Corvus
LogiCalc
User
Guide

CORVUS

NOTICE

FCC WARNING

The Corvus Concept
LogiCalc User Guide

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INTRODUCTION

Corvus LogiCalc is a powerful spreadsheet program for the Corvus Concept Personal Workstation. LogiCalc is extremely easy to learn and use on the Concept. You will be delighted with the extra-large screen and function keys for most commands.

LogiCalc can be used to produce financial statements, budgets, sales projections and a multitude of other types of reports. You do not have to learn a complicated programming language to use LogiCalc, and you can easily format your reports as you develop them.

We have tried to make this User Guide as simple and easy to use as possible. We hope that you will enjoy using LogiCalc and the Corvus Concept.

HOW THIS USER GUIDE IS ORGANIZED

This User Guide provides complete documentation on LogiCalc. The first six chapters cover the basic features and commands of LogiCalc, starting with elementary concepts. Chapter seven explains the more advanced features of LogiCalc such as linear regression and conditional expressions. Chapter eight covers technical information about LogiCalc. The glossary, list of error messages and an index are found at the end of this guide.

CONVENTIONS USED IN THIS GUIDE

TYPE—The word "Type" is used throughout this guide to mean that two or more characters are to be entered on the Concept keyboard, exactly as shown. Do not add or delete punctuation at the end of the line.

PRESS—The word "Press" indicates that a single character or keytop symbol is to be entered on the Concept keyboard. When a keytop symbol is used, press the key to which it refers. Do not type out the individual letters of the word shown within the keytop symbol.

FUNCTION KEY LABELS are shown like keytop symbols in this guide. These labels correspond to the ten function keys at the top of the Concept keyboard, numbered F1 through F10. The current set of labels is displayed across the bottom of the Concept screen. Each function key may represent up to four functions:

Function 1 - [Function Key]
Function 2 - [SHIFT] + [Function Key]
Function 3 - [COMMAND] + [Function Key]
Function 4 - [COMMAND] + [SHIFT] + [Function Key]

Refer to "The Corvus Concept Personal Workstation User Guide" for a more complete discussion of function keys. Function key instructions in this guide are always given in terms of the label displayed at the bottom of the screen, rather than key number and position.

OTHER MANUALS TO READ AND USE

Basic information about the Concept is presented in "The Corvus Concept Personal Workstation User Guide." Edword, the word-processing program for the Concept, is covered in "The Corvus Concept Edword User Guide." Additional technical information about the Corvus Concept can be found in one of the other reference manuals.

GETTING STARTED | 1

WHAT IS A SPREADSHEET?

A spreadsheet is an organized collection of numbers in rows and columns with identifying labels, forming a table of data. The row-and-column format is used to assemble the information into a set of meaningful relationships. Paper and a pencil are the the only materials you need to make a rough spreadsheet.

The spreadsheet can be used to solve a wide variety of numeric problems. For example, a phone salesman can analyze how many calls were made in a week and how many sales were produced to find the total calls and sales for the week. The average amount per sale can also be calculated. The information might look like this when it is arranged on paper:

Day Of The Week	Number Of Calls	Number Of Sales	Total Amount Of Sales	Average Amount of Sale
Monday	35	5	456	91.20
Tuesday	42	7	586	83.71
Wednesday	24	4	398	99.50
Thursday	36	5	520	104.00
Friday	29	3	465	155.00
Total	133	24	2425	101.04

The rows and columns create a pattern of "cells." Each cell holds one piece of information, a word like "Monday" or a number like "520." If we give each column a letter name and each row a number name, every cell now has a unique column-row name, such as A1, B5, etc.

Spreadsheets done by hand using paper and pencil have some limitations, however. They can require a considerable amount of time to complete, even requiring a pocket calculator for the calculations. If a mistake is made or a change occurs (for example, a sale is cancelled), the entire spreadsheet may need to be recalculated.

LogiCalc provides an easy way to use the spreadsheet to solve problems. A set of rows and columns are set up for you automatically; you simply enter the information. Equations and formulas are solved by the computer and the result displays in the desired location. Best of all, the entire spreadsheet can be changed and then completely recomputed with just a few keystrokes.

HARDWARE AND SOFTWARE REQUIRED

You will need a Corvus Concept Personal Workstation with a complete operating system, plus LogiCalc. The Concept may be either a stand-alone computer or part of a network.

Your Concept must be up and running with the Dispatcher level of function key labels displayed. You should see a function key label marked

[LogiCalc]

which means that the LogiCalc programs have been added to your system. If [LogiCalc] is not displayed, have the System Manager install the LogiCalc programs from the diskettes onto the Disk System.

Directions for installing LogiCalc are found in Chapter 8, "Technical Information."

SELECTING A VOLUME

LogiCalc files are stored in volumes, either on the hard disk or the diskette drive. These files are saved in the current volume, unless another volume is specified. Therefore, it is important that you select a volume with sufficient space to save files. We recommend you select a volume with a minimum of 100 blocks of free space.

If you plan to save files on floppy diskettes, format extra diskettes before using the LogiCalc program. See the "Corvus Concept Personal Workstation Guide" for instructions on formatting diskettes.

NOTE: DO NOT SAVE LOGICALC FILES IN THE /CCSYS OR /CCUTIL VOLUMES.

ENTERING LOGICALC

LogiCalc is entered directly from the Dispatcher level using the [LogiCalc] key. This key automatically loads the LogiCalc programs into memory.

Press [LogiCalc]

After a few seconds, the LogiCalc spreadsheet displays on the screen. This spreadsheet is empty, and looks like this:

Column Headers

Row Headers

Spreadsheet Cursor

Cells

Entry/Edit Area

Command Window

Function Key Labels
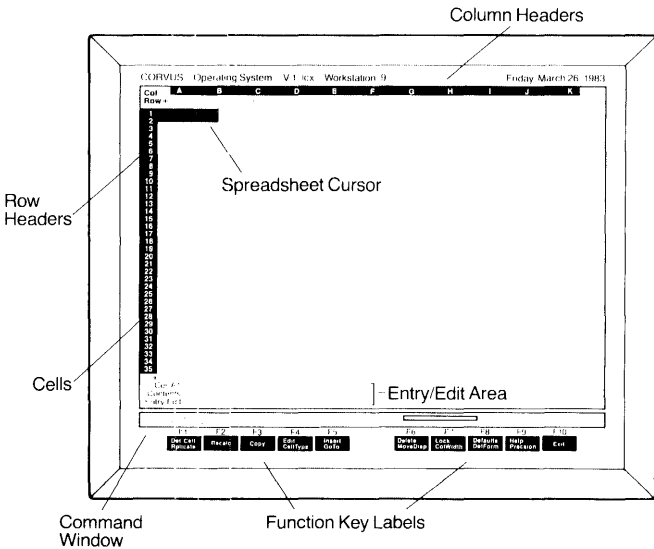
The spreadsheet you see displayed on the screen is actually part of a much larger sheet measuring 127 columns by 255 rows. The screen display might be thought of as a viewing area that can be positioned to display any part of the sheet.

When you enter LogiCalc, the spreadsheet will always be empty. Unlike Edword, LogiCalc does not store a copy of your work, nor does it automatically save a copy when you exit the program.
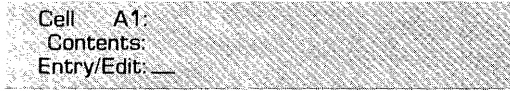
PARTS OF THE LOGICALC DISPLAY

A brief description and explanation of the main parts of the LogiCalc screen display are presented below. Spend a few minutes identifying each part on your screen, so you will be familiar with the spreadsheet display.

Spreadsheet Display	This is the LogiCalc display you will use to construct spreadsheets.
Spreadsheet Cursor	This is the reverse video marker in the top left corner of the spreadsheet. The spreadsheet cursor is used to highlight the current cell.
Column Headers	The Column Headers in reverse video across the top of the screen identify each column. Columns are labeled A, B, C, etc.
Row Headers	The Row Headers displayed in reverse video down the left side of the screen mark each row. Rows are labeled 1, 2, 3, etc.
Cell	Each cell is a location defined by each Column-Row pair on the spreadsheet that can hold an entry. For example, cell A1 is the cell in Column A, Row 1.

Entry/Edit Area	The Entry/Edit area is located below the cells of the worksheet. This is your working area where data is entered or edited. The Entry/Edit area looks like this:

> Cell A1:
>   Contents:
>   Entry/Edit: __
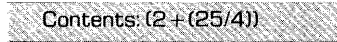
Cell Location Line	The top line shows the current cell. If this cell contains data, the data type and position are shown:

> Cell A1: text:left justified

Cell Contents Line	The second line shows the contents of the current cell when there is data in the cell. Formulas are shown as entered, with the cell location displaying the result. For example, this line might show:

> Contents: (2 + (25/4))

Entry/ Edit Line	The bottom line has two different uses. The first use is to display data as you enter it. The second use shows the contents of a cell for the Edit function. When data is being entered, this line might look like this:

> Entry/Edit: Curren__

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Command
Window

The Command window is the boxed display area below the System window. The copyright notice and version number for LogiCalc appear here when LogiCalc is started. Prompts for commands and functions are shown in this area, as well as error messages. For most responses, a default is shown:

```
load position: A1
```

The Command window is also used for displaying results from the Calculator function:

```
4 + 6 = 10.0000000000000
```

Function
Key
Labels

The labels for the ten function keys are at the very bottom of the screen. You may recall that each function key can have four possible positions:

UNSHIFTED
SHIFTED
UNSHIFTED + [COMMAND]
SHIFTED + [COMMAND]

Many functions have a second level of labels.

THE CONCEPT KEYBOARD

The diagram below shows the Concept
keyboard with the nonstandard keys indicated
and described.
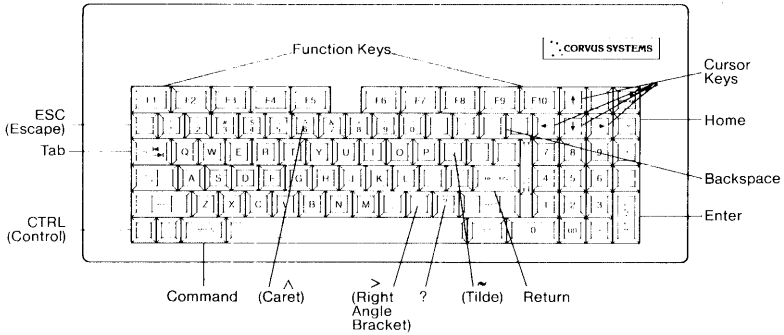
The Concept Keyboard for LogiCalc

[F1] - [F10] LogiCalc has its own set of functions
associated with these keys.

[ESC] The [ESC] key is used to leave certain
operations and return to the main level of
LogiCalc.

[TAB] The [TAB] key is used as an alternate way to
call the GoTo function. It does not perform
the normal tabbing operation.

[CTRL] The [CTRL] key can be used for only two
purposes. The first use, [CTRL] plus the letter
C, produces the same result as the [NextLine]
key of the GoTo function. The second use,
[CTRL] plus the [BREAK] key, performs a warm
boot of the Concept.

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[COMMAND]	The [COMMAND] key is used to display additional function key labels, as explained earlier.
[RETURN]	The [RETURN] key can perform two different operations. The first is to mark the end of an entry on the Entry/Edit line. This stores the data in the current cell location. The second use is to move the cursor to the next cell if there is no data on the Entry/Edit line.
[BACKSPACE]	The [BACKSPACE] key is used to correct typing mistakes on the Entry/Edit line. It is also used in the Edit function to erase data on the Entry/Edit line.
KEYPAD AREA	The keypad area can be used to enter numeric data.
CURSOR KEYS	The four cursor keys are used to move the spreadsheet cursor around the worksheet. In the Edit function, the left and right keys move the Edit cursor, and the Edit cursor, the up key inserts a blank character, and the down key deletes a character.
[HOME]	The [HOME] key moves the cursor to the top left cell of the worksheet.
[ENTER]	The [ENTER] key works the same as the [RETURN] key.
^	The caret key is an alternate key for the [CellType] key. This changes the data type of a cell from text to numeric, and vice versa.

~ The tilde key calls the Cell Comment function. This function is used to link a text comment to a numeric data entry. For more information, see the description of the Cell Comment function.

> The right angle bracket key has two different uses. The most common use is to show a range of cells; for example, to indicate the group of cells A1, A2, A3 ... A10, you would type:

A1>A10

In user-defined expressions and conditional expressions, this symbol is used to indicate "greater than." You would show the condition of B5 greater than B10 in this manner:

B5>B10

? A question mark instead of ⌜RETURN⌝ at the end of formulas activates the Calculator. See Chapter 6 for detailed information.

THE BASICS OF LOGICALC | 2

This chapter provides a brief description of the basics of LogiCalc. You will need to be acquainted with these basics to understand more complex material. Many LogiCalc features initially presented in this chapter will be explained in more detail later in this manual.

THE SPREADSHEET CURSOR

The spreadsheet cursor has two main uses in LogiCalc:

- It marks the current cell where the next entry will appear. This cell location is shown on the Cell Location line in the Entry/Edit Area.

- It is used as a pointer to enter a cell location in a formula or specify a cell coordinate for a function.

The spreadsheet cursor can be moved by four different methods:

Cursor Movement Keys

The four cursor keys are located in the keypad area of the keyboard. The cursor is moved in the direction indicated on the keytop. The cursor will continue to move as long as the key remains pressed.

[HOME]

[HOME] moves the cursor to the cell located in the top left corner of the System window.

[RETURN] or [ENTER]

These two keys are interchangeable in LogiCalc. [RETURN] or [ENTER] is used to enter data into a cell. Typically, the spreadsheet cursor is also advanced to the next cell. Entering just a [RETURN] or [ENTER] will advance the cursor to the next cell.

[GoTo] or [TAB]

[GoTo] or [TAB] is used to start the GoTo function. The GoTo function moves the cursor to the location specified. This location can be specified using the function keys, or by direct entry from the keyboard. For more information on the GoTo function, see Chapter 3.

SCROLLING THE SPREADSHEET

To scroll the spreadsheet, you use the cursor keys to move the spreadsheet cursor to a part of the sheet which is not displayed. The screen will display this new part of the spreadsheet. When you reach one of the four edges of the spreadsheet, scrolling will stop.

LOGICALC DATA TYPES

There are two data types in LogiCalc: numeric data and text data. LogiCalc assigns a data type to each entry based on the first keystroke of that entry. The data type can be changed using the CellType function. You cannot mix numeric and text data within the same cell, but a text comment can be linked to numeric data using the Cell Comment command.

Numeric Data

Numeric data consists of numbers, formulas, expressions and coordinates referencing other cells. LogiCalc interprets any entry that starts with a number, arithmetic operator, or opening parenthesis as numeric data.

When the first character of an entry is an opening parenthesis or a plus sign, the entry is defined as numeric.

Numeric data usually displays as a number with a decimal point and two digits following the decimal point. This is the default setting for decimal precision.

Formulas and expressions are automatically calculated and the result displays in the cell location. If LogiCalc cannot compute the formula, "?n?" displays instead and an error message displays in the Command Window.

Numeric expressions cannot be more than 80 characters long. LogiCalc automatically converts large numbers to exponential notation; i.e., 220,000,000,000 is shown as 2.20e11 (2.20 multiplied by 10 to the eleventh power).

Text Data

Text data can be of three types: regular text, title text, and repeated text. Text data cannot be used in numeric computations.

A regular text entry can be up to 80 characters long, with a maximum of 63 characters displayed in the cell. Any extra characters are stored as the contents of the cell.

