

COMPUTER SOFTWARE ASSOCIATES

PRACTICALC PLUS

Program by Sandy Ruby

A Computer Spreadsheet for the Commodore VIC-20

22 Mathematical Functions
Addition, Subtraction, Multiplication, Division . . .
Square Root, Logarithms

Capacity of up to 100 Columns/250 Rows

Column Width of 3–21 Characters

Sorts Alphabetic & Numeric Entries

Bar Graphs—Lo-Res & Hi-Res

Special Title Column Width

Manual by Kathleen F. Nolan

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If PractiCalc Plus fails to load within 90 days after purchase due to product defect, return it to your local retailer in its original packaging with proof of purchase and it will be replaced free of charge. Computer Software Associates makes no other warranties, either expressed or implied, regarding the enclosed software or its fitness for any particular purpose.

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Introduction

Our thanks for your purchase of PractiCalc Plus, the complete electronic spreadsheet for the Commodore VIC-20. PractiCalc is an all-purpose number handler which is capable of managing information in the home, school, or office environment.

Essentially a worksheet of rows and columns, PractiCalc works with both numbers and letters. For handling the numeric entries, PractiCalc has 22 mathematical functions and operations. It can figure your family budget for the next five years—or find the logarithm, sine or cosine that will solve a student's math problems. PractiCalc can sort words alphabetically from A to Z (and even Z to A!). It will search, too, for entries that you can't quite remember. Not only does PractiCalc put so many functions at your touch, but it also has the extras to make it all convenient: an option which repeats information *for* you, and options like move, insert, and delete for easy reshuffling of information.

Read the manual carefully, paying close attention to notes and examples intended to clarify the more complex points. Chapter Four of the manual uses a small business as an example within a tutorial. A business problem was used because it permitted more of the spreadsheet's functions to be shown. However, business applications are only one of the categories whose needs can be met by PractiCalc. From something as simple as an address book to applications as complex as financial forecasting, PractiCalc Plus can be used.

At the end of the manual you will find information about warranties, and purchase of back-up and upgrade copies. There is also a number to call for technical support.

Think of PractiCalc as a blank sheet, laden with numerical and alphabetical capabilities. Like the spreadsheet needs of its users, PractiCalc's uses are virtually limitless. Best of luck with your new piece of software!

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Chapter 1

Loading the PractiCalc Program

The process of loading PractiCalc Plus into your Commodore home computer is a simple one. The following steps outline the easiest way to ready the PractiCalc program for your use.

- #1. Make certain the VIC-20, the Datassette cassette player (or the disk drive), and your TV or video monitor are connected by the appropriate cables and that the VIC-20 is securely plugged into an electrical outlet. PractiCalc Plus also requires that a minimum of 16K RAM (for additional memory) be securely inserted at the rear of the keyboard unit. [PractiCalc Plus can use up to 24K of additional memory.]

To Load Cassette Version

- #2C. Place the PractiCalc Plus cassette in the Datassette.
- #3C. Turn the VIC-20 on. The on/off switch is located on the right side of the keyboard unit.
- #4C. Rewind the PractiCalc Plus cassette in the Datassette to ensure that the cassette will be playing at the start of the program. The following will now appear on your screen:

```
**** CBM BASIC V2 ****  
19967 BYTES FREE  
READY.  

```

Note 1A: *If the screen does not read at least "19967 Bytes Free", your RAM Card is not completely inserted at the rear of the keyboard.*

The blinking box is called the 'cursor'. Its presence tells you the computer is ready for your next command.

#5C. If you are using a color monitor, type

LOAD "PRACTICALC",1,1

If you are using a black & white monitor and wish to have a reverse cursor, type

LOAD "PRACTICALC",1,1:0

The addition of the :0 (zero) signals PractiCalc Plus to use an *alternate cursor*. The cursor, (see page 7), is your place-marker on the spreadsheet.

[The alphabetic characters all appear in upper case; therefore, there is no need to depress the shift key to capitalize.]

#6C. Press **RETURN**

Note 1B: *All characters which are to be typed and keys which are to be stroked according to the instruction manual will be represented in boldface type. Step-by-step instructions in the manual will **not** be punctuated according to correct grammatical practice. The absence of punctuation should eliminate any confusion about exactly what is to be typed.*

#7C. Now the screen will read:

PRESS PLAY ON TAPE.

Respond by pressing **PLAY** on the cassette recorder. The word **SEARCHING** will next appear on the screen as the computer searches on the cassette for the start of the program. Within 20 seconds the screen will read:

FOUND — PRACTICALC
LOADING

Other indicators may appear on the screen, showing version number, etc. The loading process will take approximately four minutes, as the program is loaded into the Commodore VIC-20.

Continue with Step #8 (page 4).

To Load Disk Version

WARNING: IF USING A DISK COPY OF PRACTICALC AND LATER SAVING YOUR SPREADSHEETS TO DISK, YOU MUST FORMAT A BLANK DISK IN ORDER TO SAVE YOUR SPREADSHEETS. REFER TO YOUR COMMODORE USER'S MANUAL AND FORMAT A BLANK DISK BEFORE LOADING THE DISK VERSION OF PRACTICALC.

- #2D. Turn the disk drive on. The on/off switch is located at the rear of the unit.
- #3D. Turn the VIC-20 on. The on/off switch is located on the right side of the keyboard unit.
- #4D. Place the PractiCalc diskette in the disk drive.
- #5D. The following will now appear on your screen:

```
          **** CBM BASIC V2 ****
19967 BASIC BYTES FREE
READY.
□
```

Note 1C: *There must be a minimum of 19967 Bytes Free or PractiCalc will not load. Should there be less than 19967 bytes, make certain the RAM card is securely inserted at the rear of the keyboard unit.*

The blinking box is called the 'cursor'. Its presence tells you the computer is ready for your next command.

- #6D. If you are using a color monitor, type

LOAD "PRACTICALC",8,1

If you are using a black and white monitor and wish to have a reverse cursor, type

LOAD "PRACTICALC",8,1:0

The addition of the :0 (zero) signals PractiCalc Plus to use an *alternate cursor*. The cursor, (see page 7), is your place-marker on the spreadsheet.

[The alphabetic characters all appear in upper case; therefore, there is no need to depress the shift key to capitalize.]

#7D. Press **RETURN**

Note 1B: *All characters which are to be typed and keys which are to be stroked according to the instruction manual will be represented in boldface type. Step-by-step instructions in the manual will **not** be punctuated according to correct grammatical practice. The absence of punctuation should eliminate any confusion about exactly what is to be typed.*

The screen will read:

```
SEARCHING FOR PRACTICALC
SEARCHING FOR P(VERSION NUMBER)
LOADING
```

Various other indicators may appear on the screen. Within approximately 20 seconds, the word **READY** will appear on the screen.

#8. The screen will then read:

```
PRACTICALC
COPYRIGHT CSA 1982

#ROWS ? 30

#COLUMNS ? 15
```

The spreadsheet has an approximate capacity of 600 cells with 16K added and 2000 cells for 24K VIC's. A cell is the intersection of one row and one column on the spreadsheet, forming a location which contains a *complete* piece of information. For example, the label **SALES** would occupy one cell, or in other words, *one row in one column*. The number '1234' would also occupy one cell; each digit does not fill a cell, but rather the complete number—in this case, four digits—would occupy *one* cell.

With 600 cells available, the number of rows and columns selected must be a multiple less than or equal to 600. If you select 20 rows, then you can have only 30 columns, since $20 \times 30 = 600$.

Next, decide if 30 rows is sufficient. If so, press **RETURN**. If more or less than 30 rows are called for, type the number needed and press **RETURN** [The maximum number of rows allowed is 250; the minimum is 1.]

- #9. The cursor will then move to the line regarding columns. If 15 columns are sufficient, press **RETURN**. If more or less are needed, type the number called for, based on the number of remaining available cells. Press **RETURN** [The maximum number of columns allowed is 100; the minimum is 1.]

[Once you have selected the dimensions of your spreadsheet, it is possible to change the dimensions without starting the program again. For more information on resizing your spreadsheet, refer to page 33.]

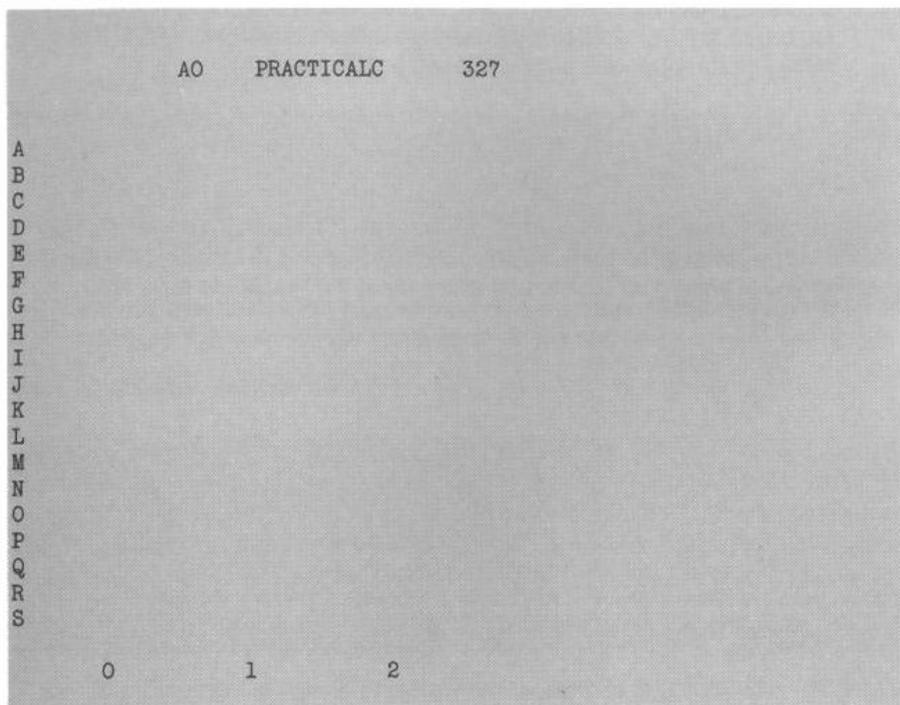
When a blank spreadsheet appears on the screen, you have completed the loading process. The next step is to familiarize yourself with the keyboard and the cursors, enabling you to enter data rapidly and efficiently in the PractiCalc program.

Chapter 2

Learning How and Where To Enter Data

After successfully starting the PractiCalc cassette or diskette, a complete spreadsheet will appear on your monitor screen as shown below:

Illustration 2-1:



The rows are labelled alphabetically in the far left-hand column. If you requested more than 26 rows (Chapter 1, Step #8), the first 26 rows will be labelled A—Z, while the next 26 rows will be the letters of the alphabet preceded by the the letter 'A'. For example, the 27th row will be labelled 'AA', the 28th will be 'AB', etc.

The columns are labelled numerically across the bottom of your screen. Note that the first column is labelled '0', *not* '1'. This is because in the preparation of spreadsheets, the first column is commonly filled with titles and labels. With the first column numbered '0', the user has a column available for titles and can still have, for example, the *first* quarter or *first* month information in the '1' column.

Cursors

The PractiCalc program is equipped with two cursors, or prompters, that indicate where the characters you are typing will appear on the spreadsheet. The first cursor is located in the upper left-hand corner of the spreadsheet and is a small, checkered square. Whenever you enter data in the spreadsheet, the data will appear, as you are typing, immediately to the left of the checkered cursor. You can enter up to 21 characters on this line, which is called the DATA LINE.

At the start of the program, the second cursor is located in Row A, Column 0. This cursor, which is a long rectangle, marks the position where the data will appear after it is entered on the Data Line. (From this point on, the word 'cursor' will refer to the rectangular block.) The first row of the first column, position A0, is also known as the HOME position.

Entering Information

Moving The Cursor

Before entering information, the cursor must be moved to the designated site. The cursor is controlled by two keys located in the lower right-hand corner of the VIC-20 keyboard. These keys are marked CRSR with arrows that indicate the directions in which the cursor will move.

To move the cursor down the screen from top to bottom, simply press the left cursor key. As with all movements of the cursor, a single touch will move the cursor one space; continued pressing of the key will result in continual movement of the cursor. In order to move the cursor up the page from bottom to top, press the **SHIFT** key and the left cursor key simultaneously. The cursor is moved across the page from left to right by pressing the right cursor key and from right to left by pressing the **SHIFT** and the right cursor keys simultaneously.

Note 2A: *It is possible to use the shift lock key when moving the cursor a great distance. You must remember to release the shift lock in order to move the cursor from left to right or down the screen.*

Rather than moving the cursor one cell at a time to the desired location, there are two methods of quickly reaching a particular cell. First, in order to return quickly to the start of the spreadsheet (Cell A0), simply press the **CLR HOME** key located in the upper-right corner of the keyboard.

The cursor can also be rapidly moved to any other cell location by pressing the left arrow key, ←, which is located in the upper-left corner of the keyboard. The Data Line will then read:



RC ←

If you enter a row reference (letter) and press **RETURN**, the cursor will move to the specific row of the column in which it was originally located.

If you enter a column reference (number) and press **RETURN**, the cursor will move to that column of the same row in which the cursor is located.

