

GRIDACCESS USER'S GUIDE

April 1984

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2535 Garcia Avenue
Mountain View, CA 94043
(415) 961-4800

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TABLE OF CONTENTS

ABOUT THIS BOOK ix

 What is GRiDAccess? ix

 Before Using This Guide ix

 How Do I Begin? x

 Typographical Conventions x

 Keycaps x

 Multi-Key Operations x

 Confirm x

CHAPTER 1: INTRODUCTION 1-1

 Communications Capabilities 1-1

 System Requirements 1-3

 Computers Using GRiDAccess 1-3

 Computers Using Non-GRiD Software 1-3

 Activating GRiDAccess 1-4

 Deactivating GRiDAccess 1-5

 How To Use GRiDAccess 1-6

 Dial, Converse, and Send a File 1-6

 Answer, Converse, and Receive a File 1-9

 Dial From a Database Telephone List 1-12

CHAPTER 2: THE IDLE MENU -- CODE-A 2-1

 Answer the Phone and Receive a File 2-1

 Answer the Phone and Send a File 2-2

 Change Telephone Configuration 2-2

 Dial the Phone 2-3

 Dial the Phone and Receive a File 2-3

Dial the Phone and Send a File	2-4
CHAPTER 3: THE ACTIVE MENU -- CODE-A	3-1
Cancel File Transfer	3-1
Change Telephone Configuration	3-2
Execute Telephone Commands	3-2
Command	3-2
Handset	3-3
Hang Up the Phone	3-3
Receive a File	3-3
Send a File	3-4
CHAPTER 4: THE DIAL ACCESS FORM -- CODE-A	4- 1
Dial Type	4-1
Local Area Code	4-2
Modem Type	4-2
Outside Access Prefix	4-2
Phone Number	4-3
Speaker Volume	4-4
Wait For Answer	4-4
CHAPTER 5: THE OPTIONS FORM	5-1
Baud Rate	5-1
File Transfer Protocol	5-2
Host is GRiD Compatible	5-2
Receive File Options Form	5-2
Line Ends With	5-3
Send File Options Form	5-3
End Line At	5-4
End Line With	5-4
Intercharacter Delay	5-5
Line Length	5-5
Type of Data	5-5
APPENDIX A: THE GRiDACCESS PROTOCOL	A-1

APPENDIX B: TELEPHONE EQUIPMENT	B-1
Telephone Equipment Checklist	B-1
Telephone Communications with the GRiD Compass	B-2
Modular Jacks for Single Line Connections	B-2
Modular Jack Accessories.	B-2
Modular Jacks for Multiple-Line Connection	B-3
APPENDIX C: ERROR MESSAGES	C-1
GLOSSARY	G-1
INDEX	X-1

LIST OF FIGURES

Figure 1-1.	Accessing Remote Systems with GRiDAccess	1-1
Figure 1-2.	File Form for Activating GRiDAccess.	1-4
Figure 1-3.	Main Memory after Activating GRiDAccess.	1-5
Figure 2-1.	The Idle Menu.	2-1
Figure 2-2.	The Dial Access Form -- Change Items	2-3
Figure 3-1.	The Active Menu	3-1
Figure 3-2.	The Commands Form	3-2
Figure 4-1.	The Dial Access Form	4-1
Figure 5-1.	The Options Form	5-1
Figure 5.2.	Receive File Options Form	5-3
Figure 5.3.	Send File Options Form	5-4

About This Book

This manual explains how to use and provides reference information on the GRiDAccess software product.

What Is GRiDAccess? GRiDAccess is a communications program that allows a user to receive and send files with a variety of remote computers over the telephone lines and other common carriers.

GRiDAccess also lets you make and receive telephone calls using a handset plugged into your computer. You continue working with the GRiD applications as you make or receive calls, and converse with your party.

The purpose of this guide is to provide reference information on GRiDAccess and explain how to use it.

Before Using This Guide If you already use the GRiD Management tools -- GRiDFile, GRiDPlan, GRiDPlot, or GRiDWrite -- this guide provides you all the information you need to use GRiDAccess.

However, if you are a new GRiD User, you should first familiarize yourself with the GRiD software keyboard, menus, and forms, file creation procedures, and file handling commands as described in the Getting Started tutorial and the GRiD Management Tools Reference manual.

How Do I Begin? Read Chapter 1 to acquaint yourself with the concepts of GRiDAccess, your system requirements and those of the remote computer you wish to communicate with, and some procedures to guide you in performing the more prominent functions of the program.

Where necessary, Chapter 1 refers you to the remaining chapters of the book; these chapters contain reference information that explain GRiDAccess menus and forms. Look at these chapters to familiarize yourself with the full capabilities of GRiDAccess.

Typographical Considerations This guide follows certain typographical conventions concerning keycaps and use of the keyboard. You should be aware of these conventions as you read.

Keycaps

Keycap labels are in upper case, just as they appear on your keyboard. Thus, when you see the symbol CODE, you should press the key labeled CODE rather than typing the word "CODE" letter by letter.

Multi-Key Operations

Throughout this manual, you are instructed to perform operations like "press CODE-RETURN." When you see a hyphen between two keycap names, press the keys in the order in which they appear and hold them down together. Thus, when you see "press CODE-RETURN," press down the CODE key and, while holding it down, press the key labeled RETURN. If you see three keycap names linked with hyphens, hold down the first two while pressing the the third.

Confirm

You are instructed both in this manual and in prompts that appear on your computer screen to "confirm" that a form is filled out correctly or that you are ready to go on to the next step of the task at hand. The proper response to a "confirm" request is to press CODE-RETURN.

Chapter 1: Introduction

This chapter introduces GRiDAccess to the new user and covers the following topics:

- o Communications capabilities: whom you can communicate with and how.
- o System requirements for both the computer using GRiDAccess and other computers using other communications software.
- o Activating GRiDAccess so that you can dial and answer telephone calls.
- o How to make connections for voice and data communications, and how to send and receive data.

The chapter gives an overview of the topics mentioned above; it doesn't cover all GRiDAccess functions or give you the technical details you may require in every instance. When necessary, you are referred to other parts of the guide for this information.

Communications Capabilities GRiDAccess lets you make and receive telephone calls on a telephone handset connected to your computer, and exchange data with other computers using either GRiDAccess or other communications software (Figure 1-1).

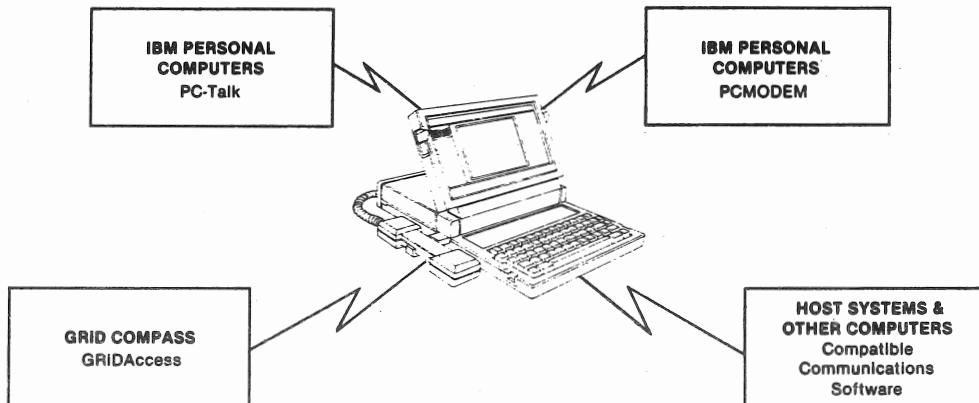


Figure 1-1. Accessing Remote Systems with GRiDAccess

The requirements of the non-GRiD communications software are discussed in the next section.

GRiDAccess lets you use a telephone handset attached to your computer just as you would an ordinary telephone. Using the GRiDAccess forms and menus, you can perform the following:

- o Make outgoing calls, answer incoming calls, and hang-up the phone.
- o Simulate depressing the switch-hook, allowing you to forward calls or enter data (such as bank transactions or credit card numbers) that you would normally enter by pressing the touch keys on an ordinary telephone.

