TEMPEST GRiDCase
Owner's Guide

TEMPEST GRiDCase Owner's Guide

October 1986

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 5 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 from the 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, Customer Service Center, 2535 Garcia Avenue, P.O. Box 7535,
Mountain View, California 94039-7535 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 whatever. 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.

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About This Book

The TEMPEST GRiDCase Owner's Guide introduces you to the TEMPEST GRiDCase™ computer. This manual describes the TEMPEST GRiDCase, explains how to set up and care for it, and helps you start using your TEMPEST GRiDCase.

Getting the Most From This Manual Although it would certainly be beneficial if every TEMPEST GRiDCase owner read this manual from cover to cover, we recognize that is unlikely to happen. Few owners, in fact, are likely to need all the information in this manual all at once. Therefore, we have attempted to design the manual to be useful to owners with a variety of needs.

How you can most usefully employ this manual depends on your situation.

If you have never used a GRiD™ Systems Corporation computer before, you may find it helpful to follow the steps listed below to start using your TEMPEST GRiDCase.

Getting Started with the TEMPEST GRiDCase and This Manual

1. Read Chapter 1, "An Introduction to the TEMPEST GRiDCase."
2. Read Chapter 2, "Setting Up Your TEMPEST GRiDCase," and follow the directions to set up your computer as you read. At the appropriate point, those instructions direct you to Chapter 4.
3. Read Chapter 4, "Using the Internal Drive." Practice inserting diskettes in the internal drive and removing them from the drive until you feel comfortable with those operations.
4. If you are not familiar with the operating system you are going to use, read Chapter 10, "A Brief Introduction to Operating Systems."
5. Go back to Chapter 2 and finish setting up the computer. You should now be ready to start running your TEMPEST GRiDCase with confidence.
6. Read Chapter 3, "Getting to Know Your TEMPEST GRiDCase," to familiarize yourself more thoroughly with your computer.
7. If you have any external devices, such as diskette drives or printers, read Chapter 7, "External Devices." This chapter tells you how to connect your external devices.
8. Read Chapter 8, "Maintenance" at your leisure.
9. Refer to chapters 5, 6, and 9 as needed.

If you are already familiar with other GRiD Systems Corporation computers, but not with the TEMPEST GRiDCase, you should read at least Chapter 3, "Getting to Know Your TEMPEST GRiDCase." Refer to other chapters as needed.

If you encounter any difficulties with your TEMPEST GRiDCase, please call the GRiD Resource Center at (415) 961-4743.

Books You May Need   Although the *TEMPEST GRiDCase Owner's Guide* contains all the information you need to begin using your TEMPEST GRiDCase, you will need to refer to other manuals for more detailed operating system information and for information about any application programs or additional hardware you purchase. Listed below are some manuals that you may find useful.

GRiD-OS Publications

Getting Started: GRiD Software for the GRiDCase (Order Number: 029100-43), for introductory information on GRiD Software.

GRiD Software Manual (Order Number: 029400-40), for reference information on the GRiD-OS operating system.

MS-DOS Publications

Using MS-DOS on the TEMPEST GRiDCase (Order Number: 029557-44), for introductory information on using MS-DOS on the TEMPEST GRiDCase.

TEMPEST GRiDCase MS-DOS Reference (Order Number: 29557-40), for reference information on using MS-DOS on the TEMPEST GRiDCase.

Hardware Publications

GRiD Portable Diskette Drive Owner's Guide (Order Number: 2102-40), for information on setting up and operating the portable 5¼-inch TEMPEST-accredited diskette drive.

GRiD 2127 Removable Storage Device Owner's Manual (Order Number: 2127-40), for information on setting up and operating the portable TEMPEST-accredited storage device.

TEMPEST GRiDCase Technical Reference Manual (Order Number: 001307-50)

Chapter 1: An Introduction to the TEMPEST GRiDCase

This chapter introduces you to the major features of the TEMPEST GRiDCase. It briefly describes the computer, lists available options, and gives the computer's specifications.

Description   The TEMPEST GRiDCase, shown in Figure 1-1, is a powerful, lightweight, portable microcomputer.

Figure 1-1. *TEMPEST GRiDCase*

Main Memory
The TEMPEST GRiDCase is equipped with 640 kilobytes of random-access memory (640K RAM).

Built-In Storage
The TEMPEST GRiDCase is equipped with one internally mounted 3½-inch diskette drive. Each double-sided, double-density 135 TPI diskette stores up to 720K bytes of data.

User-Installable Read Only Memory
You can install up to four ROM (read only memory) or EPROM (erasable programmable read only memory) chips in the TEMPEST GRiDCase. This allows you to keep up to half a megabyte of frequently-used software readily available and frees the internal diskette drive for data. See Chapter 6 for ROM installation details.

Display

The display is a flip-up, flat-panel electroluminescent light-emitting amber display. It is bit mapped, with a resolution of 640 by 200 pixels; it displays 80 characters by 25 lines of text, and measures 8½ inches diagonally.

External Connectors

The TEMPEST GRiDCase is equipped with the following external connectors:

□ **25-pin PC-compatible Centronics Parallel Connector:** This connector allows you to connect any standard PC-compatible parallel device to the TEMPEST GRiDCase. Typical parallel devices include printers and plotters.

□ **25-pin PC-compatible RS-232C Serial Connector:** This connector allows you to connect any standard PC-compatible serial device to the TEMPEST GRiDCase. Typical serial devices include external modems and many letter-quality printers.

□ **19-pin RS-232C/RS-422 Serial Connector:** This connector can be used for both synchronous and asynchronous communications. In synchronous mode, transmission rates of up to 250K baud are possible.

□ **IEEE-488 General-Purpose Interface Bus (GPIB):** Use this connector to attach GRiD-supplied external diskette drives, storage devices, and instrumentation devices. You can also use this connector with parallel printers and plotters that are equipped with GPIB connectors.

□ **External Side Connector:** This 25-pin connector is reserved for future use.

   CAUTION: Connect **only** GRiD-supplied devices to this connector. Connecting **any** other device may damage the computer's internal circuitry and will void your warranty.

Available Options   The options listed below are available from GRiD Systems Corporation to enhance the performance of your TEMPEST GRiDCase.

□ **8087 Math Co-processor:** You can purchase your TEMPEST GRiDCase with a factory-installed 8087 math co-processor to increase the speed of applications that are math intensive.

□ **2107 External Diskette Drive:** The 2107 external drive is the TEMPEST-accredited version of GRiD's portable 5¼-inch floppy diskette drive. It provides an additional 360K of storage per double-sided, double-density diskette and gives you a means of transferring data and non-copy-protected software from 5¼-inch media to 3½-inch media and vice versa.

□ **2127 Removable Storage Device**: The 2127 removable storage device (somtimes referred to as a "Bernoulli box") consists of two cartridge disk drives in a single TEMPEST-accredited housing. Each removable cartridge holds up to five megabytes of data, thus giving you high-speed access to up to 10 megabytes of storage at a time. Because the cartridges are removable, there is no limit to the total amount of storage you can access with the 2127. The 2127 thus combines the best features of floppy diskette and fixed disk drives.

□ **Power Supply Options**: You can power the TEMPEST GRiDCase in a variety of ways, listed below. Power supply options are described in detail in Chapter 5.

  - Internal Battery Pack, Model 32110
  - Internal/External AC Power Pack, Model 32137 (auto-ranging, 115 or 220 volts)
  - External AC Power Pack, Model 32131 (switchable to either 115 or 220 volts)
  - Internal AC Power Pack, Model 32120 (115 V)
    Model 32122 (220 V)
  - Auto/Boat Adapter, Model 32136
  - External Battery Pack, Model 32135
  - External Battery Charger, Model 32115

Specifications

TEMPEST Standard	NACSIM 5100A
Microprocessors	
Main microprocessor	80C86
Clock speed	4.77 MHz
Arithmetic co-processor (optional)	8087

Memory	
RAM	640K
ROM	4 28-pin direct-pin mounting positions supporting 32K and 64K EPROMs and 128K ROMs
Built-In Storage	One 720K 3½-inch diskette drive

Display

Type	Electroluminescent, light emitting, bit mapped, amber color
Size, characters	80 characters by 25 lines
Size, pixels	640 x 200, PC-compatible
Size, diagonal	8 ½ inches
Aspect ratio	1:1.6

Interfaces

Parallel	25-pin Centronics, PC-compatible
	IEEE-488 General Purpose Interface Bus (GPIB)
Serial	25-pin RS-232C, PC-compatible
	19-pin RS-232C/RS-422 connector
External side connector	25-pin connector reserved for future use

CAUTION: Connect **only** GRiD-supplied devices to this connector. Connecting **any** other device may damage the computer's internal circuitry and will void your warranty.

Other Features

Audio	Built-in speaker
Keyboard	71 keys, tactile feedback, PC-compatible
Clock/calendar	Internal lithium battery powered

Power

Requirement	10 to 18 VDC, 30 Watts

Power Options

Internal battery pack (optional)	Removeable NiCad rechargeable pack provides up to 1½ hours of power
Internal/External AC power pack	70 W max. at 115 VAC or 220 VAC
External AC power pack	50W at 115 VAC or 220 VAC
Internal AC power pack (optional)	25 W at 115 VAC or 220 VAC
External battery pack (optional)	3.5 lb NiCad rechargeable pack provides 3 to 5 hours of power

Physical Characteristics

Case	Magnesium
Weight	Under 15 pounds
Height	2.25 inches (5.7 cm)
Width	11.5 inches (29 cm)
Length	15 inches (38 cm)
Operating temperature	41° to 113° F (5° to 45° C)
Storage temperature	– 4° to 149° F (– 20° to 65° C)
Operating humidity	20% to 80%, noncondensing
Shock tolerance	50 Gs, nonoperating
Vibration tolerance	5 to 60 Hz, 3 Gs max., nonoperating
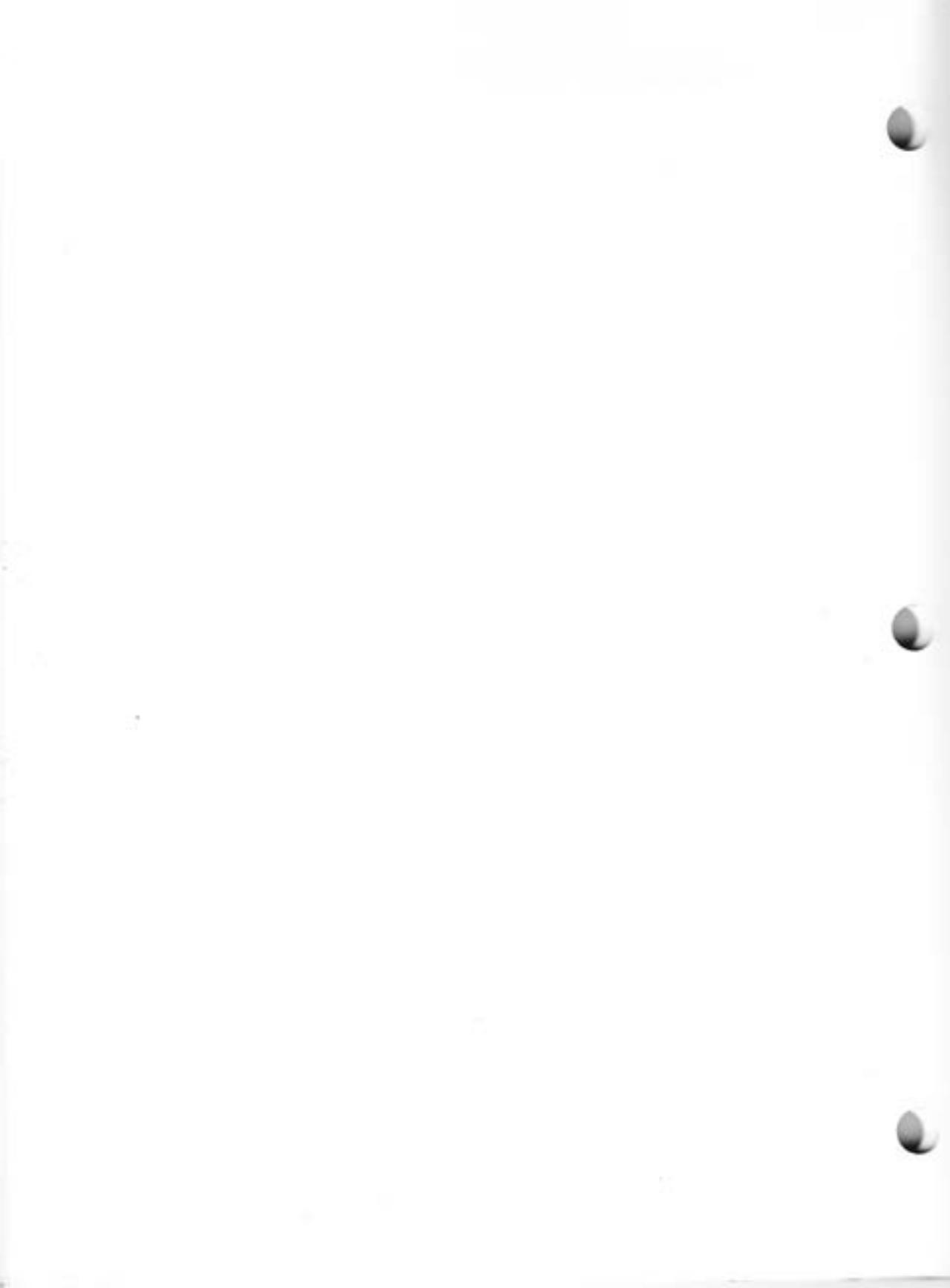
Chapter 2: Setting Up Your TEMPEST GRiDCase

This chapter tells you how to prepare your TEMPEST GRiDCase for use. It covers checking the contents of the shipping box, setting up the computer, starting the operating system, and preparing the computer for travel.

Checking the Contents of the Box   Figure 2-1 show the parts included in the TEMPEST GRiDCase shipping carton.

Figure 2-1. *Contents of the Shipping Carton*
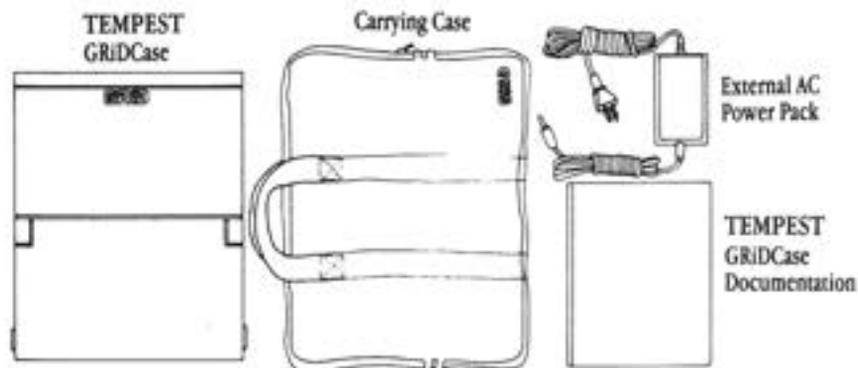
Check for shipping damage or missing parts. If there are any problems, contact the GRiD representative from whom you purchased your TEMPEST GRiDCase.

Keep the shipping carton and all original packing materials. You will need them if you ever return your TEMPEST GRiDCase for upgrading or service. **Shipping the computer in a carton other than the original shipping carton may result in damage to the computer. You assume responsibility for any damage so incurred.**

In addition to the original shipping materials, you should also keep the travel diskette that is in the internal diskette drive when you unpack the computer. You should always put the travel diskette back in the internal drive whenever you transport your TEMPEST GRiDCase. **Failure to insert a travel diskette in the internal drive before you transport the computer may result in damage to the drive.**

Starting Your TEMPEST GRiDCase   Clear a sturdy, flat work surface for the computer. Then follow the steps listed below:

1. **Make sure the on/off switch is off.**
   The on/off switch is on the back of the computer, at the far right as you face the front of the computer. When the computer is off, the bottom of the switch is pushed in, and you can see a red circle on the top of the switch. Make sure that circle is visible before you go on.

   Off Position
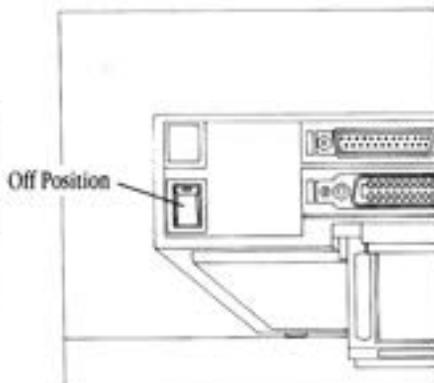
2. **Pull down the computer's leg.**
   This step is optional and does not affect the operation of the computer. You may, however, find that both your typing angle and your viewing angle are improved when you use the leg. If you do decide to use the leg, make sure you pull it down until it clicks firmly into place.

3. **Connect the computer to its power source.**
   The procedure for this step varies depending on the power supply option you are using (see Chapter 5, "Power Supply Options" for detailed information about available power supply options).

3a. **Internal Battery Pack.**
   As you face the back of the computer, hold the internal battery pack with the labeled end facing you. Then insert it into the powerpack slot in the back of the computer until it clicks firmly into place.
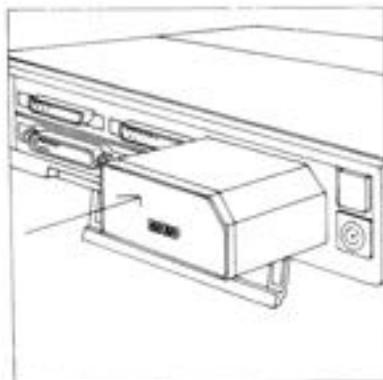
3b. Internal/External AC Power Pack.

As its name implies, the internal/external AC power pack can be used either internally or externally.

If you are using the power pack internally, hold it with the labeled end facing you. Then insert it in the power pack slot in the back of the computer until it clicks firmly into place.

Plug the female end of the shielded power cord into the power cord socket on the back of the power pack. Plug the male end of the power cord into a standard, three-hole grounded wall outlet. (If you use a plug adapter to plug the AC power cord into a two-hole wall outlet, **make sure the plug adapter is properly grounded.**
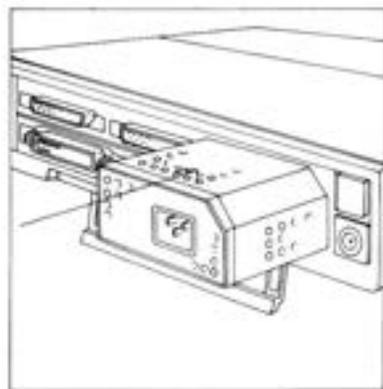
3c. External AC Power Pack.

Set the line voltage switch on the external AC power pack to the correct voltage. In the United States, this is 115 volts. Outside the United States, check the local voltage, and set the line voltage switch to match.

The external AC power pack has two cords.

One is permanently attached to the power pack at one end and has a single-prong jack at the other end. This is the direct-current (DC) cord. Plug the end of this cord into the DC input connector on the back of the TEMPEST GRiDCase.
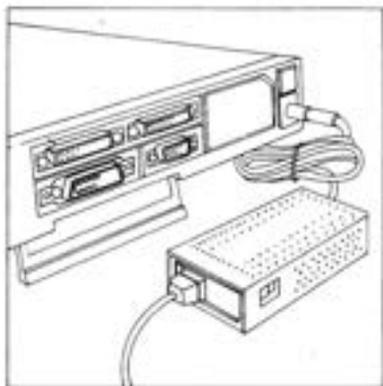
The other cord is the power pack's shielded AC power cord. Plug the female end of this cord into the power cord socket on the power pack. Then plug the male end of the cord into a standard three-hole grounded wall outlet. (If you use a plug adapter to plug the AC power cord into a two-hole wall outlet, **make sure the plug adapter is properly grounded.**

3d. Internal AC Power Pack.
The internal AC power pack comes in two versions: one for 115-volt current, and one for 220-volt current. Check your power pack's label to make sure you have the right power pack for your area.

