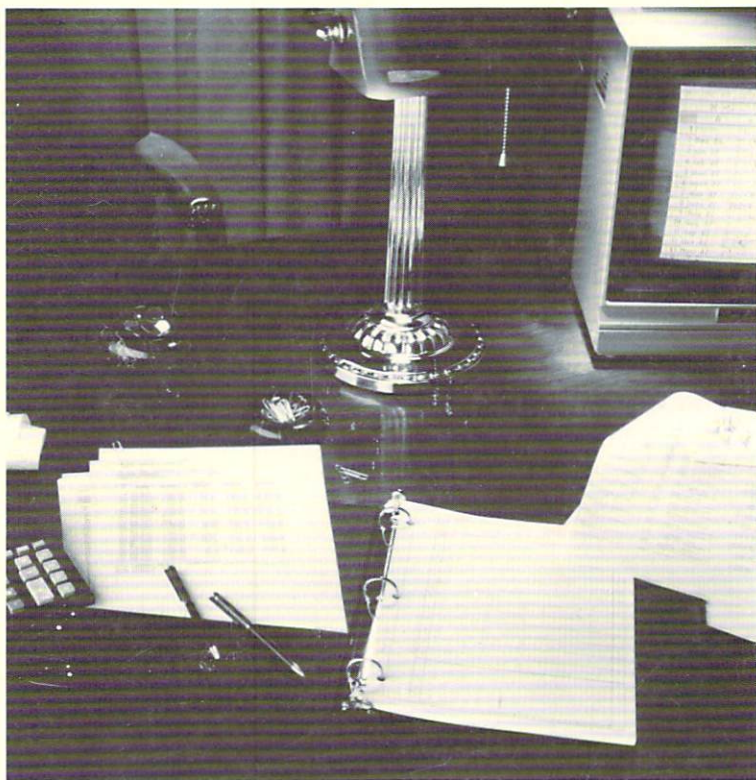


GEOCALC™

GRAPHICS-BASED SPREADSHEET FOR USE WITH GEOS™



FOR THE COMMODORE 64, 64c AND 128 COMPUTERS.

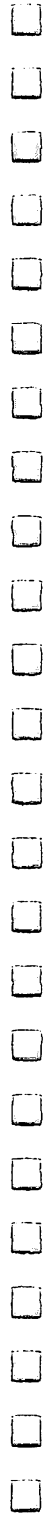
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geoCalc User's Manual

2150 Shattuck Avenue
Berkeley, California 94704



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Manual by: John Miller

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Introduction

What is geoCalc?

geoCalc is the GEOS based (Graphic Environment Operating System) spreadsheet program with powerful calculating abilities.

You can use geoCalc worksheets for accounting applications to keep track of profit and loss in a business, or create a worksheet that will calculate and display a schedule of mortgage payments for your home. geoCalc handles these and other calculating tasks with ease and reliability. And because geoCalc is GEOS compatible you will be using the same easy to learn and use graphic environment that you are already familiar with.

Unlike some other spreadsheet programs you may have used, geoCalc does not require that you learn a lot of complicated, or illogical commands in order to create and start working with your worksheet. Once you start up geoCalc you can immediately begin to type data into a worksheet that looks like a worksheet. In addition, you will be able to print out all, or part of your worksheet just the way it appears on the screen.

How to Get Help

We hope that you will find geoCalc an easy to learn and use program, and that this manual (along with your GEOS User's Manual), provides you with most of the answers to the questions you may have about the operation of geoCalc. However, if you do run across a problem that is not answered by the manual, there are two ways to obtain additional help.

The first, fastest, and recommended way to obtain information about and help with GEOS and its follow-on applications, like geoCalc, is through the QuantumLink telecommunications network. QuantumLink, or Q-Link, is an online service network designed for Commodore users.

Berkeley Softworks provides Customer Service message boards, along with a Programming and Technical Information message board and other useful services, in the Commodore Software Showcase section of Q-Link. Through these message boards, GEOS and geoCalc users can generally receive the most timely help and information. In addition you will have access to programs and products from Berkeley Softworks that are offered through Q-Link, many of them free of charge.

The second way to obtain help is to contact Customer Service at Berkeley Softworks, either by phone or letter. As the lines are often busy, we also recommend that users write in to us detailing their problems. All correspondence

is answered promptly. The Berkeley Softworks customer service address and telephone number are as follows:

Call:

Customer Service
(415) 644-0890 9 a.m.-5 p.m. Pacific time

Or write:

Customer Service
Berkeley Softworks
2150 Shattuck Avenue
Berkeley, CA 94704



Chapter 1

Before You Begin

Introduction

Before you can begin to use geoCalc you must read and follow the instructions in this chapter.

After completing Chapter 1 you will know:

- What minimum equipment and software you need to run geoCalc.
- How to install the geoCalc application program so that you can begin to work with it.
- How to make a second copy of geoCalc with the DISK COPY utility program using either one or two disk drives.
- How to make one or more work disks to use with geoCalc, and the importance of making work disks for GEOS applications.

Overview

geoCalc is a GEOS based program. This means that in addition to the geoCalc package, you will need to have the same basic hardware and software that you need to run GEOS itself. Additional equipment such as a printer, a second disk drive, a RAM-expansion unit (REU) are not required, but will improve the performance and utility of geoCalc. The REU especially is recommended for use with the geoCalc application due to its ability to bring increased speed and memory capacity to the Commodore 64/128 computer system.

Before you begin to work with geoCalc, you should make a second copy of the geoCalc disk using the DISK COPY utility. You should also make at least one additional work disk using DISK COPY for use with geoCalc.

What You Need to Run geoCalc

Rather than standing alone, geoCalc is a part of GEOS, the official operating system for the Commodore 64. geoCalc was designed to be simple to learn and to use, as well as being a powerful spreadsheet program. As a part of the GEOS world, however, there is a minimum amount of equipment (hardware) and computer programs (software) that you need in order to run geoCalc. In addition to these minimum requirements there are other optional equipment items that can improve your productivity with geoCalc, but are not necessary for its operation.

You must have the following hardware and software in order to run and work with geoCalc:

- a Commodore computer 64, 64c, or 128 (running in the 64 mode).
- one Commodore disk drive (1541 or 1571).
- GEOS (Graphic Environment Operating System) software, version 1.2 or later.
- an input device such as a joystick or mouse.
- the geoCalc package, which includes the program diskette and this manual.
- one blank, formatted, single or double sided diskette.

The following optional equipment items are recommended so that you can take full advantage of the power and versatility of geoCalc. This optional equipment is not, however, necessary to the operation of geoCalc.

- a GEOS supported printer that is properly connected to your Commodore computer. This will allow you to print out the spreadsheets that you create with geoCalc. A list of GEOS supported printers is included in your GEOS User's Manual.
- an interface card or geoPrint Cable if you are planning on using a non-Commodore compatible printer to print out your GEOS documents. geoPrint Cable is a parallel printing cable, available from Berkeley Softworks, that makes printing your GEOS documents fast and easy.
- a RAM-expansion unit (REU). With an REU the operating speed of geoCalc (and other programs) is greatly increased. Also, by using an REU you will be able to dedicate all of the disk space on the diskette in your disk drive to your spreadsheet, while the REU itself holds the geoCalc application.
- a second disk drive (1541 or 1571). With two disk drives you will be able to copy files and disks more easily. You will also be able to dedicate all of the disk space on one disk to a worksheet, while the disk in the other disk drive contains the geoCalc application.

- a proportional input device such as Commodore's 1351 Mouse. A proportional input device makes getting around in the GEOS world fast and easy.
- several blank formatted diskettes for making work disks.

Install geoCalc

You need to install the geoCalc program by following the steps below before you can begin to create spreadsheets.

IMPORTANT: Be sure to install geoCalc using your own GEOS boot disk or the GEOS boot disk that will always be used with this geoCalc disk. Any geoCalc work disks that you make from your original geoCalc disk must also be used with this same GEOS boot disk.

You perform this installation procedure only once, the first time that you open the geoCalc program.

- 1: Boot GEOS as described in your GEOS User's Manual.
- 2: Close your GEOS boot disk.
- 3: Take your GEOS disk out of the disk drive.
- 4: Put the geoCalc disk (label side up) into the disk drive and open it by clicking on the **Disk** icon.
- 5: Open the file named geoCalc by clicking on the geoCalc icon and selecting the **open** menu item from the **file** sub menu. (You can also double click on the geoCalc icon to open it.) The geoCalc screen will appear with a dialog box on top of it saying, "geoCalc installed".

NOTE: This dialog box will appear only once, the first time that you open the geoCalc application.

- 6: Select **OK** to return to the deskTop. Your geoCalc disk is now installed.

Make a Second Copy of Your geoCalc Diskette

You should make a copy of your original disk and store it with the original in a safe place. If a work copy is damaged, you can easily make another copy with the original disk or this backup.

If you are using one disk drive:

- 1: Open (or double click on) the DISK COPY utility program icon located on side B of your geoCalc diskette to run this program. The screen will turn blue to indicate that you are in the BASIC mode.
- 2: Follow the directions that appear on the screen. The source disk is the disk that you want to copy. The destination disk is your new copy.

If you have two disk drives:

First set up your system to use two disk drives as described in your GEOS User's Manual.

With your geoCalc disk in disk drive A, and your destination, or new disk in disk drive B:

- 1: Click on the copy menu item in the disk sub menu. The disk copy menu item is included with V1.3 of the deskTop.
- 2: Follow the directions that appear on the screen. The source disk is the disk that you want to copy. The destination disk is your new copy.

The two methods outlined above are the only *safe* ways to produce extra copies of your applications disks and to make work disks.

IMPORTANT: If you have the BACKUP program supplied on your GEOS disk, it **should not** be used to make copies of your applications disks, nor to make work disks. Use the BACKUP program only to make backup copies of your GEOS boot disk.

geoCalc Work Disks

Besides making a backup copy of the entire geoCalc disk, the most important thing for you to do before you start to work with geoCalc is to make at least one work disk. You can make as many copies of the geoCalc application as you wish. It is these copies that you should use when you want to work with geoCalc. Your original geoCalc disk should be stored in a safe place. Use the original geoCalc disk only if something goes wrong with one of your work disks.

The work disks that you make will contain the information that you want to store in a spreadsheet. By combining geoCalc with other GEOS applications and desk accessories, you can customize work disks to suit your exact needs.

Making a geoCalc Work Disk

There are two ways to make a work disk for use with geoCalc (or any other GEOS application).

- After formatting a blank disk, place the copy of your geoCalc disk in the disk drive and use the DISK COPY utility program to make an *additional* copy of the geoCalc disk. (See **Make a Second Copy of Your geoCalc Diskette**). After you have made this geoCalc work disk you can add files to (or delete files from) your new disk to suit your particular needs.
- Format a blank disk as above. Then copy selected files from the second copy of the geoCalc disk that you made in the previous section onto your new work disk.

An example of a geoCalc work disk containing a selection of GEOS files might include the following:

geoCalc

deskTop 1.3

printer driver (the correct one for your printer, copied from side B of your geoCalc disk).

This is a basic work disk configuration for geoCalc. Depending on your needs, you can add additional files from other GEOS products and applications, such as:

- desk accessories such as the Notepad or Calendar (from DeskPack1) so that you can jot down memos to yourself, or check on appointments while you are working with geoCalc.
- additional printer driver files if you use more than one type of printer.

By having only the files that you need on your work disks, you allow for plenty of disk space for your geoCalc worksheets. Make up several customized work disks, each useful for a particular type of job.

You are now ready to learn how to use geoCalc!



Chapter 2

Boot GEOS and Open geoCalc

Introduction

Chapter 2 contains the information that you need to boot (run) the GEOS program and to begin to work with the geoCalc application program.

IMPORTANT: Before you begin to read Chapter 2, be sure that you have read and have followed the instructions contained in Chapter 1 of this manual.

After reading this chapter you should know:

- How to open the geoCalc diskette after you have booted GEOS.
- Two ways to open geoCalc from the deskTop.
- How to open a new or an existing geoCalc worksheet.
- How to return to the deskTop.

Overview

Boot GEOS and Open Your geoCalc Diskette

As with any other GEOS based application program, you have to first boot (run) GEOS before you can open and work with geoCalc worksheets. Once GEOS is running, close your System or boot disk (the disk that you have run GEOS from) and open your geoCalc disk.

Create New Worksheets

Create new geoCalc worksheets by double clicking on the geoCalc icon, which is located on the first page of the geoCalc disk note pad. A Create/Open/Quit dialog box appears. Select the Create icon to create a new geoCalc worksheet.

Open Existing Worksheets

Open existing geoCalc worksheets by clicking on the Open icon in the Create/Open/Quit dialog box. A File dialog box appears with a list of the geoCalc worksheets that are currently stored on on the disk. Select the filename of the worksheet that you wish to open.

Existing geoCalc worksheets can also be opened directly from the deskTop by double clicking on their icons.

Saving Your Worksheets

While you are working on a geoCalc worksheet you should frequently save your work to the disk to avoid losing your data due to some mishap. To save your work at any time, simply click on the **update** menu item in the **file** sub menu. In this way all of the information that is contained in your worksheet will be saved to the diskette. You can then continue to work on your worksheet.

Return to the DeskTop

Return to the deskTop after you are finished working with geoCalc by clicking on the **quit** menu item in the **file** menu.

Step-by-step Instructions

Boot GEOS and Open Your geoCalc Diskette



The instructions below are written for a one disk drive system. If you want to use two disk drives while you are working with the geoCalc application program, refer to your GEOS User's Manual and set up your computer system to use two disk drives.



To boot GEOS and open your geoCalc diskette:

- 1: Set up and turn on your disk drive, computer, and monitor as described in your Commodore C64 System Guide. (If you have a 128 Commodore computer you will need to be running it in the 64 mode to run GEOS.)
- 2: Place your GEOS boot disk in your disk drive (GEOS, or System Disk label side up), and type the following BASIC command on your keyboard:

```
LOAD "GEOS",8,1
```

When the GEOS program has been loaded correctly, the GEOS deskTop will appear on the screen.

- 3: Close your boot disk by clicking on the Close icon located in the top right-hand corner of the disk note pad. You can also close your disk by pressing both the Commodore key  and  at the same time.

- 4: Take your boot disk out of the disk drive.
- 5: Place your geoCalc diskette (the one that came in your geoCalc package) in the disk drive and open it by clicking on the **Disk** icon (this icon is entitled Drive A if you have closed and removed your boot disk from the disk drive). The **Disk** icon is located in the upper right-hand corner of the monitor screen. You can also open your disk by pressing both the Commodore key  and  at the same time.


Open geoCalc from the deskTop: Open a New Worksheet

To open the geoCalc application:

Double click on the geoCalc icon or...

- 1: Click on the geoCalc icon once to select it.
- 2: Select the **open** menu item from the **file** sub menu. The **Create/Open/Quit** dialog box will appear.

To create a new geoCalc worksheet:

- 1: Click on the **Create** icon in the dialog box. Another dialog box will appear asking you to type in a filename for your file.
- 2: After typing in a filename press . In a few moments a geoCalc worksheet will appear on the screen. The geoCalc worksheet looks like a sheet of ruled paper.

Open an Existing geoCalc Worksheet

Once you have created one or more files on your geoCalc disk, you will be able to open existing geoCalc worksheets from the **Create/Open/Quit** dialog box.