You can dial or receive calls as you work with any application; for example, you can place or receive a call as you work with a worksheet file under GRiDPlan. You simply press CODE-A, either to dial a number or answer an incoming call. Then, GRiDAccess presents you with one or more menus and forms, depending on what you want to do, and places or receives your call.

In addition to voice communications, GRiDAccess lets you send and receive files to remote computers as summarized below:

- o You can dial a remote computer and then automatically send a file to it or receive a file from it.
- o You can have GRiDAccess automatically answer incoming calls and then immediately send a file to the calling computer or receive a file from it.

- o Using the telephone handset, you can converse with a person at the remote computer either just before or after a file transmission.
- o You can automatically dial from a list of telephone numbers in a GRiDFile database file, and then optionally send or receive data.

System Requirements GRiDAccess not only gives you data and voice communications with other computers using GRiDAccess, but makes it possible to exchange data with a variety of other computers using other communications software as well. The hardware and software requirements naturally differ at the computer using GRiDAccess and the computer using other software, as discussed in the following sections.

Computers Using GRiDAccess

Computers using GRiDAccess must have a modem (either built-in or external). For the makes and models of external modems that you can use with GRiDAccess, contact your GRiD dealer or representative. In addition, you must have the following files in the "Programs" subject:

- o GRiDAccess
- o Modem, when using an internal modem
- o Serial, when using an external modem

In addition, you must have the standard GRiD-OS files (CCOS, Common, and Executive), Release 3.1.0 level or higher.

To receive and place telephone calls for voice communications, you must have a telephone handset that plugs into the back of your computer. Depending on your telephone hook-up, you may need certain telephone accessories to connect your computer to the telephone system; see Appendix B for details.

Computers Using Non-GRiD Software

The communications software on computers not using GRiDAccess must have the same communications protocol as GRiDAccess.

A protocol is a convention, agreed upon in advance, by which two computers communicate with each other over a telephone line or other carrier. The protocol coordinates and controls the exchange of data and other operations between the two computers.

GRiDAccess uses a protocol based on the XMODEM protocol, enabling you to exchange data with any other computer whose communications software uses this protocol. XMODEM is in the public domain; it is

not for the exclusive use of one product or company. Therefore, many software products use the XMODEM protocol as part of their communication software. Two examples are PC-Talk^C and PC-MODEM^C, used on the IBMTM Personal Computer. Other examples include some of the "bulletin board" software under CP/M, an operating system used by many personal computers.

You should be able to exchange data with any personal or host computer that uses the XMODEM protocol. Appendix A, which describes the protocol, is included for GRiDAccess users interested in communicating with other remote computers that GRiDAccess doesn't support. If necessary, a programmer at the remote computer can use the information in the appendix to write a routine capable of communicating with GRiDAccess.

Activating GRiDAccess Before dialing or receiving a phone call, you must first activate (make available) GRiDAccess. When you activate GRiDAccess, the operating system brings it into main memory (RAM) where it remains until you deactivate it by entering a command or turning off your computer.

To activate GRiDAccess, you specify it in a File form (Figure 1-2) and confirm.

26-Mar-84		2:43 pm	
Executive		Run	
GRiD 53		Font	
GRiD 64		Font	
GRiD 80		Font	
GRiDAccess		Run	
GRiDfile	Run Database		
GRiDfileRepair		Run	
GRiDLink		Device	
GRiDManager	Run Sign-on		
GRiDPlan	Run Worksheet		
GRiDPlayback	Run Keystrokes		
GRiDPlot	Run Graph		
GRiDRecord		Run	
Device	Hard Disk Volume 2		
Subject	Programs		
Title	GRiDAccess		
Kind	Run		
Password			
Select = file and confirm or			
Pres = CODE-T for help			

Figure 1-2. File Form for Activating GRiDAccess

Once GRiDAccess is active, you can carry on your ordinary work, pressing CODE-A each time you want to dial or answer the phone. As you work, your file, the corresponding application, and GRiDAccess all coexist in main memory (RAM) at the same time. For example, Figure 1-3 shows the main memory when, after activating GRiDAccess, you start work on a text file.

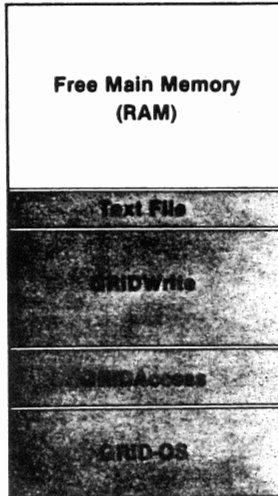


Figure 1-3. Main Memory (RAM) after Activating GRiDAccess and Retrieving a Text File

Deactivating GRiDAccess When you deactivate GRiDAccess, the GRiD-OS removes it from main memory (RAM), thus freeing space for other uses. To deactivate GRiDAccess, press CODE-A, CODE-ESC, and then confirm.

Note that GRiDAccess uses main memory -- approximately 22 thousand characters -- that would ordinarily be available to a file you are working with. If the text file shown in Figure 1-3 had been extremely large, you would consider deactivating GRiDAccess to make additional main memory available before retrieving the file.

How To Use GRiDAccess This section contains step-by-step procedures you can use to achieve the following:

- o Dial a number, hold a conversation, and optionally send a file.
- o Answer an incoming call, hold a conversation, and optionally receive a file.
- o Dial a number from a telephone list in a GRiDFile database.

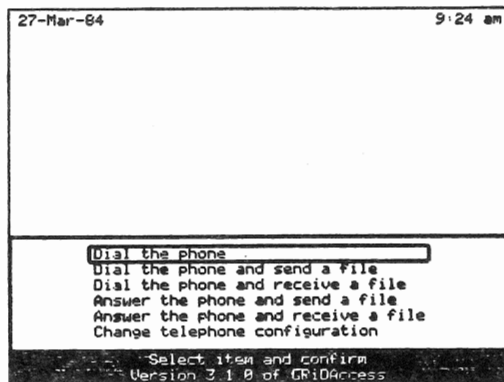
In the procedures that follow, you are referred, when necessary, to other parts of the guide for technical details.

Dial, Converse, and Send a File

This section gives the steps to follow when using your telephone handset to connect to another telephone, hold a conversation, and then send a file to the computer on the other end.

▶ To Dial, Converse, and then Send a File

1. Activate GRiDAccess as described earlier in the chapter.
2. Press CODE-A. The Idle menu, shown below, appears with the outline around Dial the Phone. Confirm.



See Chapter 2 for an explanation of all the items in the Idle menu.

3. The Dial Access form, shown below, appears.

27-Mar-84		9:24 am	
Phone number	328-7898		
Outside access prefix	9		
Local area code	415		
Modem type	Internal		
Dial type	Touch-tone		
Wait for answer	30		
Speaker volume	Medium		
Dial access: Fill in form and confirm			

Fill in the form and confirm. (The way you fill in the forms depends on your telephone configuration; see Chapter 4 for details.) In the example shown above, the Phone Number, Outside Access Prefix, and Local Area Code items were filled in.

4. When your party answers, hold the telephone conversation and then, when you're ready to send the file, press CODE-A.
5. The Active menu appears. Move the outline to Send a File, shown below, and confirm.

27-Mar-84		9:24 am	
Hang up the phone			
Execute telephone commands			
Change telephone configuration			
Send a file			
Receive a file			
Cancel file transfer			
Select item and confirm			
Phone is in use			

See Chapter 3 for an explanation of all the items in the Active menu.

6. After you confirm that the Dial Access form is correct, the Options form, shown below, appears.

27-Mar-84	9:24 am
300 1200	
Baud rate	1200
File transfer protocol	modem7
Type of data	ASCII
Host is GRiD compatible	Yes
Options: Fill in form and confirm Phone is in use	

The Options form above shows the initial settings of each item. You can change them as required; for example, you would set Host is GRiD Compatible to No if you're exchanging data with a computer that processes data in a non-GRiD format. (See Chapter 5 for details.)