Title text is used for title information that may extend across several cell boundaries, up to 80 characters long. Title text must start with /t as the first two characters entered. This is one of the slash commands used to position text, which is explained in more detail later in this guide. Titles are removed from the spreadsheet by deleting the contents of each cell occupied by the title.

Repeated text is text where a single character, or a pattern of characters, is repeated to fill an entire cell. Repeated text is created by starting the entry with /= followed by the characters to be repeated. Repeated text is primarily used to improve the appearance of your spreadsheet by inserting lines of dashes, underlining, etc.

ARITHMETIC OPERATORS

LogiCalc uses these common arithmetic operators:

   **   Exponentiation
   *   Multiplication
   /   Division
   %   Percent
   +   Addition
   −   Subtraction

Here are some examples of these operators:

Operator	Expression	Displayed
Exponentiation	2**4	16.00
Multiplication	3*4	12.00
Division	25/5	5.00
Percent	10%85	8.50
Addition	3 + 4 + 5	12.00
Subtraction	100−93	7.00

WORKING AREA OF THE SPREADSHEET

LogiCalc defines the working area of the
spreadsheet as the rectangle formed by the cell
at the top left corner and the cell at the bottom
right corner of the screen. A simple diagram
illustrates this:

Top Corner   Bottom Corner
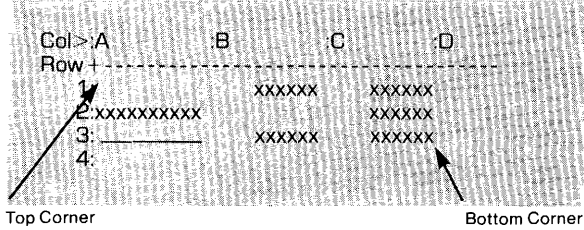
POSITIONING DATA WITHIN CELLS

Data can be positioned within the cells in one
of three different positions by using a specific
slash command as the first two characters
entered:

Command	Position	Example
/L	Left justified	:XXXXX :
/R	Right justified	: XXXXX:
/C	Center justified	: XXXXX :

The letter part of the slash command can be
either upper or lower case, i.e. /C or /c can be
used.

Normally, LogiCalc right justifies numeric data
and left justifies text data when the data is first
entered. The position of data can be
determined by a slash command when the
data is first entered or at a later time.

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BUILT-IN FUNCTIONS

LogiCalc has a number of built-in functions which include:

Calculator	The keyboard is used like a hand calculator in this function, and the results display in the Command Window.
System Functions	You can find the sum, average, count, greatest value or smallest value for a group of numbers and cells with these functions.
Mathematical Functions	These functions include logarithmic and trigonometric functions.

Linear Regression, Conditional Expressions and User-Defined Expressions are covered in Chapter Seven of this manual.

HELP

LogiCalc has a Help label that displays a brief description of all the functions and commands. When you exit the Help function, the LogiCalc spreadsheet displays. For your convenience, the text of the Help file, LC.HELP.TEXT, can be altered using the Edword word-processing program.

EXITING LOGICALC

You can stop work at any point on a LogiCalc spreadsheet and return to the main Dispatcher level on the Concept by pressing ⌷Exit⌷ at the main LogiCalc level.

LogiCalc does not save a copy of your material when you leave the program. You must save any spreadsheet you wish to use at a later time, by using the Save function.

CREATING A SPREADSHEET | 3

This chapter provides a hands-on demonstration of how to create a basic spreadsheet. The entire process is presented as a set of easy-to-perform procedures.

The spreadsheet will look like this when you are finished:
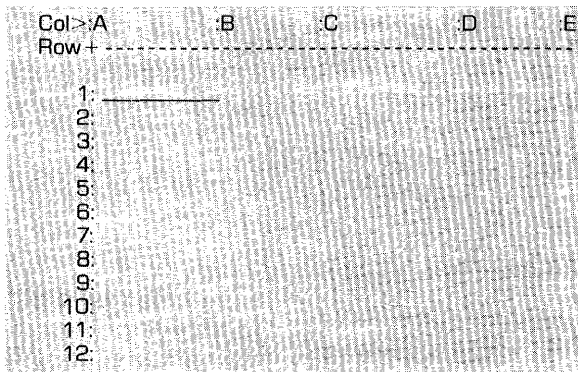
```
Col > A          B        C          D        E
Row +---------------------------------------------
    1:SAMPLE PERSONAL BUDGET
    2:============================================
    3:
    4:ITEM       JANUARY  FEBRUARY   MARCH
    5:-------    -------  --------   -----
    6:Food        255.00    235.00  255.00
    7:Housing     200.00    200.00  200.00
    8:Car         180.00    175.00  185.00
    9:Insurance    65.00     65.00   65.00
   10:Misc.       100.00    100.00  100.00
   11:--------------------------------------------
   12:Total       800.00    775.00  805.00
```

ENTERING THE LOGICALC PROGRAM

First, enter the LogiCalc program.

Press [LogiCalc]

The LogiCalc spreadsheet and the function key labels appear after a few minutes. The empty spreadsheet looks like this:

Now, look at the keyboard for a few moments. Find the function keys, labeled F1 through F10. Next, locate the cursor keys in the keypad area. After this, look for the [TAB] and [COMMAND] keys, then the [RETURN] and [ENTER] keys.

MOVING THE SPREADSHEET CURSOR

This short exercise shows you how to move the spreadsheet cursor around the sheet.

Press [RETURN]

Notice that the spreadsheet cursor has moved one cell over.

Press [ENTER]

Now, use the four cursor keys to practice moving around the spreadsheet. Try to move the cursor off the spreadsheet to the right. When you reach the edge of the sheet, it scrolls automatically so a different part displays.

Press [HOME]

The spreadsheet moves to the cell located in the top left corner. The home position is the top left corner of the displayed portion of the spreadsheet, not the entire spreadsheet.

GoTo can be started using either GoTo or [TAB].

Press [GoTo]

A second level of function key labels displays for the GoTo function.

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Next Col	Next Row	NextCell		NextUnPr					Exit

[NextCol]   moves the spreadsheet cursor to the top cell in the next column to the right.

[NextRow]   moves the spreadsheet cursor to the first cell in the next row down.

[NextCell]   moves the spreadsheet cursor to the next cell, just like [RETURN].

[NextUnPr]   moves the spreadsheet cursor to the next unprotected cell. Protecting and creating a template are explained in Chapter 7.

[Exit]   ends the GoTo function and brings back the main level of labels.

In addition to the GoTo labels, a prompt displays in the Command window showing the cell coordinate A1 as the default choice:

    goto > A1

If you enter any cell coordinate and press [RETURN], the cursor moves to that location. You can also press just [RETURN] and the spreadsheet cursor will move to cell A1. Try using the GoTo function to move the spreadsheet cursor to cell M25.

Press [GoTo]

Type M25
Press [RETURN]

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Now use the GoTo function to return the spreadsheet cursor to cell A1.

Press [GoTo]
Press [RETURN]

When the cursor is back in cell A1, you can begin the next part of this exercise.

ENTERING TITLES

The first entry in the model spreadsheet is the title line. If you make a mistake typing the entry, use the backspace key to erase characters and retype them correctly.

First, define this entry as a title.

Type /T

The Entry/Edit area looks like this:

Cell   A1; text
  Contents:
  Entry/Edit: /T_
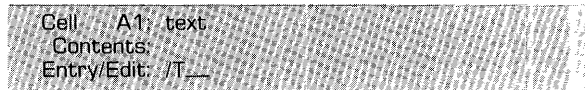
You can see that LogiCalc has defined your entry as text and that it will go into cell A1. The first two characters you have entered display on the Entry/Edit line, with the entry cursor positioned for the next character.

Type SAMPLE PERSONAL BUDGET

As you type each character, it appears on the
Entry/ Edit line. Use the backspace key to
reposition the cursor if you make a mistake.
Do not use the cursor keys because these
move the spreadsheet cursor during data
entry. The cursor keys have a special use in the
Edit function which is explained later.

Press [RETURN]

The spreadsheet now looks like this, with the
spreadsheet cursor in cell B1:

```
Col>:A          :B      :C          :D
Row +-------------------------------------------
   1:SAMPLE PERSONAL BUDGET
   2:
   3:
```
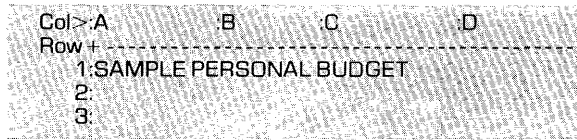
You can see that the title runs over the cell
boundary for cell A1, all the way into cell C1.
The cursor, however, is positioned in cell B1.
You cannot enter data into cells B1 or C1
without ruining your title line. Glance down
at the Entry/Edit area. It is now empty, but the
cell location is B1 instead of A1.

REPEATING CELL CHARACTERS

Next, you must fill two cells with equal signs
and then put two more equal signs in cell C2
in order to match the title length. There are a
few tricky steps involved, so follow each step
carefully.

First, move the cursor to cell A2. You can use
GoTo or the cursor keys.
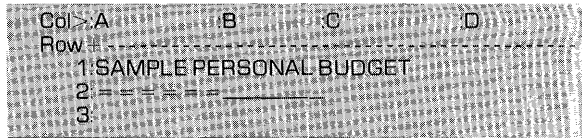
Type /=

This defines your entry as a repeating cell. Next, enter the characters to be repeated, which is the equal sign.

Press =

Press [RETURN]

Look at the spreadsheet. The entire width of cell A2 is filled with equal signs forming a double underscore.

Col> A	B	C	D
Row			
1: SAMPLE PERSONAL BUDGET			
2: ===========			
3:			

Repeat this procedure for cell B2.

Type /= =
Press [RETURN]
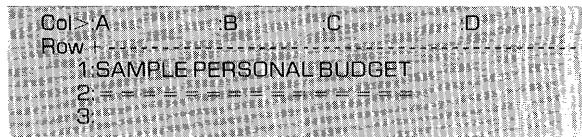
The spreadsheet cursor is in cell C2, where you want to have just two equal signs positioned on the left side of the cell.

Type = =
Press [RETURN]

Your spreadsheet looks like this if you have done every step correctly:

Col> A	B	C	D
Row			
1: SAMPLE PERSONAL BUDGET			
2: ==================			
3:			

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ENTERING REGULAR TEXT DATA

Now enter the text labels for ITEM, JANUARY, FEBRUARY and MARCH. ITEM is in the regular left-justified position. The three months are positioned on the right side of the cell, right justified. Move the cursor to cell A4.

Type ITEM
Press [RETURN]

The spreadsheet cursor advances to cell B4.

Type JANUARY
Press [RETURN]

The spreadsheet cursor is in cell C4, but "January" is left justified instead of right justified. Use the /R command (right justify command) to change the entry.

Move the spreadsheet cursor back to cell B4.

Type /R
Press [RETURN]

The contents of cell B4 are now right justified. The spreadsheet cursor has moved over to the next cell. Your spreadsheet looks like this:

```
Col>:A          :B        :C            :D
Row +----------------------------------------
     1:SAMPLE PERSONAL BUDGET
     2:===========================
     3:
     4:ITEM      JANUARY
     5:
```

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Positioning commands can also be entered as the first two characters, followed by the actual text entry. You can do this for the next two months.
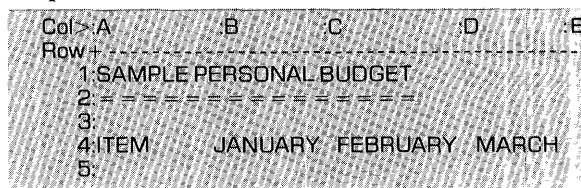
Type /RFEBRUARY
Press [RETURN]

Type /RMARCH
Press [RETURN]

The spreadsheet looks like this:

```
Col> A           B         C              D         E
Row+ ---------------------------------------------------
  1: SAMPLE PERSONAL BUDGET
  2: = = = = = = = = = = = = =
  3:
  4: ITEM      JANUARY  FEBRUARY  MARCH
  5:
```

CHANGING CELL TYPE

LogiCalc normally defines the hyphen as a minus sign, and treats it as numeric data. However, when you are using the hyphen to underscore the entry above, it should be text data. CellType is used to redefine the data type, and is entered after the data.

Move the cursor to cell A5

Type ----

The cell contents line shows that this is a numeric entry. Find the [CellType] key.

Press [CellType]

The cell type changes from numeric to text, as shown on the cell contents line.

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Press [RETURN]

The four hyphens appear in cell A5, left justified, forming an underscore. The spreadsheet cursor has moved to cell B5.

The cell type is also changed from numeric to text if the entry is started with one of the slash commands used for positioning text. We use this approach for the three months, starting in cell B5.

Type /R- - - - - - -
Press [RETURN]

Now do cell C5:
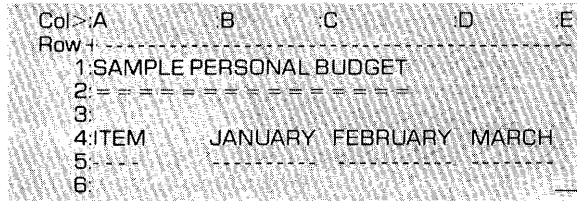
Type /R- - - - - - -
Press [RETURN]

And finally cell D5:

Type /R- - - - - - -
Press [RETURN]

The spreadsheet is starting to look more like a budget:

```
Col> A          B       C           D       E
Row + - - - - - - - - - - - - - - - - - - - - - - - - - - - -
     1:SAMPLE PERSONAL BUDGET
     2: = = = = = = = = = = = = = =
     3:
     4:ITEM      JANUARY  FEBRUARY  MARCH
     5:- - - -
     6:
```

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ENTERING NUMERIC DATA

You should find that getting the spreadsheet to look the same as the model is really quite simple and easy. After you make the text entry for Food, we start the numeric entries.

Move the cursor to cell A6.

Type Food
Press ⌷RETURN⌷

Enter three numbers for food, one for each month. The cursor is positioned in cell B6.

Type 255.00
Press ⌷RETURN⌷

The number 255.00 appears in cell B6 and the cursor is in cell C6. You do not need to enter the decimal point and two following zeroes for the next entry. The default setting for decimal precision is two places, which means that LogiCalc automatically inserts the decimal point in the correct position.

Type 235
Press ⌷RETURN⌷

Cell C6 displays your entry as "235.00" even though you just entered 235. Later, you will learn how to change the displayed precision for the spreadsheet.