To open an existing worksheet using the Open icon:

- 1: Click on the **Open** icon in the **Create/Open/Quit** dialog box after you have opened geoCalc from the deskTop. The **File** dialog box appears with a list of the filenames of the geoCalc worksheets that are currently stored on your disk.
- 2: Click on the name of the file that you want to open. The filename that you clicked on will appear in reverse video.

- 3: Click on the **Open** icon to open that file. (Clicking on the **Cancel** icon returns you to the Create/Open/Quit dialog box.) The spreadsheet with that filename will appear on the screen. Until you have typed some data into your worksheet it will appear like a blank sheet of ruled paper.

Saving Your Worksheets

You should frequently save your work while you are working with geoCalc to prevent the accidental loss of data.

To save or update your worksheet:

- 1: Click on the **file** menu item in the **command** menu. A sub menu appears.
- 2: Click on the **update** menu item in the **file** sub menu. The information in your worksheet will be saved to the diskette.
- 3: Continue to work on your worksheet.

An alternate way to update your worksheet is to use the keyboard shortcut **⌘ U**.

NOTE: Your worksheet is also saved to the diskette whenever you **Quit**, press **⌘ Q**, **Close**, or press **⌘ S**.

Return to the deskTop from the Create/Open/Quit Dialog Box

To return to the geoCalc deskTop from the Create/Open/Quit dialog box:

Click on the **Quit** icon in the Create/Open/Quit dialog box. The geoCalc deskTop will appear on the screen, turned to the first page of the disk note pad.

Open an Existing geoCalc Worksheet from the deskTop

To open an existing worksheet from the deskTop:

Open the geoCalc disk and then double click on the geoCalc worksheet icon of the file on which you want to work. The worksheet icon appears on the geoCalc deskTop, or...

1: Click once on the worksheet icon that you want to select.

2: Click on the **open** menu item in the **file** sub menu.

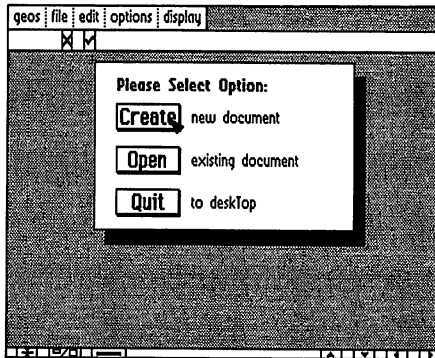
Either way, the worksheet that you have selected will appear on the screen with its name in the title bar.

Practice Creating, Opening, Exiting geoCalc Documents

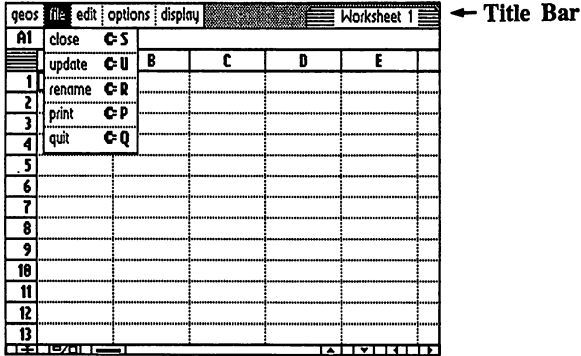
After you have set up your computer system and booted GEOS as described in the beginning of this chapter, you should practice opening up a geoCalc worksheet from the deskTop.

First, place your geoCalc diskette (label side up) in the disk drive and open it. You should see the geoCalc **program** icon on the deskTop that appears. Double click on this icon to open up the geoCalc application.

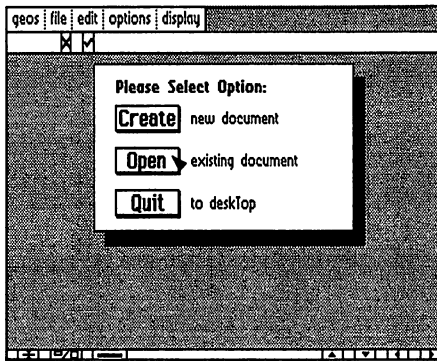
When the Create/Open/Quit dialog box appears, click on the **Create** icon to create a new geoCalc worksheet.



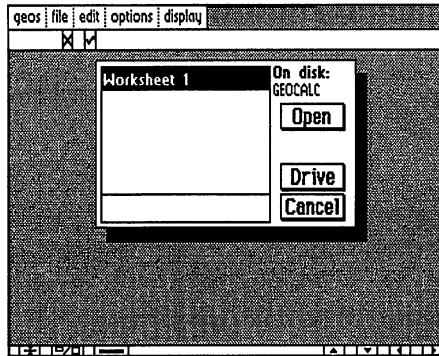
Type in the filename, **Worksheet 1** when the program asks you to enter a filename. Press the **RETURN** key. In a few moments a blank spreadsheet will appear on the screen. Notice the filename in the title bar located in the top right-hand corner of the screen.



Click on the **close** menu item in the **file** sub menu. The **Create/Open/Quit** dialog box appears. Click on the **Open** icon.

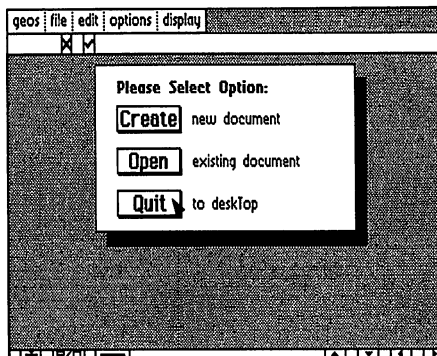


The File dialog box appears with a list of the geoCalc worksheet files that are currently stored on your diskette.



Worksheet 1 should be the only file that is currently stored on your disk. The filename of a selected file appears in reverse video.

Click on the **Open** icon to open **Worksheet 1**. The ruled lines of a geoCalc worksheet will appear on the screen. Now click on the close menu item in the **file** sub menu. You will again see the Create/Open/Quit dialog box.



Return to the geoCalc deskTop now by clicking on the **Quit** icon.

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Chapter 3

Learning geoCalc

Introduction

Chapter 3 forms a short tutorial of geoCalc that is designed to get you up and running with the basic operations of the program. By following along with the examples and illustrations contained in this chapter you should begin to feel comfortable with the basic operations involved with creating, working with, and printing out your geoCalc worksheets.

Chapter 4, *Using geoCalc*, gives you a more general view of geoCalc operations.

By the end of Chapter 3 you should know how to:

- Start the geoCalc application.
- Create a worksheet.
- Identify the major features of the geoCalc worksheet.
- Enter text into a worksheet.
- Use formulas in your worksheet.
- Define a name in your worksheet.
- Add information to your worksheet.
- Save your worksheet.
- Print your worksheet.

First of all, however, let's define what we mean by a worksheet.

What is a Worksheet?

A **worksheet** is like a large piece of ruled paper that is divided into columns and rows. The geoCalc spreadsheet contains 112 columns, labeled from A to DH, and 256 rows, labeled from 1 to 256. These rows and columns divide the geoCalc worksheet into 28,672 cells.

A **cell** is a box that holds the information, either a constant value (like text or a number) or a formula, that you want stored in that position in your spreadsheet. Each cell can be identified by its physical location in the spreadsheet. This location is a cross reference of the column and row, and is called the **cell reference**. For example, the first cell in the upper left-hand corner of your spreadsheet has the cell reference A1. Moving two columns to the right and three rows down from this cell takes you to the cell whose reference is C4.

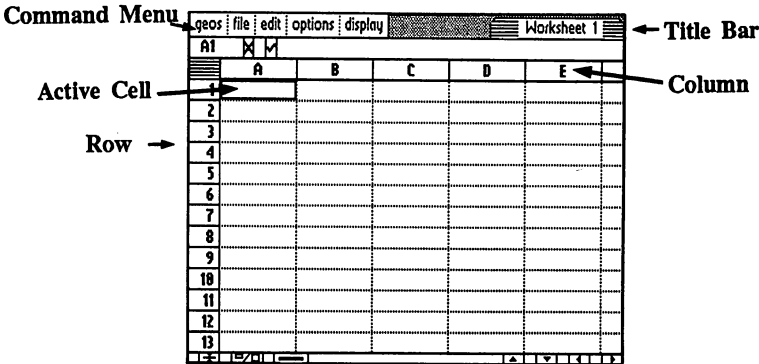
Start geoCalc

In Chapter 2 you learned how to open your geoCalc diskette and to create a new worksheet called Worksheet 1. If you have done this, go ahead and double click on the Worksheet 1 icon on your disk note pad to open it (unless Worksheet 1 is already opened and displayed on your monitor).

If you have not yet created a Worksheet 1, turn back to the **Practice** section of Chapter 2 and follow the directions contained there to create a worksheet called **Worksheet 1**.

The geoCalc Worksheet

If you have followed the directions above, you should have a worksheet with the name **Worksheet 1** in the **title bar** displayed on your monitor screen. The following illustrations and the text that follows them, show and briefly describe the major features of a geoCalc worksheet.



Command menu: The command menu lies across the top of the spreadsheet. Each item in the command menu, when it is selected, will cause a sub menu of geoCalc commands to appear.

Title bar: The title bar lies across the top of the worksheet to the right of the command menu. The filename (up to 16 characters) that you have given your geoCalc worksheet appears in the title bar. When you change the filename of a geoCalc worksheet, the new name will appear in the title bar.

Cells: A cell is a box that holds the information, either text or a formula, that you want stored in that position in your worksheet.

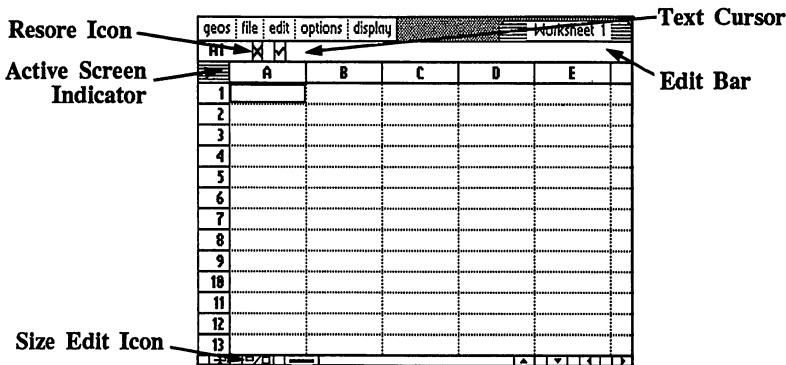
Row headings: Row headings identify the rows in a geoCalc worksheet and are numbered from 1 to 256.

Column headings: Column headings identify the columns in a geoCalc worksheet. There are 112 worksheet columns in geoCalc, and they are identified as follows: A, B, C,...Z, AA, AB...DH.

Active cell: The active cell is the cell that you are presently working on either to add information to it or to edit information that is already contained in it. The active cell is distinguished from other cells in the worksheet by having a darker outline than other cells.

Active screen indicator: The active screen indicator lets you know which of the two visible screens (if you have split the screen) is the active one on which you can work.

Cell reference box: The cell reference box displays the location on the worksheet of the active cell, and this location is given by a cross reference of the row and column headings. For example, the cell in the upper left-hand corner of the worksheet has a reference A1.



Edit bar: The edit bar displays whatever information is presently contained in the active cell.

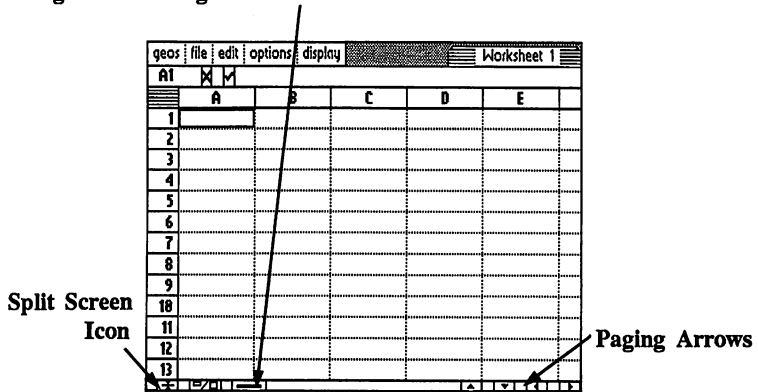
Text cursor: The text cursor appears in the edit bar at the position where the next character typed will be inserted. You can move the text cursor around in the edit bar by moving the pointer and clicking or by using the Space and Backspace keys. Any characters that you then type in will appear at the position of the text cursor.

Enter icon: When the information in the edit bar is correct, click on the enter icon to enter that information into the active cell. The information in the edit bar will appear in the active cell on your spreadsheet. The enter icon looks like a check mark.

Restore icon: By clicking on the restore icon you will restore the information that was last entered into the active cell before you started to edit the information. The restore icon looks like an X.

Size edit bar icon: Sometimes you will have entered more information into a cell than can be displayed by the standard size of the edit bar. If you do this, the size of the edit bar will increase so that all of the information contained in the active cell can be displayed. To reduce the edit bar back to the standard size, click on the size edit bar icon. Even though you may not see all of the information that is contained in a cell in the edit bar, the information is still there.

Program Working Indicator



Split screen icon: The split screen icon lets you display two portions of your geoCalc worksheet at once.

Paging arrows: The paging arrows allow you to move a screen at a time through your worksheet either up, down, left, or right.

Program working indicator: The program working indicator shows you when the program is performing some function. The indicator appears in reverse video when the program is working. When this occurs you will have to wait until the indicator goes back to its normal appearance before you can continue working. The program working indicator goes on if:

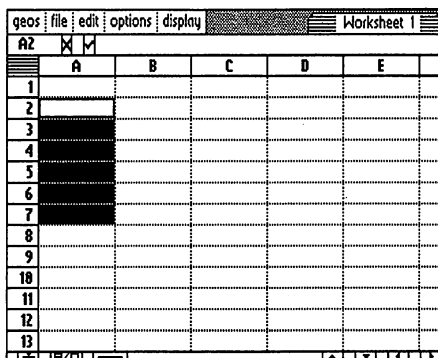
- The disk drive is active.
- The screen is being redrawn.
- A formula(s) is being evaluated.

Select an Area

There are several ways that you can select an area, or range of cells, on your worksheet into which you can enter information. A selected range of cells appears in reverse video.

To select an entire row or column of cells, click on that row or column heading. You can select the entire worksheet by clicking on the box at the top left corner of the row and column headings. You can also select a range of cells by clicking on the cell that you want to begin with. Then, while holding down the mouse or joystick button, drag the pointer to the last cell in the range you want select. Now release the button. The range of cells that you have selected will appear in reverse video. The first cell in the range will be the active cell.

Select a range of cells on your worksheet from A2 to A7 by clicking on A2 and, while holding down the joystick or mouse button, drag the pointer to A7. Release the button. The cells A2 to A7 will be selected; A2 will be the active cell.



You can also use the keyboard shortcut **⌘ M** to mark out the boundaries of a range of cells. For example, if you wanted to select the range B2 to E7, first click on the cell in the upper left-hand corner of your range (B2) to make it the active cell. Press **⌘ M**. Now click on the cell in the lower right-hand corner of your range (E7) and press **⌘ M** again. All of the cells between B2 and E7 will be selected. The last active cell, E7, is still the active cell.