Confirm when the settings in the form are correct; in this example, the initial settings as shown in the above form were used.

7. The File form appears. Specify in the form the name of the file you want to send and confirm.

2. Press CODE-A when the telephone rings, and then hold your conversation. When you're ready to receive the file, press CODE-A.
3. The Active menu, shown below, appears.

```

27-Mar-84                                     9:24 am
-----
Hang up the phone
Execute telephone commands
Change telephone configuration
Send a file
Receive a file
Cancel file transfer

Select item and confirm
Phone is in use

```

Move the outline to Receive a File as shown and confirm. (See Chapter 3 for an explanation of all the items in the Active menu.)

4. The Options form, shown below, appears.

```

27-Mar-84                                     9:24 am
-----
300 1200
Baud rate                                     1200
File transfer protocol  modem?
Type of data  ASCII
Host is GRiD compatible Yes

Options: Fill-in form and confirm
Phone is in use

```

The form above shows the initial settings of each item. You can change them as required; for example, you would set Host is GRiD Compatible to No if you're exchanging data with a computer that processes data in a non-GRiD format. (See

Chapter 5 for details.)

Confirm when the settings in the form are correct; in this example, the initial settings as shown in the above form were used.

5. The File form appears. Specify in the form the file for the incoming data and confirm.
6. When GRiDAccess notifies you the file has been sent, press CODE-A. The Active menu, shown below, again appears.

```
27-Mar-84                                     9:24 am

Hang up the phone
Execute telephone commands
Change telephone configuration
Send a file
Receive a file
Cancel file transfer

Select item and confirm
```

Note that the form offers you several possibilities; for example, at this point you could receive another file, or send a file.

Move the outline to the desired item in the Active menu (Hang Up the Phone in the example above) and confirm.

7. If you don't intend to use GRiDAccess again shortly, deactivate it by pressing CODE-A and CODE-ESC in succession, and then confirming; this action gives you additional working space in main memory.

Dial From a Database Telephone List

Use the following procedure to dial from a telephone list in a database file.



To Dial from a Database Telephone List

1. Activate GRiDAccess as shown earlier in the chapter.
2. Retrieve the database file containing the telephone list. Press CODE-F and confirm (with no query conditions) to display the entire list of numbers. An example of such a list is shown below.

A	B	C		
Name	Area	Number		
Bsu, M	314	298-1198		
Beck, B	408	295-2046		
Belton, J	408	444-3948		
Blynn, J	408	492-2378		
Delchamps, Annie	205	344-9468		
Elder, Sarah	205	444-3030		
Forsythe, Agnes	205	478-0544		
Johnson, Marshall	205	457-2386		
Jones, Fred	205	339-5033		
Myers, C	408	475-6922		
Nelson, Q	408	489-3300		
Pace, L	408	293-4972		
Parks, C	415	338-2046		
Plummer, B	415	305-3333		
Rais, Md	415	492-3852		
Russell, J	415	492-3966		
Sage, K	415	219-2211		
Santos, C	415	221-4003		

NOTE: In the example, the area codes are placed in a separate column. They can, however, appear in the same column as the telephone numbers, or any other format convenient to you.

3. Press CODE-A. The following message appears:

Access: Confirm for last number or select

You can either confirm or select a number from the database list.

If you want to select a phone number, move the outline to the desired number, press CODE-B and, using the Arrow key, select the number you wish to call. In the example below, both the telephone number and the area code were selected.

A	B	C
Name	Area	Number
Bay, M	314	298-1198
Beck, B	408	295-2046
Balton, J	408	444-3948
Blynn, J	408	492-2378
Delchamps, Annie	205	444-4422
Elder, Sarah	205	444-3830
Forsythe, Agnes	205	478-8544
Johnson, Marshall	205	457-2386
Jones, Fred	205	339-5033
Myers, C	408	475-6922
Nelson, Q	408	489-3300
Pace, L	408	293-4972
Parke, C	415	338-2046
Plummer, B	415	305-3333
Raia, Md	415	492-3892
Russell, J	415	492-3966
Sape, K	415	219-2211
Santos, C	415	221-4003

Access: Make a selection and confirm

Confirm, or select a number and then confirm.

- The Idle menu (Figure 2-1) appears with the outline around Dial the Phone item. Confirm.

```

27-Mar-84                                     9:24 am

Dial the phone
Dial the phone and send a file
Dial the phone and receive a file
Answer the phone and send a file
Answer the phone and receive a file
Change telephone configuration

Select item and confirm
Version 3.1.0 of GRIDAccess

```

See Chapter 2 for an explanation of all the items in the Idle menu.

- The Dial Access form (described in Chapter 4) appears; it is either blank or as you filled it in for an earlier call. If the information in the form is correct, confirm; the number is then dialed. Otherwise, correct the form and then confirm.

NOTE: If you confirmed in Step 4 without selecting a number from the database list, the Dial Access form appears with the information filled in on the previous call. If there was no

previous call, the form is blank.

6. Upon completing your conversation, press CODE-A to disconnect.
7. Deactivate GRiDAccess as shown earlier in the chapter when you have no more calls to make.

Chapter 2: The Idle Menu -- CODE-A

The Idle menu (Figure 2-1) appears when you press CODE-A and a call or data transmission isn't in progress -- your phone is figuratively "hung up."

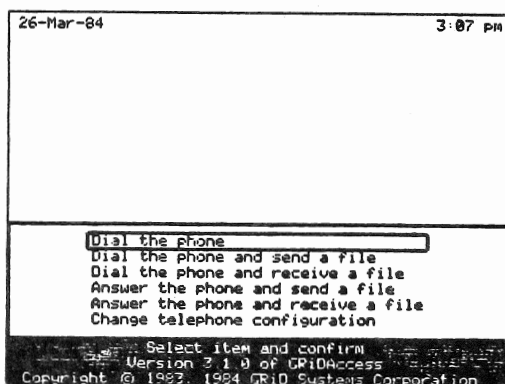


Figure 2-1. The Idle Menu

The following sections describe the items in the Idle menu in alphabetical order.

Answer the Phone and Receive a File The Answer the Phone and Receive a File item tells GRiDAccess to expect an incoming call and file from a remote computer. After you select this item and confirm, the Options form (described in Chapter 5) appears, where you specify conventions or protocols to be used during the file transfer.

After you fill in the Options form and confirm, the File form appears. Specify in the form the file that is to receive the incoming data. After the connection is made, GRiDAccess tells the remote computer to start sending a file. Upon completion, GRiDAccess hangs up the phone.

NOTE: The computer sending you the file must respond within 90 seconds after the connection is made or GRiDAccess cancels the file transfer and hangs up the phone.

To cancel Answer the Phone and Receive a File, press CODE-A, select either the Hang Up the Phone item or the Cancel File Transfer item from the Active menu, and confirm.

Answer the Phone and Send a File The Answer the Phone and Send a File item tells GRiDAccess to expect an incoming call and, after answering the call, to send a file to the calling computer. After you select this item and confirm, the Options form (described in Chapter 5) appears, where you specify conventions or protocols to be used during the file transfer.

After you fill in the Options form and confirm, the File form appears. Specify in the form the name of the file to be sent. After receiving the incoming call, GRiDAccess sends the file when the remote computer is ready. Upon completion, GRiDAccess hangs up the phone.

NOTE: The computer to which you're sending the file must respond within 90 seconds after the connection is made or GRiDAccess cancels the file transfer and hangs up the phone.

To cancel Answer the Phone and Send a File, press CODE-A, select either the Hang Up the Phone item or the Cancel File Transfer item from the Active menu, and confirm.

Change Telephone Configuration The Change Telephone Configuration item lets you change certain settings in the Dial Access form. After you select the item and confirm, a portion of the Dial Access form appears (Figure 2-2). (The items in the menu are described in detail in Chapter 4.)

