 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 Centronics 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 peripheral drive to the parallel connector.** A drive so connected 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 software installation procedures 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 Centronics cable to the parallel connector on the back of the computer.
3. Attach the other end of the Centronics cable to the Centronics 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 3 1/2-inch Pocket Diskette Drive
- Model 3402 5 1/4-inch Pouch Diskette Drive (360 KB)

- Model 3404 High Density 5 1/4-inch Pouch Diskette Drive (1.2 MB)
- Model 3403 40 MB Backup Tape System

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 5, **CONNECTING EXTERNAL DRIVES**.

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 other 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.

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 2-6).

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 disk in-use light for the internal drive or any other storage device is lit. The disk 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 2-6, below.

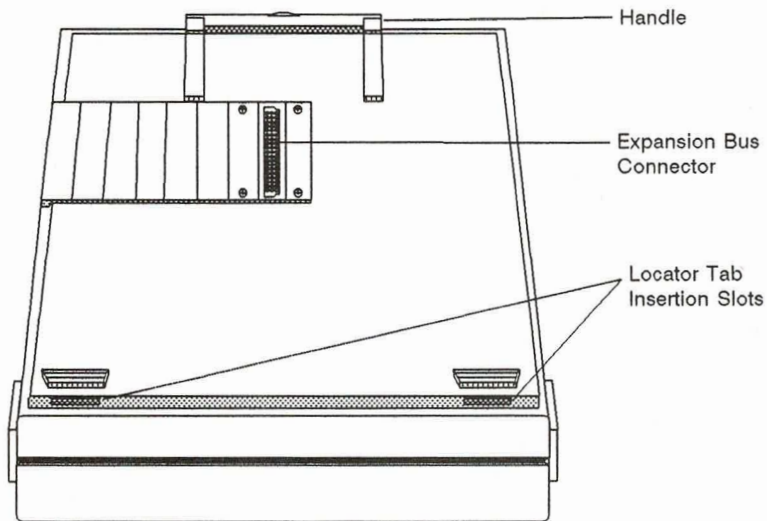


Figure 2-6. Bottom View of the GRiDCASE 1535 EXP Computer

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 6, USING THE EXPANSION TRAY.

CHAPTER 3: BUILT-IN OPTIONS

This chapter describes the built-in options available for your GRiDCASE 1535 EXP computer.

OPTION SUMMARY

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

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

Option/Option 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	Two megabytes of main memory in place of the standard one megabyte.
4 MB System RAM Option 304	Four megabytes of main memory in place of the standard one megabyte.
8 MB System RAM Option 308	Eight megabytes of main memory in place of the standard one megabyte.

ROMs:MS-DOS ROM
Option 370

Version 3.21 of the MS-DOS operating system stored in a single 128K Read-Only Memory (ROM) chip. The operating system is always available, but requires no disk storage.

Modem:2400 Baud Modem
Option 331

Built-in Hayes-compatible modem allows data transmission at 300, 1200, or 2400 baud.

Coprocessor:80387 Numeric
Coprocessor
Option 341

Provides faster operation for math-intensive applications (e.g., 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-megabyte (standard), 2-megabyte, 4-megabyte, and 8-megabyte 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.

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 512K 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.

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 Option 331 modem can transmit and receive data at 300, 1200, or 2400 baud.

FCC Regulations

The Federal Communications Commission (FCC) may ask that you contact your local telephone company before using telephone lines to transmit data. If you are asked to notify your local telephone company, they will need the following information about the 2400-baud modem (Option 331).

- Manufacturer: USRobotics, Inc.
- Computer model number: 1535

- FCC registration number: CJE794-72748-MD-E
- Modem model number: US Robotics Model GRATE1
- Ringer equivalence: 0.4B

The Canadian Department of Communications registration information is as follows:

- Model number: GRATE
- Certificate number: CS03-3525
- Certification number: 550 2111 A

The Ringer equivalence number (REN) is used to determine the quantity of devices you can connect to your telephone line and still have all of those devices ring when your number is called. In most areas, the sum of the RENs of all devices connected to one telephone line cannot exceed five. Check with your telephone company to determine the maximum REN for your calling area.

The internal modem complies with Part 68 of the FCC rules. In compliance with these rules, the FCC requires that you be aware of the following restrictions on the use of the internal modem:

- The internal modem may not be connected to a coin telephone or party line.
- If the modem malfunctions, it may harm the telephone network. You should disconnect the internal modem from the telephone line until the problem is repaired. If you don't disconnect the modem, the telephone company may temporarily discontinue your service, though they must notify you as soon as possible.
- The telephone company must notify you in advance if it makes changes that could affect the operation of the internal modem.

Connecting the Telephone Line

Your phone cord plugs into the telephone connector on the back of the computer. Most offices and residences now use the standard plug-in jack connector (RJ-11).

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

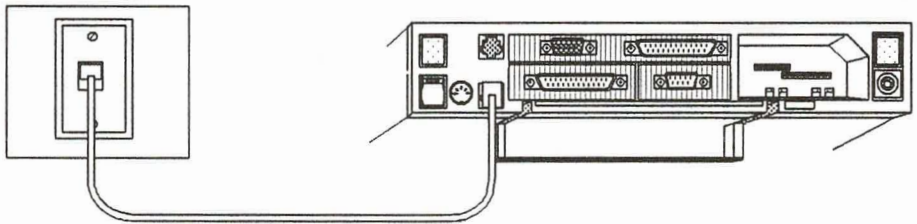


Figure 3-1. GRiDCASE 1535 EXP Computer Connected to Phone Jack

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 as shown in Figure 3-1, and then use the second telephone cord to connect the telephone to the other connector, as shown in Figure 3-2.

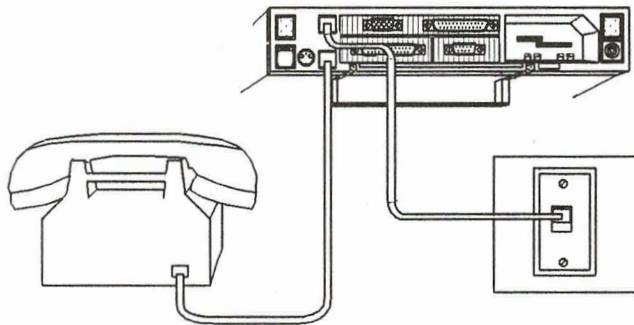


Figure 3-2. Modem Connected to Telephone System and Phone

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, **TESTING THE MODEM**, 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 or not your computer will work with your PBX telephone system, contact your local GRiD representative.

Alternative Telephone Connections

There are some telephone systems that do not use the RJ-11 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 RJ-11 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 telephone and provides an RJ-11 connector for plugging into your computer. The following couplers are available. (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 RJ-11 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 acoustic coupler supports 300 baud communications and, in some cases, can be used for 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 default settings.

If your application requires settings other than the defaults, you can use the MODE command to change them. For details on using the MODE command to change the default settings or the baud rate, refer to Chapter 9.

Modem Command Set

This subsection documents the internal modem's built-in command set. The commands documented here are available to you whenever the computer is in the terminal mode and the modem is in the command state, regardless of what communications software you are running.

You will require a communications software package of some sort to put your computer in terminal mode. Virtually all commercially available communications packages not only put the computer in terminal mode, but also take direct control of the modem. This means that, in most cases, you will not

need to learn the modem command set. Instead, you learn to use your own communications software and let the software command the modem. The modem command set is nevertheless documented here for those users who find they need it.

Putting the Modem in the Command State

When the computer is in terminal mode, and your communications software is running, the software intercepts your keyboard entries. To issue commands directly to the modem, you must first put the modem in the command state by entering the escape command. The escape command consists of three pluses (+ + +). The first + must be separated from any previous keystroke by at least one second, and the last + must be separated from any following keystroke by at least one second. Otherwise, the modem interprets the three pluses as part of the data stream instead of the escape command. The pluses must be entered with less than one second between each one.

Issuing Modem Commands

Once the modem is in the command state, you issue a command to the modem by typing the appropriate command characters on a single line and then pressing **Return**. Modem command characters can be entered as all uppercase letters or all lowercase letters, but don't mix upper- and lowercase letters.

In the following explanations, each command is followed by one or more examples of its use.

AT (attention command)

Except as otherwise noted, all modem commands must begin with the characters *AT*. These characters stand for *attention*; and they tell the modem that subsequent characters constitute a command to the modem rather than data to be transmitted.

Example: *AT command characters*

Automatic Dialing Commands

D (dial command)

Instructs the modem to dial the number specified by subsequent digits. Spaces, hyphens, and parentheses can be included; if present, they are ignored. The following options can be used with the Dial command (and are explained in the following paragraphs): P T , ; " ! W @ R

Example: ATD4085551212

P (pulse dialing command)

Instructs the modem to use pulse dialing. Can be used alone or with a dial command. Pulse dialing is the default when power is first supplied to the modem.

Example: ATP

Example: ATDP4085551212

T (Touch-Tone dialing command)

Instructs the modem to use Touch-Tone dialing. Can be used alone or with a dial command.

Example: ATT

Example: ATDT4085551212

Adaptive dialing

When any of the result code commands X2 through X6 is in effect, the modem checks the phone line to see which type of dialing is required (pulse or Touch-Tone) and then uses the appropriate type. Details of the Result Code command (X) are given in the following section.

, (pause command)

Each comma inserted in a dial command causes a two-second delay at that point in the dialing sequence. Delays are necessary when you need to dial part of a number, wait for a dial tone or signal of some sort, and then resume dialing. In the example, a four-second delay is inserted after dialing 9 to get an outside line.

Example: ATD9,,4085551212

; (return to command state after dialing)

Causes the modem to dial the specified number and then return to the command state (OK prompt) without hanging up. Ordinarily, the modem goes on-line as soon as it makes a connection. When the modem is on-line, you cannot issue any modem commands except the escape command. When you end a dial command with a semicolon (;), the modem dials the number, but does not go on-line when the connection is made.

Example: ATD4085551212;

***"string"*
(alpha-numeric convert command)**

You can enclose an alphabetic string within quotation marks in a dial command. The modem converts the letters to the corresponding numeric digits shown on a standard telephone (i.e., A, B, or C = 2; D, E, or F = 3; etc.). You can use the command to enter phone numbers mnemonically, just as they are frequently advertised. If the string to be converted falls at the end of the dial command, only the opening quotation marks are necessary. Letters can be upper- or lowercase.

Example: ATD1800"HOTLINE"

Example: ATD1800"HOTLINE

! (flash switch hook command)

Causes the modem to "depress" the switch hook¹ for half a second, then "release" the switch hook for half a second before continuing to dial. On some telephone systems, you can use this command to transfer an incoming call to another line. The example below transfers a call and then hangs up (H command, discussed later in the following subsection).

Example: ATD!1507;H0

¹ The term "switch hook" refers to whatever mechanism your telephone uses to distinguish between a raised and a lowered receiver. On the most common types of telephone, the two buttons on which the handset rests constitute the switch hook. On a wall-mounted phone, the switch hook is the bracket from which the receiver hangs when the phone is not in use.

W (wait for second dial tone command)

Causes the modem to wait for a second dial tone at this point in the dial command before proceeding to dial any remaining digits. Use this command when you access a telecommunications service that requires you to dial an access number, wait for a dial tone and then dial another number or enter a code. You can use the W command only when the result code command currently in effect is X3 or higher. The W command can be used more than once in a single dial command.

Example:

```
ATD9501022W04085551212W86455478853064
```

@ (Wait for answer command)

Causes the modem to wait for five seconds of silence at the other end of a completed call before proceeding to dial. This is useful if you need to wait for a recorded message to complete before entering digits in response to that message. To use the @ command, set the result code command to X3 or X4. The @ command can be used more than once in a single dial command. In the example below, assume that the @ command corresponds to a recorded message asking you to enter your access code. The dialing operation stops while the message is played. Five seconds after the message completes, the digits of the access code are dialed.

Example: `ATD4085553825@32863`

R (reverse frequency command)

Reverses the modem's originate and answer frequencies. This is necessary when you want to call an originate-only modem. The R command can immediately precede or follow the number to be dialed.

Example: `ATDR4085551212`

Example: `ATD4085551212R`

A/ (repeat last command)

Causes the modem to repeat whatever command was last entered. This command is **not** preceded by the AT (attention command), and it is not terminated with the **Return** key. Just type A/ and the modem performs **one** repetition of the last command entered. In the example, A/ is used to redial a busy phone number.

Example: ATD4085551212
NO CARRIER
A/

> (repeat current command)

Entered as part of a dial command, > causes the modem to repeat that command until 1) a connection is made, 2) the number has been dialed 10 times without making a connection, or 3) you press any key to cancel the command.

You can also use > in commands other than the dial command. Non-dial commands containing the > are repeated indefinitely, until you press any key to cancel the command.