Enter Text into Your Worksheet

The following example shows how you might use your worksheet to record a three month budget for office expenses for a small business.

Into the active cell A2 type the words **Expenses** and press the **RETURN** key twice. The new active cell should be A4. (Notice how the active cell in your selected range changes when you press **RETURN**.)

	A	B	C	D	E
1					
2	Expenses				
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					

Now type the following words into the cells in your selected range, pressing **RETURN** once after each word.

Type:

Press:

Rent
Telephone
Payroll
Miscellaneous

RETURN
RETURN
RETURN
RETURN

Your worksheet should look something like this:

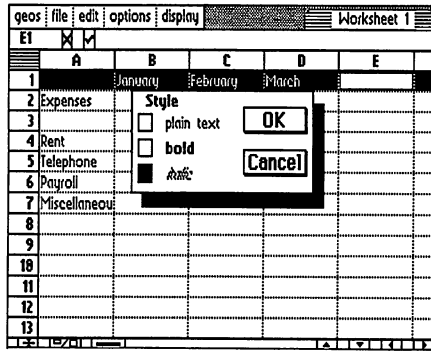
	A	B	C	D	E
1					
2	Expenses				
3					
4	Rent				
5	Telephone				
6	Payroll				
7	Miscellaneous				
8					
9					
10					
11					
12					
13					

Now select row 1 by clicking on its row heading. Press **RETURN** once to move the active cell to B1. Now type in the month names **January**, **February**, and **March**, pressing **RETURN** after each.

	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent				
5	Telephone				
6	Payroll				
7	Miscellaneous				
8					
9					
10					
11					
12					
13					

Change the Style of Text

Change the text style of the months that you just typed in by clicking on the **display** menu item in the **command** menu to reveal the **display** sub menu. Click on the **style** menu item, and then select **italic** from the dialog box that appears. Now click the **OK** box.



The months will appear now in the italic type style.

Change the Width of Cells

You will have noticed that some of the text that you typed into some of the cells flows into empty cells to the right of the original cells (e.g., **Miscellaneous**). You can change the width of a column of cells so that all of the data is displayed in the original cell.

To do this, move the pointer over the right-hand border of the column heading of the column of cells that you want to widen. The pointer turns into a double sided arrow with a bar in the middle. Press the mouse/joystick button and hold it down. Now you can move the double sided arrow back and forth (while still holding down the button) until that column of cells is the width that you want. Release the button to set the column border again.

Using this method, change the width of the A column of cells so that the word **Miscellaneous** fits completely inside the column borders.

geos file edit options display Worksheet 1					
A1					
	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent				
5	Telephone				
6	Payroll				
7	Miscellaneous				
8					
9					
10					
11					
12					
13					

Enter Information into the Worksheet

Click on B4 to make it the active cell and enter the following numbers, pressing **RETURN** after each one:

- 1000
- 75
- 1700
- 35

Your worksheet should now look something like this:

geos file edit options display Worksheet 1					
B8					
	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent	1000			
5	Telephone	75			
6	Payroll	1700			
7	Miscellaneous	35			
8					
9					
10					
11					
12					
13					

Build a Formula

Click on cell A9 and type the words **Total Expenses**, and press **RETURN** (widen the A column if necessary). Now click on cell B9 to make it active. You are going to enter a formula to add up all of the monthly expenses in this cell. First type an equal sign (=). Then click on each of the cells in the B column that have number entries one after the other. Each time that you click on a cell, its reference is placed in the edit bar. A plus sign (+) is inserted automatically between each pair of references.

geos file edit options display					Worksheet 1
B9					=B4+B5+B6+B7
	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent	1000			
5	Telephone	75			
6	Payroll	1700			
7	Miscellaneous	35			
8					
9	Total Expenses				
10					
11					
12					
13					

Click on the enter icon (the check mark). The value 2810 should now appear in cell B9.

geos file edit options display					Worksheet 1
B9					=B4+B5+B6+B7
	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent	1000			
5	Telephone	75			
6	Payroll	1700			
7	Miscellaneous	35			
8					
9	Total Expenses	2810			
10					
11					
12					
13					

Copy Information

You will want to use this formula to total the expenses for each month, so you need to copy it into cells C9 and D9. To do this, first make sure that B9 is still the active cell (it should be if you used the enter icon to enter the formula above). Now copy the formula by clicking on the **copy** menu item in the **edit** sub menu. Move the pointer over cell C9, press and hold down the mouse/joystick button. Drag the pointer over cell D9 and release the button. C9 will now be the active cell and D9 should appear black (reverse video).

geos : file : edit : options : display					Worksheet 1
C9	✖ ✖				
	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent		1000		
5	Telephone		75		
6	Payroll		1700		
7	Miscellaneous		35		
8					
9	Total Expenses		2810		
10					
11					
12					
13					

Now click on the **paste** menu item in the **edit** sub menu. This will paste the formula from B9 into both C9 and D9. (Notice that the formula in the edit bar for the cell C9 has different letters in it than the formula in B9.) The values in the cells C9 and D9 at this point will be 0; you do not have any numbers to add in these columns yet.

geos : file : edit : options : display					Worksheet 1
C9	✖ ✖ =C4+C5+C6+C7				
	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent		1000		
5	Telephone		75		
6	Payroll		1700		
7	Miscellaneous		35		
8					
9	Total Expenses		2810	0	0
10					
11					
12					
13					

Update to disk your work at this point by clicking on the **update** menu item in the **file** sub menu. You should frequently update your work while working with geoCalc to avoid accidental loss of data.

Click on the cell C4, and while holding down the mouse/joystick button, drag to cell D7.

geos file edit options display Worksheet 1					
C4	A	B	C	D	E
1		ΑΠΑΡΧΗ	ΕΣΟΔΑ	ΑΠΟΡΡΟΗ	
2	Expenses				
3					
4	Rent	1000			
5	Telephone	75			
6	Payroll	1700			
7	Miscellaneous	25			
8					
9	Total Expenses	2810	0	0	
10					
11					
12					
13					

Type the following numbers, pressing **RETURN** after each one. Notice how your entries progress through this selection of cells.

- 1000
- 72
- 1700
- 26
- 1000
- 78
- 1700
- 30

After entering these numbers your worksheet will look like this:

geos file edit options display Worksheet 1					
C4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1000		
	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent	1000	1000	1000	
5	Telephone	75	72	78	
6	Payroll	1700	1700	1700	
7	Miscellaneous	35	26	30	
8					
9	Total Expenses	2810	2798	2808	
10					
11					
12					
13					

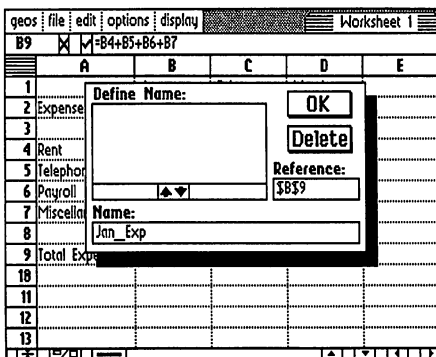
Notice that there are now values besides 0 in cells C9 and D9, 2798 and 2808 respectively. These are the totals of the expense columns for February and for March.

Define a Name

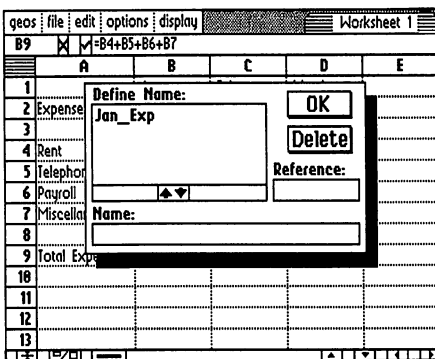
The sum in cell B9 represents the total of the expenses for January. You can reference this sum in other places on your spreadsheet by typing \$B\$9. It may be easier to remember this reference as a word like Jan_Exp. To define a name for the cell B9, first make B9 the active cell by clicking on it. Then click on the **define name** menu item in the **options** sub menu.

geos file edit options display Worksheet 1					
B9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	paste function		
	A	B	C	D	E
1		define name	January	March	
2	Expenses	copy text scrap			
3		paste text scrap			
4	Rent	names OFF	1000	1000	
5	Telephone		72	78	
6	Payroll		1700	1700	
7	Miscellaneous		35	26	30
8					
9	Total Expenses	2810	2798	2808	
10					
11					
12					
13					

The Define Name dialog box appears with the active cell in the cell reference block, in this case \$B\$9. Type in a name for this cell, Jan_Exp, in the block provided. (Do not leave any spaces in a name; use the underline character() to connect words. The underline character is created by pressing **⌘** and "-" together.)



When you have typed the name you want, press **RETURN**. The name Jan_Exp is now a defined name that you can paste into formulas and use just like a cell reference. geoCalc will prompt you for another name and its reference. When you have finished defining all of the names for cells that you wish to at this time, click on the OK icon. Click on OK now.



This returns you to your worksheet.

Click on the cell A11 and type in the word Sales. Enter this text into the cell by pressing **RETURN** twice. Now with cell A13 the active cell, type in the words **Net Income**. Click the enter icon to enter this text into the cell. Now click on cell B11, making it active, and type the number **9800**. Enter this number into the cell by clicking the enter icon.

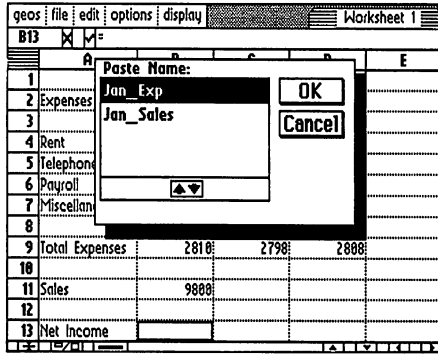
geos file edit options display Worksheet 1					
B11 9800					
A	B	C	D	E	
1		January	February	March	
2	Expenses				
3					
4	Rent	1000	1000	1000	
5	Telephone	75	72	78	
6	Payroll	1700	1700	1700	
7	Miscellaneous	35	26	30	
8					
9	Total Expenses	2810	2798	2808	
10					
11	Sales	9800			
12					
13	Net Income				

Define a name for cell B11 as you did above for cell B9: call it Jan_Sales. Click on **OK** to return to your worksheet.

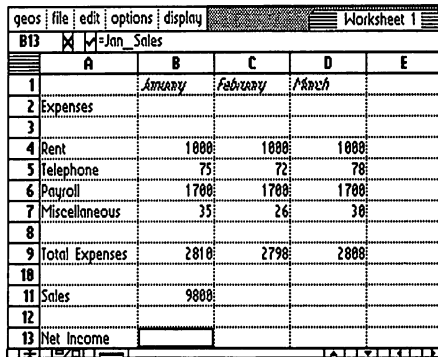
Now click on cell B13 to make it the active cell. You are going to put a formula into this cell to calculate the net income for January by using the names that you have defined. To do this, first type an equal sign (=). Now click on the **paste name** menu item in the **options** sub menu.

geos file edit options display Worksheet 1					
B13 =					
A	B	C	D	E	
1		January	February	March	
2	Expenses				
3					
4	Rent	1000	1000		
5	Telephone	75	72	78	
6	Payroll	1700	1700	1700	
7	Miscellaneous	35	26	30	
8					
9	Total Expenses	2810	2798	2808	
10					
11	Sales				
12					
13	Net Income				

A list of your defined names appears from which you can choose.



Click on Jan_Sales to select it, and then click on the OK icon. The name Jan_Sales will appear in the edit bar.



Now type a minus sign (-). Click on the **paste name** menu item in the options sub menu, and select the name Jan_Exp from the list that appears. Click on the OK icon. The name Jan_Exp appears in the edit bar as follows:

geos file edit options display Worksheet 1					
B13	=Jan_Sales-Jan_Exp				
	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent	1000	1000	1000	
5	Telephone	75	72	78	
6	Payroll	1700	1700	1700	
7	Miscellaneous	35	26	30	
8					
9	Total Expenses	2810	2798	2808	
10					
11	Sales	9800			
12					
13	Net Income				

The names that appear in the edit bar are actually references to the cells B11 and B9 respectively. Click on the enter icon to enter this formula into B13, which now calculates the difference between Sales and Total Expenses, or the Net Income. This number, 6990, should now appear as a value in B13.

geos file edit options display Worksheet 1					
B13	=Jan_Sales-Jan_Exp				
	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent	1000	1000	1000	
5	Telephone	75	72	78	
6	Payroll	1700	1700	1700	
7	Miscellaneous	35	26	30	
8					
9	Total Expenses	2810	2798	2808	
10					
11	Sales	9800			
12					
13	Net Income	6990			

Performing Range Operations

geoCalc provides a handy way to enter the calculation in cell B13 above into cells C13 and D13 also, and to use the proper cells to perform the calculation in each column. The procedure for doing this is called a **range operation**. A range operation can be performed with or without using names.

In the above example, a range operation could be used to calculate the net income for each month. Only one formula, however, is needed. Enter monthly sales figures of 9850 and 9900 in cells C11 and D11, respectively. Select cell B13 and type the formula:

=B11-B9

Now click on the **enter** icon. Notice that cell B13 has the same value now as it did in the example above. The difference, however, is that the formula now uses relative references (for a description of the two types of references, see **Relative and Absolute References**, Chapter 4). The formula can now be translated as "take the value in the cell two rows up and subtract from it the value in the cell four rows up." Now, with cell B13 still the active cell, click on the **copy** menu item in the **edit** sub menu. The formula can now be used to perform the same operation in any column. Select the range C13:D13 by clicking on cell C13 and dragging the pointer to cell D13. Now click on the **paste** menu item in the **edit** sub menu. The relative formula from cell B13 has been entered into cells C13 and D13; notice, however, that each formula is using the correct operands from that formula's column. Click on cell C13. The formula displayed is:

=C11-C9

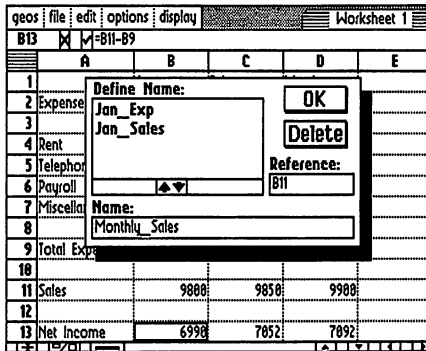
By using a range operation such as this, geoCalc can be used to calculate multiple rows or columns in a table.

geos file edit options display						Worksheet 1	
C13	=C11-C9						
	A	B	C	D	E		
1		January	February				
2	Expenses						
3							
4	Rent	1000	1000	1000			
5	Telephone	75	72	70			
6	Payroll	1700	1700	1700			
7	Miscellaneous	35	26	30			
8							
9	Total Expenses	2810	2798	2800			
10							
11	Sales	9800	9850	9900			
12							
13	Net Income	6990	7052	7098			

Names and Range Operations

As in the first example in this section, names can be used to make the worksheet easier to understand. For range operations, however, names must be defined as a relative reference, rather than as an absolute reference.

Click on cell B13, making it the active cell. Now select the **define name** menu item in the **options** sub menu. Since both references in the formula are to be relative references, they must be defined from one of the cells that will reference them. Now enter a name that can refer to each month's sales, such as **Monthly_Sales**. Click on the cell reference block, backspace over the absolute reference of the currently active cell, and enter the relative reference B11.