27-Mar-84		10:18 am	
Internal		External	
Modem type	Internal		
Dial type	Touch-tone		
Wait for answer	30		
Speaker volume	Medium		
Access: Fill in form and confirm			

Figure 2-2. The Dial Access Form -- Change Items

You can change any of the items shown in the form; after confirming, the new settings are in effect and the Idle menu appears.

Dial the Phone The Dial the Phone item dials a number and then lets you converse over the GRiD telephone handset with a party at a remote computer. You can subsequently send or receive a file using the Send a File item or the Receive a File item in the Active menu.

After you select Dial the Phone and confirm, the Dial Access form (described in Chapter 4) appears; then, fill in the form with any information necessary to complete the call and confirm. GRiDAccess then dials the remote computer.

NOTE: If your modem doesn't support voice communications, GRiDAccess displays an error message and hangs up the phone.

Dial the Phone and Receive a File The Dial the Phone and Receive a File item lets you call a remote computer and then receive a file from it. After you select the item and confirm, the Dial Access form (described in Chapter 4) appears. Then, fill in any information necessary to complete the call and confirm. The Options form (described in Chapter 5) appears.

You fill in the Options form with information on the communication conventions or protocols to be used. After you complete filling in the form and confirm, the File form appears.

Specify in the File form the file for the incoming data. GRiDAccess then dials the phone number and tells the remote computer to start sending a file.

NOTE: The computer sending you the file must respond within 90 seconds after the connection is made or GRiDAccess cancels the file transfer and hangs up the phone.

To stop a file transfer, press CODE-A, select either the Hang Up the Phone item or the Cancel File Transfer item from the Active menu, and confirm.

Dial the Phone and Send a File The Dial the Phone and Send a File item lets you call a remote computer and then send a file to it. After you select the item and confirm, the Dial Access form (described in Chapter 4) appears; then, fill in any information necessary to complete the call and confirm. The Options form (described in Chapter 5) appears.

You fill in the Options form with information on the communication conventions or protocols to be used. After you complete filling in the form and confirm, the File form appears.

Specify in the File form the file you want to send, and then confirm. GRiDAccess then dials the phone number and starts sending the file when the receiving computer is ready.

NOTE: The computer to which you're sending the file must respond within 90 seconds after the connection is made or GRiDAccess cancels the file transfer and hangs up the phone.

To stop a file transfer, press CODE-A, select either the Hang Up the Phone item or the Cancel File Transfer item from the Active menu, and confirm.

Chapter 3: The Active Menu -- CODE-A

The Active menu (Figure 3-1) appears when you are currently carrying on voice or data communications, and you press CODE-A.

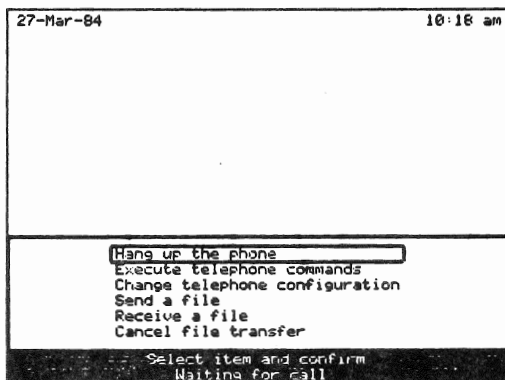


Figure 3-1. The Active Menu

The following sections describe the items in the Active menu in alphabetical order.

Cancel File Transfer The Cancel File Transfer item stops the transfer of data, either incoming or outgoing, between your computer and the remote computer. After you select the item and confirm, the file transfer halts. You can now talk over the handset if you were in voice communications before the transfer began; otherwise, GRiDAccess hangs up.

NOTE: To stop a file transfer, press CODE-A, select either the Hang Up the Phone item or the Cancel File Transfer item from the Active menu, and confirm.

Change Telephone Configuration The Change Telephone Configuration item lets you change some of the settings in the Dial Access form, described in Chapter 4.

Execute Telephone Commands The Execute Telephone Commands item lets you perform the same functions on a handset attached to your computer as you can on a regular telephone -- for example, putting a call on hold and then transferring it to another extension. You can execute a telephone command only when you are in voice communications over the telephone handset.

When you select this item and confirm, GRiDAccess displays the Commands form (Figure 3-2); it executes the commands immediately after you confirm the form.

```
27-Mar-84 10:18 am
Enter dial characters Depress switch hook Select
Command Depress switch hook
Handset On
Commands: Fill in form and confirm
Phone is in use
```

Figure 3-2. The Commands Form

Pressing ESC or CODE-A causes the Active menu to appear.

The following sections describe the items in the Commands form.

Command

Initial setting is Depress Switch Hook. The items in the form are described below.

Depress Switch Hook GRiDAccess simulates the depression of the switch hook on a real telephone for a period of 1/3 of a second. This would allow you to put your call on hold, if your telephone system supports such a function.

Enter Dial Characters You can enter any combination of the numbers and characters that appear on a telephone dial or touch buttons: the numbers 0

through 9, the pound sign (#), or an asterisk (*). This lets you enter such information as bank account transactions, telephone extension numbers, credit card numbers, etc., as desired. After you enter the numbers and confirm, GRiDAccess dials them.

Select Dial Characters

The telephone list in the GRiDFile database file or other file you are currently working with appears. Select the desired dial characters from the list and confirm. The Commands Form reappears; confirm if the numbers are correct; then, GRiDAccess dials the call.

Handset

Initial setting is On. Choices are Off, On.

The Handset item controls the use of the handset. "On" turns the handset on and "Off" turns it off (the equivalent to placing your hand over the mouth piece of the receiver). This option has no effect on the speaker built into the GRiD Compass internal modem.

Hang Up the Phone The Hang Up the Phone item causes GRiDAccess to break a telephone connection after answering or placing a call.

Receive a File The Receive a File item tells GRiDAccess to expect an incoming file from a remote computer. After you select this item and confirm, the Options form (described in Chapter 5) appears, where you specify conventions or protocols to be used during the file transfer.

After you fill in the Options form and confirm, the File form appears. Specify in the form the file that is to receive the incoming data, and confirm.

NOTE: You can receive the error message "40: File Can't be shared" under the following conditions:

- o A File form was already displayed on the screen before Active menu appears.
- o You specify a new Title and Subject in the File form displayed by the Receive a File item.

You should either (1) specify a Title in an existing Subject for the file to be received or (2) before pressing CODE-A, remove the original File form by entering an application.

After you confirm, GRiDAccess signals the remote computer to start sending the file. Upon completion, GRiDAccess returns the phone to

voice mode.

NOTE: The computer sending you the file must respond within 90 seconds after the connection is made or GRiDAccess cancels the file transfer and hangs up the phone.

To cancel Receive a File, press CODE-A, select either the Hang Up the Phone item or the Cancel File Transfer item from the Active menu, and confirm.

Send a File The Send a File item tells GRiDAccess to send a file to a remote computer already connected with your computer. After you select this item and confirm, the Options form (described in Chapter 5) appears, where you specify conventions or protocols to be used during the file transfer.

After you fill in the Options form and confirm, the File form appears. Specify in the form the name of the file to be sent. GRiDAccess then sends the file when the remote computer is ready. Upon completion, GRiDAccess returns the phone to voice mode.

NOTE: The computer to which you're sending the file must respond within 90 seconds after the connection is made or GRiDAccess cancels the file transfer and hangs up the phone.

To cancel Send a File, press CODE-A, select either the Hang Up the Phone item or the Cancel File Transfer item from the Active menu, and confirm.

Chapter 4: The Dial Access Form -- CODE-A

The Dial Access form (Figure 4-1) appears when you select a Dial the Phone item from the Idle menu (Chapter 2). You fill in the telephone number and other information necessary for GRiDAccess to make a call to a telephone or another computer.

The screenshot shows a terminal window with the following content:

```
27-Mar-84 10:16 am
-----
Phone number: 
Outside access prefix:
Local area code:
Modem type: Internal
Dial type: Touch-tone
Wait for answer: 30
Speaker volume: Off
-----
Dial access: Fill in for and confirm.
```

Figure 4-1. The Dial Access Form

The following sections describe the items in the Dial Access form in alphabetical order.

