SuperCalc
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SuperCalc™

by SORCIM

SuperCalc™ Manual.
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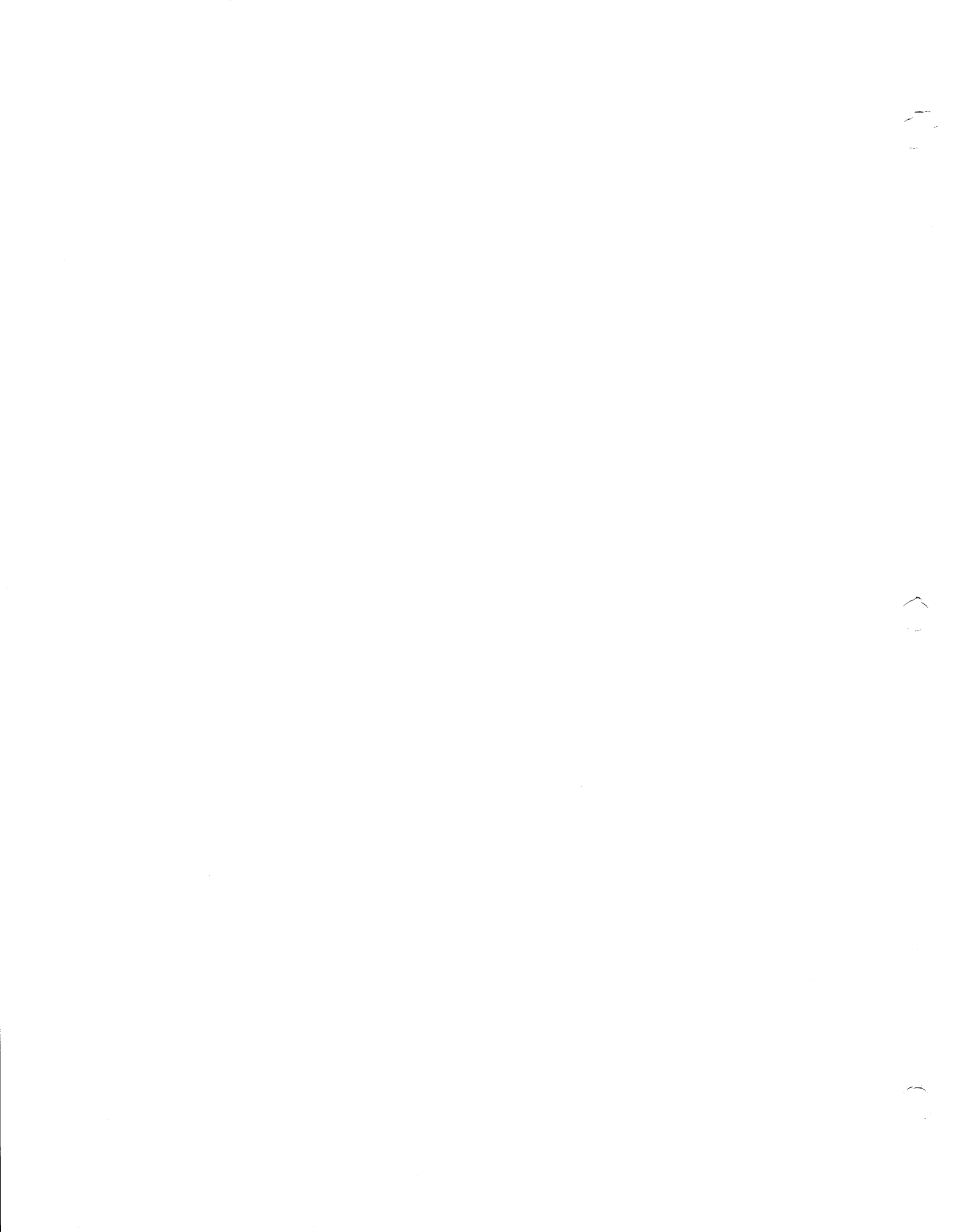
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SuperCalc™
User's Guide & Reference Manual

Documentation 1.0
July 1981

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PART I: INTRODUCTION

What Is SuperCalc?

The SuperCalc™ program is an important tool for anyone who wants to use computer power to deal with numbers. The computer novice can easily learn to use its full power because the program is designed to be friendly, to provide useful prompting messages, and to protect your work from unintentional change.

The SuperCalc program lets you use a microcomputer's memory as a large worksheet. The computer terminal screen is the window through which you can see your worksheet and manipulate its contents. You can easily alter information, or replace it entirely, with a few simple keystrokes. Subject to your control, the program will recalculate all values affected by the new, updated, or modified data.

The program's built-in functions are similar to those of a business or scientific calculator. Its data display options let you adapt the worksheet format to your individual needs by displaying numeric values in a variety of formats—for example, ordinary numbers, scientific notation, dollars and cents—without changing your actual data.

The SuperCalc program is invaluable for exploring possibilities, trying out and comparing alternatives. You can use conditional expressions—for example, you might have one formula applied to the sum of a column of numbers if it is positive, another formula if the sum is negative. It makes your intuitions visible. At the same time, it helps you develop accurate information for exact, complete, and internally consistent reports. You can display the reports on your terminal, print them "as is", or store them on disks to edit and print later.

The SuperCalc program runs on microcomputer systems that use the CP/M disk operating system, and it supports a great variety of terminals.

Chapter 2

Getting The Most Out Of This Guide

Like the SuperCalc program itself, this guide is intended to be a useful tool for people of different backgrounds, interests, and knowledge. Whatever your previous experience with computers, this guide will help you use the program easily and effectively.

Part Two, "Getting Acquainted," is primarily a tutorial or series of lessons that let you teach yourself to use the SuperCalc program at a comfortable pace. These lessons will guide you through the basic commands of the SuperCalc program. The tutorial in-

cludes short hands-on examples for you to do on your computer system. The final three chapters of this section use realistic managerial, accounting, and scientific applications to pull together what you have learned.

The tutorial section includes material suitable for people with very different levels of experience, so we recommend that you read its first short chapter, **Learning Tips**, before starting the lessons. It will help you use them most effectively. The chapter, **An Introduction to Concepts** provides a conceptual overview of the SuperCalc program that can help you understand how the various parts relate to each other. The "pre-lesson" called **Getting Started** will probably be most useful to you if you are new to computers.

Part Three, "SuperCalc Reference," includes both a brief summary reference—which is the first place to look if you need to check on something—and a detailed reference chapter that expands on some of the

basics covered in the summary. The SuperCalc program is a simple, straight forward and efficient program to use. We include the general and detailed reference sections for the novice as well as the expert who need to check the characteristics of a particular command or sequence of commands.

Words that may be unfamiliar to you, or that have some special meaning in relation to SuperCalc, are explained when they are first used. If you come across the word again later and are not sure you understand it, check the glossary.

The guide has five appendixes. The first two, **Standard or Default Settings** and **Commands Involving Formula Adjustment**, list that information in one convenient place. The third and fourth appendixes, **Memory Use—Hints and Concepts** and **Suggestions**, will probably be most useful to you after you have more experience using SuperCalc. The fifth appendix discusses the proper care of your "floppy" disks.

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PART II: GETTING ACQUAINTED

Learning Tips

Section Overview

This tutorial section will help you quickly teach yourself to use the SuperCalc program. The section has four chapters in addition to this one. The next chapter, **An Introduction to Concepts**, is optional, but we strongly recommend that you read it. It introduces some key SuperCalc terms and gives you an overview that can make learning the parts easier. Chapter 5, **Getting Started**, is a kind of pre-lesson. It is divided into two parts—one for those who are familiar with operating their computer systems and another with additional information for less experienced users.

The nine lessons in Chapter 6, with examples in Chapter 7, are the core of this section. The lessons have been carefully designed as a kind of "trialogue"—a friendly, three-way meeting between you, your guide, and your SuperCalc program. Remember that these lessons make most sense in a hands-on situation. If you try simply to read through the lessons, your understanding of the SuperCalc program will remain fuzzy and incomplete. It would be like taking a trip through Europe by a reading a map.

Learning the SuperCalc Program

The best way to learn to use the SuperCalc program is to review Chapter 4 and the relevant material in Chapter 5. Then sit down at your computer terminal with this guide; follow the **Getting Started** instructions for bringing up the SuperCalc program, and begin the lessons. You will learn by doing.

We show you how to do something. You try it and see what happens. If necessary, we give some further explanation and perhaps another "mini-example" to

try. The SuperCalc program makes it easy to recover from a wrong move. You can't hurt the program, and making a mistake will never jeopardize your work.

Set Your Own Pace

Lessons are designed to let you learn at your own pace. Most contain optional mini-examples and extra information that let you develop confidence and deepen your understanding. If you are experienced with computers, you may find that you can skip these. If computers are new to you, we suggest that you do them all. The experience will be valuable when you develop your own "real-world" worksheets.

Self-Contained Building Blocks

Lessons are self-contained. At the end of each one, you choose whether to go right on to the next lesson or to stop for a while. They are reasonably short, and you should feel free to start up the SuperCalc program and learn a little more whenever it is convenient.

The lessons build on one another, combining what you have learned with new material in an easy, step-by-step way. In the first lessons, you get some basic tools. You learn how to move about on you worksheet and how to enter or change various kinds of information. Very soon you will be developing material to be saved and used again in later lessons. (For your protection, *always* save material when the guide asks you to do so—even if you plan to go immediately to the next lesson. It's good insurance against unexpected power failures or other interruptions.)

The lessons in Chapter 7 unify what you have learned and show you some of the powerful SuperCalc functions at work in realistic applications. They use examples supplied on your SuperCalc disk.

Memory Joggers

Terms, concepts, and operations are explained when they are first introduced. Later, if you are not sure how to do something or what a word means, check the Reference Section or the Glossary, or ask the SuperCalc program itself. Try the SuperCalc "help" function, discussed in Chapter 4. It will display information relevant to your current options any time you press the ? key.

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Introduction to Concepts

The optional chapter, **An Introduction To Concepts** describes some basic SuperCalc terms and tools so that they will be familiar when you meet them in the lessons. The lessons are self-contained—if you want to plunge right in and start them now, go ahead. But we encourage you to review this chapter first, because it provides the kind of conceptual framework that many people find helpful in learning.

The Worksheet

The SuperCalc program allows you to use your computer's memory as a large worksheet organized in a grid. Worksheet columns are designated by letters (A, B...Z, AA...AZ, BA....BK); rows are designated by numbers (1 to 254). The coordinates—for example, A12, AB5—indentify specific locations called "cells". The cell at the upper left of the worksheet is A1. The cell diagonally opposite it at the lower right is BK254.

The Active Cell and the Worksheet Cursor

You enter data into cells. Only one cell is "current" or "active" at any moment. This *Active Cell* is the one immediately available for use. When you enter data, it goes into the Active Cell. The row and column that contain the Active Cell are called the current row and current column.

The Active Cell is always indicated on your screen by the "worksheet cursor." Most terminals use underlining for this, but your terminal may use something

else. For example, some terminals use < and > or reverse video. (With reverse video, screens that normally display light characters on a dark background will show the Active Cell as a light bar; characters in the cell will be dark.)

When you enter data, the SuperCalc program automatically moves the worksheet cursor to an adjacent cell. This becomes the new Active Cell. You can easily specify a different location for the Active Cell if you wish. You will learn how in Lesson 1.

The Display Window, Scrolling, Split Window

The worksheet is far too large to be seen on your screen all at once. So your screen acts as a *"display window"* through which you see part of the worksheet and manipulate its contents. The SuperCalc program moves the window over the worksheet as necessary to keep the Active Cell in view. This movement is called *"scrolling."* The window may scroll up or down, left or right. You can "lock" some columns or rows in place so that they will remain in view even when the window scrolls. Because this feature is especially useful for titles, it is called *title lock*. You can split the display window into two windows, either horizontally or vertically, in order to bring separate parts of the worksheet into view at the same time.

Status, Prompt, Entry Information

At the bottom of your terminal screen, beneath the data display area of your worksheet are three lines.

They display status, prompt, and entry information. As you progress through the lessons, you will learn more about these lines and their contents. For now, a few simple concepts will suffice. The SuperCalc program uses both the status and prompt lines to give you information. In general, the first of the three lines gives you a "status" report with information about such things as the Active Cell and its contents. The second line "prompts" you, asking what you want done next, as well as listing your immediate options. The bottom line on the screen is the entry line. This is where you tell the SuperCalc program what to do by entering commands or data.

Help Available

If you are ever confused, puzzled, or unsure about what to do next, just press the "?" key to ask for help. You can do this at any point—even in the midst of entering some command. The display on the screen will immediately change to show additional information about your choices. You can bring back the regular worksheet display by pressing any other key.

Interpretive Prompting

Interpretive prompting means that you only need to give the first character of a command on the entry line, and the SuperCalc program will immediately fill in the rest of the word. The program will also use the prompt line to indicate what you should do next. The "/" symbol precedes most commands. If you press "/," the character appears on the entry line and the prompt line will change to show you a list of possible single-letter commands. Suppose you then press B. You have put /B on the entry line. The SuperCalc program fills out the rest of the command. /B becomes /Blank. In this example, the prompt line will change again to ask you to specify what should be "blanked."

Modifying Your Commands and Data

The SuperCalc program makes it easy for you to *edit* information on the entry line. If you make a mistake while entering a command or data, you can quickly rectify your mistake by adding or deleting characters without affecting the correct portion of your entry. You will learn to use the same editing techniques to modify the contents of a cell.

Protecting Your Work

The SuperCalc program provides several "insurance policies" to safeguard against accidentally destroying work that should be preserved. You can *protect* individual cells or groups of cells in the worksheet so that their contents and *format* will not be changed unless you specifically *unprotect* them. Similarly, the SuperCalc program will check with you before executing commands that have major consequences for your work; for example, clearing the entire worksheet or exiting from the SuperCalc program before saving your new or modified worksheet.

Cells—Their Format, Contents, and Value

When you first start the SuperCalc program, cells are only potential locations on your worksheet and take no space in your computer's memory. You bring a cell into existence by "using" it in some way, by putting something into it or by *formatting* it, that is, preparing it to express an entry in a particular manner: as an equation, text, or numeric value.

Cell Format

When you *format* a cell, you tell the SuperCalc program how you want the content to look on your screen. This display format may differ from the way the cell contents looked when you entered them. For example, you might want a numeric value to display in ordinary notation (1776), with or without a decimal; or in scientific notation (1.776×10^3). You could enter your data in whichever format was convenient, and the SuperCalc program would convert the data into the dispaly format that you had specified. Similarly, you could change any of a cell's format attributes without affecting the actual contents. You can specify formats for individual cells or groups of cells, for rows, for columns, or for the entire worksheet.

Cell Contents

A cell can hold text, a number, or a formula. *Text* is useful for things like column headings, descriptions, or notes. (Example: January, Discount Sales.) It can be up to 116 characters long. *Numbers* can have up to 16 digits of precision in either ordinary or scientific (exponential) notation. Using scientific notation, you can raise these 16 digits by a power of ten, up to 10^{63}, either positive or negative. *Formulas* allow calculations based on values stored in other cells. (Examples: A5+10, SUM(B1:B9), E7/9-BK2.) The SuperCalc program has many special functions for use in formulas. You can use formulas to compare values in cells or groups of cells and then perform one calculation or another, depending on the result of the comparison.

If you put a formula into a cell, the SuperCalc program also puts into the cell the value that results from calculating that formula. You can display either the original formula or its current value. When a cell's value changes, the program will recalculate formulas referring to that cell.

Cell Value

Many SuperCalc operations use the numeric value of cells—for example, adding an entire column. The value of a cell containing a number is the value of that number. The value of a cell with a formula is the value obtained by calculating the formula. Cells that have text or that are empty or blank are considered to have a value of zero.

Display Width

The display width formatting attribute defines the width of the column you see displayed and is independent of the "width" of the data in the cell. For example, you might have a 12-digit number in a cell. The program will show you what it can of the number. With a display width of 12 or more, you could see the entire number. With a display width of 9, you could see 9 digits, and so forth. Whatever the display width, the SuperCalc program will consider all 12 digits in calculations. You can set display widths from 0-127 characters. Different columns can have different widths. When SuperCalc starts up, columns are set at a standard or *default* width of nine characters. The status line shows you the display width of the column containing the active cell.

This has been a very brief overview of *some* of the essential features of the SuperCalc program. The lessons in the following chapters will let you expand this basic knowledge by exploring these and other SuperCalc features in detail, step by step.

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Getting Started

This chapter is divided into three main parts. If you have experience using computers with the CP/M operating system, the first section is the one you should read. If you are an experienced computer user but not familiar with CP/M, you might want to read both the first part and also the third, "System Concepts," which deals briefly with a few CP/M concepts that are especially relevant to certain SuperCalc operations.

If you do not have much experience with computers, you should read the second section, "New Users," and the third, "System Concepts." Appendix V contains some tips to help keep your disks in top operating condition. Whether you are a new or experienced user you will find it useful.

CR or (CR) in the instructions below, refers to the return key on your terminal's keyboard.

Experienced Users

First be sure that you have a backup copy of the SuperCalc program. If you do not have a copy, then use your **install** program to make one before proceeding. In fact, it is best to copy your entire Super-Calc disk, which includes the SuperCalc program and several sample worksheets. Use the copy and reserve the original for backup.

The SuperCalc program must be run from the system drive. There are two ways to do this: 1) Have the SuperCalc program and your operating system on one disk, and run from that disk; or 2) Bring up the system on one drive; place the SuperCalc disk on another drive, and make that your system drive.

For convenience, here are check lists for both these approaches. (If your system drive is not ordinarily

drive A, substitute the system drive designation for A. In the second procedure, we use drive B as the alternate to the system drive, but any non-system drive will do.)

1. The SuperCalc program and the system on one disk:
   a. Power on the system
   b. Place the combination disk in drive A.
   c. Boot (load) the system.
   d. Type **SC(CR)**

2. The system drive on one disk and the SuperCalc program on another disk:
   a. Power on the system.
   b. Place the system disk in drive A.
   c. Boot (load) the system.
   d. Place the SuperCalc disk in drive B.
   e. Type **B:(CR)** to make B the system drive.
   f. Type **SC(CR)**

In either case, the SuperCalc program will be executing on your system drive. An informational page will appear on your screen and you will have a choice of calling up some "help" information or going directly to the SuperCalc worksheet display.

Press "**?**" to see the help message. After looking at it, press **CR**.

At this point, you can go on to Lesson 1 in Chapter 6 and start learning about the SuperCalc program. If you don't want to start the lessons now, here is how to return to CP/M from the SuperCalc program:

   a. Press **/**
   b. Press **Q**
   c. Press **Y**

New Users

This section tells you how to start up the SuperCalc

program on your system. In order to help you with that task, which is quite easy, this section also gives you some information about CP/M systems in general.

This additional information is given only as a convenience. This section does not replace the manuals that came with your computer system. It is meant only to give you some essential information and to guide you in what topics to look up in your systems manual. The topics we will cover are:

1. Powering up your system.

2. Inserting your system disk.

3. Booting (loading) your system.

4. Determining whether or not the SuperCalc program is on the system disk.
   a. If so, how to start up the SuperCalc program.
   b. If not, how to place it on another drive, make that drive the system drive, and start the SuperCalc program up on that drive. (The SuperCalc program must be on the system drive.)

5. Removing the disk(s) when you have finished.

6. Shutting down your system.

7. Making your own checklist and labels.
   After you have gone through the start-up procedure once, you may find it helpful to make some "mini-documentation" of your own. It doesn't have to be anything fancy, just some simple labels and checklists to remind you of the key points.

   Here are examples of the kind of things that can be especially useful during the first few times that you use a system—or when you come back to the system after being away for some time.
   a. *Start-up Checklist* Your computer system's documentation should include start-up procedures that are more specific than the ones in this guide. If it does not—or if they are not clear and concise—make yourself a checklist and post it near your system. (If the system manual *does* have something like that, make a copy of it and post it.)
   b. *Which Drive is Which* If your disk drives are not labeled (A, B, etc.), put labels on them.
   c. *How to Insert a Disk* You may also find it helpful to put labels on your drives that indicate which way the disk should face when you insert

it. For example, "DISK LABEL UP" or "DISK LABEL LEFT."

Before starting this practice session, get your system manuals out and have them handy. You should at least have the manual for your CP/M operating system and a manual that shows you how to power up and boot (load) your system from a system disk. You will also need a pencil, note pad, and perhaps some labels.

It will be helpful if someone who is experienced with your system can guide you through the start-up procedure the first time, but it is not necessary.

1. Powering up your system
For this step, you must consult your hardware manual, because different computer systems have different requirements. The procedure is usually very simple. It may be a matter of being sure the system is plugged in and then turning a key or pressing a switch. Or you may have to turn on more than one piece of equipment.

2. Inserting your system disk
A "system disk" is one that has the CP/M operating system on it, including a portion called the "boot track" which allows it to start itself. The disk should be clearly labeled, but if you are not sure that a disk has the CP/M system, go ahead and try it. You won't hurt the disk or the system.

Your system's disk drive has slots (probably two or more) where you can insert disks. The slots may be vertical or horizontal, and they may have small doors. (Some drives without doors may have a slotted piece of rubber over the drive opening.)
The disk drive must be runnng before you insert the disk. Open the door, if there is one, to the slot for drive A. Drive A is usually the "system drive." If you do not know which drive is drive A, check the documentation that came with your disk drives. Your documentation may call this "Drive zero"; that will be "Drive A" to CP/M. (If you cannot locate your documentation, step 3 below suggests a way to determine which is the system drive.)

When you insert the disk in the slot, the label on the disk must face a certain way. If you put the disk in wrong, you won't hurt anything. You can take it out, reverse it and put it back in.) Here is how to tell which way the disk label goes: Look inside the slot, and see a small cone where the center hole of the disk

will be when you slide the disk inside. The label should face away from the cone.

Slide the disk in. You will hear a change in the sound of the drive, and feel the disk seated in place. You may have to press it into place, but no force is needed. If it does not go all the way in, do not force it. Get assistance.

When the disk is in place, slide the door closed if there is a door.

3. Booting (Loading) Your System

This step gives the CP/M operating system control of your computer. It is necessary to do this before you can bring in the SuperCalc program.

Here again you will have to consult your manual. Some computer systems have a button or a switch to press; some may require you to perform a different sequence of actions. It may even happen that when you have put the system disk in the proper drive, your system will load itself automatically.

For the moment, let's assume that you have a switch or button to press. Do that, and watch the drives. Usually, there is a small light over each drive; when the system attempts to access a disk in a drive, the light for that drive will light.

When you press the button or switch, the light goes on for the drive known as "the system drive". If your CP/M disk is not in that drive, remove it, and put it in the drive which lit. (Most drives have a button that you push to remove the disk. If there is a door, it will slide open, and the disk will move a little distance out, so that you can easily pull it the rest of the way.) Then, insert the disk in the correct drive and proceed. Inserting the disk may be enough; if not, re-boot.

When the CP/M system is loaded, it will write some text on your terminal screen and will also write a "prompt", such as A**>**.

This prompt means that the system is ready to accept your commands.

4. Determining if the SuperCalc program is on the system disk

The CP/M operating system has a command called "Directory" that will show you a directory of the contents of the disk. Your CP/M manual will give you information on the DIR command.

All you have to do is type **DIR** and press **CR**. On your screen you should see a list of the items on your system disk. (If not, check further in the manual, or get assistance.)

When you have the directory, look for an entry of SC followed by COM. If you see it, go to step 4a; if not, go to 4b.

4a. Starting the SuperCalc program from the system disk.

This is easy. Type **SC** and press **CR**. The program will be loaded in and will begin running. It will display a page of information, and give you the choice of pressing "?" to see a help display or pressing CR to go to your worksheet.

Press **?**.

After you have looked at the help display, press **CR**.

Now you can go directly to lesson 1 and begin learning to use the SuperCalc program. If you do so, come back to step 5 of this chapter when you finish your lesson work for this session.

If you do not want to begin the lessons right now, here is how to get back to the CP/M operating system:

a.   Press **/**
b.   Press **Q**
c.   Press **Y**

4b. Starting the SuperCalc program from another disk

The first step is to locate the disk with the SuperCalc program on it. It may be nearby and labelled as such. If you cannot find it, get assistance.

Note: If you have only the original SuperCalc disk, be sure that there is a back-up copy before you use it. It is better to reserve the original disk as back-up and run from a copy.

Insert the disk in drive B and close the door. Let's check the directory for drive B. Type **DIR B:** and press **CR**.

Look for SC with an extension of COM. If you find it, good; if not, remove the disk and try another.

At this point we will assume that you have a usable copy of the SuperCalc program on a disk. (Not the original.) Insert it in another drive. For now, let's

assume that you have one other drive, drive B. You may have drives C and D or even more. If so, you may use anyone of them. Just change the designation in our example (B) to the one you actually use (say, C).

The SuperCalc program must be "executed" or "run" on the system drive. So when you have the SuperCalc disk in drive B, you must make drive B the system drive. This is easy to do: Type **B:** and press **CR.**

The CP/M prompt on your screen will change from A to B, indicating that the B drive is now the system drive.