Example: ATD4085551212>

Any key

While the modem is dialing, pressing any character key causes the modem to cancel the call.

Modem Operation Commands

+++ (escape command)

Use this command to take the modem off-line and return it to the command state. The escape command is **not** preceded by the AT (attention) command, and it is not terminated with the **Return** key. The first + must be separated from any previous keystroke by at least one second, and the last + must be separated from any following keystroke by at least one second. The pluses must be entered with less than one second between each one.

C_n (transmitter command)

Example: *data keystrokes* [1 sec. pause]+ + +
[1 sec. pause] *command keystrokes*

C0 turns the modem's transmitter off, making it a receive-only device. C1 (the default setting) turns the transmitter on.

Example: ATC0

E_n (command-state echo command)

E1 turns local echo on. In this state, commands you type at the keyboard are echoed to your screen. E0 (the default setting) turns local echo off for modem commands.

Example: ATE1

F_n (on-line echo command)

F0 (half duplex) turns on-line echo on. That is, the data your modem is transmitting is also sent to your screen. F1 (the default, full duplex, setting) turns on-line echo off. In this state, your modem does not echo transmitted data to your screen. (The data you send may still appear on your screen, but it is being echoed by the remote modem.)

Example: ATF0

H_n (on/off hook command)

H0 causes the modem to hang up (go on hook). H1 causes the modem to go off hook (this is like picking up the receiver of a telephone).

I_n (user inquiry command)

Returns various information, depending on the value of *n*:

- 0: returns modem product code
- 2: performs a RAM test and returns the result, either OK or ERROR
- 51: returns all current modem settings

Example: ATIO

O (on-line command) Takes the modem from the command state back to the on-line state when a connection is still open.

Example: ATO

M*n* (speaker control command) The number you enter to replace *n* determines when the modem's built-in speaker is on and when it is off. The four possible values are shown below. M1 is the default.

ATM0 disable speaker

ATM1 ON through dialing and carrier detect, OFF at connection

ATM2 ON continuously, even during data transmission

ATM3 ON after last digit dialed, OFF at connection

Q*n* (quiet command) This command determines whether or not result codes are displayed on the screen. Q0 (the default setting) causes the codes to be displayed. Q1 causes the codes to be suppressed.

Example: ATQ1

S*r*=*n* (register command) You can use this command if you need to change the values stored in any of the modem's 15 registers. (It is unlikely that you will need to do this—do not change register values unless you are sure of what you are doing.) The general form of the register command is shown below. In an actual command, you would replace *r* with the register number and *n* with the value to be set (from 0-255).

ATS*r* = *n*

The registers and their values are listed in Table 3-2.

Table 3-2. *Modem Registers and Values*

Register Number	Function	Default Value
0	sets number of rings before automatic answering	0
1	counts and stores number of rings from incoming call	na
2	sets ASCII value of escape code sequence	43
3	sets ASCII value of carriage return	13
4	sets ASCII value of line feed	10
5	sets ASCII value of backspace	8
6	number of seconds modem waits for dial tone	2
7	number of seconds modem waits for carrier tone	30
8	duration of pause for comma (,) command	2
9	carrier detect time, in tenths of a second	6
10	duration, in tenths of a second, that modem waits after loss of carrier before hanging up	7
11	duration, in milliseconds, of spacing between touch-tones during dialing	70

Register Number	Function	Default Value
12	duration, in 50ths of a second, of guard time required in escape code sequence	50
13	<i>reserved</i>	5
14	<i>reserved</i>	0
15	<i>reserved</i>	0
16	<i>reserved</i>	0

You can display a help screen of the S register functions by issuing the following command:

AT\$S

Sr?

To determine the setting of a particular register, use the command AT\$Sr?. Replace *r* with the number of the register you want to query.

Example: AT\$S8?

Vn (verbose command)

Determines whether result codes are displayed as numbers or text. V0 (the default setting) causes codes to be displayed as numbers. V1 causes codes to be displayed as text.

Example: ATV1

X7 (result code command)

Every operation the modem performs has one of several possible results. The modem reports the actual result of each operation in the form of a result code from 0 to 12. Each result code has an associated text message. Whether or not a particular result code appears on the screen depends on the result code set that is enabled by the result code command. Your choice of a result code set also determines whether or not certain modem functions are enabled, as explained later in this section.

The result codes and their associated messages are shown in Table 3-3.

Table 3-3. *Result Codes*

Code	Message
0	OK
1	CONNECT
2	RING
3	NO CARRIER
4	ERROR
5	CONNECT 1200
6	NO DIAL TONE
7	BUSY
8	NO ANSWER (Replaces NO CARRIER if a @ is present in the dial string.)
9	<i>reserved for future use</i>
10	CONNECT 2400
11	RINGING
12	VOICE

Table 3-4 lists the result code commands and indicates which result codes are reported according to which command is in effect.

Table 3-4. Result Code Commands

Command	Codes Reported												
	0	1	2	3	4	5	6	7	8	9	10	11	12
X0	•	•	•	•	•								
X1	•	•	•	•	•	•					•		
X2	•	•	•	•	•	•	•				•		
X3	•	•	•	•	•	•		•	•		•		
X4	•	•	•	•	•	•	•	•	•		•		
X5	•	•	•	•	•	•		•	•		•	•	•
X6	•	•	•	•	•	•	•	•	•		•	•	•

If you do not enter a result code command, X0 is assumed by default.

Whether reported codes appear on the screen as numbers or as messages depends on what V command is in effect, as explained later in this section.

Example: ATX3

Z (reset command)

Resets the modem to all its default settings.

Example: ATZ

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.

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 provides a summary of the available power options. 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	<p>When used internally, the AC power pack fits into the power pack/accessory slot on the back of the computer and powers the computer and an external 3 1/2-inch drive (optional).</p> <p>NOTE: When used internally, the AC power pack cannot power the expansion tray. Further, you cannot use the AC power pack internally if your computer is equipped with a plasma screen.</p> <p>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.</p> <p>When used externally, the AC power pack provides adequate power for the computer, for an optional external 3 1/2-inch drive, and for the expansion tray. (See Chapter 6 for power consumption considerations concerning the expansion tray.)</p> <p>The AC power pack automatically senses the voltage (110 or 220) that your AC wall outlet supplies and sets its internal circuitry accordingly.</p>

Power Source	Description
Internal Battery Pack Model 32111	Powers computer and 3 1/2-inch external drive (optional) from rechargeable battery pack. Actual battery life depends on your GRiDCASE model and system configuration. NOTE: You cannot use the internal battery pack to provide power for the expansion tray. 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, optional 3 1/2-inch external drive, and expansion tray. Provides two to three times the battery life of the internal battery pack. This attachable battery pack clips to the top of the computer at the rear.
Auto/Boat Adapter Model 32136	Powers computer from the cigarette-lighter socket of a car or boat. Provides adequate power for the computer, the expansion tray, and an optional 3-1/2" diskette drive.
External Battery Charger Model 32115	This external charger recharges the internal battery pack in about 12 hours.

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, the AC power pack power will adequately support the computer, an external 3 1/2-inch drive attached to the external peripheral connector, and an expansion tray.

A power cord is included with the power pack for connecting it to the wall outlet.

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

1. 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.

2. Attach one end of your power pack cord to the power pack.
3. Attach the other end of your power pack cord to the DC input connector on the back of the computer.
4. Attach one end of the AC power cord to the power cord socket on the back of the power pack.
5. Plug the other end of the power cord into a wall outlet that accepts a three-prong plug (see Figure 4-1). 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.
6. Turn on the computer.

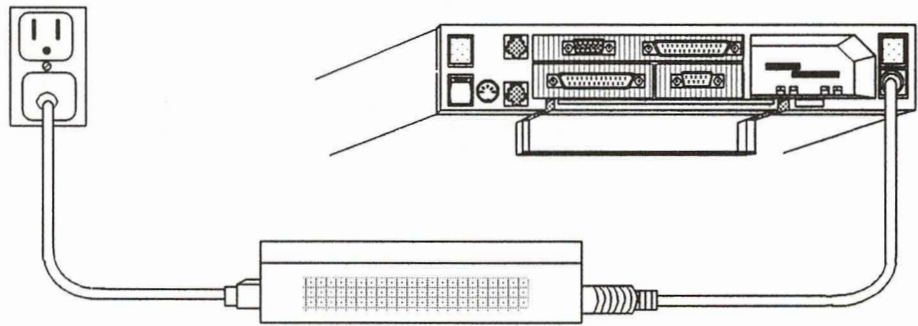


Figure 4-1. Installing the AC Power Pack Externally

CONNECTING THE AC POWER PACK INTERNALLY

The AC power pack, when used internally, provides power for your GRiDCASE 1535 EXP computer from either a 110-volt or 220-volt wall outlet. When used internally, the AC power pack will supply power adequate for a computer equipped with an LCD screen and a 3 1/2-inch external diskette drive (if attached).

NOTE: When used internally, the AC power pack **cannot** power an expansion tray or any peripherals other than the 3 1/2-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 internal/external AC power pack internally, follow these steps:

1. 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.

2. Remove the DC power pack cord from the power pack.

3. Hold the power pack with the socket for the power cord facing you.
4. Plug one end of the AC power cord into the socket on the power pack.
5. 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).
6. Plug the other 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.
7. Turn on the computer.

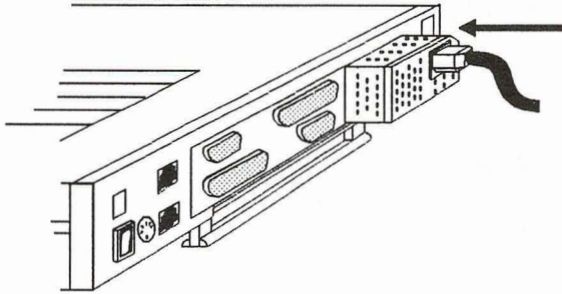


Figure 4-2. Installing the AC Power Pack Internally

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

CAUTION

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 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 5 1/4-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.

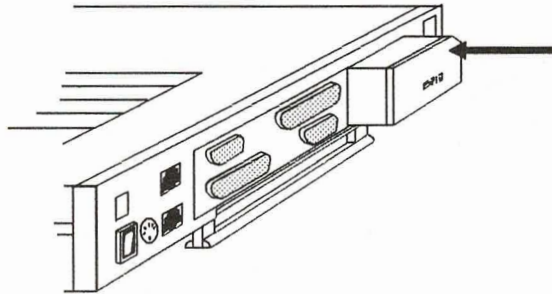


Figure 4-3. Installing the Battery Pack

To remove the battery pack, push in the power pack eject button (below 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 of your system. You will get the fullest capacity out of your battery pack after you have fully discharged and recharged it about three times. Thereafter, 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 plasma screen, it draws about 20% more power when in the 640 x 400 graphic display mode than when in the 640 x 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.
- Storage temperature – if the battery pack is stored at temperatures in excess of 90°F for two months or more without recharging, it may take a few rechargings for the battery pack to return to normal.
- Restarting the computer by using the power switch to turn the computer off and then on again: this uses more power. Instead, try using the warm start-up method – **Ctrl-Alt-Del**.

NOTE: Do not use any operating system other than those 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-low/charging 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 previously. 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 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.

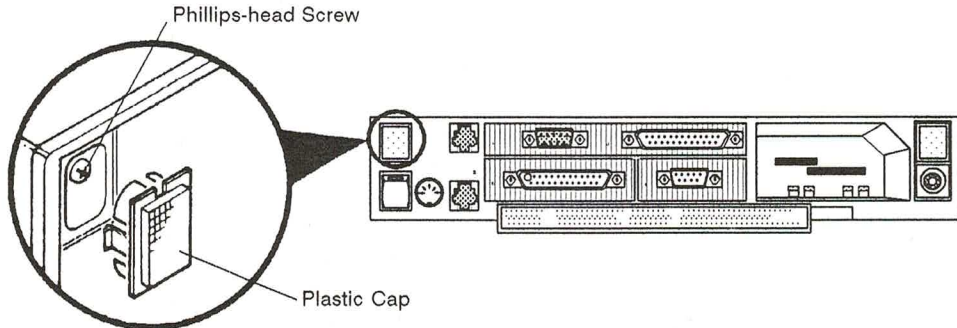


Figure 4-4. Removing Plastic Cap from Rear of Computer

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.