Dial Type Initial setting is either Touch-ToneTM or the last value specified and saved in the GRiDManager Sign-On form. Choices are Pulse, Touch-Tone.

Specify Touch-Tone for most modern, digital telephone installations. For older, nondigital equipment, set the Dial Type to Pulse.

Local Area Code Specify the Local Area Code item under the following conditions:

- o You make telephone calls using a GRiDFile database from a list of telephone numbers and area codes.
- o You travel, making the calls from different locations with different area codes.

Changing the Local Area Code setting ensures that GRiDAccess can reach the number you dial. In dialing, GRiDAccess compares the Local Area Code setting and the area code in your database telephone list. If they are the same, GRiDAccess knows you're making a local call and doesn't dial the area code. If the Local Area Code setting differs from the code given with your number, GRiDAccess uses the area code in your database telephone list to make the connection.

NOTE: When you deactivate GRiDAccess, the current code is saved. When you next activate GRiDAccess, the Local Area Code is set to this value.

Modem Type Initial setting is either Internal or the last value specified and saved in the GRiDManager Sign-On form. Choices are External, Internal.

A modem is the device by which a computer transmits data over phone lines. Select Internal if you intend to use the modem built into your computer; select External if you have a separate modem or an internal modem without the auto-dialing feature. For the makes and models of external modems that you can use with GRiDAccess, contact your GRiD dealer or representative.

Outside Access Prefix Where applicable, this is the prefix you must dial to get an outside telephone line. For example, dialing 9 is a common escape prefix on many telephones.

NOTE: When you deactivate GRiDAccess, the current prefix is saved. When you next activate GRiDAccess, the Outside Access Prefix is set to this value.

Phone Number No initial setting.

The Phone Number setting is the number of the party you want to dial and special control characters that specify time intervals for GRiDAccess to wait before dialing the numbers, as explained below.

0-9, * # GRiDAccess dials these characters. They perform the same functions as those on your telephone dial.

x GRiDAccess assumes the call is to an internal extension and dials only the digits in the Phone Number item, ignoring any specifications for the Local Area Code and Outside Access Prefix items.

. GRiDAccess waits one second before entering the next number.

^ GRiDAccess waits either for the dial tone or for a maximum of 15 seconds, whichever comes first, and then dials the number.

space, comma, parentheses, hyphen. Edit characters, which GRiDAccess ignores. Use any of these to edit characters for readability. They don't affect dialing.

The following are examples using the characters just described.

^242

This tells the system to wait for a dial tone (or for 15 seconds), and then dial an extension 242.

..9^555-1212

The system waits two seconds, dials 9 to reach an outside line, waits for a dial tone (or for 15 seconds), then dials 555-1212.

..9 ^ (408)-555-1212

The system waits two seconds, dials 9 to reach an outside line, waits for a dial tone (or for 15 seconds), and dials the long-distance number. The parentheses, spaces, and hyphens are for appearance only; they have no effect on dialing speed.

^9^555-1212.....00000 (213)-555-1212

This instruction is for a long-distance common carrier line (in this example, MCI). The GRiD Compass system waits for an internal dial tone (or for 15 seconds), then dials 9 to reach an outside line. It waits for an outside dial tone and dials the local number of the common carrier. After waiting 11 seconds while the local number

rings, it dials a five-digit access number followed by the 10-digit long-distance number that you are trying to call. (You must substitute your own access number for the five zeros.)

NOTE: When you deactivate GRiDAccess, the current telephone number is saved. When you next activate GRiDAccess, the Outside Access Prefix is set to this value.

Speaker Volume Initial setting is either Medium or the last value specified and saved in the GRiDManager Sign-On form. Choices are Off, Low, Medium, High.

The Speaker Volume setting controls the loudness of the speaker within the GRiD Compass. The speaker stays on as the telephone number is dialed; it is turned off after you are connected.

With the speaker on, you can hear whether the telephone line is busy, ringing, or disconnected.

NOTE: GRiDAccess automatically turns the speaker volume off when answering an incoming call.

Wait For Answer Initial setting is either 30 seconds or the last value specified and saved in the GRiDManager Sign-On form.

This item applies when you are dialing, and then sending or receiving a file. After changing from voice mode to data mode, the GRiD Compass system waits for a carrier signal from the external computer. The Wait for Answer setting determines how long the system waits for this carrier signal. If there's no signal from the carrier by the end of the period you specify, the system disconnects the line.

To change the Wait for Answer setting, type an integer representing the maximum number of seconds that the system is to wait before disconnecting.

Chapter 5: The Options Form

The Options form (Figure 5-1) appears when you specify in either the Idle menu (Chapter 2) or the Active menu (Chapter 3) that you intend to send or receive a file.

The screenshot shows a terminal window with a date and time at the top. Below that is a form with several fields. The 'Baud rate' field has a dropdown menu with '300' and '1200' options, and '1200' is selected. The 'File transfer protocol' field has a dropdown menu with 'MODEM' selected. The 'Type of data' field has a dropdown menu with 'ASCII' selected. The 'Host is GRiD compatible' field has a checkbox that is checked, with the text 'Yes' next to it. At the bottom of the form, there is a label 'Options' and a prompt 'Fill in form and confirm'.

```
27-Mar-84 10:18 am
300 1200
Baud rate 1200
File transfer protocol MODEM
Type of data ASCII
Host is GRiD compatible Yes
Options Fill in form and confirm
```

Figure 5-1. The Options Form

The following sections describe the items in the Options form in alphabetical order.

Baud Rate Initial setting is either 1200 bits per second or the last value specified and saved in the GRiDManager Sign-On form. Choices are 300, 1200.

Baud Rate is the speed at which data is transmitted and received. Choosing 300 bits per second makes your system compatible with a BellTM 103 modem; choosing 1200 bits per second allows you to communicate with a Bell 212A modem.

NOTE: Check with a person at the remote computer if you're not sure which baud rate to specify.

File Transfer Protocol The file transfer protocols are the conventions and rules that GRiDAccess and the remote computer use in making a file transfer. The protocol at your computer and the remote computer must be the same. If they aren't the same, the communications attempt fails and GRiDAccess issues an error message.

Choices are Modem7 and Modem16; the protocols are the same except in the way each checks for error in the data transmission. The Modem7 protocol uses an error detection technique in which the checksum character can indicate an error. The Modem16 protocol uses a technique in which the cyclic redundancy check characters can indicate an error.

NOTE: If you need detailed technical information on the differences between the Modem7 and Modem16 protocols, see Appendix A.

Host Is GRiD Compatible The format of a file created by a GRiD-OS application and one created by another application can differ. When such files are to be transmitted, GRiDAccess must know the expected format of an incoming file, and how to put outgoing files into a format expected by the remote computer. You provide this information to GRiDAccess through the Host Is GRiD Compatible option.

The information you require depends on whether you intend to send or receive files, as described in the following sections.

Initial setting is Yes. Choices are Yes, No. If you specify No, either the Receive File Options form (when you're to receive data) or the Send File Options form (when you're to send data) appears.

NOTE: If you select Binary as the Type of Data item, GRiDAccess ignores the settings in the Receive File Options form, and all settings in the Send File Options forms except the Intercharacter Delay item.

Receive File Options Form

The Receive File Options form (Figure 5-2) appears when you select No as the Host Is GRiD Compatible item, and you intend to receive data.

27-Mar-84	10:18 am
Enter character(s) CR <input type="text" value="CR-LF"/>	
Line ends with <input type="text" value="CR-LF"/>	
Receive file options. Fill in form and confirm.	

Figure 5-2. Receive File Options Form

The next section describes the Line Ends With item shown in the figures.

Line Ends With Initial setting is CR-LF (for carriage-return, line-feed characters). Choices are CR-LF, CR (for carriage return character), or up to three ASCII character(s) that the remote computer recognizes as line-end characters. GRiDAccess uses the character you specify to break the incoming stream of characters into separate lines.