Hold the internal AC power pack with the labeled end facing you. Then insert it into the power-pack slot in the back of the computer until it clicks firmly into place.

Plug the female end of the shielded power cord into the power cord socket on the back of the internal power pack. Plug the male end of the power cord into a standard three-hole grounded wall outlet. (If you use a plug adapter to plug the AC power cord into a two-hole wall outlet, **make sure the plug adapter is properly grounded.**)

4. Lift the display screen.
The screen is locked in the closed position by two latches, one on each side of the case. Pull both latches toward you simultaneously to unlock the screen; then lift the screen into its operating position.
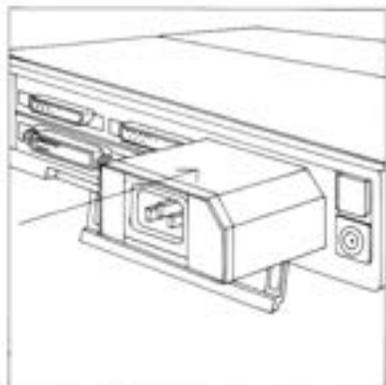
NOTE: If you are not familiar with the operation of 3 ½ -inch diskette drives, you may find it helpful to read Chapter 4, "Using the Internal Drive," before you proceed with the setup of your TEMPEST GRiDCase.

5. **Write protect your operating system diskette.**
   Although this step is not absolutely necessary, we strongly recommend that you take the precaution of write protecting your operating system diskette to ensure that you do not accidentally erase or alter any of the files on the diskette. Those files are essential to the satisfactory operation of your TEMPEST GRiDCase.

   Look at the side of the diskette with the smaller label. In one corner of this side of the diskette, you will find the write-protect hole and the write-protect tab (see illustration). To write protect the diskette, slide the write-protect tab toward the edge of the diskette so that you can see clear through the write-protect hole. Once you have done so, it is physically impossible for the diskette drive to write new files to the diskette or, more important, to erase or alter the files already on the diskette.
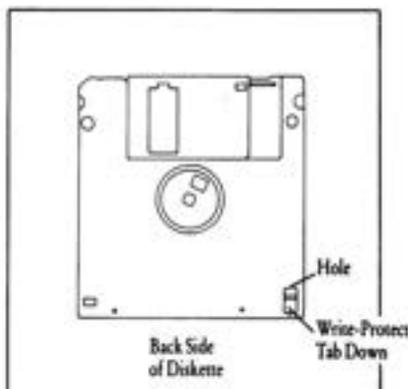
6. **Eject the travel diskette from the internal floppy diskette drive.**
   Press the diskette eject button on the side of the computer to eject the travel diskette. This diskette is designed to protect the internal drive during transport of the computer. Do not operate the computer with the travel diskette in place. **Save the travel diskette for future use.**
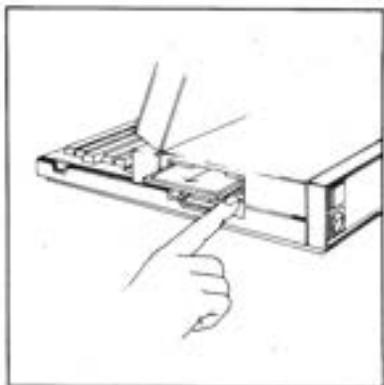
7. **Insert the operating system diskette in the internal diskette drive.**
   (This step is not necessary if you have already installed system ROMs in the computer. Refer to Chapter 6, "User-Installable Read-Only Memory," for information on ROM installation.)

   Hold the diskette so that the side with the larger label is up and the metal edge faces away from you. Insert the diskette metal-edge first into the diskette drive opening (there should be an arrow on the diskette itself indicating the proper direction for insertion). Push the diskette in gently until it clicks into place. **Never jam a diskette into the drive.** If you have trouble inserting the diskette, press the eject button on the drive and try again.

   NOTE: If you are not yet familiar with the operating system you will be using, you may find it helpful to stop here and read Chapter 10, "A Brief Introduction to Operating Systems."
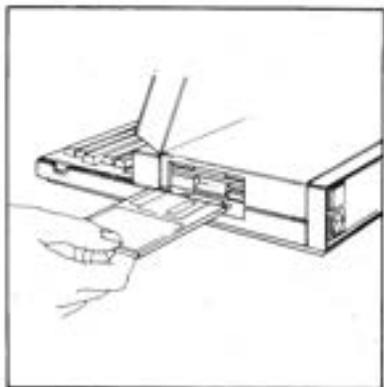
8. **Turn the computer on.**

The on/off switch is located on
the back of the computer, to the
far right as you face the front
of the machine. Press on the top of
this switch to turn the TEMPEST
GRiDCase on.

On Position

When you turn the computer
on, the first thing it does is load
the operating system from
auxiliary storage into main
memory (RAM). This process
takes from approximately 20
seconds to approximately 60
seconds, depending on which
operating system you use and on the type of auxuliary storage from
which the operating system is loaded.

If you are usng GRiD-OS, the screen displays the File Form when the
operating system is fully loaded (refer to Chapter 10 for a description of
the File Form). If you are using MS-DOS, you are prompted to supply
the current date and time. Once you have done so, the MS-DOS system
prompt is displayed. At this point, you are ready to begin using your
TEMPEST GRiDCase. Refer to your software documentation for
information specific to the application software package(s) you
have purchased.

NOTE: If you have **both** MS-DOS and GRiD-OS in installed ROMs, the
computer loads MS-DOS unless you specify GRiD-OS. Refer to "Cold
Start-Up" below for details.
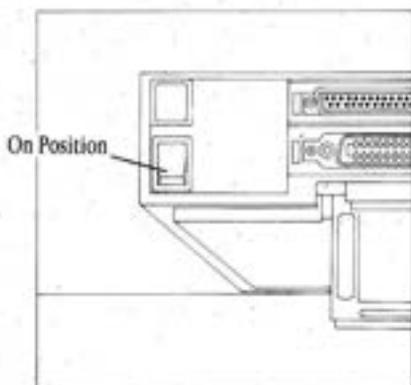
Connecting External Devices

If you have any external devices, such as
printers or external drives, to connect to your computer, please read
Chapter 7, "External Devices," before doing so.

CAUTION: Before connecting any device to your computer or
disconnecting any device from your computer, **always turn off both the
other device and the computer**. Failure to do so may result in damage to
your computer's internal circuitry. The low-power circuitry of the TEMPEST
GRiDCase can be damaged by static discharge. Static discharge occurs
whenever you connect or disconnect a device, if either the device or the
computer is turned on at the time. Once you have connected an external
device to the computer, you should always **turn the external device on
before you turn the computer on**. Likewise, you should **turn the
external device off before you turn the computer off**.

Starting or Restarting the Operating System

Cold Start-Up

Whenever you turn the TEMPEST GRiDCase on, it loads the operating system from auxiliary storage (generally ROM or diskette) into main memory (RAM). Loading the operating system in this way is sometimes called a cold start-up or a cold *boot*. When you cold start the computer, it looks for the operating system first in ROM. If it finds an operating system in ROM, it loads that operating system. If the computer finds no operating system in ROM, it then looks for an operating system on the internal floppy diskette, and finally on the lowest-addressed GPIB device (if any). Refer to Chapter 7 for more information on external devices. You can, however, override the order in which the computer searches devices for the operating system.

Pressing one of the following keys during start-up forces the computer to load the operating system from the device indicated:

F   Operating system is loaded from the internal Floppy diskette drive.

E   Operating system is loaded from the lowest-addressed GPIB drive (if present). If a 2127 is the lowest-addressed GPIB drive, the operating system is loaded from the left drive of the 2127.

The first message that appears on the screen after you turn the computer on is "Phoenix ROM BIOS," accompanied by a version number and a date. When you see this message, press the key for the device you want to specify.

Suppose, for example, that you have GRiD-OS in ROM but, on a particular occasion want to load MS-DOS from the internal floppy diskette drive. Ordinarily, the computer would find GRiD-OS in ROM and load it without looking for an operating system on the floppy diskette drive. To force the computer to load the operating system from the internal floppy diskette drive, press the **F** key when you see the "Phoenix ROM BIOS" message.

It is possible for **both** the GRiD-OS and MS-DOS operating systems to reside in ROM. When this is the case, the computer loads MS-DOS from ROM at start-up unless you specify GRiD-OS. To specify that GRiD-OS be loaded from ROM instead of MS-DOS, press the **G** key during start-up.

Warm Start-Up

When the computer is operating, you can reload the operating system without first turning the computer off and back on again. This is called a warm start-up, or warm boot. A warm start-up is sometimes necessary if an error causes the system to "hang." A hung system will not respond to any commands until you reload the operating system.

The key sequence you use to reload the operating system depends on which operating system you are using.

To reload GRiD-OS, hold down the following four keys simultaneously for three full seconds:

Ctrl-Code-Shift-minus(−)

To reload MS-DOS, press the following three keys simultaneously:

Ctrl-Alt-Del

The results of a cold start-up and a warm start-up are the same. When you have a choice, however, you should generally perform a warm start-up. A warm start-up saves wear on the computer's power supply and off/on switch, is faster than a cold start-up, and conserves battery power.

On rare occasions, the system may become so badly hung that it does not respond to an attempt to perform a warm start-up. If this happens, perform a cold start-up by turning the computer off, **waiting several seconds**, and then turning the computer back on.

Preparing Your TEMPEST GRiDCase for a Move   When you are ready

to close and move your TEMPEST GRiDCase, follow the steps listed below:

1. Save any files you are working on. Refer to the *GRiD Software Manual* for information on saving files under GRiD-OS. Refer to your application programs' documentation for information on saving files when you are running programs under MS-DOS.

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

3. Turn the computer off.

4. Remove your working diskette from the internal diskette drive and insert the travel diskette in its place.

5. Close the screen by lowering it slowly and then pushing it down gently until the latches click shut.

6. Disconnect all cords and cables from the computer.

7. If the computer's leg is extended, retract it. Push the leg firmly toward the rear of the computer until it snaps into its fully closed position. Be careful to keep your fingers out of the way.

Your TEMPEST GRiDCase is now ready to move.

Chapter 3: Getting to Know Your TEMPEST GRiDCase

This chapter gives a detailed description of the TEMPEST GRiDCase, with particular attention to the keyboard and its relation to the IBM® PC keyboard.

The Top View   The top view of the TEMPEST GRiDCase is shown in Figure 3-1. Note that the GRiD logo is on the top of the case, toward the rear, and that the screen latches are on the sides toward the front.

Figure 3-1. *Top View of the TEMPEST GRiDCase*
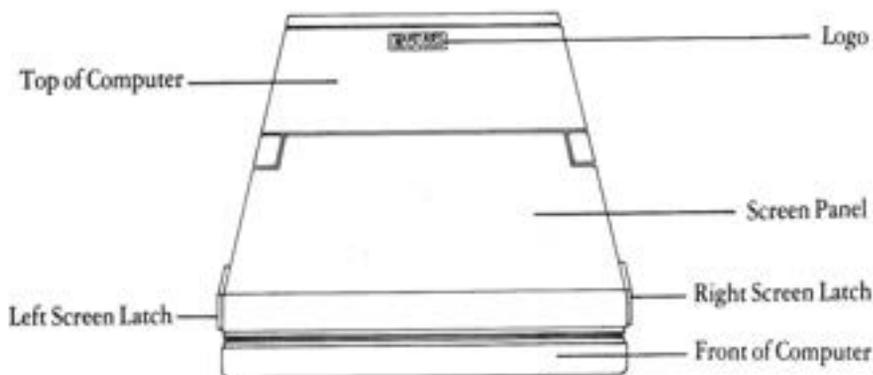
The Front View   The front view of the TEMPEST GRiDCase is shown in Figure 3-2.

Figure 3-2. *Front View of the TEMPEST GRiDCase*
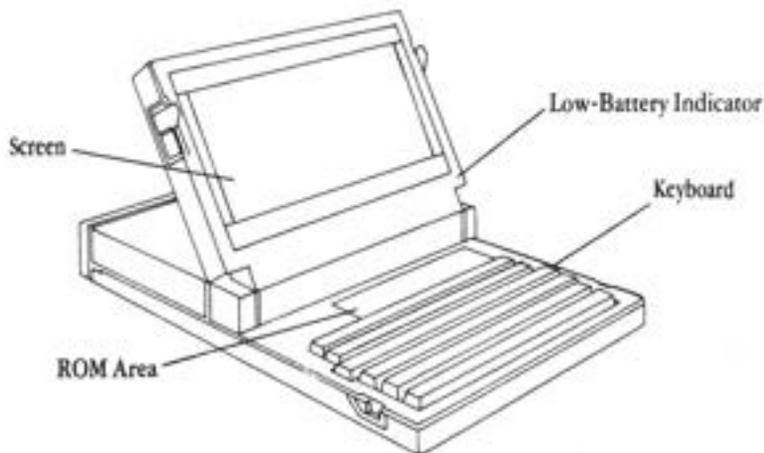
Low-Battery Indicator

The low-battery indicator lights when the battery pack's charge is running low. When this happens, you should **immediately** save any file you are working on. If you intend to resume work, you must then supply external power to the computer or substitute a charged battery pack for the low battery pack.

The exact amount of battery life remaining when the low-battery indicator lights depends on many factors, including your system configuration and the frequency with which you access the diskette drive. **Take no chances**—when the low-battery indicator lights, save your file(s) **immediately**. If you allow the computer to lose power before you save your file(s), all data in main memory (i.e., all changes to your file(s) since the last save) will be lost.

ROM Area

The ROM area contains four 28-pin mounting positions into which you can install 32K EPROMs, 64K EPROMs, 128K ROMs, or any combination of these. Chip options and accessing the ROM area are explained in Chapter 6.

CAUTION: Always turn off the computer before attempting to install or remove EPROMs or ROMs.

Screen

The screen displays text and graphics data. You should treat it with care. For instructions on cleaning the screen, see Chapter 8, "Maintenance."

Keyboard

Figure 3-3 shows the TEMPEST GRiDCase keyboard. The keyboard is fully compatible with both GRiD-OS and MS-DOS and provides the functions available on an IBM PC, PC/XT, or enhanced PC keyboard.

Figure 3-3. *TEMPEST GRiDCase Keyboard*
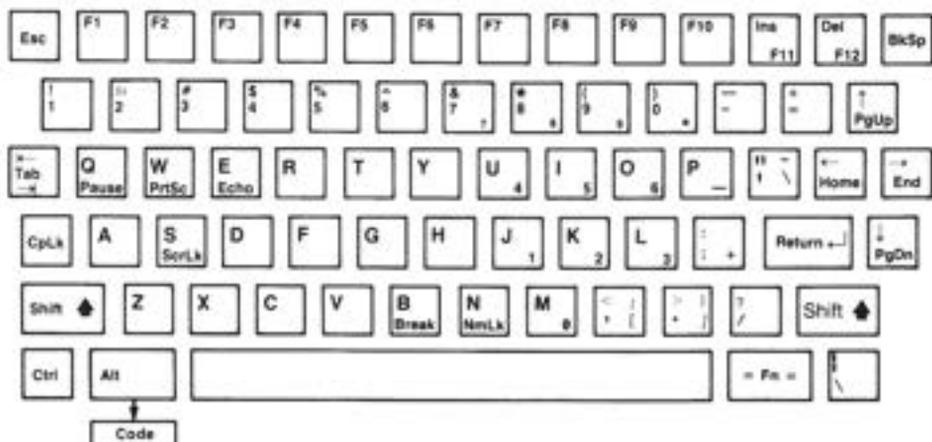
IBM and TEMPEST GRiDCase Key Equivalents   Table 3-1 lists IBM PC, PC/XT, and enhanced PC special keys and their TEMPEST GRidCase equivalents. Any key sequence shown in parentheses is an alternative sequence and accomplishes the same function as the primary key sequence that precedes it.

Table 3-1. *IBM PC, PC/XT, and Enhanced PC Special Keys and TEMPEST GRiDCase Equivalents*

Function Keys

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

Cursor-Control Keys

IBM Key	GRiDCase Key
→	→
←	←
↓	↓
↑	↑
End	Fn-End
Home	Fn-Home
Pg Dn	Fn-Pg Dn
Pg UP	Fn-Pg Up

Typewriter Keyboard Keys

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

Numeric Keypad Keys

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

[1]To enter a keypad number, you must first set the numeric lock function by pressing Fn-NmLk. To restore the keys to their non-numeric-keypad functions, release the numeric lock function by pressing Fn-NmLk a second time. See "The NUMPAD.COM and NUMPAD.SYS Files" below for more information on using the numeric keypad keys under MS-DOS.

Special Characters

IBM Key	TEMPEST GRiDCase Key
[	Fn-[
]	Fn-]
{	Fn-Shift-[
}	Fn-Shift-]
~	Fn-Shift- ~
`	Fn-`

The NUMPAD.COM and NUMPAD.SYS Files   If you are an MS-DOS user, your MS-DOS distribution diskette contains two files called NUMPAD.COM and NUMPAD.SYS. These files allow the TEMPEST GRiDCase numeric keypad keys to fully emulate the numeric keypad of an IBM PC, PC/XT, or enhanced PC keyboard.

NUMPAD.COM is an executable file that you load into the computer's memory by entering NUMPAD in response to the MS-DOS system prompt. The file NUMPAD.COM should be on the current drive. Otherwise, you must specify a path to the file.

If, for example, the current drive is internal floppy diskette drive A, you would load NUMPAD.COM by putting your MS-DOS diskette in drive A and entering NUMPAD, as shown below:

NUMPAD

Once you have loaded NUMPAD.COM, the file remains resident in memory until you turn off the computer or reboot the operating system.

When NUMPAD.COM is in the computer's memory, you can use the numeric keypad keys just as you would use the numeric keypad on an IBM keyboard: set the numeric lock to begin using the numeric keypad keys; release the numeric lock to return the keys to their normal functions.

NUMPAD.SYS is a device driver file. NUMPAD.SYS performs the same function as NUMPAD.COM. But NUMPAD.SYS is invoked from a CONFIG.SYS file, rather than from the MS-DOS command line. To invoke NUMPAD.SYS, put the following line into a CONFIG.SYS file:

DEVICE=NUMPAD.SYS

You can create a new CONFIG.SYS file specifically to invoke NUMPAD.SYS, or you can add the above line to your existing CONFIG.SYS file. Creating a CONFIG.SYS file is described in the *TEMPEST GRiDCase MS-DOS Reference*.

The commands in a CONFIG.SYS file take effect only when you start or restart MS-DOS. Therefore, to invoke NUMPAD.SYS from a CONFIG.SYS file, you must first create or edit the CONFIG.SYS file and then reboot MS-DOS. Only then will you be able to use the numeric keypad keys.

Which file you should use depends on the frequency with which you expect to use the numeric keypad. If you expect to use the keypad only occasionally, you should probably use NUMPAD.COM, thereby conserving main memory when you have no need for the keypad. If you expect to use the keypad nearly every time you use the computer, you should probably use NUMPAD.SYS so that the keypad is always available to you.

Temporary Numeric Keypad Access   It is, in fact, possible to access
the numeric keypad keys without using NUMPAD.COM or NUMPAD.SYS.
Doing so requires more keystrokes, but may be an acceptable alternative if
you use the numeric keypad keys very infrequently.