Now you can load the SuperCalc program and start running it.

To do so, type **SC** and press **CR.**

The program will display a page of information on your screen and give you the choice of pressing either the ? key, to see a help display, or CR, to go to the SuperCalc worksheet display. Press **?.**

When you have examined the information,
Press **CR.**

Now you can go directly to lesson 1 and begin learning to use the SuperCalc program. If you do so, come back to step 5 of this chapter when you have finished your lesson work for this session.

If you do not want to start the lessons now, you can get back to the CP/M operating system by typing:

a. **/**
b. **Q**
c. **Y**

5. Removing the disk(s) when you have finished

You must take all disks out of the disk drive before shutting off its power.

On most drives there is a button near the slot. Push it, and you will hear a change in the sound of the drive and see the disk move partly out. Pull it gently all the way out and put it in its protective jacket. Do this with all disks in the drives before shutting down the system.

6. Shutting down your system

Here again you will have to consult your system

manual. This may be a simple matter of turning off a key or pressing one switch, or you may have to turn off several items of equipment. It is a good idea to make a note for yourself of the appropriate steps for your system.

System Concepts

Here are a few CP/M operating system concepts that are especially relevant to the SuperCalc program. The information given here is basic and is meant only to suggest further study in your system documentation. These particular concepts have been selected for mention because they affect the following operations:

- loading and executing the SuperCalc program
- using the SuperCalc *save* and *load* commands to save and reload worksheets
- using the SuperCalc *output* command to save report text on a disk file and to print that text later
- using CP/M commands to look at file directories, to erase files, to rename files, and to copy files.

Some Useful CP/M Commands

CP/M commands can be directly executed from your terminal only when the CP/M system is in control. You cannot use them while you are running the SuperCalc program. Here is a list of CP/M commands that will be useful in conjunction with your use of the SuperCalc program and your SuperCalc worksheets. The commands are explained in your CP/M manual.

DIR – Displays a directory of the files on a disk.
REN – Renames disk files.
PIP – Copies disk files to another disk; also prints disk "text" files (see the /PRN file name extension information below). When copying SuperCalc ".cal" files, always include the square bracket 0] parameter (refer to CP/M documentation).
ERA – Erases disk files.
STAT – In addition to displaying useful information about disks, this can be used to set "read only" (write-protected) status for disk files and for entire disks. (This is different from physical write-protection for an entire disk.)

Drive Designation

Files are assumed to be on the disk in your system drive unless you specify otherwise. This means that you can refer by name alone to any file located on that disk. For example, LESSON5.CAL. References to files on other drives must include a drive designation, which consists of the drive's identifying letter and a colon; for example, B: LESSON5.CAL.

CP/M File Name and File Name Extensions

Files on a disk have individual names, which are kept in a directory on the disk. Each name on a disk must be unique. (Of course, different disks may have files of the same name.)

Valid CP/M file names must start with an alphabetic character. They may be from one to eight characters long. The name may not contain blank spaces or any of these characters:

$$< > . , : = ; \times \,]$$

File Name Extensions

File names usually have a three-character extension, such as SC.COM or REPORT.PRN. The File name and extension are separated by a "." as shown.

Some extensions have a significance for the CP/M system. One has a significance to the SuperCalc program. Three of the possible extensions are discussed briefly here:

1. COM (as in **SC.COM**). The COM extension tells CP/M that the file can be "loaded" and "executed" by typing its name at the console (the terminal). For example, we load and execute (start up) the SuperCalc program by typing SC(CR).

2. CAL (as in **LESSON3.CAL**). This extension has a special meaning to the SuperCalc program. When you save a worksheet (using the SuperCalc *save* command), you provide a file name with or without an extension. If you do not specify an extension, the SuperCalc program automatically gives the file the .CAL extension. Similarly, when you load a worksheet (using the SuperCalc *load* command), the .CAL extension is assumed unless you provide an extension.

   When you look at a disk directory, the .CAL extension is a quick way to locate the SuperCalc worksheets.

3. PRN (as in **REPORT.PRN**). This has a special meaning to the CP/M system and is used for disk files that can be printed by certain system utility programs (for example, the CP/M command PIP). Such files are set up in what is called "print image," meaning that the contents of the disk file can be printed as a text or as text-control characters. (A character that will control underlining is an example of a text-control character.)

The SuperCalc command, *output*, allows you to print or display a worksheet and also allows you to save it as a print-image file for later printing. When you specify a disk file name for *output*, the SuperCalc program automatically supplies .PRN unless you add an extension of your own.

Write-Protecting a Disk

An entire disk can be physically write-protected. When it is protected, no one can write on it or erase it. The CP/M system detects this protection and gives you a suitable message if you try to write or erase information on that disk.

The method of physical write-protection varies, depending on whether your disks are 8-inch or 5¼-inch disks.

8-inch disks are protected *unless* a notch in the casing is covered. The covering is usually a silver reflective label, which is folded over the notch. Placing the silver label on the disk is sometimes called "write-enabling" the disk.

With 5¼-inch disks the situation is *reversed.* A silver label is put on them to *protect* them.

Your system disk drive documentation will explain in detail how to write-protect or write-enable a disk.

Write-Protecting a File

The CP/M system allows you to "write-protect" individual files by name on a disk (see CP/M STAT command). When you do this, the file cannot be written over or erased. If you try to write over or erase a protected file, the CP/M system will give an error message. Consult your CP/M manual on the STAT command for information on how to write-protect a file.

NOTES

THE LESSONS, 1 to 9

The following twelve lessons are provided to teach you the basic skills needed to use the SuperCalc program. Each lesson walks you through key features of SuperCalc building your knowledge of the program. The individual lessons are designed to augment the reference section.

Sit down at your terminal, place your disk in the system and let's learn about this powerful tool: SuperCalc.

LESSON 1: Moving the Active Cell Around the Worksheet

Imagine that you are examining a map through a magnifying glass. When you use the SuperCalc program, think of the video screen or "display window" as your magnifying glass; through it, you can view any area of your map or SuperCalc worksheet. In this lesson you will learn how to move your magnifying glass across the surface of the worksheet. You will make the display window move or "scroll" to show you different parts of your worksheet.

In the same way that you use latitude and longitude measurements to designate a unique location on a map, you will learn to locate and enter data on the SuperCalc worksheet in positions specified with reference to alphabetically designated columns and numerically designated rows. A unique letter and number combination names every location on your worksheet. In this lesson, you will also learn how to point to, or specify, a unique address on the display area of your worksheet by using a pointer or cursor.

This lesson assumes that you know how to load the SuperCalc program from your diskette. If you do not, you should read **Getting Started.**

Bring up the SuperCalc program if you have not done so already as part of your work in **Getting Started.** (Remember that the drive it is on must be the system drive.)

With the SuperCalc program now running you should see its title page on your screen, including the SORCIM copyright and address.

```
            SuperCalc™
           Version 1.00
     Terminal: Myterminal xx
            CPU: 8080
       S/N-000101   ,Sys 2.x

           Copyright 1981
           SORCIM CORP.
          Santa Clara, CA

  Enter "?" for HELP or "return" to start.
```

At the bottom of the screen is a line that reads:
Enter "?" for HELP or "return" to start.

Press the **return** key. From now on we'll call it "CR" for carriage return.

Note: Alternatively, or if your keyboard is not equipped with the arrow keys, you can

```
        A       B       C       D       E       F       G       H
    1| _____
    2|
    3|
    4|
    5|
    6|
    7|
    8|
    9|
   10|
   11|
   12|
   13|
   14|
   15|
   16|
   17|
   18|
   19|
   20|
  > A1
  Width:  9     Memory:33     Last Cell:A1     ? for HELP
    1 >
```

Let's examine the screen. You will note that columns A through H, and rows 1 through 20 are represented. You will see that the coordinate A1 is highlighted. On most terminals, you will see a bright underscore at that position. (Some terminals may have "reverse video," which means you will see a bright bar there. Or perhaps your terminals uses **< >** as an indicator.) This is the "worksheet cursor" and designates the Active Cell. The active cell is the location or destination of any data that we enter.

Any coordinate—for instance, A1, B3, B6, or G19—is called a "cell" because it represents a unique position on our "worksheet". The worksheet cursor can be positioned to any cell on the screen. This is accomplished by pressing any of the arrow keys at the right side of your keyboard.

use the **d, s, e, x** keys along with the **Control** key (CNTRL) to move right (**d**), left (**s**), up (**e**), or down (**x**). When one of these keys is pressed simultaneously with the control key, it will function like its corresponding arrow key. For convenience, we will refer only to arrow keys in the manual.

Let's press the **right arrow**. The worksheet cursor should have moved one cell to the right, to B1. Again press the same key, to move to C1. Try the down direction. Experiment, using these four keys to move the Active Cell indicator around to different locations on the worksheet display.

Scrolling

What happens if you try to go above Row 1 or to the left of Column A? Nothing. You have reached the worksheet margin in these directions. But what about moving to the right or down? Try it, if you haven't already. You will quickly discover that when you move as if to go off the screen to the right or downwards, the columns or rows appear to renumber themselves. Actually those cells that were "off-screen", beyond the range of your display window, are brought into view, a column or row at a time.

Move one column to the right beyond the edge of the screen. You see that the columns change from A through H, to B through I. At any given moment you will be looking at only a portion of the potentially usable worksheet. This is what we mean by the "display window". As we move this window either horizontally or vertically, we are "scrolling" the display.

Try moving off the screen to the right, but this time continue to hold the key down instead of just striking it once. If your keyboard is so equipped, you will see the screen continue to scroll until you stop pressing the key.

If your keys do not "repeat" when you hold them down, your terminal may have a special "Repeat key" instead. Use it together with the arrow key for the same result.

Continue to "scroll" the screen until you come to column Z. Note that the remaining columns are represented by two letters, AA, AB, and so on.

The Status, Prompt, and Entry Line

The Status Line

Notice the three lines at the bottom of your screen. The top line is the Active Cell and worksheet cursor "status" line. The SuperCalc program uses this line

	W	X	Y	Z	AA	AB	AC	AD
1								40
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

A1
Width: 9   Memory:33   Last Cell:AD1   ? for HELP
1 >

to report to you the status of each of these functions.

The first character, an arrow (ʌ, v, <, >), indicates the direction in which the worksheet cursor will move when you use the (CR). To change the direction of the cursor movement, press an arrow key that points in another direction from which the cursor is presently moving.

The next entry on the status line is the "address" of the current Active Cell. The status line allows you to read from your worksheet the location of the Active Cell more conveninently than you could by visually triangulating the cursor position with respect to the worksheet borders.

If the current Active Cell is empty, there will be nothing else displayed on the "status" line; however, if the Active Cell contains text, numbers, or formulas, the contents of the cell will appear as you **originally** entered it. It will be displayed like this:

Form= (contents of cell as per original entry).

Now move the worksheet cursor around, and watch the status line as the Active Cell and direction indicators change.

The second line is the "prompt" and secondary status line. This line will display the current cell width, available memory, and indicate that last cell used for your current application. When you are in command-entry mode the message displayed here will change depending on what command you are currently using. The prompt message lists your options at any given moment.

The bottom line is the "entry" line. It displays a 1 ⟩ at the left margin. This line allows us to communicate with the SuperCalc program. It displays the information we type in at the keyboard—data, commands, or responses to prompt messages. The entry line is your scratch pad. It allows you to check and edit the data or text you wish to enter before you commit it to the worksheet. As we input characters, the entry line cursor will move to indicate where the next character will appear. At the left-hand margin, the number 1 will change to 2, 3, etc. as the cursor moves.

The GoTo Command

It is natural to wonder if there isn't some way to move the worksheet cursor quickly to a desired position without using a stepwise combination of arrow keys. There is. Typing "=" initiates the *go to* command.

What if you mistyped "="? What can you do about it? You can use the left arrow key to backspace and then try again. We'll explain this feature more fully later on, but for now you know how to correct a mistake.

The prompt line now reads "Enter cell to jump to." This is typical of the helpful conversational efforts you can expect from the prompt line. Now type **M31** or **m31**. Either will work. (The SuperCalc program accepts either lower case or upper case letters for any entries, but you cannot use a lower case letter "l" for the numeral one, "1.") But for any action to occur, you must press the return key, **CR**. It's a good habit to check your work first, by reading the entry line.

Now press **CR**, if you haven't done so already. If you did everything right, we have very quickly moved to the part of the worksheet where M31 is located. Cell M31 now appears at the top leftmost corner of your display window. See if you can use the "=" to find out how large the worksheet is. When you are finished, *go to* A1 again.

Here is an additional feature of the *go to* command. Move the Active Cell to anywhere near the middle of the screen, say to E8. Enter =, but specify no cell, just press **CR**. Notice how the Active Cell remains E8, yet the display window is repositioned so that the Active Cell appears at the top left corner.

We have now used the arrow keys and the "=" key. Remember that for most situations, any entry must be followed by pressing the CR key. The SuperCalc program will then accept and display our entry.

Press the **CR** key a few times, and notice that the position of the Active Cell advances to the next cell. The direction taken—left, right, up, or down—depends on which arrow key was last used.

Press the **down arrow**, and then **CR** a few times. Now the **left arrow**, and **CR** several times. The arrow keys set the direction, and then the CR advances the worksheet cursor cell by cell. (Remember you can always check the status line to find the current direction.)

The Quit Command

What about some of the other operations? Let's try "/". Press the *I* key. You see that the prompt line changes. It now says, "B,C,D,E,F,G,I,L,M,N,O, P,Q,R,S,T,U,W,Z, or ?."

The prompt line is telling you that these letters represent the only meaningful actions you can take now that you have entered the "/."

Each letter designates an option of the "/" commands. Whenever you wish to examine this command option list in its expanded form, press "?" and the list will be displayed on your screen. To return to your worksheet display, press **CR**. We will explore many of these commands soon, but for now you should know about one in particular.

Press the **Q** key. What happened? First the *I***Q** was automatically interpreted by the SuperCalc program so that your *I***Q** appears on the entry line as *I***Quit**. Second, the prompt line changed. It now reads, "EXIT SuperCalc ? Y(es) or N(o)".

If you want to stop here and continue the lesson later, press the **Y** key; otherwise, press **N**.

What you have you learned in this lesson?

In this lesson you have seen the display window scroll and learned what "current direction" means. You have also learned how to:

- Identify the worksheet cursor and locate the Active Cell.
- Move the worksheet cursor anywhere on the worksheet.
- Move the cursor with the four arrow keys, the alternate diamond keys, and the CR.
- Use the = (or **GoTo**) command, either as a shortcut to a new location, or to reposition the worksheet with respect to the active cell.
- Read the Active Cell location, current direction, and column display width on the status line.

NOTES

LESSON 2: Data Entry—Numbers, Text, and Simple Formulas

From Lesson 1 you have gained a general understanding of the control and display characteristics of the SuperCalc program. In this lesson, you will learn how to enter data. You will also learn the *zap* command (/Z) to clear the worksheet, using the "in-line editing" features, and using the *edit* command (/E).

If the SuperCalc program is not already loaded, load it now. (See **Getting Started** if you aren't sure how to do this.)

Now let's actually make some entries on our worksheet.

In this exercise, we will be entering numbers down the column, so we want to set the worksheet cursor to move "down". Do so by pressing the **down arrow**. Now use the *go to* command to place the active cell marker at A1.

Enter the number **5** on the entry line. Do not press **CR** yet. You may cancel an operation any time by pressing the CNTRL key and the Z key simultaneously. If you start to do something but then change your mind, pressing CNTRL-Z will allow you to start over without harming your worksheet.

You have "5" on the entry line. Now press **CR**.

Pressing CR will enter whatever is currently shown on the entry line; that is, the characters you have

typed will be sent to the active cell, and the entry line will be cleared. In our example, the data item "5" should now appear on the screen in cell A1.

Notice that the worksheet cursor moved to A2. Enter **6**, but do not press CR yet. Did you notice that before you typed 6, there was a 1 at the left edge of the entry line? Now there is a 2 . You will see this number increase each time you type a character on the entry line. The number you see is always one more than the number of characters you have typed. For now, this information helps you fit your data into the column width you have—remember the "9" on the status line. In a later lesson, you will learn how to change the column width, and this character count will be even more helpful.

Now press **CR**, and cell A2 will contain the value 6. Cell A3 has become the Active Cell.

Let's try another entry, **12 and CR**.

The same thing should have happened. The worksheet cursor is progressing down the column, automatically anticipating the location of your next entry.

Now press the **right arrow** . Enter **56**, press **CR**. What happened?

56 appears in B4, and the worksheet cursor has moved to cell C4. After each entry, the worksheet cursor will continue to move automatically to the next cell. The direction it will move has been set by whichever of the arrow keys was last used. For instance, suppose we wish to change the contents of cell B4. Press the **left arrow**. Enter **8** press **CR**.

This will replace the previous entry of "56". But, in addition, the worksheet cursor continues now in a leftward direction to A4.

	A	B	C	D
1	< 5 >			
2				
3				
4				

```
          A           B           C           D
   1|      5
   2|      6
   3|     12
   4| <       >              8
   5|
```

Try entering different letters and numbers as data, using the arrow keys to change direction. Take a few minutes.

Depending on how adventurous you were, you may have made some discoveries. Generally speaking, there are two kinds of entries—"text" and numbers. Your entry will be regarded as a number unless you type a single or double quotation mark as the first character, in which case it will be entered as repeating text or text respectively.

Headings, labels, and explanatory notes are all examples of text entries. In a mathematical sense, they are simply regarded as having a value of zero. If you forget to lead these with quotation marks the computer will respond with an error message. The quotation marks will not appear on your screen; they simply signal the computer that you are making a text entry. You do not have to close the quotation marks.

The Zap Command

Let's try some examples, but first let's start with a fresh screen.

Remember we used the *quit* command to exit from the SuperCalc program altogether in Lesson 1. Now we'll use another command, *zap*.

Enter *l*, and note that the prompt line again displays for us all possible "/" commands.

Enter **Z**; the interpretive prompting now reads "Zap-ENTIRE-worksheet?" The effect of the *zap* command is to clear the entire worksheet and return everything to its original state, just as it was when you first loaded the SuperCalc program. Because the effect is so drastic, the program uses the prompt line to remind us that the entire worksheet will be emptied and to verify that we really want to do this. The prompt asks, "Y(es) to clear everything, else N(o)?"

We do want to clear everything, so enter **Y**, and the SuperCalc program will do just that. Whatever we had put on the worksheet is now gone, permanently.

Characteristics of Textual and Numerical Entries

Now enter **"Oranges** in cell B1 and **250** in B2. Remember to lead off Oranges with quotation marks("). Notice that text is left-justified and numeric values are right-justified within the column.

```
          A           B           C           D
   1|              Oranges
   2|      250
   3|              <        >
   4|
   5|
```

Now move the Active Cell back to B2 and watch the rightmost display of the status line. It will say "Form = 250". Move the Active Cell to B1; the same display will say "Text = Oranges".

```
      > B3
      Width:  9     Memory:33    Last  Cell:A1    ?  for HELP
        1 >
```

How wide are the columns, how large a number can we enter? How much text? Remember we mentioned "display width" earlier when looking at the status line. Note again the "9" on the status line.

The 9 tells us that the column currently accessed (the column with the Active Cell) is set to display nine characters. Nine is the standard or *default* value that the SuperCalc program will use for the display width of all columns unless you specify otherwise. You will soon learn how to specify display widths. A cell may contain as many as 110 characters.

Move the worksheet cursor to B3, and type **"Alberta peaches**. This piece of text is certainly longer than nine characters, but the SuperCalc program allows display of your *text* to extend over neighboring cells if they are unused. Now go to A1 and try the same thing.

Your entry did not display in full because B1 is occupied. But the entire entry was accepted to cell A1 even if only a portion of it (the first nine characters) is displayed. (Notice that the status line indicates the contents of A1 as Text= "Alberta peaches).

Move to B4. Enter, without commas, **2500000000**. The number is too large to display. The SuperCalc program converts it to scientific notation, a more compact format, and displays it as 2.5e9. 2.5e9 is the display form of the expression 2.5×10^9, or the conventional abbreviation of 2,500,000,000. The SuperCalc program provides many different display and format options. These will be described in more detail later.

	A	B	C	D
1	Alberta	pOranges		
2			250	
3		Alberta peaches		
4		2.5e9		
5				
6				

If exponential numbers are new to you, here is a quick look at what they are and how the SuperCalc program displays them. Exponential numbers are displayed as "powers of 10." You will soon see what this means.

Go to Cell C1 and set column C for exponential display. We use the *format* command to do this. Enter **/F**, for the command, and **C**, for "column formatting." When the prompt asks you what column to format, you can just press the "," key, because you are at column C. Then enter **E**, for exponential, and press **CR**.

Press the **down arrow** to set the current direction as down. Now enter **1776**. Cell C2 shows "1.776e3." What does this mean? e3 means "exponential 3" or "10 to the power of 3." 10 to the power of 3 is 1000; 1.776 times 1000 is 1776. That's all that 1.776e3 means.

Try entering **1000**. Is 1e3 what you expected? What will 100 be? Try it. Now enter **2000**, and then enter **.002**. Notice that 2000 is 2e3 and that .002 is 2e-3. e3 is thousands; e-3 is thousand*ths*. What is -2000? Try it and see.

What happens if you enter a number in exponential notation? Let's try it. Enter **567e13**. Are you surprised to see it display as 5.67e15? The SuperCalc program prefers to put the decimal point just after the first digit and will adjust the exponent value to do so.

Explore on your own—entering numbers as you ordinarily would, and entering them in exponential form. Try to guess beforehand what the display will be.

When you feel comfortable with exponential notation, let's give the SuperCalc program a little job to do.

Press the **down arrow**, (v), to reset the cursor direction; then, **go to**, (=), D1.

In cell D1, enter **93000000**. That is 93 million, which is the number of miles between the earth and the sun. 9.3e7 is 9.3 times 10 million, which seems right. Now in cell D2, enter **5280*D1**. The value displayed, 4.910e11, is the number of feet in 93 million miles. What about inches? Enter **12*D2** in cell D3. 5.892e12 is the number of inches in 93 million miles.

So 5.892e12 is the number of inches between the earth and the surface of the sun? Well, not really. It is the number of inches in 93 million miles, but 93 million is the number of miles between here and the sun expressed *to the nearest million.*

What 5.892e12 really tells us is that there are about 5.9 times 1,000,000,000,000 inches between here and the sun. Only the first two digits of 5.892 are significant, because only the 93 was significant in 93 million miles.

Why bring this up? Because that is the point of scientific notation. Scientific notation allows us to quickly grasp the essential points of a number and discard the unessential.

The first part of the number gives us the essentials (and probably some others that we can discard). The exponent value, the number after E, tells us whether we are talking about 10s, 100s, 1000s, or millions, billions, trillions. Or billionths and trillionths, for that matter.

In short, exponential or scientific numbers give us the essentials: the significant digits and the general magnitude of the value.

Three types of exponential expressions may occur:
1) $1.776e3$; 1.776×1000 or 10^3
2) $1.776e{-}3$; $1.776 \times 1/1000$ or 10^{-3}
3) $-1.776e3$; -1.776×1000 or 10^3 (a negative number.)

Move the Active Cell to B5. Type this incorrect spelling, **Pinapples**, but *do not* press **CR**. As you know, you could use a *left* arrow to backspace and re-type from the point of the error. The *right* arrow key just moves in the opposite direction.

Now use the left and right arrows, move back and forth across your text, but take care not to backspace beyond the leftmost character. Notice that nothing is changed, but the position of the cursor on the entry line. Now locate that cursor on the "a". Notice, too, that the number 4 appears at the left of your entry line. This indicates that the cursor is located at the fourth character position.

Press the **up arrow** key, and see what happens.

A space has been created for us just ahead of the "a" so that we may insert the correction without having to re-type good text. Enter **e**. Your entry line now says "**Pineapple**. What if you had needed to insert several characters, or to delete some?

Press the **up arrow** key continuously and generate a large gap in the text. Press the **down-arrow** key once, and notice that the gap is reduced by one character. Hold the key down, and watch the blank spaces be

	A	B	C	D	E
1	Alberta	pOranges			
2		250			
3		Alberta peaches			
4		2.5e9			
5					
6					

...
...

> A5

Width: 9   Memory:33   Last Cell:B4   ? for HELP

4 > Pin apples

In-line Editing

Right now, let's investigate the SuperCalc program's "in-line" editing feature. If you have used the exponential notation section of the lesson, *"zap"* your worksheet and reenter your original data.

deleted. Go ahead and enter "**Pineapples**, and then make up other examples. Practice with these keys until you are confident with this "in-line editing" feature. Try it with numeric entries, too.

Regardless of where the cursor is positioned on the entry line, all of the visible text or numeric values will

go into the Active Cell when you press **CR**.

You have discovered that the arrow keys have two different uses. They move the active cell around the worksheet *until* you type a character on the entry line. Then the SuperCalc program recognizes that you have begun to enter data, and the prompt changes to "Enter into cell (or CNTRL-Z to abort command)." The function of the arrow keys changes in data entry mode; they are used for editing.