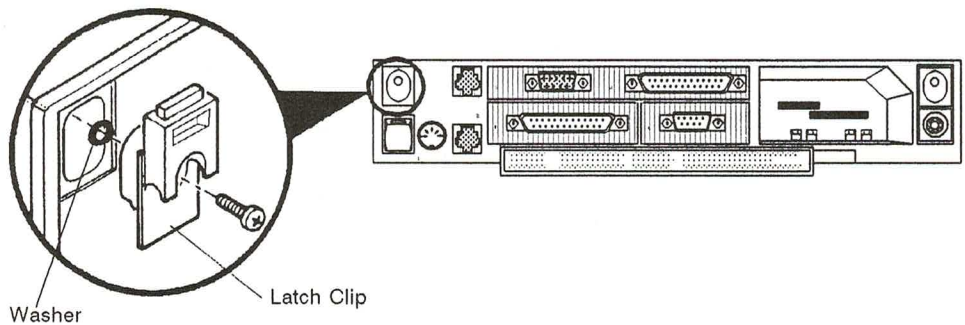


Figure 4-5. Attaching Latch Clip to Computer

5. Repeat steps 3 and 4 to attach a latch clip to the opposite side of 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).

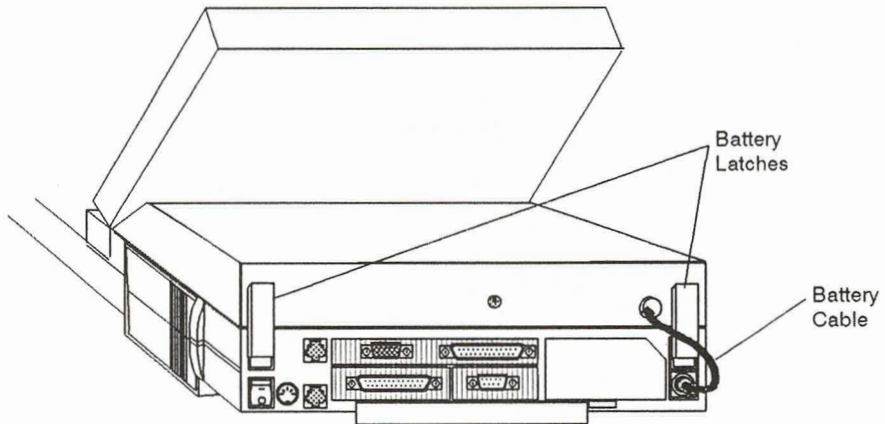


Figure 4-6. Attachable Battery Clipped to Computer

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 in to the AC power pack shipped with your computer. Refer to the information provided with the attachable battery pack for more detailed recharging instructions.

CONNECTING THE AUTO/BOAT ADAPTER

The auto/boat adapter lets you power your computer from the cigarette-lighter socket of a car or boat (see Figure 4-7).

To connect the adapter, follow the steps listed below.

1. Turn off the computer.

CAUTION

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

2. Plug the cigarette-lighter end of the adapter cable into the cigarette-lighter socket.
3. Plug the other end into the DC input connector on the back of the computer.
4. Turn on the computer.

NOTE: Many automobiles cause power surges or depressions 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. This causes the loss of any data currently in main memory.

We recommend having a battery pack installed in your computer to ensure continuous power while operating from a car cigarette-lighter socket. Note that the auto/boat adapter will not completely recharge a battery pack installed in the computer; it supplies much less power than the internal/external AC power pack.

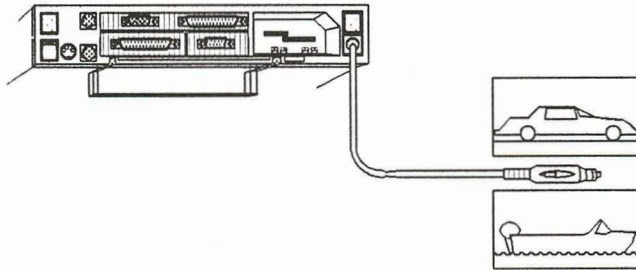


Figure 4-7. Installing the Auto/Boat Adapter

USING THE EXTERNAL BATTERY CHARGER

The external battery charger recharges your 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 of the Y cable to the battery charger.
3. Plug the female connector of 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.

In about 12 hours the battery pack is fully recharged.

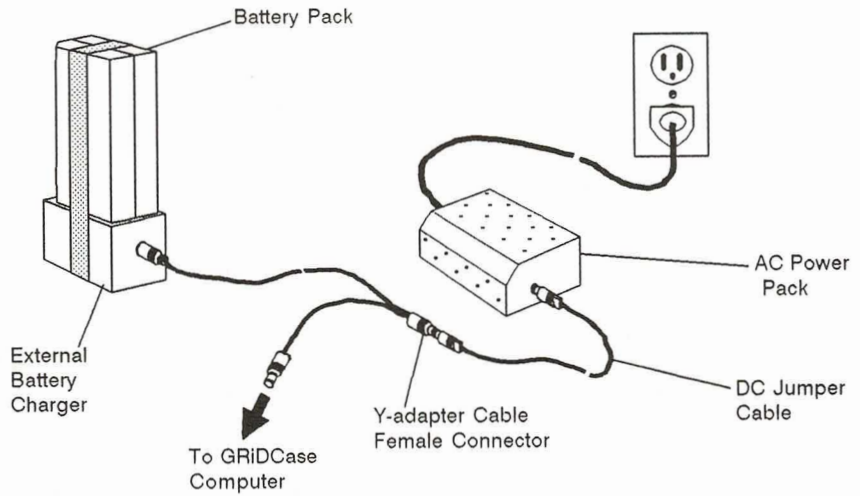


Figure 4-8. Connecting the External Battery Charger

CHAPTER 5: CONNECTING EXTERNAL DRIVES

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

CONNECTING A 3 1/2-INCH DISKETTE DRIVE

You must connect the external Model 3401 3 1/2-inch diskette drive (called the "pocket floppy") to the external peripheral connector (located on the back of the computer) using the diskette drive cable that is provided. Figure 5-1 shows where this connector is located.

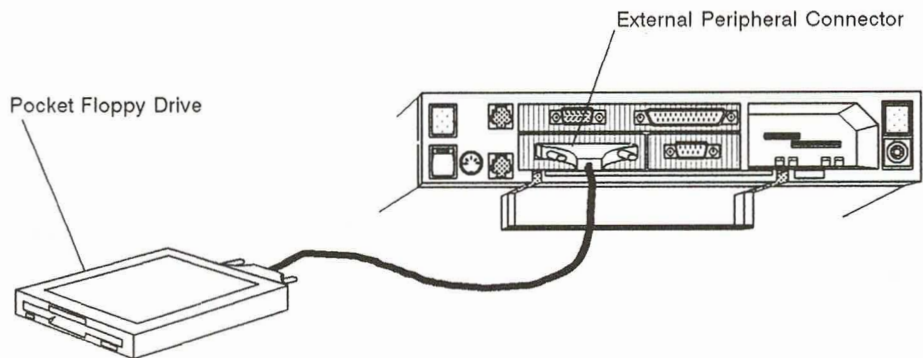


Figure 5-1. Connecting the 3 1/2-Inch External Diskette Drive

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 supply, 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 supply internally.

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

1. Turn off the computer, the external diskette drive, and any other 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 00 (both switches are in the DOWN position). These switches set the device's address, allowing the computer to exchange data with it. Refer to the section SWITCH SETTINGS FOR THE EXTERNAL DISKETTE 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 in easily the first time, turn the end of the cable upside-down. Tighten the thumbscrews on each side of the connector to attach the cable firmly to the computer.
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 DISKETTE DRIVE

Two types of external 5 1/4-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 5 1/4-inch diskette drive (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 the special drive cable. The pouch diskette drive must be powered by a separate power supply. Figure 5-2 shows how to connect the pouch diskette drive to the computer.

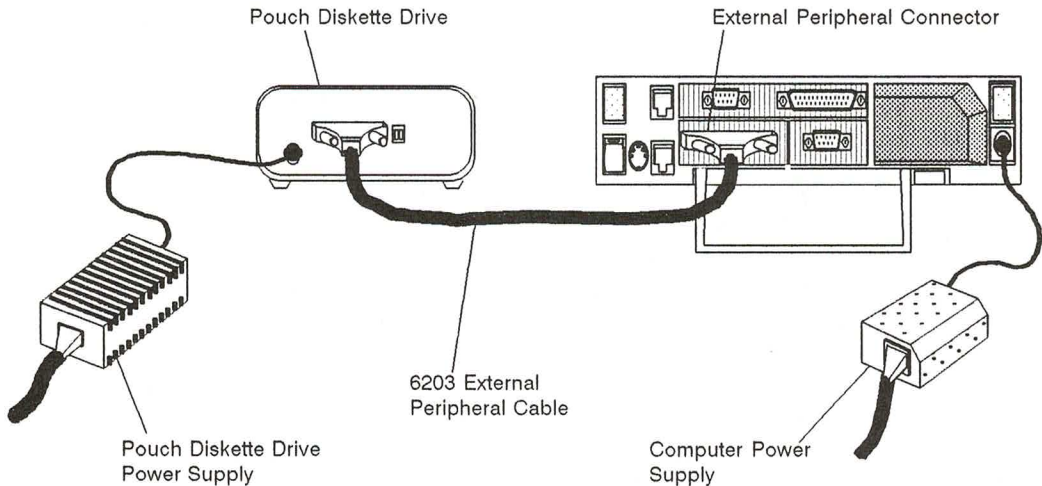


Figure 5-2. Connecting the 5 1/4-Inch External Diskette Drive

To connect the external 5 1/4-inch diskette drive to the computer, follow the steps listed below.

1. Turn off the computer and any other 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 00 (both switches are in the DOWN position). These switches set the device's address, allowing the computer to exchange data with it. Refer to the section SWITCH SETTINGS FOR THE EXTERNAL DISKETTE DRIVES, later in this chapter, for more information on setting the switches.
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 upside-down. Tighten the thumbscrews on each side of the connector to attach the cable firmly to the computer.
4. Attach the other end of the drive cable to the drive.
5. Plug one end of the thin power pack cord into the diskette drive power pack.
6. Plug the other end of the power pack cord into the diskette drive.
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 5 1/4-inch diskette drive, consult the manual that accompanies the drive.

SWITCH SETTINGS FOR THE EXTERNAL DISKETTE DRIVES

The external diskette drives' address switches are located on the back of the drive to the left of the cable connector. The drives have only one valid switch setting when used with a GRiDCASE 1535 EXP computer equipped with a standard 40-megabyte internal hard disk drive: both switches in the DOWN position.

The primary designator for the external diskette drive is A. In addition to the primary drive designator, MS-DOS assigns a secondary, or logical, device designator (B) to the diskette drive. You can address the diskette drive by either its primary or its secondary designator. In effect, you have two logical diskette drives (one physical drive, plus a logical drive).

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 the drive cable provided. The tape drive must be powered by a separate power supply. Figure 5-3 shows how to connect the tape drive to the computer.

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

1. Turn off the computer and any other 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 00 (both switches are in the DOWN or OFF position). 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 drive connector on the back of the computer. If it doesn't fit in easily the first time, turn the end of the cable upside-down. Tighten the thumbscrews on each side of the connector to attach the cable firmly to the computer.
4. Attach the other end of the drive cable to the drive.
5. Plug one end of the thin power pack cord into the tape drive power pack.
6. Plug the other end of the power pack cord into the tape drive.
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.

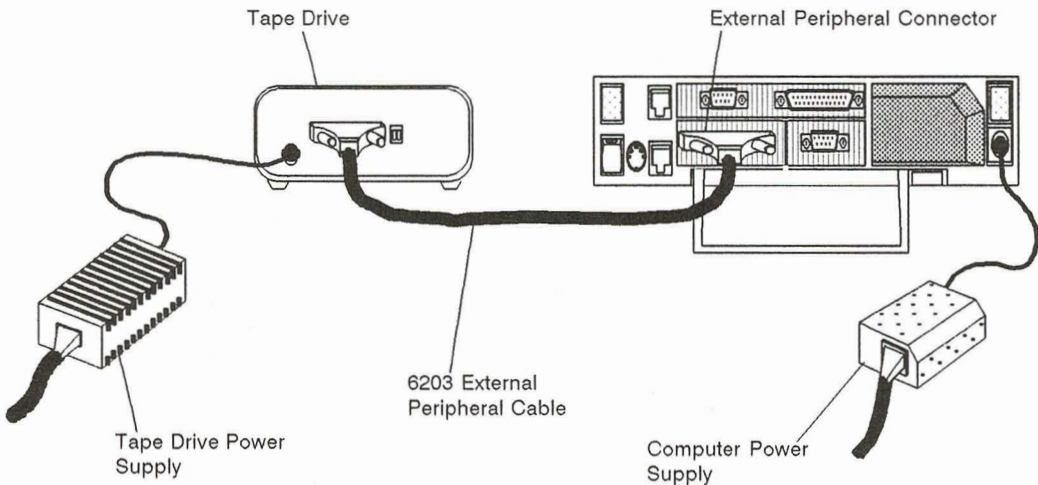


Figure 5-3. Connecting the External Tape Drive

CHAPTER 6: USING THE EXPANSION TRAY

This chapter describes how to use the 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, TECHNICAL INFORMATION.