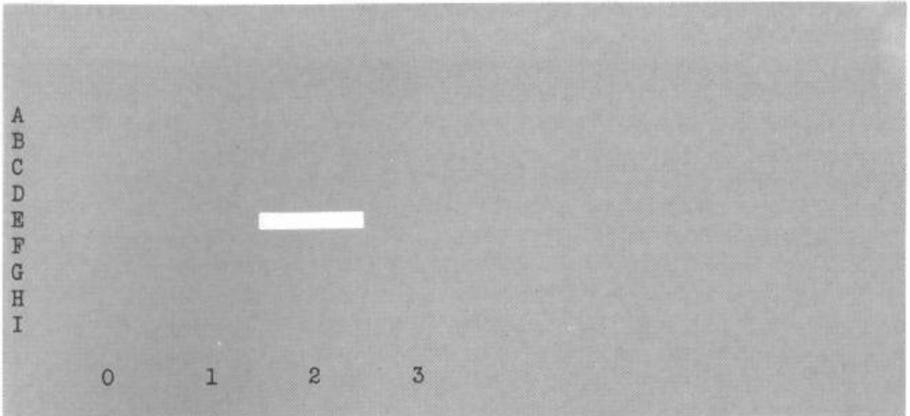
If you enter a row/column reference (letter/number) and press **RETURN**, the cursor will move to the new location.

Entering Data

To enter data on the spreadsheet, there are two simple steps to perform:

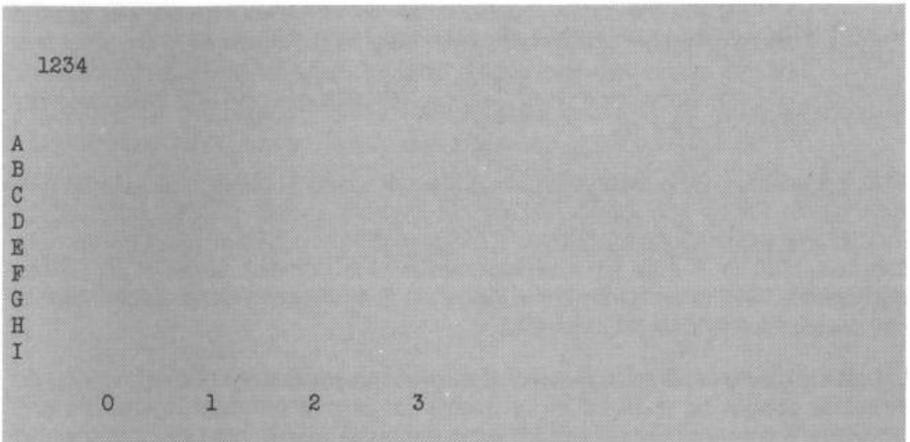
- #1. Move the cursor to the position on the spreadsheet where you want the information to appear, i.e. Row E, Column 2.

Illustration 2-2:



#2. Type the number **1234** It will appear on the Data Line.

Illustration 2-3:



#3. Press **RETURN** to enter data, and the data will appear in Row E, Column 2.

Illustration 2-4:

A				
B				
C				
D				
E		1234		
F				
G				
H				
I				
	0	1	2	3

Note 2B: If, after entering data on the Data Line, you press a cursor key instead of RETURN, the data is lodged in the cell where your cursor was located and the cursor is automatically moved to the next cell in the direction of the cursor key you struck. This is useful when entering columns of information, for it combines the **RETURN** function and the movement of the cursor key.

Before continuing on to enter information, it is necessary to distinguish between two data types: *values* and *labels*. Values are numeric pieces of data upon which mathematical operations and functions can be performed. A value may be a number, such as "25", or it may be a representative of a numeric value, such as cell coordinates "A4", when a number is lodged in cell A4. (An in-depth explanation of cell coordinates follows in Chapter 3.)

Labels are pieces of information which are *not* representative of a numeric value, and therefore cannot be involved in the execution of mathematical operations and functions. Examples of labels would be the names of salespeople which you would choose to place in the column preceding their sales figures. Labels are *left-justified* when they are entered; they are flush against the left side of the column into which they are entered. Values are always *right-justified*; they will be against the right side of the column where they appear.

PractiCalc automatically distinguishes between values and labels according to the form in which they are entered. The following simple rules will clarify the differences.

- #1. Any piece of information which starts with a letter will automatically be treated as a label.
(ex: SALES, Y123, DEPT302)
- #2. Any piece of information which is completely numeric will be treated as a value.
(ex: 1234, 59, -20.2, 1.04)
- #3. In order that a number be treated as a label,
 - a. Move the cursor to the correct cell
 - b. Type any letter
 - c. Press **DELETE** [located in the upper right corner of the keyboard]
 - d. Type the number which is to be treated as a label
 - e. Press **RETURN**

(This will be especially useful when a column heading is a number such as the year '1982'.)

PractiCalc has a convenient function which allows for the right-justification of labels. This function, the "J" option, is fully described on page 41 of Chapter 5.

This concludes the preliminary chapters on PractiCalc. At this point, you should be familiar with loading the PractiCalc program and entering data. The following chapters will continue to explain the functions found in PractiCalc Plus.

Chapter 3

Formulas Are Just Numeric Sentences

The PractiCalc program is equipped to perform a variety of numerical operations and functions. To get the program to execute an operation or function, a formula must be written. A formula is simply a “sentence” telling the computer which mathematical operations to perform on a given set of numbers.

Formulas are composed of four basic groups:

- Cell Coordinates (which hold numeric value)
- Numeric Constants
- Operators
- Functions

Cell Coordinates

In order to specify the locations on the spreadsheet, each cell has been given a set of coordinates. A cell is one row of one column. The coordinates are the row and column in which the cell appears. Therefore, all cell coordinates will be one or more letters followed by a number.

Example 3-1:

The cell in the 5th row of the 3rd column will be known as 'E2'. (Remember, the columns start with '0', not '1'.) The cell in the 28th row of the 4th column will be 'AB3'.

Cell coordinates are used to represent the data lodged in that particular cell. If the number 456 is lodged in cell A3, A3 is equivalent to 456 when used in a formula.

In the upper left-hand corner of your screen, a cell coordinate will be displayed. This indicator will tell you in which cell the cursor is positioned.

Numeric Constants

Numeric constants are numbers which:

1. Contain 1–9 digits (27, 5162, 78, 123456789)
2. May contain a decimal point (1.23, .6789, 4.009)
3. May be preceded by '+' or '-' (+3.4, +45, -.56, -1.9)

Operators

Operators are the symbols for the mathematical processes that combine numbers, cell coordinates, and functions in numeric expressions. (Keep in mind that cell coordinates are representative of the quantity lodged in that cell.) The operators are:

1. + to signify addition
2. - to signify subtraction
3. * to signify multiplication
4. / to signify division
5. ↑ to signify exponentiation

Order of Operations

In a formula which contains more than one operator, there is a set order in which the operations are performed. Working from the left to the right of the formula, exponentiation is performed first. Next, multiplication and division are executed, and finally, addition and subtraction. If you wish to perform the operations in a different order, surround the operation to be performed first in parentheses. Operations contained within parentheses are performed first; then the standard order of operations is followed.

Example 3-2:

The numbers above each operator in the following formulas indicate the order of operations for that formula.

$$\#1. \quad \begin{array}{cccc} 3 & 1 & 4 & 2 \\ 13 + 5 / 10 - 1 * 5 = 8.5 \end{array}$$

$$\#2. \quad \begin{array}{cccc} 1 & 3 & 2 & 4 \\ (13 + 5) / (10 - 1) * 5 = 10 \end{array}$$

There are also operators which are used to express equalities and inequalities. These are:

< to signify 'is less than'
(ex: $7 < 12$)

> to signify 'is greater than'
(ex: $9 > 4.3$)

= to signify equality
(ex: $3^2 = 9$)

Functions

PractiCalc is capable of performing many mathematical functions. Listed below are expressions which represent the functions and an explanation of them.

Note 3A: Each of the functions listed below must be treated as a **formula** when used. A formula is distinguished by pressing the **F1** key, when the formula is entered on the Data Line. This will be further explained in Chapter Four.

SUM—Finds the total of a range of numbers

Example 3-3:

To find the total value of all numbers in Column 0 between Rows A and H, use the formula SUM(A0.H0)

AVG—Finds the average of a range of numbers

Example 3-4:

To calculate the average numeric value of all numbers in Row A from Column 1 through 6, the formula should read AVG(A1.A6)

MAX—Finds the maximum value in a range of numbers

Example 3-5:

The maximum value of the numbers in Column 3 from Row A to Z is calculated by the formula MAX(A3:Z3)

MIN—Finds the minimum value in a range of numbers

Example 3-6:

MIN(S3:S6) yields the minimum numeric value in Row S between Columns 3 and 6

COU—Counts the number of entries in a range

Example 3-7:

To find the total number of *numeric* entries in Column 5 between Rows C and F, use the formula COU(C5:F5)

LOG—Finds the logarithm of a number (base e)

Example 3-8:

To find the exponent which indicates to which power e is raised to produce 100, use the formula LOG (100) [Log(100) = 4.60517 since $e^{4.60517} = 100$.]

EXP—Finds the exponential expression for a number (base e)

Example 3-9:

To find the expression which results when base e is raised to a certain power; i.e. EXP(3)= 20.0855 since $e^3=20.0855$

ABS—Finds the absolute value of a number

Example 3-10:

To find the absolute value (numerical value of a number regardless of its sign) of cell B5, use the formula ABS (B5)

INT—Finds the integer (whole number) value of a numeric quantity

Example 3-11:

To find the integer value of the formula A1 + 100 / 4, use the formula INT(A1 + 100 / 4)

SGN—Finds the sign (+, 0, -) of a number and results in 1 if the answer is positive, 0 if the answer is zero, and -1 if the answer is negative

Example 3-12:

Cell Z99 contains a formula. To find if the solution to the formula (quantity lodged in Z99) is positive, negative or equal to zero, use the formula `SGN(Z99)`

SQR—Finds the square root of a number

Example 3-13:

The formula `SQR(81)` yields the square root of the number 81 (9)

RND—Generates a random number within a given range

Example 3-14:

The formula `RND(0)` will result in the generation of a random number between 0 and 1. The formulas `(RND(0)) * 10` or `10 * RND(0)` will result a number between 0 and 10

PractiCalc is also capable of the following trigonometric functions. To write formulas with these functions, simply enter the abbreviation for the function (as shown below) followed by the number.

SIN—Finds the sine of a number

COS—Finds the cosine of a number

TAN—Finds the tangent of a number

ATN—Finds the arc tangent of a number

As in BASIC, the operators `<`, `>`, and `=` can be used in true/false expressions or formulas. If the answer to the true/false expression is true, a value of -1 will result after calculation. If the expression is false, zero will result.

Example 3-15:

If cell A2 contains the number 10, and cell J5 equals 34, the formula `A2 > J5` will equal zero, since the expression is false

Chapter 4

Writing Formulas

Formulas, as mentioned before, are simply commands which tell the program which mathematical process(es) to perform on any given numbers. Combining the four basic groups (learned in Chapter 3) into "sentences" will result in formulas which the computer program is equipped to understand.

All formulas will be initially written on the Data Line. In order that formulas be distinguished from numbers and labels, it is necessary to press the **F1** key which is located on the far right-hand side of the VIC-20 unit. After hitting the **F1** key, the letter "F" in a darker box will appear on the Data Line. The presence of the "F" on the Data Line signals that the information being entered is a formula and will later be calculated.

As you enter your formula, the "F" block will move across the Data Line. Should you forget to strike the **F1** key before you start typing a formula, you may hit that key *any time* while you are typing the formula. The "F" will then appear to the right of the formula which you have typed thus far. If you neglect to hit the **F1** key, and press RETURN to enter the formula, it will be treated as either a label or a number, and no numeric answer will result upon calculation.

If you enter a sign (+ or -) first and then an alphabetic character or a function name, the program automatically switches to the formula mode (unless you deleted a letter first, in which case it would treat the data as a label [see page 11, step #3]).

Example 4-1:

+SUM (A0.C0)

This would automatically be designated a formula even without striking the formula key.

Tutorial for PractiCalc Plus

In order that you become familiar with PractiCalc Plus and its numerous functions, the following pages outline a sample exercise which will require use of most of PractiCalc's features. After working through the exercise step-by-step, you should feel comfortable with PractiCalc and have gained a strong understanding of just what it can do for you and your VIC-20.

Note 4A: *PractiCalc will occasionally pause in the execution of certain functions. The pause is only to allow for a reorganization of memory in order to maximize available memory.*

Congratulations!!! You have just been appointed sales manager of the XYZ Corporation, a small manufacturing firm with a sales force of 12 people. In your newly-acquired position as sales manager of XYZ, you will use PractiCalc Plus and a VIC20 to keep track of the sales action within your department.