In cell D6, enter the figure for March:

Type 255
Press ⌷RETURN⌷

At this point, pause for a moment and
compare the spreadsheet on your screen to
the one displayed below. If you made any
mistakes, correct them.

```
Col>:A          :B       :C           :D       :E
Row+------------------------------------------------
   1:SAMPLE PERSONAL BUDGET
   2:= = = = = = = = = = = = =
   3:
   4:ITEM     JANUARY  FEBRUARY  MARCH__
   5:----     -------  --------  -----
   6:Food     255.00   235.00    255.00
   7:
```

You now have to spend a few minutes entering
in the rest of the items into the sample budget.
Work carefully and try to avoid mistakes. The
listing below gives the entry for each cell:

Cell A7:   **Type** Housing   **Press** ⌈RETURN⌉
Cell B7:   **Type** 200   **Press** ⌈RETURN⌉
Cell C7:   **Type** 200   **Press** ⌈RETURN⌉
Cell D7:   **Type** 200   **Press** ⌈RETURN⌉

Cell A8:   **Type** Car   **Press** ⌈RETURN⌉
Cell B8:   **Type** 180   **Press** ⌈RETURN⌉
Cell C8:   **Type** 175   **Press** ⌈RETURN⌉
Cell D8:   **Type** 185   **Press** ⌈RETURN⌉

Cell A9:   **Type** Insurance   **Press** ⌈RETURN⌉
Cell B9:   **Type** 65   **Press** ⌈RETURN⌉
Cell C9:   **Type** 65   **Press** ⌈RETURN⌉
Cell D9:   **Type** 65   **Press** ⌈RETURN⌉

Cell A10: **Type** Misc.   **Press** ⌈RETURN⌉
Cell B10: **Type** 100   **Press** ⌈RETURN⌉
Cell C10: **Type** 100   **Press** ⌈RETURN⌉
Cell D10: **Type** 100   **Press** ⌈RETURN⌉

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Your spreadsheet looks like this if you entered
all the information in correctly:

Col: A	B	C	D	E
Row+				
1:SAMPLE PERSONAL BUDGET				
2:				
3:				
4:ITEM	JANUARY	FEBRUARY	MARCH	
5:				
6:Food	255.00	235.00	255.00	
7:Housing	200.00	200.00	200.00	
8:Car	180.00	175.00	185.00	
9:Insurance	65.00	65.00	65.00	
10:Misc.	100.00	100.00	100.00	
11:				

Insert a line separating the total for each
month into your spreadsheet. Move the cursor
to cell A11 and do the following four times:

Type / = ---
Press [RETURN]

ENTERING SIMPLE FORMULAS

LogiCalc can handle a wide variety of
formulas and expressions. You can use both
numbers and cell coordinates in formulas.
Many different types of operators can be used:
the arithmetic operators, the mathematical
operators, and the various built-in functions
mentioned earlier in Chapter 2.

This lesson shows you how to use formulas in
your spreadsheet. More complex formulas and
other applications are explained later in this
guide.

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You should clearly label all elements on your spreadsheet, particularly formulas, to make the sheet easy to understand. For example, you now need to insert the label Total in your sample budget.

Move the spreadsheet cursor to cell A12.

Type Total
Press [RETURN]

The cursor moves to cell B12, where you enter the first formula that totals the numbers in cells B6, B7, B8, B9, and B10. You could enter the formula like this:

(B6 + B7 + B8 + B9 + B10)

LogiCalc offers you an easier way, using one of the system functions called SUM. The SUM function totals a group of values. LogiCalc has a particular way of indicating a range of cells which contain values. The range of cells from B6 through B10 is shown like this:

(B6>B10)

Because SUM has letters, you need to define the cell as numeric first. The easiest way is to start with a plus sign. In cell B12, type the formula.

Type +SUM(B6>B10)
Press [RETURN]

The result is automatically calculated and
displayed in cell B12:

Col>A	B	C	D	E
Row				
1:SAMPLE PERSONAL BUDGET				
2:= = = = = = = = = = = = = = = =				
3:				
4:ITEM	JANUARY	FEBRUARY	MARCH	
5:- - - -	- - - - - - -	- - - - - - - -	- - - - - -	
6:Food	255.00	235.00	255.00	
7:Housing	200.00	200.00	200.00	
8:Car	180.00	175.00	185.00	
9:Insurance	65.00	65.00	65.00	
10:Misc.	100.00	100.00	100.00	
11:- - - - - - - -	- - - - - - -	- - - - - - - -	- - - - - -	
12:Total	800.00			

Now enter the formula in cell C12 that adds up
Column C. It is the same formula, except the
range is different.

Type + SUM(C6>C10)
Press RETURN

Finally, enter the formula in cell D12.

Type + SUM(D6>D10)
Press RETURN

You have now finished this first spreadsheet.
Your screen should match the one shown
below:

Col>A	B	C	D	E
Row				
1:SAMPLE PERSONAL BUDGET				
2:= = = = = = = = = = = = = = = =				
3:				
4:ITEM	JANUARY	FEBRUARY	MARCH	
5:- - - -	- - - - - - -	- - - - - - - -	- - - - - -	
6:Food	255.00	235.00	255.00	
7:Housing	200.00	200.00	200.00	
8:Car	180.00	175.00	185.00	
9:Insurance	65.00	65.00	65.00	
10:Misc.	100.00	100.00	100.00	
11:- - - - - - - -	- - - - - - -	- - - - - - - -	- - - - - -	
12:Total	800.00	775.00	805.00	

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RECALC

Recalc is used to recompute the formulas and equations contained in the spreadsheet. The entire spreadsheet or just the current cell location can be recomputed. Recalc is used to update the spreadsheet whenever you wish to see the current condition of the sheet.

The normal order of recalculation is left-to-right across rows. This order can be changed to top-to-bottom down columns. See the section "LogiCalc Defaults" in Chapter 6 for more information on order.

Recalc has a second level of function key labels which display when [Recalc] is pressed:

F1	F2	F3	F4	F5		F6	F7	F8	F9	F10
		Cell	All							Exit

Recalculating the Current Cell Location

The [Cell] key recalculates the current cell. For example, to recompute the formula in cell D12, move the spreadsheet cursor to cell D12.

Press [Recalc]

Press [Cell]

The contents of cell D12 are recalculated and the entire spreadsheet repainted on the screen. When just the individual cell is recalculated, data in other cells is not checked for changes. If this data has been changed, the All option should be used.

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Recalculating the Entire Spreadsheet

The [All] key is used to recompute the entire spreadsheet. All formulas are checked for references to cell locations occurring at an earlier point in the order. For certain types of work, you may need to recompute the entire spreadsheet twice, when there are cells at the top of the spreadsheet that use data contained in cells lower down.

To recompute the entire spreadsheet:

Press [Recalc]

Press [All]

The entire spreadsheet is recalculated and then the screen repainted with the updated spreadsheet.

EDITING, INSERTING AND DELETING | 4

In the last chapter, you learned how to make a spreadsheet. This chapter covers the functions involved in editing, inserting and deleting material.

EDIT

Edit allows you to change the contents of cells. With Edit, you can correct complex formulas without reentering them, and reposition cell contents easily. Edit works only on individual cells, not the entire spreadsheet. Edit has a second level of function key labels.
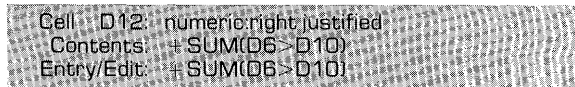
First, move the cursor to the cell you want to edit. For example, to edit the formula in cell D12, move the spreadsheet cursor to D12.

Press [Edit]

A second level of function key labels displays and the Command window shows the Edit label in reverse video:

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Open	Close	Title	CellType	Insert	Delete	Left Jst	Center	RightJst	Exit

Notice that the contents of cell D12 display on the Entry/Edit line with the edit cursor positioned over the first character.
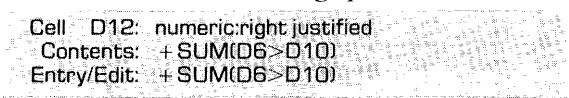
Cell   D12: numeric,right justified
   Contents: +SUM(D6>D10)
   Entry/Edit: +SUM(D6>D10)

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The right and left cursor keys are used to move the edit cursor. Use the right cursor key to position the edit cursor over the first "D" in the formula.

Press [Open]

A gap is created at the cursor position with the characters to the right moved to the extreme right side of the Entry/Edit line. You can type more characters into this gap.

```
Cell   D12:  numeric:right justified
  Contents:  +SUM(D6>D10)
Entry/Edit:  +SUM(D6>D10)
```

Press [Close]

The line is joined back together like this:

```
Entry/Edit:  +SUM(D6>D10)
```

[Title] inserts /T at the beginning of the Edit line making the entry a title cell.

[CellType] changes the cell data type. Numeric data is changed to text and text to numeric.

Press [CellType]

The Entry/Edit Area now looks like this:

```
Cell   D12:  text:left justified
  Contents:  +SUM(D6>D10)
Entry/Edit:  +SUM(D6>D10)
```

[Insert] adds a single empty space at the edit cursor position making room for a character to be added. The up-arrow cursor key performs the same action.

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⌊Delete⌋ removes the character under the edit cursor and adjusts the Edit line. You can use the down-arrow cursor key to delete a character in the same way. Holding ⌊Delete⌋ down will remove a number of characters at one time.

⌊Left Jst⌋ inserts /L at the beginning of the line. This slash command positions the entry on the left side of the cell.

⌊Center⌋ inserts /C at the beginning of the line. This command positions the data in the center of the cell.

⌊RightJst⌋ inserts /R at the beginning of the line, positioning the entry on the right side of the cell.

⌊Exit⌋ ends the Edit function. The edit cursor is set to the end of the edited line. The main level of LogiCalc labels is displayed. You must now press ⌊RETURN⌋ to enter the edited data into the current cell.

SPECIAL EDITING CONDITIONS

Editing Protected Cells

Protected cells are cells whose contents cannot be accidentally changed or deleted. See the section on protecting cells in Chapter 7 for more information. This protection must be removed before the cell can be edited. If you attempt to edit a protected cell, the Concept bleeps and an error message displays:

Protected

The backspace key must be used to remove any data on the Entry/Edit line before any more changes can be made to the spreadsheet.

No Changes Wanted

You must completely clear the Edit line before leaving the Edit function if you do not want the edited line to replace the original data. For example, you have started editing the contents of cell A10:

```
Cell   A10:  text:left justified
   Contents:  Misc.
   Entry/Edit:  Miscell___
```

You must first clear the Entry/Edit line using the delete key:

```
Cell   A10:  text:left justified
   Contents:  Misc.
   Entry/Edit:  ___
```

Now press [EXIT] or press [RETURN] to end the Edit function.

Press [RETURN] to enter the data, which in this case is unchanged.

INSERT

Insert adds a blank column or row at the spreadsheet cursor location. The columns or rows after the insertion are automatically moved and relabeled. All formulas and expressions in cells that were moved change automatically to reflect the new spreadsheet arrangement. Insert has a second level of function key labels.

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Inserting Columns

This is the procedure for inserting a blank column between the two columns.

Position the spreadsheet cursor in the column where a blank column is to be inserted, column B below.

Col: A	B	C	D	E
Row
1 Flowers			38.83	
2 Candy			10.42	
3				

Press [Insert]

The Insert label appears in the Command window and the second level of labels displays:

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Column	Row								Exit

If you decide to halt the Insert function before adding a column or row, press [Exit]

Press [Column]

The main level of LogiCalc function labels display and the sample sheet now looks like this:

Col: A	B	C	D
Row
1 Flowers			38.83
2 Candy			10.42
3			

If you decide to halt the Insert function before adding a column or row, press [Exit]

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Inserting Rows

Rows are inserted using a procedure similar to that used for inserting columns.

First, move the spreadsheet cursor to the row where you want to insert a blank row.

Press [Insert]

Press [Row]

The blank row is inserted into the spreadsheet and all following rows are moved down and relabeled.

DELETECELL

DeleteCell clears all data from the current cell.

For example, the contents of cell A3 below are deleted with DeleteCell.

Move the cursor to cell A3.

```
Col>:A          :B          :C
Row + - - - - - - - - - - - - - - - - - - - - - - -
     1:Barley
     2:    25.82
     3:___26.46
```

Press [DelCell]

All data is cleared from the cell.

```
Col>:A          :B          :C
Row + - - - - - - - - - - - - - - - - - - - -
     1:Barley
     2:    25.82
     3:_____
```

DeleteCell cannot be used to delete protected cells; the protection must be removed first.

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DELETE

Delete is used to remove data from the spreadsheet. There is no undo feature in LogiCalc, so all deletions are final. Protected cells can be deleted using either the Column or Row option of Delete. Delete uses a second set of function key labels for available options.

Position the spreadsheet cursor before you enter Delete. Once you have pressed [Delete] you will not be able to change the cursor position.

Press [Delete]

The Delete label displays in the Command window and the new set of function key labels display:

F1	F2	F3	F4	F5		F6	F7	F8	F9	F10
Column	Row	Cell	All	UnProt						Exit

You then select the function key for the type of deletion you want to do.

Deleting Columns

First, position the cursor in the column to be deleted. If you are deleting more than one column, position the cursor in the first column to be deleted. For example, in the sample sheet below you want to delete Columns B and C:

Col>A	:B	:C	:D	:E
Row +				
1:COSTS	US	THEM	JOINT	
2:Soccer	45.00	50.00	100.00	
3:Baseball	60.00	78.50	23.86	
4:Track	25.92	52.43	11.23	
5:				

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Position the spreadsheet cursor in column B.

Press [Delete]

Press [Column]

The Command window displays:

Delete how many columns? _

Press 2
Press [RETURN]

You are asked to verify this:

Are you sure? _

Press Y

The two columns are deleted and the sample sheet looks like this now:
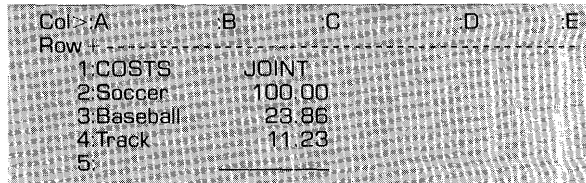
```
Col>:A          :B        :C          :D      :E
Row +---------------------------------------------
   1:COSTS    JOINT
   2:Soccer         100.00
   3:Baseball        23.86
   4:Track           11.23
   5:                _____
```

You can terminate the Delete function by responding with N or n and the columns will not be deleted.

Deleting Rows

Rows are deleted in the same way columns are deleted.

Taking the example used to demonstrate deleting columns, we delete Rows 2 and 3. The initial spreadsheet starts like this:

Col>A	B	C	D	E
Row+				
1:COSTS	JOINT			
2:Soccer	100.00			
3:Baseball	23.86			
4:Track	11.23			
5:				

Move the cursor into Row 2.

Press [Delete]
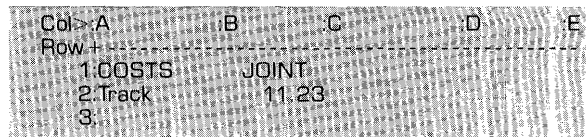
Press [Row]

Press 2
Press [RETURN]

Press Y

The resulting spreadsheet looks like this:

Col>A	B	C	D	E
Row+				
1:COSTS	JOINT			
2:Track	11.23			
3:				

Deleting Cells

You can use Cell to delete single cells, the same as the DeleteCell function.

Move the cursor to the cell you want to delete.

Press [Delete]

Press [Cell]

The contents of the cell are deleted. Protected cells cannot be deleted with the Cell option, but must be unprotected first.

Deleting All Cells

Deleting all cells clears all data from the entire spreadsheet including protected cells. Be sure the spreadsheet has been saved first if it will be used later. Each time you start a new sheet, clear the spreadsheet.

For example, if you want to clear the spreadsheet of all data shown below:

```
Col>:A        :B      :C          :D        :E
Row+ -------------------------------------------------
   1:COSTS     JOINT
   2:Track     _11.23
   3:
```

Press [Delete]

Press [A]

The Command window prompts you:

```
Are you sure? _
```

Press Y

The spreadsheet is cleared:
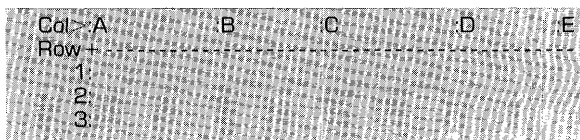
Deleting Unprotected Cells

You can clear all data except in protected cells with the Unprot option of the Delete function. For more information about protected cells, see the section about protecting cells in Chapter 7.

To delete all unprotected cells:

Press [Delete]

Press [Unprot]

The Command window prompts:

Press Y

The data in all unprotected cells is deleted from the spreadsheet.