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:

- 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.
- 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.

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.

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 and lift off the expansion tray cover. 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.

Figure 6-1 shows the expansion tray with its cover removed.

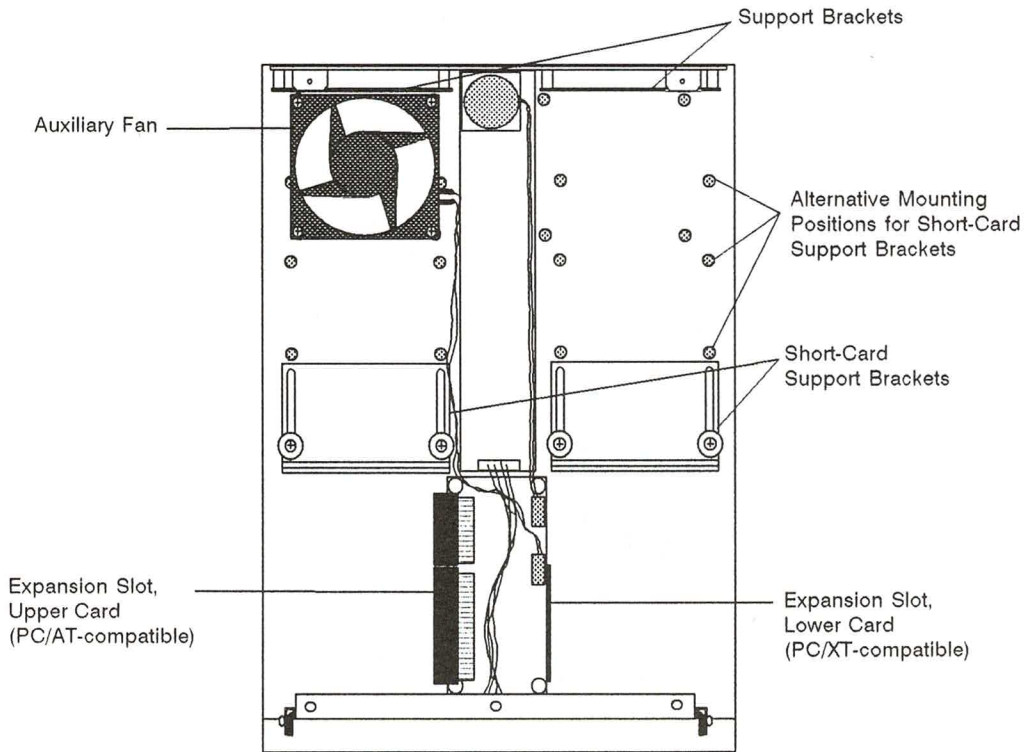


Figure 6-1. Bottom View of the Expansion Tray

POSITIONING THE AUXILIARY FAN

The auxiliary removeable 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 6-2). (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.

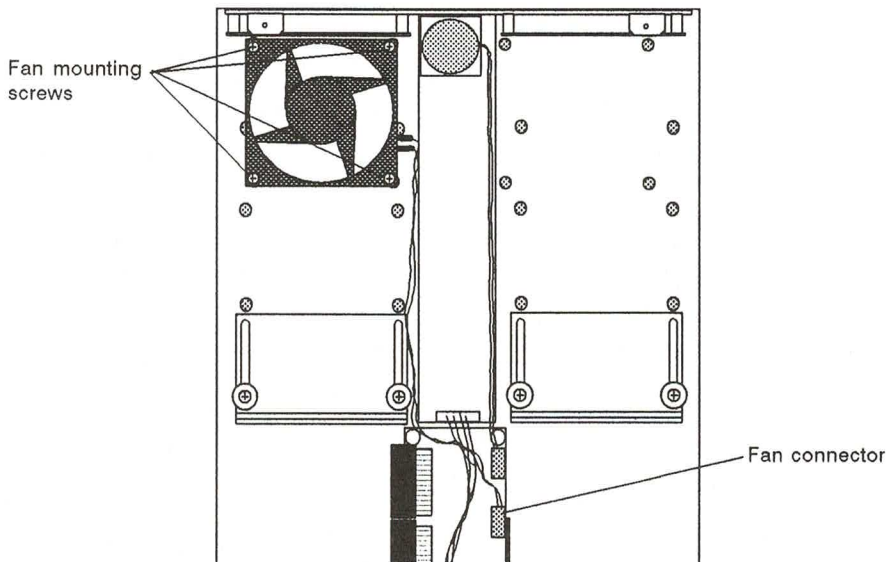


Figure 6-2. Removing the Auxiliary Fan

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 6-3 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.

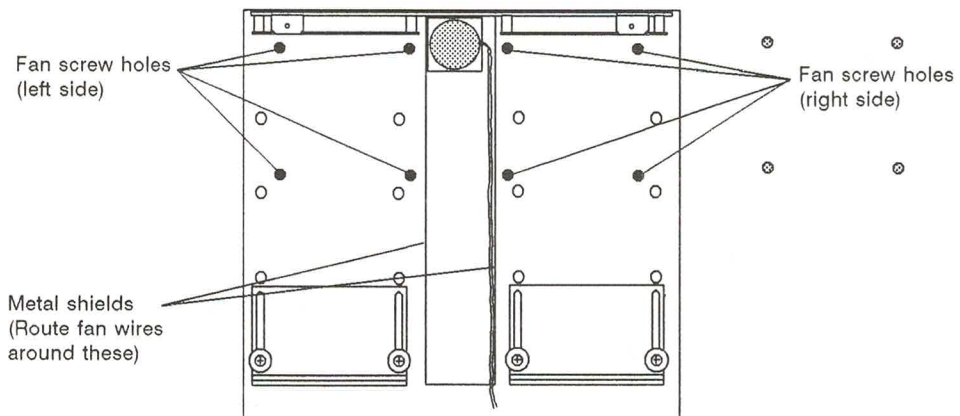


Figure 6-3. Auxiliary Fan Screw Hole Locations

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 6-1 summarizes the proper vent cover positions, depending on how the auxiliary fan is positioned. The diagram in Figure 6-4 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 6-1. 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)

MOVE VENT COVERS
IF FAN IS MOVED

CHANGER L'EMPLACEMENT
DES CACHES SI LE
VENTILATEUR EST DEPLACÉ

BRINGEN SIE DIE ABDECKUNGEN
JE NACH POSITION DES
VENTILATORS AN

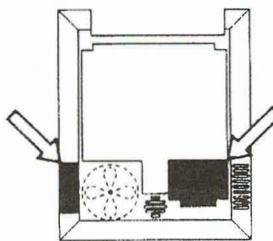
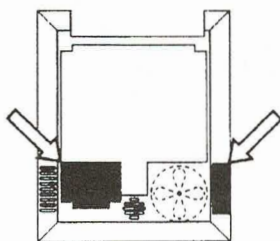
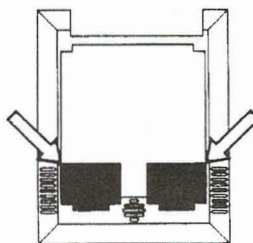


Figure 6-4. Vent Cover Positions

INSTALLING AN EXPANSION CARD

Figure 6-1 shows the expansion slots and card connectors in the expansion tray.

The two expansion slots 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 back of 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 adjust 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 6-5 and 6-6).

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, pop the plastic card support off of the bracket and place it on the reverse side of the bracket.

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 6-5 shows a full-length card being installed. Figure 6-6 shows a short card.

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

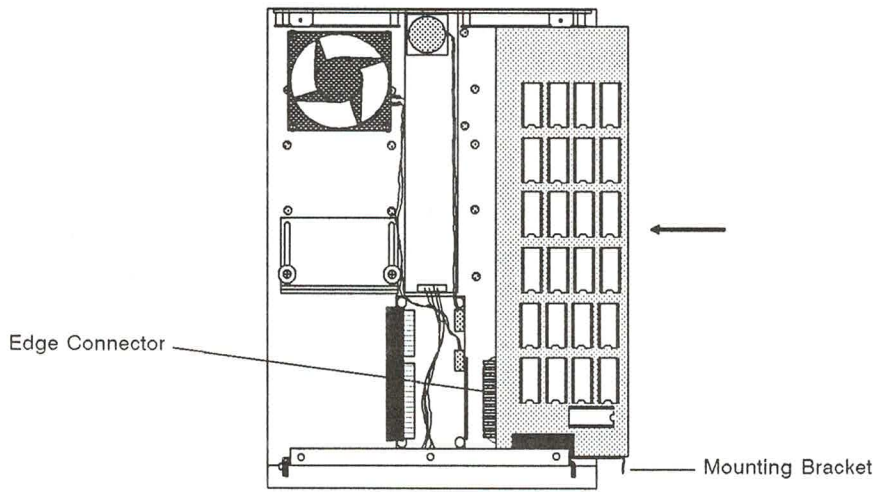


Figure 6-5. *Installing a Full-Length Card*

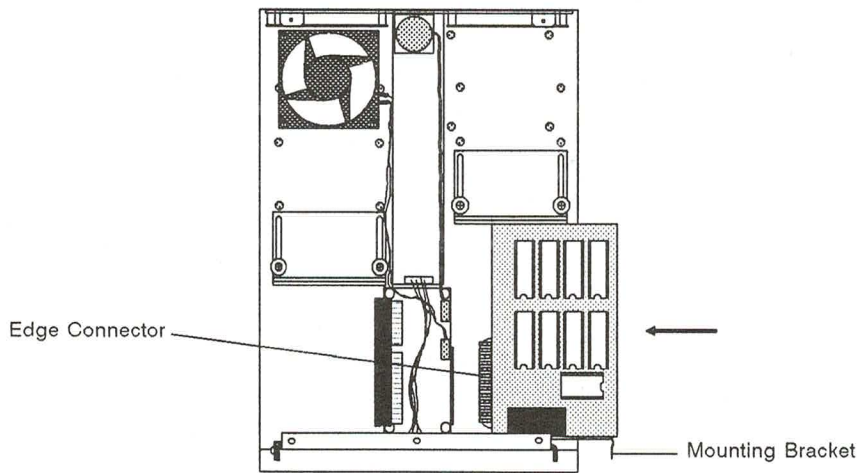


Figure 6-6. *Installing a Short Card*

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 locator tabs faces towards you (see Figure 6-7). Push the top of the latches away from the tray so that they are hanging outward.

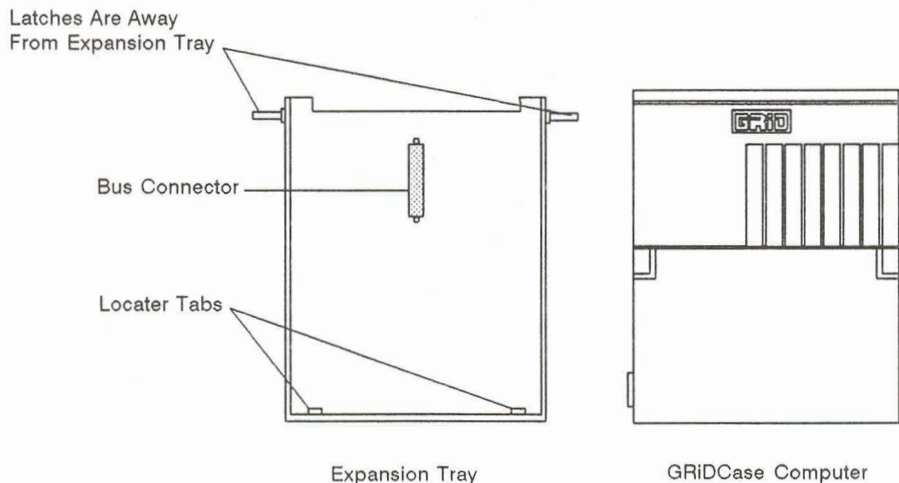


Figure 6-7. Preparing to Attach the Expansion Tray to the Computer

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 locator tabs on the expansion tray slip into the matching slots on the computer (see Figure 6-8).
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.

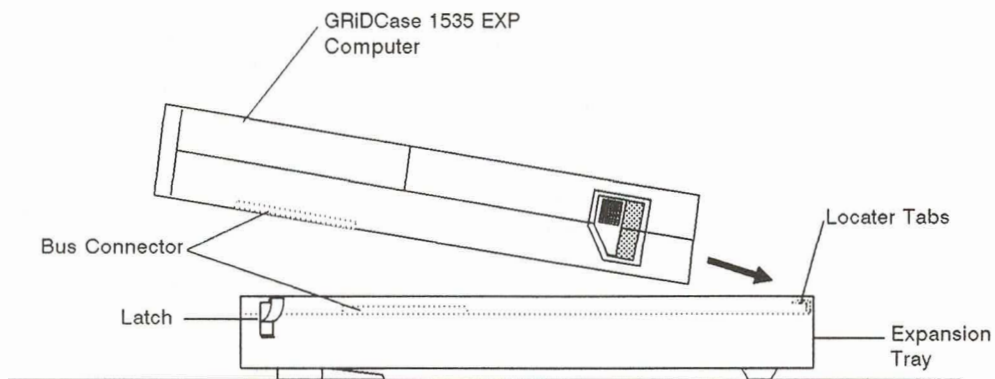


Figure 6-8. Attaching the Expansion Tray

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 locator 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 front card 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.