The Edit Command

We have seen how to edit data *before* we actually enter it into the Active Cell. How can we edit data that we have already sent to a cell? Of course, we could enter the data again in its entirety. The new entry would replace the old one. But there is a better way. We can use a new command, the *edit* command (/E).

Make B4 the Active Cell (use *go to* or move the worksheet cursor). Enter **/E**, for *edit*. You see the prompt line now says, "From? Enter cell." It is asking where to find the material to be edited.

Because in this case we want to edit the contents of the Active Cell, we don't have to give a cell address. Simply press **CR**, and the SuperCalc program will bring the Active Cell's contents to the entry line.

Make your changes, using the arrow keys. For instance, delete three of the zeros from 2500000000. When your change is complete, press **CR**, and your modified entry replaces the old one in B4. If you

haven't done this, try it now.

You may sometimes wish to edit the contents of a cell and enter them into *another* cell. For example, position the Active Cell to B5 (our destination cell). Enter **/E**. In response to the prompt, "From?", enter **B4** (our source cell), and press **CR**. The contents of B4 will be copied to the entry line. After you have made your change, press **CR** and the edited version of B4 will be copied back to B5.

Note that no matter where it comes from, the "new" or "edited" data on the entry line is always entered into the *Active Cell*. In our first example, the original contents of B4, the Active Cell, were modified and replaced by our edited version. In the second example, the contents of B4 were *not* changed. The edited material went into B5, the Active Cell, and the source material remained unchanged in B4.

If you want to stop here, use the *quit* command. Or if you wish, continue on to lesson 3.

What have you learned in this lesson?

In this lesson you have learned how to:

- make number and text data entries

- cancel an operation by using Control-Z

- replace one data entry with another

- set the direction in which the worksheet cursor moves

- recognize and use exponential notation

- do *in-line* editing

- use /E, the *edit* command

NOTES

LESSON 3: Blanking, Protecting, Unprotecting, and Saving Your Work

In Lesson 2, we expanded our knowledge to include the fundamentals of data entry for the purposes of creating text or for entering numeric data to be used in actual calculations. In this lesson, you will gain more experience entering data. You will learn to blank, protect, unprotect, and save your data. You will also learn to use the /G command to make some general or "global" changes in your worksheet display and to use the /F command to make certain formatting changes.

If you are continuing directly on from lesson 2, do a /Z command so that we may start with an empty screen. Otherwise, load the SuperCalc program in accordance with the instructions in "Getting Started".

Use the **down arrow** to set the current direction. Use the *go to* command to go to A1. Enter **"Apples**. At A2, enter **5**. Continue in this way with A3 through A9, entering values of **8**, **3**, **11**, **4**, **9**, **6**, and **12** respectively.

In lesson 2, we learned how to modify a cell's contents, to *edit*. But what if we want to "blank" a cell, to clear out its contents?

We can do that with a new command, the *blank* command. It can be used to blank out, or erase, data that you have already entered on any size portion of your worksheet. You can blank an individual entry or cell, partial or complete rows or columns, or entire blocks (rows *and* columns) of cells. We will try an example of each in this lesson.

Enter **/** and note the prompt line. Now enter **B**. The interpretive prompting fills this out, /**B**lank. And the prompt line changes to say, "Enter range." You must now specify the portion, or range, of the worksheet that you wish to blank.

Type **A4** and press **CR**. The contents of A4 have been

"blanked", that is erased. Or you can enter /**B**, place the worksheet cursor on the cell you wish to blank, and with no cell reference, press **CR**. Try doing this with cell A5. When working regularly within the SuperCalc program, use whichever method is more convenient for you. Remember that since the cursor can only point to an individual cell, the cursor-**CR** method of the /**B** command will only affect an individual entry.

Enter /**B** again. Now in response to the prompt, "Enter range", specify A6 through A8 by typing **A6:A8**. Press **CR**. This is how we can specify a range of cells for either a row or a column. The range that you designate will always include the end points.

	A	B	C	D
1	Apples			
2		5		
3		8		
4				
5	<	>		
6				
7				
8				
9		12		
10				

The Protect Command

Re-enter the numbers we just blanked out. Create a new column of numbers in column B. Label it **"Oranges.**

Now let's use **/P** to protect a cell. Enter **/P**. We use the **protect** command in the same way as the **blank** command. That is, enter a cell or a range. For example, enter **A5**. Press **CR**. Move the cursor to A5 and note that a "P" appears now next to the "Form" display on the status line. This indicator tells you that the Active Cell is "protected".

```
         A          B         C         D
 1| Apples      Oranges
 2|                5         1
 3|                8         2
 4|                3         3
 5| <             11>        4
 6|                4         5
 7|                9         6
 8|                6         7
 9|               12         8
10|
```

If your terminal provides half-intensity display, you will also see the protected cells at half intensity.

Let's continue by protecting a range of cells.

Type **/P** and enter **A8:B8**. Press **CR**. This will protect that portion of row 8.

What is the significance of what we have done?

Remember we said that **/B** could blank out an entire block of cells. Let's attempt to blank out that block of cells from row 2 through row 8 for both columns A and B. How do we specify this?

Enter **/B**. Now enter **A2:B8**. (We define the range for a **Block** of cells as a diagonal, top leftmost cell followed by the lower rightmost cell in the block.)

Now press **CR**, and let's consider the results of our actions.

Row 1, with our titles, should remain because it lay outside the range of the block-definition we used with the **Blank** command. A5 and row 8 remain because they were protected. Row 9 remains, not because it was protected but because it, too, was beyond the range we blanked out.

Try to change the contents of A9. Now try the same thing with A5 or B8. Because these cells have been protected, they cannot be changed or blanked out. This feature can provide you with a large measure of safety when you are working around information that has taken you time to develop, and which you cannot afford to accidentally lose.

The **unprotect** command (/U) can be used to unprotect cells, partial rows, partial columns, or blocks of cells. We could use the command twice to unprotect cell A5 and row 8, but can we do it with just one /U command?

Yes. **Unprotect** the "block", row 5 through 8 of columns A and B. What is the proper range specification? Did you say **A5:B8**? Correct.

Formula and Numeric Display Options

Move the Active Cell to A2. Enter **3 + 5**. What happened? The value of the expression, 8, was placed in A2. If the worksheet cursor is not at A2, move it there and examine the status line. The rightmost display will read "Form=3+5", our original expression.

What has the SuperCalc program actually stored, "3+5" or the "8"?

However complicated the expression is, the Super-Calc program will calculate the result and display it. This allows us to use the entry line like a scratch pad. For instance, we may be adding two columns of numbers but only be interested in their total value.

Again at A3 enter **1 + A2**. The SuperCalc program will recognize this as a formula referring to cell A2 and will quickly calculate and display the value based upon the value in A2. Further, if we change the contents of A2—for instance, to "5"—we should observe that the new value of A3 will be recalculated as well. Try it!

Now move the Active Cell to A3. The screen displays "6" there, the current value, while the status line displays "Form = 1+A2." Apparently, the Super-Calc program is keeping track of both. In A4, let's

enter **A3 *.65**. (The "*" means multiply and is equivalent to the "×" sign in conventional notation. Division is represented by "/".)

Locate the active cell at A10. Enter **SUM(A2:A9)**.

SUM is a built-in function. The SuperCalc program provides many special built-in functions, including SQRT (square root), AVERAGE (mathematical mean), NPV (net present value), trigonometric functions, IF conditionals, and many more. (See for more detail on formulas and functions.) For SUM, we can specify a list of ranges (as we have done in this example) and cells, for example, "SUM (A8, B9, A2)."

Now change the value of any cell in column A and watch the sum be recalculated.

The Global Command—Formatting Options

Earlier we determined that the SuperCalc program is keeping track of our formulas although it only displays their current values on the worksheet. How can we review all the original formulas more clearly? Enter **/G**.

Note that SuperCalc's interpretive prompting fills this out to read **/G**lobal. What could this conceivably mean? The prompt line now reads, "F(orm.), N(ext), B(order), T(ab), R(ow), C(ol.), M(an.), A(uto)?" We could think of the **/G** command as a way to make

	A	B	C	D
1	Apples	Oranges		
2	5			
3	1 + A2			
4	A3*.65			
5	11			
6				
7				
8	6	7		
9	5	8		
10	SUM(A2:A9)			
11	<	>		
12				

overall or "global" changes to the worksheet, rather than specific or local changes. It is as if we had a map of California before us and we could, at will, transform it into a topographical map, a population density map, a tourist attraction map, etc.

Our concern here is with formulas, so Enter **F** and see your formulas displayed.

To return to the other style of display (cell values), simply repeat the sequence **/G, F**. The SuperCalc program will alternate or flip-flop between the two display modes.

Determining Column Width

Enter **9** in cell B10.

In formulas made, you will notice one problem. The SUM formula in A10 has two characters more than our column width, which is only 9. Let's widen the column to accommodate our entry.

Enter **/F** for *format*. The prompt line will respond with "Enter Level: G(lobal), C(olumn), R(ow), or E(ntry)." The "G" in this case is not the same as the **/G** command. Here it simply qualifies the **/F** command. But its meaning is similar; that is, "for all" or "every".

Now enter **G**. The prompt line now displays, "Define Formats: (I, G, E, \$, R, L, TR, TL, *, D, column width)". As you can see, the **/F** command has many possible parameters; however, for now, let's enter a new column width by typing **12** and **CR**. Now move the cursor to column B and note the status line display, "12". Notice that we changed *all* columns to a width of 12 characters. We could have specified the new width for just a single column by **C** for column level.

Now that we are using commands with several levels of prompts, it may be useful to point out another use for the left arrow key—one that you may have discovered for yourself already. Backspacing with the left arrow will always take us back to the prior "step" in a command, to a less completely specified statement.

For instance, enter **/F, G, 12** again. Now backspace once with the **left arrow** (or **CNTRL-s**). Backspace again, and see that the prompt changes to its earlier

message, "Enter Level: G(lobal), ..."

If we wished, we could then enter a level other than G(lobal), and continue on with the command sequence. Instead, let's backspace once more.

You will see the list of "/" command options on the prompt line. Backspace again. And now we have finally backed all the way to the original prompt.

Of course, no matter how far we have gone in specifying some command, range, or option, we can always use **CNTRL-z** to abort; that is, to cancel everything we have started to enter. Simultaneously pressing the CNTRL key and "z" will return us to the original prompt. You can use this technique, for example, if you start to enter data on the entry line and then notice that the Active Cell is not positioned where you want it.

Now return to the display mode that displays cell values rather than formulas. (**G, F.**)

The Save Command

We will want to save the work we have done in this lesson so that we may use it later. We can do this with the **/S** command (**Save**). This command makes a copy of our entire worksheet and stores it on a diskette located on either drive A or drive B, depending on which we specify.

Enter **/S**. The prompt requests, "Enter File name." You can respond to this in one of several ways, depending on where you want to store your file. If you wish to save it on the disk on the system drive (the same disk that has the SuperCalc program), enter **WORK1** and **CR**. Or you can specify the drive to use by entering either **A:WORK1, CR** or **B:WORK1, CR**. Do not leave any blank spaces in your file name. The computer will not accept "TOM 1", but only "TOM1". (If you have more than two disk drives, you can

specify C:WORK1 or D:WORK1, and so on.) If you are unsure what is meant by "system drive," review that material in "Getting Started".

After you have entered the file name, the prompt line inquires further, "A(ll) or V(alues)?"

Since we wish to save both our formulas and our values, enter **A**, for all. Your disk drive unit will whir and click contentedly for a few moments.

We will use this file to "load" our work back into the system when we resume with lesson 4, so keep the disk handy. Now enter **/Q** and exit from the Super-Calc program, all our work "disappears." It is gone irretrievably *unless* you specifically save it with the *save* command before exiting.

What have you learned in this lesson?

In this lesson you have learned:

* How to blank the contents of a cell or group of cells by using the /B command.

* How to protect and unprotect cells, using the /P and /U commands, and what protection does for a cell.

* That in an arithmetic expression, "*" means multiply and "/" divide.

* That you can enter numerical expressions and formulas, that the SuperCalc program will calculate and display the results, and that it will continue to recalculate as necessary.

* How to use the *global option* command, /G, to display formulas or their calculated values on the worksheet display.

* How to use the *format* command, /F, to change column display width.

* How to use the backspace (left arrow) key to return to an earlier step in a command sequence.

* How to create a file and *save* your work by using the /S command.

LESSON 4: COPY AND REPLICATE

In Lesson 3, we began to see the power of the Super-Calc program—in particular, its ability to recalculate automatically all values that depend upon the values in other cells. In this lesson we will gain even more insight into its verstility. You will learn to use the *load* command (*/L*), *copy* command (*/C*), *replicate* command (*/R*), and the current—cell key (**ESC**). The */C*, */R*, and **ESC** commands are basically time saving commands.

THE LOAD COMMAND

We are going to continue using the worksheet we began to develop in Lesson 3. Let's retrieve the file we created at the end of that lesson. We will use the *load* command, */L*, to this. (If the file is not on the disk that has the SuperCalc program, be sure to insert the disk with the file into your other disk drive.)

Enter */L*. How you respond to the prompt message "Enter File name" depends on where you stored the file. If it is on the same disk as the SuperCalc program, it is on the system drive. So you should enter **WORK1** and press **CR**. (If the file is not on the system drive, you should designate the appropriate drive by entering **A:WORK1** or **B:WORK1**, etc. before pressing **CR**.)

The disk drive will repond with some clicking, and the prompt line will change to read, "A(ll) or P(art)?"

Enter **A**, for "all", and the material we saved from our last effort will be copied from the disk and appear on the screen.

The Copy Command

Now that we have restored our work from the previous lesson, let's investigate another command,

copy (*/C*). The *copy* command is easy to use. You can *copy* a single cell, a partial row or partial column, or a block of cells.

In this first example, we will copy the data in column A into column C. Enter **C**. The prompt line responds with, "From? (Enter Range)."

In response, enter **A1:A10**, (**CR**). This time the prompt asks, "To? (Enter Range), then Return; or "," for Options." We just want a "standard" copy this time—we will look at "options" later. So enter **C1** and press **CR**.

Now use the *copy* command to copy the contents of cell A10 to B10.

Change the display to show formulas, and look at the contents of B10 and column C. The formulas have all been translated automatically relative to the column. All cell references have changed to reflect the new location of the formulas. If we had moved to a new row, as well as a new column, relative row designation would also have been adjusted.

	A	B	C
1	Apples	Oranges	Apples
2	5		5
3	1 + A2		1 + C2
4	A3*.65		C3*.65
5	11		11
6			
7			
8	6	7	6
9	5	8	5
10	SUM(A2:A9)	SUM(B2:B9)	SUM(C2:C9)
11			
12			

Generally, this automatic adjustment is exactly what we want. But there are other options open to us. For instance, we can specify that there be no adjustment, or we can tell the SuperCalc program to ask whether each occurrence of a cell reference should be adjusted or left alone. We will try this soon.

The *copy* command makes a one-to-one copy of its source material into a destination of the same type of size; cell to cell, row to row, or column to column. But suppose you want to repeat a series of values and formulas many times, perhaps to compare alternative cases.

The Replicate Command

You can use another very powerful command, *replicate* (*/R*), to do that. It will make a "one-to-many" copy of a cell, a partial row, or a partial column and will distribute these copies over a destination range that is larger than the source range. Change the display to show formulas.

Let's *replicate* a single cell, A10.

Enter */R*. For "Form", enter **A10**, **(CR)**. For "To?". enter the range. D10 through F10, by typing, **D10:F10** and **CR**. And note how the command performs.

Try replicating the partial column A3 through A4 in-

to D3 through F3. These columns, D through F, now have data in rows 3, 4, and 10.

Fill up these columns by entering some data (whatever you want) in rows 2 and 5 through 9.

The *replicate* command has the same formula-adjustment options as the *copy* command. Let's try one of them now.

Enter into cell A12, the formula **A2 + A2**.

Now enter */R*eplicate, **A12**, **B12:F12**. After you enter "**F12**" enter an additional "," to get the options. They will be displayed on the prompt line: "N(o Adjustment), A(sk for Adjust.), V(alues)."

Enter **A**.

The prompt changes to say, "Source location A12. Adjust A2?" and the first A2 is highlighted on the entry line.

Respond with **N**, for no adjustment. Now the second reference to A2 is highlighted on the entry line. Let's respond with **Y**. You see that the first part of our formula remained unchanged while the second was adjusted, according to our responses. In this way, we can specify one component of a cell to be held constant, while other components are adjusted relative to their new location.

Replicate cell A1, to D1 through F1. Then use */E* to *edit* the contents of C1 through F1 so they will be APPLES-1, APPLES-2, and so forth.

	A	B	C	D	E	F
1|	Apples	Oranges	Apples			
2		5	1	8			
3|	1+A2	2	1 + C2	1 + D2	1 + E2	1 + F2
4|	A3*.65	3	C3*.65	D3*.65	E3*.65	F3*.65
5		11	4	11			
6		4	5	4			
7		9	6	9			
8		6	7	6			
9		7	8	7			
10|	SUM(A2:A9)	SUM(B2:B9)	SUM(C2:C9)	SUM(D2:D9)	SUM(E2:E9)	SUM(F2:F9)
11							

	B	C	D	E	F
1	Oranges	Apples-1	Apples-2	Apples-3	Apples-4
2	1	8	3	4	5
3	2	1 + C2	1 + D2	1 + E2	1 + F2
4	3	C3*.65	D3*.65	E3*.65	F3*.65
5	4	11	6	7	8
6	5	4	10	11	12
7	6	9	13	14	15
8	7	6	1	2	3
9	8	7	4	5	6
10	SUM(B2:B9)	SUM(C2:C9)	SUM(D2:D9)	SUM(E2:E9)	SUM(F2:F9)
11					
12	A2 + B2	A2 + C2	A2 + D2	A2 + E2	A2 + F2
13					

It's very important to save the work we have completed up to this point. We will use it again in Lesson 5. If you want to save it on the same disk as the SuperCalc program, enter /S, then WORK1, CR; otherwise, specify the drive that has your destination disk. (If you want to jog your memory about the *save* command, try *help*, (?). Or you could look back at Lesson 3 or at the detailed reference.

To help protect your work, the SuperCalc program checks to see if you already have a file with the same name on your destination disk. If you do, the Super-Calc program asks you, "OK to overwrite?" If you no longer need the original version, then reply with "Y." Otherwise, rename the new file you want to save. (In this case, you can overwrite because you won't need the old "WORK1" file created in lesson 3. The worksheet developed in this lesson is the one we will use later.)

Try replicating a row, or rows, or a block. If a practical application of your own comes to mind, try to begin an example on the screen. If you want to save this first effort of your own, be sure to use a different name—for example, TRIAL or MYTRY. (Safety tip: It is a good idea to choose a name substantially different from WORK1, so that there is less chance of inadvertently overwriting the material you will need on this tutorial. "WORK2", for example, is so close that it might cause you some confusion.)

By now you have probably realized that the Super-Calc program offers you a great many command op-tions. This makes it a tremendously powerful and versatile tool. We will not discuss all the options in this tutorial section. Instead, we encourage you to investigate them on your own. You should find it easy to make the best possible use of the SuperCalc program by combining what you learn here with information available in the reference section of this guide and through the *help* function, (?), built into the SuperCalc program itself.

The Current-Cell key: ESCAPE key.

This is a good time to become acquainted with the "current-cell" key. It can be used to boost the efficiency of certain kinds of data manipulation, which use the *copy* and *replicate* commands. The ESC key serves as the current-cell key.

Whenever a cell or range is required by the SuperCalc program, the Active Cell coordinate will be placed on the entry line if we simply press the ESC key.

Let's set up an example and learn how to use this feature. Start with a fresh screen. After you have saved any work you want for later, use the *zap* command.

Enter 123 into A1. Use the *replicate* command to fill every cell on the visible screen with "123". Can you do this? Try it before looking ahead.

Here is how your entries should have looked. First, enter, /Replicate, **A1**, **B1:H1**. Then, /Replicate, **A1:H1,A2:A20**. Or, /R, **A1**, **A2:A20**. Then, /R, **B1:H1**.

Now you should have "123" everywhere for the purposes of our example.

Enter /B, for *blank*. The SuperCalc program now wants you to specify a cell or a range to be blanked. Let's start with a single cell.

Press the **ESC** key. The address of the Active Cell will appear on the entry line. Use the arrow keys to move the worksheet cursor to another location—for example, C11. Notice the Active Cell address on the entry line change as we go.

Now press **CR**. Observe. Notice that the latest Active Cell was blanked, and that the Active Cell location has returned to its original place. Again, enter /Blank, and press **ESC**.

Use the **arrow** keys to make cell C16 be the Active Cell. The entry line now reads /Blank, **C16**.

We can use this to begin a range specification. Just enter ":". The line now reads /Blank, **C16:C16**. Now move the worksheet cursor to cell H16. Notice that the second address of our range is incremented as we go. Now press **CR**. The cells in the range C16 through H16 have been blanked.

In brief, this is what happens. Once you have set the ESC function, the arrow keys will move the worksheet cursor and set the cell location on the entry line. A colon ":" will generate a limiting location (end point) for a range specification. Pressing **ESC** or **CR** key will terminate the ESC function and allow the arrow keys to be used for editing. The ESC movement of the Active Cell is only temporary; when you terminate the ESC function, the Active Cell returns to its starting place.

Here is another sample. Enter /Blank. Press **ESC** . Move the worksheet cursor to D4, press ":" and move again to H14, press **CR**. We have blanked cells in the block from D4 to H14.

	A	B	C	D	E	F	G	H
1	123	123	123	123	123	123	123	123
2	123	123	123	123	123	123	123	123
3	123	123	123	123	123	123	123	123
4	123	123	123					
5	123	123	123					
6	123	123	123					
7	123	123	123					
8	123	123	123					
9	123	123	123					
10	123	123	123					
11	123	123						
12	123	123	123					
13	123	123	123					
14	123	123	123					
15	123	123	123	123	123	123	123	123
16	123	123						
17	123	123	123	123	123	123	123	123
18	123	123	123	123	123	123	123	123
19	123	123	123	123	123	123	123	123
20	123	123	123	123	123	123	123	123

By using the ESC key and placing the Active Cell at the appropriate points, we can let the SuperCalc program define our statements. At first, this may seem a little difficult, but with some practice, you will begin to find it increasingly useful. This feature allows us to modify our screen simply by pointing with the Active Cell to the boundary of the range of cells we wish to blank without our having to blank each cell individually.

Here are some examples you can try using *replicate* and ESC. Enter in E5, **aac**. Enter **/Replicate**. Press **ESC**, place the Active Cell at E5, then press "," or **CR**. Now press **ESC** again for the "To?" portion of our entry. Move the Active Cell to E6, enter ":", and move the Active Cell to E13, then press **CR**.

One more example. **/Replicate**, **ESC**, move the Active Cell to E5, enter ":", move to E13, press **CR**. Press **ESC**, move to G7, enter ":", move to J7, press **CR**.

The ESC key allows us to identify cells either by their contents or their location on the worksheet, and to perform operations on them, without concerning ourselves with their cell address. The ESC function can be used any time you have information on the entry line. You can use it in commands or with data. For example, you can use it to provide cell locations in formulas.

There is no need to save any of this work. At this point you may *quit* or continue on to Lesson 5.

What have you learned in this lesson?

- How to use the *load* command, (**/L**), to bring a worksheet in the SuperCalc program from a disk file.

- How to use the *copy* command, (**/C**).

- That the SuperCalc program will adjust formulas automatically when data is moved to new locations—or that the program will let you specify whether to leave part or all of a formula unchanged.

- How to use the *replicate* command, (**/R**), to make a "one-to-many" copy of a cell, a partial row, or a partial column and to distribute the copies over a range.

- That you can use the ESC key to bring the Active Cell location to the entry line and can then change the location by using the arrow keys to move the worksheet cursor. You have also learned the special use of ":" with the ESC function.

NOTES

LESSON 5: Move, Insert, Delete

You have learned to use the *Go To* command, the ESC key, and many important "/" commands. You can *Save* and *Load* your worksheet. Now we will introduce some new commands and techniques that can greatly simplify the development of a complex display.

If you are continuing directly on from Lesson 4, use the *zap* command so that you will begin with an empty worksheet. Otherwise, start up the SuperCalc program.

We will continue to develop the worksheet that we saved in Lesson 4.

Use /L to *load* the file WORK1. (You can use **?** for *help* or check back to Lesson 4 if you want a refresher on how to use *load*.)

Suppose Column B, labeled "Oranges", really belongs to the right of "Apples-4", at Column F. With what you know already, you could use *copy* to "move" it there and then use *blank* to erase Column

B. But there is a better way.

Enter **/M** for *move*, and read the prompt, "R(ow) or C(olumn)?"

Enter **C**, and the prompt changes to "Enter column letter."

We want to move Column B, so enter **B**, (**CR**). The new prompt, "To?", asks where we want the material to go. Enter **F**, for Column F, and **CR**.

But isn't Column F already occupied?

Press **CR** and note what happens.

Our column has been moved and the formulas adjusted. The "gap", which we might have expected Row C to leave behind, had been filled. The SuperCalc program moved our entries for former columns C through F one column to the left, in effect, vacating Column F and making it available to us. The program has neatly moved all the columns and adjusted all the formulas to reflect the new locations.