Exiting From Delete

You can halt Delete in several ways. If you decide to stop after pressing ⌊Delete⌋, press ⌊Exit⌋. The regular set of labels appears.

If you have pressed ⌊Column⌋ or ⌊Row⌋ and then decide not to delete, respond with zero and ⌊RETURN⌋ or just ⌊RETURN⌋.

Finally, Delete can be terminated by responding to the prompt "Are you sure?" with N or n.

LOGICALC FILE FUNCTIONS | 5

This chapter covers the functions used to handle LogiCalc files:

ListVol
Save
Load
Merge
Print
Dump

These functions are accessed by holding down the [COMMAND] key and pressing the function key. With these six functions, you can work with spreadsheet files from inside the LogiCalc program.

LogiCalc files are stored in volumes on the disk or on diskettes. All LogiCalc files have a .LC suffix.

LISTING LOGICALC FILES

ListVol is used to display a directory listing of files for any mounted volume. The names of all files or only LogiCalc files can be listed. In addition, volume space used and volume space available are shown similar to a normal volume listing.

Suppose your current volume is /SPRING, but you want to see all files in /SUMMER. Hold the [COMMAND] key down.

Press [RETURN]

The Command window prompts you for the volume name:

```
CCOS volume name? /SPRING
```

Enter the volume you want listed.

Type /SUMMER
Press [RETURN]

You now have the choice of seeing all files in the volume or just LogiCalc files, as the Command window displays:

```
A(ll or L(ogiCalc files only?__
```

If you press A all files are shown, and LogiCalc files are marked with an asterisk. If you press L, only LogiCalc files are listed.

Press A

A listing of the files, similar to the one below, displays on your screen replacing the spreadsheet:

```
Disk volume /SUMMER
- - - - - - - - - - - - - - - - - - - - - - - - - - -
: RAIN.TEXT     :          :          :
: RUN           :          :          :
: FUN.TEXT      :          :          :
:*CASH.LC       :          :          :
: W             :          :          :
:*HEAT.LC       :          :          :
: CAR.TEXT      :          :          :
:               :          :          :
:               :          :          :
- - - - - - - - - - - - - - - - - - - - - - - - - - -
7 listed out of 7 in directory, 724 used, 300
        free, 158 in largest.
```

The top line identifies the volume. The files are listed in the table. The line below the table tells you the number of files listed out of the total number of files in the volume, the number of blocks used, the number of blocks free, and the largest area in blocks available.

In the Command window, this prompt displays:

Press <space> to continue

Press [SPACE]

Your spreadsheet returns to the screen with all data.

SAVING LOGICALC SPREADSHEETS

Spreadsheets are saved as files in a volume. If no volume name is specified, LogiCalc assumes the current volume. Spreadsheets need to be saved before exiting LogiCalc; there is no automatic save. Be sure sufficient room exists in your volume for the file; otherwise, an error message displays and the file is not saved.

LogiCalc file names can be a maximum of 18 characters long. They must begin with an alphabetic character and must not use special symbols like slash or backslash.

The spreadsheet to be saved must be displayed on the screen. You have the choice of saving all or part of the spreadsheet. If you save a partial sheet, you must provide the top left corner and bottom left corner cell coordinates.

A password can be used to protect files from unauthorized users. Passwords can be up to five alphabetic characters long. We recommend that you keep a record of all passwords for future reference. If desired, LogiCalc files can be saved without passwords.

Saving Spreadsheet Without a Password

This example illustrates how a complete spreadsheet is saved without a password. Suppose your screen displays this spreadsheet:

```
Col > A          B        C           D         E
Row + -------------------------------------------------
   1:TYPICAL FOOD COSTS
   2:
   3:ITEM          1900      1980
   4:  Bread        0.12      0.85
   5:  Milk         0.07      0.54
   6:  Flour        0.05      0.45
   7:  Sugar        0.03      0.35
```

Press [SAVE]

The prompt for the file name appears in the Command window. If you have already saved a file in the current session or loaded a file into LogiCalc, the name of that file displays as the default.

```
File name: _
```

File names that help identify the contents of the file are most useful. Let's assign the name "INFLATION" to the sample file.

Type INFLATION
Press [RETURN]

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The Command window displays the next prompt:

```
Plartial or All...
```

Press A

The password prompt displays:

```
Password ([RETURN] = none):
```

A password is not used with this file.

Press [RETURN]

As the spreadsheet is being saved, the line numbers display for an instant in the Command window. When the file is saved, you see:

```
Saved
```

The Entry/Edit cursor appears again and you can resume work on the spreadsheet.

Saving Spreadsheet With a Password

We now save a section of a spreadsheet and use a password. Only the shaded portion of the sheet will be saved.

```
Col   A              B        C        D        E
Row  -----------------------------------------------
      1 TYPICAL FOOD COSTS
      2                            1980
      3 ITEM          1900         0.85
      4   Bread        0.12        0.54
      5   Milk         0.07        0.45
      6   Flour        0.05        0.35
      7   Sugar        0.03
      8
```

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Press [Save]

You are asked to supply the file name. The last
file name used displays as a default response:

File name: INFLATION

Use the name OLDPRICES for this file.

Type OLDPRICES
Press [RETURN]

The Command window prompts:

P(artial or A(ll __

Press P

You are asked to supply the top left corner cell
coordinate. Cell A1 is the default:

top left corner : A1

There are two ways to enter the cell
coordinate. One way is to type it. The second
way is to use the spreadsheet cursor as a
pointer, moving it to the top left corner cell.
We use the first method:

Type B3
Press [RETURN]

The Command window now displays:

bottom right corner : C7 __

This time we use the spreadsheet cursor as a
pointer.

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Move the cursor to cell B7.

Press [RETURN]

LogiCalc asks for a password:

Password ([RETURN] = none):

Enter the password LOW for this file.

Type LOW
Press [RETURN]

The password does NOT display on the screen while you enter it. You are requested to verify it:

Again —

Enter the password a second time, exactly the same way, even matching capital and lowercase letters:

Type LOW
Press [RETURN]

The line numbers display for a very brief moment as the file is being saved. LogiCalc then informs you the file is saved:

Saved

You can now continue on to the next function.

LOADING LOGICALC FILES

LogiCalc files that have been saved earlier can be put back into the spreadsheet again. Files can be loaded into their original position, or at a new position. The file being loaded over-writes any existing file in the spreadsheet.

Load prompts you for information needed for each step. This makes it easy to use. We load the file OLDPRICES, saved in the previous section, in the spreadsheet at location A3.

Press [Load]

The Command window displays:

File name: __

Type OLDPRICES
Press [RETURN]

Next you see a prompt for the password:

Password: __
File name: OLDPRICES
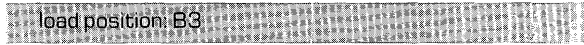
You must enter the password exactly as you first used it, including capital and lower case letters. The password originally used was LOW in all caps.

Type LOW
Press [RETURN]

If you make a mistake entering the password, an error message displays informing you the Load function has been terminated. You will have to start again.

After the password, the prompt for the Load location appears with the original position shown as the default response:

```
load position: B3
```

Type A3
Press [RETURN]

Your file is loaded into the spreadsheet display with the spreadsheet cursor positioned in the first cell of data.

MERGING LOGICALC FILES

Merge lets you combine several spreadsheets into one large display. This building-block approach makes it easy for you to develop each section independently and then combine sections together. Merge adds each new file to the existing spreadsheet.

There are a few important points to remember:

- The first spreadsheet must be displayed on the screen.

- As each file is added, it will overlay any previous data.

- When combining large files, be sure that the resulting file will fit available memory space.

- Formulas and expressions should be checked to ensure that cell coordinates are valid.

Suppose that the screen displays this file:

```
Col>:A          :B          :C          :D          :E
Row +----------------------------------------------------
    1:GOLD STAR BUILDING CO.
    2:
    3:Project         Cost
    4:- - - - - -       - - - -
    5:Homes Ltd.    463.82
    6:Bar            123.74
    7:Office         872.89
```

A second file, called REVENUES, has money received by Gold Star. This file was saved earlier in the volume MONEY with the password SAFE. This file contains the following data:

Col> A	B	C	D	E
Row +				
1 Revenues				
2				
3 Job 1111	845.62			
4 Job 2222	982.22			
5 Job 3333	123.80			

Press [Merge]

The file name prompt appears:

File name: __

Enter the file name:

Type /MONEY/REVENUES

The password prompt displays:

Password: __
File name: /MONEY/REVENUES

Type SAFE
Press [RETURN]

The prompt for load position displays with the original location shown:

load position : A1

Enter the top left corner of where you want the new material to go:

Type A9
Press [RETURN]

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The new file is combined with the old file. The
screen displays:

```
Col>:A          :B          :C          :D          :E
Row +-------------------------------------------------
    1:GOLD STAR BUILDING CO.
    2:
    3:Project          Cost
    4:- - - - - -            - - - -
    5:Homes Ltd.     463.82
    6:Bar            123.74
    7:Office         872.89
    8:
    9:Revenues
   10:- - - - - - -
   11:Job 1111       845.62
   12:Job 2222       982.22
   13:Job 3333       123.80
```

Additional files can now be merged into this
new file.

PRINTING LOGICALC FILES

Print transfers the spreadsheet data, as
displayed on the screen, to an output device.
The three output devices available are a local
printer, a text file, or the console (screen).

There are five basic decisions you must make
to print a file:

- Output device
- Area of spreadsheet to be printed
- Page length
- Page width
- Report titles

Output Device

Normally, a printer is used as the output device. The printer must be physically connected to one of the RS-232C output ports at the back of the Concept. Instructions for setting up a printer can be found in "The Corvus Concept Personal Workstation Guide."

If you are using a different output device, the standard Concept conventions for specifying a device must be followed. For example, to print to a file, you would enter /VOLUMENAME/ FILENAME.

Area Of Spreadsheet To Be Printed

The entire spreadsheet or any part of it can be printed. You need to specify the top left corner and bottom right corner of the area to be printed. The default cell locations shown are for the entire spreadsheet. The spreadsheet cursor can be used to point to the location or the cell location can be entered with the keyboard.

Page Length

The default setting for page length is continuous, with page breaks made by the output device. Check the page length setting for your printer.

You can use the /P command to force a page break inside the spreadsheet. The /P is placed in the first two spaces in Column A at the row where you want the page break; the rest of the row is left empty.

Page Width

The standard value for page width is 132 spaces. You can set any width up to the maximum allowed by your particular printer. Check your printer and paper to determine the maximum width.

Spreadsheets wider than the maximum value set will automatically be split into multiple sheets. The left part is printed first, followed by the right side. Line numbers are added to the right half for your convenience in matching the two sides.

Report Titles

Titles can be added to your printed report. Each title line is centered on the first page of the report. You can add as many title lines as needed.

Printing a Sample LogiCalc File

Now that you have a general understanding of the Print function, we will demonstrate how a sample file is printed. We will print the spreadsheet below to a text file, which can later be spooled, called /STOCK/OTC.

```
Col>:A           :B      :C          :D           :E
Row+----------------------------------------------------
     1:OVER-THE-COUNTER MARKETS
     2:
     3:             Friday  Thursday  Wednesday
     4:Volume       3454    3452        3446
     5:Advances      993     687         700
     6:Declines      411     756         826
     7:Unchanged    2050    2009        1920
```

Press [Print]

The prompt for output devices displays:

To which file? /PRINTER

If you were sending the file to a printer, you would press [RETURN]. Since we are printing to a text file, enter the file name:

Type /STOCK/OTC
Press [RETURN]

The prompt for the top left corner displays:

top left corner : A1

You want to print the entire sheet, so this is the correct cell coordinate. If you wanted to print only part of the spreadsheet, you would enter the top left corner cell coordinate.

Press [RETURN]

The prompt for the bottom left corner displays:

bottom right corner : D7

You will use the displayed coordinate again. If only part of the sheet is to be printed, enter the bottom right corner. These two coordinates form a rectangle marking the area to be printed.

Press [RETURN]

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The Command window displays the page length prompt:

> Form length: CONTINUOUS

In most instances, you will want to leave the page length set to CONTINUOUS and let the printer set the page breaks.

However, you can set the page length to any whole number greater than 1. We set the line length to 50 lines per page.

Type 50
Press [RETURN]

This prompt displays:

> Stop after each page? Y/N

Press Y if you want to stop after each page. Press N if you want the report printed without stopping. This option may be used for single sheets of extra-wide paper or special letterheads, to name two possible uses. Pausing after each page is useful only when you have a local printer.

Press N

Next, you are prompted for the output width in spaces. The default value is set to 132 spaces for wide paper.

> Output width: 132

You can set the output width to the maximum allowed for your printer. If you are using 8½ inch wide paper, you will want to set the width to a smaller value, such as 80 spaces. For reports that are printed to the screen, you will probably want to match the screen width.

Type 80
Press [RETURN]

At this point, your spreadsheet is cleared from the screen and replaced with the following display. If you are printing to a file, the line referring to the printer is omitted.

Report Printing
Make sure printer and paper are ready
Title > __

Enter each title line and end it with [RETURN]. When your title is complete, press [RETURN] to signal you are done.

Type SAMPLE OVER-THE-COUNTER
　　　VOLUME
Press [RETURN]

Type MAY 11 - MAY 13, 1983
Press [RETURN]
Press [RETURN]

The screen displays a message telling you when your report is finished. The Command window displays:

Press <SPACE> to continue

Press [SPACE]

You now see the spreadsheet displayed on the screen. You can continue working on it or begin another task.

DUMP

Dump lists the contents of all cells in the displayed spreadsheet. The list includes the equations, data type, etc. which are not displayed on the spreadsheet itself. You may want to make a dump of any important spreadsheet to have a complete hard copy of your work.

The output device for a dump can be the printer, a file, or the console (screen). A comment line containing up to 80 characters can be added. It appears at the top of the output.

We will demonstrate Dump by producing a dump of the file /STOCK/OTC to the screen. The spreadsheet must be displayed on the screen.

Press [Dump]

The prompt for output appears:

    Output file:/PRINTER

You would press [RETURN] to send the dump to a local printer; however, in this case it is going to the screen.

Type /CONSOLE
Press [RETURN]

A prompt for comments displays:

Output file: /CONSOLE Comments ? __

Type SAMPLE DUMP OF OTC REPORT
Press [RETURN]

The spreadsheet clears from the screen and the
Dump listing displays:

SAMPLE DUMP OF OTC REPORT

Position A1: Type Title: OVER-THE-COUNTER MARKETS
Position B3: Type Text (Right justified):Friday
Position C3: Type Text (Right justified):Thursday
Position D3: Type Text (Right justified):Wednesday
Position A4: Type Text (Left justified):Volume
Position B4: Type Numeric:3454 = 3454.000000000000
Position C4: Type Numeric:3452 = 3452.000000000000
Position D4: Type Numeric:3446 = 3446.000000000000
Position A5: Type Text (Left justified):Advances
Position B5: Type Numeric:993 = 993.000000000000
Position C5: Type Numeric:687 = 687.000000000000
Position D5: Type Numeric:700 = 700.000000000000
Position A6: Type Text (Left justified):Declines
Position B6: Type Numeric:411 = 411.000000000000
Position C6: Type Numeric:756 = 756.000000000000
Position D6: Type Numeric:826 = 826.000000000000
Position A7: Type Text (Left justified):Unchanged
Position B7: Type Numeric:2050 = 2050.000000000000
Position C7: Type Numeric:2009 = 2009.000000000000
Position D7: Type Numeric:1920 = 1920.000000000000

The Command window displays:

Press <space> to continue __

Press [SPACE]

Your spreadsheet displays again on the screen,
ready for the next command.

