TRS-80®

Model 100 Portable Computer

USING MULTIPLAN™

10 9 8 7 6 5 4 3 2 1

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INTRODUCTION

Multiplan™ is an electronic worksheet — a large grid of entries, each of which can be words, titles, numbers, or formulas. But more, Multiplan can replace your pen and paper and your calculator because Multiplan can perform the calculations for you.

Multiplan frees you from the limitations of more traditional methods of calculation. Because Multiplan remembers relationships between entries on a worksheet, it can automatically perform calculations. This lets you test out plans by putting different values into your formulas. If one number changes, what is the effect on the worksheet?

For example:

What if costs rise 10% for one item and 6.5% for another?

What if production increases?

What if sales of one item skyrocket?

What if home utility bills soar?

Is it worth it to pay express freight to get a product early?

Is it worth it to give a discount to marginal buyers?

Simply alter a critical number and watch the figures change across your worksheet. You can run sensitivity analyses, do budget and resource planning, and schedule more efficiently. You'll soon find that Multiplan is a vast improvement over "hand calculating" methods.

Multiplan overcomes the limitations of paper worksheets. Multiplan offers you a worksheet 99 rows long and 63 columns wide. You can, as necessary, instantly insert or erase data, widen or shrink columns; thereby eliminating the costly and tiresome work of typing or hand printing the worksheet over and over. A Multiplan worksheet is always very flexible.

HOW TO PROCEED

An interactive program like Multiplan can be learned only by practice. It's important that you try, test, and experiment as you learn. Nothing you type can damage the computer or Multiplan, so don't hesitate to experiment.

The tutorial, *Using Multiplan*, introduces Multiplan in simple steps with many practical examples. It takes you step by step in creating a financial analysis of a model firm — Spencer Ceramics.

The sections, "Fundamentals" and "Building a Worksheet," help you become familiar with the keyboard and screen display and introduce you to the Multiplan typing aids.

"Entering Formulas" and "Naming Cells and Copying" lead you further into the use of Multiplan. When you complete these sections you'll have used some of the most important Multiplan commands and features.

"Copying Formulas and Options" introduces the finer points of the Multiplan screen display. After completing it, you'll be ready to print some samples of your work. "Printing a Worksheet" tells you how.

As you work through *Using Multiplan*, you'll find it helpful to refer to your reference manual, *Multiplan Reference Guide*. It begins with "Elements of Multiplan" which explains in depth the Multiplan worksheet, how to enter commands, how to edit, what formulas are, how access to files works, and what happens when the worksheet undergoes changes that move data.

The *Multiplan Reference Guide* also contains detailed descriptions of all Multiplan commands in "Command Directory"; of all mathematical and statistical functions in "Function Directory"; and of all messages Multiplan displays in "Message Directory."

At the end of the reference manual, you'll find appendices that contain additional information you'll find helpful. Appendix A, entitled "Helpful Hints," is the most important. These hints suggest ways to make your Multiplan sessions more efficient and effective; if you follow the hints, you'll save time and space.

Included also is the *Multiplan Quick Reference Guide*, which summarizes Multiplan for quick, easy reference.

Begin applying Multiplan to simple tasks, making frequent use of the reference manual. As you gain experience, use Multiplan for more complex tasks. You'll soon find that you have a firm grip on a powerful tool.

OPERATING INFORMATION

Multiplan works on any TRS-80 Model 100 Portable Computer with at least 16K of RAM.

To save your files to cassette, you need a cassette recorder, such as Radio Shack's CCR-81. You can save your files to diskette with the Model 100 Disk/Video Interface.

A printer is optional, but is convenient to obtain a hardcopy of your worksheets. Your Radio Shack dealer has a wide selection of printers from which to choose.

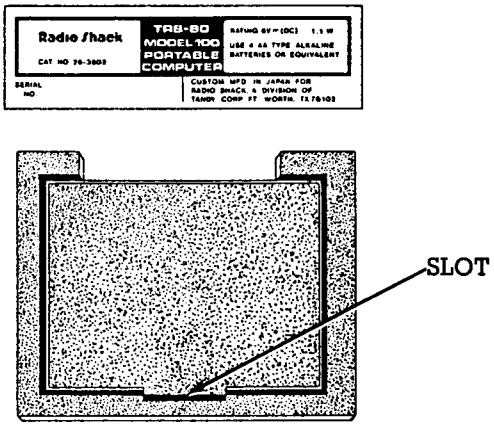
Installing Multiplan

The Multiplan program is stored on a ROM cartridge that you install in your Model 100. This means that the Multiplan program is always available for you to use and it doesn't consume any precious RAM space. All available RAM is left available for your Multiplan worksheets.

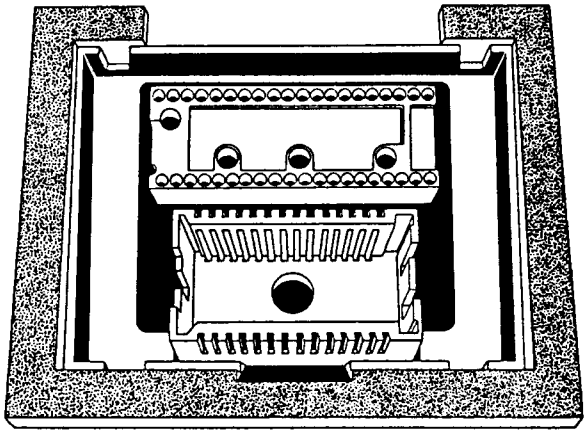
Before installing the Multiplan ROM in your Model 100, make sure your computer is turned off. (Use the power switch on the right side of the computer). If you are using the Model 100 Power Adapter, make sure it is unplugged.