	A	B	C	D	E	F
1	Apples	Apples-1	Apples-2	Apples-3	Apples-4	Oranges
2	5	8	3	4	5	1
3	1 + A2	1 + B2	1 + C2	1 + D2	1 + E2	2
4	A3*.65	B3*.65	C3*.65	D3*.65	E3*.65	3
5	11	11	6	7	8	4
6	4	4	10	11	12	5
7	9	9	13	14	15	6
8	6	6	1	2	3	7
9	7	7	4	5	6	8
10	SUM(A2:A9)	SUM(B2:B9)	SUM(C2:C9)	SUM(D2:D9)	SUM(E2:E9)	SUM(F2:F9)
11						
12	A2 + A2	A2 + B2	A2 + C2	A2 + D2	A2 + E2	A2 + F2
13						

The Insert and Delete Commands

Here are two other complementary commands that can create or delete intermediate columns and rows. They are /I (*insert*) and D (*delete*).

Let's insert a new row between rows 9 and 10.

Enter /I, followed by R for row. Respond to the next prompt by entering 10, and a "new" row appears.

Look at the formulas in row 11, and you will see they are unchanged. The SuperCalc program has no way of knowing if you want to include the new row in the SUM equations—you would have to change them yourself.

Nevertheless, the SuperCalc program does know something. Note first the range we have specified in our SUM formulas.

Now let's insert another row at 7. /Insert, Row 7.

Look at the SUM formulas in row 12. They have been adjusted, extended automatically from A2:A9 to A2:A10, because the row we just inserted fell within the range we had described.

Now enter /D and R (for row). For row number, enter 14 and CR. Row 14 is deleted. If we delete row 7, will the SUM formulas be adjusted back to A2:A9? Try it and see.

Let's delete a column, and try an experiment as well. Let's find out what happens to a value that depends on one that we delete. Enter into cell E9 the equation, F2. E9 will contain whatever value F2 contains. Change the display to show cell value.

	A	B	C	D	E	F
1	Apples	Apples-1	Apples-2	Apples-3	Apples-4	Oranges
2	5	8	3	4	5	1
3	1 + A2	1 + B2	1 + C2	1 + D2	1 + E2	2
4	A3*.65	B3*.65	C3*.65	D3*.65	E3*.65	3
5	11	11	6	7	8	4
6	4	4	10	11	12	5
7						
8	9	9	13	14	15	6
9	6	6	1	2	3	7
10	7	7	4	5	6	8
11						
12	SUM(A2:A10)	SUM(B2:B10)	SUM(C2:C10)	SUM(D2:D10)	SUM(E2:E10)	SUM(F2:F10)
13						
14	A2 + A2	A2 + B2	A2 + C2	A2 + D2	A2 + E2	A2 + F2

Now enter /Delete, Column, **F**, **CR**. The column entitled Oranges has been deleted. E9 displays "ERROR". The SuperCalc program has no value to use in calculating the value of E9, and warns us of that with this message. Once a cell is in error, any reference to it will display a similar error message. As you see, the SUM value also indicates ERROR.

It produced an ERROR in the SUM formula.

The general rule is not to delete either of the boundaries specified in a range like the one in our example. Our example was "SUM(A2:A9). Deleting either A2 or A9 will cause an ERROR condition because the SuperCalc program connot guess your exact intentions. These warnings help us avoid inadvertently

	A	B	C	D	E	F	G	H
1	Apples	Apples-1	Apples-2	Apples-3	Apples-4			
2	5	8	3	4	5			
3	6	9	4	5	6			
4	3.9	5.85	2.6	3.25	3.9			
5	11	11	6	7	8			
6	4	4	10	11	12			
7	9	9	13	14	15			
8	6	6	1	2	3			
9	7	7	4	5ERROR				
10								
11	51.9	59.85	43.6	51.25ERROR				
12								

If cell E9 should, in fact, have "F2" in it, we could simply enter that formula again, and everything would be set right. Now put a number or F2 into E9, whichever you wish. Notice that the error display in the SUM value also goes away. It is replaced by the recalculated value.

If we delete row 10, will this affect our range specification for the SUM formulas in row 10? No, because row 10 is beyond the range. Delete row 10.

What will happen if we delete row 9? Try it.

leaving references to non-existent cells after a *delete* command.

Use the *blank* command to blank out the block from A7 to E9. Now reenter **SUM(A2:A6)** in A7, and then use *replicate* to place it in cells B7 through E7.

Use the /**I**, the *insert* command, to create a new column at A for labels.

Now enter **Variable A** in cell A2, **Formula 1** and **Formula 2** in A3 and A4, respectively. Enter **Variable B** and **Variable C** in A5 and A6, and **Total** in A7.

	A	B	C	D	E	F
1		Apples	Apples-1	Apples-2	Apples-3	Apples-4
2	Variable A	5	8	3	4	5
3	Formula 1	1 + B2	1 + C2	1 + D2	1 + E2	1 + F2
4	Formula 2	B3*.65	C3*.65	D3*.65	E3*.65	F3*.65
5	Variable B	11	11	6	7	8
6	Variable C	4	4	10	11	12
7	Total	SUM(B2:B6)	SUM(C2:C6)	SUM(D2:D6)	SUM(E2:E6)	SUM(F2:F6)
8						
9						

At this point, use **/S** to save your work. This time, let's call it "LESSON5." It will be used later.

Now that you have saved your work, let's try something new. We should start with a fresh worksheet, so use the *zap* command.

As we have seen, doing insertions and deletions at the boundaries of specified ranges creates problems. But because you will often want to add or delete from lists—including, naturally, the beginning or end of the list—here is a useful suggestion.

At B1, enter **TITLE**. From B2 through B4, enter some numbers. At B5, enter "----------. At B6, enter **SUM(B1:B5)**. Notice that our range specification includes our title line and the ledger line (---). This is harmless, because in a mathematical sense, "text" is regarded as having a value of zero.

```
        A           B           C
  1|               Title
  2|               3
  3|               4
  4|               5
  5|               ----------
  6|               SUM(B1:B5)
  7|
  8|
  9|
```

Now you may *insert* or *delete* with impunity. Enter **/Insert**, **Row**, **5**, and add new number. Now *delete* row 2. *Delete* row 5 . As you can see, you can add entries or remove entries without concerning yourself about the top and bottom of your column.

By the way, here is an easy way to put in lines of repeating characters like the "--------" you entered in cell B5. The SuperCalc program has a function to repeat text. Go back to cell B5 and enter '- and press **CR**.

As you see, the single quote (') causes the display of "-" to be repeated to fill the cell display, and in fact to continue displaying to the right until it meets a non-blank cell. Not bad for three keystrokes. Take a look

at the contents of cell B5. As you see, they are what you typed in.

Experiment with this one a bit. Find some open space and try:

> '123 and press **CR**.
> 'abcd and press **CR**.
> '* and press **CR**.
> ' * and press **CR**.

And so on. Try your name. . .

Sometimes you may be working on a complex worksheet with many values which are functions of other values. Because your data may be incomplete, you may mistakenly view some totals or values as significant when in fact they are not yet complete.

Here is what you can do in such cases. Using the example we started above, now enter **NA** into cell B3, for instance. This tells the SuperCalc program that you intend to have a value here at some future time so the value of the cell should be considered as "Not Available" rather than zero. You will see that as soon as we enter **NA**, cell B6 is also flagged as NA.

```
         A           B           C
  1|                Title
  2|                          4
  3|                N/A
  4|                          7
  5|                -------------------------------
  6|                N/A
  7|
  8|
  9|
```

NA and ERROR behave identically; the difference is the display: "NA" or "ERROR". By using NA, you inform yourself of the ramifications of any incompleteness or oversights.

You may either *quit* here or continue on to Lesson 6.

What have you learned in this lesson?

In this lesson you have learned:

- How to use the *move, insert, delete* commands. (**/M, /I, /D**).

- That those commands automatically adjust your formulas to fit the new worksheet.

- That if you delete cells which are referred to by formulas elsewhere, you get error messages. You learned how to fix that error.

- How to use "''" to repeat the display of one or more characters.

- How to use **NA** to make sure that you do not forget to enter important information.

NOTES

LESSON 6: Format

By now you have learned many of the basics that you need in order to use the SuperCalc program. You may remember that when we introduced the *format* command, /F, in Lesson 3, we used it to change the display width of all the columns on the worksheet. But the prompt line indicated that there were a number of other options available to us with this command. In this lesson, we will examine these options more closely.

We will use the worksheet that we have been developing in previous lessons. It is the one you saved under the name "LESSON5" in the last lesson.

If you are continuing directly on from Lesson 5, use /Z now, so that you will have a fresh start. Otherwise, bring up the SuperCalc program.

Now *load* the file, **LESSON5**.

Integer Format

Look at your worksheet. Is it displaying formulas? We will want to look at cell *values*, not formulas, in this example. Use the *global options* command, /G, if you need to change the display.

Look at column B. If it does not contain a decimal fraction (for example, 6.4), enter one.

Enter /F, and note the prompt line: "G(lobal), C(olumn), R(ow) or E(ntry)." This means we can specify whether our format change will affect all cells, a column only, a row only , a cell, or a range of cells.

Let's enter **C** for column. The prompt line now asks what column we want to affect. Enter the column letter, in this case, **B**. Press **CR**.

Now the prompt gives us a great variety of choices, " Define Formats: (I, G, E, $, RL, TR, TL, D, column width)." Enter **I**, for *integer* format. Press **CR**. Look at the entries on the display, and see what happened to the value in B4—and to any other decimal fractions you might have had on your worksheet.

Only the integer portion of the values is displayed. Integer format will round our values to the nearest whole number.

	A	B	C	D	E	F
1		Apples	Apples-1	Apples-2	Apples-3	Apples-4
2	Variable A	5	8	3	4	5
3	Formula1	6	9	4	5	6
4	Formula2	4	5.85	2.6	3.25	3.9
5	Variable B	11	11	6	7	8
6	Variable C	4	4	10	11	12
7	Total	30	37.85	25.6	30.25	34.9
8						
9						

Until now we have always used the SuperCalc program's standard or "default" display format to display numbers. That is the "G" or *general* format. We have seen that with general format, numbers too large to display in ordinary notation will be converted to scientific or exponential notation automatically. In *integer* format, numbers too large to display will appear as a series of >>>> s at the cell location. (In fact, whatever the format, >>>> s will be displayed whenever a number cannot be shown. The SuperCalc program will round off as necessary, even if it can only display one significant digit, the E, and the exponent.)

Enter **123456789** at cell B5.

Now reduce the display width to 8. Do you remember how? **/F, G, 8.**

Notice the >>>>>>. Now change the column widths back to 12.

Again enter, **/Format, Column, B, CR.** This time specify **G,** for *general* format. Notice that the fractional portion of our data values has been restored.

Exponential Notation

For scientific or exponential notation, enter **/Format, Column, B, (CR), Exponent, (CR).** This format displays numbers as a power of 10. For example, 1776 is 1.776E3, or 1.776×10^3; 1,000,000 is 1.0E6, or 1.0×10^6.

Look at your worksheet. As you can see, the SuperCalc program converted all our data to this format. If the data does not look familiar to you, you may wish to experiment a bit. Enter some ordinary numbers in this column, and watch how the program displays them.

	A	B Apples	C Apples-1	D Apples-2	E Apples-3	F Apples-4
1							
2	Variable	5	8	3	4	5
3	Formula	6	9	4	5	6
4	Formula	4	5.85	2.6	3.25	3.9
5	Variable	> > > > > > >	11	6	7	8
6	Variable	4	4	10	11	12
7	Total	> > > > > > >	37.85	25.6	30.25	34.9
8							
9							

	A	B Apples	C Apples-1	D Apples-2	E Apples-3	F Apples-4
1							
2	Variable A	5e0	8	3	4	5
3	Formula 1	6e0	9	4	5	6
4	Formula 2	3.9e0	5.85	2.6	3.25	3.9
5	Variable B	1.2345681e0	11	6	7	8
6	Variable C	4e0	4	10	11	12
7	Total	1.2345681e0	37.85	25.6	30.25	34.9
8							

$ Format

The next format option may be more familiar to you. Enter /Format, Global, $, (CR). The dollars and cents format comes into view. Numbers will be rounded to the nearest cent. (Note that the SuperCalc program adds the ".00" to whole numbers, but does not insert a "$").

We could specify a range of cells—that is, a partial row or a partial column—at this point. Or we could specify a single cell. Let's change the format of C6, the Active Cell. Of course, you could type "C6" on the entry line. Instead, press "," or CR and see what happens.

The SuperCalc program automatically added C6, the Active Cell, to the entry line. Now enter E for Expo-

	A	B	C	D	E	F
1		Apples	Apples-1	Apples-2	Apples-3	Apples-4
2	Variable A	5e0	8.00	3.00	4.00	5.00
3	Formula 1	6e0	9.00	4,00	5.00	6.00
4	Formula 2	3.9e0	5.85	2.60	3.25	3.90
5	Variable B	1.2345679e8	11.00	6.00	7.00	8.00
6	Variable C	4e0	4e0	10.00	11.00	12.00
7	Total	1.2345681e8	37.85	25.60	30.25	34.90
8						
9						

Individual and Global Format Changes

Let's change the format for a single cell. Move the worksheet-cursor to C6, making that the Active Cell.

Enter /Format, Entry. Notice that the prompt line reads, "Enter range".

nent and press CR. Note the change on your worksheet.

Now, suppose we wished to convert all the display back to the "general" format. Could we make a "global" change? Let's try it. Enter /Format, Global, General (CR).

Well, everything has changed, except those cells where we have been changing formats. Why? The

	A	B	C	D	E	F
1		Apples	Apples-1	Apples-2	Apples-3	Apples-4
2	Variable A	5e0	8.00	3.00	4.00	5.00
3	Formula 1	6e0	9.00	4.00	5.00	6.00
4	Formula 2	3.9e0	5.85	2.60	3.25	3.90
5	Variable B	1.2345679e8	11.00	6.00	7.00	8.00
6	Variable C	4e0	4.00	10.00	11.00	12.00
7	Total	1.2345681e8	37.85	25.60	30.25	34.90
8						
9						

SuperCalc program will change all the formats when "Global" is indicated—*except* those that you have specified by the Column, Row, or Entry options. It leaves these untouched, because you set them individually.

level. The next levels, in order, are row, column, and finally the global formats. In this case, the column defaulted to the existing global format because there was no intervening row format.

See if you can "default" the format on C6.

	A	B	C	D	E	F
1		Apples	Apples-1	Apples-2	Apples-3	Apples-4
2	Variable A	5e0	8	3	4	5
3	Formual 1	6e0	9	4	5	6
4	Formula 2	3.9e0	5.85	2.6	3.25	3.9
5	Variable B	1.2345679e8	11	6	7	8
6	Variable C	4e0	4e0	10	11	12
7	Total	1.2345681e8	37.85	25.6	30.25	34.9
8						
9						

What can we do so that "global" changes will include any column, row, or cell that was formatted individually? Column B, for example? If you said we must "undo" the individual format, you were right.

Position the Active cell to column B. Enter /Format, Column, (CR). Now enter D, for default, and press CR. Notice that column B has changed to *general* format.

When a *format* setting that refers to a column or row is defaulted, it changes back to whatever format operates on the next level. An entry level format, entered as a cell or a range of cells, is the "highest"

Display Format: Right and Left Justification

Enter /Format, Row, 1, CR. You will see these options (". . . R, L, TR, TL . . .") on the prompt line. They allow us to change the setting of right or left justification. The standard or "default" values are left-justified text and right-justified numbers. Let's shift the text on row 1 so that all text entries are right justified. Can you do it? Of course, you can. TR stands for "Text Right".

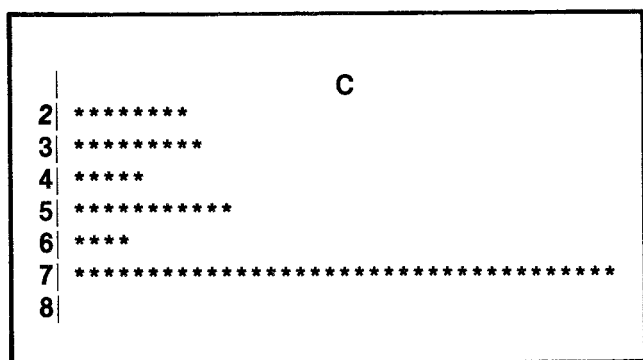|	A	B	C	D	E	F
1		Apples	Apples-1	Apples-2	Apples-3	Apples-4
2	Variable A	5e0	8.00	3.00	4.00	5.00
3	Formula 1	6e0	9.00	4.00	5.00	6.00
4	Formula 2	3.9e0	5.85	2.60	3.25	3.90
5	Variable B	1.2345679e8	11.00	6.00	7.00	8.00
6	Variable C	4e0	4e0	10.00	11.00	12.00
7	Total	1.2345681e0	37.85	25.60	30.25	34.90
8						
9						

Now that you have done that, let's try another one.

Enter /Format, Global, L, CR. All numbers will now be justified to the left.

Format entries may be entered in combination; for example, /F, G, R, $. Try this one, and you will see the numbers right-justified in dollars and cents format.

Graphic Display

We have one more *format* option to try, "graphic" display. Place the Active Cell at C2. Enter =, CR to put C2 at the upper left of our screen. Enter /Format, /Global. Enter the * to specify graphic format. We will also need some display space, so enter 75 as our column width. Press CR. If your values in column C are less than 75, you will see them represented by bar graphs composed of asterisks. Values greater than 75 will fill the column and the screen width; you cannot tell if they are 75 or larger.

```
  |                         C
 2|  * * * * * * *
 3|  * * * * * * * *
 4|  * * * * *
 5|  * * * * * * * * * *
 6|  * * * *
 7|  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
 8|
```

But it is possible to make the column display wider than the screen. The screen is 75 characters wide. You can specify a column width up to 126. Then you can scroll back and forth to see the whole line. You might like to try doing this with column C. Try putting values between 75 and 126 into the column and scrolling to see their display.

This was a very brief look at the *graphic* **format** option. In practice, you will want to make the graphic display fit within a column width of convenient size and still give a comparison of values. In Lesson 8, we will find out how to do this by "scaling" the values in order to fit them within the column.

There is no need to save our work from this lesson. But remember we will use the file LESSON5 again, so do not overwrite it.

Now you may either *quit* or continue on to Lesson 7, as you wish.

What have you learned in this lesson?

In this lesson you have learned:

- That formats can be entered globally, by column, row or cell (including a range of cells).

- The Integer, General, Exponential, and $ formats of display.

- How to change individual column widths.

- How to *default* formats.

- How to alter justification for text or numbers.

- How to transform numerical values into graphic display.

LESSON 7: Title Lock and Window (Split Screen)

You now know enough about the SuperCalc program and its many commands to put it to practical use. You have used the different *format* options. This lesson adds two more commands to your store of tools.

One of them, *title lock*, is useful if you want to keep a portion of the worksheet locked in place while you scroll the rest of the screen. Although it is called "title lock" because locking titles can be especially useful, any part of the screen can be locked. The other, *window*, lets you "split" your screen and look at different parts of your worksheet at the same time. Let's try them now.

Title Lock

First, of course, start the SuperCalc program, if it is not already running. Or, if you are continuing directly on from Lesson 6, *zap* the screen so that you will have a fresh worksheet.

Now *load* the file that we saved under the name LESSON5. What can *title lock* do for us? Place the Active Cell at A1. Enter /T. The prompt line asks, "H(oriz), V(ert), B(oth), or C(lear)?". The SuperCalc program wants to know which titles you want locked in place.

Press **V**, for vertical titles.

Now scroll the screen so as to move off the screen to the right. You will see that the titles at the left of our screen are "locked" in place, while the rest of the screen scrolls as usual. The position of the Active Cell when you enter the **T** command determines how much of the screen will be locked in place.

Use the **H** option to lock the top row of titles in place.

Move the worksheet cursor down the screen, and watch the information scroll up while the row 1 titles stay in place. Now, go back to A1 by using the = command.

Now let's clear the locked row. Enter /T. Then enter **C**, for "Clear". We are telling the SuperCalc program that we do not want anything locked. Use the /I command to insert a new row 1 for an additional title. At

	A	B	C	D	E	F
1			Sample Worksheet			
2		Apples	Apples-1	Apples-2	Apples-3	Apples-4
3	Variable A	5	8	3	4	5
4	Formula 1	1 + B3	1 + C3	1 + D3	1 + E3	1 + F3
5	Formual 2	B4*.65	C4*.65	D4*.65	E4*.65	F4*.65
6	Variable B	11	11	6	7	8
7	Variable C	4	4	10	11	12
8	Total	SUM(B3:B7)	SUM(C3:C7)	SUM(D3:D7)	SUM(E3:E7)	SUM(F3:F7)
9						

C1, enter **Sample Worksheet**.

This time let's lock both the horizontal and vertical titles with one command. Position the Active Cell at A2. Enter **/T**. Enter **B**, for "Both". This locks column A and rows 1 and 2.

Move the worksheet cursor down and to the right to make the dispaly scroll both up and to the left. Note that rows 1 and 2 and column A stay in place.

Window—Split Screen

What if you want to view two widely separated areas of your worksheet at the same time? The *window* command will allow you to do this. We will use one of the sample programs on your SuperCalc program disk to demonstrate *window*. But we will need to have a new worksheet.

Use the *zap* command to clear everything.

Now let's load that sample program. Use **/L** and enter the file name, **BALANCE**. BALANCE is a complete sample SuperCalc worksheet. We will study it more closely later. For now, just scroll to column N, and notice that we have columns representing months and total column for the year.

Go back to A1, and scroll down to row 24 to see "Net Income". Go back to A2. Now move the Active Cell to column D. This will designate where we wish to "split" the screen.

Enter **/W**, for window. The prompt reads, "H(oriz), V(ert), C(lear Split), S(ynch), or U(nsynch)". We are going to split the screen vertically into two separate display windows, so enter **V**.

Notice that now, starting at column D, there is a second set of row numbers. This is the left-hand border of our new display. You should realize that the worksheet itself has not been split. We have simply created two display windows through which to view it. Either window may now be scrolled independently.

	A	B	C		D	E	F
1		This is a Sample S		1			
2				2			
3		Jan	Feb	3	Mar	Apr	May
4	ASSETS			4			
5	Acct.s Receivable	1000.00	1050.00	5	1102.50	1157.63	1215.51
6	Cash	250.00	500.00	6	525.00	551.25	578.81
7	Unsold Goods	250.00	262.50	7	65.63	289.41	303.88
8				8			
9	Total Assets	1500.00	1812.50	9	1693.13	1998.28	2098.20
10	LIABILITIES			10			
11	Acct.s Payable	1000.00	916.67	11	833.33	750.00	666.67
12	Storage Costs	50.00	50.00	12	50.00	50.00	50.00
13	Labor	100.00	105.00	13	110.25	115.76	121.55
14	Materials	50.00	52.50	14	55.13	57.88	60.78
15				15			
16	Total Liabilities	1200.00	1124.17	16	1048.71	973.64	898.99
17				17			
18	NIBT	300.00	688.33	18	644.42	1024.64	1199.20
19	Dep. Allowance	100.00	100.00	19	100.00	100.00	100.00
20	Taxable Income	200.00	588.33	20	544.42	924.64	1099.20

Scroll the display and notice that the right-hand window remains still.

Now press the ";" key. This will transfer us to the "other" window. Regardless of which window we are working in at a given moment, the ";" key will serve to move us over to the other.

Instead of splitting our screen into a right and a left half, we could split it horizontally. In fact, we can do this without having to return to a single window display. First set the Active Cell at the point at which you wish to split the screen horizontally. For our example, move the Active Cell to row 15 and then enter /Window, **H**.

When you wish to remove the split screen, enter /**W** and then **C** for clear split.

The **S** option indicates to the SuperCalc program that we wish to scroll both windows in a "synchronized" fashion. That is, we want them to scroll simultaneously. Let's try it.

Split the screen vertically at D again, but now enter /**W, S**. Now scroll the displays together. To "unsynchronize" the displays so that only one window will scroll at a time, enter/W,U.

With split screen in effect, each window has its own "global" identity for both the *global options* and *format* commands. For instance, we could specify for-

	D	E	F	G	H	I	J	K
1								
2								
3	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
4								
5	1102.50	1157.63	1215.51	1276.28	1340.10	1407.10	1477.46	1551.33
6	525.00	551.25	578.81	607.75	638.14	670.05	703.55	738.73
7	65.63	289.41	303.88	319.07	335.02	351.78	369.36	387.83
8								
9	1693.13	1998.28	2098.20	2203.11	2313.26	2428.92	2550.37	2677.89
10								
11	833.33	750.00	66.67	583.33	500.00	416.67	333.33	250.00
12	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
13	110.25	115.76	121.55	127.63	134.01	140.71	147.75	155.13
14	55.13	57.88	60.78	63.81	67.00	70.36	73.87	77.57
	A		B	C	D	E	F	G
15								
16	Total Liabilities		1200.00	1124.17	1048.71	973.64	989.99	824.78
17								
18	NIBT		300.00	688.33	644.42	1024.64	1199.20	1378.33
19	Dep. Allowance		100.00	100.00	100.00	100.00	100.00	100.00

Press ";" to place us in the lower screen, and scroll down so we can see Net Income. Press ;. Move the cursor to B5 and change the value. Watch as recalculation takes place. Within moments you will see the Net Income change in the lower window.

mula display in one window and cell value display in the other. Similarly, we could use *format* to specify General format in one window and Integer in the other. We could even look at the same data, if we wished, in two different formats at once.