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, 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 6-1 and Figure 6-4 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 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 7: TROUBLESHOOTING

This chapter describes problems that might arise as you use your GRiDCASE 1535 EXP computer and provides tips on how to resolve them.

IDENTIFYING THE PROBLEM

There are generally two types of problems: problems with computer hardware or software, and problems due to user errors.

User Errors in Setting Up the Computer

Table 7-1 lists common problems you might encounter when setting up your computer system. To use the table, look for your problem under the heading Symptom, identify the Cause, and follow the suggested Remedy.

Table 7-1. Troubleshooting Chart

Symptom	Cause	Remedy
No response when computer is turned on	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 plasma screen or if the expansion tray is attached to the computer.
	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.

Symptom	Cause	Remedy
Computer unable to boot	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 5).
	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.
Computer boots, but battery low indicator is lit	Battery needs recharging	Recharge batteries using external AC power pack or external battery recharger.
No response from external diskette or tape drive	Incorrect switch settings	Check to see that the configuration switch settings are correct. (See Chapter 5.)
	Bad cable	Call the GRiD Resource Center.
	Not powered correctly	The 5-1/4" diskette drive and tape drive must be powered separately from the computer.

Symptom	Cause	Remedy
Expansion card doesn't work	Card installed incorrectly	Check to see that card is properly installed. (See Chapter 6.)
	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.
No response when printer is turned on	Not plugged in	Plug in power cord.
	Hardware not functioning	Run a self-test. (Refer to printer manual.)
	Cables not hooked up correctly	Connect cables 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	Printer not supported	Check the software manual to make sure the program is configured for and supports the attached printer.
	Switches set incorrectly	Check that configuration switches are set properly. (See Appendix B.)

Symptom	Cause	Remedy
Installed ROMs don't show up in directory or title list	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 9.
	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 mounting position.
Incorrect date or time on screen	Time-of-day clock set incorrectly	Set correctly. (Refer to the <i>MS-DOS Reference</i> 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 jack.
	Switch settings are incorrect under MS-DOS	MS-DOS users set software switches correctly using MODE command (refer to the <i>MS-DOS Reference</i> 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 keyboard doesn't function	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.

Symptom	Cause	Remedy
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 RGB color monitor	Connect an IBM PC-compatible RGB color monitor only.
Built-in screen blank	Output is directed to external monitor	Press the Ctrl , Alt , and Tab keys simultaneously to switch output to the built-in screen.
	Contrast switch set incorrectly	Adjust contrast switch at right of screen.

If, after consulting the troubleshooting chart, you've determined the problem is not due to a user error, try to determine whether it is a software or hardware problem.

Software or Hardware Problems

If the troubleshooting techniques listed in Table 7-1 do not solve your problem and you decide your problem is not a set-up or software problem, you can call the GRiD Resource Center at (415) 656-2100 between 8:00 and 4:00 Pacific time 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 (i.e., it is visible only when the handle is pulled out).

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 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 disk 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 peripherals are connected to the computer, be sure to use shielded cables.

If these solutions still do not produce satisfactory reception, contact your GRiD representative.

CHAPTER 8: 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 precision instrument – with care.

WARNINGS

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.
- 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.
- 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

Observe the following cautions. Ignoring these cautions could damage your unit.

- Operate the computer only when the surrounding temperature is from 41° to 95° F (5° to 35° C).
- Operate the computer only when the relative humidity level is from 20% to 80% noncondensing.
- Store the computer where the surrounding temperature is from -4° to 149° F (-20° to 65° C).
- Do not store or set up the computer (or its peripherals) 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 an external diskette drive opening.

STORING YOUR GRIDCASE 1535 EXP COMPUTER

Always store your computer between the temperatures -4° and 149° F (-20° to 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, pack it in the original shipping carton and packing materials that came with your computer. Any damage incurred due to improper shipping is considered abuse and will not be covered under extended 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 time-of-day clock, which displays the time and date on your screen, is not intended to replace your wristwatch. The precision of its time-measuring electronics may vary because of temperature changes. Check the time and date of your clock 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 9: USING MS-DOS ON GRiDCASE 1535 EXP COMPUTERS

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; and how to move and then run applications currently in use on the IBM PC, PC/XT, or PC/AT to the GRiDCASE 1535 EXP computer.

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 GRiDCASE 1535 EXP COMPUTERS?

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 computer keyboards have fewer keys, but all the functions of an IBM PC/AT keyboard.
- The GRiDCASE 1535 EXP computers display text and images in blue and grey, 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 is available on a ROM chip for GRiDCASE 1535 EXP computers.

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 GRiDCASE 1535 EXP computers. Although GRiDCASE 1535 EXP computers are fully compatible with the IBM PC/AT, it is neither legal nor desirable to run PC-DOS on GRiDCASE 1535 EXP computers.

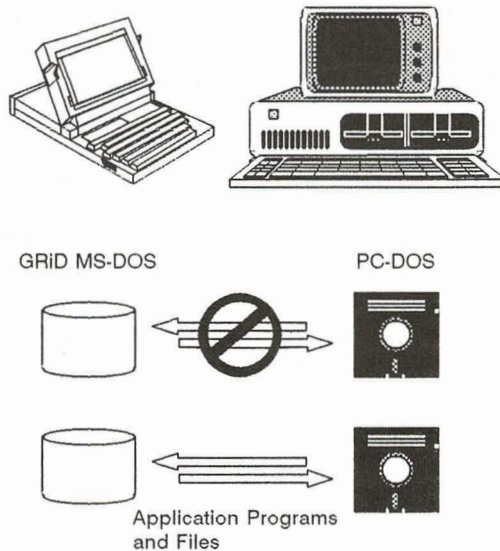


Figure 9-1. GRiDCASE 1535 EXP Computers Require GRiD MS-DOS

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 9-1).

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 GRiDCASE 1535 EXP computer and an IBM PC, PC/XT or PC/AT.
- 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 computers work like an IBM PC/AT. You can use the GRiDCASE 1535 EXP computer's 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

Your GRiDCASE 1535 EXP computer's 40-megabyte hard disk is already formatted for use with MS-DOS, and MS-DOS has been loaded onto the disk. Because you do not have a built-in diskette drive, you must use one of the following GRiD products to load programs onto the hard disk:

- **Model 3401 3 1/2-inch Pocket Diskette Drive.** The pocket diskette drive can be attached to the external peripheral connector on the back of your computer, allowing access to files stored on 3 1/2-inch diskettes.
- **Model 3402 5 1/4-inch Pouch Diskette Drive (360K).** If your programs are stored on 5 1/4-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 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, PC/XT, or PC/AT to your hard disk.

THE GRIDCASE 1535 EXP KEYBOARD

The GRiDCASE keyboard contains fewer keys than the IBM PC/AT keyboard. Consequently, you 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 grey, 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 grey 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 for removable Read-Only Memory (ROM) chips, which give permanent storage for MS-DOS programs. (The two ROM mounting positions are under a hinged cover above the keyboard.) A single ROM containing the MS-DOS operating system and its utility files is available from GRiD.

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

If your computer does not have an external diskette drive attached, ROM files are treated as an extension of drive C.

If your computer is equipped with an external floppy diskette drive, MS-DOS treats files on the ROM cartridge as though they reside on floppy diskette drive A, and thus as an extension of the diskette in drive A. 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.

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 hard disk contains a file with the same name as a file in ROM, MS-DOS always uses the file on the hard disk. (If you have an external floppy diskette drive A attached to your system, this note applies to drive A rather than the hard disk.)

- When copying files, you cannot specify a target file for drive C (drive A if an external diskette drive is attached to your system) that has the same name as a ROM file, unless you either turn off the ROM or temporarily rename the ROM file. You can turn off the ROM by issuing the command `MODE ROM = OFF`.

WHAT'S DIFFERENT ABOUT GRID MS-DOS?

GRiD MS-DOS is an operating system specifically written for GRiDCASE 1535 EXP computers. 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 MS-DOS commands provide functions not available in PC-DOS. Let's look at these commands.

FORMAT

The `FORMAT` command provided with GRiD MS-DOS is functionally identical to the PC-DOS `FORMAT` command provided with IBM PS/2 computers that use high-density, 1.4 megabyte, 3 1/2-inch floppy diskette drives. It is documented here, however, because many users moving to a GRiDCASE 1535 EXP computer with an external 3 1/2-inch floppy diskette drive will not be familiar with using `FORMAT` on such drives.

When you issue a **FORMAT** command for a high-density, 3 1/2-inch external drive like those used with GRiDCASE 1535 EXP computers, the drive formats the diskette for 1.4 megabytes. **If the diskette in the drive is not a high-density diskette, it cannot reliably be formatted for 1.4 megabytes.** The format operation itself may fail, or, worse, the format operation may **seem** to succeed, resulting in a completely unreliable diskette.

CAUTION

Do not format a diskette for 1.4 megabytes 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-kilobyte, double-density diskettes in a high-density external drive, but you must use the following special form of the **FORMAT** command to do so:

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

A special batch file called **FORMATLD.BAT** is supplied on your 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 **FORMATLD** in response to the MS-DOS system prompt.

PCMASTER/PCSLAVE

The **PCMASTER** and **PCSLAVE** commands (also called the PC file transfer utilities) transfer files from IBM PC, PC/XT, or PC/AT 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 can't 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. Two dots (..) indicate a range of choices (e.g., "1..6" means that you can enter any number from 1 to 6).

MODE MODEM=*switches*

This command allows you to change the settings of the software switches in the optional internal modem. The optional internal modem emulates the Hayes Smartmodem 1200 software switches. The *switches* parameter consists of eight "U" and/or "D" characters (for *Up* or *Down*, meaning the switch is on or off, respectively). For example, the initial setting is UDDDDUUD. For more details, see the section THE INTERNAL MODEM, later in this chapter.

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 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 disk drive. If you specify the hard disk C, this setting is saved, even when the computer is powered off. 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}

This command allows you to switch the video output to an external monitor that is connected to the video output port on the back of the GRiDCASE 1535 computer. The computer cannot simultaneously display output on the internal screen and an external monitor. Specify CRT to switch output to the external monitor. Specify GRID to reactivate the internal display.

This switching function can also be accomplished by using the keystroke **Ctrl-Alt-Tab**. Each time you press this key combination, the video output is switched between the internal screen and an external monitor.

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, and default, is 12.5 MHz; the slow speed is 6 MHz. **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.**

You also can 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 current color mapping mode. The color mapping mode determines how colors are displayed on the internal display. Six color maps are predefined. You can select any one of the six by specifying the color map number with this MODE option. Some programs designed for color displays may be more readable with a color mapping mode other than the default (1). Table 9-1 shows the different color mapping modes.

The color mapping mode also can be changed by using the keystrokes **Ctrl-Alt-Fn-←** and **Ctrl-Alt-Fn-→**. Repeatedly pressing one of these keystrokes cycles through all six color mapping modes.

Table 9-1. Color Mapping Modes

Color	Mode					
	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={1..60|ON|OFF}

This command allows you to control the back light on GRIDCASE 1535 EXP computers equipped with LCD screens. 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 back light. The default is 2 minutes. After the back light is off, any keyboard input turns it back on. Specifying OFF turns the back light off until you give the ON command. Specifying ON turns the back light on until you change the setting. This MODE setting is remembered by the computer even after the power is turned off, so you don't need to reset it each time you start-up the computer.

MODE DISPLAY={ON|OFF}

This command allows you to disable and enable the display hardware inside the computer. It may be necessary to disable the internal display circuitry if you connect a different display adapter to the computer either through the bus connectors in the power pack/accessory slot or by installing the adapter in the expansion tray.

MODE NUMPAD={ON|OFF}

This command allows you to disable and reenble the numeric keypad embedded in the internal keyboard. 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 reenble 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; this means that the hard disk is always powered on. Specify OFF to turn off power immediately to the hard disk. Or, for automatic control, you can specify a number of minutes (up to 99 or the maximum allowed by your hard disk), 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 a disk access is required.

If you specify a number of minutes greater than the maximum allowed for your hard disk, the interval is set to the maximum, and you are alerted by a message to the actual number of minutes set.