1. Place your Model 100 face down on a flat surface such as a table.

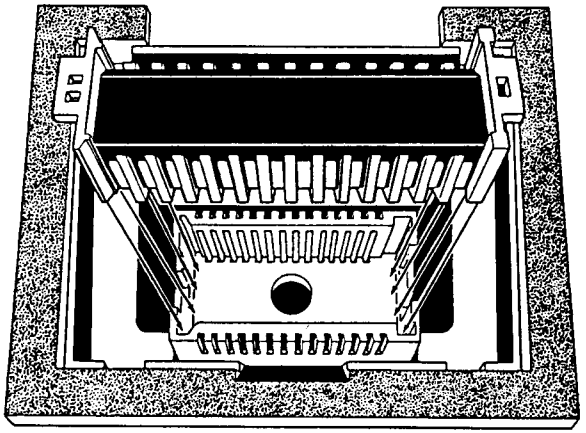
2. Locate the ROM Module Expansion Compartment using the illustration below. Open the compartment door by inserting a small coin (penny or nickel) in to the slot and pushing down on the coin.



3. There are two sockets in this compartment. Your Multiplan ROM plugs into the shorter socket.



4. Align the ends of the ROM as shown here:



5. Gently push the ROM into the socket. Don't force the ROM. If you have trouble, make sure you are aligning the ROM and the socket correctly.

6. Close the compartment door and turn your Model 100 over.

7. Turn on the Model 100. If MSPLAN does not appear on the directory, do the following:

   Position the cursor over BASIC and press (ENTER). At BASIC's prompt (OK), type the following:

   ```
   10 CALL 63012 (ENTER)
   SAVE"MP" (ENTER)
   ```

   This creates a file called "MP.BA" that starts up Multiplan. Press (F8) to return to the directory.

Filenames

Files, like files of paper documents, are collections of information. This information may be data (numbers, text, formulas, and so on), computer programs, or a combination of the two.

You will be using the Multiplan program and any number of Multiplan worksheet files that you create yourself. Worksheet files are a permanent record of the information that you enter into the worksheet.

Your worksheet files can be stored on cassette, diskette or in your Model 100's random access memory (RAM). Because there may be many files on each cassette, diskette or in memory, files are identified by filenames or pathnames. This makes it easy for you to find specific information.

When using SYLK format files (RAM files), the default extension is *.DO*. SYLK files can be viewed and edited by using TEXT (your Model 100's text editor) or transferred to other computers by TELCOM (your Model 100's communication program). SYmbolic LinK format is described in Appendix D.

Sample Filenames

Below are some sample filenames:

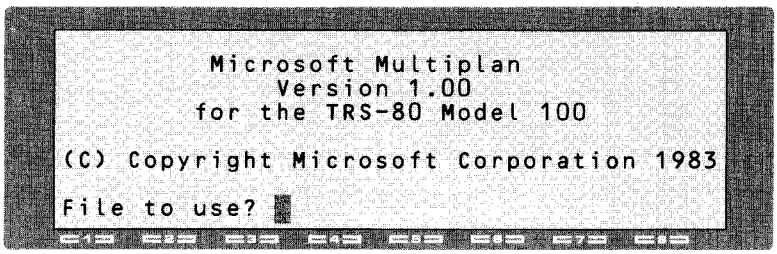
OCTSLS	PROPSL
BUDGET	MPWK20
TEST	HOME

If the file was saved using Normal Mode, the file would have the extension *.CO*; otherwise the extension *.DO* is used.

Starting Up Multiplan

Follow these steps to start up Multiplan:

1. Turn on your Model 100.
2. Position the cursor over the file MP.BA or MSPLAN and press (ENTER). The screen shows:



You can now enter a filename.

If you want to load a worksheet that already exists, you can enter the name at this point. An easier way, however is at the directory, position the cursor over the filename you want to load and press (ENTER). Multiplan starts up and automatically loads that file.

Note: If you plan to use a cassette recorder, you should use the SOUND OFF command from BASIC before running Multiplan.

Backing Up Your Multiplan Files

It is strongly suggested that you periodically store your Multiplan files currently in RAM out to cassette or disk as backups. This prevents the loss of valuable data due to low batteries, or some other unexpected problem. See Transfer Save in the *Multiplan Reference Guide* for instructions on saving Multiplan files to cassette/disk.

Since your Multiplan program is permanently stored in its ROM, there is no need to make a backup of it.

FUNDAMENTALS OF MULTIPLAN

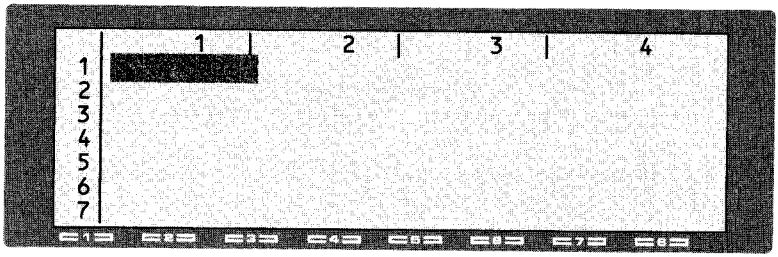
In this chapter, you will learn the fundamentals necessary to effectively use Multiplan. You will also learn about the special keys often used in Multiplan.

The Screen

To work with Multiplan, your Multiplan ROM must be installed. Refer to the "Operating Information" section at the beginning of this manual for specific information about "Installing Multiplan."