To access the numeric keypad keys without using either NUMPAD file, take
the following steps:

1. Enter NumLock mode by pressing Fn-NmLk.
2. Access the desired key by pressing Fn and that key simultaneously.

When you no longer need access to the numeric keypad keys, you should
exit from NumLock mode by pressing Fn-NumLk again. If you do not, any
combination of Fn and an arrow key will result in the entry of a number
instead of the desired cursor movement.

The numeric keypad +, −, and * keys are available whether or not you are
in NumLock mode. You can access them at any time by pressing Fn and the
desired key.

The Side View   The side view of the TEMPEST GRiDCase is shown in Figure 3-4.

Figure 3-4. *Side View of the TEMPEST GRiDCase*
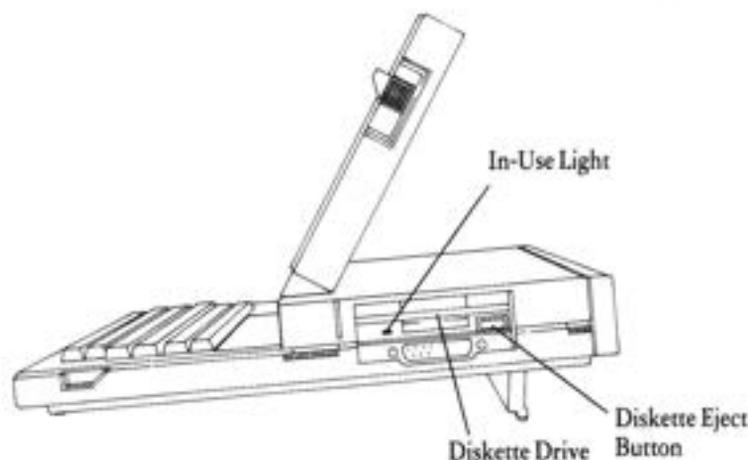
Internal Diskette Drive

The internal diskette drive uses 3 ½-inch double-sided, double-density floppy diskettes capable of storing 720K of data each. Chapter 2, "Setting Up Your TEMPEST GRiDCase," contains a brief description of how to insert diskettes in the drive. For more detailed information about the drive and about floppy diskettes, refer to Chapter 4, "Using the Internal Drive."

Diskette Eject Button

The diskette eject button is located on the lower right corner of the internal diskette drive. Press this button to remove a diskette currently in the drive. When you press the diskette eject botton, the diskette currently in the drive pops part way out of the drive, allowing you to grasp and fully remove it. See the caution statement below concerning the diskette eject button and the in-use light.

In-Use Light

The in-use light is located on the lower left corner of the internal diskette drive. This light serves two purposes: Under both MS-DOS and GRiD-OS, the in-use light is lit whenever the drive is accessing a file on the diskette. Under GRiD-OS only, the in-use light is sometimes also used to prompt you to insert a diskette. This is the case, for example, during a GRiD-OS diskette duplication operation.

CAUTION: Never eject a floppy diskette when the in-use light is lit, unless you are prompted to do so. At all other times, the in-use light indicates that file access is taking place. Ejecting the floppy diskette during file access may damage files.

External Side Connector

This connector is reserved for future use.

CAUTION: Connect **only** GRiD-supplied devices to this connector. Connecting **any** other device may damage the computer's internal circuitry and will void your warranty.

The Rear View   The rear view of the TEMPEST GRiDCase is shown in Figure 3-5.

Figure 3-5. *Rear View of the TEMPEST GRiDCase*
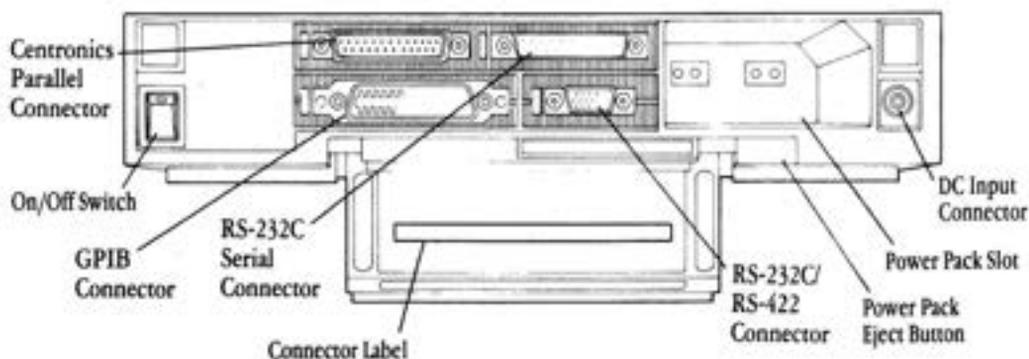
On/Off Switch

When you are facing the **back** of the computer, the on/off switch is at the far
left. This switch is a rocker-type switch. It is in the "off" position when the
bottom of the switch is pushed in. When the switch is in the "off" position,
you can see a red circle on the top of the switch. To turn the computer on,
push in on the top of the switch. To turn the computer off, push in on the
bottom of the switch.

CAUTION: Never turn the computer off while the internal diskette drive
in-use light is lit or while the in-use light of any external storage device
is lit. The in-use light indicates that file access is taking place. Turning the
computer off during file access can destroy data.

Centronics Parallel Connector

This connector allows you to connect the TEMPEST GRiDCase to printers
and other parallel devices using a GRiD-supplied, shielded cable. Note the
trapezoidal or "D" shape of the connector. This makes it impossible to
connect the cable incorrectly. You can connect only one device at a time to
the computer through the Centronics connector. Refer to Chapter 7 for
more information on connecting external devices.

IEEE-488 GPIB Parallel Connector

The IEEE-488 General Purpose Interface Bus (GPIB) connector allows you to connect multiple devices to the computer using a single connector. You can, for example, connect a 2107 external floppy diskette drive to the computer's GPIB connector, then connect a 2127 storage device to the external floppy, then connect a GPIB-equipped parallel printer to the 2127. The number of devices and the order in which they are connected do not matter[1]. Note that the GPIB connector, like the Centronics connector, is shaped such that an incorrect connection is impossible. Use GRiD-supplied, shielded GPIB cables to connect GPIB devices to your TEMPEST GRiDCase. Refer to Chapter 7 for more information on connecting external devices.

PC-Compatible RS-232C Serial Connector

This 25-pin PC-compatible connector allows asynchronous transfer of data at speeds of up to 9600 baud[2]. Under MS-DOS, this connector serves as the COM1 connector. Refer to *Using MS-DOS on the TEMPEST GRiDCase* and the *TEMPEST GRiDCase MS-DOS Reference* for more information on COM1 and COM2 reserved device names. You can also access this connector under GRiD-OS by changing the "Current serial" item in the Options menu of the GRiDManager program. Refer to the *GRiD Software Manual* for details. You can use the 25-pin serial connector and a GRiD-supplied shielded cable to connect the computer to serial devices such as external modems and many letter-quality printers. Refer to Chapter 7 for more information on connecting external devices.

RS-232C/RS-422 Serial Connector

This 19-pin connector can accommodate data transfer in either asynchronous or synchronous mode. In asynchronous mode, data transfer through this connector is highly application dependent. For some specialized applications, transfer rates can be as high as 76.8 kilobaud. In synchronous mode, this connector can transfer data at up to 250 kilobaud. Use a GRiD-supplied, shielded cable with this connector.

[1] There is a maximum number of devices that can be connected to the GPIB connector: 15. In practice, however, it is exceedingly unlikely that you will ever approach this limit. Under MS-DOS only, you are ordinarily limited to a total of four floppy diskette drives, including the internal drive. MS-DOS treats a 2127 storage device as two floppy diskette drives. Therefore, under MS-DOS, you are limited to no more than three 2107 external floppy diskette drives, or one 2107 and one 2127. You can get around this limitation by using the device driver DRIVER.SYS—see your MS-DOS documentation for details. There is also a maximum total length of GPIB cable you can use to connect devices to a single TEMPEST GRiDCase. That length is 2 meters times the number of devices (including the computer) or 20 meters, whichever is less. Again, it is unlikely that you will approach this limit.

[2] Baud = bits per second. The number of bits required to transmit one character (i.e., a letter or digit) of data varies somewhat depending on a number of communications parameters, but is generally about 10. Thus, a baud rate of 9600 means that approximately 960 characters of data are transmitted or received each second.

Power Pack Slot

The internal/external AC power pack, the internal AC power pack, or the battery pack fits into the power pack slot. Refer to Chapter 5 for more information on power-supply options.

Power Pack Eject Button

The power pack eject button, immediately below the power pack slot, ejects the battery pack or AC power pack from the power pack slot. To remove the power pack or battery pack, push the power pack eject button in until the power pack or battery pack pops out.

CAUTION: Always save your work and turn the computer off before you eject the power pack or battery pack.

WARNING: Never eject an internal/external or internal AC power pack without first removing the power cord from either the wall socket or the power pack. **Failure to heed this warning can result in serious electrical shock.**

DC Input Connector

The DC input connector connects the TEMPEST GRiDCase to an internal/external AC power pack, an external AC power pack, or to an auto/boat adapter. Refer to Chapter 5 for more information on power-supply options.

Connector Label

This label is located on the computer's leg and is visible from the rear when the leg is pulled down. It identifies the various connectors to help you when you are connecting external devices to your TEMPEST GRiDCase.

Tracking Number Label

The tracking number label is located on the back of the machine, at the bottom edge. It is visible only when the computer's leg is pulled down. This number uniquely identifies your computer. If you ever have occasion to call the GRiD Resource Center, you will need to provide this number.
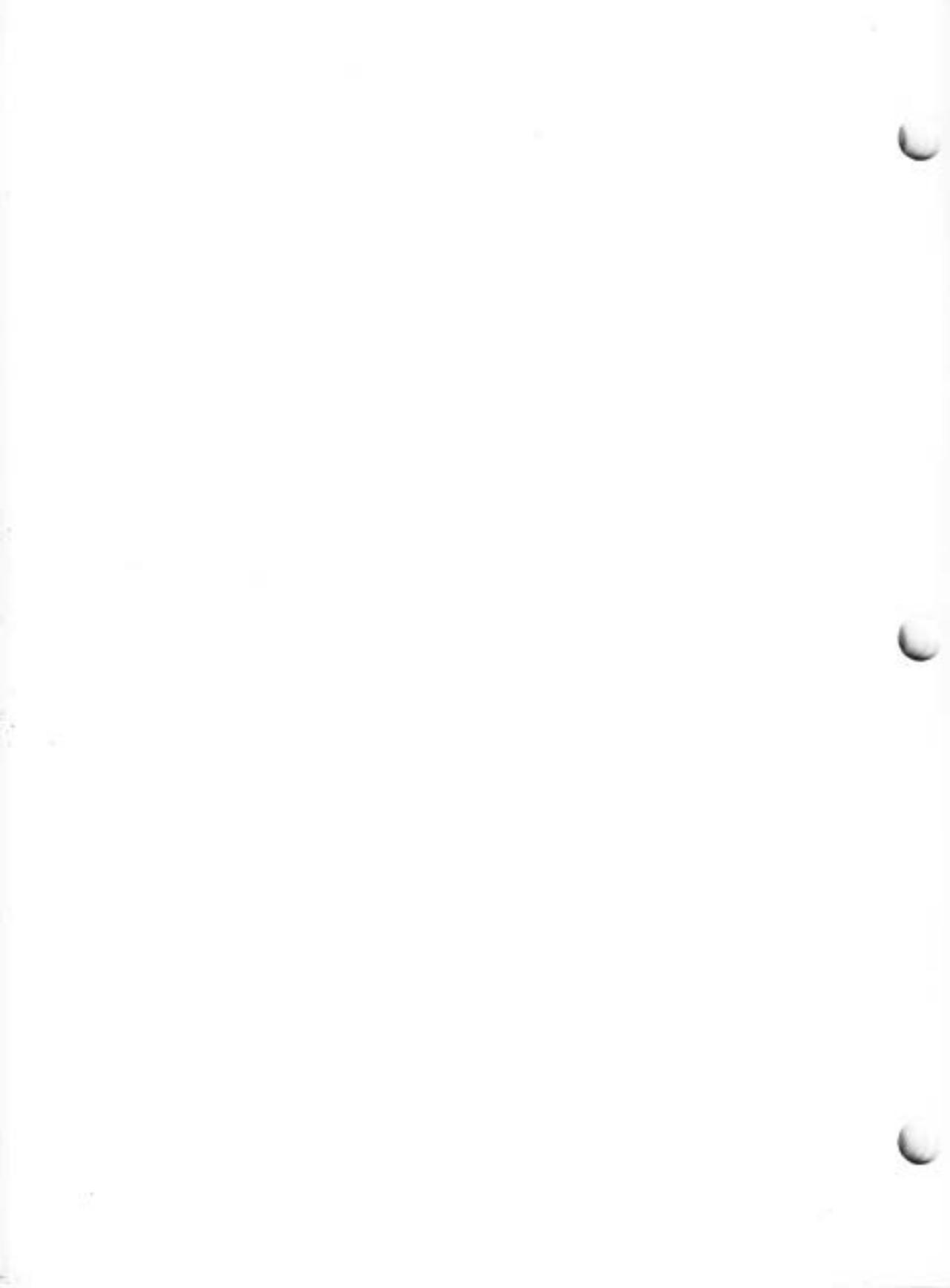
Chapter 4: Using the Internal Drive

This chapter explains how to use the TEMPEST GRiDCase's internal floppy diskette drive and how to care for 3½-inch floppy diskettes.

Taking Care of the Diskette Drive Follow the rules listed below for taking care of the internal floppy diskette drive.

- ☐ Use only high-quality double-sided, double-density 135 track-per-inch (TPI) 3½-inch floppy diskettes. The following diskettes are recommended:

  - Sony OM-4440
  - Xidex 3022-3000
  - Maxell MF2-DD
  - Fuji MFN B2
  - 3M 5337

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

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

- ☐ Whenever you transport the computer, always protect the diskette drive by putting in the travel diskette that originally came in the drive.

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

The following symptoms may indicate dirty read/write heads:

- ☐ You receive error messages when you try to read from or write to a diskette inserted in the internal drive.

- ☐ You notice grooves on the surface of your floppy diskettes when you remove them from the drive. You can check for this condition by sliding the metal portion of the floppy diskette's rigid case to one side to expose the mylar diskette inside. **Never** touch the mylar surface of the diskette, however.

If you believe the drive heads are dirty, clean them with a wet-process diskette drive cleaner, which can be purchased from most local computer stores. **Do not use a dry-method cleaner.**

Floppy Diskettes   Floppy diskettes are mylar plastic disks coated with magnetic
material and enclosed within a protective plastic case. The mylar disk is
designed to remain within its protective case at all times. **Never attempt to
remove a diskette from its protective case.**

Data is stored on the magnetically coated surface of the diskette in the
form of "bits" (**binary digits**). Each bit is either "on" (magnetized) or "off"
(not magnetized).

Each formatted 3 ½-inch, double-sided, double-density 135 TPI diskette can
store up to 737,280 characters (720K) of data[1]. By changing diskettes in the
drive, you can access an unlimited amount of total data and can run an
almost unlimited number of application programs (you are, of course,
limited to the total number of application programs available).

CAUTION: Many brands of 3 ½-inch diskettes are available. Diskettes of
some brands do not perform satisfactorily on the TEMPEST GRiDCase; that
is, they may malfunction and cause you to lose valuable data. You can avoid
this problem by using only the brands recommended above.

All diskettes you use in your TEMPEST GRiDCASE must have the following
characteristics:

Double sided
Double density
Soft sectored
135 TPI (tracks per inch)

[1]One character of data is represented by one *byte* of computer storage. K, as used here, stands
for kilobyte. One K, however, is not equal to exactly 1000 bytes. Rather, 1K = 2^{10}, or 1024 bytes.
This accounts for the apparent discrepancy between 737,280 characters and 720K.

Figure 4-1 shows the front and back sides of a 3-1/2 inch floppy diskette.

Figure 4-1. *Front and Back Sides of Floppy Diskette*

Front Side   Back Side   Write Protect Tab (slides forward to write-protect diskette)
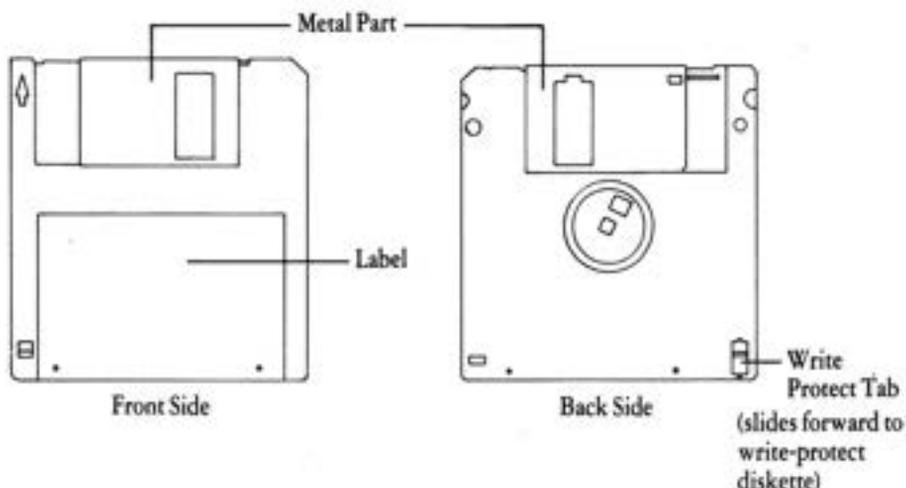
Inserting and Removing Floppy Diskettes

The following instructions explain how to insert and remove floppy diskettes from the internal floppy diskette drive.

Inserting a Floppy Diskette

1. Hold the diskette so that the side with the larger label is up and the metal edge faces away from you.
2. Insert the diskette metal-edge first into the diskette drive opening. There should be an arrow on the diskette itself indicating the proper direction for insertion.
3. Push the diskette in gently until it clicks into place.

    Never jam a diskette into the drive. If you have trouble inserting the diskette, press the eject button on the drive and try again.

Figure 4-2. *Inserting a Floppy Diskette into the Drive*
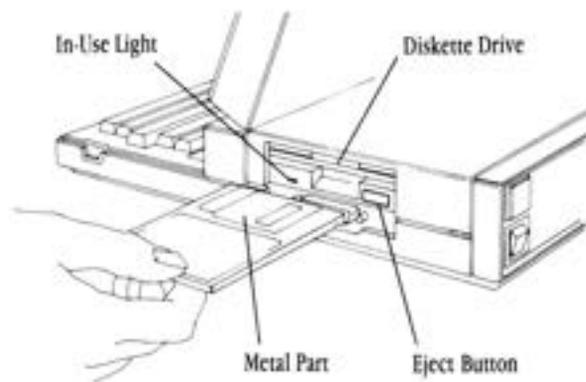
To remove a floppy diskette, push the diskette eject button until the
diskette pops out of the drive.

CAUTION: Except as described below, never eject a floppy diskette while
the in-use light is lit. The in-use light indicates that file access is taking place.
Ejecting a diskette during file access may damage files. Under GRiD-OS, the
in-use light is sometimes used to prompt you to change diskettes. When this
is the case, you can safely eject a diskette.

Write-Protecting Floppy Diskettes

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

Every 3½-inch floppy diskette is equipped with a write-protect tab and
write-protect hole that allow you to block any attempt to write data to that
diskette.