Now press **RETURN**. In a similar manner, define the name **Monthly_Expenses** as a relative reference to cell B9, press **RETURN**, and then click on the OK icon.

Now click on cell B13, and you will see the formula appear with the new names that you have defined. If you click on cells C13 and D13, you will see that the relative references you defined will appear as names for those cells, too.

NOTE: When you define a name for a cell as a relative reference, that name will appear in the edit bar of any cell that uses that particular reference. To disable this, select the **names off** feature in the **options** menu.

geos file edit options display Worksheet 1					
C13 Monthly_Sales-Monthly_Exp					
	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent	1000	1000	1000	
5	Telephone	75	72	78	
6	Payroll	1700	1700	1700	
7	Miscellaneous	35	26	30	
8					
9	Total Expenses	2810	2798	2808	
10					
11	Sales	9800	9850	9900	
12					
13	Net Income	6990	7052	7092	

Formatting Numbers

Let's say that you want to add dollar signs to some of the cell values on your worksheet. First select a group of cells to format. You can do this by dragging the pointer from B4 to D13.

You can also select a group of cells by using a keyboard shortcut. To select cells this way, click on B4 and then hold down the **⌘** key and press **M** (for mark). This marks the beginning of your selection. Now move to cell D13 and click to select it. Hold down the **⌘** key and press **M** again; this marks the last cell in your selection. Notice that all of the cells between B4 and D13 are selected; D13 is the active cell.

geos file edit options display Worksheet 1					
B4 1000					
	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent	1000	1000	1000	
5	Telephone	75	72	78	
6	Payroll	1700	1700	1700	
7	Miscellaneous	35	26	30	
8					
9	Total Expenses	2810	2798	2808	
10					
11	Sales	9800	9850	9900	
12					
13	Net Income	6990	7052	7092	

Now pick a format for these cells by clicking on the **format** menu item in the **display** sub menu.

geos file edit options display		screen	
B4	<input checked="" type="checkbox"/> 1888	format	
A		D	E
2	Expenses		
3			
4	Rent		
5	Telephone	1000	1000
6	Payroll	1700	1700
7	Miscellaneous	25	30
8			
9	Total Expenses	2810	2800
10			
11	Sales	9800	9900
12			
13	Net Income	6990	7092
14			

A list of number formats appears from which you can choose.

geos file edit options display		Worksheet 1	
B4	<input checked="" type="checkbox"/> 1888	Format:	
A		general	OK
1		0	Cancel
2	Expenses	0.0	
3			
4	Rent		
5	Telephone	0.00	
6	Payroll		
7	Miscellan		
8			
9	Total Expenses	2810	2800
10			
11	Sales	9800	9900
12			
13	Net Income	6990	7092
14			

Click on the down arrow located at the bottom of the list until you can see the format that looks like this:

\$#,##0 (\$#,##0)

Click on this format to select it, and then click on the OK icon. Your worksheet should now appear something like this:

geos file edit options display Worksheet 1					
B4	M 1200				
	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent	\$1,000	\$1,000	\$1,000	
5	Telephone	\$75	\$72	\$78	
6	Payroll	\$1,700	\$1,700	\$1,700	
7	Miscellaneous	\$35	\$26	\$30	
8					
9	Total Expenses	\$2,810	\$2,798	\$2,808	
10					
11	Sales	\$9,800			
12					
13	Net Income	\$6,990			

Update your work by clicking on the update menu item in the file sub menu.

Changing Information on Your Worksheet

Changing information on your worksheet is no problem at all. Let's say that your rent in March went up by \$200 to \$1200. To change this information in your worksheet, simply click on the cell D4 to make it active, and type 1200. This new number replaces the old one in the edit bar.

geos file edit options display Worksheet 1					
D4	M 1200				
	A	B	C	D	E
1		January	February	March	
2	Expenses				
3					
4	Rent	\$1,000	\$1,000	\$1,000	
5	Telephone	\$75	\$72	\$78	
6	Payroll	\$1,700	\$1,700	\$1,700	
7	Miscellaneous	\$35	\$26	\$30	
8					
9	Total Expenses	\$2,810	\$2,798	\$2,808	
10					
11	Sales	\$9,800	\$9,850	\$9,900	
12					
13	Net Income	\$6,990	\$7,052	\$7,092	

Click on the enter icon to enter this new value into the cell.

geos file edit options display Worksheet 1					
B4	<input checked="" type="checkbox"/>	1200			
	A	B	C	D	E
1		<i>January</i>	<i>February</i>	<i>March</i>	
2	Expenses				
3					
4	Rent	\$1,000	\$1,000	\$1,200	
5	Telephone	\$75	\$72	\$78	
6	Payroll	\$1,700	\$1,700	\$1,700	
7	Miscellaneous	\$35	\$26	\$30	
8					
9	Total Expenses	\$2,810	\$2,798	\$3,008	
10					
11	Sales	\$9,800	\$9,850	\$9,900	
12					
13	Net Income	\$6,990	\$7,052	\$6,892	

Notice that your Total Expenses for March are recalculated to reflect this value.

Save Your Worksheet

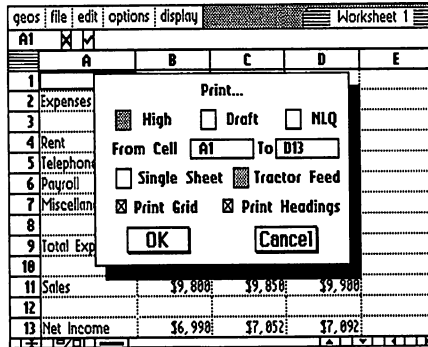
You can save your worksheet either by updating (see above), or by closing your file, or by quitting out of the geoCalc program. To quit and return to the deskTop, click on the quit menu item in the file sub menu.

Print Your Worksheet

If you want to print your worksheet now, you can do so by clicking on the print menu item in the file sub menu.

NOTE: Before you try to print your worksheet, make sure that your printer is properly hooked up and turned on. (See your GEOS User's Manual for information on how to set up your system to print GEOS documents, such as a geoCalc worksheet.)

A dialog box appears in which you can select various print options. Click on the box next to the options you wish to use.



You can print your worksheet in either High (quality), Draft, or NLQ (near letter quality), print modes. (Your printer must support an NLQ and/or Draft mode in order to utilize these options.)

You can specify the range of cells that you want to print by selecting that range on your worksheet or by typing the range into the dialog box. If you do not specify a range (i.e., the active cell is the only selected cell), geoCalc will suggest a range to be printed which will be a rectangle of cells on the worksheet that will take in all of the cells that have any entries or dependencies in them. If you are printing out the example above and have only one cell selected, the suggested range will be A1 to D13.

You can also choose to print using computer paper (tractor fed paper) or single sheets, as well as whether or not to print the spreadsheet grid lines and/or column and row headings.

When you have finished making your selections of print options, click on the **OK** icon to begin printing your worksheet.

This concludes the geoCalc tutorial. Chapter 4, *Using geoCalc*, contains more generalized information on the geoCalc application.



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Chapter 4

Using geoCalc

Introduction

In Chapter 3 you learned some of the basic operations of geoCalc by working through a simple example. Chapter 4 covers these and other operations of the program in more detail.

Create a New Worksheet

To create a new worksheet, double click on the geoCalc icon and click on the **Create** icon in the dialog box that appears. When asked to do so, type in a name for your worksheet (up to 16 characters). A geoCalc worksheet will appear on the screen with the name you typed appearing in the title bar.

What is a Worksheet?

A **worksheet** is like a large piece of ruled paper that is divided into columns and rows. The geoCalc worksheet contains 112 columns, labeled from A to DH, and 256 rows, labeled from 1 to 256. These rows and columns divide the geoCalc worksheet into 28,672 cells.

A **cell** is a box that holds the information, either a constant value (such as text or a number) or a formula, that you want stored in that position in your worksheet. Each cell can be identified by its physical location in the worksheet. This location is a cross reference of the column and row, and is called the **cell reference**. For example, the first cell in the upper left-hand corner of your worksheet has the cell reference A1. Moving two columns to the right, and three rows down from this cell takes you to the cell whose reference is C4.

Scrolling a Worksheet

While you are using your worksheet you will want to be able to move to different locations to enter and edit information and to change how your worksheet looks.





Moving to a different place in your spreadsheet is called **scrolling the worksheet**. There are five ways to scroll the worksheet in geoCalc.

To scroll the worksheet a screen at a time, click on one of the scrolling arrows located at the bottom of the screen.

To move one row or column at a time, simply move the mouse/joystick pointer to one of the screen edges in the direction that you want to move. There is a slight delay between the time that the pointer touches the screen edge and when the worksheet starts to scroll so that you do not scroll the worksheet accidentally.

You can move rapidly to another, distant part of your worksheet by using the **scroll indicator**. If you want to use the scroll indicator click on the **scroll ON** menu item in the **display** sub menu or press **⌘ W**. The indicator appears in the lower right-hand side of your worksheet. The small box represents the part of your worksheet that currently appears on the screen. To view a different part of your worksheet, click on the small box and drag it to a different place on the indicator. Click again. You will now see this new portion of your worksheet on the screen.

You can also use the cursor keys to scroll a column or row at a time. The following table summarizes how to use the cursor keys to scroll the screen.

<u>To scroll:</u>	<u>Press these keys.</u>
Right one column	
Left one column	SHIFT 
Down one row	
Up one row	SHIFT 

Finally, you can click in the cell reference box and type in a cell reference (such as F3) to which you want to move. When you press **RETURN**, the worksheet will scroll so that the cell whose reference you typed in appears in the upper left-hand corner of your worksheet.

In any case, whenever you scroll the worksheet, whichever method you use, the active cell remains what it was before you started to scroll. If you reach the edge of the worksheet, geoCalc will beep to inform you of this.

Selecting Parts of a Worksheet

Most of the commands in geoCalc, such as **copy**, **cut**, or **print**, operate on a selection of cells from a worksheet. You can select either a single cell or a range of cells. A **range** of cells is a rectangular selection made up of many cells.

To select a single cell just click on that cell. This cell will now be the active cell.

The following summarizes how to select various ranges of cells.

To select this range:

Do this.

A block of cells

Click on a cell, hold the mouse or joystick button down, and drag the pointer to include a continuous rectangle of cells.

One column or row

Click on the column or row heading.

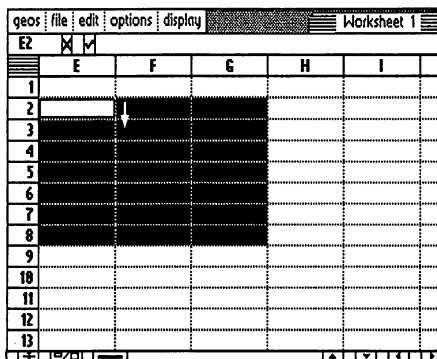
Entire worksheet

Click on the box below the active cell reference containing the horizontal lines (Active Screen Indicator).

If while selecting a range of cells you drag the pointer past the last row or column on the screen, geoCalc will scroll the window as you add to the selection.

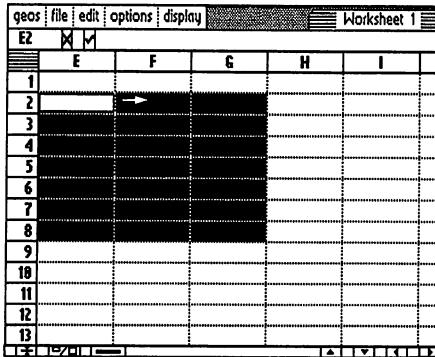
Move Through a Selection of Cells

Whenever you type something and press the **RETURN** key, geoCalc enters whatever you typed into the active cell. If you select a range of cells, pressing the **RETURN** key makes the next cell in the selection the active cell. The way that geoCalc moves through a selection of cells is illustrated below.



If you want to move up through a selection of cells, press the **↑** key and the **RETURN** key together.

If you want to move to the right through a selection of cells, press the **CONTROL** key and the **I** key together (**CONTROL I** is used for tabs in GEOS). This will move you through a selection of cells as illustrated below.



To move left through a selection of cells press the **←** the **CONTROL** and the **I** keys together.

Entering Information into Your Worksheet

You can type either text, numbers, or formulas into the cells on your worksheet.

To enter text or numbers, select a cell and type in the text or number. To enter a formula, type an equal sign (=) first and then the formula. What you type appears in the edit bar and is entered into the active cell whenever you do one of the following:

- 1: Click on the enter icon. The currently active cell will remain the active cell.
- 2: Press the **RETURN** key. The cell below the currently active cell will become the active cell.
- 3: While holding down the **←** key, press the **RETURN** key. The cell above the currently active cell will become the active cell.

- 4: Press **CONTROL I** (the GEOS TAB character). The cell to the right of the currently active cell will become the active cell.
- 5: While holding down the **←** key, press **CONTROL I**. The cell to the left of the currently active cell will become the active cell.

If you decide not to enter what is in the edit bar into the active cell, click on the restore icon (the X), and whatever was previously contained in the cell will be restored. You can type up to 200 characters into the edit bar or up to five lines of text (whichever comes first). If the edit bar becomes full, then geoCalc will just beep if additional characters are typed.

Enter Text

Text is anything that is not preceded by an equal sign (=) or that geoCalc does not recognize as a number. Text may contain letters, digits, and all other printable characters. You can have an equal sign (=) appear at the beginning of some text in a cell by typing two equal signs (==) together before typing the text.

A cell can hold up to 200 characters of text. If the text is too long to fit in a cell, geoCalc extends the text into the cells to the right until it comes up to a cell that is not empty. There are certain instances when part of the text that overflows into another cell may become obscured. If this is the case, select the cell and reaffirm it by pressing **RETURN** or selecting another cell. In any event, even though you may not see all of the text that is contained in a cell, geoCalc stores all of the text.

Enter Numbers

Numbers can include any of these characters:

1 2 3 4 5 6 7 8 9 0 + - . E e

You cannot use commas (,) when entering numbers. However, you can format numbers so that commas will appear. Some examples of legal numbers are:

123
-47
1.32
-0.05
12.5E-26
+4.7e8

Non-zero numbers must have an absolute magnitude in the range between 10^{-65} and 10^{62} approximately. Numbers may be entered with up to 12 digits of accuracy. This accuracy is maintained when the arithmetic operators +, -, *, and / are used. However, some functions maintain only 9 digits of accuracy. When these functions are used, the absolute magnitude must lie in the range between 10^{-37} and 10^{38} , approximately.

If a number has too many digits to be displayed accurately in its cell, then the **overflow flag** ("* * *") will appear in that cell. geoCalc cannot put the number into the cell because it would have to clip off significant digits to do so, and this would result in a misleading number being displayed. Therefore, in order to have the number appear in the cell, you must make the column wider. As soon as the cell's column is wide enough, the number will be displayed.

Cell References

The box to the left of the cancel icon displays the row and column cross reference of the active cell and is called the **cell reference box**.

In geoCalc the columns are labeled A through DH, and the rows are labeled 1 through 256. geoCalc labels the columns A through Z, and then AA, AB, AC and so on to DH. For example, the cell in column A, row 1 is referred to as A1.

References make formulas flexible. You can easily use the same value in many formulas by entering the value in a cell and referring to that cell in the formulas. Then, if you change the value of the cell, geoCalc recalculates any formulas that are dependent on that cell using the new value.