Your salespeople cover two states—Massachusetts and New York. Each state is divided into two territories and each territory is covered by three salespeople. The sales force is divided as follows:

Massachusetts:

Territory A:	Smith Jones Hogan	Territory B:	Nelson Parsons Andrews
--------------	-------------------------	--------------	------------------------------

New York:

Territory C:	Allen Shea Connors	Territory D:	Bennett Ryan Edwards
--------------	--------------------------	--------------	----------------------------

Before starting to type information onto the screen, it is necessary to learn how to blank or clear a cell so that any errors made while inputting data can be easily remedied. The functions of blanking a cell and clearing the entire spreadsheet are discussed in-depth in Chapter 5. For now, however, it will suffice to know that, in order to clear a cell, the following steps must be performed:

- #1. Move cursor to cell which is to be cleared
- #2. Press **F3** [The key is located at the far right of the keyboard]
- #3. Type **B** Any information contained in the cell will be erased, except the format of the cell [Chapter 5, page 34]

It is also possible to erase material in a cell by simply moving the cursor to that cell and typing over the original information in the cell. Also, if an error is recognized while the information is still on the Data Line, depressing the **F7** key at the far right on the keyboard will erase the information on the Data Line.

With the knowledge of how to correct your errors, type the necessary data into your spreadsheet so that your sheet looks like the following illustration:

Illustration 4-1:

A	NAME	SALES		
B	SMITH	500		
C	JONES	700		
D	HOGAN	900		
E	NELSON	1000		
F	PARSONS	1200		
G	ANDREWS	500		
H	ALLEN	800		
I	SHEA	400		
J	CONNORS	600		
K	BENNETT	900		
L	RYAN	700		
M	EDWARDS	800		
	0	1	2	3

Addition

Your first objective is to find the total sales for each of the four territories.

For Territory #1, therefore, you must add the sales figures of Smith, Jones, and Hogan. The sum is to be entered in cell D2, since Column 2 will hold the totals for the territory. Label Column 2 (in cell A2) **TER.TTL** and then

- #1. Move cursor to D2
- #2. Press **F1** [to signal a formula]
- #3. Type **B1 + C1 + D1**
- #4. Press **RETURN** which will move the formula from the Data Line to the Formula Line as well as enter it in cell D2

Simply entering a formula into a particular cell will not result in calculation of the formula. PractiCalc operates in the manual mode. This means that a formula will not automatically be calculated after it is typed. The program requires a specific command to initiate calculations. The command needed is **!** which is achieved by striking the **SHIFT** key and the numerical **1** key simultaneously.

When the **!** is typed, the calculation will be done, and the sum (2100) of the addition formula entered in cell D2 will appear in D2. It is important to note that whenever **!** is typed, *all* formulas on the spreadsheet are recalculated. The cursor on the Data Line will disappear during calculation. Its reappearance signals that the calculations have been completed. (A tone is also generated at the conclusion of calculation if the volume control of your monitor is turned up.) PractiCalc calculates column by column, top to bottom, left to right.

The formula which gave you the sum of 2100 is not lost when 2100 appears in cell D2; The answer 2100 is the result of the formula that was lodged in D2; therefore, anytime the cursor is positioned over D2, the formula which resulted in 2100 will appear on the Formula Line at the top of the screen.

Using the formula we just used above and the correct cell coordinates for each salesperson's sales, total Territory #2's sales and enter in G2. Territory #3's sales should be entered in J2, and Territory #4's sales in M2.

Note 4B: Remember, the F1 formula key, used to designate a data entry as a mathematical formula to be calculated, may be hit **at any time** during the entry of the formula on the **Data Line**.

When all territories' sales figures have been totalled, your spreadsheet should look like this:

Illustration 4-2:

A	NAME	SALES	TER. TTL
B	SMITH	500	
C	JONES	700	
D	HOGAN	900	2100
E	NELSON	1000	
F	PARSONS	1200	
G	ANDREWS	500	2700
H	ALLEN	800	
I	SHEA	400	
J	CONNORS	600	1800
K	BENNETT	900	
L	RYAN	700	
M	EDWARDS	800	2400
	0	1	2

Subtraction

You are curious to learn how the sales territories, within each state, compare with each other. Therefore, compare the sales figures of the territories within each state and find the difference.

Starting with Massachusetts, find the difference between the total sales of Territory A and B and enter it in G3. To avoid a negative answer, simply take the absolute value of the difference between Territory A and Territory B.

- #1. Move cursor to G3
- #2. Press **F1**
- #3. Type **ABS (D2-G2)**
- #4. Press **RETURN**
- #5. Type **!**

A solution should appear in G3.

Now continue on and find the difference between the territories within the state of New York. Enter the absolute value of the difference between Territories C and D in M3. After completing both subtraction problems, label Column 3 **SALEDIF**. The spreadsheet should then look as follows:

Illustration 4-3:

A	NAME	SALES	TER. TTL	SALEDIF
B	SMITH	500		
C	JONES	700		
D	HOGAN	900	2100	
E	NELSON	1000		
F	PARSONS	1200		
G	ANDREWS	500	2700	600
H	ALLEN	800		
I	SHEA	400		
J	CONNORS	600	1800	
K	BENNETT	900		
L	RYAN	700		
M	EDWARDS	800	2400	600
	0	1	2	3

Multiplication

The president of XYZ is anxious to learn the projected sales for each territory over the next three months. However, the sales figures you have are only for a one-month period. Therefore, you need to multiply the total sales of each territory (which you calculated earlier and placed in Col. 2) by 3 to find an estimated sales figure for the next 3 months. Place the 3-month projection in Column 4 on the same row as your total sales figures for each territory.

Starting with Territory #1,

#1. Move cursor to D4

#2. Press **F1**

#3. Type **D2 * 3**

#4. Press **RETURN**

#5. Type **!**

You have just multiplied the total sales of Territory #1 (which you lodged in D2 earlier) by three to give an estimate of what the sales will be over the next 3 months.

Now do the same for the remaining areas. Multiply the total sales, which you already calculated, by 3 and enter the solution in the 5th column on the same row as the other information about the territory. Label Column 4 **3MSALES**. (Use the procedure outlined on page 11 to make 3MSALES a label rather than a value.) When your three-month projection is finished, your spreadsheet should look like this:

Illustration 4-4:

A	NAME	SALES	TER.TTL	SALEDIF	3MSALES
B	SMITH	500			
C	JONES	700			
D	HOGAN	900	2100		6300
E	NELSON	1000			
F	PARSONS	1200			
G	ANDREWS	500	2700	600	8100
H	ALLEN	800			
I	SHEA	400			
J	CONNORS	600	1800		5400
K	BENNETT	900			
L	RYAN	700			
M	EDWARDS	800	2400	600	7200
	0	1	2	3	4

Division

New on the job and unfamiliar with the system, you can not find a copy of the daily sales figures for each territory. Your friend, the president, is insisting that you come up with just an approximation of the daily sales for each territory. Therefore, you have decided that if you divide the total sales of each territory by 30 (for 30 days in a month), you will come fairly close to the actual daily sales figures.

Therefore, for Territory #1, take the total sales figure of one month, which is the quantity in D2, and divide it by 30. Enter the answer in Column 5, beside your 3-month projection figure.

#1. Move cursor to D5

#2. Press **F1**

#3. Type **D2/30**

#4. Press **RETURN**

#5. Type **!**

An estimated daily sales figure should appear in D5.

Continue on and do the same for each territory, placing the daily sales figure in Column 5. When you are finished, label Column 5 **DAYSALE**. Your spreadsheet should look like this:

Illustration 4-5:

A	NAME	SALES	TER.TTL	SALEDIF	3MSALES	DAYSALE
B	SMITH	700				
C	JONES	700				
D	HOGAN	900	2100		6300	70
E	NELSON	1000				
F	PARSONS	1200				
G	ANDREWS	500	2700	600	8100	90
H	ALLEN	800				
I	SHEA	400				
J	CONNORS	600	1800		5400	60
K	BENNETT	900				
L	RYAN	700				
M	EDWARDS	800	2400	600	7200	80
		0	1	2	3	4
					5	

PractiCalc is also equipped with several *functions* which can be used to simplify formulas.

Count (COU)

Sales review time for the month is here and you need to know how many reports on salespeople you will need to file. The simplest way to do so would be to count the number of entries between B1 and M1 to determine how many salespeople were on your salesforce this month. (Remember, the COU function works only on numeric entries; therefore, it is not feasible to count the names in Column O.)

- #1. Move cursor to O1
- #2. Press **F1** [COU is a formula and must be marked as such.]
- #3. Type **COU(B1.M1)** [The expression "B1.M1" includes all entries in Column I between Rows B and M. If you were to enter COU (B2.M3), the number of numeric entries between Rows B and M and Columns 2 and 3 would be counted.]
- #4. Press **RETURN**
- #5. Type **!**

PractiCalc will automatically count the elements in Column 1 from Row B to Row M and place the total in O1. Now you can label the answer **PEOPLE**.

- #1. Move the cursor to O0
- #2. Type **PEOPLE**
- #3. Press **RETURN**

Sum (SUM)

In order to figure out the total sales for the entire company, you could add each of the four territories in an equation. However, the SUM function will find the total *value* of a range of numbers. To find the total sales, sum Column 2, which contains only the territorial sales figures.

- #1. Move cursor to N1, where you want the total to appear
- #2. Press **F1** [SUM is a formula.]
- #3. Type **SUM (D2.M2)** [As with the COU function, the expression "D2.M2" means the range between and including D2 and M2.]

#4. Press **RETURN**

#5. Type !

The total sales for one month, 9000, will appear in N1. Next, label it **TSALES** in N0.

Maximum (MAX)

Your friend, the president, needs to know the highest sales figure for any territory for the month. You have already found the totals for each territory and have them entered in Column 2. To find the highest sales total, simply evoke the MAX function, which finds the maximum value in a range of numbers.

#1. Move cursor to R1 where you want the answer to appear

#2. Press **F1** [MAX is a formula.]

#3. Type **MAX (D2.M2)**

Note 4C: *The cells between D2 and M2 which have no data lodged in them will be read by PractiCalc as containing no data and therefore will not interfere with the search for the correct value.*

#4. Press **RETURN**

#5. Type !

The highest sales figure for a single territory for the month, 2700 (Territory B), will appear in R1. Now label it **HIGH** in R0.

Minimum (MIN)

The lowest as well as the highest territorial sales figure is needed. To find this, simply evoke the MINIMUM (MIN) function, which is the opposite of the MAX function and seeks out the lowest value in a range of numbers.

#1. Position the cursor on T1

#2. Press **F1** [MIN is a formula.]

#3. Type **MIN (D2.M2)**

#4. Press **RETURN**

#5. Type !

The lowest sales total of any territory, which is 1800, will appear in T1. Type **LOW** in cell T0.

Average (AVG)

You are interested in finding out the average daily sales according to territory. The daily sales by territory have been calculated and stored in Column 5. Rather than totalling Column 5 and dividing by the number of entries in the column,

#1. Move cursor to V1 [where you would like the average to appear]

#2. Press **F1** [AVG is a formula.]

#3. Type **AVG (D5.M5)**

#4. Press **RETURN**

#5. Type !

The average daily territorial sales figure is 75, which will appear in V1. Next type the label **AVDSALE** in V0.

Formulas With Multiple Operators

At this point, the spreadsheet is as follows:

Illustration 4-6:

A	NAME	SALES	TER.TTL	SALEDIF	3MSALES	DAYSALE
B	SMITH	500				
C	JONES	700				
D	HOGAN	900	2100		6300	70
E	NELSON	1000				
F	PARSONS	1200				
G	ANDREWS	500	2700	600	8100	90
H	ALLEN	800				
I	SHEA	400				
J	CONNORS	600	1800		5400	60
K	BENNETT	900				
L	RYAN	700				
M	EDWARDS	800	2400	600	7200	80
N	TSALES	9000				
O	PEOPLE	12				
P						
Q						
R	HIGH	2700				
S						
T	LOW	1800				
U						
V	AVDSALE	75				
	0	1	2	3	4	5

You now must determine the percentage of the total monthly sales contributed by each salesperson. These percentages will be entered in Column 6. Label A6 **%TSALES**

To arrive at the individual percentages, it is necessary to combine more than one operator. Your formula will be:

"Individual Sale Divided by Total Monthly Sale Multiplied by 100"

Therefore, starting with Smith,

#1. Move cursor to B6 where Smith's percentage is to be entered

#2. Press **F1**

#3. Type **B1/N1*100** [Parentheses are not needed here, for division and multiplication are treated equally and operations here will be performed from left to right.]

#4. Press **RETURN**

#5. Type **!**

Smith's contribution to the monthly sales is 5.55555 per cent, which appears in B6.

Continue and calculate the formulas to arrive at each salesperson's percentage of monthly sales. Record each number in Column 6.

After completing all of the above calculations, your spreadsheet should look like this:

Illustration 4-7:

A	NAME	SALES	TER.TTL	SALEDIF	3MSALES	DAYSALE	%TSALE	
B	SMITH	500					5.55555	
C	JONES	700					7.77777	
D	HOGAN	900	2100		6300	70	10	
E	NELSON	1000					11.11111	
F	PARSONS	1200					13.33333	
G	ANDREWS	500	2700	600	8100	90	5.55555	
H	ALLEN	800					8.88888	
I	SHEA	400					4.44444	
J	CONNORS	600	1800		5400	60	6.66666	
K	BENNETT	900					10	
L	RYAN	700					7.77777	
M	EDWARDS	800	2400	600	7200	80	8.88888	
N	TSALES	9000						
O	PEOPLE	12						
P								
Q								
R	HIGH	2700						
S								
T	LOW	1800						
U								
V	AVDSALE	75						
		0	1	2	3	4	5	6

Essentially, the work on your first spreadsheet for XYZ Corporation is nearly completed. However, there are a few changes which would improve the spreadsheet's appearance (and win you some points!). The following options and the exercises which accompany them will help you achieve a more accurate spreadsheet that is also easier to read.