When you look at the back of a floppy diskette oriented as shown in Figure
4-1, the write-protect tab and write-protect hole are located near the lower
right corner of the diskette. To write protect the diskette, slide the
write-protect tab toward the edge of the diskette so that you can see clear
through the write-protect hole. Once you have done so, it is physically
impossible for the diskette drive to write data to the diskette. While the
write-protect tab is in this position, you cannot create, alter, or erase files on
the diskette.

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

Formatting Floppy Diskettes

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

CAUTION: Do not attempt to format your operating system diskette or any application program diskette. **Formatting a diskette destroys any data already stored on that diskette.**

MS-DOS and GRiD-OS require different diskette formats.

To format a diskette under MS-DOS, use the external command FORMAT. FORMAT is described in the *TEMPEST GRiDCase MS-DOS Reference*.

To format a diskette under GRiD-OS, run the Initialize Media program. Initialize Media is described in the *GRiD-OS Software Manual*.

NOTE: Once you have formatted a diskette under one operating system, you cannot use that diskette to store files generated by the other operating system. You can, of course, reformat the diskette for use with the other operating system, **but doing so destroys all data already stored on that diskette.**

Taking Care of Floppy Diskettes

You should treat your floppy diskettes with care to avoid losing valuable data stored on them. Follow the tips listed below:

☐ Except to check occasionally for visible grooves, do not expose the diskette surface by moving the metal slide. The slide protects the recording surface while the diskette is not being used.

Never touch the surface of the diskette.

☐ Keep diskettes away from magnetic office items such as paper clip dispensers, magnetic paper holders, telephones, etc.

☐ Do not set diskettes on top of televisions, color monitors, CRTs, or speakers.

☐ Do not carry a diskette and a calculator together in your pocket.

☐ Do not expose diskettes to microwave or infrared rays.

☐ Do not expose diskettes to temperatures below 50°F (10°C) or above 140°F (60°C).

☐ Keep diskettes away from wall adapters.

□ For optimum long-term storage, keep diskettes at a temperature between 60°F and 70°F (15°C and 20°C).

□ Never use a damaged diskette.

□ Except as described below, never eject a floppy diskette while the in-use light is lit. The in-use light indicates that file access is taking place. Ejecting a diskette during file access may damage files. Under GRiD-OS, the in-use light is sometimes used to prompt you to change diskettes. When this is the case, you can safely eject a diskette.

□ Do not leave a data diskette in the drive while traveling. Doing so may seriously damage the diskette. While traveling, always insert the travel diskette that was in the drive when you unpacked the computer.

□ Keep your diskettes away from cigarette smoke.

□ Label and date your diskettes. This is especially important when you make back-up copies.

Backing Up Files on Floppy Diskettes

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

Under MS-DOS, you can make back-up copies using the COPY command, the XCOPY command, or the DISKCOPY command. These commands are described in the *TEMPEST GRiDCase MS-DOS Reference*.

Under GRiD-OS, you can make back-up copies using either the GRiDManager program Duplicate command or the Duplicate Media program. Both methods are described in the *GRiD-OS Software Manual*.

Chapter 5: Power Supply Options

This chapter describes the various options available for powering the TEMPEST GRiDCase. Either the internal/external AC power pack or the external AC power pack is supplied with the computer. To obtain any of the other power supplies described in this chapter, contact your GRiD representative.

You should use only GRiD-supplied power options that maintain your system's TEMPEST rating. Powering your TEMPEST GRiDCase in any other way may affect the system's TEMPEST rating.

The Power Options   Table 5-1 summarizes the power supply options available. Each option is described in greater detail later in the chapter.

Table 5-1. *Power Options for Your TEMPEST GRiDCase*

Power Source	Description
Internal Battery Pack Model 32110	Powers the TEMPEST GRiDCase and its internal floppy diskette drive for up to 1½ hours. The battery pack contains several nickel-cadmium rechargeable batteries and fits into the power pack slot in the back of the TEMPEST GRiDCase. See "Recharging Your Battery Pack" later in this chapter for methods of recharging the internal battery pack.
Internal/External AC Power Pack Model 32137	Powers the TEMPEST GRiDCase and its internal floppy diskette drive from an AC wall outlet. Can be inserted internally in the power pack slot or used externally and connected to the computer's DC input connector. This power pack is auto-ranging; that is, you can plug it in to either a 115-volt or 220-volt outlet without setting any external switch; the internal/external AC power pack automatically adjusts to the line voltage.

Power Source	Description
External AC Power Pack Model 32131	Powers the TEMPEST GRiDCase and its internal floppy diskette drive from an AC wall outlet and simultaneously recharges a battery pack if the battery pack is fully inserted in the power pack slot. A cord from the external AC power pack plugs into the DC input connector on the back of the computer; a second shielded cord connects the power pack to an ordinary, three-prong wall outlet. The external AC power pack converts alternating current (AC) into direct current (DC) for the computer and the internal floppy diskette drive.
Internal AC Power Pack Model 32120 (115V) Model 32122 (220V)	Powers the TEMPEST GRiDCase and its internal floppy diskette drive. Fits into the power pack slot on the back of the computer and is connected by a shielded cord to a standard wall outlet. Use the Model 32120 to power the TEMPEST GRiDCase from a 115-volt outlet. Use the Model 32122 to power the TEMPEST GRiDCase from a 220-volt outlet.
Auto/Boat Adapter Model 32136	Powers the TEMPEST GRiDCase and its internal floppy diskette drive from the cigarette-lighter socket of a car or boat. Also used to connect the TEMPEST GRiDCase to the External Battery Pack.
External Battery Pack Model 32135	Powers the TEMPEST GRiDCase and its internal floppy diskette drive for approximately three to five hours. Requires Auto/Boat Adapter.
External Battery Charger Model 32115	Recharges the internal battery pack in about 10 hours.

NOTE: External devices you connect to the TEMPEST GRiDCase **do not** receive their power from the computer. External devices require their own power supplies.

Using the Internal Battery Pack   The internal battery pack supplies power to the TEMPEST GRiDCase from rechargeable batteries permanently sealed inside the battery pack.

Installing the Internal Battery Pack

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

2. Turn off the computer.

   CAUTION: Before connecting or disconnecting the internal battery pack or any external device, turn off the power both to the computer and to the device to be attached. Some devices do not have their own power switches. When that is the case, make sure the device is unplugged from the wall receptacle before you attach the device to the computer.

3. Grasp the battery pack so that the labeled end faces you.

4. Insert the battery pack into the power pack slot in the back of the computer until it clicks into place.

5. Turn on any external devices connected to the computer.

6. Turn on the computer.

Figure 5-1. *Installing the Internal Battery Pack*

Power Pack Slot
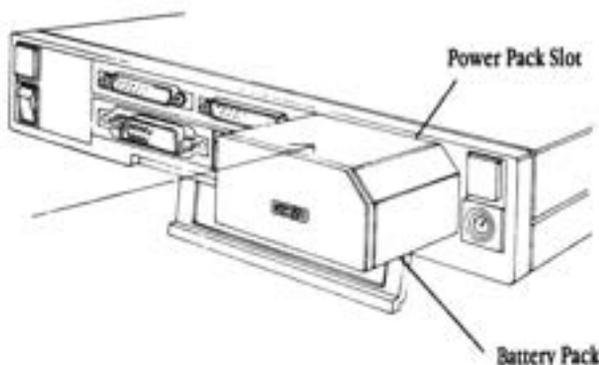
Battery Pack

To remove the battery pack, push in on the power pack eject button, located below the power pack slot, until the battery pack pops part way out of the power pack slot. Then release the eject button and grasp the battery pack and pull it the rest of the way out of the power pack slot.

Battery Life

A fully charged internal battery pack can power your TEMPEST GRiDCase for up to 1½ hours. The battery pack will accept and hold the greatest charge after you have fully discharged and recharged it about three times. After that, battery life depends on a number of factors:

☐ **8087 Co-processor:** An 8087 co-processor requires a constant flow of power. A TEMPEST GRiDCase equipped with this option therefore uses a battery's charge more rapidly.

☐ **Use of a serial device:** When a serial port is activated, power consumption increases. Under GRiD-OS, the serial ports are automatically deactivated when not in use. If you are running MS-DOS, you should deactivate the serial ports when you are not using them. Refer to the *TEMPEST GRiDCase MS-DOS Reference* for information on deactivating the serial ports.

☐ **Diskette Access:** To minimize power consumption and maximize battery life, the TEMPEST GRiDCase supplies power to the internal floppy diskette drive only when data is being read from or written to a diskette. You can therefore extend the working time you achieve on a single battery charge by avoiding unnecessary diskette access (e.g., frequent saves, switching back and forth between files, etc.).

☐ **Battery Storage Temperature:** If you store the battery pack at temperatures of over 90°F for two months or more without recharging it, it will lose some of its charge. After such storage, you may have to use and recharge the battery pack several times before it is again able to hold a full charge.

☐ **Cold Starting the Computer:** Turning the computer off and then back on again to reload the operating system consumes considerably more power than performing a warm start-up. Refer to "Warm Start-Up" in Chapter 2 for instructions on performing a warm start-up.

NOTE: Do not use any operating system other than one of those supplied by GRiD Systems for the TEMPEST GRiDCase computer. GRiD-supplied operating systems are designed to maximize battery life.

Recharging Your Battery Pack

Always let the battery pack become almost fully discharged before you recharge it. Frequent recharging of a battery pack that has not been allowed to discharge fully may result in some loss of battery capacity. You will know that the battery pack is almost completely discharged when the low-battery indicator lights.

CAUTION: When the low-battery indicator lights, **immediately save any file(s) you are working on** and turn the computer off. Only then should you connect a new power source. All data in main memory (RAM) is lost when you remove the battery pack or otherwise interrupt power to the computer. If you remove the battery pack without first saving your file(s), you lose any changes you've made since the last time you saved the file(s).

Once you've saved your work, you can install a fresh battery pack or recharge the old one. You can recharge a battery pack in either of two ways:

☐ Leave the discharged battery pack in the power pack slot and connect the internal/external AC power pack or the external AC power pack to the computer's DC input connector. This will recharge the battery pack in about 12 hours, whether or not the computer is on.

   CAUTION: Do not leave a charged battery pack in the power pack slot for more than a few days while an AC power pack is connected to the computer externally. Doing so can overcharge the batteries and cause them to lose some of their capacity.

☐ Remove the discharged battery pack from the power pack slot and insert it in the external battery charger, as explained later in this chapter. The external battery charger fully charges a battery pack in about 10 hours.

Connecting the Internal/External AC Power Pack   The
internal/external AC power pack powers the TEMPEST GRiDCase from either a 115-volt AC outlet or a 220-volt AC outlet. The internal/external AC power pack is auto-ranging; that is, it senses and responds appropriately to either 115- or 220-volt line voltage without the need for a line voltage switch.

Used externally, the internal/external AC power pack automatically recharges the internal battery pack, if an internal battery pack is installed. Recharging the internal battery pack with the internal/external power pack takes approximately 12 hours.

Installing the Internal/External AC Power Pack Internally

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

   CAUTION: Before connecting or disconnecting the internal/external AC power pack or any device, turn off the power both to the computer and to the device to be attached. Some devices do not have their own power switches. When that is the case, make sure the device is unplugged from the wall receptacle before you attach the device to the computer.

3. Grasp the power pack with the labeled end facing you.

4. Insert the power pack into the power pack slot in the back of the computer. Push the power pack in gently but firmly until it clicks into place.

5. Plug the female end of the shielded power cord into the power cord socket on the back of the power pack. Plug the male end of the power cord into a wall outlet. If you use a plug adapter, make sure it is properly grounded.

   NOTE: You must make sure you have the correct shielded AC power cord for the voltage you are using and the country you are in. The male end of a 220V AC power cord differs from that of a 115V cord. 220V cords also differ from country to country.

6. Turn on any attached external devices.

7. Turn on the computer.

Figure 5-2. *Installing the Internal/External AC Power Pack Internally*

Power Pack Slot

Power Pack

To remove the power pack, push in on the power pack eject button, located below the power pack slot, until the power pack pops part way out of the power pack slot. Then release the eject button and grasp the power pack and pull it the rest of the way out of the power pack slot.
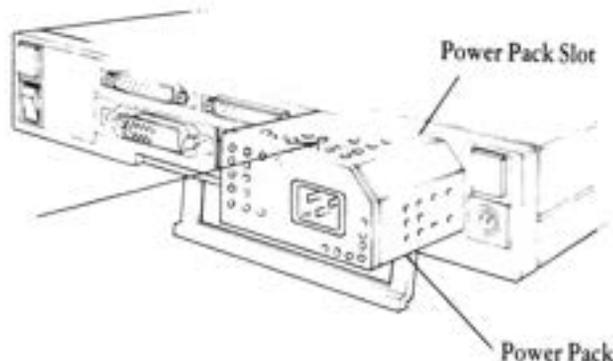
Installing the Internal/External AC Power Pack Externally

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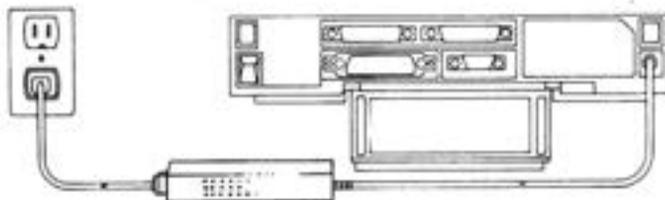
2. Turn off the computer.

CAUTION: Before connecting or disconnecting the internal/external
AC power pack or any other external device, turn off the power both to
the computer and to the device to be attached. Some devices do not have
their own power switches. When that is the case, make sure the device
is unplugged from the wall receptacle before you attach the device to
the computer.

3. Plug the DC output cord from the power pack into the DC input
   connector on the back of the computer.

4. Attach the female end of the shielded AC power cord to the power cord
   socket in the back of the power pack.

5. Plug the male end of the AC power cord into a wall outlet. If you use a
   plug adapter, make sure it is properly grounded.

   NOTE: You must make sure you have the correct shielded AC power cord
   for the voltage you are using and the country you are in. The male end
   of a 220V AC power cord differs from that of a 115V cord. 220V cords
   also differ from country to country.

6. Turn on any attached external devices.

7. Turn on the computer.

Figure 5-3. *Installing the Internal/External AC Power Pack Externally*

Connecting the External AC Power Pack The external AC power pack powers the TEMPEST GRiDCase from either a 115-volt AC outlet or a 220-volt AC outlet. The external AC power pack also automatically recharges the internal battery pack, if an internal battery pack is installed. Recharging the internal battery pack with the external power pack takes approximately 12 hours.

Installing the External AC Power Pack

1. Turn off any attached external devices.

2. Turn off the computer.

   CAUTION: Before connecting or disconnecting the external AC power pack or any other external device, turn off the power both to the computer and to the device to be attached. Some devices do not have their own power switches. When that is the case, make sure the device is unplugged from the wall receptacle before you attach the device to the computer.

3. Set the external AC power pack's voltage switch to the correct voltage. In the United States, the correct voltage is 115V. In other countries, check the local voltage and set the voltage switch to 220V if appropriate.

   CAUTION: Always make sure this switch is set properly before plugging the power cord into an electrical outlet. Supplying power at the wrong voltage can damage your computer.

4. Plug the DC output cord from the power pack into the DC input connector on the back of the computer.

5. Attach the female end fo the shielded AC power cord to the power cord socket on the back of the power pack.

6. Plug the male end of the AC power cord into a wall outlet. If you use a plug adapter, make sure it is properly grounded.

   NOTE: You must make sure you have the correct shielded AC power cord for the voltage you are using and the country you are in. The male end of a 220V AC power cord differs from that of a 115V cord. 220V cords also differ from country to country.

   CAUTION: Make sure the external AC power pack is in an upright position. Allowing the power pack to rest upside down or on its side blocks ventilation holes in the case and may result in overheating.

7. Turn on any attached external devices.

8. Turn on the computer.

Figure 5-4. *Installing the External AC Power Pack*
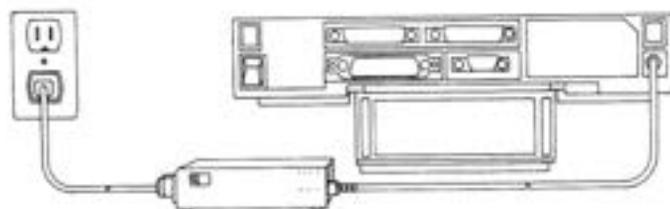
Connecting the Internal AC Power Pack   If you don't need to keep a battery pack in the computer, you can integrate the AC power supply into the computer itself by using an internal AC power pack. It is then unnecessary to carry a separate power supply when you transport your computer. The internal power pack comes in two models: Model 32120 for use with 115-volt AC power and Model 32122 for use with 220-volt AC power. Using the appropriate model power pack, you can power your TEMPEST GRiDCase from a standard wall outlet.

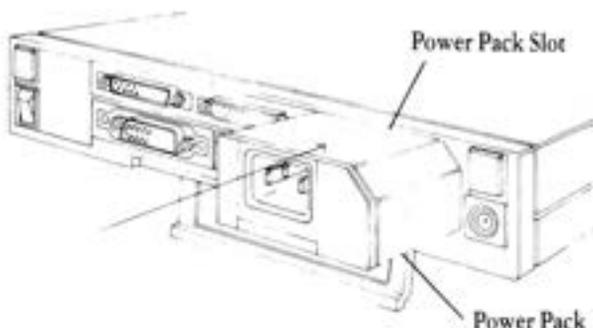### Installing the Internal AC Power Pack

1. Turn off any attached external devices.

2. Turn off the computer.

   CAUTION: Before connecting or disconnecting the internal AC power pack or any external device, turn off the power both to the computer and to the device to be attached. Some devices do not have their own power switches. When that is the case, make sure the device is unplugged from the wall receptacle before you attach the device to the computer.

3. Grasp the power pack with the labeled end facing you.

4. Insert the power pack into the power pack slot in the back of the computer. Push the power pack in gently but firmly until it clicks into place.

5. Plug the female end of the shielded power cord into the power cord socket on the back of the power pack. Plug the male end of the power cord into a wall outlet. If you use a plug adapter, make sure it is properly grounded.

6. Turn on any attached external devices.

7. Turn on the computer.

Figure 5-5. *Installing the Internal AC Power Pack*

To remove the power pack, push in on the power pack eject button, located below the power pack slot, until the power pack pops part way out of the power pack slot. Then release the eject button and grasp the power pack and pull it the rest of the way out of the power pack slot.

Connecting the Auto/Boat Adapter

The auto/boat adapter lets you power your TEMPEST GRiDCase from either the cigarette-lighter socket of a car or boat or from the external battery pack.

Connecting the Auto/Boat Adapter

1. Turn off any attached external devices.

2. Turn off the computer.

   CAUTION: Before connecting or disconnecting the auto/boat adapter or any external device, turn off the power both to the computer and to the device to be attached. Some devices do not have their own power switches. When that is the case, make sure the device is unplugged from the wall receptacle before you attach the device to the computer.

3. Plug the larger end of the auto/boat adapter cable into the cigarette-lighter socket of the car or boat.

4. Plug the smaller end of the auto/boat adapter cable into the DC input connector on the back of the computer.

5. Turn on any attached external devices.

6. Turn on the computer.

CAUTION: When you power your TEMPEST GRiDCase from a car or boat cigarette-lighter socket, and the vehicle's engine is not running, you should save any file(s) you are working on before you start the vehicle's engine. Most cars and boats cut off power to the cigarette-lighter socket during engine start-up. Note also that running the TEMPEST GRiDCase from a vehicle cigarette lighter for prolonged periods when the vehicle's engine is not running can drain the vehicle's battery.