Enter **/W,U**. Scroll both displays to show January through April. Now change to display formulas for one side of the screen. Enter **/W,S**. Now you can scroll through the data in one window and compare it to the formulas as you go.

What have you learned in this lesson?

In this lesson you have learned:

- How to lock any number of rows or columns in place so that they will remain in place while the rest of the screen scrolls.

	A	B	C	D	E
1		This is a Sample SuperCalc Worksheet			
2					
3		Jan	Feb	Mar	Apr
4	ASSETS				
5	Acct.s Receivable	1000.00	1050.00	1102.50	1157.63
6	Cash	250.00	500.00	525.00	551.25
7	Unsold Goods	250.00	262.50	65.63	289.41
8					
9	Total Assets	1500.00	1812.50	1693.13	1998.28
10	LIABILITIES				
11	Acct.s Payable	100.00	916.67	833.33	750.00
12	Storage Costs	50.00	50.00	50.00	50.00
13	Labor	100.00	105.00	110.25	115.76
14	Materials	50.00	52.50	55.13	57.88
15					
16	Total Liabilities	1200.00	1124.17	1048.71	973.64
17					
18	NIBT	300.00	688.33	644.42	1024.64
19	Dep. Allowance	100.00	100.00	100.00	100.00
20	Taxable Income	200.00	588.33	544.42	924.64

The *window* and *title lock* affect the way our worksheet is displayed. The effect is temporary and may always be reversed. When you *save* your worksheet to a disk, the *title lock* and "split screen" information is included; When you load your work back to the screen, it will look exactly as it did before.

If you want to take a break now, use *quit* to exit from the SuperCalc program.

- How to split the screen, either horizontally or vertically, into two windows and how to move back and forth from one "window" to the other.

- How to "synchronize" the windows.

- That you can specify different *global* display options (cell values or formulas) and Global level *format* options for each window.

LESSON 8: Graphic Format Option & Recalculation Options

In this lesson we will look more closely at some of the options available with two of the SuperCalc program's most powerful commands, *format* and *global options*. By now you have enough experience to appreciate what they can do for you. We will need to start with a fresh screen—so use *zap* if you are continuing directly from Lesson 7.

We touched briefly on graphic representation of data in Lesson 6 and promised that you would learn more about it. Now it's time to work a bit with it, so that you will feel confident to try it with your own data. Let's enter some numbers in column A, from row 2 to row 20; use numbers between 1 and 50.

```
              A
 1|   45
 2|    3
 3|   12
 4|   50
 5|   23
 6|   13
 7|    8
 8|   31
 9|   29
10|    6
11|   43
12|   21
13|    9
14|   17
15|   25
16|   36
17|   48
18|   23
19|    7
20|   41
```

Now enter /Format, Column, A, CR, *, 50, CR.

We have done two things—we have changed to graphic display, and we have increased the width of column A to 50, in order to accommodate our largest number.

Suppose we wish to have the number itself display as well. Try this: Enter /F, C, A, CR, Default, CR. Enter /G, D, F to show formulas. Enter at B1, the "formula", A1. Enter /Replicate, B1, B2:B20.

```
              A                    B
 1|   45                A1
 2|    3                A2
 3|   12                A3
 4|   50                A4
 5|   23                A5
 6|   13                A6
 7|    8                A7
 8|   31                A8
 9|   29                A9
10|    6                A10
11|   43                A11
12|   21                A12
13|    9                A13
14|   17                A14
15|   25                A15
16|   36                A16
17|   48                A17
18|   23                A18
19|    7                A19
20|   41                A20
```

Enter /F, C, B, CR, *, 50. Enter /G, F.

Now we have a one-for-one graphial display. But what if the values we wish to display are as large as 600 or 1000? Let's put a "scaling" formula into column B, so our largest value will be equal to the column width. You may remember from Lesson 6 that we could make column B longer—up to 126 characters—but it would be difficult to view beyond the screen width, so we may as well leave it at 50 characters.

If we divide any value in column A by the maximum value within our sample from A1 to A20, the result will express its *size* (relative to the maximum). And since our maximum, whatever it is, will be represented by 50 characters (*) of display, we can multiply the size by 50 to determine our "scaled" value.

Now we have an opportunity to use another built-in function: *Max*. The value of *Max* will be the largest value within the specified range or list. We will use MAX to scale our graphic displays so that they are relative to the maximum value. Our formula will look like this: A1*50/MAX(A1:A20).

	A	B
1	45	A1*50/MAX(A1:A20)
2	3	A2*50/MAX(A1:A20)
3	12	A3*50/MAX(A1:A20)
4	50	A4*50/MAX(A1:A20)
5	23	A5*50/MAX(A1:A20)
6	13	A6*50/MAX(A1:A20)
7	8	A7*50/MAX(A1:A20)
8	31	A8*50/MAX(A1:A20)
9	29	A9*50/MAX(A1:A20)
10	6	A10*50/MAX(A1:A20)
11	43	A11*50/MAX(A1:A20)
12	21	A12*50/MAX(A1:A20)
13	9	A13*50/MAX(A1:A20)
14	17	A14*50/MAX(A1:A20)
15	25	A15*50/MAX(A1:A20)
16	36	A16*50/MAX(A1:A20)
17	48	A17*50/MAX(A1:A20)
18	23	A18*50/MAX(A1:A20)
19	7	A19*50/MAX(A1:A20)
20	41	A20*50/MAX(A1:A20)

Enter /G, F. Enter **A1*50/MAX(A1:A20)** at B1. Now we will use one of the *replicate* options. Enter /R, **B1**, **B2:B20** and the , for options. Enter **A**, for "A(sk for Adjust)". Respond **Y** for "yes"for the first A1, then **N** for "no" for the other two values in the formula.

If you would like to see what your formulas look like, use /G, F. Your formulas should look like this.

Enter /G, F to return to the graphic display. Our graph looks the same but now change the value in any cell to, say, **75**. Notice that all the other lines are "scaled", relative to 75. Enter **150**.

You may wish to save this example for your own use later. Use *save* and call the file GRAPH or something easy to remember.

Now let's change our formula to scale from the minimum to the maximum value in A1 through A20. Go to B1 and use *edit*. We will insert new information into the formulas:

$$A1\text{-}\textit{MIN(A1:A20)}\text{*}50/MAX(A2:A20)$$

Move the cursor to the left and put in (, then move right to the * and insert 13 spaces. Then, replace the blanks with -MIN(A1:A20))

Replicate it for A2 through A20, using the *ask* option. Be careful to adjust only the first cell reference in the formula.

Enter /G, **F**. Notice how the results of this formula differ from those of our first formula. Try different values to test and verify your work.

Recalculation Options

If you enter a new value in cloumn A, notice that the progam takes considerable time to go through all the necessary recalculation of formulas. It may take even longer with a larger worksheet, because the Super-Calc program recalculates automatically every time we enter a new value.

We can suspend that automatic recalculation. Enter /G, M. Now try entering new numbers for the graph.

As you can see, the time required for their entry is greatly reduced.

This is fine, but what does "manual" recalculaton

mean? Certainly, we don't do it ourselves with pencil and paper. How can we get the SuperCalc program to do it? By now you have used almost every option offered. You may have wondered from time to time just what the "!" is for.

Besides its usual exclamatory function in text, "!" has a very special meaning to the SuperCalc program: Pressing ! "forces" a recalculation.

Try pressing !.

Manual mode allows you to make periodic recalculations at your convenience. When you wish to re-establish automatic recalculation, enter /G, A for "automatic".

Order of Recalculation

When the SuperCalc program recalculates, it does so in a certain order. You can change that order. Usually, the order of calculation will not affect the results of your recalculations, and you can ignore it. But there are times when it can make a difference. Let's explore this problem.

First, use *zap* to get a fresh worksheet.

Enter **4** into cell A1, **6** into A2, and **SUM(A1:A2)** in A3. Now enter **A3** into B1.

Look at the values. Everything seems fine. A3 and B1 both display 10. Now change the value in A1 to **3**.

Observe that B1 does not yet contain the 9, which is the new result in A3. Why?

The SuperCalc program recalculates row by row. First row 1, then row 2, then 3, and so forth. Obviously, A3 was still 10 when B1 referenced its value during recalculation.

Now enter **/G**. The prompt line now says, "F(orm), N(ext), B(order), T(ab), R(ow), C(ol), M(an), A(uto)?"

We have just determined that in our example recalculation should proceed column by column, so let's enter **C**. This will change the order of recalculation.

Enter **5** in A1. And now everything seems to work, because the SuperCalc program is proceeding down

columns as it recalculates. Both A3 and B1 display 11.

It is possible to create a situation where neither order of calculation can give us current values in all cells.

Here is an example. First, *zap* the worksheet.

Enter **5** in cell A1. In C1, enter **A1**. In A3, enter **A1**. Now *go to* B2 and enter **C1 + A3**. You can see a problem coming up, can't you?

Of course, at the moment all looks fine—C1 and A3 display 5, B2 displays 10. Now *go to* A1, and enter **4**.

Cells C1 and A3 display 4, which is correct. But B2 has 9. When it was calculated, one of the cells was 4, the other was 5.

Change the order and try again. **/G, C**. Then enter **6** in A1. C1 and A3 show 6, but B2 shows 10. When it was calculated, one cell had 6 and the other had the leftover 4.

Press **!**. Now B2 has 12, the correct value. You have forced a second recalculation and have the correct value.

This example is unrealistic and improbable. Still you should be aware that it is possible to create situations involving out-of-order references, which give misleading values.

In a case like this one, we can press ! and cause a second recalculaton, which gives us the correct values. (You see that you can use "!" in automatic mode as well as in manual mode. Generally, of course, you don't need to).

Cases of out-of-order references like this one are called "forward" references, because the reference is "forward" to a value not yet recalculated. They can occur in actual worksheets, perhaps because a worksheet is especially complex or because it has been amended or changed in ways very different from its original design.

A real-life example of forward reference might happen like this: You build a worksheet with a table of expenditures by category (columns) and locations (row). You SUM the rows and columns to get totals. Everything works fine. Later, you add a table comparing various category and location totals. Everything still works fine, because you know where the second table should be. Then, someone else adds new material to the worksheet, and moves one of

your tables to a new location . . . . Now the comparison table shows incorrect values, but they might seem reasonable.

One way to check for such cases is to press ! and see if any value changes. If so, it is time to re-do the worksheet.

The "circular" reference is another case that you will certainly want to avoid. Here is an example:

First *zap* the worksheet. Now in cell A1, enter **1 + B1**. It shows as 1, since there is nothing in B1. In cell B1, enter **1 + A1**. Suddenly you have 3 and 4. Got the idea? Press **!** a few times, and watch the values increase. They will never stop changing, because there is no logical place to stop calculating.

You might like to experiment by making up some forward or circular references and trying them out.

When you wish, you can *quit*—or you can *zap* these offending formulas into the oblivion they deserve, and go on to the next lesson.

What have you learned in this lesson?

In this lesson, you have learned:

- How to make practical use of the * *format* option for the graphic display of data by scaling values to fit the display width.

- The difference between the "manual" calculation option and automatic recalculation.

- That the ! key causes a recalculation to occur when you press it.

- What order of calculation means, and how to change it by using the *global options* command.

- What a forward reference is, and how to use ! to get the correct value for such a case.

- What a circular reference is, and that there is no correct value for such a case.

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LESSON 9: Output

We have worked with all but one of the SuperCalc commands and have come to appreciate the power and flexibility of the SuperCalc program and its electronic worksheets.

But so far we can't photocopy those worksheets, put them in a binder, or have them reformatted later into some special report layout. In this lesson, we will discuss the *output* command. It makes those things possible.

The *output* command will make a copy of our worksheet and send that copy to any of three places, depending on our specification. We can send the "output'—that is, the copy of all or part of our worksheet—to our computer system's printer which will print it out immediately. Or we can send it to the "console", our terminal, where it will temporarily replace the usual SuperCalc display. Or we can send the output to a disk drive; in this case, the output will be "saved" or "stored" as a special sort of disk file, *different* from the ones we have created in the past with the *save* command.

Let's try this new command now. First, be sure that you have a fresh worksheet. Start up the SuperCalc program, or use *zap*, if necessary.

Now *load* the file that we created in lesson 5. (You may have made some practice files of your own. This is the one we stored as LESSON5.)

Enter **/O**. Now the prompt line reads, "D(isplay) or C(ontents) report."

Display means that the output will reproduce exactly what you see on the screen. Let's try that first.

Enter **D**.

You see that the prompt line requests the range of the material you want as output. Specify the range as usual. In this case, enter **A1:F8**, which describes our whole worksheet. Press **CR**.

The prompt now says, "Enter Device: P(rinter), S(etup), C(onsole), or D(isk)." Enter **C**, and we will list the report to our screen. There may seem to be no reason to do this, but sometimes you may want to check your output before printing it. By the way, if you have several pages of output, the SuperCalc program shows them to you one at a time; you tell the program when to show the next one.

Press any key to return to the SuperCalc display.

Now let's try sending output to the printer. And let's just print part of our worksheet. We will use a range specification that is a little different from the one we used before. (If you don't have a printer connected to your system now, just skip on to the next example.) Be sure that your printer is turned one. Now enter **/O**, **D**, **A1:D8**, **CR**. And enter **P** for printer.

So far, all our examples have used the "D" or display option. What will happen if we choose "C" for contents output? Try it.

Enter **O**, **C**, and specify **A1:F7** for the range. Enter **P**. (If you don't have a printer, specify **C** for console and see the contents displayed on your screen.)

The contents report gives us a list of cell contents, what is actually in each cell. The contents may be quite different from what you see on the worksheet, because of display formatting. You are familiar with the idea of cell contents, because the contents of the Active Cell regularly display on the status line.

There is one other option, "D" for disk. In some ways, it is similar to the *save* command, which you already know. It also copies the screen to a disk. But the resulting disk file is different. You cannot use *load* command and relaod an *output* file to the SuperCalc program. The files created with this *output* op-

tion automatically receive a special filename extension ".PRN".

The ".PRN" files can be very useful. There are other system programs, which can print or edit these files. Therefore, you can make copies of your worksheet information to be printed later. Then you, or someone else, can use an editor program to add information and notes or to reformat the reports. You can include your worksheets inside some other report that is be-ing edited. These edited reports can then be printed.

What have you learned in this lesson?

In this lesson you have learned:
* How to send "output" to the printer, console, or disk.
* The difference between "display" and "contents" reports, and how to specify either one.

* That these reports, when sent to the disk, can be edited and can be printed later by other programs.

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SuperCalc Examples

Overview of Lessons 10, 11, and 12

The lessons in this chapter present three simplified but realistic sample SuperCalc worksheets. You will find the worksheets on your SuperCalc disk. They let you see how the things that you have learned in Chapter 6 as separate SuperCalc capabilities can be combined in useful ways.

By now you know enough about the SuperCalc program to be able to use it without step-by-step instructions. With these example lessons we will give you some general guidance and let you put what you have learned to work.

Experiment with the sample worksheets. Make changes and see their effects. You will find that some changes to values of formulas will have only minor effects on the rest of the worksheet, but others will have major consequences. It can be surprising to see how even a slight change in a percent figure in one formula can make a great difference to the final total.

This sort of experimentation is what helps make "intuition visible," as we suggested in the first chapter. You will find it useful in developing your own work.

These examples deal with different subjects. One is a balance sheet projection, one calculates the break-even point for a project, and one does engineering calculations to specify requirements for an "air curtain." (An air curtain can be used to separate two locations of different temperatures, such as separating a walk-in freezer from the rest of a room. Since you can walk right through the air curtain, you don't have to worry about anyone leaving the door open.)

Experiment with all the examples, even if the subject matter is outside your area of interest. The techniques used in the samples are general techniques, and you can transfer them easily to your own work. In fact, you may be able to use one or more of the sample worksheets as a model for your own.

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LESSON 10: A Projected Balance Sheet

This example is called BALANCE. It will look familiar, because we used it in the last chapter.

Load BALANCE now, and let's take a closer look at it. It has a split window, of course. That's why we used it earlier. What else can you find out about it? How far does the information extend? Is there a title lock present? Is scrolling synchronized or unsynchronized?

Play around with it. See what you can find out on your own before reading any further.

The left window has information extending to column N. Both windows have information down to row 26. Scrolling is not synchronized now, and you will probably find it more convenient if you synchronize the scrolling. There are two locked portions in the left window: column A and rows 1-4.

What about the worksheet's contents? This seems to be a balance sheet for some project within a larger enterprise—notice "Department Allowance" on row 20.

As you scrolled around, you may have found that most of the figures are formulas. Set the formula display for the left window, if you haven't already done so, and notice that all figures for the months of February through December are either formulas that depend on prior months or are constants repeated from the January column. The totals column in the right window consists only of formulas.

The balance sheet is a projection based on the January figures. Assets, liabilities, and net profits are projected. For example, in row 5 we see the assumption that accounts receivable (sales) will grow steadily at 5% a month. In row 13 we see that storage costs are constant. Taxes (row 23) are a constant 30%.

What happens if you change some of these assump-

tions? Try it. They can be changed easily.

You can change constant figures in the January column and replicate them across the row for February through December. You can change the February value for formulas, and then replicate across March through December (without options, so that the SuperCalc program adjusts automatically).

You will notice that slightly raising or lowering constant values, such as storage costs (row 13), or constant relationships, such as taxes (row 23), has a fairly predictable effect. But slightly changing the expected percentage of increase in sales (row 5) can have a more marked effect. There are other places where a slight change in a value will have a significant effect, because it causes a change in trend. (For example, rows 5, 6, 7, 14, and 15.)

What is the effect of a *decline* in sales (row 5)? An increased rise in labor costs?

As we said, this example is realistic, but it is simplified. It is typical of a worksheet developed to get a quick impression of a possible project or of the prospects for an existing project. You could adapt the example for similar projections of your own.

For many applications, it would be more realistic to assume seasonal changes than it is to assume constant changes (like the 5% sales growth). You might see what happens if you make sales and their associated values rise in summer and fall in winter, or some similar pattern.

In a more realistic forecast, other values might change at intervals. Storage costs might increase once in the middle of the year. Taxes might rise when sales increased beyond a certain amount.

You can use the SuperCalc condition function (IF) to test a total value and increase the tax rate when the total exceeds a certain amount. One way to do that is

to test the taxable income figure for each column (row 21).

Try this experiment. Let's say that if the taxable income is greater than $1800, the tax rate rises from 30% to 32%. Insert a row at 23. and put the title **Tax Rate** at A23. Now put the following formula in B23: **IF(B21 = < 1800, .3, .32)**. *Replicate* the formula, without options, across the row from February through December.

Now the tax rate will be 30% when the taxable income is $1800 or less, and 32% when it is greater. In what month does the rate increase?

Now change taxes (row 24). Change B24 from .3*B21 to **B23*B21**. *Replicate* this change, without options, across row 24 from February through December.

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LESSON 11: Break-Even Analysis

The idea behind a break-even analysis is a simple one. When you market a product, you have two kinds of costs. There are fixed costs, such as development and overhead; and there are variable costs associated with making the product, such as parts and labor. When you sell the product, you want to price it in such a way that you recover your fixed costs, your incremental (or variable) costs, and also make a profit. The break-even point is the point where you switch from loss to profit.

This example is called BRKEVN. Load it now, and see what it looks like.

The setup is basically simple. Let's step through an example. You will probably want to set recalculation to manual mode until we have plugged in all the variables we want to provide.

We set the retail price in B2 and the discount rate in B19. (We could have directly specified a wholesale price, but specifying price in terms of retail price and a discount from that allows us to experiment with variations in pricing policy for the public and for the people who will wholesale this product for us.)

In B18 we set the quantity increment, such as 50, 100, or 1000, whatever is suitable for the particular product. Then we provide our fixed and variable costs.

At this point we can calculate the results with ! and see the break-even point. Maybe we will see how the profits can mount up and make us rich (if we chose right)—or how miserable our prospects are (if we chose wrong).

Now let's tinker a bit and see what happens. You may want to set automatic recalculation at this point.

Try changing some of the fixed costs, then some of the variable ones.

You will notice, for example, that increasing fixed costs delays the point where you break even, but does not have a great effect on your eventual profits. But changing variable costs has a continuing effect.

Try pricing and discount changes. Were you surprised at the results?

Now let's look at how the worksheet is built. Set formula display.

Take a look at column C, Units Sold. C2 starts with B18, which is quantity increment. C3 is C2 plus quantity increment, and so on down the column. The formula for each value consists of the value above plus the increment.

What is an easy way to build a column of values like that?

Yes. You would put the values shown in cells C2 and C3. Then you would *replicate* C3 down the column, using the Ask option. You would tell the SuperCalc program to adjust the first value and not adjust B18.

Now look at column D, Profit and Loss. These formulas may look rather forbidding, but once we have figured them out, we will see that the calculation is straightforward.

Let's start with a look at D2. This shows as:
C2*B3* (.01*(100-B19))-(B9 + (B16*C2))

Going down the column, we see that the other formulas are similar. In D3, the formula has C3 in place of C2, but all other values are the same. This pattern continues. For each entry in column D, the column-C references refer to the adjoining Units Sold value.

So the formula in D2 starts out with Units Sold times Retail Price (that is, C2*B3).

The .01(100-B19) simply subtracts the discount rate (B19) from 100 and makes it a per cent. If B19 con-

tains 40, then .01*(100-B19) is equal to 60. In other words, this expression is the percentage of our retail price that we get to keep. It is our wholesale price.

What about -(B9+(B16*C2))? B9 is the sum of our fixed costs. B16 is the sum of our variable costs. B16*C2 is the variable cost (B16) times the units sold for this particular row (C2).

So the formula in D2 turns out to be quite straightforward: It is Units Sold times Price minus Cost.

Like the other examples in this chapter, this worksheet is realistic but simplified. You can use it "as is" in order to get a general idea of the effects of pricing policy on a product or to do short-term forecasting. But in actual marketing, costs and prices change.

There are two ways that you might adapt this worksheet to show the effect of changes in prices and costs.

One way is to put changes at intervals in the worksheet. For example, break it into intervals representing six months of production. Change your costs, prices, and even your incremental values for production (you are producing more efficiently).

A second way is to use conditional expressions as described in the prior lesson on the Projected Balance Sheet. You could test the number of units produced. Based on that test, you could specify adjustment factors for prices and costs. Then you multiply your price and cost information by the adjustment factors, and refer to the *adjusted* figures in your other formulas.

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LESSON 12: Air-Barrier Engineering Worksheet

This example is called BARRIER. Although it is based on actual engineering practice, you do not have to know anything about engineering in order to do this lesson. We use the example to demonstrate a key SuperCalc feature, the Look-up function, which can be of great value to you in your own work.

The BARRIER example represents *part* of a larger worksheet for specifiying air-conditioning equipment. It is not complete in itself. BARRIER lets you change five of the values used in determining installation requirements for equipment that generates an air barrier or "air curtain". (An air barrier is a stream of moving air that separates two areas of differing temperatures, such as a barrier between a walk-in freezer and an ordinary room.)

Load BARRIER from your SuperCalc disk. Take a look at it.

These are the five values that you can change:
  D5   Cold-storgage room temperature
  D6   The air-barrier temperature
  D8   Door height
  D9   Door width
  D21 Velocity

When you specify these values, the values change for the following cells in column D: D7, D10-D20, D23, and D24.

As you will see, the worksheet is set for manual recalculaton. Can you explain why?

There is no point in calculating until all the values have been entered.

Here is one way this worksheet—or one similar to it but more complete—might be used. A salesperson could enter the customer's installation requirements in D5, D8, and D9, and put trial entries in D6 and D21 for different available equipment. Looking at the results in D23 and D24, the salesperson could im-

mediately determine which equipment could do the job.

Moreover, the salesperson could vary some of the requirements and see how much of a margin is left in the specification. For example, if the temperature differential is increased by 5 degrees, could the equipment still handle the job?

The *output* command could be used to print out several variations of the worksheet to show the customer.

Try making some changes and see their effects. Remember to press the "!" for recalculation.

Earlier we said that this worksheet demonstrates the look-up function. Now let's see how LOOKUP works. It is at D15. Depending on the value you enter in D9, this function will look up a value from the table in columns H and I. That is, given the door width in feet (D9), LOOKUP provides a slot width in inches.

To take a closer look at this, we will need to remove the title lock from columns A and B. After you have done that, use the *go to* command to put D1 in the upper left corner of your screen. You will see the table in column H and the associated values in column I.

Try entering different values at D9. See what happens at D15. Remember you will have to use "!" or change to automatic calculation.