If you don't know the proper setting, check with a person at the sending computer.

Send File Options Form

The Send File Options form (Figure 5-3) appears when you select No as the Host Is GRiD Compatible item, and you intend to send data.

```

27-Mar-84                                     10:18 am
-----
1-256 No change
Line length      No change
End line at     Character
End line with   CR-LF
Intercharacter delay None
Send file options Fill in form and confirm/

```

Figure 5-3. Send File Options Form

The items in the form are described in alphabetical order in the sections that follow.

End Line At The End Line At item applies only when you specify a number from 1 through 256 in the Line Length item.

The End Line At item lets you ensure that only full words -- a group of non-blank characters preceded and followed by at least one blank character -- are transmitted to the remote computer.

NOTE: If you select Binary as the Type of Data item, GRiDAccess ignores this setting.

Initial setting is Character. Choices are Character, Word. The settings, as described below, determine GRiDAccess action when the characters of a word spill over the end boundary of an outgoing line, as determined by the Line Length item.

Character GRiDAccess includes the partial word in the current outgoing line and sends the remaining characters of the word at the beginning of the next outgoing line.

Word GRiDAccess removes the beginning characters of the word from the outgoing line and sends the entire word at the beginning of the next outgoing line.

End Line With Initial setting is CR-LF (for carriage-return, line-feed characters). Choices are: CR (for carriage-return character), CR-LF, or up to three ASCII character(s) that the remote computer recognizes as line-end characters.

When transmitting, GRiDAccess normally indicates a completed line

with the carriage return, line-feed (CR-LF) character. But some computers don't recognize CR-LF to represent the last character of the line. You must therefore set this item to the character(s) that the remote computer expects to see at the end of each line.

NOTE: GRiDAccess ignores this setting when you set the Line Length item to No Change or set the Type of Data item to Binary.

When GRiDAccess sends a file to the external computer, it inserts the line-end character(s) you specify at the point you specify in the Line Length item.

Intercharacter Delay Initial setting is None. Choices are None, or a number indicating the number of 1/100th of a second increments GRiDAccess is to pause.

The Intercharacter Delay item determines how long GRiDAccess pauses after transmitting each character.

Use a setting other than None when the receiving computer cannot process the data as fast as your computer sends it. Increase the delay period, until the data can be received and processed successfully by the remote computer.

Line Length The Line Length item indicates the number of characters in each line of data that GRiDAccess transmits. At the end of each line, GRiDAccess inserts a line-end character, depending on your choice in the End Line With item.

NOTE: If you select Binary as the Type of Data item, GRiDAccess ignores this setting.

Choices are No Change, or a number from 1 through 256, indicating the number of characters.

If you select No Change, GRiDAccess doesn't insert a line-end character. If you specify a number, GRiDAccess insert the line-end character after the specified number of characters of each transmitted line.

Type of Data Initial setting is ASCII. Choices are ASCII, Binary.

Use this setting to determine the type of data to be transmitted or received.

NOTE: If you set the Host Is GRiD Compatible item to No and select Binary as the Type of Data item, GRiDAccess ignores the settings in the Receive File Options form, and all settings in the Send File Options forms except the Intercharacter Delay item.

Appendix A: GRiDAccess Protocol

This appendix gives the communications protocol used by GRiDAccess in exchanging data with other computers. It is included for programmers who want to write routines for non-GRiD computers enabling them to communicate with GRiD computers using GRiDAccess.

GRiDAccess uses two transfer protocols: Modem7 and Modem1b. The two protocols are sometimes referred to as XMODEM after the program that originally used them.

The protocols Modem7 and Modem1b are identical, except that, in checking for line errors, Modem7 uses a checksum character and Modem1b uses a cyclic redundancy check character.

After the connection, the receiving computer transmits an ASCII Negative Acknowledgment control character (NAK, 15h) to the sending computer every 10 seconds until the sender responds with a data packet, or until 9 NAK characters are sent. If the receiving computer sends 9 NAK characters without a response from the sending computer, the file transfer is canceled.

The data is transmitted in packets of 132 characters each. Figure A-1 shows the format of the packet.

```
      1      2      3      4 through 131      132
-----
| SOH | BLK | nBLK | <=== Data ===> | *** |
-----
```

Figure A-1. XMODEM Packet Format.

SOH: This byte always contains the ASCII control character 01h (Start of Header).

BLK: This byte contains the binary representation of the block number. The blocks are numbered 1 through 255; after 255, the block numbers start at 0 and again increase in increments of 1 up to 255, before starting with 0 again.

nBLK: This byte contains the ones complement of the block number.

Data: This is the actual data. Since the packet length must always be 132 characters, the final packet may contain less than 128 bytes of actual data. If the file is being transmitted to a non-GRiD computer, the portion of the packet not containing real data is filled with the ASCII control character SUB (MS/DOS EOF marker, CTRL-Z, 1Ah). If the computer is GRiD compatible, the remainder of the packet is filled with ASCII NUL control characters (00h).

*****:** This is either a checksum or cyclic redundancy character computed on the data portion of the packet only. A checksum character is computed by simply adding all of the characters in the data portion of the packet (the 128 bytes) together using byte arithmetic. The cyclic redundancy character is computed using the following divisor polynomial:

$$\text{CRC-16} = P(X) = x^{16} + x^{15} + x^2 + 1$$

The packets are checked at the receiving side and may be rejected by the receiver for any of the following reasons:

- First character of packet is not a SOH.
- Incorrect block number.
- nBLK is not the ones complement of BLK.
- The checksum or CRC character computed is not the same as the one passed.

If the packet is rejected, the receiver sends an ASCII NAK control character (15h) to the sender. The sender will then send the packet again, up to eight times. If the packet is not received correctly within nine attempts, the transfer is canceled.

If the packet was received correctly, the receiver sends an ASCII ACK control character (06h) to the sender. The sender will then send the next packet.

After the last packet has been sent and received error-free, the sender transmits an ASCII end-of-transmission control character (EOT, 04h). The receiver sends an ACK character back and the file transfer is concluded.

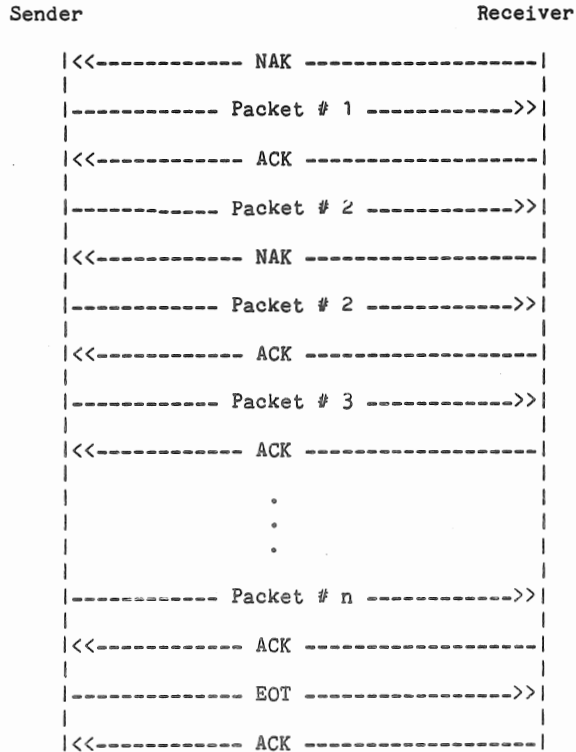


Figure A-2. XMODEM Protocol.

A minor change has been made by GRiDAccess to the protocol. If the user specifies that the host (receiving) computer is GRiD compatible, the first packet transmitted is a special GRiD-defined data packet with a block number of 0. The packet contains information about the file to be transmitted. If the receiving computer is not a GRiD compatible system, this special packet will be rejected by the receiving computer.

Appendix B: Telephone Equipment

Appendix B provides the following information for users of the GRiD Compass computer:

- o A checklist to determine the suitability of your telephone and related equipment for GRiD Compass communications.
- o Information on accessories you may find helpful when you communicate via your telephone connection.