Chapter 5

The Function Keys

The function keys are located to the far right of the VIC-20 keyboard. PractiCalc Plus uses keys F1, F3, F5, and F7.

F1—The Formula Key

This key, introduced in Chapter 4, signifies that the information entered on the Data Line is a mathematical formula and may be entered as such by pressing **RETURN**. Pressing the F1 key results in "F" appearing on the Data Line. The "F" will move across the Data Line as the formula is entered. Any formula, designated as such by the F1 key, will be used and calculated whenever ! is typed.

The Direction Function (?)

The **F1** key, or formula key, is also used to create spreadsheets that can be designed by one person and then used by another without the need for explanation. Known as the **direction function**, this feature of the F1 key enables operators to use another's PractiCalc spreadsheets without explanation or the need to write duplicate worksheets.

For example, the spreadsheet used in the previous exercises could be used each month provided the figures were updated. All calculations on the spreadsheet are dependent upon the sales of each person. If the spreadsheet, with the correct formulas in place, was given to another person who knew *where* to enter the current sales, he could use the spreadsheet without instruction from the person who originally set up the sheet.

IMPORTANT: BECAUSE THE QUESTION MARK (?) PROMPTS USED IN THE DIRECTION FUNCTION HALT THE CALCULATION PROCESS, THEY SHOULD ONLY BE ENTERED JUST BEFORE THE SPREADSHEET IS GIVEN TO ANOTHER USER. OTHERWISE, YOU WILL BE UNABLE TO COMPLETE THE EXERCISES OUTLINED IN THE MANUAL SINCE THE DIRECTION FUNCTION AWAITS INPUT OF NEW DATA.

To flag the location where the sales figures should be entered,

- #1. Move the cursor where you want the varying data to be entered. In this case, position the cursor over B1

#2. Press **F1**

#3. Type a question mark and a label which will adequately instruct the second user, i.e. **?SALES SMITH**

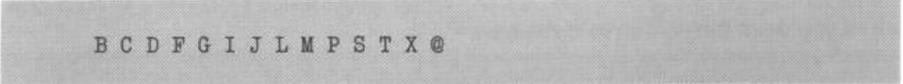
#4. Press **RETURN**

In the case of the XYZ Corporation spreadsheet, the **?SALES** prompt (with the person's name) should be entered beside the name of each salesperson. With current sales figures entered each month, the other information will also be accurate since it is based on the individual performance of each member of the sales force.

When the spreadsheet is given to a second user who is not aware of the formulas which have been set into the sheet, all he need do is type **!** This will initiate the calculation process. When the process reaches a formula that starts with a question mark, it will halt and display the question mark and the following entry on the Formula Line at the top of the spreadsheet. (In this case, **?SALES SMITH** will appear on the Formula Line.) This will instruct the second user to enter the current sales figure in that cell so that the quantity may be used in formulas further in the spreadsheet. The user answers a prompted question with current data and presses **RETURN**. The calculation process will continue and halt at the next entry marked with a **?**; the prompt will appear on the Formula Line. After all the question-marked formulas have been answered with the necessary data, the calculation of all formulas on the spreadsheet will be completed, resulting in the current (and correct!) answers.

F3—The Options Menu

Pressing the F3 key results in a display of letters on the Data Line. Called the 'options menu', this display may be thought of as a Table of Contents to PractiCalc's commands. Press the F3 key and the following will appear on your Data Line:



B C D F G I J L M P S T X @

Each letter represents a separate option. To use each option, it is necessary to press **F3**, then type the letter which represents the option to be used.

Listed on the following pages are brief descriptions of each option and what they accomplish.

B

The **B** key in the F3 mode enables the user to clear the contents of a cell. Not only is the cell on the screen cleared, but the corresponding cell in the computer memory is also erased (unless the spreadsheet has been previously saved.) To clear a cell,

#1. Move the cursor to the cell location which you want to clear

#2. Press **F3**

#3. Press **B**

The cell will be completely cleared (except for the local format of the individual cell - see F [formatting] below).

C

By pressing **C** after pressing F3, you are able to clear the entire screen and the computer memory of the screen. If you accidentally press 'C' while you are in the F3 mode, PractiCalc does not automatically clear the screen, but rather asks if you do, in fact, wish to clear the screen. To clear the screen,

#1. Press **F3**

#2. Press **C** The Data Line will then read:



CLEAR Y ?

IMPORTANT: IF YOU ARE FOLLOWING THE PRACTICALC MANUAL EXERCISES FOR THE FIRST TIME IN ORDER TO FAMILIARIZE YOURSELF WITH PRACTICALC, DO NOT PRESS Y TO CLEAR THE SCREEN YOUR SAMPLE SPREADSHEET WILL BE LOST.

#3. If you want the screen to clear, type **Y**

If you do not want the screen to clear, type **N**

If you selected N, the screen display will remain. A Y choice results in a blank screen (and a blank memory of that screen!).

Note 5A: *If you have saved a file (as is described below under "S") and wish to blank the screen **after saving**, the saved file, although identical to the screen, will not be erased.*

Resizing the Spreadsheet

The **C** function of the options menu serves another function as well, for it also allows you to return to the start of the program and reset the row/column assignments without reloading PractiCalc. To enlarge the dimensions of your spreadsheet,

- #1. Make certain the information on your screen has been saved to tape or disk (see "S" below) or is of no further value to you
- #2. Press **F3**
- #3. Type **C** The Data Line will read:

CLEAR Y ?

- #4. Type **R**

The questions of how many rows and columns are needed will appear. Type the correct number needed, and a blank spreadsheet of those dimension will be loaded onto the screen. [If you had saved a file in order to enlarge the spreadsheet, reload the file following the steps outlined under "L" (Load) below.]

D

The **D** key, when struck after the F3 key, allows you to delete an entire column or row. To use the delete key,

- #1. Move the cursor into the row or column which you want to delete
- #2. Press **F3**
- #3. Type **D** The Data Line will now read:

D ' R/C'

- #4. Type **R** to delete a row
Type **C** to delete a column

The row or column in which your cursor was located will be deleted and the information from the row below (or column to the right) will move up (or in) to the space that has been vacated.

Note 5B: If a formula contains a reference to a deleted cell, ## will appear in the formula in place of the cell reference. Until the ## has been replaced with a valid cell reference, any attempt at calculation of that formula will result in **ERROR**, since the referenced value is no longer on the spreadsheet.

F

The **F** key is used to *format* the contents of a cell. Formatting is, essentially, selecting the way in which the data is to appear. To see the formatting choices PractiCalc gives you,

#1. Move the cursor to the cell which is to be formatted

#2. Press **F3**

#3. Press **F** The Data Line will now read:



G I \$ F

To have the cell switch to the same format as all other cells [global format], type **G**

To have the cell in *integer* form [whole number without decimals], type **I**

To have the cell in *dollar* form [carried out 2 places after the decimal point], type **\$**

To have a *floating decimal* [a decimal that appears wherever you specify] in the cell, type **F**

Example 5-1:

The individual sales figures located in Column 6 do not need to be in the floating decimal format in which PractiCalc is loaded. To change them to the *integer* form,

#1. Move the cursor over B6

#2. Press **F3**

#3. Type **F**

#4. Type **I**

Smith's percentage of total sales, which was 5.55555, will now read 5.

For now, leave the other salepeople's percentages as they are. In Example 5-12 on page 56, you will see how to change the entire column to the integer format without doing each cell individually.

Example 5-2:

The total sales figure, which is located in N1, would be more appropriately represented in the dollar format. To change it to such,

#1. Position the cursor over N1

#2. Press **F3**

#3. Type **F**

#4. Type **\$**

The total sales figure will now be represented as 9000.00.

If you change the format of an individual cell so that it differs from the global format, the individual cell's format will be noted by a single letter or symbol (F, I, \$) in the left corner of the Formula Line whenever the cursor is on that cell. To see this, move the cursor to N1 and notice the \$ on the Formula Line.

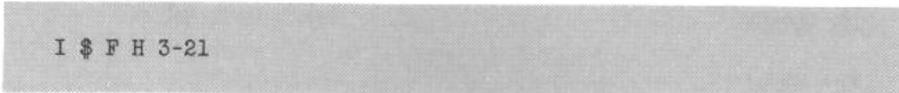
G

Where the F key sets the format for an individual cell, the G key sets the format for the entire spreadsheet. (The F key exists to make exceptions to the format which has been set for the entire screen.)

Unless a global format is specified, each cell will remain in floating point format and all columns are 7 characters wide, as they are when PractiCalc is loaded. To change the format of *all cells* (the global format),

#1. Press **F3**

#2. Type **G** The Data Line will read:



I \$ F H 3-21

#3. To change all numeric data in the spreadsheet to *integer* format,

type **I** and press **RETURN**

To change all numeric data in the spreadsheet to *dollar* format [with 2 decimal places],

type **\$** and press **RETURN**

To change all numeric data in the spreadsheet to a *floating decimal* format,

type **F** and press **RETURN**

Note 5C: *If you have specified the format of an individual cell (see "F" above), that cell will not be affected by any of the global commands you give. In order to make an individual cell agree with the global format,*

#1. Press **F3**

#2. Type **F**

#3. Type **G**

The 'H' which is listed on the Data Line after selecting the **G** option from the option menu signifies PractiCalc's ability to switch to *high-resolution graphics*. Chapter 6 of the manual deals exclusively with graphics; therefore, the use of the 'H' will be dealt with there in detail.

Changing Column Widths

The final numbers on the Data Line of the G option allow you to change the width of the columns. The columns, when PractiCalc is loaded, are of 7-character width. To change the character capacity (or width) of all columns,

- #1. Press **F3**
- #2. Type **G**
- #3. Type number of characters desired per column [Three is the minimum; 21 is the maximum.]
- #4. Press **RETURN**

This will narrow or widen the columns of the spreadsheet.

Note 5D: *PractiCalc does **not** “round off” numbers. When the digits of a numeral exceed the character width of the column, PractiCalc will display the numeric value of the cell as accurately as the column width allows. However, the **precise** value of the number, not the **truncated** value, is retained within the cell memory for mathematical calculations.*

Example 5-3:

To make all columns 3 characters wide,

- #1. Press **F3**
- #2. Type **G**
- #3. Type **3**

All columns in the spreadsheet will be 3-character columns. This poses a problem for many entries, but especially for the numbers which are more than 3-digits. Nelson's sales are now shown as "1E3", since exponential notation is the most accurate way to represent the number 1000 in a 3-character column.

Now a column width of three characters is not suitable for the spreadsheet upon which you are working. Instead, make the columns all 7-character width again:

- #1. Press **F3**
- #2. Type **G**

#3. Type **7**

#4. Press **RETURN**

This will return the spreadsheet to its original format.

For a given column width, PractiCalc tries to make as much information as possible available to the user, and will drop decimals and use exponential notation as necessary. If it is impossible to represent reasonable information within a given column width, >>>>>> will appear within the cell.

Key

After changing the width of the columns, some of the numbers which were in the spreadsheet were compressed because full representation was not possible. To see the *full* contents of a cell,

#1. Move the cursor over the cell to be read

#2. Type #

The full entry of that cell will appear on the Data Line.

#3. Press **RETURN** to continue

The # key, although not part of the options menu, is perhaps one of the most useful keys when working with values of several digits.

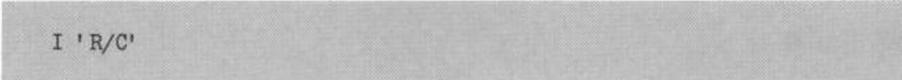
I

The **I** which appears in the Data Line after pressing the F3 key represents the option to insert extra rows or columns within the spreadsheet. To insert a blank row or column,

#1. Move the cursor to the row or column where the blank row or column is to appear

#2. Press **F3**

#3. Type **I** On the Data Line will appear:



I 'R/C'

- #4. Type **R** for an additional blank row
Type **C** for an additional blank column

Note 5E: *If a row or column is inserted into a range which is referenced in a formula, the formula is automatically re-referenced to include the additional row/column within the limits of the range.*

Example 5-4:

Your spreadsheet for the XYZ Corporation contains all the necessary information, but its appearance could be changed so that the facts are more clearly presented. One easy way to change the spreadsheet's appearance would be the insertion of rows and columns.

The addition of a column to list the territories will be the first change. To do so,

- #1. Move the cursor to Column 0 [where the new column would be best.]
- #2. Press **F3**
- #3. Type **I**
- #4. Type **C** [for column]

Column 0 is now blank. The information which was there has been moved to Column 1, and Column 1's data has been moved to Column 2, etc.