Relative and Absolute References

When you build a formula, you can refer to cells using relative references or absolute references.

A **relative reference** is like giving someone directions — "go down three blocks, turn left and go two blocks." An **absolute reference** is like an address — "213 S. Main." In Chapter 3 you used relative references in most of your formulas. A relative reference tells geoCalc how to get to a cell starting from the cell containing the formula.

An absolute reference is unique to each cell. For example, \$D\$2 refers specifically to the cell in column D, row 2. This is the only cell that has this reference. The dollar signs tell geoCalc that \$D\$2 is an absolute reference.

<u>To enter</u>	<u>Type</u>
a relative reference	A1
an absolute reference	\$A\$1

Copying References

The difference between relative and absolute references becomes important when you copy formulas from one cell to another using the **cut** or **copy** menu items in the **edit** sub menu.

In the following example, both cells in the third row have formulas that calculate the sum of the values in the two cells immediately above them. The formula in A3 is built with relative references; the one in B3 is built with absolute references.

	A	B	C
1	10	10	
2	40	40	
3	50	50	=B\$2+B\$1
4			

=A2+A1

When you copy the formulas from row 3 into row 4 using the **copy** and **paste** menu items in the **edit** sub menu, the results of both formulas are correct, but the answers are different:

	A	B	C
1	10	10	
2	40	40	
3	50	50	
4	90	50	=B\$2+B\$1

=A3+A2

The formula $=A3+A2$ calculates the sum of the values in the cells in the same column, one row above and two rows above the cell containing the formula. No matter which cell you copy this formula into, geoCalc looks in the two cells immediately above it for values to add.

The formula $=B\$2+B\1 always adds the values in B2 and B1. No matter where you put this formula on your worksheet, geoCalc always looks in B2 and B1 for values to add.

If you click on a cell while building a formula you enter a relative reference. For example, if you are entering a formula in A4 and click on A1, geoCalc enters A1 as the reference. geoCalc remembers "the cell three rows up in the same column."

If the active cell is A10 and you enter $A8+A5+A2$ as the formula:

geoCalc remembers

Which is the cell

the value two cells above this cell	A8
the value five cells above this cell	A5
the value eight cells above this cell	A2

Because geoCalc remembers positions that are relative to the cell containing the formula, if you copy the formula, it now applies to cells in the new position. For example, if you copy the above formula into B11, geoCalc changes the reference to $=B9+B6+B3$.

Mixed References

If you want to refer to cells so that only the column or the row reference is relative (or absolute), you can use **mixed references**. For example, in the reference B\$3 only the row reference is absolute.

In the following example, A3 and C3 have formulas that calculate the sum of the values in the cells immediately above them. The formula in A3 is built with relative column/absolute row mixed references. The formula in C3 is built with absolute column/relative row mixed references.

	A	B	C	D
1	10		10	
2	40		40	
3	50		50	
4				=C2+C1

=A\$2+A\$1

If you move the formulas in A3 and C3 to the right and down one cell the result would look this:

	A	B	C	D
1	10		10	
2	40		40	
3	50		50	
4		0		90

=C3+C2

=B\$2+B\$1

When you copy the formula =A\$2+A\$1 into B4, geoCalc changes the references so that the formula is =B\$2+B\$1. geoCalc sums the values in the cells in row 2 and row 1 in the same column as the cell containing the formula. In this mixed reference, the column reference is relative, but the row reference is absolute.

When you copy the formula =\$C2+\$C1 into D4, geoCalc changes the references so that the formula is =\$C3+\$C2. geoCalc sums the values in the cells in column C, one row above and two rows above the cell containing the formula. In this mixed reference, the column is absolute, but the row is relative.

Names

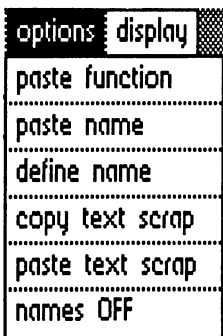
Cell references, such as \$A\$1, identify cells on your worksheet. You can use a cell reference in a formula or function to refer to the values contained in that cell.

It may at times be more convenient to refer to a cell by a name such as Total_Expenses, rather than by a cell reference, such as \$B\$7. geoCalc allows you to give names to cells. You can then use those names in exactly the same way as you would use cell reference in formulas or functions. A name may have up to 40 characters. It cannot have blank spaces (e.g., "Total Expenses" is incorrect; "Total_Expenses" is correct), and it should not look like a number or cell reference.

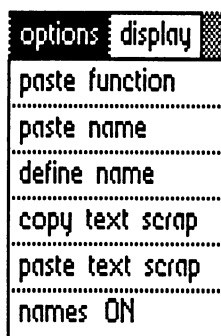
IMPORTANT: If you have selected the **names ON** option (**names OFF** is visible when you select the **option** menu), then any cell for which you have defined a name will display that name in the edit bar even when you type in the cell reference. For example, if you have defined the cell \$B\$9 to be Expenses, then Expenses will be displayed in the edit bar whenever you type the cell reference \$B\$9.

If you select the **names OFF** menu item, then names will not be displayed in the edit bar, only the actual cell references.

If the options sub menu looks like this:



names are displayed



names are not displayed

Define a Name

The first step in naming a cell is to define a name for the cell. To do this:

1: Click on the cell that you want to name, making it the active cell.

- 2: Click on the **define name** menu item in the **options** sub menu. A dialog box appears.
- 3a: Type a name into the name edit box. The name cannot have any spaces in it or look like a number or a formula. In addition, geoCalc makes no distinction between upper and lower case in names that you define (EXPENSES is the same as expenses in this case).
- 3b: Click in the reference box and retype what is there if you want to give this name to some other cell besides the active cell. A cell reference that you type into this box can be an absolute or a relative reference.
- 4a: Press **RETURN** when you are satisfied with both the name and the cell reference.
- 4b: You can now define names for additional cells in your spreadsheet by typing in the Name edit and the reference boxes. Press **RETURN** after typing each name and cell reference.
- 5: Click on the **OK** icon when you are finished defining names for your cells.

Delete a Name

- 1: Click on the **define name** menu item in the **options** sub menu. A dialog box appears.
- 2: Select the name that you want to delete from your list of defined names.
- 3: Click on the **Delete** icon. The name that you selected will be removed from the list.

Edit an Existing Name or Cell Reference

- 1: Click on the **define name** menu item in the **options** sub menu. A dialog box appears.
- 2: Select the name you wish to edit by clicking on it in the list of defined names.

- 3: The name will appear in the name edit box with the text cursor after the last character. Use the backspace key to modify the name.
- 4: If you want to modify the cell reference, then click in the cell reference box.
- 5: Press **RETURN** to enter the change.
- 6: Click on the **OK** icon when finished.

Use a Name as a Cell Reference

Once you have defined a name for a cell, you can use that name in a formula or function just as you would a cell reference. To do this:

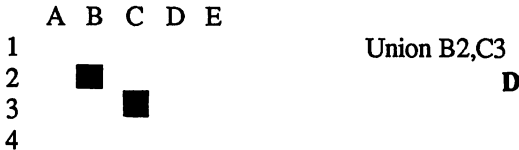
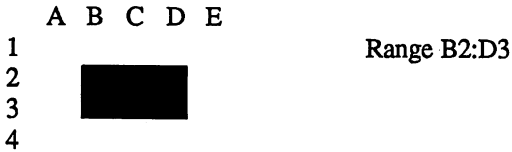
- 1a: Type the name in place of a cell reference in a formula or function, or...
- 1b: Click on the **paste name** menu item in the **options** sub menu.
Select the name you want by clicking on it. Then click on the **OK** icon to paste it into your formula.

Cell Ranges

Some functions in geoCalc operate on cell ranges. For example, the **SUM()** function sums together a range of cells. A **range** is the smallest rectangle of cells that can contain two references. A range is designated by the range operator (:). For example, the range **A1:C3** describes the rectangular area containing all the cells between columns **A** and **C** and between rows **1** and **3**. The expression **SUM(A1:C3)** is equivalent to **SUM(A1,A2,A3,B1,B2,B3,C1,C2,C3)**. The commas (,) here produce a **union** between two references. For a range reference to be legal, the first cell reference must be the upper left cell in the range, and the second cell reference must be the lower right cell in the range.

The comma (,) and colon (:) are called **reference operators**. The use of reference operators is summarized below:

Reference Operator	What it does
:	Range: Produces one reference to all the cells between the two references.
,	Union: Produces one reference that includes the two references.



Both relative references and absolute references can be used in a cell range reference.

Operators

Besides the **reference operators** described in the previous section, geoCalc has several arithmetic operators and the parentheses that you can use when building a formula.

An **operator** is an instruction, such as + or -, that tells geoCalc to produce a new value from existing values. For example, in the formula =4+3, the addition sign (+) is the operator that instructs geoCalc to add the operands 4 and 3 and produce the value 7.

Some operators act on two operands; others act on one operand. For example, in the formula =3%, the percent sign divides the operand (3) by 100 to produce the value 0.03.

Operands (and most function arguments) should be either single values or references to single cells. In a formula, if you specify a reference to a row

or column of cells that should be a reference to a single cell, geoCalc puts up an illegal formula dialog box and forces you to change the reference.

Arithmetic Operators

The arithmetic operators perform basic mathematical functions. They combine numeric values and produce numeric results. The arithmetic operators in geoCalc are:

sign	description	decimal places of accuracy
+	Addition	12
-	Subtraction	12
-	Negation (one operand only)	12
*	Multiplication	12
/	Division	12
%	Percent	12
^ (up arrow key)	Exponentiation (raise a number to a power)	9

NOTE: Negation is effective on numerical operands only. geoCalc does not accept negation of cell references.

Parentheses

In addition to the arithmetic and the reference operators a special set of operators, parentheses (), are used in geoCalc to alter the standard order of priority of the arithmetic operators or to enclose the arguments of a function.

Order of Operations

If you combine several operators in a single formula, geoCalc performs the operations in this order:

-	Negation
^ (up arrow)	Raise a number to a power
%	Percent
* or /	Multiplication or Division
+ or -	Addition or Subtraction

If you want to alter this order use parentheses to group expressions in your formula. geoCalc first calculates the expressions in parentheses and then uses the results to calculate the formula. For example:

$$6*2+5=17$$

$$6*(2+5)=42$$

Entering Formulas

A **formula** calculates a new value from existing values. A formula can consist of operands, arguments, operators, functions, and parentheses. The operands and arguments you can use in a formula can be:

- Numbers
- References
- Names
- Functions

An **operand** in a formula is the number, reference, or name on which a mathematical operation is performed.

An **argument** in a formula is information used by a function to produce a new value. Arguments can be any value, reference, or name, or can themselves be formulas containing functions and operators. Arguments appear between parentheses following the function name and are separated by commas.

A formula can be as simple as =A1+A2, which adds the values of cells A1 and A2. Or, a formula can be complex:

$$= \$B5 + (3\% * 26.7 / \text{TAN}(\text{Theta}))$$

In the above example the name Theta acts as the argument for the function TAN. 3 is an operand of the percent (%) operator, and both together with 26.7 are operands of the multiplication (*) operator.

Build a Formula

You build a formula for a cell by typing or by using the mouse or joystick.

Whenever you want to build a formula, start by typing an equal sign (=). Finish the formula by pressing the **RETURN** key or by clicking on the enter icon.

To build a formula:

- 1: Type an equal sign (=). It will appear in the edit bar.

2: Type the formula into the edit bar.

NOTE: You can enter cell references by typing or by selecting the cells with the mouse or joystick. If you have not typed an operator in the formula before you select the cells, geoCalc supplies the addition operator (+). If the cell reference is the first item that appears in the edit bar, then geoCalc inserts an equal sign (=).

3: Press the **RETURN** key or click on the enter icon to enter the formula.

When you enter a reference to a cell by clicking on it, geoCalc inserts a relative reference to that cell in the formula.

To enter an absolute reference to a cell in a formula, type it into the edit bar. For more information on absolute and relative references, see the earlier section, **Cell References**.

You can include functions and names in a formula by pasting them into the edit bar with the **paste function** and **paste name** menu items located in the **options** sub menu. Or you can type them in. For more information see the sections "Functions" and "Names" later in this chapter.

If you make a mistake while you are building a formula, you can always use the **restore** icon to get the previous contents of the cell back.

To cancel a formula:

Click on the **restore** icon (the X). geoCalc cancels the formula and restores the previous contents of the edit bar.

All calculations are made automatically when a formula is entered. If the value of a cell that is referenced in a formula is changed, then that formula is automatically recalculated.

Circular References and Iteration

Circular references occur when two or more cells in your worksheet are either directly or indirectly dependent on each other. The most obvious type of circular reference occurs when you build a formula in a cell that contains a reference to that same cell. For example, if you enter a formula such as:

=B2+A1

in cell A1 on your worksheet, geoCalc will not be able to solve this

formula no matter what values are in the cells, or how many times it is calculated. Instead geoCalc will display a reference error, "***REF***", in A1.

There are, however, other types of circular references that can be solved with geoCalc by using a process known as iteration.

Iteration is a repeated calculation on a spreadsheet until some condition is met. Whenever geoCalc runs into a circular reference, it will iteratively calculate and recalculate the formulas within the loop until you tell it to stop. This form of formula resolution can be very useful for solving some types of problems that cannot be resolved in a straight forward manner.

Let's say that you enter the following values and formulas into the cells indicated and in the order indicated:

A1	=A2+A3
A2	=.5*A1
A3	100

The values for A1 and A2 are dependent on each other. Notice that this dependency is set up right after the formula in A2 is entered. geoCalc recognizes that the result of the formulas in A1 and A2 remain the same after the calculation (each equals zero) and therefore stops recalculation. When the value for cell A3 is entered, however, a new value for cells A1 and A2 is produced for each new calculation. The following table summarizes how the values change with each iteration:

<u>Iteration Number</u>	<u>A1</u>	<u>A2</u>	<u>A3</u>
-	=A2+A3	=.5*A1	100
1	0	0	100
2	100	50	100
3	150	75	100
4	175	87.5	100
5	187.5	93.75	100
6	193.75	96.875	100
7	196.875	98.4375	100
8	198.4375	99.21875	100
9	199.21875	99.609375	100
10	199.609375	99.8046875	100

Notice in the above example that the result in cell A1 approaches 200 and the value in cell A2 approaches 100. Eventually both cells will converge on 200 and 100, respectively. If and when a formula in a circular reference converges to a single value, geoCalc will automatically stop calculation; if the formulas in an iteration loop don't converge after approximately 300 cycles, then geoCalc will also automatically stop calculation. At any time, however, you can stop calculation by pressing the cancel key sequence **⌘ RUN/STOP**). This will cancel calculation until any formula involved in the iteration is modified.

If you want to iterate a previously entered formula, make the cell containing the formula active by clicking on it, and then modify the formula in the edit bar in some way. Typing a space at the end of the formula will be enough of a change. Now reenter the formula by clicking on the enter icon. The value in the cell will be recalculated.

Convergence and Divergence

The above example of a circular reference is an example of convergence, or the process by which the difference between values from one iteration to the next become smaller and smaller. As stated above, the values contained in cells A1 and A3 would get closer and closer to, or converge on, the numbers 200 and 100, respectively.