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 command displays immediate answers to many questions you might have about MS-DOS commands and functions. Normally, you find such information only in a reference manual. Instead, using GRiD MS-DOS, you can type in the command HELP and press RETURN. The Help menu (Figure 9-2) is then displayed.

```
MS-DOS Help Utility (version 3.2D)
Copyright (c) 1985,86 GRiD Systems Corporation

Topics Available:

APPEND      ASSIGN     ATTRIB     BATCHFILES  BREAK      CHDIR
CHKDSK     CLS       CONFIG.SYS COPY         CTTY       DATE
DEL        DIR       DISKCOMP   DISKCOPY    EDLIN     EXECBIN
EXIT       FDISK     FC         FIND        FORMAT    GRAFTABL
GRAPHICS   EMM       HELP      JOIN        KEYBOARD  LABEL
LINK       LOGICALDRIVE MKDIR     MODE       MODEM    MORE
PATH       PCMASTER  PCSLAVE   PRINT      PROMPT   RANDRIVE
RECOVER    REN       REPLACE   RMDIR     SERVER   SET
SHARE     SORT      SUBST     SYS        TIME     TREE
TYPE      VER       VERIFY    VOL        XCOPY

HELP (Enter topic or Esc to exit)>
```

Figure 9-2. The Help Menu

From this menu, you pick out the name of the command or function you want information on, and type it in. "MODE" was typed in to display the information shown in Figure 9-3.

```

The MODE command provides 20 options for configuring your computer.
The options are summarized below. See the option topic for information
on a specific option.

Option1 - Controls output to the printer.
Option2 - Sets display mode for the screen and external monitor.
Option3 - Determines serial port's communications protocol.
Option4 - Changes parallel printer output to serial printer output.
Option5 - Sets the PRN device.
Option6 - Switches power on or off to the serial port.
Option7 - Switches power on or off to the internal modem and controls
          modem parameters.
Option8 - Determines the blink and shape of the cursor.
Option9 - Controls power to the internal floppy disk drive.
Option10 - Sets font size and reverse video.
Option11 - Determines which device letter ROM files are appended to.
Option12 - Switches from internal display to external monitor.
Option13 - Switches between EMS and Extended memory over 640K.
Option14 - Switches between fast and slow processor speeds.
Option15 - Determines how colors are mapped to a monochrome display.
Option16 - Controls how long screen backlighting stays on.
Option17 - Switches on or off the internal display hardware.
Option18 - Sets the display refresh for 50Hz or 60Hz.
Option19 - Enables/disables numeric keypad of the internal keyboard.
*****Press Any Key To Continue*****

Option20 - Controls power to the internal hard disk.

Additional Topics:

OPTION1    OPTION2    OPTION3    OPTION4    OPTION5    OPTION6
OPTION7    OPTION8    OPTION9    OPTION10   OPTION11   OPTION12
OPTION13   OPTION14   OPTION15   OPTION16   OPTION17   OPTION18
OPTION19   OPTION20

HELP (Enter topic or Esc to exit)>
    
```

Figure 9-3. MODE Help Information

The MODE help menu displays subtopics that you can select to retrieve more specific information. From this menu (Figure 9-3), the subtopic "OPTION16" was typed in. Figure 9-4 shows a display of the additional information.

This option of the MODE command controls the backlighting for those GRiD computers that have backlit screens. Specify option 16 as follows:

```
MODE BACKLITE = [ON | OFF | n]
```

where n is a number of minutes from 1 to 60.

On computers with backlit displays, the backlighting can be controlled in 3 different ways. Specify the OFF option to turn OFF the backlighting. For continuous backlighting, specify the ON option. For automatic control of the backlighting, specify a number between 1 and 60. If a number is specified, the computer will turn off the backlighting after that number of minutes if there was no keyboard input during that time interval.

Additional Topics:

NONE

HELP (Enter topic or Esc to exit)>

Figure 9-4. MODE Option 16 Information

To get back to the main help menu shown in Figure 9-2, press RETURN.

You can customize the help facility to add any other information you wish or to change the existing information. To learn more about HELP, try using it or read about it in Chapter 7 of the *MS-DOS Reference* manual.

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 9-5). 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.

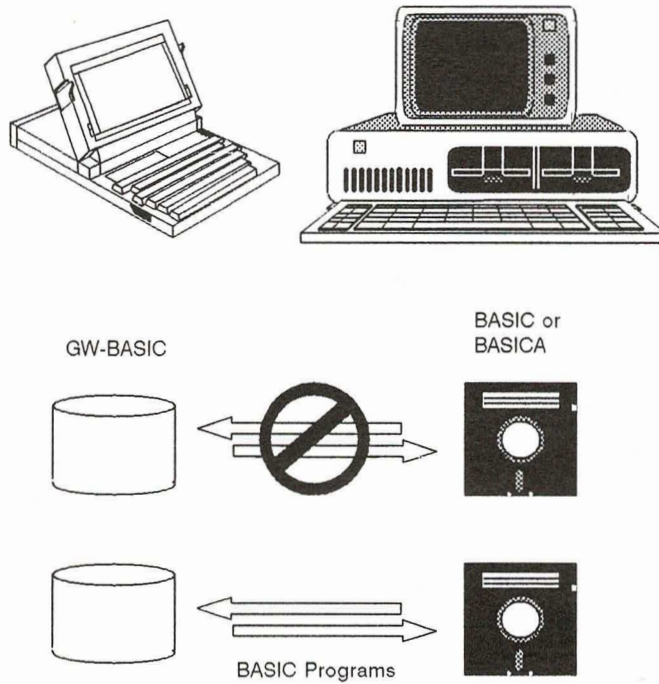


Figure 9-5. Running BASIC Programs on a GRiDCASE 1535 EXP Computer

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 (Option 331) permits communications through the telephone system. The internal modem behaves just like a Hayes 2400 baud 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.

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:

```
MODE MODEM=UDDDDUUD
```

The *D*'s and *U*'s 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 9-2.

Table 9-2. *Internal Modem Switch Settings (Defaults Shown in Bold)*

Switch	Position	Meaning
1	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, PC/XT, or PC/AT using 5 1/4-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, PC/XT, or PC/AT from the original diskettes placed in a GRiD external 5 1/4-inch pouch diskette drive.
- Copying programs and files from IBM PC, PC/XT, or PC/AT 5 1/4-inch diskette drives to the GRiDCASE internal drive using the PC File Transfer Utilities (PCMASTER/PCSLAVE) – when an external 5 1/4-inch diskette drive isn't available.

USING A GRiD EXTERNAL DISKETTE DRIVE

This subsection describes how to run IBM PC, PC/XT, or PC/AT application programs on diskettes from an external diskette drive. The procedure applies equally to external 5 1/4-inch diskette drives and external 3 1/2-inch diskette drives, although Figure 9-6 only shows a 5 1/4-inch diskette drive. Device letter assignments are shown in Figure 9-6

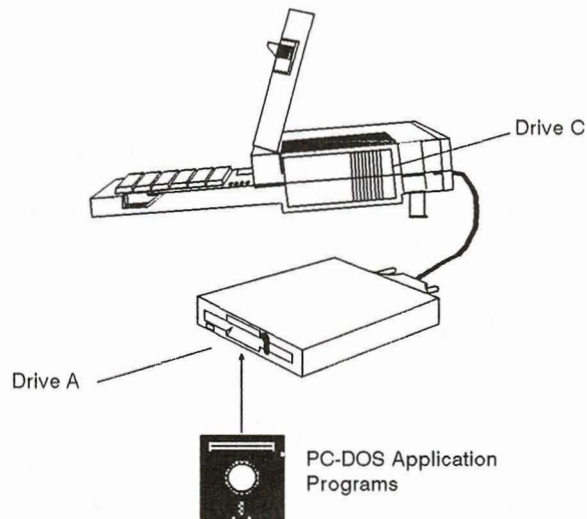


Figure 9-6. Running a Program from the GRiD External Diskette Drive

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" 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 diskette drive.

3. Start up (boot) the computer.

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 subsection 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 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, PC/XT, or PC/AT.

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, PC/XT, or PC/AT connected by a cable attached to a serial port of each computer.

Figure 9-7 shows a typical PCMASTER/PCSLAVE configuration; the procedure that starts below assumes this configuration of storage devices, although many others are possible.

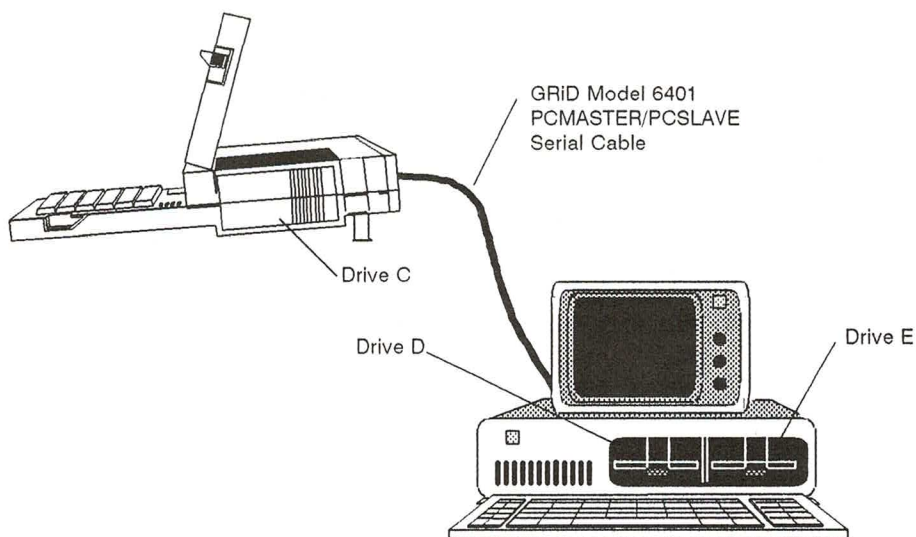


Figure 9-7. Moving Files Using the PC File Transfer Utilities

As shown in Figure 9-7, GRiD MS-DOS assigns the letter C to the GRiDCASE internal 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 9-7) 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 diskette, in ROM, or on the hard disk.
- The GRiD-supplied 5 1/4-inch diskette that contains the PCSLAVE.EXE file.
- A PC-DOS boot diskette for your IBM PC, PC/XT, or PC/AT.

- 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/AT, you will need a 9-pin-to-25-pin adapter cable, included with your PC/AT or available from your computer dealer.

CAUTION

The computer system that is running the most current version of 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 3.2, 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 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 6401 cable or your own null modem cable as shown in Figure 9-8.

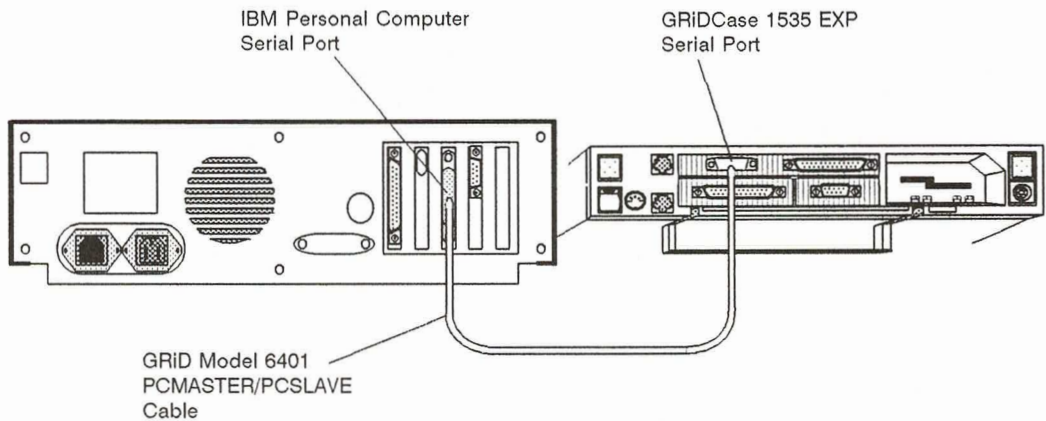


Figure 9-8. PCMASTER/PCSLAVE Cable Connection

3. At the IBM PC:

- Insert the PC-DOS boot diskette into the diskette drive and start up PC-DOS by turning on the power.
- Replace the boot diskette with the 5 1/4-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 the 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 can be found in the *MS-DOS Reference* manual.

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 pressing **Ctrl-Alt-Del**.