As you see, if D9 has a value equal to one of the values in column H, the SuperCalc program puts the associated value from column I into D15. For example, entering 7 into D9 gets you 2.65 in D15. Entering 8 gets you 2.85.

What about intermediate values? Try entering 7.5. As you see, you get the next higher associated value, 2.85 in this case.

This worksheet also includes examples of

trigonometric functions, the square root function, and using ʌ to raise a value. These are all in column D. In order to see them, set formula display and widen column D to 35. You will see a SQRT at D12, trigonometric functions at D18 and D19, and the use of ʌ at D23 and D24.

If you are interested in engineering or mathematics, you will enjoy seeing how the worksheet is calculated and how values inter-relate. You may wish to print out the contents of this worksheet.

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PART III: SUPERCALC REFERENCE

Summary Reference

This part of the guide provides reference information with different levels of detail. The next section includes basic information about commands and their use, data entry, the current-cell reference key, in-line editing, and formula adjustment. It also has a condensed reference to SuperCalc's "/" commands. You can use the chapter as a memory jogger, to quickly check general points.

Chapter 9, "Detailed Reference, " provides more in-depth reference information. Topics include "Data Entry and Data Display," "Status, Prompt, and Entry Information," "Formulas and Functions," and "The / Commands."

When In Doubt, Ask!

When you are using the SuperCalc program and you need information about your current entry options, press the "?" key. The display screen will change to show you a list of entries that you may make relative to your present position within SuperCalc. This help function is available at any time—in any mode. Press any key to return to the previous display.

Moving Around the Worksheet

There are several ways to move the worksheet cursor to a new Active Cell. You can use the four arrow keys. (Similary, you can use the alternate diamond keys. Hold down the *Control* key while you press the **s**, **d**, **e**, or **x** key to move left, right, up, or down.)

Or you can use the =*[address]* command—also called the *go to* command—to move directly to the designated cell. The SuperCalc program will ask for the cell address. When you enter it, the display on your screen will change. If the designated cell is already on the display, it will show as the Active Cell. If not, the window will move to show the new Active Cell at the upper left corner. There is a special case. If you enter only = CR, the window will be adjusted to show the current Active Cell at the upper left.

Current-Cell Reference Key (ESC)

The current-cell key is the ESC (escape) key. When you press it, the SuperCalc program puts the location of the active cell onto the entry line for you to use in a command or expression. After you press the current-cell cey, the arrow and alternate diamond keys control the worksheet cursor. If you move the worksheet cursor, the Active Cell address on the entry line changes dynamically to reflect the new location. When you press ESC again, the address stops changing, and the arrow and diamond keys can again be used for editing.

Pressing ":" after the Active Cell address is a special case. The SuperCalc program places another Active Cell address after the colon. The address before the ":" is fixed; the address after the ":" can still be dynamically changed.

The new Active Cell location is temporary. When you press CR to enter the command or expression, the worksheet cursor will return to the prior active cell location. If you are entering data into a cell, it will go into that prior location.

Data Entry

The SuperCalc program accepts numbers, formulas, and text. Ordinary numbers can have 16 significant digits plus a decimal point. Scientific, or exponential, numbers can have 16 significant digits and a decimal point, all raised to a power of ten. The limit is the 63d power of 10. Text can have up to 110 characters. Formulas can have up to 110 characters and can include arithmetic expressions, relational expressions, functions, and references to cells. The next chapter, "Detailed Reference" will give you further detail on data entry.

In-Line Editing

Once you begin to type a command or data on the entry line, the four arrows—and the alternate diamond keys—no longer move the worksheet cursor around the worksheet. Instead, you can use them to edit information on the entry line. You can always correct your commands or data while they are on the entry line. The /Edit command allows you to use the edit process, and enter the changed contents into the Active Cell after you have committed an entry to the worksheet.

Left and right arrows (or **CNTRL s** and **d**) move the data-entry cursor non-destructively across the entry so that the cursor can be positioned where the change is to be made.

Because a cell can contain 110 characters, which is longer than can be shown on the entry line, the SuperCalc program will scroll your entry during the edit process, allowing you to examine any portion of it.

Wherever the cursor is, a new character can be entered to replace the old one. The cursor then moves right one location.

Down arrow (**CNTRL x**) deletes a character each time it is pressed. The cursor stays in position.

The Up arrow (**CNTRL e**) inserts a new space at the cursor location each time it is pressed. The cursor stays in place, and spaces fill out to the right of it. The space(s) can then be filled with additional characters.

Remember, what you see on the entry line is what gets entered into the Active Cell. When you finish making your changes and enter the data or execute the command, SuperCalc takes *everything* on the entry line, not just the material to the left of the cursor.

Recalculation

The ! command forces recalculation. In manual calculation mode, the command is the only way to have the program recalculate values. In automatic mode, it provides an additional recalculation.

Moving From Window to Window

The ";" command moves the worksheet cursor from one portion of a split window display to the other portion. See the /**Window** command.

The "/" Commands

All other commands consist of / and a single letter. SuperCalc's interpretive prompting fills out the rest of the word, and the prompt line lists the options available. These commands are summarized on the folloing pages and described in detail in the next chapter.

Formula Adjustment

Some commands cause formulas to be moved into new locations. It is usually desirable to have formulas adjusted for their new locations. For example, cell D4 has the formula "+B4*C4". If the contents of cells B4, C4, and D4 are moved to T7, T8, and T9, the formula in T9 should read "+T7*T8". The SuperCalc program ordinarily makes such adjustments automatically.

For some commands, options allow you to move formulas without adjustment, or to be queried so that you can choose for each cell reference of each formula whether or not it should be adjusted. Some commands also have an option to move values only; formulas are not transferred, only their values.

Condensed Reference to the / Commands

/Blank

Blank the contents and clear the formatting of a cell, partial column, partial row, or block.

/Copy

Make a one-to-one copy of a cell, partial column, partial row, or block to a new location. Options give a choice of formula adjustment or copying values only.

/Delete

Delete a column or a row; automatically adjust the rest of the worksheet.

/Edit

Edit the contents of a specified cell and place them in the Active Cell.

/Format

Specify formatting for a cell or group of cells, a column, a row, or the entire worksheet. Choices (one or more):

Numeric display.

Integer notation (value rounded to integers).
Ordinary notation, if it will fit, or scientific notation.
Scientific notation.
Dollar amount (rounded to nearest cent, ".00" appended to whole numbers).
Right or left justify, text or numerical values.
Graphic display, using *s to represent the number.

Text display. Left or right justify.

Column width. Specify number of characters for one column or all columns.

/Global

Set worksheet options:
Options

Display/Suppress borders

Display values of formulas or formulas

Recalculate automatically/on request

Tab over/through protected data

Set order of recalculation as columns across/rows down

Set or clear auto-advance in current direction.

/Insert

Insert a new empty column or row; automatically adjust the rest of the worksheet.

/Load

Load the worksheet contents and settings from a disk file. You may load all or part of the worksheet at a location you specify. Options give a choice of formula adjustment or of loading values only.

/Move

Move a column or row to a new location; automatically adjust the rest of the worksheet.

/Output

Write all or part of the worksheet to the printer, the terminal, or a disk test file. Options allow writing the displayed information or the contents of cells.

/Protect

Protect the contents and formatting of a cell, partial column, partial row, or block from change.

/Quit

Exit from SuperCalc to the system; optionally, save the worksheet.

/Replicate

Make a one-to-many copy of a cell to a group of cells, a partial column to a group of partial columns, or a partial row to group of partial rows. Options give a choice of formula adjustment or of replicating values only.

/Save

Save the worksheet contents and all settings on a disk file. Options give a choice of saving all contents or values only.

/Title

Lock columns, rows, or both into their place on the display window. Other information will scroll; these will remain fixed.

/Unprotect
>Remove protection from the contents and formatting of a cell, partial column, partial row, or block.

/Window
>Split the display window into two portions, horizontally or vertically. Each portion can have separate format settings and options.

/Zap
>Set entire worksheet to empty cells and clear all settings. (Overrides protected cells.) Equivalent to a fresh start.

NOTES

Detailed Reference

The material in this chapter is divided into these major sections: "Data Entry and Data Display," "Status, Prompt, and Entry Information," "Formulas and Functions," and a "Detailed / Command Reference."

Data Entry and Data Display

This section provides some detailed information about the data you can put into cells and the formats you can use to display that data.

Limits for Data Entry

Numbers. 16 significant digits, plus optional decimal point and optional sign for ordinary numbers. 16 significant digits, plus decimal point and optional sign for exponential numbers (scientific notation). These 16 digits can be raised to the 63rd power of 10.

Largest ordinary number: 9999999999999999
Smallest ordinary number: −9999999999999999

Largest exponential number: 9.99999999999999e62
Smallest exponential number:
                 −9.99999999999999e62

Text.
110 characters. Examples: "Expenses, January"

Formulas.
110 characters Examples: "7+A5, 9+5*E7, SUM(B1:B9), MIN(A4, D4, G4)"

Distinguishing Among Numbers, Text, and Formulas When Entering Data

Numbers start with digits (0-9), +, −, or . (period). An entry that begins with a period is assumed to be a decimal entry beginning with zero and a decimal point.

Text starts with quotation marks.

Formulas can start with the same characters as numbers—that is, 0-9, +, −, or period. They can also start with a (. You can put arithmetic expressions, relational expressions, functions, and references to cells within formulas.

Data Display

You will find more information about display options under "/Format" and "Global Options" in the "Detailed Reference to / Commands" later in this chapter.

Numbers. Ordinarily right justified; optionally, left.

The way in which numbers appear when displayed depends on the display format selected, not on the way they looked when entered into the cell. The content of the cell is not affected by the display format.

Display options allow numbers to be displayed in the following ways:

- General (ordinary numbers if they fit column display width; otherwise exponential)

- Exponential (scientific notation), rounded if necessary Integer (integers only; if there is a decimal number, round up or down to make it integer)

- Dollar amounts, rounded to the nearest cent; ".00" is appended to whole numbers

- Graphic display, using *s to show relative values in bar graph form

For any display format, if the numeric display cannot fit into the column, then > > > > fills the column.

A colulmn can be widened to display a number or text in full. Column width can be set from 1 to 126.

Text. Ordinarily left justified; optionally, right.

If text is too large for the column, the text display will continue into the adjoining blank cell(s) to the right. If it cannot continue into adjoining columns, it is cut off at the right.

Formulas. Ordinarily the resulting value is displayed; optionally, the formula. On the status line, the formula is displayed. When the formula is displayed in a cell, it can continue into adjoining blank cells as text does.

Status, Prompt, and Entry Information

SuperCalc uses the prompt and status lines near the bottom of your screen to send you messages. You use the entry line. Here is a more detailed look at some of the things you may find on those lines.

Active Cell Status

The status line is the first of the three lines. This line always displays information about the Active Cell. This information displayed includes: The "Current Direction" that you have been moving, the Active Cell location, the Active Cell's specific format and protection, and the textual contents of the Active Cell.

Here is an example of a status line:

> A5 L$TR P Text="February

Here is what it means: [xxxxx ERROR]

>   The current direction of the worksheet cursor, set by the last arrow key pressed. It may be >, <, ∨, or ∧.

A5   Is the Active Cell location. Data entered will go into that cell. Commands that use the current column or row will use the column or row containing that cell; in the example, column A and row 5.

L$TR   Active Cell format settings; in this case, numbers Left justified, $ format, and Text Right justified. The detailed reference for /Format gives full information on these settings.

P   Data protection. P if the Active Cell is protected, blank if unprotected.

Text="February"
                  The contents of the Active Cell; in this case, Text. Repeating text is indicated by "Rtxt=". Numbers or formulas show as "Form". For example, "Form=73" or "Form=12*B9."

The SuperCalc program also uses the status line to display error messages and certain informational messages. These special messages disappear and the status information reappears as soon as you press any key.

Prompt and Global Status

The middle of the three information lines serves a dual purpose; while you are entering a command, this line "prompts" you by outlining the choice of possible entries you may make. For example, after you have entered /Delete, the prompt line reads:

R(ow) or C(olumn)

This prompts you that you must next tell the SuperCalc program whether you wish to delete a Row or a Column. If you then enter **R**ow, the prompt line changes to:

Enter Row Number

to remind you that a row is specified by a Number.

Whatever the prompt is, if you press **?** a short but detailed explanation of your options will be displayed on the screen.

When you have finished entering a command, the middle line reverts to its other function: global

status. It then tells you about your worksheet's current status. An example is:

Width: 9 Memory:32 Last Cell:J10 ? for HELP

This information is:

Width:9
Column width. This is the display width of the column that contains the Active Cell. The standard or default setting is 9, but you can specify a different width. You can set all columns to the same width or set different widths for different columns. In the event that you change the default setting, the status line will list the display width that you have selected.

Memory:32
Available memory, in "kilobytes" (a kilobyte is the memory sufficient for 1024 characters or digits). This number changes as you add data to the worksheet.

Cell:J10
This tells you the lower right-hand corner of an imaginary block that *just* contains all of your worksheet. In other words, J is the right most column that you have used, and 10 is the lowest row (biggest row number).

? for HELP
This reminds you that typing "?" will always give you an explanation of the options you have at that moment. If you press "?", you will receive an explanation of your choices.

The / key precedes most commands. If you press it, the prompt line will change to list possible entries and the "?" symbol. Pressing "?" will give you an explanation of the choices listed on the prompt line.

As you proceed within commands, or make other possible entries, the prompt line will change to show you your current choices. Whenever you press "?", a short but detailed explanation of your options will be displayed on the screen.

Entry

This is the line where you tell the SuperCalc program what to do by entering your commands or data. Your

experience with the self-teaching materials in Part Two and the information elsewhere in the summary and detailed reference chapters will tell you what you need to know about entering data or specific commands.

Formulas and Functions

Formulas specify calculations and comparisons. Formulas use values in other cells (which may be themselves the result of formulas), constants, and built-in functions. These values are combined using arithmetic and relational operators:

+	addition
−	subtraction
*	multiplication
/	division
∧	raising to a power
=	is equal to
< >	is not equal to
<	is less than
< =	is less than or equal to
>	is greater than
> =	is greater than or equal to

The built-in functions:

ABS(value)
Absolute value.

AVERAGE(list)
Arithmetic mean of the non-blank values in the list.

COUNT(list)
The number of non-blank entries in the list.

ERROR, NA
Display "ERROR" or "NA" (not available) for the cell having this function and for any cell with a formula referring to this cell.

EXP(value)
Raise "e" exponentially. Value is the exponent.

OR(expression 1, expression 2)
Results in "true" (value of 1) If either expression 1 or expression 2 are "true" (non-zero), otherwise results in "false" (value of 0).

AND(expression 1, expression 2)
Results in "true" (value of 1) if both expression 1 and expression 2 are "true" (non-zero), otherwise results in "false" (value of 0).

NOT(expression)
Results in "true" (value of 1) if expression is "false" (zero), otherwise results in "false" (value of 0).

IF(exp1,exp2, exp3)
If expression 1 is true, then use expression 2, otherwise use expression 3. Expression may be combined with AND, OR NOT to form expression 1.

INT(value)
Integer portion of value. The value is not rounded. This is not to be confused with **I/F**ormat, which will round-off numerical entries.

LOOKUP(value,column/row range)
Search the range for the last value less than or equal to the search value given. Return the adjacent value from the column to the right of search column or the row below the search row. Assumes the search range is in ascending order of values.

Ln(value), **LOG10**(value)
Natural log, log base 10, of the value.

MAX(list), **MIN**(list)
The maximum or minimum value in the list.

NPV(discount, column/row range)
Net present value of a group of cash returns at the given rate of discount. The cash amounts are assumed to be projected for equal time periods, such as every year; and the discount rate is for that interval. The first cash entry is discounted once, the second twice, and so forth, and added to form the total value.

PI
Pi to 16 significant digits.

SIN(value), **ASIN**(value), **COS**(value), **ACOS**(value), **TAN**(value), **ATAN**(value)
Trigonometric calculation of the value. ASIN is arcsine, etc. Trigonometric results are give in radians.

SQRT(value)
Square root of value.

SUM(list)
Sum of the values in the list.

Here is a quick explanation of what "value," "range," and "list" mean in this context.

Value is a constant, the value of a cell, or a combination of these values made by using the arithmetic operators.
Examples:

Constants: 12, 5.9, 3.4e3

Cell values: A12, B19, BK54

Combinations: 12+5.9, B19-3,7, A12*B14, (9+E5)/4

The combinations are also called "expressions." They are evaluated from left to right; * and / are evaluated before + and −. Use parentheses to group terms in your expressions so that SuperCalc will evaluate them as you wish. Examples:

$$5+4*3+1=18 \text{ (that is, } 5+12+1)$$
$$(5+4)*3+1=28 \text{ (that is, } 9*3+1)$$
$$5+4*(3+1)=21 \text{ (that is, } 5+4*4)$$
$$(5+4)*(3+1)=36 \text{ (that is, } 9*4)$$

Here are some examples of functions with values:

ABS(A12), SQRT(9.5*E7), LN(3.5 e4), TAN(C5 + E5)

Range is simply a partial column or partial row, such as B4:B12 or B4:H4. Here are some examples of functions that use both a value and a range:

LOOKUP(7,C5:J5)   LOOKUP(A4,D3:D12),
NPV(.18,D12:H12)   NPV(B4,G3:G8)

List You can mix all of the above. A list can have values, expressions, and ranges. Here are some examples:

SUM(A12,B9,D5)
SUM(C12:E12,H3:H7)
SUM(MAX(E3:B9),MAX(C12:E12))
COUNT(E3:E12,F8:J8)
AVERAGE(B7,B8:H8,C12:C20)

Sample worksheets provided on your SuperCalc disk give examples of these formulas in actual use. The examples are explained in the lessons. This material will help you understand how you can put the formulas to work; it is especially useful for IF, LOOKUP, and NPV.

THE / COMMANDS

All the commands are entered with / and the first letter of the command. The rest of the command is automatically filled out on the entry line. For example, "**B**" appears as "**Blank**". The prompt line lists the choices available to you for that command. When you enter /, the prompt line shows the possible one-letter entries. When you choose one of these, the prompt line changes to show the choices available for that particular command. Whenever you wish further information about your options, you can press the ? key.

Some commands have several levels of entry; that is, there will be a sequence of prompts and entries before the command is executed. An example is the command to *copy* from one location to another. If you are entering one of these multi-level commands, it is possible to back out of your current entry by using the back (left) arrow. In fact, you can back entirely out of the command without executing it. You may also cancel any command by entering CNTRL-Z (holding down the Control key while pressing Z).

Commands, like data, can be edited with the in-line editor. Remember that when you press carriage return (**CR**), everything visible on the entry line will be executed—not just the part of the command to the left of the cursor.

A few commands use only the current cell, column, or row. Most allow you to specify which cell, column, or row in the command line. Column addresses may be entered as either capital or lower-case letters; SuperCalc will convert lower-case column entries to capitals. If you want to specify the current cell, column, or row (as appropriate) in such commands, simply press "," (comma) to enter the current location into the command line.

The current-cell key (ESC) can also be used to enter the current cell, column, or row into the command line. (If only the column or row is needed, the other part of the current cell location is ignored.) As explained in "A Summary Reference," once you press the ESC key, you can move the Active Cell temporarily to a new location. Its address changes on your entry line and can be used in your command. Pressing : allows you to develop two cell addresses, such as B5:E5, which is convenient for many commands.

The carriage return (CR) ends a command, causing it to be executed. In some cases, a comma (,) can also end a command because pressing the comma enters the last item of information needed in the command line. The command is complete, so the SuperCalc program executes it.

DATA COMMANDS

/Blank

Blank the contents and clear the cell format of a cell, partial column, partial row, or block. Blank clears the formatting of the cell if it has been formatted individually (that is, at the E level; see /Format, below). Formatting for a column or row is not affected, even if every cell in it is blanked. Only the */format* command can change the format for a column or row. Protected cells will be bypassed.

Prompt: Enter Range

Examples:

      /Blank, **c7** (CR)
      /Blank, **c7:c12**(CR)
      /Blank, **c7:h7**(CR)
      /Blank, **c7:h12**(CR)

/Edit

Edit the contents of a specified cell and place them in the Active Cell. If the Active Cell is protected, you cannot *edit.*

Prompt: From?

Specify a cell; "," means the current or Active Cell. The cell contents come to the entry line, replacing the command on the line.

Editing is done with the in-line edit function. Use the arrow or alternate diamond keys to move the cursor non-destructively left and right to characters you want to change. The character that will be altered is the one under the cursor. You can replace characters one-for-one simply by typing new characters over them. You can delete characters, including blanks, by pressing the down arrow (or CTRL-x). You can insert

blanks by pressing the up arrow (or CTRL-e). Then if you wish you can replace the blanks by typing other characters over them.

Example:

The Active Cell contains "Janaurry".

/Edit and "," brings this to the entry line. Use the left arrow to move the cursor to the second "a", Janaurry. Type "ua". Move cursor right to one of the "r"s, Januarry. Press the down arrow to delete it, and press carriage return. (Remember, pressing **CR** puts the entire entry into the cell no matter where the cursor is positioned.)

The Active Cell now contains "January".

/Format

Specify formatting for a cell or group of cells, a column, a row, or the entire worksheet. Choices (one or more):

Numeric display. Ordinary, scientific, both; dollar amounts; right or left justify.

Text display. Right or left justify.

Column width. Specify display width for one column or all columns.

Prompt: Enter Level: G(lobal),
           C(olumn), R(ow), or E(ntry)

Specifies the format for displaying numbers or text in the entire worksheet (G), in a column (C), a row (R), or a cell or group of cells (E). If you reply C or R, you are asked to specify the column or row; "," will specify the current column or row. If you reply E, you can specify a single cell or a range of cells; that is, a partial column or partial row. Using E to specify formatting at the cell level gives the highest priority of formatting.

The next prompt message you receive depends on the level of formatting you specified.

A level of **G** or **C** has this prompt:

Define Formats: (I, G, E, $, *,
R, L, TR, TL, D, column
width)

A level of **R** or **E** has the same prompt, except that "column width" is not included because it is not a valid choice.

You may enter as many of the formats as you wish.

Here is a list of the possible format choices:

I   Display numbers as integers. Decimal fractions are rounded up or down to convert them to whole numbers.

E   Expontential. Display numbers in scientific notation, as a power of 10. For example, 1776 is 1.77e3. 1,000,000 is 1.0e6. Round if necessary.

G   General. Display the number as an ordinary number if it fits in the column width; otherwise, display it as an exponential number.

$ Dollar amount. Round to the nearest cent; append ".00" to whole numbers. No $ is displayed.

*   Graphic display for numbers. Use asterisks to show the relative sizes of numbers. Allows bar graph display.

R, L   Right, Left Justify. For numbers.

TR, TL   Text Right, Text Left Justify. For text.

0-126   Column width, for the specified column or for the worksheet.

D   Default. Reset to the next level of formatting. See note 2 below.

When your entries are contradictory, the SuperCalc program will act on the one entered last. For example, if you enter "R, L, I, G", then L and G will take effect and R and I will be ignored.

NOTES:

1. **Format** does not apply to data entry. The contents of a cell are kept as entered; **Format** specifies how the contents are displayed.

2. Where formats differ, the order of

precedence is first the cell (E), then row (R), column (C), and finally worksheet or "global" (G). That is, cell formatting overrides any format for the column or row where the cell is. Where row and column intersect, row formatting overrides. Any of these override the global settings.

When the program is started up, these global format settings are in effect: general numeric display (G), numeric right justify (R), text left justify (TL), and a column width of 9.

Examples:

/Format, **C**, **E**, **12 (CR)**
/Format, **R**, **TR**, **(CR)**
/Format, **G**, **$**, **11**, **(CR)**
/Format, **E**, **E**, **(CR)**

WORKSHEET ADJUSTMENT COMMANDS

/Delete

Delete a column or row.

Prompt: R(ow) or C(olumn)

If you reply **R**, the prompt becomes:

Enter Row Number

You may then enter a number form 1 to 254, or "," for the current row.

If you reply **C**, the prompt will be:

Enter Column Letter

You may enter a letter designation from A to BK, or "," for the current column.

This command causes the contents and formatting of the specified row or column to be deleted. The command will not execute if a protected cell is in that row or column.

The rest of the worksheet adjusts:

• Rows below the deleted row move up, and all row numbering adjusts. If row 4 is deleted, row

5 moves up and becomes the new row 4, and so on.

• Columns to the right of the deleted column move left. If column D is deleted, column E moves and becomes column D, and so on.

Examples:

/Delete, **R**, **5**, **(CR)**
/Delete, **C**, **E**, **(CR)**

All formulas on the worksheet are automatically adjusted as necessary. The adjustments preserve references to cell contents by giving their new location. For example:

Row 3 is deleted.

A prior reference was SUM(B2:B5).

That reference becomes SUM(B2:B4).

The contents that were at B5 are now at B4.

A reference to B3 itself would cause an error if column B or row 3 is deleted. This is because the contents vanish, and there can be no new reference to them. The SuperCalc program cannot assume that this is a special case, one where you want the old formula to refer to the new contents of cell B3. For example:

Cell A6 has the formula SUM(B3, F3, G3).

Column B is deleted.