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

Figure 5-6. *Installing the Auto/Boat Adapter*
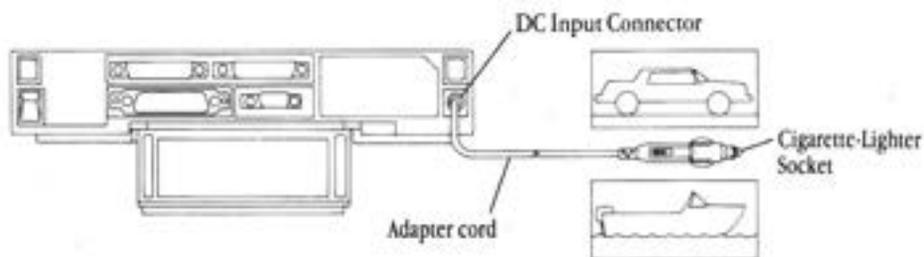
NOTE: As mentioned above, the internal battery pack receives only a partial charge when you power the computer from the auto/boat adapter. To fully recharge an internal battery pack, you must either supply AC power to the computer or use the external battery charger.

Connecting the External Battery Pack   You can power the TEMPEST
GRiDCase from the external battery pack for up to five hours. The auto/boat
adapter is used to connect the external battery pack to the computer. An
auto/boat adapter is supplied with the external battery pack.

Connecting the External Battery Pack

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

   CAUTION: Before connecting or disconnecting the external battery
   pack or any other external device, turn off the power both to the
   computer and to the device to be attached. Some devices do not have
   their own power switches. When that is the case, make sure the device
   is unplugged from the wall receptacle before you attach the device to
   the computer.

3. Plug the larger end of the auto/boat adapter cord into the socket at the
   end of the battery pack power cord (refer to Figure 5-7).
4. Plug the smaller end of the auto/boat adapter cord into the DC input
   connector on the back of the computer.
5. Turn on any attached devices.
6. Turn on the computer.

Figure 5-7. *Installing the External Battery Pack*
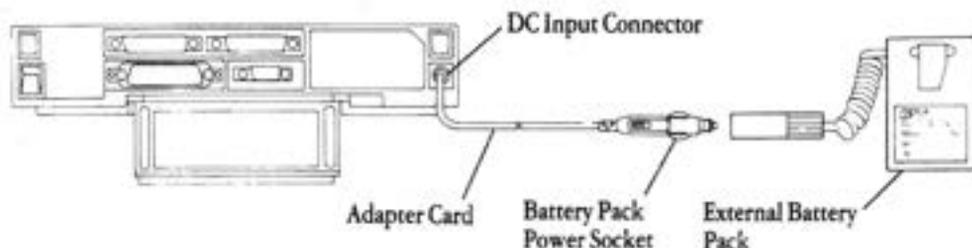
NOTE: The external battery pack is labeled "Compass Power Pack." This power pack works equally well with GRiD Compass," TEMPEST GRiD Compass, GRiDCase, and TEMPEST GRiDCase computers.

The battery life considerations discussed earlier in this chapter under the heading "Battery Life" are equally applicable to the external battery pack. When the external battery pack's charge becomes critically low, the battery pack begins to beep. The low-battery indicator on the computer also lights. When this happens, save your data immediately.

To recharge the external battery pack, use the GRiD Compass power pack charger provided with the external battery pack and shown in Figure 5-8.

Figure 5-8. *GRiD Compass Power Pack Charger*
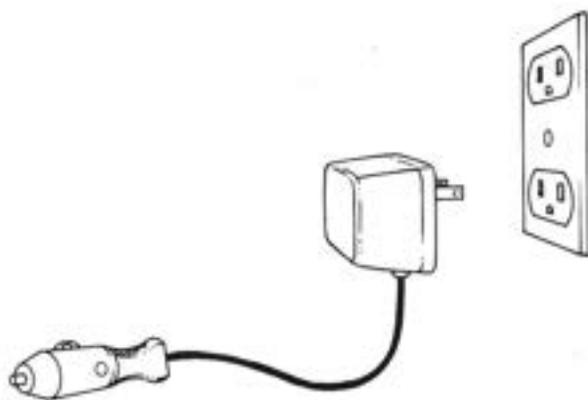
**Charging the External Battery Pack**

1. Plug the charger cord into the socket at the end of the battery pack power cord.

2. Plug the charger itself into a standard 115V wall outlet.

3. Leave the battery pack connected to the charger for 14 to 20 hours at room temperature (40°F to 85°F) to fully recharge the battery pack.

Using the External Battery Charger To use an external battery charger, you must also have an internal/external AC power pack or an external AC power pack. The external battery charger can fully recharge an internal battery pack in about 10 hours.

Recharging the Internal Battery Pack

1. Put the battery pack inside the charger and secure it with the elastic strap.

2. Plug one of the Y-shaped power cord's two male connectors into the power cord socket on the battery charger.

3. Connect the single female connector on the battery charger power cord to the male connector on the DC output cord from the AC power pack.

4. If you are using an external AC power pack, make sure its line voltage switch is set correctly.

5. Plug the AC power pack's shielded power cord into a 115-volt or 220-volt wall outlet.

Figure 5-9. *The External Battery Charger*
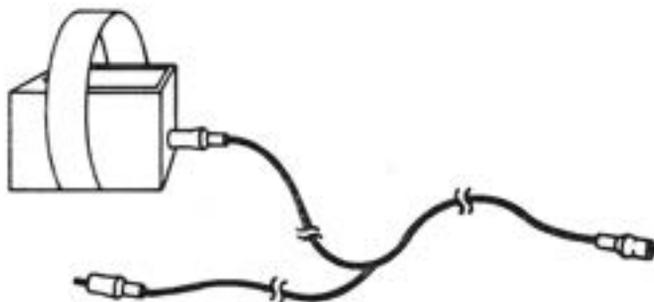
Chapter 6: User-Installable Read Only Memory

This chapter describes the Read Only Memory (ROM) chips available for your TEMPEST GRiDCase and explains how to install and remove them. It also includes operating system information that you will need if you install GRiD-OS or MS-DOS ROMs in your TEMPEST GRiDCase.

About Read Only Memory (ROM)   Read Only Memory (ROM) is a type of electronic circuit that can be used to store programs in a computer. Unlike the computer's main memory, RAM, ROM is nonvolatile. That is, programs stored in ROM remain intact even when the computer is turned off or unplugged.

ROM also differs from RAM in that you cannot change the contents of ROM circuits while they are installed in your computer.

As used in this chapter, the term ROM refers to silicon chips that you can install in your TEMPEST GRiDCase. The circuits of these chips contain software programs.

ROMs for the TEMPEST GRiDCase plug directly into corresponding holes in the circuit board inside the computer's ROM area.

Types of ROM

Several types of ROM chips are commercially available. GRiD Systems computers use two of the major types: standard 128K-byte ROMs, which are mass produced and whose contents cannot be changed after manufacture; and Erasable Programmable ROMs, EPROMs, which can be programmed in any quantity and whose contents can be erased and replaced using a device called a PROM programmer. You cannot, however, erase and reprogram EPROMs while they are installed in your computer. EPROMs are available in a variety of storage capacities.

In terms of installation and operation, there is only one significant difference between ROMs and EPROMs:

The label on the back of an EPROM covers a small window into the internal circuitry of the chip. It is this window that makes an EPROM erasable by allowing the entry of ultraviolet light during the erasure operation. Exposing this window to ordinary ambient light can partially erase the EPROM, thus rendering it uselsss. Therefore, **never remove the label from an EPROM** unless you intend to erase the EPROM.

For easy reference, both ROMs and EPROMs are generally referred to simply as ROMs in this chapter.

Advantages of Using ROM

Using programs in ROM provides a number of advantages compared to loading the same programs from auxiliary storage devices:

☐ ROM is more rugged than floppy diskette or hard disk drives.

☐ When you have programs in ROM, you don't need to have the same programs on another storage device. This frees some of the capacity of your other storage device(s) for your own files.

☐ When you have the operating system and other software in ROM, you don't need to carry those files with you on diskettes.

☐ Having programs in ROM reduces the need to switch diskettes during computer operation.

☐ Loading programs from ROM conserves power and prolongs battery life relative to loading programs from diskette.

☐ The TEMPEST GRiDCase can retrieve programs from ROM faster than it can from any other storage device.

☐ Many GRiD software ROM programs are directly executable. That is, the program does not have to be loaded from ROM into RAM before it can be run; instead, it executes directly from ROM. This provides the additional advantage of conserving RAM during program execution, leaving more room for user data.

Figures 6-1 and 6-2 illustrate the auxiliary-storage and RAM savings provided by having a program in executable ROM. Note that, even if a particular ROM program is not executable, you still realize a considerable saving in auxiliary storage by having the program in ROM.

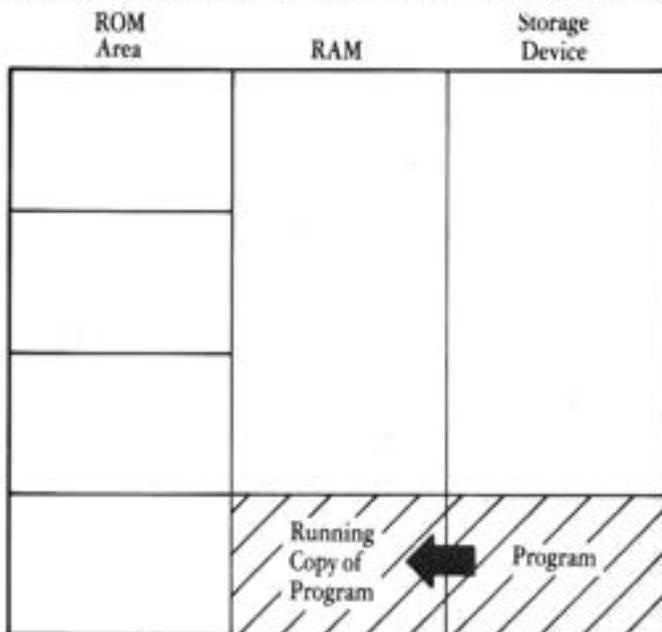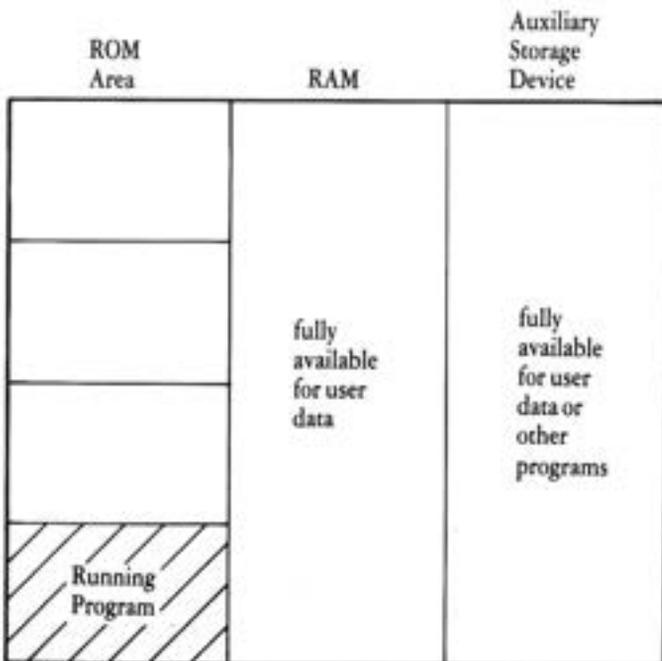Figure 6-1. *Loading a Program from Auxiliary Storage and Executing it in RAM*

Figure 6-2. *Running a Program from Executable ROM*

Installation and Removal of ROMs   The ROM area of the TEMPEST GRiDCase, shown in Figure 6-3, is designed to accept direct-pin ROMs. A direct-pin ROM is shown in Figure 6-4.
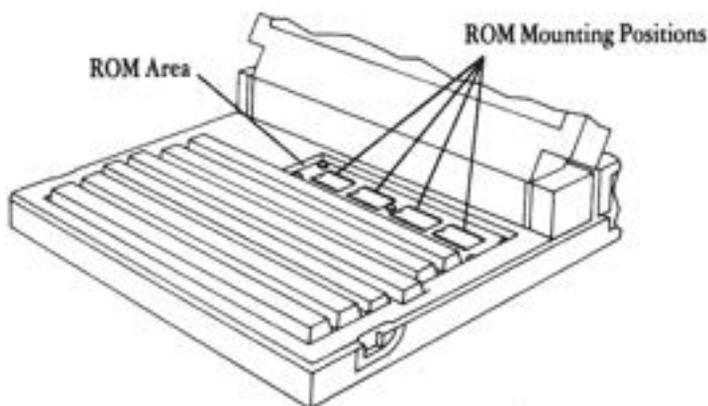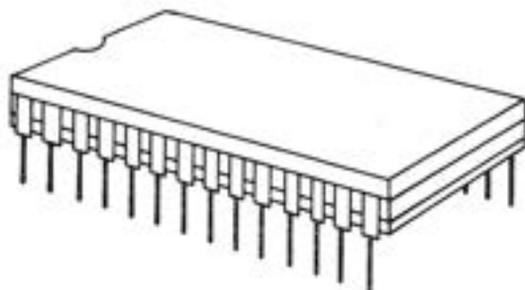
Figure 6-3. *ROM Area*

Figure 6-4. *ROM Chip*

General Cautions

To ensure your safety and the proper operation of your TEMPEST GRiDCase and your ROM(s), please take the precautions listed below:

☐ Avoid static discharge during ROM installation. Under some circumstances, your body may build up a charge of static electricity that can be discharged through a ROM chip during installation. Static discharge can ruin the ROM. To reduce this risk, take the following precautions:

— Discharge any static charge you may be carrying by touching some conducting metal object **before** you handle the ROM.

- If possible, ground yourself during ROM installation. You can do this by keeping one hand on a grounded metal object while you install the ROM with the other hand.

- During installation, have your computer connected to an AC power pack that is plugged into a wall outlet. This allows static electricity to discharge through the power cord and reduces the likelihood of damage to ROM circuits during installation.

☐ Make sure the computer is turned off whenever you install or remove a ROM. Failure to follow this precaution may result in electrical shock to the user and/or damage to both computer and ROM circuits.

☐ Never operate the computer without the ROM area cover in place. Foreign objects such as paper clips can fall into an uncovered ROM area, damaging both the ROMs and the computer itself. Allowing a foreign object to fall into an uncovered ROM area voids the warranties of the ROM(s) and the computer. Operating the TEMPEST GRiDCase with the ROM area open also compromises the computer's TEMPEST rating.

☐ Never remove the label from an EPROM. Doing so allows light to enter the erasure window, thus damaging the software stored in the EPROM.

Installation

To install a ROM chip in the TEMPEST GRiDCase computer, follow the steps listed below.

Installing a ROM in the TEMPEST GRiDCase

1. **Make sure the computer is turned off.**

2. **Remove the cover of the computer's ROM area, as shown in Figure 6-5.** To remove the ROM area cover, you must first remove the two cover screws, shown in Figure 6-5. Even after you have removed the screws, however, the cover remains firmly in place. To lift it, you must carefully insert the smaller end of some L-shaped object such as a small Allen wrench or dental hygienist's tool through one of the screw holes and pull up until one end of the cover comes loose. You can then remove the cover by hand.

Figure 6-5. *Removed ROM Area Cover*
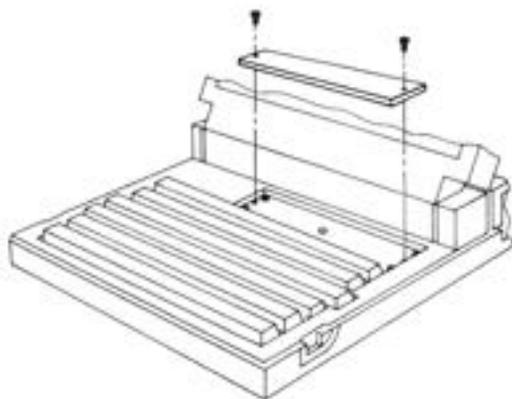
3. **Remove the ROM chip from its case.** Handle the ROM chip only by its ends, as shown in Figure 6-6. Save the ROM shipping case and the anti-static foam inside; you will need both later if you ever remove the ROM from the computer.

Figure 6-6. *Proper Handling of a ROM Chip*

4. **If necessary, prepare the ROM for installation by bending its pins slightly inward.** The pins on most new ROM chips are bent slightly outward so that the two rows of pins are not quite parallel. Before you can install the ROM, you must bend the rows of pins inward until they are parallel to each other and perpendicular to the chip itself. You can do this by setting the ROM down on its side on a table or other flat, solid surface and rocking it gently to bend the rows of pins, as shown in Figure 6-7. Bend one row of pins, and then turn the ROM over and bend the other row. Be careful not to bend the pins too far—bending them back out is harder than bending them in.

Figure 6-7.   *Bending the Pins of a ROM Chip*
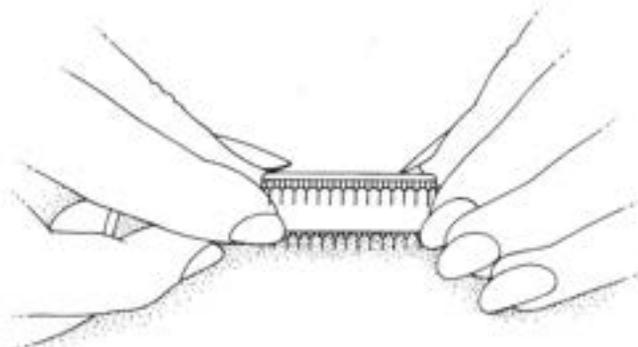
5. **Align the ROM with the double row of pin holes it**, as shown in Figure 6-8. You can install a ROM in any open ROM mounting position; the location of individual ROMs within the ROM area does not matter.

Note the small, semicircular notch at one end of the ROM. There is a matching notch traced on the circuit board at one end of each ROM mounting position. Orient the ROM so that its notched end is over the traced notch on the circuit board.

CAUTION: Correct orientation of the ROM in its pin holes is essential. It is physically possible to install the ROM backward. Doing so damages the ROM and voids its warranty.

Figure 6-8. *Aligning the ROM*
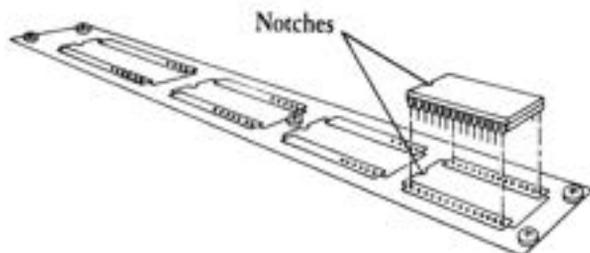
6. **Set the ROM gently onto the double row of pin holes, making sure that each pin of the ROM chip is aligned with the corresponding pin hole.**

7. **Press the ROM into the circuit board.** When you are sure the pins are correctly aligned, grasp the ROM by its ends and push it **gently** into the circuit board. Use a gentle end-to-end rocking motion if necessary.

   CAUTION: Never force a ROM into the circuit board. Doing so may bend or break the pins, rendering the ROM useless. If a pin breaks off inside a hole, one ROM mounting position on the circuit board is also rendered useless.

8. **Replace the cover of the ROM area.** Set the cover on top of the ROM area and make sure it is correctly aligned. Then press down gently but firmly on both ends of the cover until it is firmly seated and its top is level with the surrounding edges of the case. Then replace the two cover screws.