The territories would be more clearly presented if there were blank rows between them. Therefore, insert a blank row beneath the titles and one blank row between each territory. To do so,

- #1. Move the cursor to row B
- #2. Press **F3**
- #3. Type **I**
- #4. Type **R** (for row)

To enter a row between Territories A and B,

- #1. Move the cursor to row F
- #2. Press **F3**

#3. Type **I**

#4. Type **R**

Continue on and insert a row between territory B and C, between C and D, and after territory D. Label the territories in column 0, and your spreadsheet will look as follows:

Illustration 5-1:

A	TER	NAME	SALES	TER.TTL	SALEDIF	3MSALES	DAYSALE	%TSALE
B								
C	A	SMITH	500					5
D		JONES	700					7.77777
E		HOGAN	900	2100		6300	70	10
F								
G	B	NELSON	1000					11.1111
H		PARSONS	1200					13.3333
I		ANDREWS	500	2700	600	8100	90	5.55555
J								
K	C	ALLEN	800					8.88888
L		SHEA	400					4.44444
M		CONNORS	600	1800		5400	60	6.66666
N								
O	D	BENNETT	900					10
P		RYAN	700					7.77777
Q		EDWARDS	800	2400	600	7200	80	8.88888
R								
S		TSALES	9000					
T		PEOPLE	12					
U								
V								
W		HIGH	2700					
X								
Y		LOW	1800					
Z								
AA		AVDSALE	75					
	0	1	2	3	4	5	6	7

J

The **J** which appears on the Data Line when the options menu is displayed stands for the *justification* function of PractiCalc. Labels, when initially entered, are left-justified and values are right-justified. The **J** key will only change the justification of labels.

Example 5-5:

To illustrate how to justify a label, look at the word "PEOPLE" in cell T1. To right-justify it like the number 12 to which it refers,

#1. Position the cursor over T1

#2. Press **F3**

#3. Type **J**

The label PEOPLE will slide over and will be right-justified in the column.

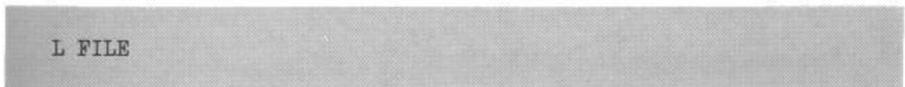
The justification function is also used on the numeric entries of the spreadsheet, but for the purpose of graphic representation rather than justification. Graphics with PractiCalc will be discussed in-depth in Chapter 6.

L

It is very simple to retrieve a file which has been previously stored on disk or tape. Be certain that the PractiCalc program has been loaded into the VIC-20 and that a PractiCalc spreadsheet is visible on the monitor screen. Remove the PractiCalc program cassette or disk and replace with your data cassette or disk. To load a file,

#1. Press **F3**

#2. Type **L** The Data Line will then read:



L FILE

#3. For loading from a tape, type the name of the file; for example, **SALES**

For loading from a disc, type @0: followed by the name of the file; for example, **@0:SALES**

IMPORTANT: MAKE CERTAIN THE DATASSETTE OR DISK DRIVE IS CONNECTED TO THE VIC-20 AND THAT THE DISK DRIVE IS PLUGGED IN AND TURNED ON.

#4. Press **RETURN**

The screen will go blank while the loading is in progress; upon completion, the file you requested will appear upon the screen.

If you had omitted a file name in step 3 of the loading process, the next file (on the tape only) would have been loaded.

If you requested a tape load, (i.e. omitted the signs '@0:') but intended a disk load, the screen will blank. To return to the spreadsheet upon which you were working, press the **RUN STOP** key, located at the far left of the VIC-20 keyboard.

It is possible to "overlay" sheets, but it is advisable to clear the spreadsheet. In order to overlay, you must enter beyond the largest sheet.

M

Often, as information is added to a spreadsheet, it becomes necessary to rearrange the order of the columns. To do so without retyping information,

#1. Move the cursor to the cell, row, or column where the information *is to be moved*

#2. Press **F3**

#3. Type **M** The Data Line will read:



M FROM R/C

#4. If you are moving *one cell*, type both coordinates

If you are moving a *row*, type the letter

If you are moving a *column*, type the number

#5. Press **RETURN**

Note 5F: When only a cell is moved, the information will be duplicated and will appear in both the old and new cells, and the information which was in the new cell will be written over. When an entire row or column is moved, the information will be entirely removed from the original location and will reappear in the new position. No information is written over with the movement of a row or column. PractiCalc rearranges your data to make room for the movement. Formulas will be re-referenced after the movement of rows or columns. However, when a cell is moved, re-referencing does **not** result, since information is **copied**, rather than moved and deleted from the original location.

P

If your Commodore VIC-20 is equipped with a printer, it is easy to print a *hard* copy of your spreadsheet.

IMPORTANT: MAKE CERTAIN THE PRINTER IS PLUGGED IN, CONNECTED TO EITHER THE VIC-20 OR DISK DRIVE, AND TURNED ON.

With the spreadsheet to be printed on the screen,

- #1. Move the cursor to the *upper-left* cell of the area to be printed
- #2. Press **F3**
- #3. Type **P** The Data Line will read:

```
PRINT TO RC
```

The PRINT command works in a rectangular fashion. The cell where your cursor is located is the upper-left corner and the coordinates you type supply the lower-right corner.

- #4. Type in the coordinates of the *lower-right* cell of the area to be printed
- #5. Press **RETURN**
- #6. The Data Line will read:

```
SETUP
```

PractiCalc is equipped with a special interface option which allows you to print your PractiCalc spreadsheets to a wide variety of printers. The process of 'setting up' the PractiCalc program is performed when you are ready to print a spreadsheet. Because a detailed explanation is necessary, however, an appendix on interfacing PractiCalc with different printers has been written and may be found on page 66. If you are reading the manual for the first time, we suggest that you do not print a spreadsheet at this point, but simply continue reading the manual and following the exercises. When you are sufficiently familiar with PractiCalc and ready to print your spreadsheets, refer to Appendix A.

#7. Press **F7** [to escape from the print routine and *not* print.] To print a spreadsheet, see Appendix A, page 66, for the correct responses to the prompt of **SETUP**.

Instead of printing all the labels and values on the spreadsheet, it is possible to print *only* the formulas which are contained in all cells. To do so,

#1. Press **F3**

#2. Type **P**

#3. Type any 4 letters [ex: **FORM**]

#4. Press **RETURN**

The formulas of the spreadsheet will be printed.

S

If the spreadsheet you are working upon contains information which you need to save and use again, PractiCalc enables you to store the information on the tape or disk you are using.

IMPORTANT: YOUR FILES SHOULD NOT BE STORED ON THE PRACTICALCALC TAPE OR DISK. USE A BLANK TAPE OR FORMATTED DISK FOR STORAGE. (SEE THE COMMODORE USER'S MANUAL FOR FORMATTING PROCEDURES.)

To save a spreadsheet,

#1. Press **F3**

#2. Type **S** The Data Line will read:

S FILE

#3. To save on a tape, type the name the file is to have; for example: **APRIL SALES**

To save on a disk, type '@0:' followed by the file name; for example:
@0:APRIL SALES

#4. Insert your storage tape or disk into the Datassette or disk drive

#5. Press **RETURN**

#6. Push **PLAY** and **RECORD** together on the Datassette [With the disk drive, it is enough to simply press **RETURN**]

When the cursor reappears on the screen, you have named and saved the file onto the tape or disk which is currently connected to the Commodore VIC-20. To retrieve that information, simply follow the steps listed above under L(Load) command.

If you intend to save on a disk, but neglect to type @0:, press the **RUN/STOP** key and the spreadsheet on which you were working will be restored to the screen.

After saving on tape or disk, it is often desirable to *verify* that the information has been recorded on the tape or disk before clearing the spreadsheet from the screen.

To verify that a spreadsheet has been recorded on a tape, save the file onto the tape, rewind the tape, and load the file without clearing the screen. If the file has been saved and can be loaded, the information on your screen will be the same, but more importantly, the Datassette will stop at a certain point on the tape. If the tape plays to the end without stopping, the file has not been successfully saved and should be saved again while the information remains on the screen.

To verify that a file has been loaded onto a disk, save the file and then leave the information on your screen. Next, load the file using the name you just gave it. If the file has been saved, the information will remain on the screen. If the saving process was not successful, the screen will go blank and will then read **R = -1 C = 0**. To restore the spreadsheet to the screen, press **RUN/STOP**. Save (and verify!) the file again.

T

A spreadsheet is often more easily understood if headings are put on the columns and rows to indicate the exact nature of the information they contain. The **TITLE** function fixes a data entry so that it will remain as a title to that particular column or row regardless of how far down or across the spreadsheet the cursor may go.

These steps apply for making a row into a fixed title.

#1. Move the cursor to the row or column which is to become fixed as a title

#2. Press **F3**

#3. Type **T** The Data Line will read:

```
R C B G 3 - 21
```

#4. Type **R** to fix a row as a title

Type **C** to fix a column as a title

Type **B** to make both the row and column into titles

Type **G** to return a column to the global column width

Type a number between 3 and 21 to change one column to a width other than that of the global column width

#5. Press **RETURN**

Example 5-6:

It would be convenient to have the titles across row A as well as the territories and salespeoples' names remain fixed on the screen even if you have moved to Q5. To do so,

#1. Move the spreadsheet so that Row A is upper-most and Column 1 is against the left side of the screen

#2. Press **F3**

#3. Type **T** The Data Line will then read:

```
R C B G 3 - 21
```

#4. Type **B** since you want *both* the column and the row to become fixed as titles

#5. Press **RETURN**

Column 1 and Row A will remain on the screen as titles, and anything above a "frozen" row or to the left of a "frozen" column will be locked out.

The TITLE function works so that the column, row, or both, which are against the left and upper edges of the screen, will be frozen as titles.

The cursor cannot get back into a cell which holds a fixed title unless you press **HOME**, which moves the cursor to the upper and/or left-most title position. An alternate method of getting back to a frozen window would be the use of the ← key (p. 8). This is especially useful if you need to change a title without losing the title status of the cell. When you are finished with titled cells or wish to get to rows and columns which have been locked off the screen by titling,

#1. Press **F3**

#2. Type **T**

#3. Press **RETURN**

The cells which were fixed as titles will again be as all other cells.

Changing Width of One Column

The remaining numbers on the Data Line of the TITLE function allow you to change the width of a *single* column of the spreadsheet without changing the global column width. Only one column may vary from the global width at a time.

Example 5-7:

Column 1 of your spreadsheet for XYZ could be more useful if it were wider so that it could display fully any salesperson's name which is more than 7 characters. To do so,

#1. Move cursor to Column 1

#2. Press **F3**

#3. Type **T**

#4. Type **12** [to make it 12 characters wide]

#5. Press **RETURN**

X

The 'X' which appears in the F3 menu stands for the SORT (on column) function of the PractiCalc program. PractiCalc will sort alphabetically and numerically, either from highest to lowest or from lowest to highest. The highest (or greatest) letter or number will be placed in the cursor position. To sort the rows within a particular column,

- #1. Move the cursor to the first or last cell where the greatest number [letter] in the range is to be after the sorting is done
- #2. Press **F3**
- #3. Type **X** The Data Line will read:



SORT FROM R

- #4. Type the row coordinate that marks the other end of the range to be sorted
- #5. Press **RETURN**

By placing the cursor on the the top or bottom of the column to be sorted, PractiCalc is able to determine whether to sort alphabetically or numerically. If the cursor is over a numeric entry, the column will be sorted numerically; if the cursor is over a label, the sort will be done alphabetically, from A - Z. Everything within the column from the cursor position to the coordinate given will be sorted.

Note 5G: *When a column is sorted, the corresponding data in other columns is moved as necessary. Sorting re-references formulas with the entries; but range functions like SUM may not have the correct parameters maintained. In this case, further calculation may yield undesired results. You may preserve range limits by sorting within the range. For this reason, you may wish to make your range limits (parameters) overextend your data and then sort within the range. (ex: Use the range (A0.F0) to sort the data in the range (B0.E0).*

One of the advantages to PractiCalc's SORT feature is that it does not change the spacing of the information in the spreadsheet. If you were to sort the sales figures of the XYZ Corporation, the spaces between each of the four territories would remain. Similarly, if you had a large list with spaces between each item, the items would each

still be separated by a space even after the sort. Cells which contain no data are passed over in the sort, and are therefore *not* treated as zeros and placed at the lower end after the sorting is done. By preserving the appearance of the spreadsheet during the SORT routine, it is not necessary to respace the data after the sorting has been done.

Space Bar

The number in the upper-right corner of the screen indicates the approximate number of labels and/or formulas which you can enter before the memory is filled. The number is not automatically updated while you are entering data, but rather when a file is loaded or the screen is cleared. If you need to find the available memory left for labels and formulas *while you are entering data*,

#1. Press **F3**

#2. Press the **space bar**

The indicator in the upper-right corner will briefly disappear and return with the updated amount of memory available for labels and formulas.

@

The last function listed in the options menu on the Data Line after pressing the F3 key is the SEARCH function, symbolized by the sign '@'. The SEARCH function enables the user to scroll quickly through the spreadsheet in search of a particular piece of information: a sales figure, name, or percentage, for example.