Cell A6 will now display "ERROR" because the contents of B3 have vanished. To correct the error, you must correct the reference to B3 in cell A6.

/Insert

Insert a new empty column or row.

Prompt: R(ow) or C(olumn)?

If you reply **R**, the new prompt is:

Enter Row Number

You may enter a number from 1 to 254, or "," for the current row.

If you reply **C**, the prompt is:

Enter Column Letter

You may enter a letter or letters from A to BK, or "," for the current column.

This inserts a new row or column of empty cells between existing rows of columns. A new row appears above the specified row, a new column to the left of the specified column.

The rest of the worksheet adjusts. Columns move right, rows move down. The contents of each column or row are preserved but have a new designation. The contents, if any, of the last row (254) or column (BK) are discarded. The command will not execute if that last row or column contains a protected cell.

Example:

/Insert **R**, 5(CR)
/Insert **C**, D(CR)

All formulas on the worksheet are automatically adjusted as necessary. The adjustments preserve references to cell contents by giving their new location. For example:

Row 3 is inserted.

A prior reference was SUM(B2:B5).

That reference becomes SUM(B2:B6).

The contents that were at B5 are now at B6.

A prior reference to B3 itself will become a reference to B4 when a new 3 is inserted.

/Move

Move one column or row to a new location.

Prompt: R(ow) or C(olumn)?

If your reply is **R**, the prompt is:
Enter Row Number

You may enter a number from 1 to 254, or "," for the current row.

If you reply "**C**", the prompt is:

Enter Column Letter.

You may enter column designation from A to BK.

After you have specified a row or column, the SuperCalc program will ask the destination of the move. The prompt is: To?

Reply with a row or column designation, whichever is appropriate. Pressing "," or the current-cell key (ESC) will designate the current row or column.

Move adjusts the worksheet without destroying any data or any formatting. It moves a specified column left or right and inserts it in a new location, or moves a specified row up or down and inserts it in a new location. The columns or rows in between move to fill the old location. They move in the opposite direction to the basic move.

Example:

/Move **R**, 5, 12(CR)
/Move **C**, E, A(CR)

All formulas on the worksheet are automatically adjusted as necessary. The adjustments preserve references to cell contents by giving their new location. For example:

Row 3 is moved to row 5. The former rows 4 and 5 move up to become new rows 3 and 4. The former row 3 becomes row 5.

A prior reference was SUM(B2:B5).

That reference becomes SUM(B2:B4). The contents of B5 are now at B4.

BUILD DATA AND/OR WORKSHEET COMMANDS

/Copy

Make a one-to-one copy of a cell, partial column, partial row, or block to a new location. Options give a choice of formula adjustment or copying values only.

Prompt: From? (Enter range)

Specify a cell, partial column, partial row, or block.

The next prompt is:

> To? (Enter Range), then Return; or "," for options.

Copy makes a one-to-one copy of the source into a destination of the same shape and size. Enter a single cell address to give the new location:

> For a partial column, give the upper cell.
>
> For a partial row, give the left cell.
>
> For a block, give the upper left cell.

Press carriage return (CR), or if you wish a choice of options for copying formulas, press the comma key (,).

If you press **CR**, then all the formulas are copied and automatically adjusted; that is, all references to other cells are adjusted for their new location, if possible.

If you press "," to select options, the Super-Calc program will prompt you:

> N(o) Adjustment, A(sk for Adjust), V(alues only)

N—Copies formulas exactly as they are.

A—Allows you to choose for each reference to another cell address within a formula whether to copy it as is or to have the SuperCalc program adjust it.

V—Copies the values only, without formulas.

When you choose the Ask option, each formula that qualifies for possible adjustment is displayed on the entry line. Its source and destination address are shown on the prompt line. The SuperCalc program positions the cursor at each cell reference on the entry line, and you are asked to reply "Y" or "N". **Y** means, "Yes, automatically adjust." **N** means "No adjustment, transfer as is."

Examples:

> Copy cell to cell:
> /Copy, **b9, c12(CR)**
>
> Copy partial column to partial column:
> /Copy, **b9:b15, e9(CR)**
>
> Copy partial row to partial row:
> /Copy, **b9:g9, h12(CR)**
>
> Copy block to block:
> /Copy, **b9:g15, k20(CR)**
>
> Copy without adjustment:
> /Copy, **b9, c12, N(CR)**
>
> Copy, ask for individual choice of adjustment:
> /Copy, **b9, b15, e9, A(CR)**

/Replicate

Make a one-to-many copy of a cell to a group of cells, a partial column to a group of partial columns, or a partial row to a group of partial rows. Options give a choice of formula adjustment or replicating values only.

Prompt: From (Entry Range)

Specify a cell, partial column, or partial row, followed by a comma.

The next prompt is:

> To? (Enter Range), then Return; or ","for options.

Replicate makes a one-to-many copy of its source into a destination that is larger than the source:

A cell into a partial column or partial row.

A partial column into a group of partial columns. The destination address is give as the left and right cell addresses on the top row of the destination group. The partial column will be copied once for each cell in that portion of the row.

A partial row into a group of partial rows. The destination address is given as the upper and lower cell addresses for the left column of the destination group. The partial

row will be copied once for each cell in that portion of the row.

Specify the destination and press **CR**, or if you wish a choice of options for copying formulas, press , (comma).

The options are the same as those for **/Copy**. If you press **CR**, formulas are automatically adjusted. The options are no adjustment, or to be asked whether or not to adjust for each reference to another cell address, or to replicate values only, leaving formulas behind. See **/Copy** above for details.

Examples:

>Replicate a cell into a partial column
>**/Replicate,b12,e3:e8(CR)**

>Replicate a cell into a partial row
>**/Replicate,b12,e3:j3(CR)**

>Replicate a partial column into a group of partial columns
>**/Replicate,b3:b7,d3:j3(CR)**

In this example, the partial column is five cells deep. The result will be a block of cells repeating that partial column seven times. The top of that block is on row 3.

>Replicate a partial row into a group of partial rows.
>**/Replicate,b3:e3,g5:g7(CR)**

The partial row here is four cells across. The result will be a block of cells repeating the partial row three times. The left side of that block is column G.

>Replicate without adjustment
>**/Replicate,b12,e3:e8,N(CR)**

>Replicate, ask for individual choice of adjustment
>**/Replicate,b12,e3:j3,A(CR)**

Note: **/Copy** and **/Replicate**

As a special case, **/Replicate** can make a one-for-one copy just as **/Copy** does. **/Copy**

cannot replicate (make multiple copies). **/Copy** can, however, do something that **/Replicate** cannot do; it can copy a block.

DATA PROTECTION COMMANDS

/Protect

>Protect a cell, partial column, partial row, or block.

>Prompt: Enter Range.

>Protects cell contents and formatting from change. Data cannot be entered into, or edited into, a protected cell. **/Blank, /Format, /Copy, /Replicate,** and **Load** all bypass protected cells. That is, the commands will operate on surrounding cells but leave the protected cells unchanged. **/Delete** will not work if a protected cell is in the specified row or column.

>There is one exception: the **/Zap** command overrides protection.

>Examples:

>>**/Protect,c3(CR)**
>>**/Protect,c3:c9(CR)**
>>**/Protect, c3:g3(CR)**
>>**/Protect,c3:g9(CR)**

/Unprotect
>Removes protection from cell, partial row or block.

>Prompt: Enter Range

>Allows cell contents or format to be changed. (There is no error if you try to remove protection from something that is not protected).

>Examples:

>>**/Unprotect,c3(CR)**
>>**/Unprotect,c3:c9(CR)**
>>**/Unprotect,c3:g3(CR)**
>>**/Unprotect,c3:g9(CR)**

SAVE AND RESTORE COMMANDS

/Load

Load the worksheet contents and settings from a disk file. You may load all or part of a worksheet at a location you specify. Options give a choice of formula adjustment or loading values only.

Prompt: Enter File Name (or RETURN for directory)

Enter the name of the file, with the drive designatin if the disk is not on the system drive. The file name must have the extension ".CAL". This extension is assumed, and you do not have to enter it. Do not leave blank spaces in the file name.

For example:
SALESFEB(CR)
B:SALESFEB(CR)

If you reply A, the entire worksheet is loaded in its original location as it was when saved. The *load* is finished.

If you reply P, then further questions appear on the prompt line:
From? (Enter Range)

Specify the position of the saved worksheet that you wish to load.
To? (Enter Range) then Return or "," for options.

Enter the cell address at the upper left of your destination, which may be a new location for that portion of your worksheet. Press CR if you wish automatic adjustment of formulas for the new location; otherwise press "," for options. The options are: N(o Adjust), A(sk for Adjust); V(alues). See/Copy for an explanation of these options.

If there are protected cells in the destination area, they will remain unchanged.

Examples:
/Load,QUARTER3(CR)
/Load,B:QUARTER3(CR)

/Save

Save the worksheet contents and all settings on a disk file. Options give a choice of saving all contents or values only.

Prompt: Enter File Name (or RETURN for directory)

Enter the name you have chosen for saving your worksheet. Also enter the drive designation if you do not want to write it to the disk in the system drive. The SuperCalc program will automatically give the file the extension ".CAL". You do not need to enter it as part of the file name.

The next prompt is:

A(ll) or V(alues)

"A" specifies that all cell contents are to be saved; "V" that values will be saved without formulas. For either case, all of these are saved: format settings, global options, title locking, window splitting, and Active Cell location.

Note: If you specify the name of an existing file, the program will display the following prompt:

File already exists: C(hange name), B(ackup) or O(verwrite)?

Examples:

/Save,WORK5(CR)
/Save,B:WORK5(CR)

WORKSHEET DISPLAY COMMANDS

/Title

Lock columns, rows, or both into their place on the display window. Locked information will not scroll; other information on the screen can scroll. Title Lock uses the current row and columm.

Prompt: H(oriz.), V(ert), B(oth), or C(lear)?

H locks the current row and all rows above it.

V locks the current column and all columns to the left of it.

B locks both the current row and column and all rows above and columns to the left.

C removes the title lock.

A new title lock replaces a prior one.

/Window

Split the display window into two parts. Each portion can have separate format settings and options. Window uses the current row or column.

Prompt: H(oriz.), V(ert.), C(lear Split.), S(ynch.) or U(nsynch.)

H The screen is split horizontally, with the current row moving down to be replaced by a second border. The Active Cell moves up one cell in its column.

V The Screen is split vertically, with the current column moving right to be replaced by a second border. The Active Cell moves left one cell in its row.

Note: In both these cases, there is an alternate Active Cell in the original location. You can switch between the two Active Cells by pressing ";". They move independently.

C Clear the split screen. The portion that was above or to the left is the "primary" screen; it is now displayed in full.

S Synchronize scrolling in the two portions.

U Unsynchronize scrolling. The two portions will scroll independently.

Within the two portions of the screen, formatting and global options can be set independently. It is possible to show the same data with different formatting and options; for example, to show the same column as values and as formulas.

When the split is cleared, the options and formats for the primary screen remain. The primary screen is the portion above or to the left.

DATA DISPLAY/PRINTING COMMANDS

/Output

This command writes part or all of the worksheet to the printer, the terminal, or a disk text file. You can write out a partial column, partial row, or block. If you write the report to a disk file, you can use your system text editor to add further information or modify formats before printing or to include the SuperCalc report within other text.

The worksheet information can be written out in the way it is displayed or as the actual cell contents.

OTHER COMMANDS: GLOBAL OPTIONS, QUIT, ZAP

/Global

Set worksheet options.

Prompt: F(ormat), N(ext, B(order), T(ab), R(ow), C(ol.), M(an.), A(uto).

If you respond to the prompt by pressing **F**, The display window will show the formulas contained in the cells instead of the values that results from the formula calculatins. If formulas are currently being displayed, pressing **F** will cause the values to be displayed.

If you respond to the prompt by pressing **N**, "auto-advance" of the cursor will occur (in the "current direction") after the data is entered into a cell. If auto-advance of the cursor is already in effect, then pressing **N** causes no auto-advance of the cursor after the data is entered into a cell.

If you respond by pressing **B**, the display of the worksheet border will be supressed. If you already supressed the border display, then pressing **B** will restore the border

display. ("Border" refers to the column and row designations across the top and down the left side of your display window.)

Response of **T**, activates Tab mode. If SuperCalc was already in Tab mode then pressing **T** will deactivate the Tab mode. In Tab mode, advancing between cells skips all empty or protected cells. Therefore, a protected or an empty cell can never be selected as the active cell in this mode.

Options "R", "C", "M" and "A" concern recalculation.

R means recalculate by rows, from the top down. (Rows are recalculated left to right).

C means recalculate by columns, from the left across. (Columns are recalculated from top down.)

If you reply **A**, then recalculation is automatic. If you reply **M**, then recalculation is done on your request, whenever you press the **!** key.

/Quit

Exit from SuperCalc and return to the operating system.

Prompt: EXIT SuperCalc? Y(es) or N(o)

If you reply Y, you return to the operating system. If you reply N, you return to the SuperCalc program. Any other reply is ignored.

If you have work that could be lost when you *quit*, the SuperCalc program gives you a chance to save the work before exiting.

/Zap

Clears the contents and formatting from the entire worksheet.

Prompt: Entire Worksheet (Y(es) to clear everything, else N(o)

Zap clears the contents and formatting from the entire worksheet. All cells become empty. All format settings and modes of operation revert to their standard settings. Everything starts fresh, as if you had just started up the SuperCalc program.

Zap is the only command that can override protection of cells.

Remember, when you *zap* the worksheet, nothing remains.

Example:

        /Zap,Y
        /Zap,N

NOTES

SuperCalc Error Messages: Cause and Cure

This chapter provides you with a detailed description of the error messages that you may receive while using the SuperCalc program. They are discussed in alphabetical order. For each error message we have included a brief explanation of its cause and a procedure for correcting the situation that resulted in the error message.

Here is a list of errors considered:

BDOS Error,	Column Error,
Copy Definition Error,	Disk Full,
Drive Not Ready,	File Not on Disk,
Formula Error,	Memory Full,
Overlay Error,	Protected Entry,
Range Error,	Replicate Definition Error,
Window Parameter Error,	and Worksheet Full

Some of these errors come from your CP/M operating system rather than from the SuperCalc program. They are included here for your convenience.

CP/M uses a simple approach to handle errors:

a. If you want to retry the operation, press any key *except* CNTRL-C.

b. If you want to quit, press CNTRL-C. You will return to the CP/M operating system. You will have no chance to save your work in the Super-Calc program, because CP/M will not return you to the SuperCalc program.

For error messages READ ONLY or FILE R/C , there is no point in retrying the operation. The condition will not change.

Consult your CP/M system documentation for information about the BDOS error conditions. In addition to the CP/M documentation, you should select the documentation provided with your disk drives for information about recovering from disk-drive problems such as BAD SECTOR OR SELECT.

BDOS Error

This is an error message from the CP/M operating system. It will appear on your screen as "BDOS ERROR ON d:error". The d: stands for a drive designation, such as A or B; the actual designation will appear on your screen. The error in our example stands for the detailed error message that will appear on your screen. For example:

BAD SECTOR
SELECT
READ ONLY

FILE R/O

Column Error

Cause:

Incorrect specification of a column. Correct specification is a letter from A to Z or two letters from AA to BK.

To Correct:

Use the in-line editor to correct the entry and re-enter the command, or cancel the command with CNTRL-Z.

Disk Full

Cause:

The disk designated to receive the file does not have enough space. The SuperCalc program will ask if you want to re-do the operation (Y) or not (N). If you want to re-do the operation, remove the disk and insert another one, which has enough space, then press Y. If you press N, the operation is aborted, and you return to the SuperCalc program.

Drive Not Ready

This is a system error message from the BIOS portion of your CP/M operating system. To retry or cancel the operation, see the procedure given under BDOS ERROR above. It is possible that the drive will become ready and that retrying will work. If you retry several times without success, consult your disk-drive documentation for further information.

File Not On Disk

This occurs with the *load* command.

Cause:

The file name given is not found on the disk drive specified or implied in the entry.

To Correct:

Check your command entry.

1. Check the drive designation. If you did not specify one, the SuperCalc program assumes you mean the system drive.

2. Check the spelling of the file name.

3. Is the correct disk on the drive?

For cases 1 and 2, use the in-line editor to correct the drive designation or the file name and re-enter the command.

For case 3, either place the correct disk in the drive, or if this is not feasible, cancel the command with CNTRL—Z.

Formula Error

Cause:

There are two possible causes.

1. You entered text without a leading ". The SuperCalc program assumed that you intended to enter a formula, and it cannot make sense out of the entry as a formula.

2. There is some error in the way you specified a formula. Check it for correct specification of function name, correct use of expressions, balanced parentheses, valid cell names, etc. (See the section on "Formulas and Functions" in chapter 10, "Detailed Reference", for a list of all valid expression and function names.)

To Correct:

Use the in-line editor to correct your entry and re-enter, or cancel the entry with CNTRL-Z.

Memory Full

Cause:

Too much content in the worksheet. (This is a different case from Worksheet Full, described below, in which there are too many cell stubs on the worksheet.)

To Correct:

Blank any contents that you can spare. If you can, move material to the upper left of the worksheet, try-

ing to preserve a roughly rectanglar shape. Save the worksheet, *zap* the screen and reload the worksheet.

If this does not free enough space, then you must break the worksheet into convenient portions for future work. To do this, *zap* the screen and reload selected portions of the saved worksheet. Build two or more worksheets out of these portions, saving them as separate worksheets.

Overlay Error

This is a serious error that prevents the SuperCalc program from being used.

Cause:

There are two possible causes.

1 . The SuperCalc program has not been "installed" or has been "installed" incorrectly. Installing the SuperCalc program means customizing it to your computer system. This customizing involves specifying the terminal that you are using, the disk drives available, the memory space available, and the version of the CP/M operating system that you use.

2 . The version of the CP/M operating system that you are using is incompatible with the SuperCalc program. Your version of CP/M may be an early or outmoded one, or it may have been incorrectly installed.

To Correct:

1 . If you are installing the SuperCalc program yourself, re-install it, checking the installation documentation carefully as you proceed. If you still have the error, consult your dealer or Sorcim Corporation. If your dealer installed the Super-Calc program, have the dealer re-install it.

2 . Consult your dealer or Sorcim Corporation to determine if the CP/M system is incompatible. If this is the case, then contact the supplier of your CP/M system for information and assistance.

Protected Entry

Cause:

This message can appear as the result of an error, or it may appear as an informational note. If the message is the result of an error it will appear during data entry or the *edit* command. You are attempting to enter data into an Active Cell which is protected. You must either remove the data from the entry line or cancel the *edit* command.

To Correct:

If you wish to put data in that cell, *unprotect* the cell and re-do the operation.

1 . This message may appear as an informational note during a *blank, copy, load,* or *replicate* command. If there are protected cells in the area being blanked or in the destination area of the copy, load, or replicate command, the protected cells in the area remain unchanged; the other cells in the area have been changed. If you meant to leave the protected cells unchanged, all is well. If not, you may wish to unprotect them and re-do the command.

Range Error

Cause:

Incorrect specification of a range. A range may be a single cell, a partial column, or a partial row.

To Correct:

Use the in-line editor to correct the entry and re-enter the command, or cancel the command with CNTRL-Z.

Row Error

Cause:

Incorrect specification for a row. Correct specification is a number from 1 to 254.

To Correct:

Use the in-line editor to correct the entry and re-enter the command, or cancel the command with CNTRL-Z.

Replicate Definition Error

Cause:

The destination may be specified incorrectly, or the destination area may be too small.

1 . Specification error for the destinaton.
   a . If the source is a single cell, the destination should be specified as a partial column or partial row.
   b . If the source is a partial column, the destination should be specified as cells on the upper row of the destination. This will look like a partial row.
   c . If the source is a partial row, the destination should be specified as cells in the column on the left of the destination. This will look like a partial column.
2 . Destination area is too small (will not fit).

Given the size of the source and the location of the destination, the result will not fit within the worksheet boundaries.

To Correct:

Correct the specification using the in-line editor and re-enter the command, or cancel the command with CNTRL-Z. (Note: The SuperCalc program caught the error before attempting to execute the command.)

Window Parameter Error

This occurs during the window command.

Cause:

Attempting to split the screen with the *window* command when the Active Cell is at the left or right edge or the top or bottom row of the display screen. Because of the way that the command works, the split connot be made at the edges of the screen.

To Correct:

Either move the Active Cell away from the edge of the display window or scroll the screen to provide an additional column or row between the edge and the location you desire for the split.

Worksheet Full

Cause:

The worksheet is too large in size; there are too many cell stubs. (This is different from the case described above in Memory Full, where the worksheet has too much content.)

To Correct:

If you can, *blank* any unecessary contents and move the other contents to the upper left, trying to preserve a roughly rectangular shape. Then *save* the worksheet, *zap* the screen, and reload.

Appendix Three, *"Memory Use—Hints and Concepts"*, explains how it is possible to create unintentionally far more cell stubs than necessary. You may get a Worksheet Full message even though you have few contents and they are at the upper left. In such a case, saving the worksheet, zapping the screen, and reloading the worksheet will get rid of unnecessary cell stubs.

Part IV: Appendixes
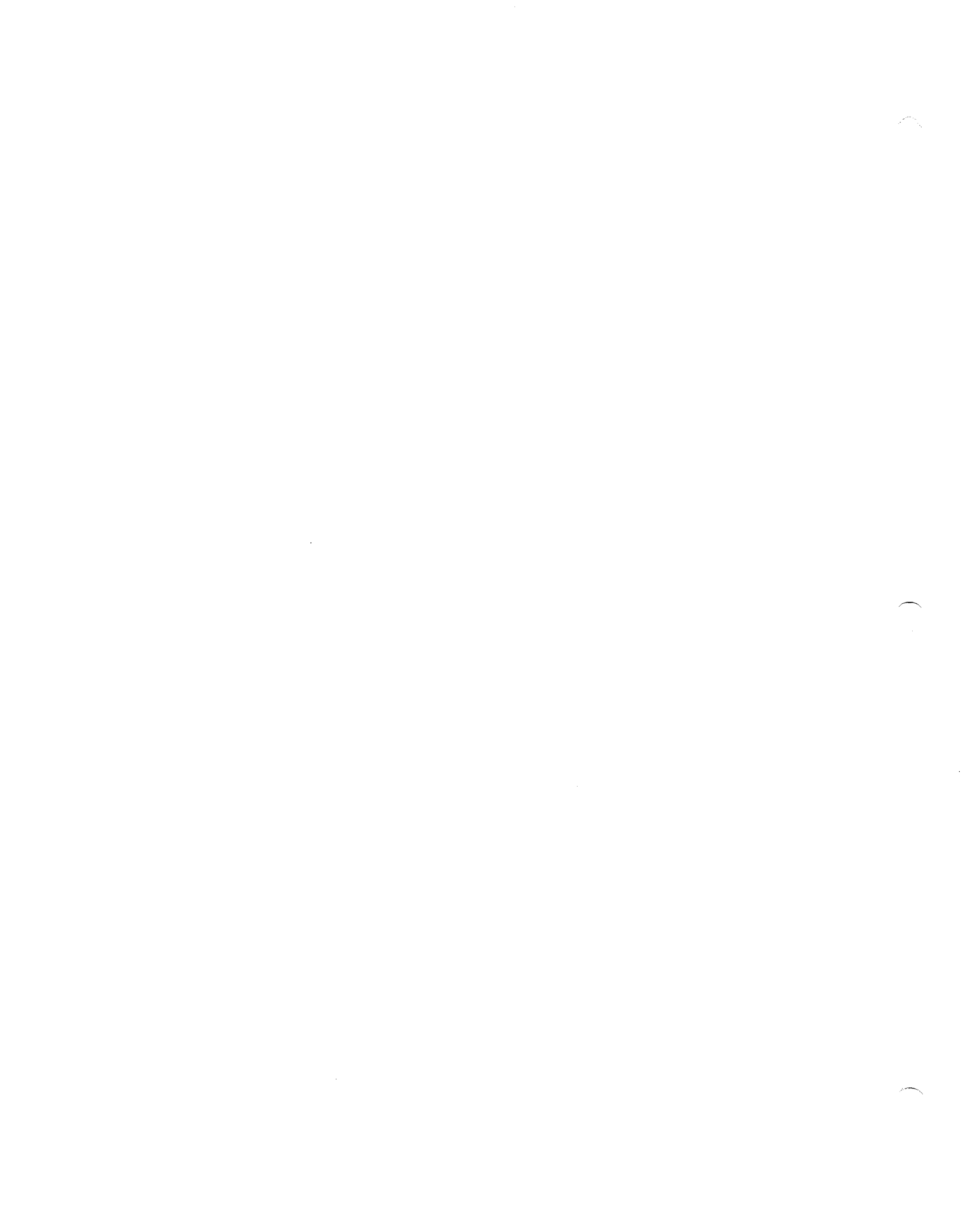
Appendix I

Standard or Default Settings

The SuperCalc program uses standard settings for display and formatting and standard modes of reference. These are also called *default* settings or modes. You can change these by choosing among available options described in the Reference Section. For convenience, here is a list of the standard settings and standard modes.