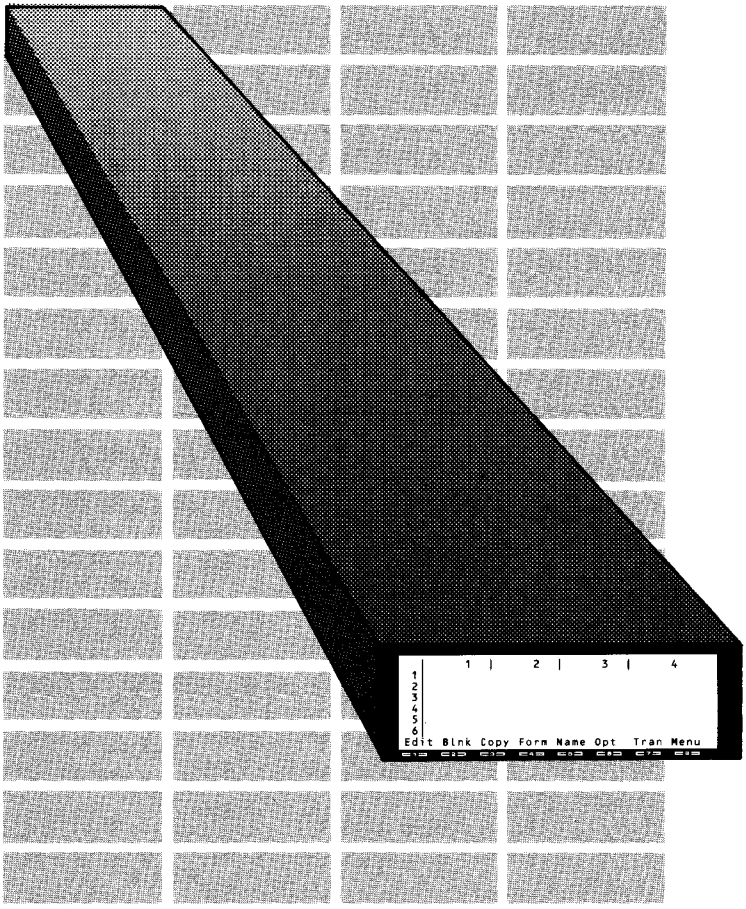
Start up Multiplan by positioning the cursor over MP.BA or MSPLAN and pressing (ENTER). When prompted to enter a filename, enter "SPENCE" for Spencer, a worksheet we will create in the next chapter.

When Multiplan is loaded and ready, your screen shows the following display:



What you see now is the basic Multiplan screen. Notice the row and column numbers.

Your screen displays only a small portion of the actual worksheet available to you. You can imagine the screen as a window to your worksheet:



Columns are numbered across the top. The illustrated screen now shows you 4 of the 63 worksheet columns.

Rows are numbered down the left side of the display. The illustrated screen now shows you 7 of the 99 worksheet rows.

Imagine lines running vertically between the column numbers and horizontally between the row numbers to form boxes on the worksheet. Each box is called a "cell." Cells hold the values of the worksheet.

The cell that is available for immediate use, the active cell, is illuminated by the cell pointer. The cell pointer is currently in the upper left corner of the display; in row 1, column 1.

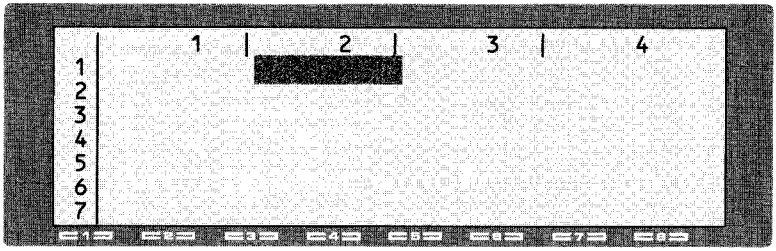
A cell is identified by its location; the row number is always given first. Cell "row 1, column 1" (R1C1) is the active cell now.

The Direction Keys

Locate the direction keys (←, →, ↑, ↓) on your Model 100 keyboard. These keys are used to move the cell pointer around the worksheet (and for other functions you will learn about later).

Moving the Cell Pointer

Press the → key once. Now look at the cell pointer. You moved it one cell to the right, to column 2. The pointer is now in row 1, column 2 (R1C2). That cell is now the active cell.



Try the other direction keys. Watch how the cell pointer moves.

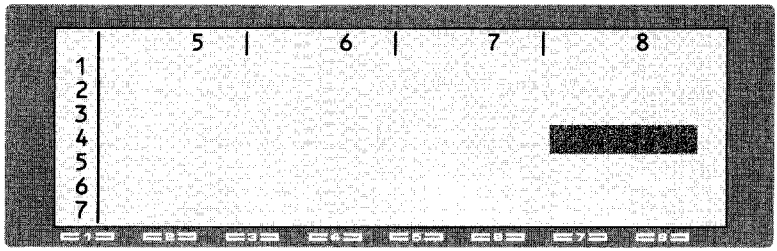
Try to move the cell pointer to row 4, column 4 (R4C4). You can press the direction keys in any order you want.

Scrolling the Worksheet

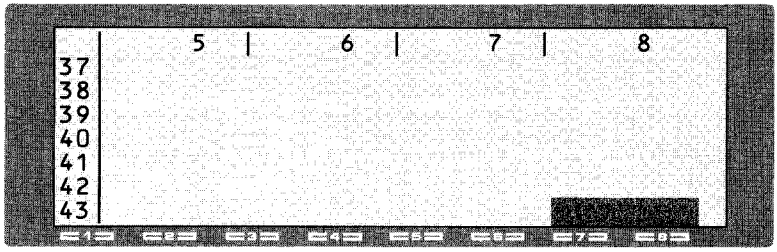
The illustrated screen shows you only 4 columns. What if you want to see column 8? Press the → key until the cell pointer reaches the right edge of the display.

As you continue to press the → key, the pointer remains still, but the columns move to the left above it. (Look at the column numbers as you move the pointer.) This is called scrolling.

Press the → key until you reach column 8. (Columns 1 through 4 are no longer visible on the left.) You are now in row 4, column 8 (R4C8).



Now press the ↓ key until the cell pointer reaches row 43. You are now in row 43, column 8 (R43C8).