The SEARCH function can search one specific row or column, or the entire spreadsheet. It can search for alphabetic and numeric entries, and can search forwards and backwards. When searching through the entire spreadsheet, PractiCalc searches column by column, from the top row to bottom, starting at the current cursor position.

If the user is not precisely certain of the data for which he is searching, the SEARCH function provides a *wild card* option which allows specified variations of the data to be sought. The wild card option is also symbolized by the '@' sign.

To use the SEARCH function in its simplest form,

#1. Move the cursor to the start of the spreadsheet

#2. Press **F3**

#3. Type @ The Data Line will read:

SEEK

#4. Type the entry which you are seeking: a name, number, or a formula (If searching for a formula, press **F1**)

#5. Press **RETURN**

The cursor will move to the entry requested.

The cursor will only stop at the entry for which you are searching *if*

1. the entry, numerically, is an entry in its own right,
2. the entry, alphabetically, *starts* with those letters, or
3. the entry, a formula, is a valid formula.

It is at this point that the wild card option comes into play. It is important to remember that the wild card option of the SEARCH function applies only to alphabetic entries for which you are searching. For numeric entries or formulas, it is necessary to state precisely what you are searching for. The wild card symbol of '@' is used as a placeholder for letters when searching the spreadsheet.

When used at the start or end of an entry for which you are searching, the '@' can symbolize any number of letters. When used between two letters, the '@' can only represent one character (letter).

For example, if you typed **SON** after the question SEEK, the cursor would scroll through the XYZ Corporation spreadsheet without stopping at any entry because SON does not start off any entry in the spreadsheet. But if you had entered **@SON** after the SEEK prompt, the cursor would have first stopped at G1 for Nelson; pressing **RETURN** would have signalled the SEARCH to continue and it would have next stopped at H1, for Parsons.

A few of the basics to remember about the SEARCH function are:

To search forward through the entire spreadsheet, evoke the SEARCH function and press **RETURN** to initiate the search.

To search backward through the spreadsheet, evoke the SEARCH function, enter the piece of data, and press the **CLR HOME** key in the upper-corner of the keyboard.

To search through a row or column, position the cursor in the row (or column), use the SEARCH function to input the data for which you are searching, and then use the appropriate cursor key(s) to initiate the search in the correct direction.

The wild card function cannot be used to find formulas or numeric entries.

To search for any word which may contain a particular letter (or string of letters), use the SEARCH function and when it prompts SEEK, type **@ and the letter(s)** for which you are searching.

To search for any word which contains one variable letter in the center of the word (i.e. pin, pen, pan), evoke the SEARCH function and type **P@N**. The SEARCH will stop at each entry that is spelled **P@N**, the @ being the variable.

Examples will most accurately illustrate the capabilities of the SEARCH function.

Example 5-8:

Let's return to the spreadsheet you have done for the XYZ Corporation. You are looking for the territory whose three-month sales projection was 7200. Understanding that the only such value in the sheet is the projected three-month sales figure for one territory, you

#1. Move the cursor to the start of the sheet

#2. Press **F3**

#3. Type @ The Data Line will read:



SEEK

#4. Type **7200**

#5. Press **RETURN**

The cursor will stop in Q5, where Territory D's total of 7200 is lodged.

Example 5-9:

To search for every name or title in spreadsheet that contains the letter 'S',

#1. Move the cursor to the start of the spreadsheet

#2. Press **F3**

#3. Type @ The Data Line will read:



SEEK

#4. Type **@S**

#5. Press **RETURN**

The cursor will initially stop at Smith; then press **RETURN** and it will move onto Jones, etc.

The wild card function is helpful when seeking alphabetic entries, but is of no use in finding a value on the spreadsheet when you do not know the exact number. It is possible, however, to search for numbers within a known range.

Example 5-10:

To search for every salesperson at XYZ who sold more than \$800.00 worth during the past month,

#1. Move the cursor to C2

#2. Press **F3**

#3. Type @

#4. Type **800<**

#5. Press **RETURN**

PractiCalc will search for every value which "800 is less than". Therefore, the cursor will only stop at numbers greater than 800.

The < and > signs can be used to search for values for which an approximate is known, much like the wild card for alphabetic entries.

Since the SEARCH function affords such easy access to the contents of lengthy lists, PractiCalc is able to be used as a data filer for addresses, inventory, and other large files. For example, a spreadsheet with 200 rows and 10 columns could be used for an inventory system with cost look-up done by the SEEK function.

Even after PractiCalc has completed the search for a particular entry, the SEEK prompt on the Data Line will remain. To exit the SEARCH mode, simply press **F7**, located in the lower-right corner of the keyboard.

As mentioned before in Note 4A, the PractiCalc program will occasionally pause during the execution of certain functions. The pauses simply signify PractiCalc's reorganization of memory space to maximize its capacity.

F5

One of PractiCalc's most important features is the *replicate* function which allows repetition of data, cell format, or formulas throughout a specified range on the spreadsheet. A few instances where the replicate function would be most useful are: to enter a line of asterisks (*) across the screen; to apply a certain formula to each cell in a column without retyping the formula each time; or to change all cells of one column to a particular format.

Replicating can be done in any range of the spreadsheet by row or column (or portion thereof), or through the entire spreadsheet. If you choose to replicate in a column, the replication is done down the column. If you replicate within a row, the process is executed across the row. PractiCalc will replicate through more than one column and row by going through the columns from left to right across the sheet and from top to bottom in each column. To use the replicate function,

- #1. Move the cursor to the cell where the data is to start being replicated
- #2. Type the data that is to be replicated, unless it is the cell format, in which case it is not necessary to type anything
- #3. Press **RETURN**
- #4. Press **F5** The Data Line will read:



REP TO \$ R/C

#5. If you are replicating just the *format* of the cell, type **\$** and the row, column, [or both if you are replicating in more than one column and row]

If you are replicating a formula or an entry, type the row, column, or both to which you are replicating

#6. Press **RETURN**

If you requested that a replication be done of a format or a piece of data that contains *no cell coordinates*, the information will be entered in each cell.

If you entered a formula which contained cell coordinates, after you press **RETURN**, the formula will appear on the Formula Line. Above it on the Data Line will appear

FIX/REL

A small cursor will be positioned over the first variable in the formula as shown on the Formula Line. It is necessary to select whether that cell reference will be a constant (fixed) in each cell where the formula will be replicated, or whether it is to change, (relative) to each new position.

#7. Type **F** if the cell coordinate is to remain the same [fixed] in each cell to which the formula is being replicated

Type **R** if the cell coordinate is to change [relative] to each cell to which the formula is being replicated

The cursor will stop over each cell reference in the formula until the question of FIX/REL has been answered for each. After Step #7 has been answered for the last cell reference, the formula will be entered in each cell within the specified range. To find the results,

#8. Press **!** [to calculate]

Example 5-11:

The XYZ Corporation spreadsheet, with your most recent changes, is as follows:

Illustration 5-2:

A	TER	NAME	SALES	TER.TTL	SALEDIF	3MSALES	DAYSALE	%TSALE
B								
C	A	SMITH	500					5
D		JONES	700					7.77777
E		HOGAN	900	2100		6300	70	10
F								
G	B	NELSON	1000					11.1111
H		PARSONS	1200					13.3333
I		ANDREWS	500	2700	600	8100	90	5.55555
J								
K	C	ALLEN	800					8.88888
L		SHEA	400					4.44444
M		CONNORS	600	1800		5400	60	6.66666
N								
O	D	BENNETT	900					10
P		RYAN	700					7.77777
Q		EDWARDS	800	2400	600	7200	80	8.80888
R								
S		TSALES	9000					
T		PEOPLE	12					
U								
V								
W		HIGH	2700					
X								
Y		LOW	1800					
Z								
AA		AVDSALE	75					
	0	1	2	3	4	5	6	7

The daily sales figure for each territory was calculated by dividing the monthly total by 30 (days). You realize now that 25 selling days would yield a more realistic estimate of the daily sales figures. To change the daily sales figures,

- #1. Move the cursor to E6
- #2. Press **F1**

#3. Type **E3/25**

#4. Press **RETURN** entering the formula in E6

#5. Press **F5** The Data Line will read:

REP TO \$R/C

#6. Type **Q** the row to which you want the formula replicated

#7. Press **RETURN** The Data Line will read:

FIX/REL

and the cursor will be positioned over the E3

#8. Type **R** since you want the cell to be relative to each row in which it appears

#9. Type **!**

The new figures in Column 6 will read 84, 108, 72, and 96. The zeros resulted because the formula was replicated throughout the entire range. To maintain an accurate average daily sales figure (cell AA2), blank the zeros from Column 6 and then type **!** The average daily sales figure will be 90.

Note 5H: As mentioned before, PractiCalc calculates column by column, top to bottom, left to right. If your formulas cross back and forth from one side of the spreadsheet to another, it may be necessary to press **!** twice. The first calculation would complete the entire spreadsheet from left to right. The second calculation would take any newly-calculated values and insert them, where necessary, in formulas which lie to the left of the values used in the formulas.

Example 5-12:

Row B, which is a blank space between the titles of the spreadsheet and Territory A, would be more clearly marked if a line were drawn across the spreadsheet in the space. To do so,

- #1. Move the cursor to B0
- #2. Type-----
- #3. Press **RETURN**
- #4. Press **F5**
- #5. Type **7** since you wish to replicate to Column 7 of Row B
- #6. Press **RETURN**

Example 5-13:

The first figure in Column 7, which is Smith's percent of the total sales was converted to integer form in Example 5-1. To convert all the other salespeople's percentages to integer form without reformatting each individual cell,

- #1. Move cursor to C7
- #2. Press **F5**
- #3. Type **\$** [to replicate format only]
- #4. Type **Q** [the point to which the replication is to be executed]
- #5. Press **RETURN**

All the numbers in Column 7 will be in integer format.

Example 5-14:

The words HIGH and LOW in the lower left portion of the spreadsheet would mark the accompanying numbers more clearly if the words were right-justified. In Example 5-5, the justification of cell T1 was changed. To replicate the right-justification within that cell,

- #1. Move the cursor to T1
- #2. Press **F5** The Data Line will read:



REP TO \$ R/C

- #3. Type **\$** [to designate that only the format, and not the contents, of the cell is to be replicated]

#4. Type **AA** [the row to which you wish to replicate]

#5. Press **RETURN** and the labels will be right-justified

If you still wish to right-justify the word TSALES, repeat the justification procedure outlined in Example 5-5 on page 41.

At this point, your spreadsheet looks as follows:

Illustration 5-3:

A	TER	NAME	SALES	TER.TTL	SALEDIF	3MSALES	DAYSALE	%TSALE
B								
C	A	SMITH	500					5
D		JONES	700					7
E		HOGAN	900	2100		6300	84	10
F								
G	B	NELSON	1000					11
H		PARSONS	1200					13
I		ANDREWS	5000	2700	600	8100	108	5
J								
K	C	ALLEN	800					8
L		SHEA	400					4
M		CONNORS	600	1800		5400	72	6
N								
O	D	BENNETT	900					10
P		RYAN	700					7
Q		EDWARDS	800	2400	600	7200	96	8
R								
S		TSALES	9000					
T		PEOPLE	12					
U								
V								
W		HIGH	2700					
X								
Y		LOW	1800					
Z								
AA		AVDSALE	90					
	0	1	2	3	4	5	6	7

F7

The F7 key, the last of the function keys which PractiCalc will use, is simple in its purpose. It acts as an 'escape' key which will allow the user to exit a function if he does not want to complete the execution of that function or any of the functions contained within the F3 menu. For example, you have pressed F3, then typed D in order to delete a row. However, you realize the contents of the row are still needed for future calculations. Simply pressing the F7 key will remove you from the delete function and return the checkered cursor to the left of the Data Line.

There will perhaps be certain occasions in the use of PractiCalc when a function does not appear to be accepted by the computer. An example of this would be if the cursor were positioned over N4, and you started to enter a piece of data only to realize that N4 was the incorrect location. You would strike the delete key in the upper-right hand corner to clear the characters you were entering off the Data Line. When the Data Line was blank, pressing the ← key should summon a prompt of GO TO to the Data Line. It will not, however, because the program is still waiting for a label (or value) to be entered such as the one which you started. Pressing **F7** will escape from the mode that awaits the input of data and allow you to utilize the other keys of the VIC-20.

Chapter 6

The Graphics of PractiCalc

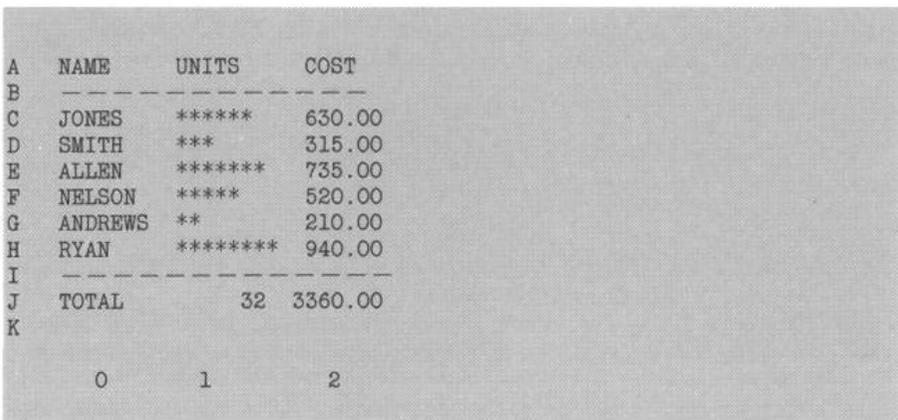
PractiCalc Plus for the Commodore VIC-20 has the capability to translate numerical data into histograms or bar graphs, as they are more commonly known.