A divergence occurs when the difference between values from one iteration to the next becomes larger and larger. In the above example, if you had entered $=5*A1$ as the formula in A2, the values in A1 would grow larger and larger (diverge) after each iteration.

Circular references that diverge are typically not very useful to calculate since the values do not approach any particular number but simply get larger and larger.

Functions

Functions are a convenient way to perform large or complex calculations. Think of functions as a kind of short hand that simplifies computations that would be very difficult, or sometimes nearly impossible, to express as formulas.

A function is like an operator: it is an instruction that takes values as arguments to produce a new value. Some functions, like FV (future value), perform calculations on more than two values; some functions, like COS (cosine), perform calculations that can't be done easily with arithmetic operators alone; and some, like ABS (absolute value), convert one value into another.

A function has two parts: its name and its arguments enclosed in parentheses. You can include function names in a formula by typing them or by pasting them.

To paste a function into the edit bar:

- 1: Click on the place in the edit bar in which to paste a function. The text cursor moves to this place.
- 2: Click on the options menu item in the **command** menu. A sub menu appears.
- 3: Click on the **paste function** menu item in the **options** sub menu. A dialog box appears containing a list of all of the functions available in geoCalc. Click on one of the arrows at the bottom of the box to see more of the function list.
- 4: Select one of the functions listed by clicking on its name. The name will appear in reverse video to indicate that it is selected.
- 5: Click on the **OK** icon.

geoCalc pastes the function that you selected into the edit bar where the text cursor was located. The text cursor now appears within the parentheses of the function. You can now type in the arguments or a range of cells for the function to operate on. If more than one argument is typed, they should be separated by commas to make an **argument list**.

The following mathematical, statistical, financial, scientific, and trigonometric functions are available with geoCalc.

Mathematical Functions

<u>function and description</u>	<u>digits of accuracy</u>
ABS(<i>number</i>) Absolute value of <i>number</i>	12
INT(<i>number</i>) Integer part of <i>number</i>	12
RAND() Random number between 0 and 1	12
RND(<i>number</i>) Rounds <i>number</i> to nearest integer	12
SQRT(<i>number</i>) Square root of <i>number</i>	9

Statistical Functions

These functions are used with a cell, a constant, single range, series of ranges, or a combination of these as arguments. For example:

=MAX(A1:D10,E11:H27,I2,23).

<u>function and description</u>	<u>digits of accuracy</u>
AVG(<i>argument list</i>) Average of values in <i>argument list</i>	12
MAX(<i>argument list</i>) Maximum of values in <i>argument list</i>	12
MIN(<i>argument list</i>) Minimum of values in <i>argument list</i>	12

SUM(*argument list*)
 Sum of values in *argument list* 12

Financial Functions

function and description

digits of accuracy

FV(*payment, term, rate*) 9
 Future value of series of equal *payments*, invested at a certain interest *rate*, over a specific *term*

PMT(*principal, term, rate*) 9
 Single loan payment, based on a particular *principal*, per term of the loan, and period interest rate

PV(*payment, term, rate*) 9
 Present value of a series of equal *payments*, invested at a certain interest *rate* made over a *term* of payment

RATE(*final value, principal, term*) 9
 Interest rate of a loan based on a particular *principal*, *final value* (or sum of the payments), and over a specific *term*

TERM(*final value, rate, payment*) 9
 Term of a loan of equal *payments*, at a certain interest *rate* with a certain *final value* (or sum of payments)

Scientific Functions

function and description

digits of accuracy

EXP(*number*) 9
 The value *e* raised to the *number* power

LN(*number*) 9
 Log of *number*, base *e* (natural log)

LOG(*number*) 9
 Log of *number*, base 10

PI()
The number π=3.14159...

12

Trigonometric Functions

function and description

digits of accuracy

ATAN(number)
2-quadrant arc tangent of number

9

COS(number)
Cosine of number

9

SIN(number)
Sine of number

9

TAN(number)
Tangent of number

9

NOTE: COS, SIN, and TAN functions accept numbers in radians. ATAN gives results in radians.

Special Function

function and description

digits of accuracy

NA()
Not available flag (*N/A*)

—

Function Descriptions

Mathematical Functions

Math functions are the simplest geoCalc functions.

ABS()

ABS (number or cell reference) returns the absolute value of a number. If the number or value in the argument is positive the ABS function will have no effect. If, however, the argument is negative, the function converts the number in the argument into its positive equivalent. For example, =ABS(-41) is 41. =ABS(41) is simply 41.

INT() and RND()

INT(number or cell reference) converts a decimal number into the greatest integer contained in that number. (Integers are always whole numbers, not fractions or decimals.) For example, =INT(14.65) is 14. =INT(14.2) is also 14.

The RND function on the other hand, rounds a decimal number to the nearest integer. For example, =RND(14.65) is 15. =RND(14.2) is 14.

The Difference Between Number Formats and RND()

It is important not to confuse the difference between number formats (see **Formatting Numbers**) and the RND function. Number formats affect the way in which a number is *displayed*, while RND actually changes the number. For example, =RND(14.65) is 15. If you choose the format 0.00 the number displayed is 15.00. If, on the other hand you format the number 14.65 in a cell to display no decimal places, it appears as 15. If you change the format of the cell later to include two decimal places, the number 14.65 is displayed.

RAND()

The RAND function generates a random number between 0 and 1. This function does not accept an argument.

SQRT()

The SQRT function computes the square root of a number. For example, the function:

=SQRT(16)

returns the value 4. If the value passed is negative, the function gives you a *RANGE* error.

Statistical Functions

geoCalc also includes some statistical functions that allow you to compute statistics on a range of cells. A range of cells can also be thought of as an argument list.

AVG()

The AVG function computes the arithmetic mean of a range of numbers. The arithmetic mean is commonly called the average, or just the mean. This value is computed by adding the numbers in a range and dividing this sum by the number of entries in the range. For example, the function:

=AVG(9,4,8)

returns the value 7. You can also reference a cell range like A2:D5 as your argument.

MAX() and MIN()

The MAX and MIN functions return the maximum and minimum values of a range of cells or numbers. The form of these functions is:

=MAX(range)

=MIN(range)

SUM()

The SUM function is used to compute the total sum of a series of numbers. Usually this function is used to compute quickly the sum of all numbers in a specific range.

NOTE: The arguments of these statistical functions can be either a range of cells (A1:D4), constants (1,3,5), a series of individual cells (A1,B3,C4,D5), a series of ranges (A1:D4,F5:J10), or a combination of these.

Financial Functions

Financial functions allow you to perform financial computations like present and future value without the use of long or complex formulas.

PV()

The PV function computes the present value of a constant stream of payments. This constant stream of payments is also known as an ordinary annuity.

In order to compute the present value of an ordinary annuity, you need to know the term of the annuity (the number of payments you will receive), the amount of each payment, and the interest rate that will be used to compute the present value. The interest rate is also known as the discount rate. The form of the PV function is:

`=PV(payment,term,discount rate)`

The payment amount and term of an ordinary annuity are facts, or are given, so it is easy to put these numbers into the function. Selecting a discount rate is not as easy. In order to understand how to select a discount rate, first look at what is meant by the present value of an investment.

Present Value: What Does It Mean?

Present value is useful in determining the suitability of a particular investment. Suppose that someone offers to pay you \$1.04 one year from today if you give them \$1.00 today. Would this be a good investment? Probably not since you could put the the same \$1 in a certificate of deposit for a year at an annual rate of 7% and receive \$1.07 after a year. The difference here would be three cents, and after all, three cents is three cents.

Now let's say that you wanted to analyze this problem using the concept of present value. The above problem could be stated like this: "I want an investment to have a rate of return of at least 7%. What is the present value to me of an investment paying one payment of \$1.04 after a year?" The fact that you want an investment to return at least 7% before it is attractive to you is a threshold.

Now compute a present value using the PV function available in geoCalc. Enter the function:

`=PV(1.04,1,.07)`

into a blank cell on your worksheet. Enter the interest rate as a decimal (.07), or as a percent (7%). When you enter this formula a value of ~.9720 (the symbol ~ means approximately) should appear in the cell. (Increase the width of the column if three number signs (###) appear instead of a value.) This number is the present value of this simple ordinary annuity. Since the present value of this annuity, ~.9408, is less than one, the original price you have to pay for the annuity, this is not an attractive investment. You could also say that the present value of the investment is less than the cost of the investment.

NOTE: Be sure that the discount rate you choose matches the spacing of the payments in the annuity. For example, suppose you want to compute the present value of an annuity that will pay you \$50 per month for 24 months. Suppose as well that your desired, or threshold, discount rate is 9%. Since your payments are to be spaced one month apart to properly calculate the present value, you will need to convert 9%, which is an annual rate, to a monthly rate. To do this, divide the annual rate by 12. The result, .75%, is the correct monthly discount rate. Enter .0075 as the last argument in your PV function (or .75%).

The formula used for PV() is:

$$\text{PV}(\text{payment}, \text{term}, \text{rate}) = \text{payment} * [(1 - (1 + \text{rate})^{-\text{term}}) / \text{rate}]$$

PMT()

If you know the present value, the interest rate, and the term of a loan, and you want to compute the payment, use the PMT function. The form of PMT is:

$$=\text{PMT}(\text{present value}, \text{term}, \text{interest rate})$$

The present value here can also be thought of as the principal.

As an example of how PMT works, let's say that you want to buy a car and plan to finance \$10,000 of the purchase price over five years. If the current annual interest rate for a five year car loan is 15%, what would your monthly payment be? The form for this problem is:

$$=\text{PMT}(10000, 5*12, 15\%/12)$$

The principal is the amount of the loan, \$10,000; the term is 12 (months per year), times 5 (years), or 60; the interest rate is 15 (% per year), divided by 12 (months per year), or 0.0125.

After entering this function you should get an answer of \$237.90 (format the cell to display the answer in dollars and cents), which is the monthly payment.

The formula used for the PMT() function is:

PMT(present value, term, rate)
= present value * [rate / (1 - (1 + rate) ^ -term)]

FV()

FV computes the future value of a stream of payments. The form of FV is:

=FV(payment,term,interest rate)

Future value is used to compute the amount of money that you will have in the future if you regularly invest a certain amount at a certain interest rate. For example, if you invest \$100 a month at 9% interest, how much will you have after 4 years? To solve this problem, enter the following into an empty cell on your worksheet:

=FV(100,48,.0075)

The payment is \$100 per month for a term of 48 months (12 months per year times 4 years) at .0075 per term (9% per year divided by 12 months per year).

NOTE: You can either enter numbers, cell references, or formulas (without an = sign like 5*6) as arguments in a function.

The answer you should get is \$5,752.07 (after you format the cell to display dollars and cents). The formula used by the FV() function is:

FV(payment, term, rate)
= payment * [(1 + rate) ^ term - 1] / rate]

RATE()

The RATE function computes the interest rate (rate of return), of an investment if you already know the present value, future value, and the term. The form of the RATE function is:

`=RATE(future value,present value,term)`

For example, let's say that you are told that you will receive \$1,500 in 3 years if you invest \$1,000 today. What is the annual rate of return of this investment? To solve this problem, enter the following function into an empty cell:

`=RATE(1500,1000,3)`

The number displayed in the cell after you have entered this formula is ~.1447, which corresponds to an annual interest rate of 14.47%. The formula used for the RATE() function is:

`RATE(future value, present value, term)`
 $= [(future\ value / present\ value) ^ (1 / term)] - 1$

TERM()

You can also determine the term of an investment made up of a series of regular payments if you know the future value, the interest rate, and the amount of each payment. The form of the TERM function is:

`=TERM(future value,interest rate,payment)`

Let's say that you want to know how many years it will take an investment of \$500 per year to grow to \$10,000 at an annual interest rate of 10%. Enter the following function into an empty cell on your worksheet (remember not to put commas inside your arguments; enter 10000, not 10,000):

`=TERM(10000,10%,500)`

The term calculated is ~11.53, or about 11 and a half years. The formula used for the TERM() function is:

`TERM(future value, rate, payment)`
 $= [LN(1 + (future\ value * (rate / payment)))] / LN(1 + rate)$

Scientific Functions

geoCalc includes a number of scientific functions that are of use to scientists and engineers.

LN()

LN computes the natural, or base e, logarithm of the number or cell reference in the argument. This function has the form:

`=LN(number, cell reference, or another function)`

For example the function `=LN(2)` returns the value $\sim.6931$. The argument must be a number greater than zero or a *RANGE* error value will appear in your cell.

EXP()

The EXP function computes the value of the constant e (about 2.71828), raised to the power specified by the function's argument. For example, `=EXP(2)` returns the value ~ 7.389 , or 2.71828 times 2.71828.

EXP is the inverse of the LN function. For example, the function `=LN(EXP(10))` returns the value 10.

LOG()

LOG computes the base 10 logarithm of the number or cell reference in the argument. The function has this form:

`=LOG(number or cell reference)`

For example, the function `=LOG(100)` returns the value 2.

PI()

The function PI always returns the value of the constant pi (π), accurate to 12 decimal places, or 3.14159265359. PI is one of the few geoCalc functions that takes no argument.

Trigonometric Functions

The trigonometric functions included in geoCalc are cosine, sine, tangent, and arc tangent.

COS()
SIN()
TAN()

These functions compute the cosine, sine, and tangent, respectively, of the number or cell reference in the argument. geoCalc accepts arguments for the trigonometric functions in radians.

What are Radians?

Radians are a way to measure angles. Degrees are another way to measure angles. Radians are convenient to use in trigonometric functions because they are based on the constant pi (π). For example, a right angle of 90 degrees can also be expressed as $\pi/2$, or ~ 1.57 radians. 360 degrees is the same as $\pi * 2$, or about 6.2831 radians. Use the following formula to convert degrees into radians:

$$\text{radians} = \pi/180 * \text{angle measure in degrees}$$

Similarly:

$$\text{degrees} = 180/\pi * \text{angle measure in radians}$$

ATAN()

The function =ATAN computes the arctangent of the value in the argument. Think of ATAN as "the angle whose tangent is (the argument)". For example, the function =ATAN(1) has a value of $\pi/4$, or $\sim .785$.

Deriving Functions

geoCalc has the basic trigonometric functions built in. If, however, you need one that is not predefined, then you can derive it using the functions that are predefined.

Inverse Sine:

$$\text{Arcsin (number)} = \text{ATAN}(\text{number}/\text{SQRT}(-\text{number}*\text{number}+1))$$

Inverse Cosine:

$$\text{Arccos (number)} = 0-\text{ATAN}(\text{number}/\text{SQRT}(-\text{number}*\text{number}+1))+1.5708$$

Secant:

$$\text{Sec}(\text{number}) = 1/\text{COS}(\text{number})$$

Cosecant:

$$\text{Csc}(\text{number}) = 1/\text{SIN}(\text{number})$$

Cotangent:

$$\text{Cot}(\text{number}) = 1/\text{TAN}(\text{number})$$

Special Function NA()

The NA() function can be used to flag a cell that you do not have a value for. When this is done, all cells that have a reference to this cell will also return the NA flag. The NA flag can help you to keep your worksheet cleaner and more organized.

Formula Errors

There are four different types of errors that can occur while information is entered into a geoCalc document. These are:

User Errors:

A user error occurs when the user has entered illegal data into a cell. geoCalc will display a dialog box alerting the user to the error. The error must be corrected before the data can be entered into a cell.