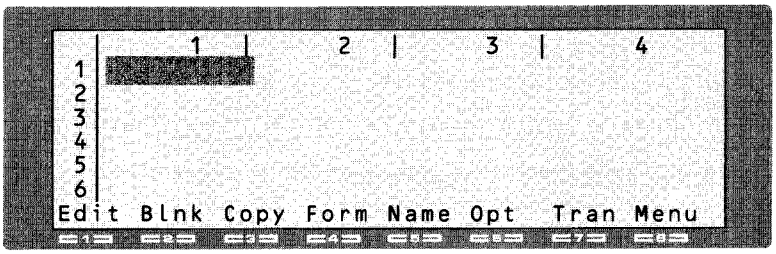
Notice that during all of these movements, the cell pointer always stays on the screen. When the cell pointer reaches the edge of the display, the row numbers or the column numbers scroll across the screen. You can visualize this as sliding the window around the worksheet.

You could return to the upper left corner of the worksheet (R1C1) by pressing the ↑ and ↑ keys until the cell pointer arrives there. But, there is another, faster way to move the cell pointer to R1C1.

Press CTRL ↑. (Hold down the CTRL key while pressing ↑). The pointer returns in one movement to R1C1! This is called the "HOME" cell; therefore CTRL ↑ is known as the "HOME KEY."

The LABEL Key

The LABEL key prints the command line on the last line of the display. Press the LABEL key once. The display shows:



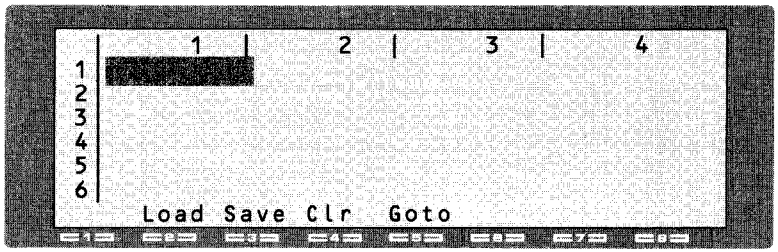
Notice that there is one command for each function key. For example, the F1 key is the Edit command, F2 is the Blank command, and F3 is the Copy command.

If you do not want the command line displayed, press the LABEL key again and the bottom line of the worksheet reappears.

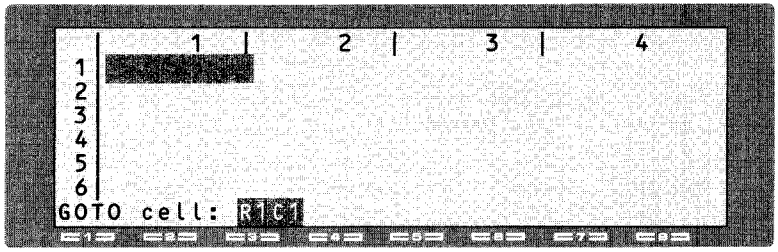
To make the rest of this manual easier to follow, all illustrations of the Multiplan display show the command line.

The Goto Command

There is a way that is faster than using the direction keys to reach a cell on a different part of the worksheet. Press F7 (Transfer). You see the following options:



Now select the Goto command by pressing F5. At the bottom of the screen (replacing the command line), you should see the prompt:



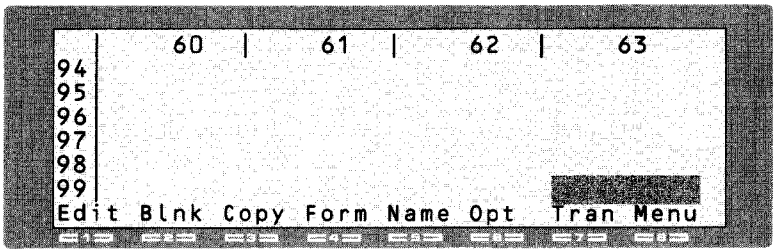
Notice that a response is given in the shaded command field. When you first select a command, Multiplan proposes responses in the command fields; these responses are called "proposed responses."

Multiplan derives proposed responses from various aspects of the worksheet and your previous responses in command fields. In this case, the proposed responses in the command field are based on the current position of the cell pointer.

To enter a cell number, use the same form as shown. For this example enter the number of the last cell on the worksheet: Row 99, Column 63. Type:

R99C63 (ENTER)

Your screen shows:



What if you change your mind? You have moved a different part of the worksheet into the screen by using the Goto command. Use this command to move quickly to any part of the worksheet.

Suppose you decide you want row 65 instead of row 99 and column 3 instead of 63. Press (F7) then (F5) again. When the "GOTO cell" prompt appears, enter "R65C3." Press (ENTER) to carry out the command. The cell pointer is now on row 65, column 3.

Command Selection from Menus

All Multiplan commands are selected in the same way as the Goto command: by selecting the function key that represents that command.

If you press a function key that does not represent a command, you will hear a beep telling you that the operation is illegal. You can turn off the "beep" option by pressing (F6) for Options, then pressing (F7) for Mute and press (ENTER).

If you press the wrong function key, press (BREAK) ((SHIFT)(PAUSE)) to clear the command line. You can also use (CTRL)(C) instead of break. Both of these keys can help you regain control of the system if you accidently press the wrong key.

The lists of commands (or subcommands) are called menus. In fact, any time you see choices on the command line, that's a menu. You can select an option from a menu by selecting the function key for that option.

Multiplan Proposed Responses

When the command line shows fields (such as "Goto cell"), each field shows a proposed response. In some fields the proposed response is a blank. In other fields a proposed response is given which looks like a typed-in response. In fields that have a menu of possible responses, the proposed response is shown by the highlight (when the command line cursor is in that field).

Proposed responses often reflect the current settings and positions. If you agree with the proposed response, merely press (ENTER) to carry out the command. If you do not want the proposed response, you can change the command field to the response you want.

When you are selecting a command or subcommand, the first choice shown is highlighted. This is also called a proposed response. If you agree with the proposed response, merely press [ENTER]. Or, press a different "F" key to select another choice. The command line changes to display your choice.