5. At the IBM PC, insert into Drive E the source diskette containing the files to be copied (see Figure 9-7).

6. At the GRiDCASE computer, you can specify any device on either the GRiDCASE (Drive C) or the IBM (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 (see Figure 9-7), 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 drive, 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 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: (*x* is a letter indicating the storage device.) First, 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
```

APPENDIX A: TESTING THE MODEM

If you suspect that your modem is not working properly, run the GRIDSCAN program (see Chapter 7) 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.

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 for the Option 331 modem).

It should take less than 30 seconds to connect to the modem at the GRiD Resource Center. If you don't connect, disconnect and call again. You may have a bad phone line. If you still can't connect to the modem after trying about five more times, your modem probably needs service. To confirm whether or not your phone line is bad, try the test using a different phone line.

If you do connect to the modem at the GRiD Resource Center, you will see a message on the screen indicating that you have made a successful connection.

To make sure your modem is working properly, follow the next step.

3. Type a few characters on the keyboard. If you get an error message, or you see characters other than those you typed, or a different number of characters than you typed, disconnect and try again. You may have a bad phone line. If you still can't connect to the modem after trying about five more times, your modem probably needs service. Again, to be absolutely sure, you should try the test with a different phone line.

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, phone the GRiD Resource Center at (415) 656-2100. 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, operating at 12.5 MHz

Displays

Backlit LCD (standard)	10" diagonal, blue LCD; 640 x 400-pixel display; aspect ratio of 1:1, contrast ratio of 11:1
Gas Plasma (Option 282)	10" diagonal, 640 x 400-pixel display; aspect ratio of 1:1, contrast ratio of 20:1

Memory

RAM	1 megabyte standard; 2,4, or 8 megabytes optional
-----	--

Modem

2400 Baud (Option 331)	300/1200/2400 bits-per-second Hayes Smartmodem 2400 compatible; auto dial, auto answer
---------------------------	--

Mass Storage

Hard Disk (standard)	40 megabyte capacity
Read-Only Memory (ROM)	Two 32-pin ROM mounting positions provided; MS-DOS operating system optionally available in ROM
3 1/2-Inch External Diskette Drive (Model 3401)	3 1/2" high-density (1.4 megabyte) diskette drive; reads, writes, and formats 1.4MB and 720KB diskettes
5 1/4-Inch External Diskette Drive (Model 3402)	5 1/4" 360KB diskette drive
5 1/4-Inch High Density Diskette Drive (Model 3404)	5 1/4" 1.2-megabyte diskette drive
Tape Backup System (Model 3403)	40 megabyte capacity; backs up internal hard disk

Interfaces

Serial	RS-232C 9-pin
Parallel	Centronics 25-pin
External Peripheral	Access to GRiD external diskette and tape drives
Video Output	RGB output, 9 pin, CGA compatible
Keyboard	5-pin DIN plug for PC/AT-compatible keyboard or GRiD 10-key keypad
Phone jacks (optional)	Two RJ-11 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 speaker
Keyboard	72 keys (alphanumeric), PC/AT- compatible, tactile feedback
Clock/calendar	Powered by internal lithium battery

Power Sources

Internal/external AC power pack	110 VAC or 220 VAC, autosensing
Internal battery pack (Model 32111)	1 lb. NiCad rechargeable battery pack fits inside computer
External attachable battery pack (Model 32161)	4.25 lb. NiCad rechargeable battery pack clips to top of computer

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° to 95° F (5° to 35° C)
Storage temperature	-4° to 149° F (-20° to 65° C)
Operating humidity	20% to 80% relative humidity
Storage humidity	5% to 95% relative humidity
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, and memory usage 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 64K 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 128K 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 one megabyte of dynamic RAM. The main memory can be optionally increased to two megabytes (Option 302), four megabytes (Option 304), or eight megabytes (Option 308).

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

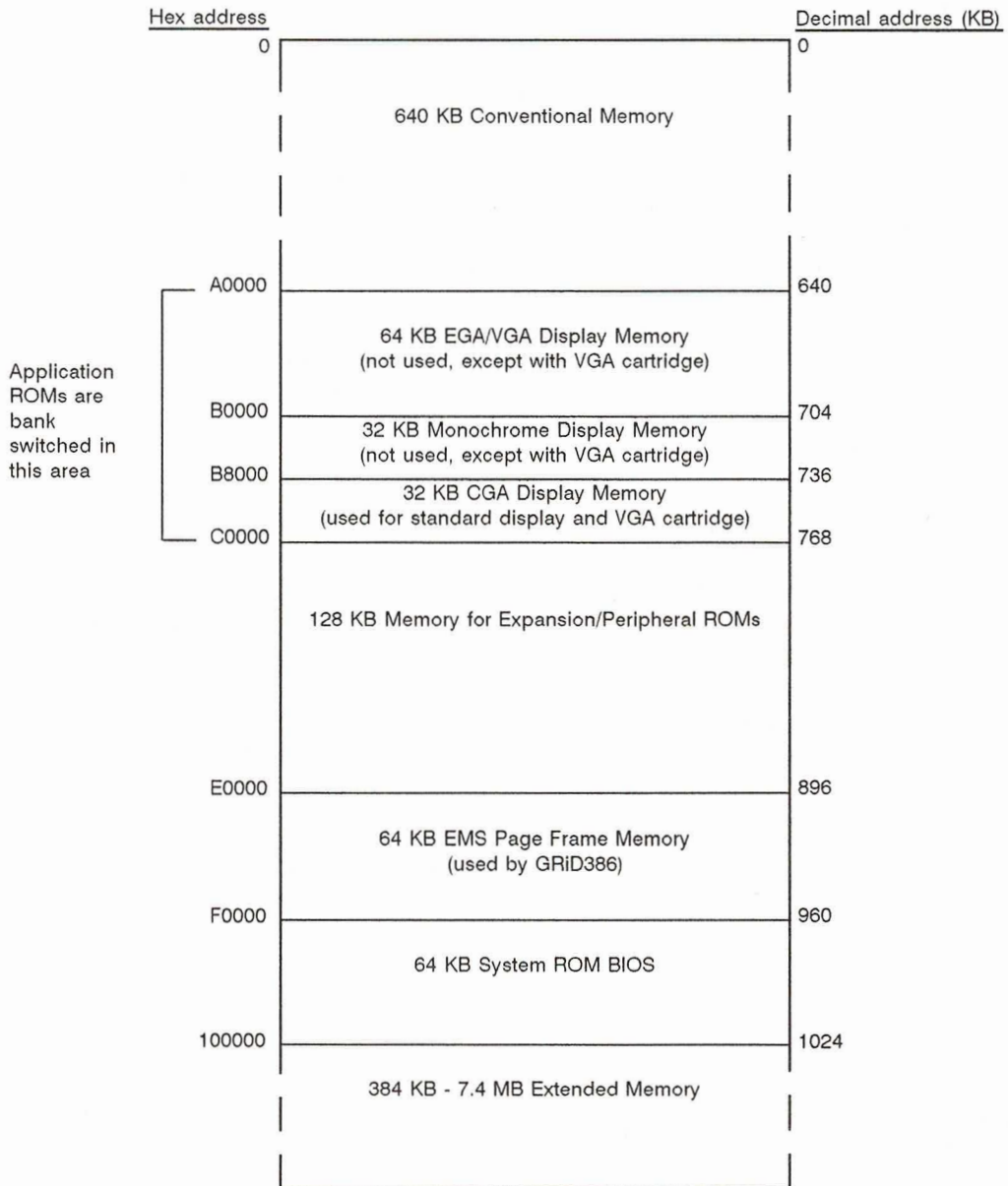


Figure D-1. Memory Map

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-4. System Resources Used by Expansion Cartridges

Cartridge	Hardware Interrupt	DMA Channel	I/O Register Addresses (hex)
Model 34010 High Speed Serial Cartridge	9	1	—
Model 34012 3270 Interface Cartridge	—	1	3EE; 220-227 (with IRMA driver)
Model 34013 VGA Video Controller Cartridge	—	—	3C6-3C9
Model 34014 Ethernet Interface Cartridge	2	—	360

Index

!

- 80387 coprocessor, 3-19
- ! (flash switch hook) command, 3-10
- @ (wait for answer) command, 3-11
- + + + (escape) command, 3-12
- , (pause) command, 3-9
- "" (alpha-numeric convert) command, 3-10

A

- A/ (repeat last command) command, 3-12
- AC power pack
 - 220 volt operation of, 4-2
 - capacity of when used externally, 4-2, 4-4
 - capacity of when used internally, 4-2, 4-5
 - caution concerning handling when hot, 4-6
 - connecting, 1-4
 - internal/external, 1-2
 - maintaining ventilation of, 4-4
 - using internally, 1-5
 - using to charge internal battery pack, 4-4, 4-9
 - using with expansion tray, 1-2, 1-5
 - warning concerning ejection of, 8-1
- acoustic coupler
 - with built-in modem, 3-7
- acoustic modem adapter, 3-7
- adapter cable
 - for use with PC file transfer utilities, 9-24
- adapters
 - telephone, 3-6
- adaptive dialing, 3-9
- address switch settings
 - changes effective at start up only, B-1

- address switches
 - changing internal modem, 9-18
 - pouch diskette drive, 5-4
 - tape drive, 5-5
 - to make floppy drive A, 9-21
- application programs
 - interchangeability of, 9-3
 - running from the external diskette drive, 9-21
- AT (attention) command, 3-8
- attachable battery pack
 - capacity of, 4-10
 - installing, 4-10
- auto/boat adapter
 - described, 4-3
 - recommended use of internal battery pack with, 4-13

B

- back light
 - effect of on battery life, 2-3
 - setting period before automatic turnoff, 9-12
 - to improve readability of LCD screen, 1-7
- back light adjustment switch
 - location of, 1-7
- back-light brightness
 - increasing or decreasing, 2-3
- backing up
 - importance of, 2-12
- battery charger
 - external, 4-3, 4-9

- battery life
 - effect of graphics display mode on, 4-8
 - effect of plasma display on, 1-7
 - effect of warm start on, 1-9
 - factors affecting, 4-8
- battery low/charging indicator, 2-4
- battery pack
 - attachable, 4-10
 - capacity of attachable, 4-10
 - desirability of removing during transport, 8-4
 - importance of allowing to discharge fully, 4-9
 - inserting, 1-4
 - internal, 1-4, 4-3, 4-7
 - recharging options, 4-9
 - recharging with AC power pack, 4-4
 - time required to recharge, 4-14
 - using with expansion tray, 1-4
- battery power
 - conserving by decreasing screen brightness, 2-3
- battery storage temperature
 - effect of on battery life, 4-8
- brightness switch, 2-3
- C**
- C (transmitter) command, 3-13
- centronics cable, 2-16–2-17
 - attaching, 2-18
- cigarette-lighter socket
 - caution concerning powering computer from, 4-13
- cleaning the computer
 - caution concerning, 8-2–8-3
- cleaning the screen, 8-3
- clock speed
 - changing, 2-4, 9-11
- color mapping mode
 - changing, 2-10, 9-11
- color monitor
 - differentiated from built-in display, 9-5
- COM1
 - device designator for internal modem, 9-5
 - use with the PC file transfer utilities, 9-25
- COM2
 - device designator for serial port, 9-5
 - use with the PC file transfer utilities, 9-25
- command state
 - accessing modem, 3-8
- communications software
 - required to put computer in terminal mode, 3-8
 - to control modem, 3-8
- computer
 - setting up, 1-3
- CONFIG.SYS file, 9-27
 - to invoke LOWPOWER.SYS, 9-3
- configuration switches
 - printer, 2-16, B-1
- connector label
 - location of, 2-13
- contrast switch, 2-3
- COPY command
 - error generated if target is ROM file, 9-6
- couplers
 - RJ-11 to telephone handset, 3-6
- cursor
 - changing shape off, 9-9
- cursor-control keys
 - table of, 2-8
- D**
- D (dial) command, 3-9
- data
 - loss of when battery pack is removed, 4-9
 - loss of when power is lost, 2-21
- desktop configuration, 9-4

- device drivers
 - LOWPOWER.SYS, 9-3
 - PCMASTER.SYS, 9-22
 - devices not supported, 9-17
 - dialing
 - adaptive, 3-9
 - DIP switches
 - expansion card, 6-8
 - disk heads
 - parking, 2-12
 - disk in use indicator, 2-4
 - DISKCOMP command
 - not applicable to slave station, 9-27
 - DISKCOPY command
 - not applicable to slave station, 9-27
 - diskette drive
 - address switch settings for pocket, 5-2
 - cabling of 5 1/4-inch, 5-3
 - external, 2-12
 - location of address switches, 5-5
 - power requirements of external 5 1/4-inch, 5-3
 - switch settings to make drive A, 9-21
 - using to load files onto the hard disk, 9-4
 - diskette drive switch settings
 - caution concerning changing, 9-21
 - diskette drives
 - number of logical, 5-5
 - diskette file
 - precedence over identically named ROM file, 9-6
 - diskettes
 - distinguishing between 1.4M and 720K, 9-8
 - display
 - advantages of gas plasma, 3-2
 - differences between internal and color monitor, 9-5
 - disabling internal circuitry of, 9-13
 - how it differs from IBM color, 9-2
 - display adapter
 - adding, 9-13
 - display fonts
 - list of those available, 9-10
 - displays
 - switching between internal and external, 2-20
 - DMA channel assignments, D-3
 - double-density diskette format
 - special form of the FORMAT command, 9-8
 - double-density diskettes
 - not suitable for 1.4M format, 9-8
 - using FORMATLD.BAT to format, 9-8
 - drive designators
 - assigned by PC File Transfer Utilities, 9-23
 - for running programs from an external drive, 9-20
 - primary and secondary, 5-5
- E**
- E (command-state echo) command, 3-13
 - EMS memory
 - emulating with GRiD386, 1-2, 3-2
 - errors
 - software/hardware, 7-5
 - user, 7-1
 - escape command
 - to access modem command state, 3-8
 - expansion bus
 - accessed through power pack/accessory slot, 2-20
 - powering the computer during use, 2-21
 - expansion bus connector
 - location of, 2-22
 - expansion cards
 - correct handling of, 6-14
 - limit on power consumption of, 6-2
 - orientation of, 6-8
 - PC/AT compatible, 6-1