The following default settings can be changed by using the /F(ormat)command:

Column Width: 9

Numeric Display:
>Right-justified.
>Standard numeric format. (Cells that contain formulas will have their values displayed; if the number is too large to fit into the column, the number will be displayed in scientific notation.)

Text Display:
>Left-justified.

The following default settings can be changed by using the /G(lobal) command:

Border Display:
>Row numbers (1-254) and Column designations (A-BK) are always displayed. (When the screen is split, the Row numbers and Column designations are displayed for both windows.)

Calculation:
>Automatic calculation upon receiving new or altered data followed by a CR.

Order of Calculation:
>Calculation is performed by Rows, from left to right and top to bottom.

Numeric Display:
>Standard numeric display. (Cells that contain formulas will have their values displayed.)

Tab Mode:
>Tab mode is inactive. That is, the cursor advances to the next cell in the current cursor direction.

Automatic Cursor Advancing:
>Auto-advance mode is active. That is, the cursor will advance to the next cell in the *current cursor direction* after data entry followed by a CR.

Additional standard operations:
>When you execute a /Copy or /Replicate command, formulas with references to other cells are automatically adjusted to their new locations unless you choose one of the options provided for these commands.

Appendix II

Commands Involving Formula Adjustments

This appendix provides a list of commands that cause or allow formula adjustment. See Part Three, *"SuperCalc Reference,"* for specific information about formula adjustment and the individual commands.

/Delete, /Insert, and /Move all cause automatic formula adjustment. They have no options. Deleting a column or row that contains a cell upon which a formula outside the range of the deletion depends will cause an error.

/Copy and /Replicate allow formula adjustment. Adjustment is automatic, unless you specify otherwise by selecting one of the options. The options allow you to disable formula adjustment or to choose individually for each outside reference whether or not SuperCalc should adjust it.

/Load will adjust formulas if the material is being loaded into a worksheet location different from the one where it originated. In this case, you have the same options as in /Copy and /Replicate. (Naturally, there will be no adjustment if you are loading into the original worksheet area.)

Appendix III

Memory Use—Hints and Concepts

This appendix gives you some practical suggestions so that you can have the SuperCalc program use your system's memory efficiently. If you are interested in knowing the concepts behind the suggestions, we also provide you with a non-technical explanation. We will give you the practical suggestions first. If your interest stops there, feel free to skip the explanations. But you may find that knowing how SuperCalc uses your System's memory eliminates the need to memorize arbitrary rules.

Practical Suggestions

1. Keep your work in the upper left of the worksheet grid.

2. Keep your work in a rectangular shape. Try to avoid having long columns or rows projecting outside the basic shape.

3. Do not blank cells, protect cells, or format cells in the area below or to the right of the area that you actually need. Especially, do not put data below or to the right of the area you actually need.

4. When you have extra or interim work on the screen that you can get rid of, use the following procedure to free that space completely:

   a. Delete or blank the material you do not need.

   b. Move the rest of the work to the upper left of the grid, and adjust it as you wish it to display.

   c. Save your work.

   d. Zap the screen.

   e. Reload. You are now using the minimum space required for your worksheet.

Concepts

Two simple concepts underlie these suggestions: (1) the difference between an"empty" cell and a "blank" cell and a cell with contents; and (2) the concept SuperCalc uses in managing your system memory, the "memory use block." These concepts are explained below in a non-technical manner. Here and there, a few technical terms creep in—for example, "byte," the memory unit which holds one letter or digit. We will explain the few such words we use; we use them only to save you time and effort.

Blank Cells, Cells with Contents

When you start up SuperCalc, every cell in the work sheet is *empty*. Empty cells are merely potential locations that you can use. When you use a cell, Super-Calc allocates memory space on two levels:

1. A "stub" of two bytes. The stub is reserved for information about the cell itself—for example,

whether or not it is protected and what its format is. The system's memory retains this information even though you have blanked the cell's value or content.

2. The "contents" space, which varies in size according to the number of digits or letters you enter.

The SuperCalc program automatically creates cell stubs for any empty cells to the left and above the SuperCalc worksheet area where you are entering data. In additon to the cell stubs, it will reserve a minimum contents space for these cells, if you are entering contents below or to the right.

When you *blank* a cell, the contents portion is no longer needed. SuperCalc recycles the space so that it can be reused when needed for any general use. But the stub remains reserved for your use with that particular cell. SuperCalc assumes you will eventually re-use the cell.

In fact, if you blank a group of empty cells, Super-Calc sets up a stub for each cell. It gets ready to use those cells.

Protecting cells is always done in the stubs. If necessary, SuperCalc will create stubs. When you un-protect the cells, those stubs remain.

When you put data in a cell that was empty, both the stub and the contents are set up. At this point, you can format the cell or protect it without using any more memory space because the stub is available for that purpose. In fact, the stub already has the standard or default information about the cell, and when you format or protect the cell, you just change that information.

In short, formatting or protecting a non-empty cell is "free". No more space is required. But formatting or protecting an empty cell takes space.

The Memory Use Block

SuperCalc makes a basic assumption that you will start at the upper left corner of the worksheet grid and work your way to the right and down. This assumption follows from our habit of reading and writing from the left to the right, and from the top to the bottom.

As you fill in data on the worksheet, SuperCalc works behind the scenes, keeping track of your work in the system memory. SuperCalc sets up a "memory use block," which grows as you use it.

This block is a rectangle defined by cell A1 at the upper left of the worksheet and a cell diagonally opposite A1. This lower-right corner cell represents both the rightmost column and "deepest" row you have used. For example, you may have material in A2-A4, B2-B9, and D1-D5. The memory use block in this case is defined by cells A1 and D9.

Every cell in this block will have a stub, and even if it appears blank, it will have a minimum "contents" space.

Adding material to the right of the block sets a new maximum column. Adding material below the block sets a new maximum row. Adding new material to the right and below sets a new maximum column and row.

It is a good idea to keep your work in the upper left area of the worksheet and to keep it basically rectangular.

You might like to try this example of the memory use block. It is exaggerated but shows how the concept works.

Start with an empty worksheet. (Either load in SuperCalc fresh or **zap** the worksheet after saving anything you want to keep.) Make a note of the space available (shown as xxK on the alternate status line). The number stands for "kilobytes," which means 1024 bytes of space.

Remember that each cell stub uses tyo bytes. Therefore, one kilobyte will hold 512 stubs.

Use the = command to go to P32. This cell is 16 columns to the right of and 32 rows down from A1. If you use this cell, you will define a "use block" of 512 cells (16*32).

Now format the cell; for example, set its format to "/Format, entry, **$**.

You will see on the status line that you have one kilobyte less memory than you had before. What happened? By formatting that cell, you defined a memory use block that required one kilobyte of stubs.

Now enter the value in P32, such as **123**. Notice the increase in space required. You now have a minimal contents space reserved for each cell in the block.

Blank the block A1:P32. You release the minimal contents space but still have the stubs.

At this point, even if you delete column P or row 32, you will not regain space. The area from A1 to P32 now consists of cell stubs; all the other cells are empty.

Why should SuperCalc do such a thing? The reasoning is based on the assumption that you will find it convenient to work from the upper left (A1) to the lower right. Even though you started at P32, SuperCalc assumes that you just happened to start there and will be making use of the area to the left and above. It prepares that area for your use.

Here are some facts about the memory use block:

The block grows as needed. The lower right cell defines its limits and therefore its minimum size. Adding material to the right or below (or both) increases the block.

Adding contents within the block or blanking cells within the block will cause additional memory space to be used or released from use, but does not change the size of the block.

Remember that the display width of a column has nothing to do with its actual contents. A blank column takes the same space, whatever its display width is. Squeezing down the display of a column with contents does not save any actual memory space.

When you delete a column or row within the block, the portion of the column or row inside the block becomes blank cells. The portion to the right and below the block still consists of empty cells.

In some cases the memory use block will have an inside block at the upper left, in which each cell has a stub and a minimum contents space, and the rest of the block will have stubs only. The maximum row and column with actual contents define the inside block; the rest of the block is left over from delete operations or the blanking of outside columns and rows.

The only way to unburden the memory block of unnecessary blank columns and rows is to save and reload. Move your work to the upper left, deleting or blanking unnecessary material below and to the right. Save the worksheet, zap the screen, and reload. When the sheet is saved, SuperCalc considers that blank columns to the right of your work, and blank rows below, are empty. They are not saved.

Appendix IV

Here are some useful hints for using the SuperCalc program. Some of this material is covered elsewhere and is repeated briefly here for convenience. Some is unique to this appendix.

The material is divided into four general categories: Display, Building Worksheets, Security, and Memory Management.

Display

A Command, Text, or Formula Too Long for the Entry Line Information on the entry line will scroll left when it reaches the end of the line. You can enter a command, text, or a formula that is too long to display in its entirety. You can then use the in-line editor to examine any part of the entry by moving the cursor to the left or right. The information will scroll to show the hidden part of the line. When you want to enter the line, press **CR**. The SuperCalc program will take the entire entry, not just the portion to the left of the cursor.

Column Width Greater Than Screen Width

You may sometimes want to make the width of a column greater than the width of your screen. In such cases, you can scroll to see all of the display. If you have a printer with a wide carriage, you can use the *output* command to print the full width of the information. This can be useful for long text notes, explanations, or graphic display of numeric values.

To See the Same Information in Different Formats

The *window* command lets you look at the same information in different formats simultaneously. Split the single display window into two smaller windows. After you have split the screen, you can move one window so that it shows the same information as the other. Each part of the screen can have its own format settings for entries, rows, columns, or the entire worksheet. Each can have its own global options settings. By using this technique, you could display both values and formulas for the same cell contents.

When you set formats or global options for a split screen, remember that the portion above or to the left on your screen is "dominant". That is, when you cancel the split, the settings that were in effect for the upper or left window will remain in effect for the entire single display window.

Building Worksheets

Combining worksheet portions to build new worksheets the *save* command saves the entire worksheet, but the *load* command can load all or part of a wordsheet. It can place the part loaded at any worksheet location. This means that you can construct the nucleus of a new worksheet from parts of one or more existing worksheets.

When you have a fully developed worksheet with data, you can save it both with and without data. For example, you have developed a monthly report, which you *save*. Then you *blank* all the variable con-

tents of the report, which you save. Then you *blank* all the variable contents of the report and *save* only the information that will not change, such as titles, formatting, the general layout of the sheet, formulas, and any constant values. Next month you can *load* this file, fill in the new information, and *save* it as your current monthly report.

Using Protect To Build New Worksheets From Old

The *blank*, *copy*, *load*, and *replicate* commands all bypass protected cells, leaving their contents unchanged while changing surrounding cells. You can use this capability to combine information in detail, protecting key information and then surrounding it with new information by using *load*, *copy*, or *replicate*.

Summing a Partial Column or Partial Row

When developing a worksheet, you may often find yourself inserting new columns or rows within a range covered by a SUM formula. This can be awkward. Inserting or deleting at the top or bottom of an existing column or at the left or right of an existing row can mean redoing your formula. For example, you wish to insert a new row 12 and have to change the formula SUM(C2:C12) to SUM(C2:C13).

Here is a way to avoid this difficulty. Include a header or title at the top or left and an extra cell at the bottom or right within your sum. For a column, the extra cell could have "--------- as a total line.

For example:

```
            C
 1| January Receipts
 2|                35
 3|               405
    •
    •
    •
    •
 9|                38
10| _____
11| SUM(C1:C10)
```

As text, C1 and C10 have a zero value. Including them in the sum makes no difference. We can insert or delete rows from 2 through 9 and have the SUM formula automatically adjust to the new situation.

Security

Security includes protecting your work from accidental loss or change and protecting confidential information in your worksheet.

Save Your Work Often

It is important to save your work frequently while you are entering data or building worksheets. This practice insures you against losing the time and effort you have invested. It protects you against problems that are completely out of your control—such as power failures or hardware problems with your disk drive.

The Update option of the *save* command is a convenient way to do this. Every time you save your work, use the same name; for example, "TRIALBAL". The first time you save your work, it is stored on the disk as TRIALBAL.CAL. The second time you save it, the SuperCalc program will tell you that there is a file of that name (TRIALBAL) and ask what you want to do. If you choose the Update option, your new worksheet will be saved as TRIALBAL.CAL. and the earlier one will become TRIALBAL.BAK, your backup file. Whenever you use the Update option after that, the SuperCalc program will give you the two most recent files as filename.CAL and filename.BAK; it will erase any earlier files.

Having the backup file can be very convenient; you may want to go back to that file in case a change does not work out in actual operation. You can use CP/M operations to change your file names so that filename.BAK becomes filename.CAL. Or, you can directly *load* the file by giving its full name including the .BAK extension.

Protecting Your Worksheets

The CP/M operating system allows you to specify files or entire disks as "read only". Designating your worksheet files as Read Only allows others to examine them or print reports from them, but not change or erase them.

Protecting Information With "Values Only"

The SuperCalc option to save Values Only offers another protection. Your full worksheet may have important proprietary information within its formulas or lookup tables.

After you have saved a full copy for yourself, you can save a Values Only worksheet for others to use. In that worksheet, you may wish to remove lookup tables.

Similarly, you can use the *output* command to put a Values Only copy of selected portions of your worksheet on a disk file for others to use. They can print that file or use the system text editor to include it in their own text file.

Memory Management

Memory Hints

The memory hints are given in Appendix III, "Memory Use—Hints and Concepts". They can be summarized as follows: Keep your work in the upper left corner of your worksheet, and try to keep the pattern of your work in a rough rectangle or square.

Using a Full Column or Row in Blank, Protect, Unprotect

It is possible to specify a full column or row in the *blank*, *protect*, and *unprotect* commands. For example, /B, 3 will blank all cells in row 3. This can use a great deal of memory unnecessarily, as explained in Appendix III. /B, 3 CR—followed by /B, D CR—would fill the entire worksheet with cell stubs even if you had done nothing else.

If you do want to use the full column or full row version of these commands for convenience, be sure to keep an eye on your available memory space. (Check the status information.) When space gets low, *save* your worksheet, *zap* the screen to start fresh, and reload your worksheet. This elimimates unnecessary stubs.
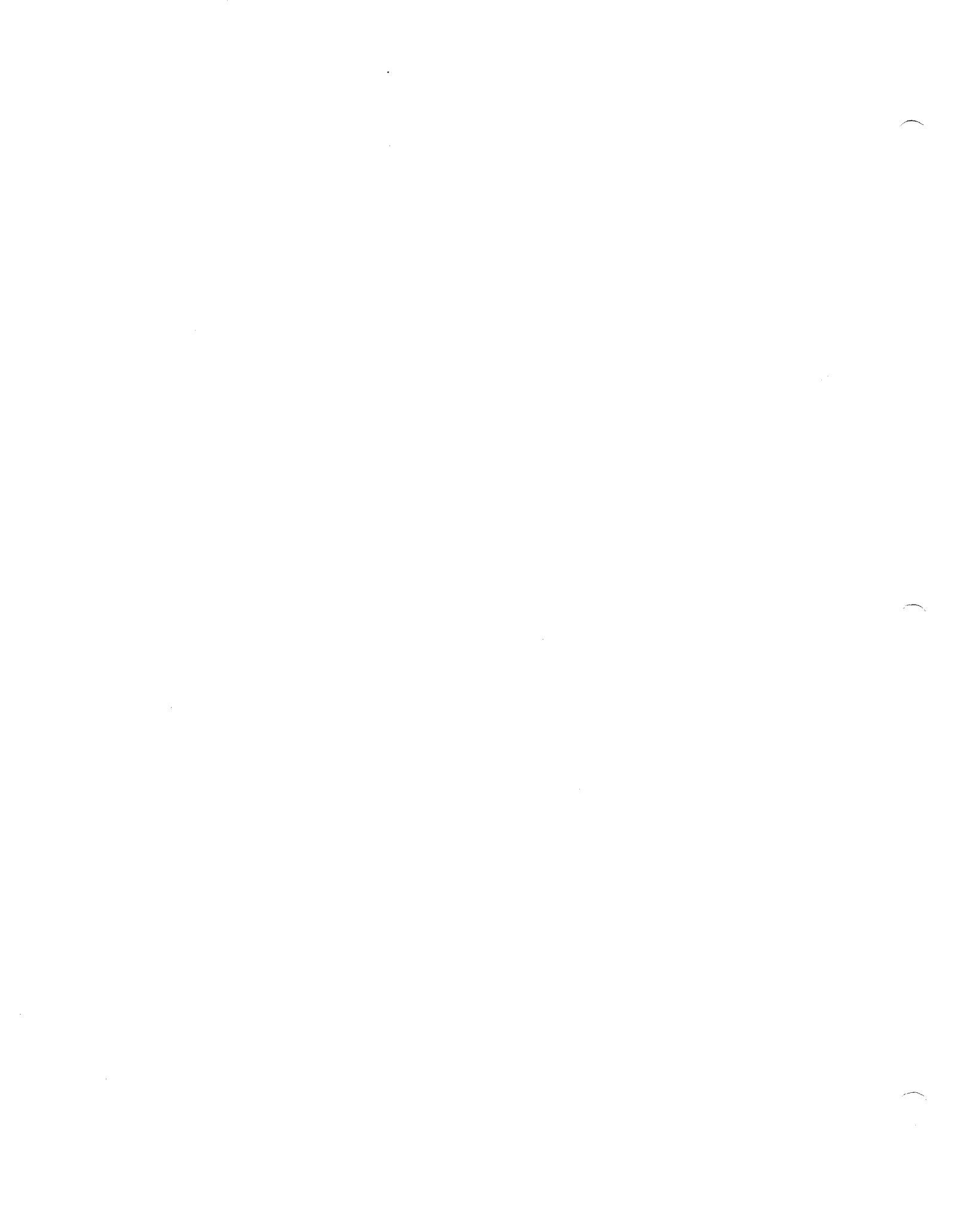
Appendix V

Taking Good Care of Your Floppy Disks

Disks cost only a few dollars each, but the information on them may be worth hundreds or thousands of dollars and a considerable investment of time. The information is safe if the disks are handled properly. But disks are fragile, and people sometimes mishandle them without intending any harm.

Here is a check list to help you keep your disks in top operating condition:

1 . Make copies of your important files. Keep backup files that are write-protected. (Chapter 5, "Getting Started," includes information about CP/M resources for copying and protecting files and disks.)

2 . Handle disks carefully. Do not bend them.

3 . Protect disks from grease, dust, and dirt. Never touch the exposed surface of the disk where it shows through the protective sleeve that surrounds it.

If a disk is not inside the drive,it should be inside a protective envelope. Better still, the disk and its envelope should be inside a box. A nonmetallic box is best for storing disks.

4 . Protect disks from magnetic fields. This means keeping your disks away from electrical equipment. Do not put disks on top of the drive or on the computer. Some screw drivers are magnetized; so, in general, keep screwdrivers away.

A ringing telephone can damage information on a disk. Do not have a phone near your disks or on top of the disk drive.

5 . Always start the disk drive before inserting disks. Always remove disks before turning off the drive. This is to protect them from surges of electrical power and to insure that the read/write head inside the drive moves smoothly into contact and out of contact with the surface of the rotating disk.

In case you forget these precautions, modern disk drives have some built-in safety factors that will usually prevent harm to your disk. But it is best to put safety first—Turning the drive on or off with a disk inside still subjects the disk to an unnecessary risk.

GLOSSARY

Active Cell

The cell on the worksheet that is currently "active" and can receive data; sometimes called **current cell**. It is indicated on your screen by the **worksheet cursor**. Data entered on the entry line goes into the Active Cell. The *edit* command edits the contents of the Active Cell. The location of the Active Cell determines the **current column** and **current row**. The **status line** shows the location of the Active Cell.

alternate diamond keys

Control (CNTRL) e, x, s, d. (Hold down the control key and simultaneously press one of these keys.) They have the same effect as **arrow keys**; that is, they can be used to move the **worksheet cursor** or for **in-line editing**. CNTRL e, x, s, and d are, respectively, equivalent to up, down, left, and right.

arrow keys

The four arrow keys—up, down, left, and right—have the basic function of moving the **worksheet cursor** around the **worksheet** displayed on your screen, thereby specifying the **Active Cell**. They have an additional function when doing **in-line editing**. There is another set of keys with the same functions as the arrow keys: the **alternate diamond keys**—Control e, x, s, and d.

blank cell

A cell without contents. But some minimal information about a blank cell is kept in memory, so it is not the same as an **empty cell**, which takes no memory space. Appendix III, "Memory Use—Hints and Concepts," explains this difference.

block

Rectangular group of cells, can be thought of as a group of **partial rows** or **partial columns**. A block is defined by its upper left and lower right cells; for example, B3:F5 is a block of fifteen cells, five across and three down.

byte

Storage space for one character; that is, a letter, digit, or special character such as $ and %.

cell

The basic unit of storage for the SuperCalc program. A cell can contain a number, text, or a formula. Cells are organized in a grid, called the **worksheet**. A cell is **empty** until it is used in some way. Empty cells take no storage space. See **worksheet**.

cell address

Each cell in the **worksheet** has a unique address: at the intersesction of its column and row. For example, the cell located where column G and row 12 intersect is cell G12.

column

All cells in a column, including empty cells and cells with contents. Columns are vertical. They are disignated with letters; for example, column D. Valid column addresses are A-BK. (See **worksheet**.)

current cell

The cell in the worksheet grid pointed to (highlighted) by the worksheet cursor; see **Active Cell**.

current-cell key:

(ESC) When this key is pressed, it places the **current cell** address on the entry line, to be used as desired in a command or expression. At the same time, pressing this key also activates the **arrow keys** for moving the **worksheet cursor**. If the worksheet cursor is moved, the current cell address on the entry line dynamically changes to show the new location.

current column

The column having the current or **Active Cell**.

current direction

The direction in which the **worksheet cursor** is set to move. For example, if the current direction is "down" when you enter something into cell B5, then B6 becomes the new **Active Cell**. If the direction is "right", C5 becomes the new Active Cell. The direction is specified as up, down, left, or right by pressing the corresponding **arrow** or **alternate diamond** key. The direction remains "set" until you change it by pressing a different arrow key.

current row

The row having the current or Active Cell.

cursor

A blinking box on your video screen, taking one character's space. Usually the cursor is seen on the entry line and shows where the next character that you type will go. When doing **in-line editing**, the cursor passes over characters, highlighting them. In that mode, the character under the cursor can be deleted, inserted, or replaced.

empty cell

When the SuperCalc program is started up, all cells are empty. An empty cell takes no memory space in your system. It is only a potential location, for you to use as needed. An empty cell is different from a **blank cell** because the SuperCalc program keeps some minimal information about blank cells. Appendix III, "Memory Use—Hints and Concepts," gives more information about this difference.

entry line

The bottom line on your terminal screen. It is indicated by **>** at the left margin. The entry line will display your commands and data as you interact with SuperCalc.

ESC key

See **current-cell** key.

global

Affecting the entire **worksheet**. Used in describing option; some options may have a local or neighborhood effect—one cell, one column, one row. Global options affect the entire worksheet. The SuperCalc program has both a **global** command and a global option within the **format** command.

help

You may press **?** at any time. The SuperCalc program will then change the display to show you more information about your current options. You can return to your worksheet by pressing any key.

integer

A whole number. It is also one of the display options. If you specify "integer" display format, the SuperCalc program will round off decimal fractions and display the nearest whole number.

interpretive prompting

You give commands to the SuperCalc program with one or two keystrokes. It immediately fills in the rest of the word. For example, you type **/B**; the SuperCalc program immediately fills in **/B**lank. And the **prompt** line changes to ask you to specify what should be blanked.

kilobyte

Storage space for 1024 characters; that is, for 1024 letters, digits, or special characters such as $ and %.

partial column

A contiguous group of cells within a column; for example, "B3:B7" designates five cells in column B. (See **column**.)

partial row

A contiguous group of cells within a row; for

example, "B3:F3 designates five cells in row 3. (see **row**.)

prompt, prompt line

The second of the three lines at the bottom of your terminal screen. This is where the SuperCalc program asks you what you want to do next. The line indicates your immediate options. You choose among them and put your response—command information or data—on the **entry line**.

row

All cells in a row, including empty cells and cells with contents. Rows are horizontal. They are designated with numbers; for example, row 3. Valid row addresses are 1-254. (See **worksheet**.)

status line

The first of three lines at the bottom of your screen is status line. The SuperCalc program uses it to keep you informed about your worksheet and its display. It includes such things as cursor advance direction and the actual content of the **Active Cell**—numeric value, formula, or text—which may look different on the worksheet display as a result of format choices you have made. Error messages are displayed at the right side of this line.

worksheet

The worksheet exists in your computer's memory. It is made up of **cells** organized in a grid. The grid has vertical **columns** and horizontal **rows**. There are 63 columns and 254 rows. Cells in the worksheet come into existence as they are used. Until then, they do not take up memory space in your computer; they are protential, not actual, cells.

worksheet cursor

The worksheet cursor indicates the **Active Cell** on your display screen. How the cell is indicated will vary according to your terminal. The cell may be underlined on the screen, put in reverse video, or indicated with **< >** . The location of the current cell also shows on the status line. The **arrow keys** move the worksheet cursor.