Value Errors:

A value error occurs when a legal formula results in an illegal value. The formula is entered into the cell, but an error message will be displayed in the cell. geoCalc will beep to draw your attention to the error.

Internal Errors:

An internal error is extremely rare, and, in fact, you probably will never be faced with one. They can occur if a particular formula overruns the internal space allocated for it.

Fatal Errors:

Fatal errors are also extremely rare. They can occur only with a very large worksheet or with a very dense worksheet.

What follows is a list of possible errors and what to do if they occur.

User Errors:

Illegal Function

The formula contains an undefined function. If this happens, remove the function in question.

Illegal Formula

The formula itself is illegal. This might result from several things: illegal operator syntax ($5*6+3$), incorrect number of arguments in a function ($\text{SIN}(5,4,A5)$), or other errors. If this happens, correct the illegal part of the formula.

Undefined Name

A name was used that had not been defined. Remove the name in question.

Value Errors:

Out of Range (*RANGE*)

During calculation of the formula, an illegal value (too large, too small, negative when it should have been positive, etc.) was encountered by geoCalc.

Illegal Reference (*REF*)

A cell containing an illegal value (such as a cell with text) was referenced in a formula.

Division By Zero (*DV/0*)

Division by zero was required by the formula. Division by 0 is an undefined mathematical operation.

Not Available (*N/A*)

A cell was referenced in a formula that contained the $\text{NA}()$ function or "flag."

Internal Errors:

Stack Overflow

One of the internal stacks overflowed (ran out of memory space). If this happens, use a shorter formula.

Buffer Overflow

An internal buffer overflowed (ran out of memory space). If this happens, use a shorter formula.

Fatal Errors:

Out of Memory (very rare)

Too much information (extremely long formulas, many, very long text entries) was put into one 16 by 16 block of cells in your worksheet. If this happens the program quits to the deskTop and may not have saved the most recent changes to the worksheet.

If, however, you have recently updated your worksheet before the error message appears you will be able to recover most of your data.

Out of Disk Space:

There was no more room to put data on the disk. geoCalc requires at least 8.5K bytes of free memory to be able to run. Remove files on the data disk to continue to use geoCalc.

Editing Your Worksheet

After you have entered information into your worksheet, you can add to it or change it, delete or clear it, copy it, or move it to another location on your worksheet.

Adding or Changing Information

Change Information

You can replace the entire value or formula in a cell by selecting the cell and then typing the new information. When you click on the enter icon, this new information will be entered into the cell and will appear on your worksheet.

You can change part of the information contained in a cell by clicking in the edit bar after that portion of information that you want to change. This inserts the text cursor into the edit bar. Now you can backspace over the unwanted information by pressing the **INST/DEL** key once for each unwanted character. Type in any new information and click on the enter icon to enter the new information into the cell.

You can also use the **cut**, **copy**, or **paste** menu items in the edit sub menu to replace the information contained in cells. (You cannot, however, cut, copy, or paste directly into and out of the edit bar.)

Add information

To add information to a cell, first select it, and click in the edit bar after the last character in that cell. Now type the additional information. When you click on the enter icon, the information will be added to the cell and will appear on the worksheet.

You can add cell references into a formula by clicking on those cells after having typed an equal sign (=) into the edit bar. geoCalc automatically inserts a plus sign (+) before the cell reference (+B3) unless you have typed in a different operator before you click on the cell.

Clearing Information

Use the **clear** menu item in the edit sub menu to clear the contents of a cell (formula or value including format) or a selection of cells.

NOTE: If you want to clear the formulas and values from an entire worksheet, it is easier and quicker to just create a new worksheet and delete the old one from the deskTop.

Copying Information

If you need to put the same formulas or values into several columns or rows on your worksheet, you can use the **copy** menu item in the **edit** sub menu. First, select the cell or cells that you want to copy. Then click on the **copy** menu item. The information in these cells will be copied into a **calc scrap**.

A calc scrap can be pasted anywhere on your worksheet by selecting the cell where you want the paste to begin and then clicking on the **paste** menu item in the **edit** sub menu. The calc scrap will be pasted into this portion of your worksheet and appears exactly the same way as the original copy.

You can also paste a calc scrap into a selection of cells. If your selection of cells is a different size or shape than the original scrap, geoCalc will try to fit the scrap in as well as it can. It is important to remember, however, that geoCalc pastes calc scraps by columns. So a column of values such as:

April
June
Apples
Bananas

when pasted into a 2 by 2 rectangle, will appear on the worksheet as follows:

April	Apples
June	Bananas

Moving Information

Moving information on your worksheet is accomplished in a fashion similar to copying information except that you use the **cut** menu item in the **edit** menu rather than the **copy** menu item to create a calc scrap. You can then paste this scrap into another part of your worksheet following the instructions above for copying information.

NOTE: When you cut or copy cells from one place to another in your worksheet, the relative references in the paste area refer to different cells than they refer to in the copy/cut area.

Calc scraps can also be used to transfer data from one worksheet to another. Copy or cut the data from the source worksheet, close the file, open the destination worksheet, and then paste the calc scrap into the desired area.

Change the Appearance of Your Worksheet

The value of a cell and how geoCalc displays that value within a cell are different. The value of a cell is determined by its **formula** or **constant**. How that value is displayed is determined by the **format** of the cell. A cell must have data in it or dependencies on it before it can be formatted.

You can change the appearance of a worksheet in a variety of ways without affecting formulas or values in cells. When you change the format of a cell its value does not change. geoCalc displays the value of the cell in the new format.

The format choices available in the **format** menu item of the **display** sub menu let you determine how geoCalc displays your values. Let's say that you want to display your numbers in decimal, dollar, or scientific notation. Or you want them displayed in *bold-italic* style. The geoCalc **display** sub menu has the commands that you need to do this.

Change Column Width

When you first create a geoCalc worksheet, each column is 11 spaces wide. (11 spaces is not necessarily 11 characters because characters take up a varying amount of space.) As you fill in your worksheet, you may need to show information that will not fit into this standard column width. You can change the width of any of the columns so that they are anywhere from 4 to 49 spaces wide.

One way that you can change the width of a column is to move the pointer to the right border of the column heading. The pointer turns into a double sided arrow. If you click the mouse/joystick button and hold it down, you will see that the column border appears to be in motion. You can now drag the border left or right until you have the width you want.

Another way that you can change the width of a column is with the **width** menu item in the **display** sub menu. First, select one or more columns whose width you want to change. (You can select any cells in a column, not just the column heading.) Now click on the **width** menu item in the **display** sub menu and type in the width, in number of spaces, that you want that column or columns to be. You can also select the default, or standard width which is approximately 11 spaces. Press RETURN to enter the column width.

Align Values

Initially geoCalc aligns text to the left in a cell, numbers to the right, and error values in the center.

To change the alignment of values:

- 1: Select the cells you want to align.
- 2: Click on the **alignment** menu item in the **display** sub menu. A dialog box appears.
- 3: Click on one of the options in this dialog box.
- 4: Click on the **OK** icon.

You can align values to the left, right, or in the center.

Formatting Numbers

How a number is displayed in a cell is determined by the number format of the cell.

NOTE: No matter what format is used, if a column is not wide enough to contain all of the digits in a number, geoCalc will display the **overflow flag** ("# # #") in the cell. This lets you know that you must widen that column in order to see all of the digits.

When you create a new worksheet, all cells have General formatting. In the General format, geoCalc displays numbers as precisely as possible up to 12 digits. geoCalc uses scientific notation if the number has more than 12 placement digits.

You can change the format of a number in a cell with the **format** menu item in the **display** sub menu.

To choose a number format:

- 1: Select the cells that you want to format.
- 2: Click on the **format** menu item in the **display** sub menu. A format list appears. Click on the arrows at the bottom of the box to see more of the list.
- 3: Select a format from the list.
- 4: Click on the **OK** icon.

The following table shows the geoCalc number formats and what geoCalc displays for each one:

<u>If you choose</u>	<u>and enter</u>	<u>geoCalc displays</u>
0	1234.567	1235
0.0	1234.567	1234.6
0.00	1234.567	1234.57
0.000	1234.567	1234.567
0.0000	1234.567	1234.5670
#,##0	1234.567	1,235
#,##0.00	1234.567	1,234.57
\$#,##0 (\$#,##0)	1234.567	\$1,235
	-12.34	(\$12)
\$#,##0.00 (\$#,##0.00)	1234.567	\$1,234.57
	-12	(\$12.00)
0%	0.12345	12%
0.00%	0.12345	12.35%
0.00E+00	1234.567	1.23E+03
0.000000000000E+00	1234.567	1.234567000000E+03

Change Type Style

You can have the values in cells appear in **bold** or *italic* as well as in plain text on your worksheet.

To change the type style in cells:

- 1: Select the cells that you want to change to a different style.
- 2: Click on the **style** menu item in the **display** sub menu. A dialog box appears.

- 3: Click on the **bold**, *italic*, or *both* options.
- 4: Click on the **OK** icon.

The type style in the selected cell or cells will change to the style that you chose.

Split the Screen

You can split the screen so that you can see two different portions of your worksheet at once.

To split the screen:

- 1: Click on the split screen icon located in the lower left-hand corner of the worksheet. The pointer turns into a vertical double arrow.
- 2: Move the double arrow up over one of the row heading borders where you want to split the screen.
- 3: Click to split the screen. Initially the lower screen is the **active screen**. The active screen is indicated by its having a box with horizontal lines in it (**screen indicator**) located in the upper left-hand corner of the worksheet. The screen that has this indicator is the active screen.

You can now scroll, enter information, cut, and paste within the active screen while having another portion of your worksheet constantly in view. Any changes that you make, however, will affect the same cells in both screens because the split screen is not two separate worksheets, but simply two separate views of the same worksheet.

Switch the active screen back and forth by clicking anywhere in the visible part of the screen within which you want to work.

To un-split the screen, click again on the split screen icon. You will return to the view of one portion of your worksheet.

Print Your Worksheet

Before you try to print your worksheet, make sure that your printer is properly hooked up and turned on. (See your GEOS User's Manual for information on how to set up your system to print GEOS documents, such as a geoCalc worksheet.)

To print out your spreadsheet:

- 1: Click on the **print** menu item in the **file** sub menu. A print option dialog box appears.
- 2: Select the options that you wish from this dialog box.
- 3: Click on the **OK** icon to begin printing.

geoCalc lets you print out your spreadsheet in either High (quality), Draft, or NLQ (near letter quality) print modes.

NOTE: You can only use the Draft or NLQ modes if your printer supports these options.

You can specify the range of cells that you want to print by selecting that range on your worksheet or by typing the range into the dialog box. If you do not specify a range (i.e., the active cell is the only selected cell), geoCalc will suggest a range to be printed which will be a rectangle of cells on the worksheet that will take in all of the cells that have any entries or dependencies in them.

You can also choose to print using computer paper (tractor fed paper) or single sheets. If you choose to print on single sheets of paper, you must click on the **OK** icon after inserting each sheet.

Finally, you can choose to print the worksheet grid lines and/or column and row headings, or not, as you wish. Whenever the **print** menu item is selected, the current version of your worksheet will automatically be saved to disk.

Whatever geoCalc print options you choose will be saved on the disk. The next time that you print the worksheet these options will already be chosen. This way you can customize your own geoCalc default print option settings.

geoCalc documents can also be printed from the deskTop by selecting them and then dragging them to the **printer** icon. Refer to your GEOS User's Manual for more information on printing from the deskTop.

Getting the Most out of geoCalc

The geoCalc program divides the total worksheet into blocks 16 by 16 cells in size. There are seven of these blocks going across the worksheet, and 16 going down. Each of these blocks is stored on a separate section of the diskette, and whenever a cell or group of cells in a certain block has something done to it, that block must be brought into the memory of the computer.

With very large or complicated worksheets containing lots of information, there may be times when all of the blocks can not be held in memory at the same time. In this case one block may be "swapped" out of memory to make room for the block you are working on. geoCalc chooses the block to swap based on how long ago it was worked on. Since this swapping of blocks can slow down the operation of geoCalc somewhat, you should try to organize your worksheets efficiently as is suggested below.

First of all, you should try to organize your worksheet to utilize tight blocks of cells (preferably 16 by 16) instead of spreading yourself unnecessarily out all over the worksheet. Try to use 4 to 8 block areas for related parts of a worksheet.

Second, try to make as few cross-block cell references as possible.

The best method of building a geoCalc worksheet is to start in the upper left-hand corner of the worksheet (cell A1) and work your way out in roughly a square area. In very rare cases you may concentrate so much information in single block that you produce an Out of Memory error. Use the 4 to 8 block rule-of-thumb to effectively spread out your work.

Use geoCalc Information in Other GEOS Applications

You may find it useful to copy information from a geoCalc worksheet into another GEOS application such as geoFile or geoWrite. Maybe you want to include your worksheet data in a database you are building in geoFile. Or you might want to give a report you are writing in geoWrite more impact by including a portion of your worksheet as an illustration.

Likewise, you might want to move information from a geoFile database into a worksheet. The mechanism for performing these kind of data transfers between applications are the **copy text scrap** and **paste text scrap** menu items which are located in the **options** sub menu.

Text Scraps and Calc Scraps

Recall from the earlier section **Copying Information** that when you cut, or copy a portion of your worksheet and then paste it back in somewhere else on your worksheet, the type of scrap that you are working with is a calc scrap. Calc scraps are pasted into the paste space (the selection of cells that you choose to paste into) of the worksheet with priority given to columns. This means that the scrap will fill in the paste space in consecutive columns until it has filled the last column. It will then fill in the next scrap sized area below the currently filled in area, and it will continue to fill the paste space in this fashion until the paste space is completely filled.

When you move information into or out of the geoCalc application and your worksheets, however, what you use is a **text scrap** like that used in geoWrite. A text scrap is not pasted into a document with priority given to columns; the priority in a text scrap is given to rows.

Moreover, each entry in a geoCalc worksheet row is separated by a **tab** when it is copied into a text scrap; each row is separated by a **RETURN**. When you paste a text scrap produced by geoCalc into a geoWrite document, the information in the scrap may appear squeezed together unless you do a little pre-formatting to the receiving, or paste, document.

Paste from geoCalc to geoWrite

If you plan on pasting a geoCalc text scrap into a geoWrite document, you should first insert a tab (or decimal tab if you are using geoWrite 2.0) marker on the geoWrite ruler for each column in your worksheet that you are copying and then pasting. (You can insert up to 8 tab markers on a geoWrite ruler.) When you paste the text scrap from geoCalc into this pre-formatted document, the entries under each column should line up properly. You can, of course, insert the tab markers after you have pasted in the scrap.

Paste from geoWrite to geoCalc

If you copy and paste a text scrap from a geoWrite document into a geoCalc worksheet, you will need to insert tabs after each entry that you want to appear by itself in a cell. Line up columns of entries using the same tabs. If you do not use tabs, your text scrap will be pasted into one cell on your worksheet, up to the limit of 200 characters.

Also, you should press the **RETURN** key at the end of each line in your geoWrite document before you copy it into a text scrap. When pasted into a geoCalc worksheet, everything after a **RETURN** will appear on the next row down on your worksheet until the next **RETURN** is reached.