Filling in the Command Line: The [TAB] Key

The command line may be divided into fields. The command line cursor shows you the active field (available for immediate use).

You can move the edit cursor from field to field by the [TAB] key. The edit cursor returns to the first field after the last field has been reached.

Canceling a Command: The [BREAK] Key

At any time before you press [ENTER] to carry out a command, you may press the [BREAK] key to cancel the command. (The [BREAK] key is [SHIFT][PAUSE] on your Model 100.) When you press the [BREAK] key, the main command menu reappears and the worksheet appears as it did before you began the command.

The Quit Command

In your next Multiplan lesson, you will learn how to place information on the worksheet. To leave Multiplan now, however, use the Quit command. Press (F8). Your screen shows your Model 100's main menu with one new file: 'SPENCE.CO."

If you had entered any information on your worksheet, Multiplan would have automatically stored it before exiting.

BUILDING A WORKSHEET

In "Fundamentals of Multiplan," you learned how to start Multiplan and how the rows and columns are used to identify the cells of the worksheet.

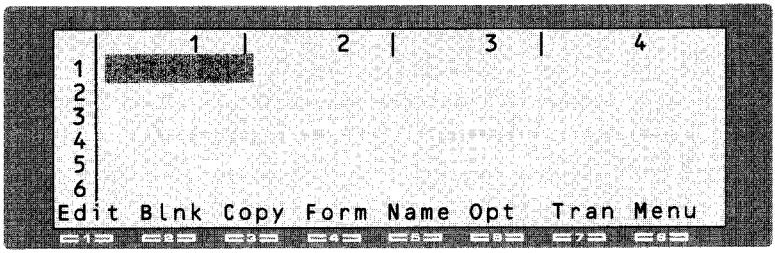
You also learned how to move the cell pointer to different parts of the worksheet by using the direction keys, and how to move the pointer quickly by using the Goto command.

In this session you will begin to build a worksheet. You will learn how to change cell entries and correct mistakes as you go along. You will also begin to work on a financial analysis for a model company — Spencer Ceramics.

A large industrial firm is considering buying Spencer Ceramics and has requested a projected income statement; the firm has asked you for a summary of operating budget, showing projected sales, costs, and gross profits. If, on the basis of this information, Spencer Ceramics looks like a good investment, the firm will send in its own accountants to do a more detailed survey.

The Worksheet Number Grid

Start up Multiplan by positioning the Model 100 cursor over the file "SPENCE.CO" that you created in "Fundamentals of Multiplan" and pressing (ENTER). After Multiplan starts up and loads "SPENCE.CO", it displays the row and column numbers. Press the (LABEL) key and the command line appears.



The row and column numbers are merely guides for entering data. The command line is there only to help you enter the data on the worksheet and does not appear on the final printed form.

To plan what needs to be done in your analysis of Spencer Ceramics, let's sketch a brief outline with pencil and paper, showing how the table will be set up.

Spencer Ceramics
Projected Income Statement
Periods per year = 12

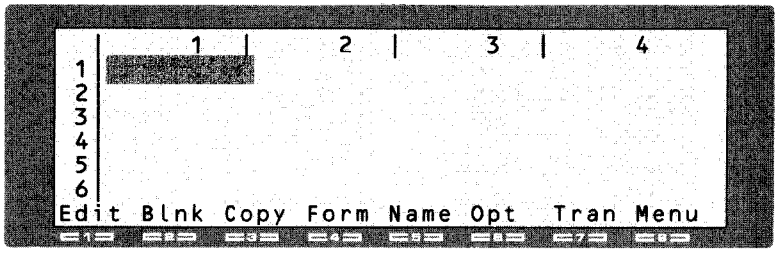
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Sum
Sales														
Cost														
Profit														

With Multiplan, it is easy to expand the worksheet later to add more items, to insert rows or columns of space, or to delete unwanted items. It is even easy to change a figure, such as January sales; Multiplan recalculates the entire table automatically.

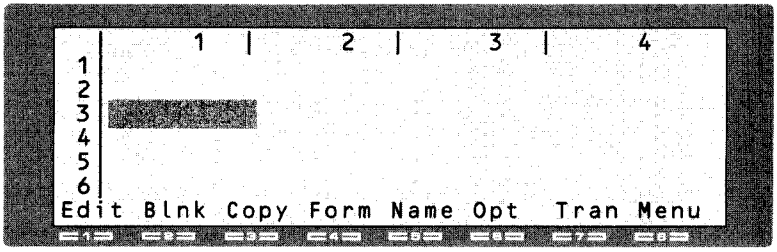
To prepare the worksheet for Spencer Ceramics, begin by entering the headings for the rows and columns. You can add a title to the sheet later.

Text and numbers are entered the same way. Simply position the cell pointer on the cell you want to enter data into (numbers or text) and begin typing.

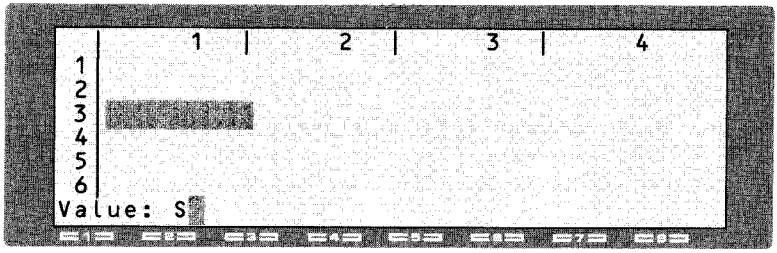
Look at the cell pointer on your screen. It should be in row 1, column 1 (R1C1). If it is not, use the direction keys or the HOME key (CTRL ↑) to place it there.



Since you will later need some room at the top of your table for the names of the months, move the cell pointer down two rows. The pointer is now in row 3, column 1 (R3C1).