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GENERAL FEATURES | 6

COPY

Specifying the Range

Copy transfers a single block of data from one location on the spreadsheet to another:

The number of cells in both blocks must match. The range of cells in the first block, whose contents are being copied, must be specified. The second block can be specified by range, or only the top right corner cell specified. Cell coordinates can be entered from the keyboard or indicated by the spreadsheet cursor. If the blocks are different sizes, the error message "sizes don't agree" displays. If the ranges specified are not valid blocks, the Command window displays the message "bad range coord" and terminates Copy.

The Relative, No Adjustment and Prompted Options

These three options are offered when numeric data, that applies to formulas, is copied.

The Relative option adjusts the cell coordinates in the formula or formulas so they are relative to the new location.

Suppose that your spreadsheet had the number 50.00 in cell A1:

```
Col>:A          :B        :C              :D        :E
Row+------------------------------------------------------
      1:    50.00
      2:
```

You enter 2*A1 in cell B1. The spreadsheet now looks like this:

```
Col>:A          :B        :C              :D        :E
Row+------------------------------------------------------
      1:    50.00  100.00
      2:
```

Now you copy the formula from cell B1 to cell A1 and specify the Relative option. Your spreadsheet displays this:

```
Col>:A          :B        :C              :D        :E
Row+------------------------------------------------------
      1:    50.00  100.00      200.00
      2:
```

Cell C1 contains the formula 2*B1. The cell coordinate A1 was replaced by B1. LogiCalc assumed that you wanted the number in the cell to the immediate left of your current location doubled, since that is what the original formula did. For most applications, LogiCalc correctly predicts what you want to do. However, if the formula change is not clear, you should check the formula in the new location.

The No Adjustment option makes no change in formulas copied from one location to another. This means that the copied formula will be exactly the same as the original formula.

The Prompted option is used to select the Relative or No Adjustment option for each cell coordinate in every formula being copied. The formula displays on the Entry/Edit line with the edit cursor positioned over the cell coordinate. The Command window displays your choices: Relative or No Adjustment. You choose one for each formula being transferred. When you are done, the entire block is moved and the screen displays the changed spreadsheet.

For example, if you copied the block of cells A1, B1 and C1 to a new location at A2, B2 and C2, and selected the Prompted option, the following would occur:

Press [Copy]

The first prompt displays:

```
Copy
from coord (>coord) : A1
```

Type A1>C1
Press [RETURN]

The second prompt displays:

```
Copy
to coord (>coord) : A1>C1
```

Type A2>C2
Press [RETURN]

The prompt for the options displays:

```
Copy
R(elative, N(o adjustment, or P(rompted?
```

Press P

The first formula appears on the Entry/Edit
line and your choices appear in the Command
window, with the cell location shown in
brackets.

```
Cell   A1: numeric:right justified
   Contents:  50
   Entry/Edit:  2*A1
```

```
Copy
[B2] R(elative or N(o adjustment?
```

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Press R

The next formula displays:

```
Cell    A1   numeric right justified
  Contents: 50
  Entry/Edit: 2*B1
```

```
Copy
  [C2] R(elative or N(o adjustment?
```

Press N

The block of data is copied, and the
spreadsheet looks like this:

```
Col> A           B          C          D          E
Row +
   1      50.00   100.00   200.00
   2      50.00   100.00   200.00
```

The cell contents are as follows:

Cell A1:   50   Cell A2:   50
Cell B1:   2*A1   Cell B2:   2*A2
Cell C1:   2*B1   Cell C2:   2*B1

As you can see, the formula in cell B2 has
been changed, from 2*A1 to 2*A2, to be
relative to its location. However, the formula
in cell C2 has not changed; it remains 2*B1
for both locations.

REPLICATE

Replicate is similar to Copy. The two functions use the same screen prompts for range and option. Replicate creates multiple copies of the data instead of a single copy.

When you use Replicate, you need to specify a range of cells for the destination that is a multiple of the number of cells you are transferring. If you specify a single location, or an invalid range, Replicate halts, and an error message for "bad range coord" displays.

If this error message appears, check the number of copies you are attempting to make. If you want to make a single copy of the data block, use Copy. If you wish to make multiple copies, specify the range correctly.

The example below demonstrates how Replicate is used to produce a list of numbers from 1 to 25 on the spreadsheet.
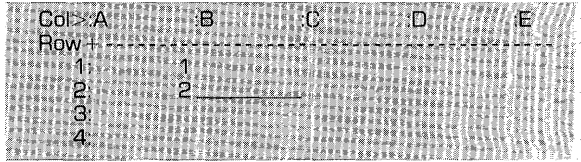
First, move the spreadsheet cursor to cell A1. Set the decimal precision for column A to 0. Then enter the starting number:

Press 1
Press [RETURN]

Type (A1 + 1)
Press [RETURN]

The spreadsheet now looks like this:
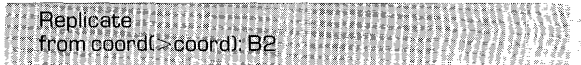
Next, move the spreadsheet cursor to cell A3 and begin Replicate.

Press [Rplicate]

The Command window shows this prompt:

Move the spreadsheet cursor to cell A2. The cursor acts like a pointer to indicate your response. This action changes the prompt to show:

Enter the range of cells where the formula from cell A2 is being transferred to. This range is from cell A3 to cell A25.

Type A3>A25
Press [RETURN]

The Command window displays the options:
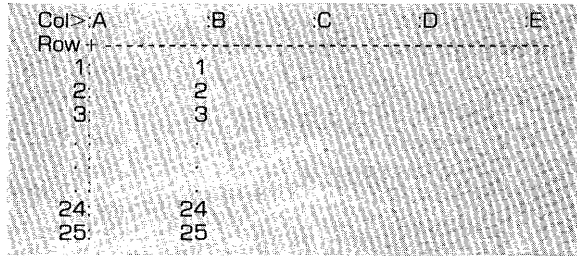
Select the Relative option.

Press R

As the formula is transferred to each cell, the
result displays, until all 25 numbers are shown
in the spreadsheet. The final result looks like
this:

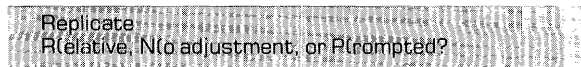| Col> A	:B	:C	:D	:E
Row +				
1:	1			
2:	2			
3:	3			
.	.			
24:	24			
25:	25			

LOGICALC DEFAULTS

The default option is used to change certain
parameters for the entire spreadsheet. These
parameters are: Order, Automatic Calculation,
Automatic Advance, Rounding, Column
Width, Protection and Precision.

The values for these parameters are stored as a
data block at the beginning of each LogiCalc
file. A default value is assigned for each
parameter. Parameter values can be changed
at any point while you are working on the
spreadsheet file.

The Rounding, Column Width, Protection and
Precision parameters differ from the regular
functions with similar names. Defaults sets the
parameter for the entire spreadsheet, not for
single cells or columns.

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Defaults can be changed at any time, except in the middle of another function.

Press [Defaults]

The Defaults label displays in the Command window, and the second level of labels displays:

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Order	AutoCalc	Advance			Round	ColWidth	Protect	Precision	Exit

Press the function key for the parameter you want to change. Prompts for each parameter display in the Command window. You can change a number of different parameters.

Press [Exit] to leave the Defaults labels.

Default Parameter Settings

The standard setting for the different defaults are as follows:

Label	Option Name	Standard Setting
Order	Order of Evaluation	Top-to-Bottom
AutoCalc	Automatic Calculation	OFF
Advance	Automatic Advance	ON
Round	Rounding Numeric Values	ON
ColWidth	Default Column Width	10
Protect	Spreadsheet Protection	ON
Precision	Default Displayed Decimal Precision	2
Exit	Exit	—

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Setting Default Parameters

Order. Changes the direction of the spreadsheet cursor and the order in which formulas on the spreadsheet are recomputed by the ReCalc function. The default direction is left-to-right across columns, then down to the next row. The alternate setting is top-to-bottom down a column, then across to the next column. The diagram below illustrates the difference:

NORMAL ORDER   ALTERNATE ORDER
(Left-to-Right)   (Top-to-Bottom)

```
1 ──────────▶        1 2 3 4 5 6 7 8 9
2 ──────────▶        │ │ │ │ │ │ │ │ │
3 ──────────▶        │ │ │ │ │ │ │ │ │
4 ──────────▶        ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼
```
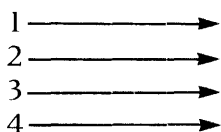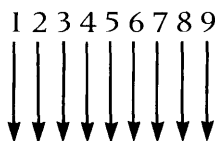
The order key is similar to a switch; each time it is pressed, Order is changed. A message displays in the Command window telling you what the new order of movement is.

To change the order, do the following:

Press |Order|

The Command window tells you the current order:

```
Defaults
Current Order is Top-->Bottom __
```

Press [Order]

The order changes back to the default setting.

```
Defaults
Current Order is Left--->Right
```

AutoCalc. AutoCalc switches the Automatic Calculation feature on and off. Automatic Calculation means that the entire spreadsheet is automatically recalculated for every entry. The normal setting is OFF. When the Automatic Calculation feature is off, Recalc must be used to recompute the spreadsheet.

Most spreadsheet files can be made in less time with the Automatic Calculation feature off. This is because a certain amount of time is lost while the spreadsheet is being recalculated. For certain applications, particularly those involving linear regression, you may want to have the spreadsheet recomputed after each entry.

To change Automatic Calculation do the following:

Press [AutoCalc]

The Command window displays the following:

```
Defaults
ReCalc [ON]
```

Press [AutoCalc]

The Command window displays this:

```
Defaults
ReCalc [OFF]
```

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Advance. Automatic Advance is switched on and off with the Advance key. Automatic Advance moves the spreadsheet cursor to the next cell each time data is entered into the cell. This advance eliminates the need for an extra [RETURN] or [ENTER].

To switch the Automatic Advance do the following:

Press [Defaults]

Press [Advance]

The Command window displays the current setting:

```
Defaults
Advance [OFF]
```

Press [Advance]

The Automatic Advance parameter changes.

```
Defaults
Advance [ON]
```
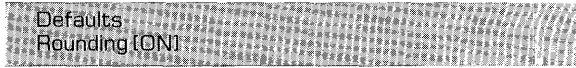
Round. Round turns rounding of numeric data for the entire spreadsheet on or off. Rounding of numeric data means that all numbers are rounded off to the number of places specified by Precision.

With decimal precision set to 2, 9.345 is rounded to 98.35 but 9.344 is rounded to 9.34.

Round is normally switched off, leaving all values truncated to the displayed precision.

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Press [Round]

The Command window shows the setting:

> **Defaults**
> **Rounding [ON]**

Press [Round]

You have now turned rounding off.

> **Defaults**
> **Rounding [OFF]**

ColWidth. The default value for column widths on the spreadsheet is set with ColWidth. Columns can be 3 to 63 characters wide. Columns that have been set to a different width using the ColWidth function are not changed.

Press [ColWidth]

The Command window prompts you for the width. Enter a whole number between 3 and 63.

> **Defaults**
> **New width (3..63):** __

Type 12
Press [RETURN]

The new value for width displays in the Command window.

> **Defaults**
> **Width is 12** __

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Protect. Protect turns protection on or off for the entire spreadsheet. The default setting is on. For protection to work with individual cells, the protection must be on for the entire spreadsheet. Similarly, by turning protection off for the sheet, changes can be made much quicker.

Press [Protect]

The Command window displays:

> Defaults
> Protection Disabled __

Press [Protect]

> Defaults
> Protection Enabled __

Precsion. Decimal precision for the spreadsheet is set with Precsion. The decimal precision is the number of digits displayed after the decimal point. The standard decimal precision setting is 2. Precision can range from 0 to 12.

Press [Precsion]

The Command window prompts for the new value:

> Defaults
> New precision (0..12): __

Press 3
Press [RETURN]

The new precision is confirmed:
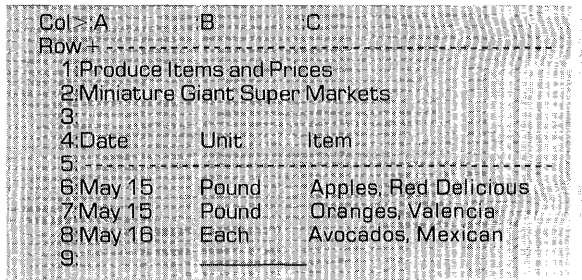
> Defaults
> Precision is 3

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MOVEDISP

MoveDisp shifts the portion of the spreadsheet displayed on the screen. The current cell becomes the top left corner.

A quick example illustrates how this function works. A sample spreadsheet looks like the following. We want cell C4 to become the top left corner.
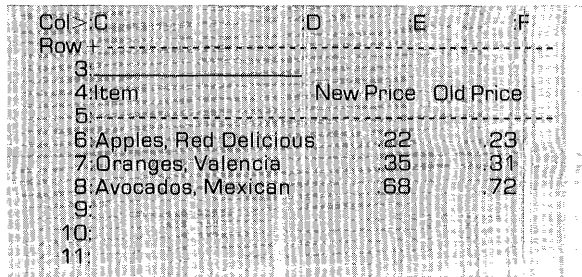
```
Col> A          B          C
Row
    1 Produce Items and Prices
    2 Miniature Giant Super Markets
    3
    4 Date       Unit       Item
    5 ----------------------------------------
    6 May 15     Pound      Apples, Red Delicious
    7 May 15     Pound      Oranges, Valencia
    8 May 16     Each       Avocados, Mexican
    9
```

First, we move the spreadsheet cursor to cell C3.

Press [MoveDisp]

The spreadsheet now looks like this:

```
Col> C                    D          E          F
Row
    3 ---------------------------------
    4 Item                  New Price  Old Price
    5 ----------------------------------------
    6 Apples, Red Delicious    .22        .23
    7 Oranges, Valencia        .35        .31
    8 Avocados, Mexican        .68        .72
    9
   10
   11
```

LOCK

Lock holds selected rows and columns on the screen. These remain displayed as you move to different parts of the spreadsheet. With Lock, you can view two different portions of the spreadsheet simultaneously.

The spreadsheet cursor is used to define the rows or columns to be locked. When Lock is pressed, a second level of labels displays:

F1	F2	F3	F4	F5		F6	F7	F8	F9	F10
Column	Row		Both							Exit

The locked rows and columns are indicated by an asterisk, which appears in front of the column header or after the row header:

```
Col>*A       *B       *C       D        E
Row+ ----------------------------------------
   1*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
   2*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
   3*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
   4:
   5:
```

If you lock only rows, the left-most material in the locked area does not display when you move along the row to a section not currently displayed. This also occurs with locked columns. To retain a block of data on the screen, both rows and columns must be locked.

Locked rows or columns are unlocked by using Lock a second time. When they are unlocked, the asterisks disappear.

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Locking and Unlocking Columns

Locking columns is a simple procedure with Lock.

```
Col>  A           B           C                    D
Row +-------------------------------------------------
    1:Part No.   Item Name   Description          In
    2:-----------------------------------------------
    3:37382      Washer      Large outside washer
    4:37885      Nut         ⅜" ID Coarse
    5:32235      Bolt        ⅜" x 2" Coarse Hex
    6:33341      Strap       10" Braided Gnd.
    7:_____
```

To lock columns A and B so we can view columns past Column C, we move the cursor to column B.