There are two modes of graphic representation: high-resolution and low-resolution.

Low-Resolution Graphics

Low-resolution graphics depict the histograms with a series of asterisks (*) in the appropriate columns.

Illustration 6-1:



A	NAME	UNITS	COST
B	-----	-----	-----
C	JONES	*****	630.00
D	SMITH	***	315.00
E	ALLEN	*****	735.00
F	NELSON	*****	520.00
G	ANDREWS	**	210.00
H	RYAN	*****	940.00
I	-----	-----	-----
J	TOTAL	32	3360.00
K			

0 1 2

When PractiCalc Plus is initially loaded, the low-resolution mode is in effect. Each asterisk (*) used in low-resolution is equivalent to one unit. Therefore, low-resolution graphics can only display numeric quantities whose value does not exceed the width of the column in which the quantity is lodged. For example, if a column were 9 characters wide, the largest quantity which could be represented in lo-res graphics would be 9, and it would be represented as such:

Illustration 6-2:

A	MARY	*****
B	TOM	*****
C	BOB	*****
D	NANCY	*****
	0	1

where the quantity in A1 equals 9.
where the quantity in B1 equals 5.
where the quantity in C1 equals 7.
where the quantity in D1 equals 6.

Switching to Graphics

To convert a cell which contains a number to graphics,

- #1. Move the cursor over the cell to be changed
- #2. Press **F3**
- #3. Press **J**

If the numeric quantity in the cell is able to be represented in lo-res graphics, asterisks will appear across the column where the number was. If the column is too narrow to represent sufficiently the data in low-resolution graphics, an **ERROR** message will result.

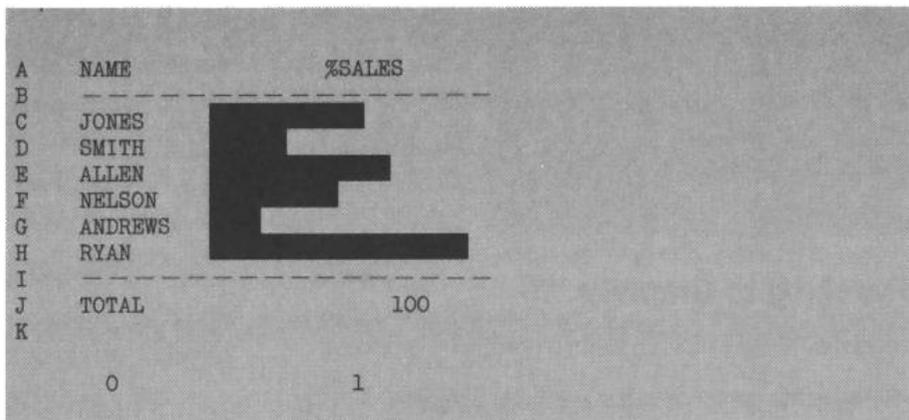
Note 6A: The J function of the options menu is used here to switch values to graphics. It is also used to change the justification of labels. However, the two uses do not pose a problem, since the graphics use is exclusively for values, and the justification change is only for labels.

If the sheet is in lo-res when an error message results, the number should be represented in high-resolution graphics.

High-Resolution Graphics

High resolution graphics show bar graphs comprised of shaded rectangular areas that are representative of numeric quantities.

Illustration 6-3:



High-resolution graphics are capable of loading much larger numbers into the same-sized space. In a column 7 characters wide, lo-res graphics can only represent quantities less than or equal to 7. High-resolution graphics represent the same quantity in one-eighth the space of low-resolution. Thus, in a 7-character column, any value less than or equal to 56 could be graphically represented. As mentioned before, PractiCalc Plus' spreadsheet is in the low-res mode when initially loaded. If you recognize that quantities cannot be represented graphically in lo-res, it is necessary to switch the screen to hi-res. To do so,

#1. Press **F3**

#2. Type **G** The Data Line will read:

```
I $ F H 3 - 21
```

#3. Type **H**

#4. Press **RETURN** The spreadsheet will be in the hi-res mode

To return to lo-res,

#1. Press **F3**

#2. Type **G**

#3. Type **H**

#4. Press **RETURN** and the screen will be back in the lo-res graphics mode.

After switching to hi-res, the steps for changing a number to graphics are the same as those listed above under **Switching to Graphics**.

If the spreadsheet is in lo-res and an attempt to convert a number to graphics results in an error message, there is no need to clear the error message. Switch the sheet to hi-res and the number will, if possible, be shown graphically. If the column width will still not allow adequate representation of the number, there are two alternatives: 1) to widen the column; 2) to divide the entire column of numbers by a common factor so as to reduce them sufficiently and equally.

To convert more than one cell to graphics, you can replicate the (graphic) format of the cell through a range. To do so,

#1. Position the cursor over the first cell which is to be represented graphically

#2. Press **F3**

#3. Type **J**

#4. Press **F5** The Data Line will read:



REP TO \$ R/C

#5. Type **\$** to indicate that only the *format* is to be replicated

#6. Type the number and/or letter which marks the end of the range through which the replication is to be completed

#7. Press **RETURN**

All the numeric quantities in the specified range will be switched, if possible, to graphics form.

Note 6B: *PractiCalc Plus is loaded in the lo-res mode and can be switched to the hi-res mode. However, simply changing the mode of the graphics will not change the numbers to bar graphs. The values on the sheet will have to undergo a format change, either by individual cell or through replication of a graphic format. Follow the steps outlined above for switching to graphics format and replicating graphics format to actually change the numbers to bar graphs.*

To switch back to numeric form,

#1. Move the cursor over the first cell in the range

#2. Press **F3**

#3. Type **J**

The single cell will be numerically represented again. To change the entire range back to numerals, simply replicate the changed format status of the first cell again.

Once numbers are in the graphic mode, they can be manipulated just as you would the actual numerals which they represent. They can be sorted and cells (which contain a graphic representation) can also be included in formulas, for it is the numbers which the graphs represent that will be acted upon in numerical processes.

The graphics of PractiCalc can also be printed through the use of a compatible printer. Low-resolution graphics, using the asterisks (*) to form bar graphs, can obviously be printed without difficulty by a compatible printer. The high-resolution graphics can be printed on a *dot printer*, with Commodore compatible graphics, for the histograms are comprised of a series of tiny dots. To print a graphic display, simply make certain that the numbers on the screen are represented graphically, and follow the print command outlined on page 43 of Chapter 5.

Error Messages

Error messages will sometimes appear in cells on the screen during calculation if any of the following errors have been made:

- #1. Division by 0
- #2. Square root of a negative number
- #3. Syntax errors (where the components of a formula are “grammatically” incorrect.)
- #4. Reference to a non-existent cell (ex: Calculation of A0 + Z99 will result in an error if Z99 is larger than the limits of the spreadsheet.)
- #5. Attempt to represent graphically a number in a column whose width is insufficient.

Appendix A:

Universal Printer Interface

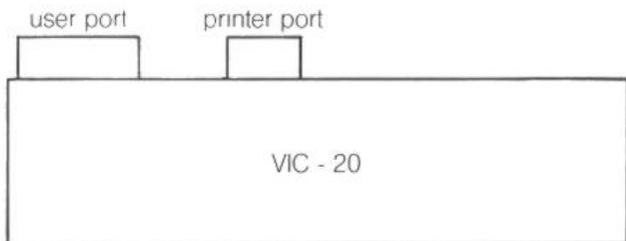
PractiCalc was originally designed to print to Commodore 1515 and 1525 printers at a width of 80 characters (condensed mode). However, the overwhelming number of non-Commodore printers owned by Commodore users has prompted us to establish a version of PractiCalc which will successfully interface with a wide variety of printers.

First, a few definitions about printer interfaces. A great deal of confusion exists about whether or not Commodore 1515/1525 printers are serial printers or belong in a class by themselves. Without attempting to solve that confusion, we have labelled the ports on the VIC-20 as shown below. For clarity in the instructions:

Commodore 1515/1525 printers will be plugged into the *printer port* of the Commodore VIC-20 (or the back of the disk drive, if daisy-chaining.)

Parallel printers, with the necessary interface, will be plugged into the *printer port* of the Commodore VIC-20.

Serial RS232 printers will be plugged in to the *user port* of the Commodore VIC-20.



Loading PractiCalc Plus

Two options, cursor type and baud rate, may be programmed into PractiCalc when the program is initially loaded. The options are input as one suffix on the LOAD command.

Alternate Cursor

The choice of standard or alternate cursor was already discussed in Chapter One when you loaded PractiCalc. PractiCalc Plus is initially loaded with a color cursor. The colored cursor will work on either black & white or colored monitors. The alternate cursor is a reversed cursor which is highly visible on a black & white monitor.

To load PractiCalc so that your video monitor will have a colored cursor, type

LOAD "PRACTICALC",1,1:0 (for tape)

LOAD "PRACTICALC",8,1:0 (for disk)

To load with the standard cursor, type the information as above, but omit ":0."

Baud Rates

If your printer is plugged into the *printer port* of the VIC-20, continue on to page 69, Print Command Options.

If your printer is plugged into the *user port* (i.e. serial RS232 printer), it is vital that you set the PractiCalc program to conform to the baud rate or 'speed' of your printer. There are different suffixes which will communicate varying baud rates *and* cursor changes. One suffix gives the commands for both cursor and baud rate.

IMPORTANT: Consult your printer's owner's manual to determine the correct baud rate for your printer. Then choose the correct suffix from the following list to configure your PractiCalc program correctly.

If your cursor is to be:	&	your baud rate is:	then	use the following suffix at the end of your LOAD statement:
standard		fixed; using printer port		(no suffix)
"		50		:A
"		75		:B
"		110		:C
"		134.5		:D
"		150		:E
"		300		:F
"		600		:G
"		1200		:H
"		1800		:I
"		2400		:Z
reverse		fixed: using printer port		:0
"		50		:Q
"		75		:R
"		110		:S
"		134.5		:T
"		150		:U
"		300		:V
"		600		:W
"		1200		:X
"		1800		:Y
"		2400		:Z

The baud rate divided by ten gives the approximate number of characters per second. Thus, a baud rate of 110 would be acceptable for a letter-quality printer with a capacity of 12 characters per second. A baud rate of 600 would work for a dot-matrix printer with an rate of 80. Printers with buffers accept higher baud rates. Characters are transmitted with an 8 bit word length, one stop bit, and no parity.

With the suffixes given above, you should have no difficulty specifying cursor type for your monitor and baud rate for printers which plug into the user port.

IMPORTANT: THESE TWO LOAD OPTIONS CAN ONLY BE SPECIFIED AT LOADING TIME AND NEED TO BE SPECIFIED (THROUGH THE USE OF A SUFFIX) EACH TIME PRACTICALC PLUS IS LOADED.

Print Command Options

When the "P" command is selected from the F3 options menu, the screen reads:

PRINT TO RC

After the lower right coordinate of the area to be printed is entered, press **RETURN** and the screen will read:

SETUP

There are two 'setup' values which are entered and provide additional information for various printers. After the first setup value is entered by pressing **RETURN**, the program will prompt for the second (and final) value. If no value is entered after the initial prompt of "SETUP" and **RETURN** is pressed instead, the second prompt will be skipped and printing will start.

The first and second setup values each have different uses. If you do not need the first value, but want to reach the second prompt of "SETUP" in order to enter the second value, the first value can be bypassed by entering '0' and pressing **RETURN**.

ONCE SETUP VALUES HAVE BEEN ENTERED, THEY DO NOT HAVE TO BE ENTERED AGAIN FOR SUBSEQUENT PRINTING.

The First Setup Value

The first value (as well as the second) is entered in the form of XXnn where:

XX is a single letter or pair of letters, and
nn is a single number or pair of numbers.

Either letter group (XX) or number group (nn) may be left out.

EXAMPLE:

The following are all acceptable first setup values:

AA33 A3 A 3

The letter group (XX) determines the maximum number of character columns to be printed. The numbers of character columns and the alphabetic equivalents which are to be used are as follows:

IF YOU WANT TO PRINT THIS # OF CHARACTERS:	USE THESE LETTERS:
0	A
1	B
22	V
25	Z
26	AA
32	AG
40	AO
80	CC
96	CS
120	DC
132	EC
136	EG
160	FE

In general, the value represented by the letter group is:

(position of right letter in alphabet) - 1 + 26 X (position of left letter, if any).

The number group (nn) determines the first 'setup' character (an ASCII value up to 99) which will be sent to the printer before printing the spreadsheet. Usually, the number group is used to select expanded or condensed printing. See the owner's manual for your printer to find the values recognized by your printer for expanded and condensed modes of printing. For example, sending character 14 (by including group 14) turns on the expanded print format on the Commodore 1515/1525. The number group can be a value between 1 and 99. A value of zero skips to the second prompt without changing the current value of the character. If you have incorrectly set the first setup character, changing it to something not recognized by your printer will effectively "pass over" this character.