 - PC/XT compatible, 6-1

- power consumption of, 6-15
- restrictions on using, 6-1
- technical information needed for, D-1
- use with LCD screen, 6-15
- use with plasma screen, 6-15
- warning concerning exceeding wattage limits, 6-15
- width limitations on, 6-2
- expansion cartridges, 2-20
 - system resources used by, D-7
- expansion chassis
 - capacity of, 2-20
- expansion products
 - ejecting from power pack/accessory slot, 2-21
- expansion slots
 - compatibility, 6-1
 - expansion card size accommodated by, 6-1
- expansion tray
 - basic configuration of, 6-1
 - caution concerning attachment of, 6-11
 - caution concerning detachment of, 6-13
- expansion tray vent covers, 6-7
- expansion unit
 - maintaining proper clearance under, 6-16
- expansion unit auxiliary fan
 - positioning, 6-5
 - removing, 6-5
 - when to use, 6-5
- expansion unit fan
 - installing, 6-6
- expansion unit slots
 - IBM PC/AT compatible, 6-8
 - IBM PC/XT compatible, 6-8
 - orientation of, 6-8
- extended memory
 - configuring as EMS, 1-2, 3-2
- external 5 1/4-inch diskette drive
 - cabling of, 5-3
 - power requirements of, 5-3

- external battery charger, 4-14
- external devices
 - powering off before connecting, 1-7
- external drive
 - use in backing up files, 2-12
- external drive connector
 - location of, 5-3
- external keyboard, 2-14
- external monitor
 - directing video output to, 2-10
 - RGB requirement, 2-19
 - switching video output to, 9-10
- external peripheral connector
 - appearance of, 2-19
 - location of, 5-1
 - not interchangeable with parallel connector, 2-17

F

- F (on-line echo) command, 3-13
- fan
 - installing in expansion unit, 6-6
 - removing from expansion unit, 6-5
 - using in expansion unit, 6-5
- FDISK command
 - not applicable to slave station, 9-27
- Federal Communications Commission
 - modem information required for, 3-3
- file transfer utilities
 - power-on sequence when using, 9-26
 - requirements for, 9-23
- files
 - backing up, 2-12
 - copying, 2-12
- fonts
 - list of those available, 9-10
- FORMAT command, 9-7
 - not applicable to slave station, 9-27
 - special form for double-density format, 9-8
- FORMATLD.BAT
 - for formatting 720K diskettes, 9-8

French Canadian display font, 9-10
 function keys
 table of, 2-8
 using F13 through F20, 2-6

G

graphics display mode
 effect of on battery life, 4-8
 GRiD MS-DOS
 features not available from PC-DOS, 9-3
 GRiD Resource Center
 telephone number of, 7-5
 GRiD386, 1-2, 3-2
 GRIDSCAN command, 7-6
 GW-BASIC
 substituting for BASICA, 9-16

H

H (on/off hook) command, 3-13
 handle
 using as a leg, 1-3
 hard disk, 2-12
 automatic MS-DOS load from, 9-22
 backing up files on, 2-12
 default load of operating system from, 1-8
 loading files onto, 9-4
 loading operating system from, 1-7
 loading programs on, 1-7
 parking heads of, 2-12
 hard disk power
 turning on and off, 9-13
 hardware interrupt assignments, D-1
 Hebrew display font, 9-10
 HELP command, 9-3
 high-density diskettes
 required for 1.4M format, 9-8
 high-density format
 warning concerning, 9-8

I

I/O register addresses, D-4
 indicator lights
 battery charging/low, 2-4
 lower/external disk in use, 2-4
 processor low, 2-4
 upper disk in use, 2-4
 internal battery pack
 installing, 4-7
 time required to recharge, 4-4, 4-14
 using with expansion tray, 1-4
 internal hard disk, 2-12
 internal modem
 baud rates supported, 3-3
 commands, 3-7–3-18
 equipment model number of, 3-3
 FCC registration number of, 3-4
 incompatibility of with PBX systems, 3-6
 manufacturer of, 3-3
 model number of, 3-4
 ringer equivalence of, 3-4
 software switches, 9-18
 internal numeric keypad
 disabling/enabling, 9-13
 interrupt assignments, D-1

J

jumpers
 on expansion cards, 6-8

K

keyboard
 colored keys, 2-5
 connecting, 2-14
 external, 2-14
 functionality of, 2-5, 9-2
 keyboards
 compatible, 9-4
 keypad
 accessing numeric, 2-7

keys

- table of cursor-control, 2-8
- table of numeric keypad, 2-9
- table of special characters, 2-10
- table of typewriter keyboard, 2-9

L

LOWPOWER.SYS, 9-3

M

M (speaker control) command, 3-14

master station

- requirement for most current MS-DOS, 9-24

memory map, D-5

MODE command

- appending ROM files to drive, 9-10
- list of options for, 9-16
- to change color mapping mode, 9-11
- to change cursor, 9-9
- to change default serial settings, 2-15
- to change display font, 9-10
- to change internal modem switch settings, 9-9, 9-18
- to control hard disk power, 9-13
- to control LCD back light, 9-12
- to disable/enable internal display circuitry, 9-13
- to disable/enable the internal numeric keypad, 9-13
- using external monitor, 9-10

modem

- as MS-DOS COM1 device, 9-5
- commands, 3-7–3-18
- connecting to computer, 2-15
- equipment model number of, 3-3
- FCC registration number of, 3-4
- incompatibility of with PBX systems, 3-6
- manufacturer of, 3-3

model number of, 3-4

ringer equivalence of, 3-4

software switches, 9-18

testing, A-1

modem adapter

acoustic, 3-7

modem command state

accessing, 3-8

modem commands

A/, 3-12

alpha-numeric convert (""), 3-10

AT, 3-8

C, 3-13

D, 3-9

E, 3-13

escape (+ + +), 3-12

F, 3-13

flash switch hook (!), 3-10

H, 3-13

issuing, 3-8

M, 3-14

P, 3-9

pause (,), 3-9

Q, 3-14

R, 3-11

repeat current command, 3-12

return to command state (;), 3-10

S, 3-14, 3-16

T, 3-9

V, 3-16

W, 3-11

wait for answer (@), 3-11

X, 3-17

Z, 3-18

modem register values

table of, 3-15–3-16

modem result codes

table of, 3-17

modem switches

changing, 9-9

MS-DOS

- availability of in ROM, 9-2

MS-DOS commands

- applicability to slave station, 9-27
- not applicable to slave station, 9-30

N

- Norwegian display font, 9-10

null modem cable

- for use with PC file transfer utilities, 9-24

numeric coprocessor

- effect of on battery life, 4-8

numeric keypad

- disabling/enabling, 9-13

numeric keypad keys

- accessing when not in NumLock mode, 2-7
- table of, 2-9

NumLock mode

- entering, 2-7
- leaving, 2-7

O**operating system**

- effect of on battery life, 4-8
- importance of using GRiD-supplied, 4-8, 9-3
- loading from floppy disk, 1-8
- loading from hard disk, 1-8
- loading from ROM, 1-7
- sequence of devices searched for, 1-8

operating system loading sequence

- overriding, 1-8

options

- built-in, 3-1
- list of, 3-1

overheating

- precautions against, 6-15

P

- P (pulse dialing) command, 3-9

packaging material

- importance of retaining, 1-2

parallel connector

- limited to one device at a time, 2-17
- not interchangeable with external peripheral connector, 2-17

PCMASTER program, 9-22**PCMASTER.SYS, 9-23**

- need for current version, 9-29

PCMASTER/PCSLAVE

- typical configuration, 9-22

PCMASTER/PCSLAVE cable

- using to load files onto the hard disk, 9-4

PCSLAVE program, 9-22**PCSLAVE.COM, 9-23, 9-25**

- need for current version, 9-29

plasma display

- advantages of, 3-2
- effect of on power consumption, 2-3

plug adapter

- importance of grounded, 1-4–1-5

pocket diskette drive

- setting address switches of, 5-2
- usable with any power option, 5-2
- using to load files onto the hard disk, 9-4

pouch diskette drive

- running programs from, 9-20
- setting address switches of, 5-4
- using to load files onto the hard disk, 9-4

power consumption

- limits for expansion cards, 6-2

power options

- table of, 4-1

power pack

- capacity of when used externally, 4-2, 4-4
- capacity of when used internally, 4-2, 4-5
- caution concerning handling when hot, 4-6
- connecting, 1-4
- internal/external AC, 1-2

- maintaining ventilation of, 4-4
- using internally, 1-5
- using to charge internal battery pack, 4-4, 4-9
- using with expansion tray, 1-2, 1-5
- warning concerning ejection of, 8-1
- power plug adapter
 - warning concerning grounding of, 8-1
- power supply
 - overloading, 6-16
- power supply options, 1-2
- power switch
 - importance of turning off for travel, 8-4
 - location of, 1-3, 1-6, 2-13
 - turning off, 1-10
 - used to cold boot computer, 1-10
- printer
 - connecting to computer, 2-16, 2-18
- printer configuration switches, 2-16, B-1
- printer device drivers, 2-16
- processor low indicator, 2-4
- processor speed
 - changing, 2-4, 2-11, 9-11

Q

- Q (quiet) command, 3-14

R

- R (reverse frequency) command, 3-11
- radio frequency interference
 - suggestions for eliminating, 7-7
- RAM
 - additional system, 3-2
 - configurations, 3-2
- repeat current command, 3-12
- RJ-11 jack, 2-15, 3-5
- ROM
 - operating system in, 1-7
- ROM files
 - appended to logical drives, 9-6, 9-10
 - differentiated from diskette files, 9-6

- not erasable, 9-6
- superceded by identically named diskette file, 9-6
- turning off during copy operation, 9-7
- ROM mounting positions
 - location of, 3-3, 9-6
- ROMs, 2-5
 - advantages of, 3-3
 - caution concerning, 2-5
- RS-232C connector, 2-15

S

- S (register) command, 3-14, 3-16
- screen
 - adjusting the angle of, 1-7
 - adjusting the contrast or brightness of, 1-7
 - cleaning, 8-3
 - LCD, 2-2
 - plasma, 2-2
- screen brightness
 - effect of on battery life, 1-7, 2-3
 - increasing or decreasing, 2-3
- screen contrast
 - increasing or decreasing, 2-3
- screen latches
 - location of, 2-1
 - releasing, 1-6
- screen type
 - effect of on battery life, 4-8
- serial cable
 - connecting, 2-17
 - for use with PC file transfer utilities, 9-24
- serial cards
 - limitations on, 6-2
- serial connector
 - limited to one device at a time, 2-15
- serial port
 - default settings required for PC file transfer, 9-29
- serial ports
 - checking switch settings of IBM, 9-29

- shock hazard
 - warning concerning, 8-3
- short-card support bracket
 - adjusting, 6-8
 - mounting positions for, 6-8
- special characters
 - table of, 2-10
- SYS command, 1-7

- T**
- T (touch dialing) command, 3-9
- tape drive
 - setting the address switches of, 5-5
 - use of to back up hard disk, 2-12
- telephone
 - connecting to the computer, 3-5
- telephone connectors
 - interchangeability of, 2-15
- temperature
 - battery storage, 4-8
 - computer operating range, 8-2
 - computer storage range, 8-2, 8-4
- terminal mode
 - software required for, 3-8
- troubleshooting, 7-1
- typewriter keyboard keys
 - table of, 2-9

- V**
- V (verbose) command, 3-16
- vent covers
 - positioning in expansion tray, 6-7
- video cards
 - limitations on, 6-2
- video output
 - switching between internal and external, 2-10, 2-20

- W**
- W (wait for second dial tone) command, 3-11
- warm boot
 - effect of on battery life, 1-9
 - keystrokes for, 1-9
 - to reduce power consumption, 4-8
 - to save wear on power supply and main power switch, 1-9

- X**
- X (result code) command, 3-17

- Z**
- Z (reset) command, 3-18