9. **Turn the computer on.** Your ROM is now fully installed, and you can begin to use the software it contains. If you have an operating system in ROM, it will load when you turn the computer on. See Chapter 2 for system start-up procedures.

Removal

ROMs can be removed and reinstalled. TEMPEST GRiDCase ROMs are **not**, however, designed for frequent installation and removal. You should remove a ROM only to replace it.

To remove a ROM from the TEMPEST GRiDCase, follow the steps listed below.

Removing a ROM from the TEMPEST GRiDCase

1. **Make sure the computer is turned off.**

2. **Remove the cover from the computer's ROM area.** See Figure 6-5.

3. **Use an IC extractor tool to remove the ROM from the circuit board.** An IC extractor is **not** supplied with ROMs or with the computer; you must provide your own. Because IC extractors of a variety of types are available, you should refer to the instructions that came with your IC extractor or consult someone familiar with its use. Suitable IC extractors are inexpensive and readily available from most electronics stores.

   CAUTION: Use extreme care when you remove a ROM. If you pull the ROM out of the circuit board violently or at an angle, you may bend or break some of its pins, rendering the ROM useless. If a pin breaks off inside a hole, one ROM mounting position on the circuit board is also rendered useless.

4. **Store the ROM in its original case.**

5. **Install the new ROM if you are replacing a ROM.**

6. **Replace the cover of the ROM area.**

Using GRiD-OS in ROM
This section describes the characteristics and use of GRiD-OS ROMs. If you need basic information on using GRiD software, consult the *GRiD Software Manual*.

Using a ROM Program
When a GRiD software program is in ROM, the computer generally executes the program directly from ROM. This direct execution from ROM does not change the way you see GRiD software. You create and use your files in the usual manner. For example, to retrieve a data file, you specify the file you need in a File Form. When you confirm the File Form, the computer automatically searches its storage devices for the application program needed for the file. If you have a ROM installed, that is where the computer looks first for the required program.

Accessing ROM Files Directly
When a GRiD-OS ROM is installed, "Read Only Memory" appears as one of the choices for the "Device" item of the File Form. To access a ROM file directly, specify "Read Only Memory" as the device when you fill in the File Form.

Disabling ROM Files

If for any reason you want to make a particular GRiD software ROM file inaccessible without removing the ROM chip from the computer, you can do so with the "Disable ROM Files" program.

To disable a ROM file, follow the steps listed below.

1. Use the GRiD-OS File Form to select the "Disable ROM Files" program as specified below:

Subject:	Programs
Title:	Disable ROM Files
Kind:	Run

   The device on which "Disable ROM Files" resides varies. The program is available both in ROM and on diskette.

2. Select "Disable a ROM file" from the "Disable ROM Files" menu, shown in Figure 6-9.

   Figure 6-9. *Disable ROM Files Menu*
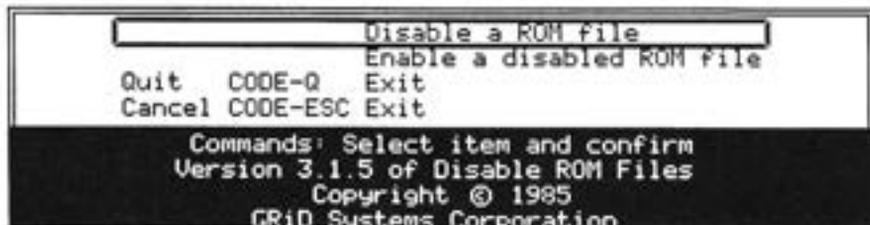
The computer displays a list of currently active ROM files.

3. Select and confirm the ROM file you want to disable.

   The message line briefly displays the message Disabling ROM file, followed almost immediately by ROM file disabled.

4. Press any key to return to the "Disable ROM Files" menu if you want to disable another ROM file. If you don't want to disable another ROM file, press Code-Q or Code-Esc to exit from the "Disable ROM Files" program.

Any disabled ROM files are now inaccessible both to you and to GRiD-OS. The names of disabled ROM files no longer appear on the Titles list for the Subject "Programs" on the Device "Read Only Memory." The operating system behaves just as if the files had been physically deleted.

Actually, the status of the ROM files is stored in a special file in the "Programs" subject of your boot device—or the first attached device, if you boot from ROM. The title of the file is "User," and its kind is "Profile."

The information contained in the User Profile determines whether or not a given ROM file is disabled. Therefore, if you boot the computer from a different device, or from a different floppy diskette, than the one you were using when you disabled the ROM files, the ROM files will no longer be disabled. Likewise, if you boot another computer from the diskette you were using when you disabled ROM files, the same ROM files on that computer will be disabled, if they are present.

NOTE: You cannot disable the file with a title of "CCOS" and a kind of "System." If you want to disable that operating system file, you must physically remove the GRiD-OS CCOS ROM chip from the computer.

Enabling ROM Files

You can use the "Disable ROM Files" program to reactivate a disabled ROM file. This is called "enabling" the ROM file.

To enable a disabled ROM file, follow the steps listed below.

1. Use the GRiD-OS File Form to select the "Disable ROM Files" program as specified below:

Subject:	Programs
Title:	Disable ROM Files
Kind:	Run

    The device on which "Disable ROM Files" resides varies. The program is available both in ROM and on diskette.

2. Select "Enable a disabled ROM file" from the "Disable ROM Files" menu.

    The computer then displays a list of all ROM files currently disabled.

3. Select the ROM file you want to enable.

    The message line briefly displays the message Enabling ROM file, followed almost immediately by ROM file enabled.

4. Press any key to return to the "Disable ROM Files" menu if you want to enable another ROM file. If you don't want to enable another ROM file, press Code-Q or Code-Esc to exit from the "Disable ROM Files" program.

Using MS-DOS in ROM This section describes the characteristics and use of MS-DOS ROMs. If you need basic information on using MS-DOS, consult the *TEMPEST GRiDCase MS-DOS Reference*.

MS-DOS Version Compatibility

MS-DOS is periodically updated with new versions. You cannot "mix and match" utility files between two different versions of MS-DOS. Therefore, if you install a new MS-DOS system ROM to replace an older version, you must also copy to your MS-DOS working diskette new versions of any MS-DOS utility files frequently used but not included in the ROM.

Drive Specifiers and MS-DOS System ROM

There is no single MS-DOS drive specifier for Read Only Memory. Instead, the computer appends MS-DOS ROM files to the directory of drive A when you start the operating system.

The computer will not start MS-DOS from ROM unless

1. The floppy diskette drive (drive A) is empty.

    or

2. The floppy diskette drive (drive A) contains an MS-DOS formatted diskette.

Once MS-DOS has been started from ROM, the MS-DOS ROM files appear in the directory listing of drive A. You access the ROM files just as you would access any other files on drive A. Refer to the *TEMPEST GRiDCase MS-DOS Reference* for information on drive and file specifications and on accessing files.

Erasing Duplicate Files

When ROM files are appended to the directory of drive A, it is possible to have two files with identical names in the same directory: one on the drive itself, and one in appended ROM. This situation arises, for instance, when you install a ROM with a newer version of an MS-DOS system or utility file than the one on your MS-DOS diskette.

When the computer has to access a file that is listed twice, it always accesses the file on the drive, rather than the file in appended ROM. Therefore, if you want the computer to use the ROM file, you must first erase the file from the diskette in drive A. Refer to the *TEMPEST GRiDCase MS-DOS Reference* for information on erasing files.

It is also possible for the directory of drive A to show two files that not only have identical names but are in fact identical. In such a case it is not mandatory to erase the duplicate file from the diskette, but doing so frees space on the diskette for other uses.

Commands Modified by ROM Installation

Installing an MS-DOS system ROM in your computer modifies the way some MS-DOS commands work. Those modifications are described in the following sections.

The CHKDSK Command   When one or more ROMs are installed in your computer, CHKDSK may report total storage in excess of the storage actually available on the drive. This is because the total storage figure displayed includes any appended ROM. CHKDSK may also generate a message similar to the one shown below:

```
41984 bytes in 16 hidden files
```

Do not be alarmed by this message. It appears as a result of the normal ROM implementation. It does not indicate anything wrong, and can be safely ignored.

The DEL Command   You cannot erase a ROM file. If you try to do so using the DEL command, you receive the message

```
Access denied
```

The DIR Command   The DIR command works in the ordinary fashion, except that appended ROM files are listed **after** all files actually on the drive.

The REN Command   The REN command is used to rename files. REN works with ROM files, but only temporarily. The original file name is restored the next time you turn the computer on.

Summary of MS-DOS ROM Characteristics

MS-DOS ROMs have the following characteristics:

- An MS-DOS ROM file cannot be erased or modified, but it can be temporarily renamed.
- MS-DOS utility files loaded from other devices must be of the same version as the MS-DOS files in ROM.
- MS-DOS does not look at ROM as a device in its own right. Instead, ROM files are appended to the directory of drive A.
- Installing an MS-DOS system ROM modifies the way the following commands work: CHKDSK, DEL, DIR, and REN.
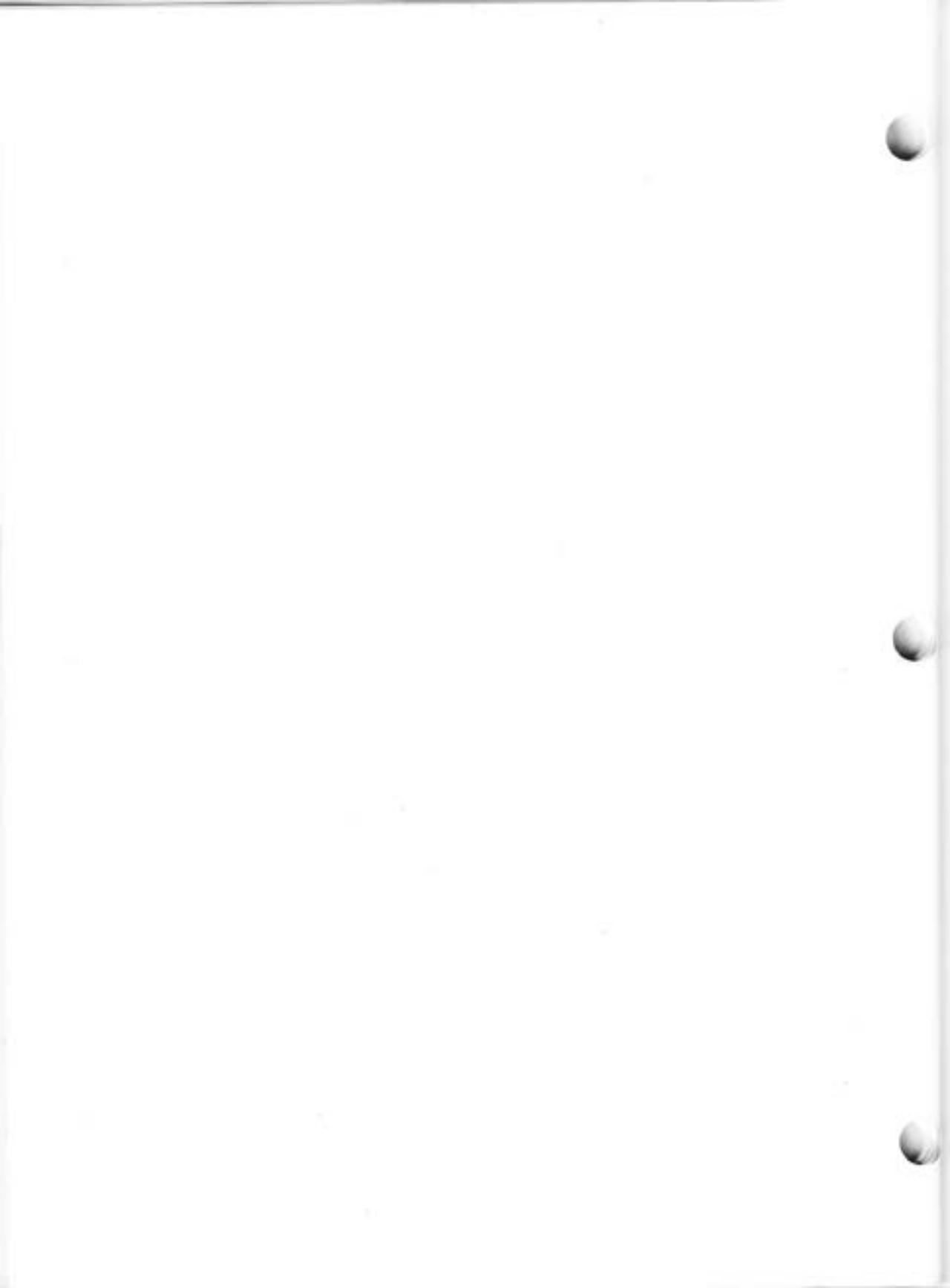
Chapter 7: External Devices

This chapter explains how to connect external devices to your TEMPEST GRiDCase. It specifically addresses the 2107 portable TEMPEST floppy diskette drive and the 2127 TEMPEST storage device. It also discusses in general terms how to connect parallel and serial printers and plotters to your computer.

CAUTION: Before you connect any external device to your TEMPEST GRiDCase, make sure that both the computer and the device are turned off. When you power the system up after connecting one or more external devices, always turn on any external device(s) **before** you turn the computer on. Similarly, when you power the system down, always turn off any external device(s) **before you turn the computer off.**

Connecting External Drives   Two TEMPEST-accredited external drives are available from GRiD Systems for the TEMPEST GRiDCase: the 2107 5¼-inch portable floppy diskette drive and the 2127 storage device.

The 2107 reads and writes standard 5¼-inch floppy diskettes. Diskettes can be single-sided or double sided, can be formatted for either GRiD-OS or MS-DOS, and can have a storage capacity of up to 360K.

The 2127 contains two 5-megabyte drives in a single TEMPEST-accredited housing. Each drive reads and writes removable 5-megabyte cartridges. Cartridges can be formatted for either GRiD-OS or MS-DOS.

General Purpose Interface Bus (GPIB) Address Switch Settings for External Drives

Both the 2107 portable floppy diskette drive and the 2127 storage device have on their back panels a row of five address switches. The setting of these switches determines the address the computer uses to direct data to and from the drive.

Each switch represents a binary digit in the drive's GPIB address. Since a five-digit binary number can represent any decimal number from 0 to 31, a total of 32 different address settings are possible. In practice, however, you need concern yourself with only five predefined drive addresses: 4, 5, 6, 12, and 13.

The appearance of the switches and the way they are labeled varies between the two drives. The basic way they work remains the same, however.

The address switches of the 2107 portable floppy diskette drive are shown in Figure 7-1.

Figure 7-1. *2107 Address Switches*
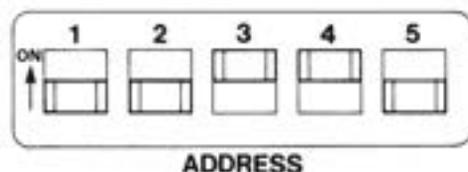
ADDRESS

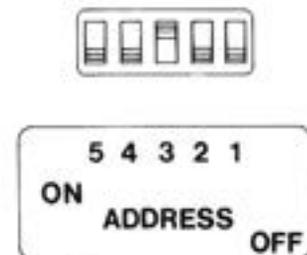The switches shown in Figure 7-1 are set to address 6.

Table 7-1 shows the relevant address switch settings for the 2107. If you are familiar with binary numbers, you can see that each switch setting represents the corresponding address in binary: switches in the up position are 1s; switches in the down position are 0s.

Table 7-1. *2107 Address Switch Settings*

Address	Switches				
	1	2	3	4	5
5	down	down	up	down	up
6	down	down	up	up	down
13	down	up	up	down	up

The address switches of the 2127 storage device are shown in Figure 7-2.

Figure 7-2. *2127 Address Switches*

5 4 3 2 1

ON   ADDRESS   OFF

The switches in Figure 7-2 are set to address 4. Note that the **numbering** of the switches on the 2127 is the reverse of the numbering on the 2107.

Table 7-2 shows the relevant address switch settings for the 2127.

Table 7-2. *2127 Address Switch Settings*

Address	Switches				
	5	4	3	2	1
4	down	down	up	down	down
12	down	up	up	down	down

The computer checks the address switch settings of attached devices only during start-up. Therefore, if you want to change switch settings or add a new device, you should turn both the computer and the external device off, make the desired change, and then turn the computer and the device back on. Otherwise, the computer will not recognize the changed address setting or new device.

CAUTION: Never set the GPIB switches of two external devices to the same address. If you do, you will not be able to access either device.

Significance of Switch Settings Under GRiD-OS   Under GRiD-OS, the name assigned to a device depends on its GPIB address switch setting. Table 7-3 shows the correspondence between addresses and names.

Table 7-3. *Device Names Under GRiD-OS*

Address	Name
4	Hard Disk
5	Removable Disk 1
6	Removable Disk 2
12	Extra Hard Disk
13	Removable Disk 3

Because the 2127 storage device actually contains two independent drives, a further naming convention is necessary to distinguish between the left and right drives of the 2127. Table 7-4 shows the 2127 left and right drive names that correspond to addresses 4 and 12.

Table 7-4. *2127 Left and Right Drive Names*

Address	Left Drive	Right Drive
4	Hard Disk	Hard Disk Drive 1
12	Extra Hard Disk	Extra Hard Disk Drive 1

NOTE: Under GRiD-OS, you should not use the GRiDManager "Change volume name" command to assign volume names to the cartridges you use in a 2127 storage device. If you do, the device names "Hard Disk" and "Extra Hard Disk" are replaced by the volume name of the first cartridge you use in the drive. Thereafter, until you restart the system, only that volume name appears on your device list, even if you change cartridges.

Significance of Switch Settings Under MS-DOS   Each GPIB address switch setting corresponds to either one or two MS-DOS drive letters. The drive letters assigned to each drive depend on the number of drives present and the GPIB address switch settings of those drives.

Under MS-DOS, you are limited to a total of four floppy diskette drives, counting the internal drive. Since MS-DOS treats a 2127 as two floppy diskette drives, this means that you are limited to no more than three 2107 drives or one 2107 and one 2127.

The **primary** drive letter A is always assigned to the internal floppy diskette drive. If any other drives are present, they are assigned primary drive letters alphabetically, in GPIB-address order. 2107 drives are assigned a single primary drive letter. 2127 drives are assigned two consecutive primary drive letters, the first to the left drive, the second to the right drive.

Suppose, for example, that your system includes a 2127 set to address 4 and a 2107 set to address 5. The internal floppy diskette drive is drive A, the left drive of the 2127 is drive B, the right drive of the 2127 is drive C, and the 2107 is drive D.

As mentioned above, the 2127, which is really two drives, is assigned two primary drive letters, compared to one primary drive letter each for the internal floppy diskette drive and any attached 2107 drives. The internal floppy diskette drive, drive A, and the lowest-addressed GPIB drive, drive B, are each assigned a **secondary** or **logical** drive letter in addition to their primary drive letters. Logical drive letters are assigned to drives in alphabetical order, after the primary assignments have been made. In the example given above, the internal floppy diskette drive would be logical drive E, and the left drive of the 2127 would be logical drive F.

The assignment of logical drive letters allows you to perform two-drive operations on a single drive. In other words, you can address the drive by either of the two drive letters, as if you were addressing two different drives. The computer prompts you to change diskettes as necessary.

Table 7-5 shows primary and logical drive letter assignments for various system configurations.