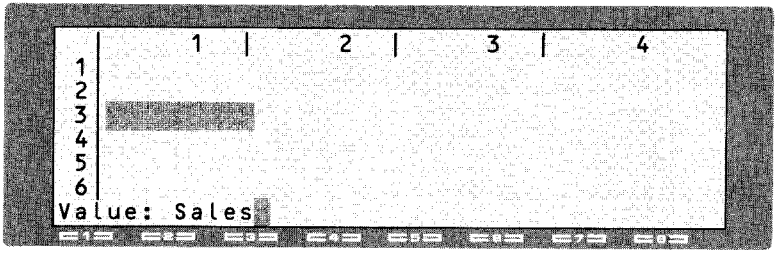


The first entry you will make is *Sales*. Type the *S* of *Sales*. The screen shows:



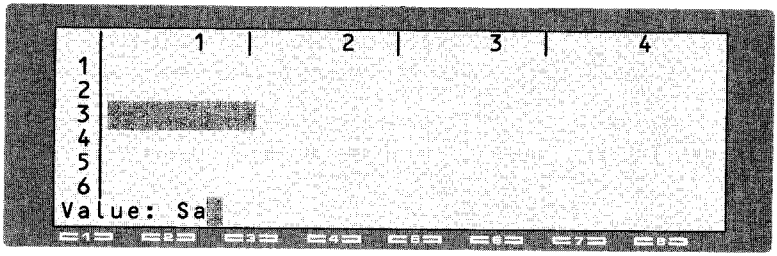
The "Value" prompt indicates that Multiplan is storing the text you are entering.

Finish typing the word *Sales*. Now you see:

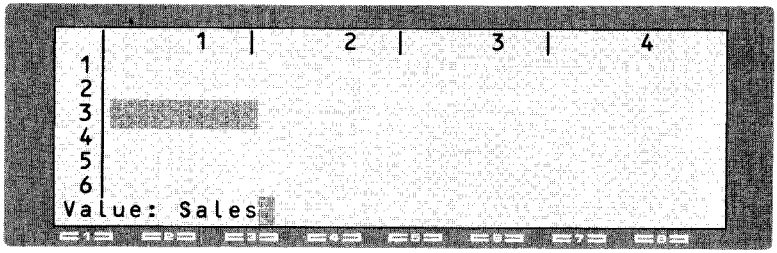


Correcting Typing Errors: The BACKSPACE Key

The edit cursor is located immediately after the text you have typed. Before you press ENTER to enter the text in the cell, try editing the word *Sales* by using the BACKSPACE key. Press BACKSPACE three times. You see that the edit cursor deletes the character to its left as it moves. You now have:



Now retype the word *Sales* once again, so that the screen looks like:



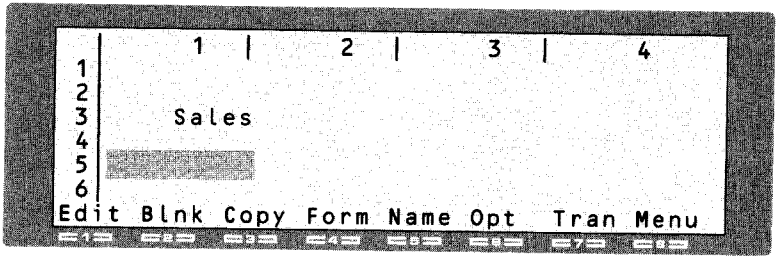
Entering Data with the Direction Keys

Now that the word *Sales* is correct, you can enter it into the cell in two ways:

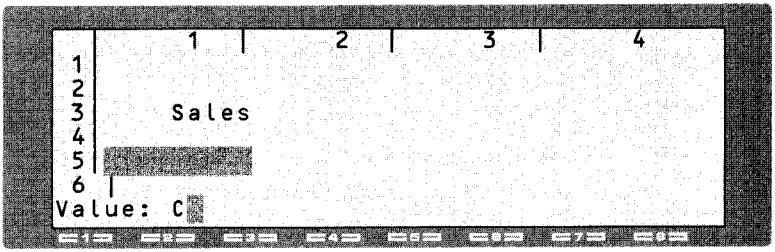
1. You could first press (ENTER), and *Sales* would appear in the cell R3C1. Try it to see. You now need to press a direction key to move the pointer to the next cell. Before you press a direction key, consider the second way to enter data.

2. A faster way to enter text is to press the ↓ direction key (instead of (ENTER)), moving the pointer to the next cell in which you want to work. *Sales* is entered automatically. Try it. Type *Sales* again. Now press the ↓ key. Sales reappears in cell R3C1, and the cell pointer moves down to R4C1. (You may, of course, use any direction key; your choice depends on the cell you want to use next.)

   To enter *Cost*, move the cell pointer down to row 5 in column 1 (R5C1).

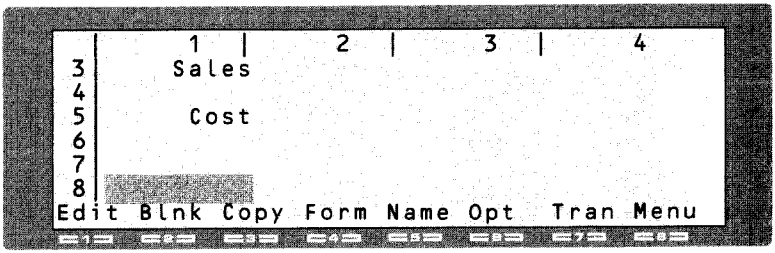


Multiplan is waiting for your next instruction. Tell it that you want to enter more text by beginning to type *Cost*. As soon as you press *C*, the command line changes to show the prompt:



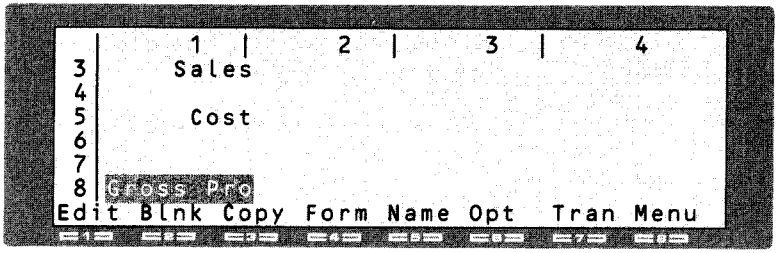
Finish typing *Cost*.