Telephone Equipment Checklist Use this checklist the first time you send and receive data via your telephone equipment.

- o The Federal Communications Commission (FCC) requires that you notify your local telephone company before using telephone lines to transmit data. For details, see the GRiD Compass Owner's Manual.
- o Remember that you can't receive and make telephone calls on the line when you are using it to receive or transmit data.
- o The telephone cord must have an RJ-11 modular plug, a small plug with four delicate wires. If your telephone cord has a four-pronged round plug instead, obtain an RJ-11 adaptor for it.
- o Your company's Private Branch Exchange (PBX) facilities may not be compatible with the GRiD Compass, even though the physical connectors (RJ-11) are identical. Check with your dealer or sales representative for compatibility information.
- o If you have a telephone handset (available from GRiD Systems), you can plug it into the slot marked AUDIO on the rear panel of the GRiD Compass. Regular telephone handsets don't work with the GRiD Compass. You need a handset when you want to engage in both voice and data communications through your GRiD Compass, and have only one telephone line.
- o If your telephone has a Call Waiting feature, you may want to disable it (by forwarding all your calls to another extension) or use your computer with a different extension. The Call Waiting signal can disrupt the telephone connection.

Telephone Communications with the GRiD Compass The GRiD Compass uses a built-in modem to transmit data and voice through the phone network. For the modem to operate properly, your phone must have an analog electrical connection and not pass through a digital telephone switching system.

Your GRiD Compass may be connected to either a single-line or multiple-line telephone connection. The most common type of connection, the single-line, is discussed in the first section below. The multiple-line connection, encountered more often in office facilities, is discussed in the second section.

Modular Jacks for Single-Line Connections

At the back of your GRiD Compass under the label TELEPHONE are two small connector slots marked LINE and AUDIO. The AUDIO port is used for connection to the handset you may have purchased with your computer. The LINE slot is a standard phone-line RJ-11 modular jack connector. Most modern phone systems use these types of connectors and matching male jacks to provide the link between single-line phones and wall-box covers.

The simplest way to connect your GRiD Compass to the phone system is to unplug the modular jack from the back of your single-line phone and plug it into the back of your GRiD Compass. This technique provides direct dial capabilities for both voice and data transmissions. The following sections discuss situations that require a different type of connection.

Modular Jack Accessories

If you want to provide parallel access to your normal phone along with the GRiD Compass, use the Y-connector provided with your computer. Unplug the line from the back of your phone and plug the Y-connector in its place. Now plug the phone line and a separate modular phone cord for your GRiD Compass in the back of the Y-connector.

You now have access to your regular phone for normal operations as well as GRiD Compass access to the same line for computer-related operations. Other useful accessories (usually available at local electronics stores) are listed below:

- o The 25-foot modular telephone extension cable can be used when you want to keep the GRiD Compass distant from your phone.
- o The female-to-female modular phone cord connector (or inline coupler) can be used when you need an extra-long extension.
- o The modular jack adapter with four prongs should be used for the four-prong phone connector.

Modular Jacks for Multiple-Line Connections

In many offices, phones have multiple lines attached to them through a single cord. You can tap into one of these lines for the modular connection into the GRiD Compass.

A pair of long metal connectors, mated together, are usually at the wall connection for a multi-line phone. You can insert an adapter between these connectors to provide access through individual modular jacks. Several models of these adapters, varying from single-line taps to multiple-line taps, are available at local electronics stores.

Once connected to the telephone system, your GRiD Compass is ready for voice and data communications with other locations.

Appendix C: Error Messages

When an error occurs, GRiDAccess displays a message preceded by a number. Use the number to locate information in this chapter that explains the message and ways to correct the error. The messages are listed in numerically ascending order.

11000: Modem is not connected to a phone line

What happened: GRiDAccess tried to dial the telephone number but the modem could not be found.

What to do: Attach the modem to the computer and redial the number.

11001: Modem does not support voice communications

What happened: The user selected Dial the Phone from the CODE-A Active menu; GRiDAccess tried to place the modem into voice mode after dialing. The modem indicated through an error code that it did not support voice communications.

What to do: The modem does not support voice communications. If a file is to be sent, select Dial the Phone and Send a File instead. If voice communications is required, use the regular telephone.

11002: Data received 9 times without success

What happened: GRiDAccess received the same data packet 9 times from the sending computer and the packet contained at least one error each time.

What to do: Make sure that either Modem7 or Modem16 is specified as the File Transfer Protocol item in the Transfer Options form (see Chapter 2) at both the sending computer and your computer. Then, try receiving the file again.

11003: Receiving computer is not GRiD compatible

What happened: The receiving computer doesn't have communications software that is compatible with GRiDAccess.

What to do: Specify No for the Host is GRiD Compatible item of the Transfer Options form (described in Chapter 2) and try sending again. See Chapter 2 for the additional information you must provide when you specify No.

11004: No response from sending computer

What happened: GRiDAccess did not receive an expected response from the sending computer within a specified time period.

What to do: The File Transfer Protocol item (Modem7 or Modem16) must be the same at both the sending computer and the receiving computer. If they are not, reset them and try again.

11005: No response from receiving computer

What happened: GRiDAccess did not receive an expected response from the receiving computer within a specified time period.

What to do: The File Transfer Protocol item (Modem7 or Modem16) must be the same at both the sending computer and the receiving computer. If they are not, reset them and try again.

11006: Data sent 9 times without success

What happened: GRiDAccess sent the same data packet to the receiving computer 9 times without the receiving computer accepting it.

What to do: If this happens shortly after the file transfer, make sure that the File Transfer Protocol item (Modem7 or Modem16) are the same at both the sending computer and the receiving computer. If they are not, reset them and try again.

11007: Phone number must not be blank

What happened: The Telephone Dial Access form was confirmed and the phone number field did not contain any characters.

What to do: The phone number field must contain at least one character.

11015: Line length is greater than maximum

What happened: The Line Length item on the Transfer Options form was set to a value greater than 256.

What to do: Specify a value less than or equal to 256.

11009: Load overlay error: Press ESC to cancel.

What happened: GRIDAccess tried to load a portion of the GRIDAccess program from a permanent storage device and an error was encountered.

What to do: The message displayed beneath this message contains the error condition that caused the load to fail. Make sure that the device that the GRIDAccess program was selected from is still attached to the computer. If not, reattach it.

11010: Modem type may not be changed while modem active

What happened: The Modem Type item on the Dial Access form was changed while the modem was in voice communications, either waiting for a call or transferring a file.

What to do: The modem type may not be changed under the conditions outlined above. If the modem must be changed, select Hang Up the Phone on the CODE-A Active menu and confirm to place the modem into an inactive state.

11011: Commands allowed only while in voice mode

What happened: The user selected the Enter Telephone Commands item on the Active menu while the modem was in a state other than voice mode. The current operation was not affected.

What to do: The commands form is applicable only while the modem is operating in voice (conversation) mode. The commands would have no effect when the modem is idle or waiting for a call, and would interfere with a file transfer. It therefore cannot be executed while the modem is performing the above functions.

11012: Access change not allowed during transfer

What happened: The user selected the Change Telephone Configuration item on the Active menu while GRIDAccess was sending or receiving a file. The transfer was not affected.

What to do: The telephone configuration may not be altered during a file transfer. Wait until the transfer is completed or cancel the transfer using the Cancel File Transfer or Hang Up the Phone items on the Active menu.

11013: Internal modem cannot be activated

What happened: GRiDAccess attempted to activate the modem built into the computer and failed.

What to do: Make sure that both the CCOS file and the Modem file (with Kind set to Device) are in "Programs" on the device used for start-up.

11014: External modem cannot be activated

What happened: GRiDAccess attempted to activate the serial port on the computer and failed.

What to do: Make sure that the file Serial`Device` is in the "Programs" on the device that was used to boot CCOS.

11015: Line length is greater than maximum

What happened: The Line Length item on the Transfer Options form was set to a value greater than 256.