Press |Lock|

Press |Column|

Asterisks display next to the column headers for Columns A and B.

Now, we scroll to the right to bring more columns onto the screen. Notice how columns A and B remain displayed:

```
Col> *A          *B          D           E         F
Row +-------------------------------------------------
    1:Part No.   Item Name   In Stock    Ordered
    2:-----------------------------------------------
    3:37382      Washer                  5273    10000
    4:37885      Nut                     4263    12000
    5:32235      Bolt                    6421    10000
    6:33341      Strap                   2221     4000
    7:          _____
```

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To unlock columns A and B, we move the
cursor into Column B.

Press ⌜ ⌟

Press ⌜ ⌟

The columns are unlocked and the asterisks
disappear.

Locking and Unlocking Rows

The procedure for locking and unlocking rows
is similar to the procedure for columns.

Using the same sample spreadsheet as the last
time, we move the cursor to row 2.

Press

Press

Rows 1 and 2 are now locked, as indicated by
the asterisk next to the row header.

To unlock rows, we move the cursor to row 2.

Press

Press

Rows 1 and 2 are unlocked.

Locking and Unlocking Both Columns and Rows

Both is used to lock a block of cells starting from cell A1. The cursor is used to mark the bottom right corner of the block. The locked section remains displayed as you move to different parts of the spreadsheet.

We move the spreadsheet cursor to cell B5, which is the bottom right corner of the area to be locked.

Press

Press

Asterisks appear next to the column and row headers marking the locked area.

To demonstrate this, we move the cursor to cell A100 with GoTo.

The screen displays:

```
Col>*A        *B      :AA      :AB      :AC
Row+----------------------------------------------
    1:Part No.   Item Name
    2*--------------------
    3*37382    Washer
    4*37885    Nut
    5*32235    Bolt
100:
101:
```

To unlock these columns and rows, we return to cell B5 with GoTo.

Press

Press

CHANGING COLUMN WIDTHS

ColWidth is used to change the width of the
column in which the spreadsheet cursor is
located. Each column on the spreadsheet can
be set to any width between 3 and 63 spaces.

We change the width of column B in our
sample sheet.

```
Col>:A         :B         :C         :D         :E
Row+ -------------------------------------------
  1:FREQUENCY OF COLORS IN THE RAINBOW
  2:
  3:              Color     Frequency
  4:                        -----------------
  5:              Red            10.0
  6:              Green          15.2
```

First, we move the spreadsheet cursor to
column B.

Press ColWidth

The Command window displays the prompt
for width:

```
Column B width [10]
New width (3..63): __
```

Type 15
Press RETURN

The width of column B is changed to 15. The
sample sheet has this appearance:

```
Col>:A         :B              :C         :D
Row+ -------------------------------------------
  1:FREQUENCY OF COLORS IN THE RAINBOW
  2:
  3:              Color           Frequency
  4:                              -----------------
  5:              Red                  10.0
  6:              Green                15.2
  7:                              _____
```

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DECIMAL PRECISION

Displayed decimal precision is set with Precsion. Precsion sets the decimal precision for the column or the current cell. The precision can range from 0 to 12 decimal places, subject to the column width.

Defaults is used to change the displayed precision for the entire spreadsheet. See the Defaults section for more information about setting displayed precision for the entire spreadsheet.

Precsion uses a second level of labels:

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Column		Cell							Exit

Changing Displayed Precision for Single Cells

In the sample sheet below, we change the displayed precision for single cells. The precision for cell A3 is from 2 places to 1 place.

Col>A	B	C	D
Row↓			
1:SAMPLE DECIMAL PRECISION DISPLAYED
2:
3: 100.00	200.00	300.00
4: 1000.00	2000.00	3000.00
5: 10000.00	20000.00	30000.00
6: 100000.00	200000.00	300000.00
7:1000000.002000000.003000000.00
8: 1.00e7	2.00e7	3.00e7

We move the spreadsheet cursor to cell A3.

Press

Press

The Command window prompts you:

```
Local precision [—]
New precision (0..12): __
```

Press
Press

We have just changed the displayed precision in cell A3 from 100.00 to 100.0. Once precision is set for a single cell, the cell remains at that precision until changed again.

Changing Displayed Precision for Columns

The decimal precision for an entire column can be set. Using the sample sheet from the single cell example, we change precision for an entire column.

The precision for column is set to 0 places so that all numbers are shown as integers.

We move the spreadsheet cursor to column A.

Press

Press

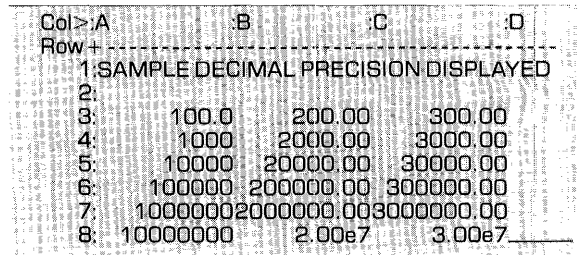Now the prompt for decimal precision displays:

```
Column A precision [2]
New precision (0..12): __
```

Press ()
Press [RETURN]

When we are finished, the sample spreadsheet looks like this:

```
Col>:A              :B            :C              :D
Row+------------------------------------------------
    1:SAMPLE DECIMAL PRECISION DISPLAYED
    2:
    3:       100.0      200.00       300.00
    4:       1000      2000.00      3000.00
    5:      10000     20000.00     30000.00
    6:     100000    200000.00    300000.00
    7:    10000002000000.003000000.00
    8:  10000000       2.00e7       3.00e7
```

Notice that cell A3 still retains the 1 place of decimal precision, even though the rest of column A now has no places of precision displayed.

ROUNDING

Rounding means that the last displayed digit of data in a cell is increased by one if the next smaller digit is five or greater. Numeric data in the spreadsheet is normally rounded off to the decimal precision set. See the section on Defaults for turning rounding on and off for the entire spreadsheet. When rounding is off, numerica data is truncated to the specified precision.

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LogiCalc rounds data internally as well as externally. When a list of rounded numbers are added, the correct result is computed and displayed.

Round turns rounding off or on for partial sections of the spreadsheet. A second level of labels is used to select either the Cell or Column option. The cursor is moved to the location to be changed, the Round function selected, and then the option chosen. The Command window displays the current state of rounding.

RoundCel turns rounding off or on for the current cell. The current rounding status is displayed in the Command window each time RoundCel is used.

CALCULATOR

The Calculator turns the Concept keyboard into a calculator that can perform mathematical operations using many of the other LogiCalc functions. The Calculator operates like a scratch pad that does not affect the spreadsheet.

The Entry/Edit line displays the expression as you enter it. The result is displayed in the Command window.

Numeric values, cell locations, the arithmetic operators, the System functions and the Mathematical functions can be used by the Calculator.

Using the Calculator

The Calculator is very easy to use. To add three numbers and view the result, we enter the numbers.

Type 1 + 2 + 3
Press ?

The word "computing" flashes for a moment on the Edit/ Entry line. The Command window displays the expression with the result:

```
1 + 2 + 3 = 6.000000000000
```

A maximum of 78 characters can be used by the Calculator, offering great flexibility in the type of expressions that can be used.

THE SYSTEM FUNCTIONS

LogiCalc has five built-in System functions to perform certain arithmetic operations. These functions are:

AVG   Average
CNT   Numeric Count
MAX   Maximum Value
MIN   Mininum Value
SUM   Summation

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These system functions evaluate a set of numeric values. This set can be any combination of the following numeric data:

- Individual cells containing numeric values

- Ranges of cells with numeric values

- Numeric expressions enclosed in parentheses.

The general form of a system function is as follows:

  + FUNCTION(set of numeric values)

where FUNCTION is the name of the function. The function name can be any combination of upper-case or lower-case letters. If a range of cells is specified, it must follow a row or column line.

The set of values can be defined in any number of ways:

  + Function (A1>A6)
  + Function (A1, A4, B3, C1)
  + Function (C3>C6, D3>D6, E1>E10)
  + Function (B2>B8, C8, D8, E5>E11)

The System functions can be used in formulas and expressions in the spreadsheet, as part of conditional or user-defined expressions, and with the Calculator.

AVG—Average

AVG calculates the numeric average for a range of values. This is defined as the sum divided by the count for a group of numeric values. The result displays at the decimal precision set.

In the example below, the AVG function is used to compute the numeric average for column C.

```
Col>:A           :B          :C          :D        :E
Row+------------------------------------------------------
   1:SAMPLE
   2:
   3:NAME OF STUDENT        TEST 1
   4: Smith, Patti               85
   5: Orwell, James              92
   6: White, Ginger              82
   7:
   8: Average            _____
```

Move the spreadsheet cursor to cell C8.

Type ⊦AVG(C4>C6)
Press [RETURN]

The numeric average for the range specified, C4 through C6, is computed and displayed in cell C8. The decimal precision for the column has been set to 0.

```
Col>:A           :B          :C          :D        :E
Row+------------------------------------------------------
   1:SAMPLE
   2:
   3:STUDENT NAME          TEST 1
   4: Smith, Patti               85
   5: Orwell, James              92
   6: White, Ginger              82
   7:
   8: Average                    86
```

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To find the average for multiple columns, find
the average for each column and then average
the set of column averages, or + AVG(A1>A3,
B1>B3, etc.).

CNT—Count

CNT counts the number of numeric values in a
set. If a range of cells is specified, only cells
with numeric data are counted. Even though
CNT always yields zero or a whole number,
the result is displayed with the current
precision. For your convenience, you may
want to set the precision to zero.

In the sample sheet below, CNT is used to find
the number of different parts in stock.

```
Col>:A          :B  :C          :D              :E
Row +-------------------------------------------------------
   1:SAMPLE CNT SYSTEM FUNCTION
   2:
   3:PART NO.      DESCRIPTION  QUANTITY
   4:   23436       Gold Faucets        423
   5:   23424       Silver Bowls         17
   6:   34572       Brass Rings          —
   7:   23454       Glass Houses          2
   8:
   9:              NO. IN STOCK  _____
```

The formula is entered in cell D9.

Type CNT(D4>D7)
Press [RETURN]

The result displays in cell D9, which has 0
places of decimal precision.

```
Col> A            B  C                              D          E
Row +----------------------------------------------------------
    1:SAMPLE CNT SYSTEM FUNCTION
    2:
    3:PART NO.     DESCRIPTION           QUANTITY
    4:   23436     Gold Faucets               423
    5:   23424     Silver Bowls                17
    6:   34572     Brass Rings
    7:   23454     Glass Houses                 2
    8:
    9:             NO. IN STOCK                 3
```

To use CNT on a block of data, the format is
+ CNT (A1>A10, B1>B10, C1>C10).

MAX—Maximum

MAX selects the largest numeric value from a
set of values. Only cells with numeric values
are evaluated when a range of cells is
specified.

For example, in the spreadsheet below, the
MAX function can be used to find the highest
part number.

```
Col> A            B  C                              D          E
Row +----------------------------------------------------------
    1:SAMPLE MAX SYSTEM FUNCTION
    2:
    3:PART NO.     DESCRIPTION           QUANTITY
    4:   23436     Gold Faucets               423
    5:   23424     Silver Bowls                17
    6:   34572     Brass Rings
    7:   23454     Glass Houses                 2
    8:
    9:             HIGHEST PART NO.
```

The formula is entered in cell A9.

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Type : :````:````: `` ````
Press :`` `````

In cell A9, the result "34572" displays.

MIN—Minimum

MIN selects the smallest numeric value from a set of values. Text data is not evaluated.

In the example below, we are looking for the smallest number in the group of cells B3 through B7. This minimum value will be displayed in cell D5, which has decimal precision set to 0.

```
Col>:A        :B          :C :D              :E
Row + ------------------------------------------
    1:SAMPLE MIN SYSTEM FUNCTION
    2:
    3:House #1    120,000      LOWEST
    4:House #2    132,000      HOUSE:
    5:House #3    109,500
    6:House #4     85,000
    7:House #5     98,750
    8:
```

Move the spreadsheet cursor to cell D5.

Type
Press

The minimum value displays at D5:

```
Col>:A        :B          :C :D              :E
Row + ------------------------------------------
    1:SAMPLE MIN SYSTEM FUNCTION
    2:
    3:House #1    120000       LOWEST
    4:House #2    132000       HOUSE:
    5:House #3    143600           85000
    6:House #4     85000
    7:House #5     98750
    8:
```

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SUM—Total

SUM calculates the numeric total of a set of numeric values.

In the sample spreadsheet below, SUM is used to find the total value of all five houses.

```
Col>:A        :B        :C  :D                :E
Row+ ------------------------------------------------
      1:SAMPLE MIN SYSTEM FUNCTION
      2:
      3:House #1    120,000    TOTAL
      4:House #2    132,000    VALUE OF
      5:House #3    109,500    HOUSES:
      6:House #4     85,000
      7:House #5     98,750    _____
      8:
```

In cell D6, enter the formula to sum the values.

Type
Press

```
Col>:A        :B        :C  :D                :E
Row+ ------------------------------------------------
      1:SAMPLE MIN SYSTEM FUNCTION
      2:
      3:House #1    120,000    TOTAL
      4:House #2    132,000    VALUE OF
      5:House #3    109,500    HOUSES:
      6:House #4     85,000                    545250
      7:House #5     98,750
      8:
```

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THE MATHEMATICAL FUNCTIONS

LogiCalc has a set of mathematical functions you can use in expressions on the spreadsheet or with the Calculator. These mathematical functions are as follows:

ABS   Absolute Value
ATAN   Arc Tangent
COS   Cosine
EXP   Exponential
LN   Natural Logarithm
SIN   Sine
SQRT   Square Root
TRUNC   Truncate

The general format of these functions is as follows:

+ FUNCTION NAME(Argument)

The argument is a valid numeric value, or a cell coordinate that contains a valid numeric value. A numeric expression can be used for most mathematical functions.

ABS—Absolute Value

ABS calculates the absolute value for a numeric value. Absolute value is the number itself if it is greater than or equal to zero. If not, it is the negative of the number. In all cases, the absolute value is zero or greater.

+ ABS(5)   =   5.00
+ ABS(-10) = 10.00
+ ABS(3-7) =   4.00

ATAN—Arc Tangent

ATAN calculates the arc tangent value for the argument.

+ ATAN(3) = 1.25

COS—Cosine

COS calculates the cosine value of an angle expressed in radians. The result is expressed in radians.

+ COS(2) = −0.42

EXP—Exponentiation

EXP calculates the value of e raised to a power of x, where e = 2.71828182. EXP is the equivalent of e**x.

+ EXP(3) = 20.09

LN—Natural Logarithm

LN calculates the natural (Naperian) logarithm for any valid numeric value.

+ LN(55) = 4.01

SIN—Sine

SIN calculates the sine value for any angle expressed in radians.

+ SIN(4) = -0.76

SQRT—Square Root

SQRT calculates the square root of any valid numeric value.

+SQRT(55) = 7.42

TRUNC -- Truncate

TRUNC calculates the truncated integer value of any numeric value.

+TRUNC(88.95) = 88.00

Converting Degrees to Radians

The conversion formula for radians to degrees is as follows:

57.296 Radians = Degrees

OR

.01745 Degrees = Radians

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WHAT IS CELL PROTECTION?

Cell protection prevents accidental changes to the contents of a cell. This protection can be turned on or turned off to allow changes to be made.