Table 7-5. *Drive Letter Assignments Under MS-DOS*

Configuration	Drive	GPIB Address	Drive Letter Primary	Logical
1	Internal	na	A	B
2	Internal	na	A	C
	2107	5	B	D
3	Internal	na	A	D
	2107	5	B	E
	2107	6	C	na
4	Internal	na	A	E
	2107	5	B	F
	2107	6	C	na
	2107	13	D	na
5	Internal	na	A	D
	2127	4	B,C	E, na
6	Internal	na	A	E
	2127	4	B,C	F, na
	2107	5	D	na
7	Internal	na	A	E
	2107	5	B	F
	2127	12	C,D	na, na

System Configurations   Because the GPIB addresses 4, 5, 6, 12 and 13 are available for external drives connected to the TEMPEST GRiDCase, it follows that you can connect up to five drives to your computer. This is in fact the case under GRiD-OS. Under MS-DOS, however, you are limited to a total of four floppy diskette drives, including the internal drive. Since MS-DOS treats a 2127 as two floppy diskette drives, this means you are limited, under MS-DOS, to no more than three 2107 drives or one 2107 and one 2127.

You can add drives beyond the MS-DOS limit by using the device driver file DRIVER.SYS, provided on your GRiD MS-DOS system diskette. DRIVER.SYS is documented in Chapter 5 of the *TEMPEST GRiDCase MS-DOS Reference* manual and in Chapter 1 of *Using MS-DOS on the TEMPEST GRiDCase*.

Which address you set for which drive, and the order in which you connect the drives is up to you, with three qualifications:

1. Use addresses 4 and 12 only for 2127s. Use addresses 5, 6, and 13 only for 2107s.

2. If you want to load your operating system from an external drive, that drive must have the lowest GPIB address on your system. You should therefore set the GPIB address of an external drive from which you wish to load the operating system to either 4 or 5, depending on the type of drive. To load the operating system from a 2127 storage device, set the address switches to 4, and put the operating system cartridge in the **left** drive.

3. Never set the GPIB switches of two drives to the **same** address. If you do, you will not be able to access either drive.

Connecting to the General Purpose Interface Bus

Both the 2107 and the 2127 are attached to the computer's General Purpose Interface Bus (GPIB).

Use a GRiD-supplied, shielded GPIB cable to attach external drives to the computer.

It is important that you connect the correct end of the GPIB cable to the computer. The two ends of the cable are **not** identical. One end of the cable has a single male GPIB connector; the other end of the cable has both a male and a female connector, back to back.

Always connect the end of the cable with the single male connector to the computer's GPIB connector, as shown in Figure 7-3.

Figure 7-3. *GPIB Cable to Computer*

GPIB
Connector

Attach this end of the cable to the computer.

Note the trapezoidal or "D" shape of both the computer's GPIB connector and the cable connector. You must align the connectors correctly before you can attach the cable to the computer.

Once the two connectors are aligned, push the cable connector gently into the computer's connector until it will go no further. Then hand tighten the two knurled screws on the cable connector to secure the cable to the computer.

Do not use a screwdriver to tighten the screws. Overtightening is unnecessary and may damage the connector. The screwdriver slots on these screws are provided in case you should ever need to use a screwdriver to **loosen** the screws.

Connect the other end of the GPIB cable—the end with two connectors— to the external drive, as shown in Figure 7-4. Use the same procedure to connect this end of the cable to the drive as you used to connect the other end to the computer. You should not have any trouble recognizing which of the two connectors attaches to the drive; it is physically impossible to make the wrong connection.

Figure 7-4. *GPIB Cable to External Drive*

Attach this end of the cable to the first external drive.
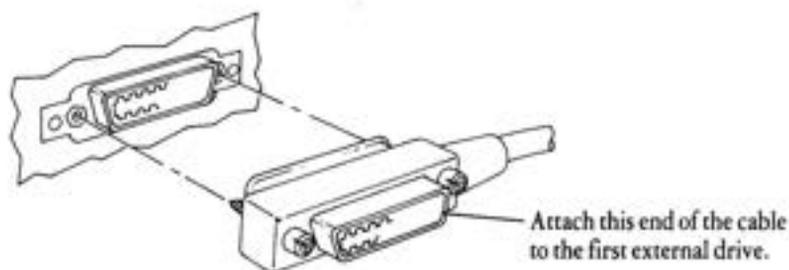
You can connect more than one drive or other external device to the computer's GPIB connector. That is why one end of the GPIB cable has two connectors: a male connector to attach to the device and a female connector to receive another GPIB cable to another device. A "piggy-back" GPIB cable connection is shown in Figure 7-5.

Figure 7-5. *Piggy-Backed GPIB Cables*
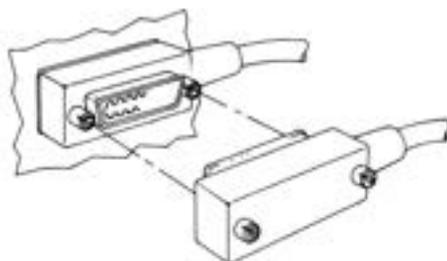
You can connect up to 15 devices to the computer's GPIB connector using 15 GPIB cables, though such a configuration is unlikely!

The order in which you attach GPIB devices to the computer does not matter. It is the address switch settings of each device that determine how the computer recognizes the device.

Connecting a 2107 Portable Floppy Diskette Drive

To connect a 2107 portable floppy diskette drive to your TEMPEST GRiDCase, you need the following items:

☐ TEMPEST GRiDCase Computer

☐ 2107 TEMPEST-accredited portable floppy diskette drive

☐ Shielded power cord (supplied with drive)

☐ Shielded GPIB cable (available from GRiD Systems)

To connect the drive to the computer, follow these instructions:

1. Make sure that both the computer and the 2107 are turned off. If any external devices are already connected to the computer, make sure those devices are also turned off.

2. Attach the single-connector end of the GPIB cable to the back of the computer, as shown in Figure 7-3 and explained under "Connecting to the General Purpose Interface Bus," above.

   If another external device is already attached to the computer's GPIB connector, attach the single-connector end of the GPIB cable to the GPIB connector attached to the back of the other device, as shown in Figure 7-5.

---

[1]In addition to the upper limit on the number of devices, there is also an upper limit on the total length of GPIB cable you can use to connect devices to a single computer. That limit is equal to 2 meters times the number of devices (including the computer itself) or 20 meters, whichever is less.

3. Attach the two-connector end of the GPIB cable to the GPIB connector on the back of the 2107, as shown in Figure 7-4.

4. Check the line voltage switch on the back of the 2107 to make sure that it is set to the correct voltage.

   CAUTION: Attempting to operate the 2107 with the line voltage switch set incorrectly damages the drive and voids your warranty.

5. Make sure the computer, the 2107, and any other attached external devices are plugged in.

6. Turn on the 2107 and any other attached devices. Then turn on the computer.

Connecting a 2127 Storage Device

To connect a 2127 storage device to your TEMPEST GRiDCase, you need the following items:

☐ TEMPEST GRiDCase Computer

☐ 2127 TEMPEST-accredited storage device

☐ Shielded power cord (supplied with drive)

☐ Shielded GPIB cable (available from GRiD Systems)

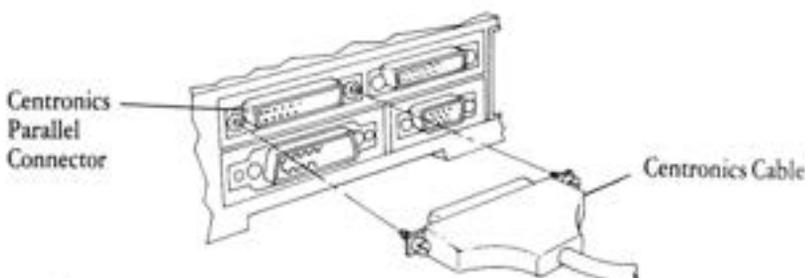To connect the drive to the computer, follow these instructions:

1. Make sure that both the computer and the 2127 are turned off. If any external devices are already connected to the computer, make sure those devices are also turned off.

2. Attach the single-connector end of the GPIB cable to the back of the computer, as shown in Figure 7-3 and explained under "Connecting to the General Purpose Interface Bus," above.

   If another external device is already attached to the computer's GPIB connector, attach the single-connector end of the GPIB cable to the GPIB connector attached to the back of the other device, as shown in Figure 7-5.

3. Attach the two-connector end of the GPIB cable to the GPIB connector on the back of the 2127, as shown in Figure 7-4.

4. Make sure that the 2127's line voltage setting and fuse are correct for the voltage to be supplied. Refer to the documentation that came with your 2127 for instructions on setting the line voltage and changing the fuse.

   CAUTION: Attempting to operate the 2127 with an incorrect line voltage setting or fuse damages the device and voids your warranty.

5. Make sure the computer, the 2127, and any other attached external devices are plugged in.

6. Turn on the 2127 and any other attached devices. Then turn on the computer.

   CAUTION: Unless specifically prompted by a program to do so, **never change cartridges in a 2127 storage device during program execution.** If you do, you may destroy files on both the cartridge you remove and on the cartridge you insert.

   NOTE: Unlike hard disks, the cartridges of a 2127 drive (or any other removable media) cannot be partitioned to store files under more than one operating system. Nor is there any need to partition removable media—just store GRiD-OS and MS-DOS files on separate cartridges.

Loading the Operating System from an External Drive

When you turn on or restart the TEMPEST GRiDCase, it ordinarily loads the operating system either from ROM (the first device checked) or from the internal floppy diskette drive (the second device checked).

You can, however, specify that the operating system be loaded from an external drive. To do so, press E immediately after the computer displays its ROM BIOS message during startup. This causes the computer to look for its operating system on the lowest-addressed drive attached to the GPIB connector. If that drive is a 2127 storage device, the operating system is loaded from the **left** drive of the 2127.

Connecting Printers

It is physically possible to connect almost any common printer to the TEMPEST GRiDCase. **However, to maintain your system's TEMPEST rating, you should connect only TEMPEST-accredited printers, and you should use only shielded cables to make the connections.**

GPIB Parallel Printers

Some parallel printers are equipped with a General Purpose Interface Bus (GPIB) connector. To connect a GPIB-equipped printer to your TEMPEST GRiDCase, you need:

- ☐ TEMPEST GRiDCase computer
- ☐ TEMPEST-accredited, GPIB-equipped parallel printer
- ☐ Shielded GPIB cable (available from GRiD Systems)

To connect the GPIB-equipped printer, follow the same cabling procedures described earlier in this chapter for connecting external drives.

To use a GPIB parallel printer under MS-DOS, you must first issue a MODE command to direct printer output to LPT2 (line printer number 2). This is necessary because MS-DOS sends default printer output to the Centronics parallel connector.

MODE is an external MS-DOS command. To use it you must have the file
MODE.EXE in the current directory of the current drive. The simplest way
to do that is to put your MS-DOS system diskette in the internal floppy
diskette drive, drive A, and log on to that drive. Then, in response to the A>
prompt, enter the form of the MODE command shown below:

```
MODE PRN=2
```

Once you issue this command, all printer output is sent to the printer
attached to the GPIB connector.

If you intend to use only a GPIB parallel printer, you may want to put the
MODE command shown above in an AUTOEXEC.BAT file so that it is
executed every time you load MS-DOS. Refer to the *TEMPEST GRiDCase
MS-DOS Reference* for information on AUTOEXEC.BAT files.

Set the GPIB address switches on the printer to 21.

Centronics Parallel Printers

To connect a printer equipped with a Centronics parallel connector to your TEMPEST GRiDCase, you need:

☐ TEMPEST GRiDCase computer

☐ TEMPEST-accredited, Centronics-equipped parallel printer

☐ Shielded Centronics cable (available from GRiD Systems)

To connect the printer, follow these steps:

1. Make sure that both the computer and the printer are turned off. If any other external devices are connected to the computer, make sure those devices are also turned off.

2. Connect the plug end of the Centronics cable to the Centronics parallel connector on the back of the computer as shown in Figure 7-6.

3. Connect the other end of the Centronics cable to the Centronics connector on the back of the printer.

4. Make sure all power cords are plugged in.

5. Turn on the printer and any other connected external devices before you turn on the computer.

Under MS-DOS, line printer output is sent to the Centronics connector by default. Therefore, if you are using only a Centronics parallel printer, you don't have to do anything special to direct output to it. If, however, you have both a GPIB and a Centronics printer and switch back and forth between the two, you must use the MODE command to redirect printer output to the Centronics printer after using the GPIB printer. To do so, enter the form of the MODE command shown below:

```
MODE PRN=1
```

Consult your printer's documentation for information on printer configuration switch settings and on operating your printer.

Figure 7-6. *Centronics Cable to Computer*

Serial Printers

To connect a printer equipped with an RS-232C serial connector to your TEMPEST GRiDCase, you need:

- ☐ TEMPEST GRiDCase computer
- ☐ TEMPEST-accredited, RS-232C-equipped serial printer
- ☐ Shielded RS-232C cable (available from GRiD Systems)

To connect the printer, follow these steps:

1. Make sure that both the computer and the printer are turned off. If any other external devices are connected to the computer, make sure those devices are also turned off.

2. Connect one end of the cable to the 25-pin serial connector on the back of the computer as shown in Figure 7-7. Some RS-232C cables have identical female connectors at either end; some have a female connector at one end and a male connector at the other. Only a female connector can be attached to the back of the computer. The connector at the other end of the cable must be compatible with the connector on your printer.

3. Connect the other end of the cable to the RS-232C connector on the back of the printer.

4. Make sure all power cords are plugged in.

5. Turn on the printer and any other connected external devices before you turn on the computer.

To use a serial printer under MS-DOS, you must first issue one MODE command to turn a serial port on and another MODE command to direct printer output to that serial port.

MODE is an external MS-DOS command. To use it you must have the file MODE.EXE in the current directory of the current drive. The simplest way to do that is to put your MS-DOS system diskette in the internal floppy diskette drive, drive A, and log on to that drive. Then, in response to the A> prompt, enter the form of the MODE command shown below:

```
MODE SERIALn:=ON
```

The *n* stands for either 1 or 2. The 25-pin serial port is SERIAL1. The 19-pin serial port is SERIAL2. Refer to *Using MS-DOS on the TEMPEST GRiDCase* for more information on using the MODE command to turn the serial ports on.

Once you have turned a serial port on, you can use the following form of the MODE command to redirect printer output to that port:

```
MODE LPTn:=COMn
```

The first *n* stands for either 1 or 2. LPT1 represents a printer attached to the Centronics parallel connector. LPT2 represents a printer attached to the GPIB parallel connector. By specifying LPT1 or LPT2 in the MODE command, you are indicating which printer's output is to be redirected to the serial printer. If you have previously issued a MODE PRN=2 command, specify LPT2. If you have issued no previous MODE command, or have issued a MODE PRN=1 command, specify LPT1.

The second *n* also stands for either 1 or 2. This number specifies which serial connector to direct printer output to. To send printer output to the 25-pin RS-232C connector, specify COM1. To send printer output to the 19-pin RS-232C/RS-422 connector, specify COM2.

Consult your printer's documentation for information on printer configuration switch settings and on operating your printer.

Figure 7-7. *RS-232C Cable to Computer*
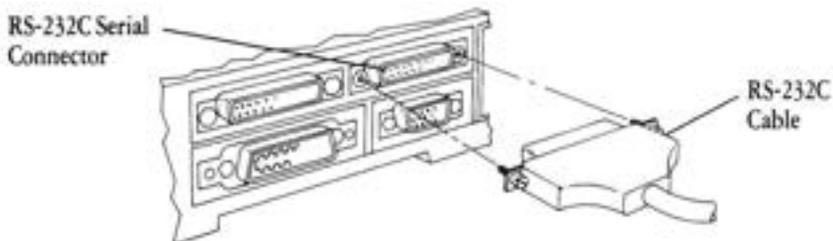
Connecting Plotters   To connect a GPIB-equipped plotter to the TEMPEST GRiDCase, follow the procedures described earlier under "GPIB Parallel Printers," with this modification:

The correct GPIB address switch setting for plotters is 20.
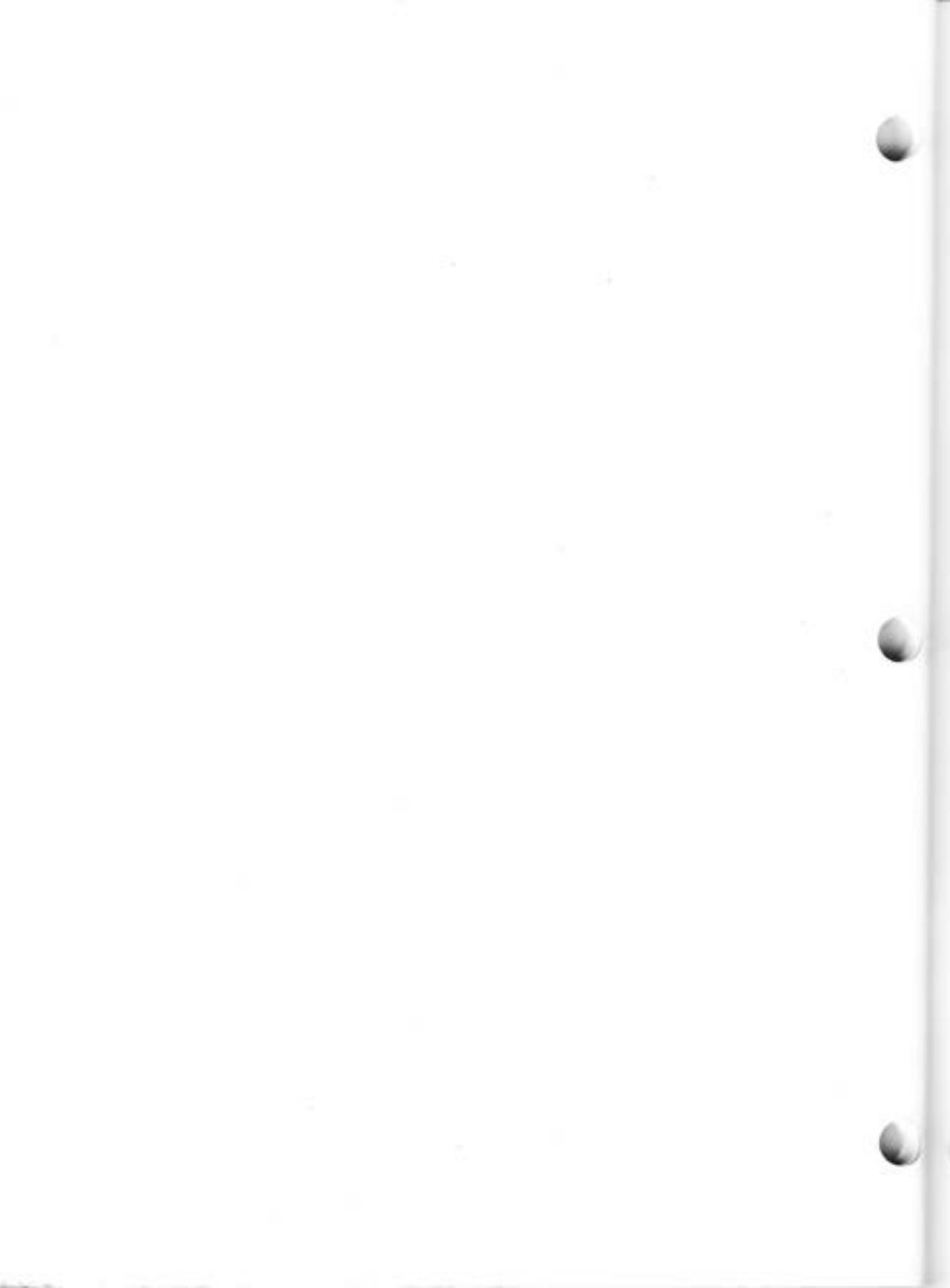
Chapter 8: Maintenance

This chapter describes how to care for your TEMPEST GRiDCase. Although the TEMPEST GRiDCase is a very durable computer, you should treat it as you would any other precision instrument—with care.