The Second Setup Value

After the first value has been entered by pressing **RETURN**, the program will prompt again with the word **SETUP** for the second value. If you did not enter a first value, but simply pressed **RETURN**, the printing will commence.

With the second setup value a letter/number group (XXnn) is again requested. As with the first value, you can omit a letter, number, both letters, or both numbers. (See example above of acceptable setup values.)

The letter group represents the second setup character (an ASCII value up to 255) which is sent to the printer and is calculated in the same way that the character width was calculated. To determine which values you need, refer to your printer manual. The values and the corresponding letters which are to be used are as follows:

Use the letter which corresponds to the ASCII value:

B = 1	AS = 44	CJ = 87	EA = 130	FR = 173	HI = 216
C = 2	AT = 45	CK = 88	EB = 131	FS = 174	HJ = 217
D = 3	AU = 46	CL = 89	EC = 132	FT = 175	HK = 218
E = 4	AV = 47	CM = 90	ED = 133	FU = 176	HL = 219
F = 5	AW = 48	CN = 91	EE = 134	FV = 177	HM = 220
G = 6	AX = 49	CO = 92	EF = 135	FW = 178	HN = 221
H = 7	AY = 50	CP = 93	EG = 136	FX = 179	HO = 222
I = 8	AZ = 51	CQ = 94	EH = 137	FY = 180	HP = 223
J = 9	BA = 52	CR = 95	EI = 138	FZ = 181	HQ = 224
K = 10	BB = 53	CS = 96	EJ = 139	GA = 182	HR = 225
L = 11	BC = 54	CT = 97	EK = 140	GB = 183	HS = 226
M = 12	BD = 55	CU = 98	EL = 141	GC = 184	HT = 227
N = 13	BE = 56	CV = 99	EM = 142	GD = 185	HU = 228
O = 14	BF = 57	CW = 100	EN = 143	GE = 186	HV = 229
P = 15	BG = 58	CX = 101	EO = 144	GF = 187	HW = 230
Q = 16	BH = 59	CY = 102	EP = 145	GG = 188	HX = 231
R = 17	BI = 60	CZ = 103	EQ = 146	GH = 189	HY = 232
S = 18	BJ = 61	DA = 104	ER = 147	GI = 190	HZ = 233
T = 19	BK = 62	DB = 105	ES = 148	GJ = 191	IA = 234
U = 20	BL = 63	DC = 106	ET = 149	GK = 192	IB = 235
V = 21	BM = 64	DD = 107	EU = 150	GL = 193	IC = 236
W = 22	BN = 65	DE = 108	EV = 151	GM = 194	ID = 237
X = 23	BO = 66	DF = 109	EW = 152	GN = 195	IE = 238
Y = 24	BP = 67	DG = 110	EX = 153	GO = 196	IF = 239
Z = 25	BQ = 68	DH = 111	EY = 154	GP = 197	IG = 240
AA = 26	BR = 69	DI = 112	EZ = 155	QQ = 198	IH = 241
AB = 27	BS = 70	DJ = 113	FA = 156	GR = 199	II = 242
AC = 28	BT = 71	DK = 114	FB = 157	GS = 200	IJ = 243
AD = 29	BU = 72	DL = 115	FC = 158	GT = 201	IK = 244
AE = 30	BV = 73	DM = 116	FD = 159	GU = 202	IL = 245
AF = 31	BW = 74	DN = 117	FE = 160	GV = 203	IM = 246
AG = 32	BX = 75	DO = 118	FF = 161	GW = 204	IN = 247
AH = 33	BY = 76	DP = 119	FG = 162	GX = 205	IO = 248
AI = 34	BZ = 77	DQ = 120	FH = 163	GY = 206	IP = 249
AJ = 35	CA = 78	DR = 121	FI = 164	GZ = 207	IQ = 250
AK = 36	CB = 79	DS = 122	FJ = 165	HA = 208	IR = 251
AL = 37	CC = 80	DT = 123	FK = 166	HB = 209	IS = 252
AM = 38	CD = 81	DU = 124	FL = 167	HC = 210	IT = 253
AN = 39	CE = 82	DV = 125	FM = 168	HD = 211	IU = 254
AO = 40	CF = 83	DW = 126	FN = 169	HE = 212	IV = 255
AP = 41	CG = 84	DX = 127	FO = 170	HF = 213	
AQ = 42	CH = 85	DY = 128	FP = 171	HG = 214	
AR = 43	CI = 86	DZ = 129	FQ = 172	HH = 215	

For example, the value 145, represented by the letters **EP**, when sent to the Commodore 1515/1525, restores the printer to CAPS only mode. Refer to your printer manual for the numeric value of the second setup character. Look at the preceding table, and find the alphabetic equivalent. Use the letter(s) as the first half of the second setup value.

The numeric part (nn) of the second setup value determines whether a linefeed is sent after each return character and what secondary address will be sent upon opening the (printer port) printer. The format is nn = secondary command value between 1 and 31 PLUS (32 for linefeed, or 0 for no linefeed).

For example, to send a secondary command of 7 (which selects upper and lower case) and to request a linefeed on the Commodore 1515/1525, use the group $7 + 32 = 39$.

Summary

In response to the first prompt of **SETUP** which appears when using the print option from the F3 options menu,

1st SETUP VALUE: XX = maximum # of characters to be printed

**nn=first character to printer before printing—ASCII value of 1-99—determines expanded or condensed mode

A response of **RETURN** at the first prompt of **SETUP** skips the second prompt and commences printing.

A response of **0** and **RETURN** skips the 1st setup value, giving you **CC** (80 characters, condensed) by default, and displays 2nd setup prompt.

In response to the second prompt of **SETUP**,

2nd SETUP VALUE: *XX = second character to printer before printing—ASCII value of 1-255 (represented by letters) used to achieve desired function

**nn = linefeed (yes/no) and secondary address value

*denotes values which are obtained from printer manual.

A Few Samples

A. An IDS 440 printer connected to the user port via a UMI 232 adaptor. To run at 1200 baud with a standard cursor and a linefeed after each carriage return,

1. Type **LOAD "PRACTICALC",8,1:H** to load.
['8' to load to disk, ':H' = serial, 1200 baud, standard cursor]
2. When printing, after initial prompt of **SETUP**,
 - a. Type **0** ['0' means skip to second setup, giving 80 characters (standard) in condensed mode.]
 - b. Press **RETURN**
3. At second prompt of **SETUP**,
 - a. Type **32** ['32' signals additional linefeed after each carriage return.]
4. On successive printing, press **RETURN** after first **SETUP** prompt.

B. A Commodore 1525 printer connected to the printer port via a five-pin cable. To use the regular cursor and expanded print,

1. Type **LOAD "PRACTICALC",8,1** to load
['8' to load disk; no suffix to load with regular cursor and no change in the baud rate.]
2. When printing, after initial prompt of **SETUP**,
 - a. Type **AO14**
['AO' for 40 character width; '14' is first setup character which signals expanded mode.]
 - b. Press **RETURN**
3. At the second prompt of **SETUP**,
 - a. Press **RETURN**

(In the expanded mode on the Commodore 1525, there is only room to print 40 characters.)

4. On successive printing, press **RETURN** after first prompt of **SETUP**.

PractiCalc Plus Command Summary

This page is intended as a reference guide for easy directions after reading the PractiCalc Plus manual.

F3 PractiCalc's Options Menu

- B To blank a cell,
 - 1. Move cursor to cell which is to be blanked
 - 2. Press **F3**
 - 3. Type **B**

- C To clear the screen,
 - 1. Save the material if necessary
 - 2. Press **F3**
 - 3. Type **C**
 - 4. Type **Y** to clear sheet
Type **N** to leave sheet on screen

- To resize the spreadsheet,
 - 1. Save the material if necessary
 - 2. Press **F3**
 - 3. Type **C**
 - 4. Type **R**

- D To delete a row or column,
 - 1. Move cursor into row or column to be deleted
 - 2. Press **F3**
 - 3. Type **D**
 - 4. Type **R** to delete a row
Type **C** to delete a column

- F To format a cell,
 - 1. Move cursor to cell which is to be formatted
 - 2. Press **F3**
 - 3. Type **F**
 - 4. Type **G** to make the cell format agree with global format.
Type **I** to make the cell integer format
Type **\$** to make the cell dollar format
Type **F** to make the cell floating decimal format

- G To format the entire screen (global),
1. Press **F3**
 2. Type **G**
 3. Type **I** to make global format integer
Type **\$** to make global format dollar sign
Type **F** to make global format floating decimal
Type **H** to make global graphics high-resolution
Type **a number between 3–21** to set global column width
- I To insert a row or column,
1. Move cursor to where the blank row or column is to appear
 2. Press **F3**
 3. Type **I**
 4. Type **R** to insert a row
Type **C** to insert a column
- J To change the justification of a label,
1. Move cursor to cell which contains label to be justified
 2. Press **F3**
 3. Type **J**
- To change a number to graphics,
1. Move cursor to cell which contains the value
 2. Press **F3**
 3. Type **J**
- L To load a file,
1. Press **F3**
 2. Type **L**
 3. Type **file name** to load from tape
Type **@0: file name** to load from disk
 4. Press **RETURN**
- M To move a row or column,
1. Move cursor to destination of cell, row, or column
 2. Press **F3**
 3. Type **M**
 4. Type **a letter and a number** to move a cell
Type **a letter** to move a row
Type **a number** to move a column
 5. Press **RETURN**

- P To print a spreadsheet,
1. Move cursor to upper-left cell of area to be printed
 2. Press **F3**
 3. Type **P**
 4. Type **cell coordinate** of lower-right corner of area to be printed
 5. Press **RETURN**

- S To save a spreadsheet (file),
1. Press **F3**
 2. Type **S**
 3. Type **file name** to save to tape
Type **@0: file name** to save to disk
 4. Type **RETURN**

- T To fix a title,
1. Move row, column, or both which are to be fixed into the upper-most or left-most positions on the screen.
 2. Press **F3**
 3. Type **T**
 4. Type **R** to title a row
Type **C** to title a column
Type **B** to title both row and column
 5. Press **RETURN**

- To change the width of one column,
1. Move cursor to column to be changed
 2. Press **F3**
 3. Type **T**
 4. Type **a number between 3 and 21**
 5. Press **RETURN**

- X To sort a column,
1. Move cursor to top or bottom of column to be sorted
 2. Press **F3**
 3. Type **X**
 4. Type **row letter** of other end of range
 5. Press **RETURN**

@ To search for an entry,

1. Press **F3**
2. Type @
3. Type **entry to be searched for**
4. Press **RETURN** to search sheet to right of cursor position
Press **CLR HOME** to search sheet to left of cursor position
Press **cursor key** to search in the direction of the key

SPACE To determine amount of remaining memory for labels and formulas:

BAR

1. Press **F3**
2. Press **space bar**

The first character of an entry determines how PractiCalc will handle the entry:

1st character a letter	→ a label
1st character a number	→ a value
1st character a number, then a letter	→ a formula
1st character !	→ calculates
1st character #	→ shows cell contents
1st character F3	→ options menu
1st character F5	→ replicates format, formula, or data
Any entry and RETURN	→ enters data in cursor location
Any entry and CRSR key	→ enters data and moves to new cell
Any entry and HOME key	→ enters data and moves cursor to A0
Any entry and F1	→ designates data as a formula
Any entry and F7	→ escape

Questions regarding PractiCalc Plus are encouraged and welcome. For technical assistance, please call:

(617) 961-5700 ext. 290
from 2-5 p.m. (EST) only

For additional information on other CSA programs, please send a #10 (business size) self-addressed, stamped envelope to:

Computer Software Associates
65 Teed Drive
Randolph, Massachusetts 02368 USA
Attn: Literature Dept.

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PLACE
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**COMPUTER
SOFTWARE
ASSOCIATES**

65 Teed Drive
Randolph, Massachusetts 02368
617-961-5700

Warranty Information

Warranty # 32396

Please complete and mail the attached card within 10 days of purchase to validate the warranty, and to receive future mailings about Computer Software Associates products.

Listed above is your warranty number which will be on file at Computer Software Associates upon receipt of your Owner Warranty Card. Should you have any questions about your PractiCalc program, please include this number with all inquiries.

Upgrading PractiCalc

Should you upgrade your Commodore system from a datassette to a floppy disk drive, you may exchange your PractiCalc cassette for a copy on diskette. To do so, send your name, address, and \$5 (check or money order) to:

Computer Software Associates
65 Teed Drive
Randolph, Massachusetts 02368
Attn: Upgrading Program

Back-Up Copies

To obtain a back-up copy of PractiCalc Plus, send your name, address, and \$5 (check or money order):

Computer Software Associates
65 Teed Drive
Randolph, Massachusetts 02368
Attn: Back-up Request

UNLESS YOUR WARRANTY CARD IS ON FILE AT COMPUTER SOFTWARE ASSOCIATES AND YOUR WARRANTY NUMBER ACCOMPANIES YOUR REQUEST FOR AN UPGRADE OR BACK-UP COPY, YOUR ORDER WILL NOT BE FILLED



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