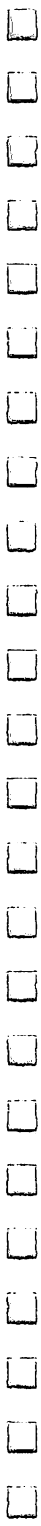


Paste from geoCalc to geoFile

You can only paste a text scrap from geoCalc into a single field in geoFile.

Paste from geoFile to geoCalc

If you wish to copy geoFile data into a geoCalc spreadsheet, follow the instructions for producing a geoFile text scrap contained in your geoFile User's Manual. Basically, the data in each field that is properly arranged and selected on your geoFile form will be pasted into a geoCalc cell.



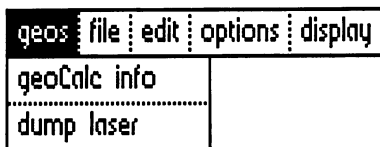
Chapter 5

geoCalc Reference

geoCalc Menu Items

Below is a list of the menu items in geoCalc and what each of them does. Any keyboard shortcuts that can be used to access these menu items appear after the menu item title.

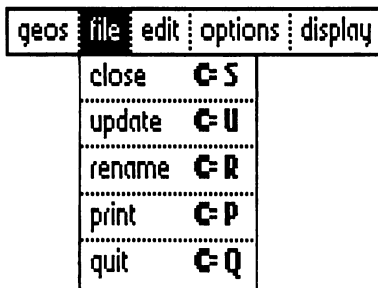
GEOS sub menu



geoCalc info Click on this menu item to display copyright information about the geoCalc program.

(desk accessories) Click on the menu items for any desk accessories that you may have copied onto your geoCalc disk in order to use them while working on a worksheet.



File sub menu





close **C-S** Click on this menu item to close the current file or spreadsheet. The Create/Open/Quit dialog box will appear.

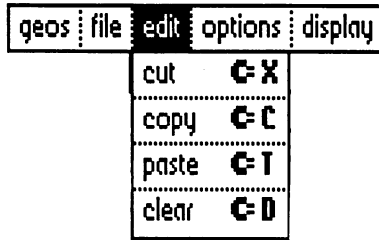
update **C-U** Click on this menu item whenever you want to update or save your worksheet to the diskette.



rename **C-N** Click on this menu item if you wish to change the name of your worksheet. Type the new name into the dialog box that appears and press **RETURN**.



print   Click on this menu item when you want to print your worksheet. The print option dialog box appears. Be sure that your system and printer are set up properly to print GEOS documents.



quit   Click on this menu item when you want to close the worksheet that you are working on and return to the geoCalc deskTop.



Edit sub menu



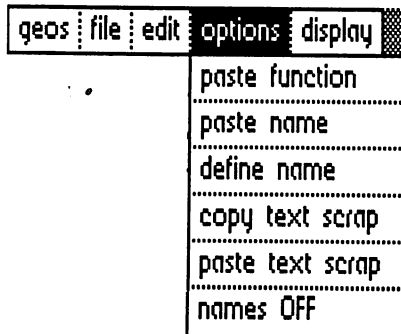
cut   Click on this menu item when you want to cut out a portion of your worksheet into a calc scrap that can be pasted somewhere else in your current worksheet or into another worksheet.

copy   Click on this menu item when you want to copy a portion of your worksheet into a calc scrap that can then be pasted somewhere else in your current worksheet or into another worksheet.

paste   Click on this menu item when you want to paste a calc scrap into your worksheet.

clear   Click on this menu item when you want to clear or delete the values contained in a selection of cells.

Options sub menu



paste function Click on this menu item when you want to paste a geoCalc function into a formula that you are building. A list of the functions available appears from which you can make your selection.

paste name Click on this menu item when you want to paste a name that you have previously defined into a formula that you are building. A list of the defined names appears from which you can make your selection.

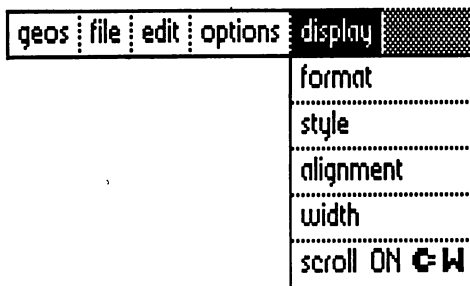
define name Click on this menu item when you want to refer to the value or formula contained in a cell by a name rather than by a cell reference. A list of previously defined names appears to which you can add new names, or edit or delete old ones.

copy text scrap Click on this menu item when you want to copy a portion of your worksheet into a text scrap (rather than a calc scrap) so that you can paste that information into another GEOS application document, such as a geoWrite or geoFile document.

paste text scrap Click on this menu item when you want to paste a text scrap into your geoCalc worksheet.








names OFF/ON Click on this menu item to either display or not display names that you have defined for cell references. geoCalc starts out displaying all names. Names that you have defined for cells, instead of the cell references will be displayed when the **names OFF** menu item is visible in the **options** sub menu.

Display sub menu









format Click on this menu item when you want to set the number format of the values in a selection of cells.

style Click on this menu item when you want to set the type style of the values in a selection of cells. The keyboard shortcuts to change the style of a cell are:



-   - *Italic*
-   - **Bold**
-   - ***Bold-Italic***
-   - Plain Text

alignment Click on this menu item when you want to set the alignment of the values in a selection of cells. The keyboard shortcuts to change alignment are:





-   - Left Justified
-   - Right Justified
-   - Centered







width Click on this menu item when you want to set the exact number of spaces that make up the width of a column or columns on your worksheet.

NOTE: Column widths can only be widened by certain set increments. There are 28 incremental width positions available. This means that when you change the width of a column, the actual width will be the closest incremental width to the one you have chosen.

scroll ON/OFF   Click on this menu item if you want to see and use the scroll indicator. (geoCalc starts out with the scroll indicator off). Use the scroll indicator to move great distances rapidly on your worksheet.

Special Keyboard Shortcuts

Cancel   **RUN/STOP** The cancel key sequence can sometimes be used to stop a long procedure. For instance, suppose that you decide to paste the number 10 into every cell in the spreadsheet, and then you decide that you didn't really want to do that. You can cancel the paste by typing   **RUN/STOP**. Cancel will also stop cutting and copying, as well as formula resolution and iteration.

Mark   This key sequence allows you to quickly select a large group of cells. Click on the first cell in the area to be selected, and mark it with  . Then click on the cell that is to be the cell in the far corner of the selection, and press   again. All cells between the two marked corner cells will be selected.

Dictionary of Terms

A

Absolute reference A reference to a specific cell or group of cells on a worksheet. For example \$B\$3 refers to the cell in the second column, third row.

Active cell The active cell appears on your worksheet with a heavy black border around it. The value or formula of the active cell appears in the edit bar. Any value or formula you type in the edit bar is displayed and entered in the active cell when you click on the enter icon, press the **RETURN** key, or tab.

Active screen The screen on which you can perform work after you have split the screen. If the screen is split, then you can make the inactive screen active by clicking on it.

Active Screen Indicator The active screen indicator (the box with the horizontal lines in it located in the upper left-hand corner of the worksheet) indicates which of the windows is active when the screen is split. If a screen is inactive, then the active screen indicator is white. You can select the entire worksheet by clicking on the active screen indicator.

Alignment The position of a value in a cell on your worksheet.

Argument Information used by a function to produce a new value. Arguments can be any value, single reference, or name, or can themselves be formulas containing functions and operators. Arguments appear between parentheses following the function name and are separated by commas.

B

Border The line around a cell. The active cell has a heavier border than other cells.

C

Calculation The process of computing the value of a formula.

Cancel The cancel key sequence (**⌘** RUN/STOP) enables you to halt some operations. If you get tired waiting for a long cut, copy, paste,

formula resolution, or iteration then you can type the cancel key sequence to discontinue it.

Cell The basic unit of a worksheet where values and formulas are stored. The intersection of each row and column on your worksheet forms a cell.

Cell Reference Box The active cell will be displayed in the cell reference box, which is to the left of the cancel icon in the edit bar. You may scroll the worksheet to a particular cell by clicking inside the cell reference box, typing the cell reference, and then pressing **RETURN**. If you click the mouse outside the active cell reference box before pressing **RETURN**, then the operation is cancelled.

Character Any digit, letter, punctuation mark, or special symbol (such as \$, %, + and so on) that you can type.

Circular reference Two or more formulas that depend on each other for answers. These can sometimes be solved by using iteration.

Click To point to what you want to select or activate and then to press and release the mouse/joystick button.

Column On a worksheet, a vertical line of cells. There are 112 columns labeled A through DH in a geoCalc worksheet.

Column heading The box identifying a column in the worksheet. Column headings are at the top of each column and contain the labels A through DH.

Constant value Anything you enter into a cell, other than a formula. Constant values can be text or numbers.

Contents What you put into a cell. A cell can contain either a constant value or a formula. If a cell contains a formula, geoCalc shows the value that results from calculating the formula.

Convergence During iteration, the process by which the difference between values from one iteration to the next becomes smaller and smaller.

D

Divergence During iteration, the process by which the difference between values from one iteration to the next becomes larger and larger.

Document A geoCalc worksheet that you have saved on a disk.

Double click To point to what you want to select or activate, and then to press and release the mouse/joystick button twice in quick succession.

Drag To hold the mouse/joystick button down while moving the mouse/joystick, and then to release the button. Dragging is a common way to select a range of cells on a worksheet.

E

Edit bar The area in which you type a value or formula. The formula bar displays the constant value or formula contained in the active cell.

Enter icon A small box with a check mark that is located to the left of the edit bar. Click on the enter icon to enter changes. The active cell remains the same after clicking on the enter icon.

F

Format How the contents of cells are displayed. On a worksheet, any cell that has a contents also has a format, which controls the way that the contents are displayed.

Formula A sequence of values, cell references, names, functions or operators that is contained in a cell and produces a new value from existing values.

Function An operator you can use to do a variety of calculations to produce a new value from one or more existing values as arguments. geoCalc has many built in functions.





G

Grid lines On a worksheet, the vertical and horizontal dotted lines between cells.

I

Iteration Repeated calculation on a worksheet until some condition is met. Iteration can be used to solve some circular references.

M

Mark A method of selecting a large area on the worksheet. Press   on the first cell of the area, then press   again on the last cell

of the area (i.e. the two corners of the rectangular area). This will cause all cells in the area to be selected.

Mixed reference A cell reference that uses an absolute column reference and a relative row reference, or vice versa.

N

Name A special kind of label that you define for an absolute or relative reference to a cell or range of cells on the spreadsheet. You can use the name anywhere that you would use the cell reference.

O

Operand In a formula, the number, reference, or name on which a mathematical operation is performed.

Operator A symbol (such as +, -, * and so on) in a formula that instructs geoCalc to produce a new value from existing values. geoCalc operators are used to perform basic mathematical functions or to produce references.

Overflow The overflow flag is used by geoCalc to signal that a number has too many digits to be accurately displayed with the current cell width. The flag will appear in the cell the number occupies until the width is adjusted enough for the number to fit.

P

Point To move the mouse/joystick pointer over a particular spot.

Pointer The small arrow on the screen that tracks the movement of the mouse/joystick.

Program working indicator The small, black horizontal bar icon located at the bottom of the screen. When the indicator appears in reverse video the program is engaged, and no user operations can be performed.

R

Range The smallest rectangle of cells that can contain two references. A range is designated by the range operator (:). For example, the range B2:D4 describes the rectangular area containing all the cells between columns B and D and between rows 2 and 4.

Range Operation An operation that calculates a series of similar calculations on a table of data, where the data in each row or column is used to find the result of the calculation for that particular row or column. A simple example of this might be a table of the total sales in each month for a series of products. The total for each month is the sum of the revenues for each product during that month. This type of table can be calculated by performing a range operation.

Reference A series of characters that describes the location of a cell or group of cells on a worksheet. A reference may include ranges (A1:D4) (A1:D4,F5:G5), individual cells (B3), or a union of cells (A2,A4,A6). You can also define a name to refer to a cell or range.

Relative reference A reference in a cell formula whose relation to the referenced cell is preserved when the formula is copied and pasted. For example, suppose the formula in C3 refers to B1, that is, the cell one column to the left and two columns up. If you copy the formula to D4 it refers to C2, again the cell one column to the left and two rows up.

Restore icon The small box containing an X that is located to the left of the edit bar. Click on the restore icon to discard changes that you might have made in a cell before you started editing the contents of that cell.

Row On a worksheet, a horizontal line of cells. There are 256 rows numbered 1 through 256 in a geoCalc worksheet.

Row heading The box identifying a row on the spreadsheet. Row headings are at the left of each row and contain the numbers 1 through 256.

S

Save To save a permanent copy of a document on your desk. You can save your worksheet by clicking on the **update** menu item in the **file** sub menu, by closing a document, or by quitting geoCalc.

Scroll Box The scroll box allows you to quickly scroll to any part of the worksheet. Select **scroll On** from the command menu, and the scroll box will appear in the lower right corner of the screen. Click anywhere in the box, and the small position indicator will move to the mouse cursor. Click the mouse cursor in the scroll box to the position

on the worksheet you wish to go to. The scroll box can be thought of as a miniature version of the worksheet and the position indicator as the part of the spreadsheet currently being viewed.

Select To specify the item on the screen that will be affected by the next command. Depending on the item, a selection is made by clicking or dragging the mouse/joystick.

Selection The group of cells on the worksheet that the next command will act upon. The selection appears in reverse video (white on black instead of black on white).

Size Edit Bar Icon The size edit bar icon can be used to hide the edit bar if it is extended because of a long entry. It is located in the lower left edge of the screen. Clicking on it once will reduce the size of the edit bar if it is extended and expand the edit bar if it is not extended. Clicking on the icon again will produce the opposite effect.

Split Screen To split the geoCalc worksheet into two parts so that you can work on one portion of your worksheet while keeping another portion in view. Click on the split screen icon, and then drag the double arrows up to a point in the row headings and click again to split the screen.

Split screen icon The small double arrow located at the bottom left of the geoCalc worksheet that you use to split the screen.

Style How your entries appear in the worksheet. You can choose bold, italic or both.

T

Text On a spreadsheet, characters entered in a cell that cannot be interpreted as a number or formula.

Text cursor In the edit bar or dialog box, the flashing vertical line that appears when you click. What you type goes into the edit bar or dialog box at the point of the cursor.

V

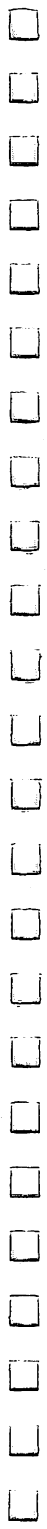
Value In a worksheet, the information in a cell: a constant such as a number or text, or the result of a formula.



W

Window An area on the screen that displays part of a worksheet.

Worksheet The grid of cells 112 columns wide by 256 rows long on which you enter constants and formulas.



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Registration Card

Please complete this card to register for product support and information.

Name _____

Address _____

City _____ State _____ Zip _____

Phone () _____

Place of Purchase _____ Date _____

Name of product purchased _____

What other GEOS products do you own?

Font Pack 1

Writer's Workshop

geoDex

Desk Pack 1

How did you learn about this product?

Computer store display

Magazine article

User recommendation

Magazine ad

Sales person

Other _____

What is your favorite computer magazine? _____

POSTAGE

Berkeley Softworks
2150 Shattuck Avenue
Berkeley, CA 94704