For some applications, you will want to avoid the possibility of key formulas being changed by accident. For example, in the spreadsheet below, only four cells are unprotected and can be changed. The rest of the sheet is protected.

```
Col> A          B           C                D
Row +----------------------------------------
    1:COST OF NOT TAKING DISCOUNTS
    2:
    3:Invoice Amount                    2000
    4:Discount %                           3
    5:Discount Period                     10
    6:Net Due                             30
    7: = = = = = = = = = = = = = = = = = =
    8:Effective Interest Rate          55.67
    9:Dollar Cost                         60
   10: = = = = = = = = = = = = = = = = = =

        Shaded area indicated protected cells.
```

Frequently, cell protection is used along with the Forms Template, which is discussed later in this chapter.

PROTECT FUNCTION

Protect sets a temporary protection condition for a single cell, a column, or the entire spreadsheet. Cells remain protected when the spreadsheet is saved and later loaded again. Once set, protection can be removed at any time to make changes.

The Protect function can be deactivated for the entire spreadsheet with the Protect option of Defaults.

Protect has a second level of labels which are displayed when [Protect] is pressed:

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Column	Cell		All						Exit

[Column]   sets the protection for the current column.

[Cell]   sets the protection for the current cell. This is identical to ProtCell.

[All]   sets the protection for the entire spreadsheet.

[Exit]   leaves Protect level.

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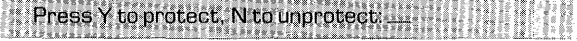
Setting Protection

Move the spreadsheet cursor to column A.

Press [Protect]

Press [Column]

The Command window now displays:

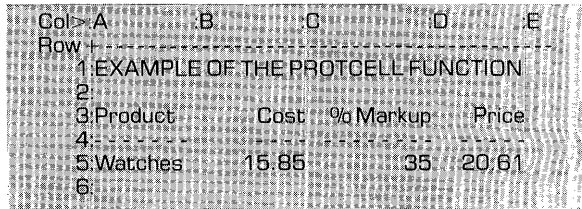> Press Y to protect, N to unprotect: __

Press Y

The Command Window changes to:

> Press Y to protect, N to unprotect:
> Column A : Protection [ON]

Column A is now protected. The information on the current cell line in the Entry/Edit Area also changes to show:

    Cell   A4: title: protected
      Contents: "Number of Points"
    Entry/Edit: __

Now, the contents of the single cell C5 should be protected to prevent the formula from being changed.

Move the cursor to cell C5.

Press [Protect]

Press [Cell]

Two things change on the screen. First, the cell location line in the Edit/Entry area changes to show that protection is on. Second, a message displays in the Command window to alert you that the cell is now protected:

```
Protection [ON]
```

Even though the contents of the cell are protected, the displayed result will change if the contents of cells C3 or C4 are changed and the spreadsheet recalculated.

The following protects the entire spreadsheet:

Press [Protect]

Press [All]

The Command window displays:

```
Press Y to protect, N to unprotect: __
```

Press Y

The Command window changes to:

```
Press Y to protect, N to unprotect: __
All cells : Protection [ON]
```

Removing Cell Protection

Cell protection may be removed in different ways:

- Protect can be used to removed protection from the current cell, the current column, or the entire spreadsheet.

- ProtCell can be used to remove protection from single cells.

- Protection can be disabled for the entire spreadsheet with the Protect option of Defaults.

To remove protection from a single cell with the Protect function, move the spreadsheet cursor to the cell.

Press [Protect]

Press [Cell]

The word "protected" disappears from the cell location line and the Command window displays:

Protection [OFF]

To remove protection from a column, move the spreadsheet cursor into that column.

Press [Protect]

Press [Column]

The Command window displays:

Press Y to protect, N to unprotect: _

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Press N

The protect tag is deleted from the cell location line, and the Command window changes to this:

```
Press Y to protect, N to unprotect:
Column A : Protectin [OFF]
```

To turn protection off for the entire spreadsheet, do the following:

Press [Protect]

Press [A]

The Command window displays:

```
Press Y to protect, N to unprotect: __
```

Press N

The Command window displays:

```
Press Y to protect, N to unprotect:
All cells : Protection [OFF]
```

The entire spreadsheet is now unprotected.

PROTCELL

ProtCell turns cell protection on and off for single cells, similar to the Cell option of Protect. ProtCell affects only the current active cell.

In the sample spreadsheet below, the contents of cell D5 will be protected since this location has a key formula.

```
Col> A          B          C          D          E
Row +-------------------------------------------------
    1 EXAMPLE OF THE PROTCELL FUNCTION
    2
    3 Product        Cost   % Markup    Price
    4
    5 Watches       15.85           35   20.61
    6
```

Begin by moving the cursor to the cell to be protected, cell D5.
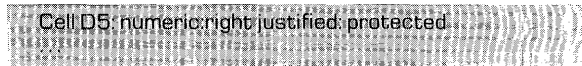
Press [ProtCell]

A message displays in the Command window:

```
Protection [ON]
```

The cell location line also shows that the cell is now protected.

```
Cell D5: numeric:right justified:protected
```

The procedure for removing cell protection with ProtCell is the same as the original protecting procedure. ProtCell can be used to remove protection from single cells that were originally protected with Protect.

Move the cursor to the cell location where you want to remove cell protection.

Press [Prot.Off]

The Command window displays:

Protection [OFF]

The cell location line now shows this:

Cell D5: numeric:right justified

THE FORMS TEMPLATE

LogiCalc has a special forms feature that is designed to allow users to prepare spreadsheet templates with minimum effort. These templates can then be used to create customized spreadsheets. DefForm is used to define the cells in the forms mode. AutoForm then activates the template form.

Once a forms template is created, it can be used over and over with each new spreadsheet being saved under a different name. The template can be changed at any time with DefForm. The forms template can be terminated with the [ESC] key at any point.

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The general procedure for creating and using a forms template is as follows:

1. Create the complete spreadsheet that will be used as the template, including all formulas and expressions.

2. Move the spreadsheet cursor to the first cell to be set to the forms mode.

3. Continue setting all cells in the forms mode until the template is completely defined.

4. Press [AutoForm]. All cells set to the forms mode are cleared of displayed data, and the spreadsheet cursor moves to the first cell.

5. Enter the data into the blank cells. The spreadsheet cursor automatically advances to the next blank cell in the forms mode.

6. When the last cell is filled, the spreadsheet is automatically recalculated and the recomputed spreadsheet displays on the screen.

This spreadsheet can be saved or discarded. AutoForm clears the template.

Creating a Forms Template

The sample spreadsheet below will be made into a forms template with cells B4, B5, B6 and B7 set to the forms mode.

```
Col>:A                                      :B        :C
Row+---------------------------------------------------------
     1:FORMS TEMPLATE EXAMPLE
     2:SAMPLE BREAKEVEN ANALYSIS
     3:
     4:Sales Price Per Unit                 1500.00
     5:Quantity Produced & Sold             2000
     6:Fixed Costs (Dollars)                250000
     7:Variable Costs Per Unit              425.00
     8:=======================================
     9:Breakeven Point (Units)              233
    10:Breakeven Point (Dollars)            248837.21
    11:Net Profit or Loss (Dollars)         1900000.00
    12:=======================================
```

Start by moving the spreadsheet cursor to cell B4.

Press |DefForm]

The Command window verifies that the forms mode has been set with this message:

```
Forms Mode [ON]
```

Move the spreadsheet cursor to the next cell, B5, and press [DefForm] again. Repeat this procedure for cells B6 and B7.

If you make a mistake and set the wrong cell in the forms mode, use DefForm again to cancel the forms mode.

When you have finished creating the forms template, it is a good idea to save the spreadsheet.

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Using the Forms Template

The forms template must be completed before it can be used.

Press [AutoForm]

The Command window alerts you that the forms mode is in use with this message in reverse video:

Automatic Form Control Mode

The cells set with DefForm are cleared and the cursor goes to the first cell.

```
Col> A                              B        C
Row
    1:FORMS TEMPLATE EXAMPLE
    2:SAMPLE BREAKEVEN ANALYSIS
    3:
    4:Sales Price Per Unit
    5:Quantity Produced & Sold
    6:Fixed Costs (Dollars)
    7:Variable Costs Per Unit
    8:
    9:Breakeven Point (Units)                 233
   10:Breakeven Point (Dollars)          248837.21
   11:Net Profit or Loss (Dollars)      1900000.00
   12:
```

Enter the data for the first form, starting in cell B4.

Type 25.00
Press [RETURN]

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The data displays in cell B4, and the cursor skips to the next cell set with the DefForm function, B5.

Type 100
Press RETURN

Type 500
Press RETURN

Type 3.25
Press RETURN

When the final item is entered, the cursor advances to the next cell position on the spreadsheet. The entire spreadsheet is automatically recalculated and the new results display. The example spreadsheet now looks like this:

```
Col>:A                                 :B          :C
Row + -------------------------------------------------
     1:FORMS TEMPLATE EXAMPLE
     2:SAMPLE BREAKEVEN ANALYSIS
     3:
     4:Sales Price Per Unit                25.00
     5:Quantity Produced & Sold             100
     6:Fixed Costs (Dollars)                500
     7:Variable Costs Per Unit             3.25
     8: = = = = = = = = = = = = = = = = = = = = =
     9:Breakeven Point (Units)               23
    10:Breakeven Point (Dollars)         574.71
    11:Net Profit or Loss (Dollars)     1675.00
    12: = = = = = = = = = = = = = = = = = = = = =
```

You can save or discard this spreadsheet. To start a new sheet in the template, press [Ctrl-clear].

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LINEAR REGRESSION AND FORECASTING

What Is Linear Regression?

Linear regression is a mathematical technique used to fit a straight line through a set of points formed by pairs of independent and dependent values. By convention, the independent values are assigned to the x-axis and the dependent values to the y-axis. The dependent variable is determined in part by the independent variable.

LogiCalc has four linear regression functions:

REGR   This determines the equation for fitting the line to the set of independent and dependent values.

PROJ   This calculates a dependent value for a specified independent value.

DEPD   This calculates an independent value for a specified dependent value.

SLOPE   This computes the slope of the line fitted through the independent and dependent values.

A table for the independent and dependent values must be set up on the spreadsheet before the linear regression functions can be used. The REGR function must be calculated first, then any or all of the other three functions can be used.

Setting Up the Independent and Dependent Values Table

The independent and dependent values must be set up in a table format. Each independent value must be paired with its dependent value. The two sets of values must run in a straight line, either horizontally or vertically.

The sample spreadsheet below shows how a table of independent and dependent variables might look. The number of calls is the independent variable. The amount of sales is the dependent variable.

Col>:A	:B	:C	D :E
Row+			
1:SAMPLE LINEAR REGRESSION			
2:			
3:WEEK (#)	CALLS (#)	SALES ($)	
4:			
5:	1	22	2573.00
6:	2	23	2601.00
7:	3	20	2536.00
8:	4	25	2694.00
9:	5	21	2558.00
10:			

There must be an equal number of independent and dependent variables. The independent variables are in the range B5>B9, while the range of dependent variables starts at cell C5.

REGR

REGR must be the first linear regression function computed.

The use of text labels is recommended to clearly identify the different functions. These labels are added to the sheet.

Col>:A	:B	:C	:D :E
Row +--
1:SAMPLE LINEAR REGRESSION
2:
3:WEEK (#) CALLS (#) SALES ($)
4:--
5: 1		22	2573.00
6: 2		23	2601.00
7: 3		20	2536.00
8: 4		25	2694.00
9: 5		21	2558.00
10:
11:REGR =
12:PROJ =
13:DEPD =
14:SLOPE =

The REGR equation goes in cell B11. The general form is as follows:

+ REGR(Independent Value Range, Start of Dependent Value Range)

Only the start of the range of cells containing the dependent values is specified since the range must contain the same number of values as the range of independent values.

Move the spreadsheet cursor to cell B11. Enter the REGR equation.

Type + REGR(B5>B9, C5)
Press [RETURN]

The result displays in cell B11. The result has a displayed precision of 0.

```
Col>:A          :B          :C          :D          :E
... :
  11:REGR    =    2592
  12:PROJ    =
  13:DEPD    =
  14:SLOPE   =
```

An option exists to display a character instead of the actual number. To use this option, the REGR equation would be entered as follows:

+ REGR(B5>B9,C5):"C"

The other linear regression functions can be used after REGR. The equations for these other functions must be located in cells on the spreadsheet that are recalculated in a later order. See the chapter on "The Defaults Function" for more information about recalculation order.

PROJ

PROJ computes the dependent value for a given independent value based on the REGR expression. PROJ can be used for only one independent value at a time. The general format is as follows:

+ PROJ(Independent value)

The corresponding dependent value displays in the cell where the PROJ expression is entered.
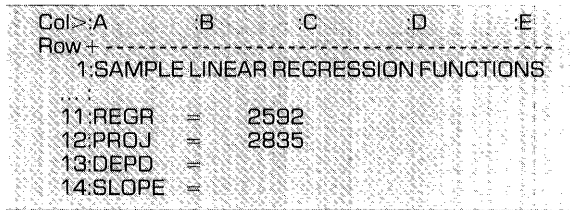
For example, you could estimate the amount
of sales 30 calls might generate based on
existing data. The independent variable is 30
and the dependent variable is unknown.

Move the cursor to cell B12.

Type | PROJ(30)
Press |RETURN|

The spreadsheet displays the result.


```
Col>:A        :B      :C        :D        :E
Row +  --------------------------------------------
        1:SAMPLE LINEAR REGRESSION FUNCTIONS
     ...
       11:REGR   =    2592
       12:PROJ   =    2835
       13:DEPD   =
       14:SLOPE  =
```

DEPD

DEPD estimates the independent value that
corresponds to a specified dependent value.
Like PROJ, DEPD finds only one value for the
value specified. DEPD must also be located on
the spreadsheet after the REGR expression.
The general format is as follows:

+ DEPD(Dependent value)

The corresponding independent value displays
in the cell location where the DEPD equation
is entered.

DEPD can be used to estimate how many calls
will be required to produce $3000.00 worth
of sales based on existing data.

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Move the cursor to cell B13.

Type + DEPD(3000)
Press [RETURN]

The result displays in cell B13.

```
Col>:A          :B         :C          :D          :E
Row + - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    1:SAMPLE LINEAR REGRESSION FUNCTIONS
...:
   11:REGR    =      2592
   12:PROJ    =      2835
   13:DEPD    =        35
   14:SLOPE   =
```

SLOPE

SLOPE returns the slope of the line through
the set of independent and dependent values
that was computed with REGR. This slope
provides information on the rate of change.
For each unit of the independent value, REGR
tells how much the dependent value changes.
A slope of 1 means that the independent and
dependent values are changing at the same
rate.

SLOPE must also be calculated after the REGR
function. However, since there is only one
slope for any given straight line, no value is
entered for this equation, just a pair of
parentheses. The format for the SLOPE
function is as follows:

  + SLOPE( )

SLOPE in this example tells us approximately
how much each additional call can be
expected to produce in sales.

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Move the cursor to cell B14.

Type +SLOPE()
Press [RETURN]

After all the linear regression equations have been computed, the spreadsheet looks this way:

Col>A	:B	:C	:D	:E
Row +				
1	SAMPLE LINEAR REGRESSION FUNCTIONS			
2:				
3	WEEK (#)	CALLS (#)	SALES ($)	
4:				
5:	1	22	2573.00	
6:	2	23	2601.00	
7:	3	20	2536.00	
8:	4	25	2694.00	
9:	5	21	2558.00	
10:				
11	REGR =	2592		
12	PROJ =	2835		
13	DEPD =	35		
14	SLOPE =	31		

Using Linear Regression for Forecasting

The examples used to demonstrate linear regression illustrate how these functions can be used to forecast unknown values based on a collection of known data values. However, the results are limited to the accuracy of the known data and the tendency of future events to behave in the same manner as past events. Also, a larger data set is more likely to produce more accurate results than a smaller set, other factors being the same.