Warnings   Always observe the warnings listed below. Failure to do so may lead to physical injury.

- ☐ Do not operate the computer in a moist environment; do not under any circumstances allow the computer to get wet.

- ☐ Do not operate the computer in any potentially flammable or explosive atmosphere **including atmospheres with high concentrations of flammable dust.**

- ☐ Do not attempt to open the computer's case; it contains no user-serviceable parts. Opening the computer's case voids your warranty and service contract, may damage the computer, and may also compromise the computer's TEMPEST rating.

- ☐ Arrange power cords and cables so that they won't be pulled out or tripped over while the computer is in use.

- ☐ If you use a plug adapter with your computer or any attached device, make sure you ground the adapter properly.

- ☐ Always turn the computer off before you unplug it.

Cautions   Always observe the cautions listed below. Failure to do so could lead to damage to your computer.

- ☐ Before you connect any device to your computer or disconnect any device from your computer, turn off both the device and the computer, in that order.

- ☐ Operate the computer only when the ambient temperature is between 41°F and 113°F (5°C and 45°C).

- ☐ Operate the computer only when the relative humidity is between 20% and 80%, noncondensing.

- ☐ Store the computer where the ambient temperature remains between −4°F and 149°F (−20°C and 65°C).

- ☐ Do not set up or store the computer or any of its peripheral devices in direct sunlight.

- ☐ Do not subject the computer to unnecessary shock or vibration.

□ Never clean the computer with any chemical cleaning agent or abrasive substance.

□ If you use an external AC power pack, always make sure that the line voltage switch is set to the proper voltage before you plug the power pack in to an outlet. Supplying power at an incorrect voltage setting can damage your computer.

Cleaning Your TEMPEST GRiDCase

Before you clean your computer, turn it off. If you are using an external power source, you should also disconnect the AC or DC power cord.

Use a soft, lightly dampened cloth to clean the computer's case. If necessary, use a mild, nonabrasive detergent.

CAUTION: Never clean the computer with any chemical cleaning agent or abrasive substance.

Wipe the case clean and then dry it.

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

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

WARNING: To avoid electrical shock, **never** apply any liquid to the rear panel or inside the diskette drive opening.

Storing Your TEMPEST GRiDCase

Always store your TEMPEST GRiDCase where the temperature remains between − 4°F and 149°F (− 20°C and 65°C). To keep it free from dust and dirt, store your TEMPEST GRiDCase in the carrying case that came with it.

Traveling with Your TEMPEST GRiDCase

When you travel with your TEMPEST GRiDCase, keep it in its protective carrying case and carry it with you; avoid checking it as luggage if possible. Many transportation carriers do not cover the replacement cost of your computer should they lose or damage it.

If for some reason you do check your computer as luggage, **pack it in its original shipping carton and packing materials**.

Whenever you move your computer or travel with it, you should **always** put the travel diskette in the internal floppy diskette drive to protect the drive from shock. If you misplace the original travel diskette, you can use a worn out or defective diskette that contains no important data.

Airport security X-rays should not damage your TEMPEST GRiDCase, peripheral devices, or floppy diskettes. You can, however, ask that your computer be hand checked if you wish.

CAUTION: If you transport your TEMPEST GRiDCase with a battery pack installed, make sure that the computer is turned off. Otherwise, the battery pack will discharge during transportation. To guard against the possibility of battery discharge due to accidental bumping of the computer's power switch, you may want to remove the battery pack and transport it separately.

Updating the Clock   The computer's internal time-and-date clock, which displays the time and date on the screen, is not intended to replace your wristwatch. Its precision over a long period may vary because of fluctuations in temperature and other factors. You should check its accuracy periodically. In any case, you must at least update the year every January 1st.

To reset the date and time under GRiD-OS, select the "Set time" option from the GRiDManager menu. Then fill in the form to specify Hour, Minute, a.m./p.m., Month, Day, Year, and Day of week.

Under MS-DOS, you are ordinarily given a chance to update the date and time every time you start the operating system. At start-up time MS-DOS displays the current date and prompts you to enter a new date. If the current date is correct, just press Return. To change the date, enter the new date in the same format as the current date.

After you respond to the date display and prompt, MS-DOS displays the current time and prompts you to enter a new time. You can press Return to retain the current time, or you can enter a new time, using the same format in which the current time is displayed.

If your boot diskette contains an AUTOEXEC.BAT file, the date and time prompts are **not** automatically displayed when you start the system. Refer to the *TEMPEST GRiDCase MS-DOS Reference* for information on the AUTOEXEC.BAT file.

You can also use the MS-DOS internal commands, DATE and TIME to reset the date and time.

To reset the date, enter DATE in response to the system prompt. You are then prompted to enter a new date. When you do so, use the same format in which the current date is displayed.

To reset the time, enter TIME in response to the system prompt. You are then prompted to enter the new time. When you do so, use the same format in which the current time is displayed.

Chapter 9: Troubleshooting

This chapter describes problems that may arise as you set up and use your TEMPEST GRiDCase and suggests possible solutions to those problems.

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

Common Set-Up Problems and Their Solutions   Table 9-1 lists common set-up problems, their possible causes, and their solutions. Before you decide that you have a serious hardware or software problem, try to solve the problem using the troubleshooting chart.

Table 9-1. *Troubleshooting Guide*

Problem	Possible Cause	Solution
Nothing happens when you turn the computer on	No AC power	Make sure that the internal/external, internal, or external AC power pack is plugged in to a live AC outlet.
	Low batteries	Recharge batteries using the internal/external AC power pack, the external AC power pack, or the battery charger.
Computer boots, but the low-battery indicator is lit	Low batteries	Recharge batteries using the internal/external AC power pack, the external AC power pack, or the battery charger.

❯

Problem	Possible Cause	Solution
External device does not respond	Not turned on	Make sure the external device is turned on.
	Not plugged in	Make sure the external device is plugged into a live AC outlet.
	Cable is not hooked up correctly	Make sure the cable is securely connected both to the computer and to the external device.
	System does not recognize the device	Make sure the device is turned on, and then reboot the computer.
No response when printer is turned on	Not plugged in	Make sure printer is plugged in to a live AC outlet.
	Printer is defective	Run a printer self-test as described in your printer's documentation.
	Cable is not hooked up correctly	Make sure the cable is securely connected to both the computer and the printer.
Printer won't print or prints incorrectly	No printer driver (GRiD-OS)	Check to make sure that you have activated the printer driver software for your make and model printer. Refer to the Options form under GRiDManager in the *GRiD-OS Software Manual*.
	Printer is not supported (MS-DOS)	Check the manual for the application software you are using to make sure the program supports the attached printer. If it does not, you may need to change software or printers.
	Printer switches are set incorrectly	Check printer DIP switch settings or GPIB address settings as described in your printers documentation and/or Chapter 7 of this manual.

Problem	Possible Cause	Solution
Computer is slow to respond after you turn it on	Normal GRiD-OS boot	GRiD-OS takes about 40 to 60 seconds to load from a floppy diskette.
	Normal MS-DOS boot	MS-DOS takes about 20 seconds to load from a floppy diskette.
Installed ROMs don't show up in directory or title list	ROMS are not correctly installed or are not seated properly	Turn off, but do not unplug, the computer and any attached devices. Make sure the ROMs are installed correctly and are properly seated in the ROM board.
	You are looking at the directory of the wrong device	Under MS-DOS, ROM files are appended to the boot device at start-up time. Make sure that you are looking for the ROM files in the directory of your boot device.
Incorrect date or time on screen	Time-of-day clock is set incorrectly	Set time and date as described in "Updating the Clock" in Chapter 8.

Problem	Possible Cause	Solution
Computer cannot load the operating system	Operating system software is not on the diskette in the internal drive	Replace the diskette in the internal floppy diskette drive with one that contains the operating system software.
	Damaged system diskette or damaged files on the diskette	Make a new working copy of your distribution system diskette.
	Operating system software is not on the diskette or cartridge disk in the external drive	Replace the diskette or cartridge disk in the external drive with a diskette or cartridge disk that contains the operating system software.
	System does not recognize the external drive from which you are trying to load the operating system	Turn off all attached devices, and then turn off the computer. Make sure all cables and cords are securely connected. Verify GPIB address switch settings. Wait at least five five seconds; then turn the attached devices and the computer back on.
	Insufficient power	Try a different AC outlet, or provide a fresh battery pack.
"Bad or missing Command Interpreter" error message	Loading MS-DOS from ROM with a non-DOS diskette in the internal drive	Remove the non-DOS diskette from the internal drive and replace it with a DOS diskette.

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

Software Problems   If you encounter problems with specific GRiD-OS software **other than** CCOS, Common, and Executive, try erasing your working copy of the problem software and replacing it with a different copy of the same version. **Do not erase your master copy of any software.**

If the software still does not function properly, and if you have ordered a GRiD Customer Support Service (CSS) contract with your TEMPEST GRiDCase, call the GRiD Resource Center at (415) 961-4743.

Required Files
Certain files are required for your TEMPEST GRiDCase to function properly when you first turn it on. The files you need depend on which operating system you are using.

GRiD-OS Files   If you are using GRiD-OS, you always need the following files in your "Programs" subject on an active device, regardless of the application you use:

Title	Kind
CCOS	System
Common	Shared
Emulator	Shared (required if your system does not include an 8087 co-processor)
Executive	Run

MS-DOS Files   If you are using MS-DOS you need an MS-DOS boot diskette that contains the file COMMAND.COM and the two hidden system files MSDOS.SYS and IO.SYS. COMMAND.COM shows up in a listing of the diskette directory; the hidden files do not. Refer to the *TEMPEST GRiDCase MS-DOS Reference* for information on creating a boot diskette that contains the two hidden system files.

Hardware Problems   If you have a problem that appears to be neither set-up nor software related, it may be a hardware problem. Call the GRiD Resource Center at (415) ~~961-4743~~ for help diagnosing the problem.

~~4900~~
656-4700

The ScanCase Program   The ScanCase program is a utility program provided for both GRiD-OS and MS-DOS users. It reports the status of input/output devices attached to your computer and lists the factory-installed hardware options present. Use ScanCase 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 TEMPEST GRiDCase is equipped with the options your application programs require.

ScanCase is provided on both the GRiD-OS and MS-DOS system diskettes.

On the GRiD-OS system diskette, ScanCase resides in the Subject "Programs," with a Title of "ScanCase" and a Kind of "Run."

To invoke ScanCase under MS-DOS, enter the command SCANCASE in response to the system prompt.

The information provided by the ScanCase program is summarized below:

ROM BIOS Date. ROM BIOS (Read-Only Memory Basic Input-Output System) is the basic operating system component installed in the TEMPEST GRiDCase when it is manufactured. The date indicates when the BIOS code for your TEMPEST GRiDCase was written.

8087. Indicates whether or not an 8087 numeric co-processor is installed in your TEMPEST GRiDCase.

Available RAM. This is the number of bytes of RAM (Random-Access Memory) installed in your TEMPEST GRiDCase and available for program execution. Under MS-DOS, this number should be 640. Under GRiD-OS, this number should be 512. Under GRiD-OS, memory between 513 and 640 is reserved for the use of executable ROMs. Because no executable ROMs are available under MS-DOS, the full 640K of installed RAM is available.

Internal Floppy. The notation "active" indicates that the drive is operating properly; any other message indicates a possible malfunction.

Parallel (Centronics) Interface. States whether a printer or other device is attached to the parallel connector.

Chapter 10: A Brief Introduction to Operating Systems

This chapter provides a brief introduction to the concept of operating systems. It also provides you with some introductory information on the two operating systems available for the TEMPEST GRiDCase: GRiD-OS and MS-DOS. For detailed operating system information, refer to the *GRiD Software Manual* and the *TEMPEST GRiDCase MS-DOS Reference*.

The Purpose of an Operating System   An operating system is your computer's most important software; the computer can't do anything useful without one. An operating system consists of a number of programs that control the computer's internal operations and handle communications between you and your computer, between your computer and other devices such as diskette drives, and between application programs and the computer and associated devices. In addition, operating systems generally provide a number of house-keeping or utility programs that allow you to perform tasks like formatting diskettes and copying and erasing files.

Files: An Important Operating System Concept   Both GRiD-OS and MS-DOS store all data in files. Text or numeric data that you create with a word processing or spreadsheet program is stored in files; the word processing or spreadsheet program itself is stored in one or more files; even the operating system is stored in files. **All** the data on your diskettes or cartridge disks is organized into files whose size, location, and other characteristics are tracked by the operating system.

Available Operating Systems   The TEMPEST GRiDCase is available with either or both of two operating systems: GRiD-OS and MS-DOS.

The two operating systems are available both on floppy diskettes and in Read-Only Memory (ROM) chips. Chapter 2, "Setting Up Your TEMPEST GRiDCase," includes instructions on starting either operating system from diskette or from ROM.

You should use only operating systems supplied by GRiD Systems. GRiD Systems has optimized these operating systems for use on the TEMPEST GRiDCase portable computer. The use of any other operating system on the TEMPEST GRiDCase will shorten battery life and may result in other operating problems.

The GRiD-OS User Interface   An operating system's "user interface" is the way that operating system looks and feels to the person using it. The user interface consists of such things as typical screen displays and the actions a user has to perform to tell the operating system what to do.

GRiD-OS has a distinctive user interface that relies extensively on easy-to-use menus and forms that the user fills in to specify the actions he wants GRiD-OS to take. The most fundamental of these forms is the File Form, which is displayed whenever you load GRiD-OS.

The GRiD-OS File Form is shown in Figure 10-1. The lower part of the form specifies the information that you must supply to tell GRiD-OS what you want to do. The upper part of the form contains a list of choices. The list of choices is different for each item on the lower part of the form. For each of these items, with the exception of the "Device" item, you can either enter new information or select from choices displayed in the upper part of the form.

Figure 10-1.   *The GRiD-OS File Form*

Let's take a quick look at the various parts of the File Form:

☐ The **Highlighted Strip** is used to select a choice from the list.

☐ **Choices** are the options available for a particular item in the lower part of the form. In Figure 10-1, the choices shown are for the "Subject" item in the lower part of the form.

☐ The **Outline** appears next to the item you are currently filling in. When you move the outline from one item to another, the list of choices changes, so that the list always applies to the item where the outline is. When you move the highlighted strip to a choice, that choice appears inside the outline. When you move the highlighted strip to a blank line above the choices, you can type your choice directly into the outline. To move the outline down a line, press Return. To move the outline up a line, press Shift and the ↑ key together.

☐ The **Message Line** gives you information on what to do next, tells you how to get more information (help), and displays error messages.

When you have filled in all the information that the form requires, you confirm that the form is correctly filled in by pressing the Code and Return keys simultaneously.

You can correct a mistaken entry in the form by moving the outline to the appropriate item and selecting or entering a new choice. If you want to start over with a clean File Form, press Esc.

Each of the File-Form items that you must fill in is described below.

Device

Device is the name of a permanent storage device where a file is kept when you are not working with it. When you move the outline to the "Device" item, a list of storage devices attached to your computer is displayed in the upper part of the screen. You cannot specify a device that does not appear on the list.

To specify a device, first move the outline to the "Device" item on the File Form. Then move the highlighted strip to the device you want to select. Finally, press Return to go on to the next item of the File Form, "Subject."

Volume

A volume name is a special subcategory of Device. It is actually a name that you assign to a specific diskette or cartridge disk. "Volume" does not have a separate line in the file form. Instead, any volume names associated with a particular device appear on the device list itself, below the physical device with which they are associated, and indented one space.

When you select a device with one or more associated volume names, the name of the volume currently in the device appears inside the outline next to the "Device" item on the File Form. If you select a specific volume, and that volume is not currently in the device, GRiD-OS prompts you to insert the specified volume.

Whenever GRiD-OS is running, it maintains a list of every volume used in every device. The device list you see at any given time therefore includes every volume that has been used in every device since you last started the operating system. You can update this list to remove volumes no longer needed.

Subject

Subject specifies a group of files. Subjects help you organize your files into logical groups. You specify which files a particular Subject contains. Your "Subject" groups can consist of one file each. At the other extreme, you can group all your files into a single subject. You can group files into subjects in any way that you find useful.

When you move the outline to the "Subject" item, a list of subjects that currently exist on the specified device is displayed in the upper part of the screen.

To select one of those subjects, move the highlighted strip to the subject of your choice and then press Return to go on. If you want to create a new subject, move the highlighted strip to the blank line above the list of current subjects (if any), and type in the subject of your choice. Then press Return to go on to the next item of the File Form, "Title."

Title

Title is the name of the specific file you want to access.

When you move the outline to the "Title" item, a list of titles that currently exist in the specified subject is displayed in the upper part of the screen. Titles are listed down the left side of the screen. The Kind that corresponds to each Title is listed on the right side of the screen. *Kind* is explained below.

To select a Title from the list, move the highlighted strip to that Title. When you do so, the Title appears inside the outline. Note that the Kind that corresponds to the Title automatically appears one line below the outline. At this point, you can select the specified file **and the appropriate application program** (if it is available) by pressing Code and Return simultaneously.

To create a new file, move the highlighted strip to the blank line above the list of titles and then type in the new Title of your choice. Then press Return to go on to the "Kind" item of the File Form.

Kind

Kind specifies what Kind of file you want to create or access.

When you move the outline to the "Kind" item, a list of kinds appears in the upper part of the screen. Each listed Kind corresponds to a file of a particular type and also corresponds to a particular GRiD application program. The Kind tells the operating system which application to retrieve with the file.

Refer to your *GRiD Software Manual* for the "Kind" associated with each application.

Once you have specified the Kind of the file you want to create or access, press Code and Return simultaneously.

If the necessary application program is available, and the specified file is not password protected, the computer proceeds to load the application program that corresponds to the Kind of the specified file. The computer then loads or creates the specified file, and you can begin to work with that file.

Password

You can, if you want, assign a password to any file. If you do so, neither you nor anyone else can access that file without first entering the correct password in the File Form. If you want to assign a password to a file, use the "Assign Password" command of the GRiDManager utility program. Refer to your *GRiD Software Manual* for instructions on assigning passwords.

When you enter a password in the File Form, the password is not displayed. This helps prevent you from inadvertently revealing a password to someone else.

The MS-DOS User Interface

The MS-DOS user interface is less sophisticated than the GRiD-OS user interface. MS-DOS does not include any equivalent of GRiD-OS menus and forms and does not generally prompt you to take appropriate actions, beyond setting the date and time at start-up time. Instead, MS-DOS is command-line driven. This means that MS-DOS displays a simple system prompt, or command-line prompt, and that you must know what command to enter in response to that prompt.

When MS-DOS is loaded, the screen displays the current date and prompts you to supply a new date. You can enter a new date, or press Return to retain the current date. The screen then displays the current time and prompts you for a new time. After you enter a new time or press Return, the screen displays the the system prompt. That prompt consists of a letter that

specifies the current drive and a right angle bracket. Refer to Chapter 7 for information on drive-letter assignments under MS-DOS. Assuming the current drive is drive A, the system prompt looks like this:

A>

Whenever you see the system prompt, MS-DOS is ready to accept a command. Refer to the *TEMPEST GRiDCase MS-DOS Reference* for information on the various commands available to you.

Frequently, the command you enter in response to the MS-DOS system prompt will be the command to load and execute a particular application program. Commands needed to load application programs are included in the documentation of the application programs.

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