To enter *Cost* in row 5, column 1 (R5C1), press the ↵ key. Continue to press the ↵ key until the screen looks like this:



Notice that row 1 and row 2 scrolled off the screen. Your screen now shows rows 3 - 8.

Now enter *Gross Profits* in cell R8C1 (your current position) and press ENTER.



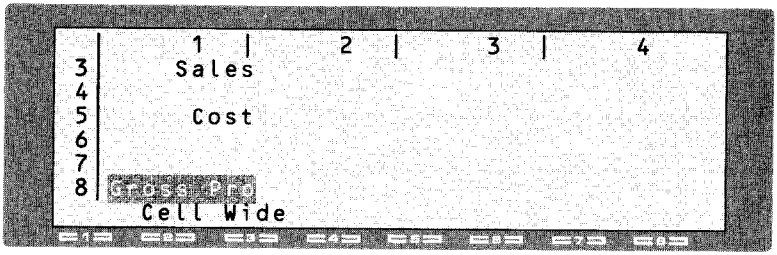
Column Width

Look at row 8, column 1. You can see that the column is not wide enough to accommodate all the characters in *Gross Profits*. Multiplan has not lost any of the information you have entered. It displays as much of it as it can in the space it has. If you give it more space, it will display the remainder of the characters.

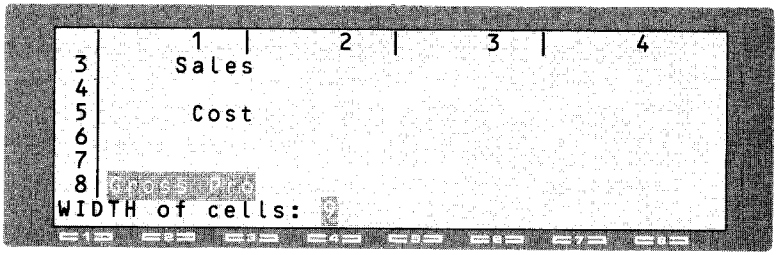
When you started Multiplan, the column width was set at nine characters. Column width is easily changed using the Format Width command.

The Format Width Command

Press the F4 key to select the Format command. On the command line you see:

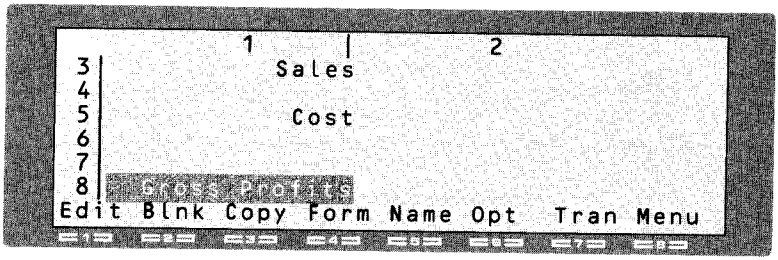


At this point you need the Format Width subcommand. The other subcommand will be explained later. For now, however, press F3 for Width. The screen shows:



The 9 shown in the response field is Multiplan's proposed response based on the current setting. Since a width of 9 characters is not wide enough to show your heading completely, choose the width you will need. *Gross Profits* has 13 characters (12 letters and 1 space). Select 15 characters of width to give yourself enough room. Type 15 and press ENTER.

Now you see:



Gross Profits may now be seen fully in column 1 because that column has been widened. Note that Multiplan automatically widens *all* columns. You cannot widen a single column with Multiplan.

Your sheet is now ready for the first numbers.

Entering Numbers

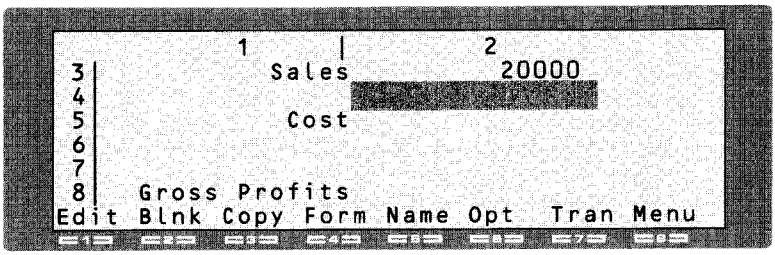
The sales figures for Spencer Ceramics show that the average amount of monthly sales last year was $20,000.

Move the cell pointer to row 3, column 2 (R3C2) opposite *Sales*. Type *20000*.

> **Note:** Do not use commas (20,000) or spaces (20 000) when entering numbers.

Do not type the $ now. Fill in all the figures first. You'll learn how to change them to dollars later.

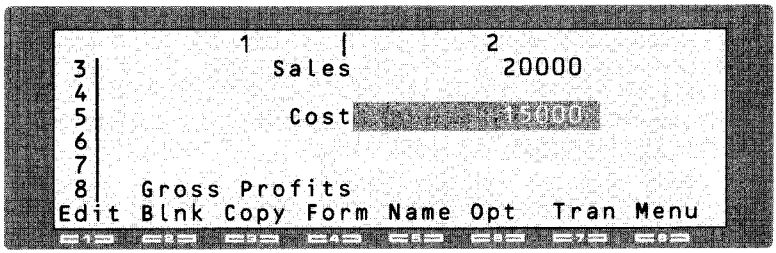
Press the ↓ key. Now you have:



Spencer Ceramics' costs were $15,000 per month. Enter *15000* in row 5, column 2, like this:

1. Move the pointer to the desired cell (row 5, column 2).
2. Type *15000*.
3. Press ENTER to enter the number in the cell.