What to do: Specify a value less than or equal to 256.

11016: Modem is being used by another application

What happened: Another GRiD application or program in your computer is currently using the modem.

What to do: Either wait until the modem is free, or cancel the competing program, and try again.

11017: Application does not support dial selection

What happened: You selected the Select Dial Characters item in the Commands form, and the application you are currently working with does not support this function.

What to do: If you wish to process dial characters, enter them manually in the Enter Dial Character of the Commands form, or else concurrently work with a GRiDFile database file or other file that supports this function.

Glossary

ASCII American Standard Code for Information Interchange. A code consisting of control characters and graphic characters used for information interchange among data processing systems, data communication systems, and associated equipment.

baud rate The rate at which a modem transmits or receives digital data; the faster the modem, the higher the baud rate.

carrier A signal that the modem changes, or modulates, in order to transmit data. If the carrier is lost, then the modem can no longer transmit or receive data.

character stream A group of characters transmitted one at a time in a sequential stream.

control character A character that controls the transmission or display of data. Control characters are part of the standard ASCII character set, though not one of the standard alphabetic, numeric, or special characters used in data. A control character may or many not be visible on your screen.

GRiDAccess A program that resides as a file in the "Programs" subject. GRiDAccess places and receives telephone calls through the GRiD telephone handset, and permits the exchange of data between a computer with GRiDAccess and external computers.

handshake A sequence of predetermined signals or control characters exchanged by the modems or data communication software of two data processing systems. The sequence establishes the initial connection between the two systems.

host system The central computer and associated software and devices that control communications with external computers. A computer communicates with host systems through GRiDAccess or through emulator programs such as GRiD3101, GRiDTerm, and GRiDVT100. The Dow Jones News Retrieval is an example of a service provided by a host system.

interface The software or hardware within a computer system that allow communications to take place. The "Diablo620" file in "Programs" is an example of an interface between GRiD-OS and the DiabloTM Model 620 printer.

line end character A character or string of characters that indicates the end of a line of text.

modem An acronym for MODulator-DEModulator. It translates the computer's digital data into signals for transmission and reception over telephone lines.

modem7 A communications protocol used by GRiDAccess based on the XMODEM protocol. This protocol is the same as the Modem16 protocol, except that it uses checksum characters (instead of cyclic redundancy check characters) in checking for line errors.

modem16 A communications protocol used by GRiDAccess based on the XMODEM protocol. This protocol is the same as the Modem16 protocol, except that it uses cyclic redundancy check characters (instead of checksum characters) in checking for line errors.

Modem A file residing in the "Programs" subject that provides an interface between GRiD-OS and a modem. This file is required when communicating over telephone lines with GRiDAccess.

parity bit A check bit added to each character (for example, in a data transmission) that makes the sum of all the binary one digits, including the check bit, either odd or even. The sender adds a parity bit to ensure that the sum of each character is even (in an even parity system) or odd (in an odd parity system). The receiver checks whether the bit count is either odd or even (depending on the system). If the bit count is not the odd or even count expected, the receiver assumes that an error occurred during transmission.

protocol In telecommunications, an arbitrary convention for communicating between a host system and a remote terminal, or another host system. The protocol is implemented in the hardware and software at the two computer systems to coordinate and control data transfer and other operations between them.

record A unit of data to be stored or processed. Each record can be broken into smaller pieces of information. In the GRiD applications, a record consists of data followed by a carriage-return, line-feed (CR-LF) control character. Each record corresponds to one row in the cell-based applications, such as GRiDPLAN.

RJ-11 A modular connector for telephone lines specified by the telephone company. It is a plastic plug with four delicate wires. It replaces the older connector, a thick round plug with four prongs.

timeout A time interval during which a certain operation must take place, for example, connecting to a host system once having dialed it.

touch-tone dialing A dialing system that uses audible tones rather than pulses. It is faster than pulse dialing, and has been installed in most recent telephone exchanges.

XMODEM A communications protocol within the public domain which defines rules and conventions for the exchange of data between two computers. See Appendix A.

INDEX

A

activating GRiDAccess, 1-4
Active menu, 3-1ff
Answer the Phone and Receive a File, 2-1
Answer the Phone and Send a File, 2-2
answering the phone, example, 1-9ff
ASCII, definition, G-1

B

baud rate,
 definition, G-1
 item in Options form, 5-1
binary data, sending and receiving,

C

Cancel File Transfer, 3-1
canceling, a file transfer, 3-1
carrier, definition, G-1
Change Telephone Configuration, 2-2
Command form, 3-2ff
control character, definition, G-1

D

database telephone list, using 1-12ff
deactivating GRiDAccess, 1-5
depressing switch hook, on handset, 3-2
Dial Access form, 4-1ff
dial characters, selecting from file, 3-2, 3-3
Dial the Phone, 2-3
Dial the Phone and Receive a File, 2-3
Dial the Phone and Send a File, 2-4
Dial Type, 4-1
dialing from telephone list, 1-12ff
dialing the phone,
 example, 1-8ff
 from Idle menu, 2-2
End Line At, 5-4
End Line With, 5-2
errors messages, explanations, C-1ff
examples,
 answering the phone, 1-9ff
 dialing from a database file, 1-12ff

 dialing from a form, 1-8ff
 receiving a file, 1-9ff
 sending a file, 1-8ff
Execute Telephone Commands, 3-2
file format, effect with binary data, 5-5
File Transfer Protocol, 5-2
files,
 receiving from non-GRiD systems, 5-2ff
 sending to non-GRiD systems, 5-2ff
format, non-GRiD Files, 5-2ff

G

GRiDAccess,
 activating, 1-4
 deactivating, 1-5
 definition, G-1
 file in "Programs", 1-3, 1-4
 how to use, procedures, 1-8ff
 protocol description, A-1ff
 summary of functions, 1-1ff

H

halting file transfer, 3-1
Handset, 3-3
handshake, definition, G-1
Hang Up the Phone, 3-3
Host is GRiD Compatible, 5-2
host system, definition, G-1

I

Idle menu, 2-1ff
Intercharacter Delay, 5-5
interface, definition, G-1

L

line end character, definition, G-2
Line Ends With, 5-4
Line Length, 5-5
Local Area Code, 4-2

M

main memory, use by GRiDAccess, 1-5
messages, errors, C-1ff
modem, definition, G-2
Modem Type, 4-2
Modem1b,
 definition, G-2
 description, A-1
 in Options form, 5-2
Modem7,
 definition, G-2
 description, A-1
 in Options form, 5-2

O

Options form, 5-1ff
Outside Access Prefix, 4-2

P

parity bit, definition, G-2
phone,
 answering, 1-9ff
 depressing switch hook, 3-2
 entering dial characters, 3-2, 3-3
 placing on hold, 3-2
 hanging up, 3-3
phone number,
 format, 4-3
 in Dial Access form 4-3
protocol, definition, G-2
protocol, GRiDAccess, description, A-1ff

R

RAM, use by GRiDAccess, 1-5
Receive a File, 3-3
Receive File Options Form, 5-2
receiving files,
 after answering, 2-1
 after dialing, 2-3
 after voice communications, 3-3
 after voice communications, 1-9ff
 Options form, 5-2
record, definition, G-2
requirements,
 system, GRiD-OS, 1-3
 system, other operating systems, 1-3
response time, required in answering, 2-2
RJ-11 plug,
 definition, G-2
 adaptors for, B-2

S

Send a File, 3-4
Send File Options Form, 5-3ff
sending a file, example, 1-7ff
sending files,
 after answering, 2-2
 after dialing, 2-4
 after voice communications, 3-4
 Options form, 5-3
Speaker Volume, 4-4
storage, use by GRiDAccess, 1-5

T

telephone equipment,
 checklist, B-1
 FCC requirements, B-1
 modular jacks, B-2
timeout, definition, G-2
touch-tone dialing, definition, G-2
Type of Data, 5-5

W

Wait For Answer, 4-4

X

XMODEM, definition, G-3