What the linear regression functions offer is a quick and simple way to estimate an unknown value. Using PROJ, for example, we estimated that 30 calls would produce $2835 in sales. DEPD told us that it would take 35 calls to produce $3000 in sales. Finally, SLOPE indicated that each call past the average number of calls produced $31 in sales.

By analyzing calls and sales in this manner, you can have some idea of how effective more calls are likely to be or how much more effort will be required to reach a higher sales level.

CONDITIONAL EXPRESSIONS AND USER-DEFINED EXPRESSIONS

Conditional Expressions

Conditional expressions in LogiCalc are statements that can return one of two results. One result is returned if the expression is evaluated and found to be true; the other result is returned if the expression is false.

The general structure of a conditional expression is as follows:

[Condition]:[True Result]:[False Result]

Conditional expressions are similar to IF...THEN...ELSE statements frequently used in programming: IF this condition is true THEN do this ELSE do that.

Valid Operands and Operators.
Conditional expressions can use numeric values or cell coordinates for operands. Operands are the data objects manipulated by various operators. The System functions may be used if a valid range of cell values is specified.

The following operators are permitted:

Relational Operators

    <   Less than
    < = Less than or equal to
    =   Equal to
    <> Not equal to
    > = Greater than or equal to
    >   Greater than

Logical Operators

    *   Logical AND, both values of the operands must be true for the expression to be true.

    +   Logical OR, either value of the operands must be true, or both can be true, for the expression to be true.

Arithmetic Operators

    *   Multiplication
    /   Division
    %   Percentage
    +   Addition
    —   Subtraction

Sample Conditional Statement Clauses.
These sample conditional statement clauses illustrate some possible conditions:

+ SUM(A1>A19) > 0: If the sum of cells A1 through A10 is greater than zero.

((C5 = 5) * (C6 = 5)): If cell C5 and cell C6 are both equal to 5.

(B8-D10) > = 100: If the value of cell B8 minus the value of cell D10 is greater than or equal to 100.

Valid TRUE Result Clauses. The following can be used as TRUE result clauses:

1 Logical TRUE	This is returned as the TRUE result if the statement is true and no other TRUE result specified.
0 Inverse TRUE	This is returned as the TRUE result when two colons are used after the conditional statement clause, i.e. ::.
Numeric Value	Any valid numeric value can be specified as the TRUE result.
Cell Coordinate	The numeric value of the cell specified will be displayed.
Character String	Any character string enclosed within double quote marks can be specified.

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Numeric Expression	This expression can contain any permissible operator with numeric values or cell coordinates.

Valid FALSE Result Clauses. The FALSE result clause can contain any one of the following:

0 Logical FALSE	This is returned as the result if the statement is FALSE and no other FALSE result is specified.
Numeric Value	Any valid numeric value
Cell Coordinate	The numeric value of the cell specified will be displayed.
Character String	Any character string enclosed within double quote marks.
Numeric Expression	Any valid numeric expression can be specified.

The Logical AND and OR Operators.
There is key difference between the logical AND and OR operators (* and +), and the arithmetic operators for multiplication and addition (* and +).

The logical operators are used to compare two expressions:

   (Statement A) * (Statement B) :

which translates "if statement A and statement B are both true....."

Statement A and statement B are evaluated separately to determine if they are true. If a statement is true, it is assigned a value of 1; if the statement is false, it is assigned a value of 0.

The arithmetic operators for multiplication and addition are used within statements. Each statement is enclosed within parentheses for clarity. The arithmetic operators work in the usual manner for normal arithmetic operations.

The Greater Than Sign. The $>$ symbol is used as a relational operator to indicate "greater than." This use should not be confused with the use of the $>$ symbol when specifying a range. The $>$ symbol is interpreted by LogiCalc to mean "greater than" unless it is used to specify a range of cells with a System function.

Using Conditional Expressions.
Conditional expressions can be used a number of ways. The examples below are designed to provide a general understanding of how to construct and use conditional expressions.

We will use the sample spreadsheet below.

```
Col>:A          :B        :C        :D
Row |-------------------------------------------
     1:SAMPLE CONDITIONAL EXPRESSIONS
     2:
     3:Age of Car          3
     4:Car Value       2800
     5:Blue Book       2400
     6:New Car         6000
     7:Savings         4000
     8:Decision
```

In cell C3, we want to insert a comment about the age of the car. If the car is 3 years old or newer, it is "OK" but if the car is over 3 years, it is "TOO OLD."

Move the spreadsheet cursor to cell C3.

Type +B3<=3:" OK ":" TOO OLD "
Press [RETURN]

Cell C3 should now display " OK ."

Next, in cell C4, we want to test if the value of the car in cell B4 is greater than the listed Blue Book price, and if so, how much larger. If both values are the same, we want zero displayed. If the value is lower, then "LOWER" should be displayed instead. Suppose that the Blue Book figure is $2400, as shown in cell B5.

Move the cursor to cell C4.

Type +B4>=B5:(B4-B5):" LOWER "

For the last sample conditional expression, in cell C8 we want a decision to " BUY " or " WAIT " based on two criteria being true:

(1) We can afford a new car, based on the new car cost being less than the value of the old car plus the amount of savings;

(2) The current car is more than three years old.

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This conditional expression involves using the logical AND operator, the asterisk.

Move the cursor to cell C8.

Type ((B4 + B7)>(B6)) * (B3>3):" BUY ": " WAIT "

Press |RETURN|

When you are finished, the final spreadsheet will look like this:

```
 Col>:A          :B          :C              :D
 Row+ - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    1:SAMPLE CONDITIONAL EXPRESSIONS
    2:
    3:Age of Car        3          OK
    4:Car Value      2800       400.00
    5:Blue Book      2400
    6:New Car        6000
    7:Savings        4000
    8:Decision                  WAIT
```

Conditional expressions must be constructed carefully, and checked for any unusual conditions.

User-Defined Expressions

User-defined expressions are arithmetic statements that you create with one variable. Each occurrence of the variable is represented by an exclamation point. An opening exclamation point is used to alert LogiCalc that the expression is a user-defined expression.

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The general format is as follows:

$$y = !(!)$$
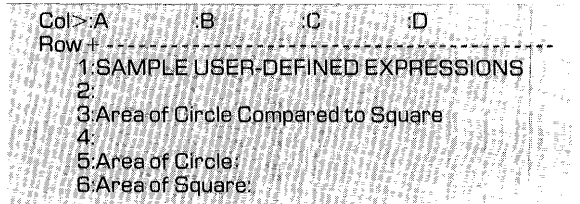
where y is the result displayed on the spreadsheet at the cell location, and (!) is the expression stored at the that cell location.

When a user-defined expression is first entered, "?n?" displays since the expression is undefined. When a value is specified, the expression is evaluated and the result displays.

User-defined expressions offer a large degree of flexibility in setting up spreadsheets where different values may be used for the variable. This allows you to try different possible values in the formula.

Constructing User-Defined Expressions.
In the sample spreadsheet below, two user-defined expressions are used to compare the area of a square with the area of a circle. Since this value may change, user-defined expressions are used.

```
Col>:A          :B          :C          :D
Row +-----------------------------------------------
   1:SAMPLE USER-DEFINED EXPRESSIONS
   2:
   3:Area of Circle Compared to Square
   4:
   5:Area of Circle:
   6:Area of Square:
```

The formula for the area of a circle is pi*r*r, where pi is approximately 3.1415 and r is the radius. The user-defined expression is as follows:

!(3.1415 * ! * !)

This formula must be changed slightly, to substitute .5*d for r, since the diameter is twice the radius. The user-defined expression becomes the following:

!(3.1415 * (.5*!) * (.5*!))

Move the spreadsheet cursor to cell C5.

Type !(3.1415 * (.5*!) * (.5*!))
Press [RETURN]

The formula for a square is the number times itself. The user-defined expression is:

!(!*!)

Move the spreadsheet cursor to cell C6.

Type !(!*!)
Press [RETURN]

Both cells C5 and C6 display "?n?" because no value has yet been assigned to the variable. Let's compare a circle with a diameter of 5 to a square of 5:

In cell C5, enter the value 5. In cell C6, enter the value 5.

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The two expressions are evaluated, and the spreadsheet displays:

```
Col>:A          :B        :C        :D
Row+------------------------------------------
   1:SAMPLE USER-DEFINED EXPRESSIONS
   2:
   3:Area of Circle Compared to Square
   4:
   5:Area of Circle:    19.63
   6:Area of Square:    25.00
```

Enter 3 in cells C5 and C6. The spreadsheet now displays:

```
Col>:A          :B        :C        :D
Row+------------------------------------------
   1:SAMPLE USER-DEFINED EXPRESSIONS
   2:
   3:Area of Circle Compared to Square
   4:
   5:Area of Circle:    7.07
   6:Area of Square:    9.00
```

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TECHNICAL INFORMATION | 8

INSTALLING LOGICALC

This section explains the procedure for installing LogiCalc on the Corvus Hard Disk System for use on the Concept Personal Workstation. LogiCalc should be installed by the System Manager or someone who is familiar with the system and has access to all passwords and files.

The following hardware is required:

    Corvus Concept Personal Workstation
    Corvus Hard Disk System
    Corvus Floppy Diskette Drive

The complete computer system should be set up with the Corvus Concept Operating System (CCOS) software installed.

The following software is needed in addition to the Corvus Concept Operating System:

    The LogiCalc diskette labelled FLGICLC.

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The LogiCalc Program Diskette

The LogiCalc diskette labelled FLGICLC has these files:

CC.LGICLC   The main LogiCalc program, which is transferred to the /CCSYS volume on the Corvus Disk.

SYSTEM.UPDATE This file is a command file that will automatically transfer the LogiCalc programs from the diskette to the Corvus Disk.

HELP.LC.TEXT   The text file for the Help command. This can be modified using Edword. This file is transferred to the /CCSYS volume.

KEYS.LC.TEXT   This file is used to contain function key labels. This file is also transferred to the /CCSYS volume. It can be modified using Edword.

If your diskette does not contain all these programs, contact your local Corvus Dealer immediately.

Transferring the LogiCalc Programs

This procedure is very simple and easy. However, if you have any problems, see "The Corvus Concept Personal Workstation User Guide" for more information.

Your Corvus Concept should be set up and operating, and the Dispatcher labels displayed.

If the LogiCalc label appears, usually on the F2 label, then LogiCalc has already been installed. If you cannot enter LogiCalc when you press this key, then reinstall the LogiCalc program.

Insert the FLGICLC diskette into the diskette drive.

Press [ExecFile]

The Command window displays:

> Execute which command file?___

Type /FLGICLC/SYSTEM.UPDATE
Press [RETURN]

The screen displays this message:

```
; File ID: /FLGICLC/SYSTEM.UPDATE

; SYSTEM.UPDATE assumes volumes /CCSYS
    and /CCUTIL exist
; and have read/write access

Continue? [Y/N]: _
```

Press Y

The screen now displays various messages as it transfers files, until the transfer is complete.

```
Current volume is now /FLGICLC

; SYSTEM.UPDATE complete
```

When the system update is complete, remove the diskette. If an error message is displayed or if files cannot be transferred, check the amount of space available on the /CCSYS and /CCUTIL volumes.

Reboot the Concept and log-on again:

Hold the [CONTROL] key down.
Press [BREAK]

Enter your name and password.

The Concept will reload the operating system, and the main level of labels display. The label for key F2 should display LogiCalc. When this label appears, the LogiCalc program is ready to use.

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LOGICALC PROGRAM SPECIFICATIONS

General

Model Size	255 Rows by 127 Columns
Column Width	3 to 63 Spaces
Cursor Keys	4

Display Area (Maximum)

Horizontal	112 Characters x 40 Lines
Vertical	85 Characters x 56 Lines
Function Keys	40 keys maximum at each level; multiple levels

Cell Capacity

The following table shows the maximum number of cells with data a spreadsheet can have based on the average data size. These numbers are approximations and may vary slightly. Additional space can be gained in some cases by moving the stack pointer, which is explained later in this chapter.

Machine Size (512K or 256K)	Average Data Size (string length)	Number of Cells
512K	10	6268
	20	4905
	30	4038
	40	3418
	50	2969
	60	2623
	70	2350
	80	2128
256K	10	1313
	20	1028
	30	844
	40	716
	50	622
	60	549
	70	492
	80	446

Arithmetic Expressions

+ Plus
- Minus
/ Divide
* Multiply
** Exponent
() Parentheses
% Percentage

Cell Formatting

Independent Column Width (3-63)
Independent Precision (0-12)
Left, Right or Center Justification of Data
Repeat character or character strings
Title entries crossing cell boundaries

Mathematical Functions —

ABS   Absolute Value
ATAN   Arc tangent
EXP   Exponentiation
LN   Natural Log
SIN   Sine
SQRT   Square Root
TRUNC   Truncate

System Functions

AVG   Average
CNT   Numeric Count
MAX   Maximum Value
MIN   Mininum Value
SUM   Sum Value

Linear Regression Functions

REGR   Regression
PROJ   Projection
DEPD   Dependency
SLOPE Slope

Conditional Expressions

If . . . Then . . . Else Clauses
Relational operations:
   $<, <=, =, >=, >, <>$
Logical AND (*) and OR (+)

Data Manipulation

Insert: column/row
Delete: cell/column/row/unprotected/all
Copy: cell/column/row/block
Replicate: cell/column/row
Protect: cell/column
Lock: columns/rows/both
Move: move display

Recalculate

Automatic recalculation option
Recalculate cell
Recalculate all
Selectable recalculation order: column/row

Print and Store Spreadsheets

Print model to printer/file/screen
Print partial models
Save model with optional password
Load model
Merge multiple models
List files in volumes
Dump model cell contents and formulas
Transfer text copy of model to EdWord

Cell Editing

Type-over character
Insert characters
Delete characters
Open/Close edit line
Change data type
Change data position in cell

Other Features

Flexible GoTo commands
Forms Template Mode
Calculator
User-Defined Expressions
Input fields up to 80 characters long

MOVING THE STACK POINTER

It is possible to gain additional memory space by moving the stack pointer in the main memory area of the Concept. The stack pointer marks the boundary of the available memory space. The stack pointer should be restored to its normal position when you no longer need the extra memory space. Moving the stack pointer may prevent you from running certain application programs that require large memory areas.

The normal settings (in hexadecimal) for the stack pointer are:

    256K Concept Memory   9E000
    512K Concept Memory   AE000

The new stack pointer locations are:

    256K Concept Memory   A4000
    512K Concept Memory   DE000

We will now demonstrate how to move the stack pointer for a 512K machine to handle extra large spreadsheet files.

First, you must be at the Dispatcher level on the Concept.

Check the current position of the stack pointer.

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Type SP
Press [RETURN]

The Command window displays, for example:

```
sp = 0009E000
```

Type SP   DE000
Press [RETURN]

After the SP command sets the system stack pointer, it restarts the Concept. A message displays on the screen telling you the system is restarting and the operating system reinitializing.

Check the new location of the stack pointer.

Type SP
Press [RETURN]

The Command window displays:

```
sp = 000DE000
```

If you attempt to set the stack pointer to an invalid location, an error message will display. The original stack pointer value is not changed in this case.

The SP command can be issued only from the Dispatcher level on the Concept. Any attempt to change the value from inside another program will result in an error message.

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