   Now your screen should look like this:

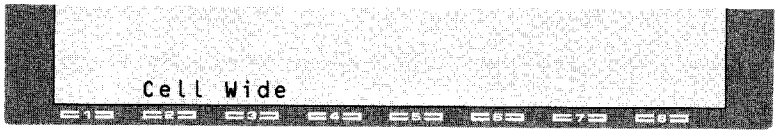


Since all the figures you are working with on this project have to do with finances, you may decide that it would be better to have all the numbers displayed as dollars. It's easy to make the change.

The Format Cells Command

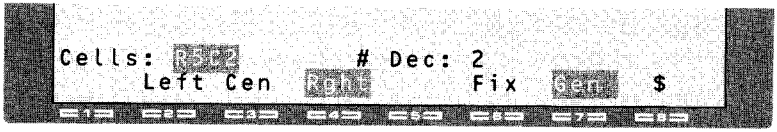
Multiplan offers a wide selection of formats in which cell entries may be displayed. The command used for this purpose is Format.

Press (F4). The command line shows:



This time you want to change the format of all cells, so choose Cells ((F2)).

The command line shows:



The top command line asks which cells are affected and the number of digits there are to be after a decimal point. You must type these answers. The second line selects the alignment and format setting.

Begin by filling in the "Cells" prompt. Since we will be using only up to Row 15 and Column 15 for this example, type:

R1C1:R15C15

DO NOT press (ENTER). This tells Multiplan to format from Row 1, Column 1 through Row 15, Column 15.

Now, press (TAB). This positions the pointer to the *# Dec* prompt. You should now enter the number of digits you want to appear after the decimal point. Multiplan suggests "2." Since this is appropriate, you don't need to enter anything.

Now you need to select the alignment.

Alignment

Alignment means where text and numbers are placed in a cell; flush with the left edge, flush with the right edge, or centered.

The "alignment" field offers you these choices:

Settings	Examples	Effect
Ctr	Sales $1000.25 $50.25	text and numbers centered
Left	Sales $1,000.25 $50.25	text and numbers flush left
Right	Sales $1000.25 $50.25	text and numbers flush right

Any alignment choice that sets the numbers to the right would be acceptable because you want the decimal points to be in line with each other. Therefore, you would choose Right.

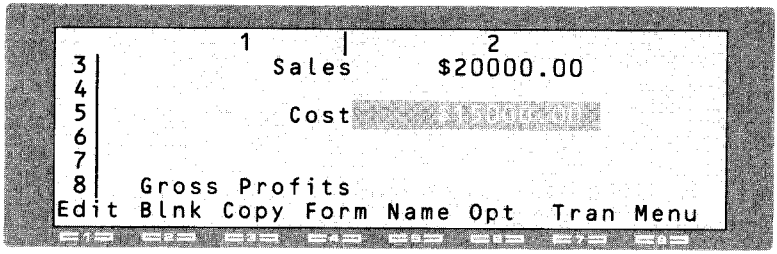
Formats

The second choice you must make is the format. At this point, you know you want the format code for dollars. Some of the other choices are specialized. The following chart gives a brief summary of these formats.

Settings	Meanings	Examples
Fix	Fixed Point	4.513
Gen	General	text and numbers shown in standard format
$	Dollars	$20000.00 ($150.00)

Choose the dollar format instead of the proposed response by pressing (F8).

As soon as you have made certain that all your choices are correct, press (ENTER) to carry out your choices.



You have made three choices in the Format command:

1. You selected Format Cells and specified certain cells.
2. You selected the proposed alignment of the contents of the cells.
3. You selected the display format for dollars ($).

   Note: You can change the way numbers are displayed any time you like without changing their values. For example, you could show the same value as 3 or $3.00 depending on the format setting you select.

You have learned about formatting in this session, and you will learn more in the next chapter. You will also use a more detailed breakdown of costs to make a more comprehensive forecast for Spencer Ceramics.

Quitting Multiplan: Saving Your Worksheet

When you exit Multiplan by pressing F8, your worksheet is automatically saved to RAM. Press F8 to exit Multiplan.

ENTERING FORMULAS

In the last session you learned to put text and numbers into cells by pointing to them with the cell pointer, typing the information, then entering it into the cell by pressing either (ENTER) or one of the direction keys.

You also learned to use the Format command to display numbers in dollar format.

When you ended the session, your file was automatically saved to a file in RAM called SPENCE.

In this session you will get more practice in entering words and numbers and in formatting cells. Most important, you will learn to enter formulas.

Starting Up (Review)

Turn on your Model 100. Position the cursor over the "SPENCE.CO" file and press (ENTER). Multiplan starts up and automatically loads that file. Notice that your cell pointer is in the same position as when you closed the file. Press the (LABEL) key to display the command line.

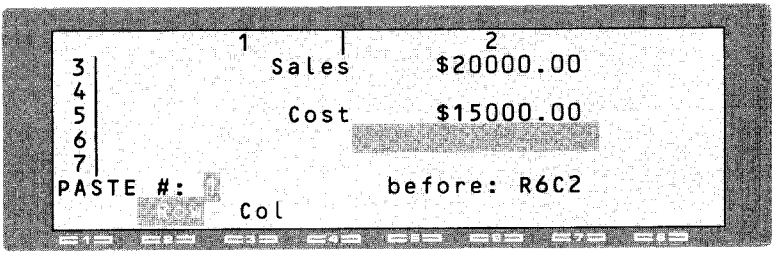
The Insert Command: The (PASTE) Key

Look at the following breakdown of Spencer Ceramics' monthly costs:

Material	=	$ 4,000.00
Labor	=	$ 7,000.00
Overhead	=	$ 4,000.00
Total Costs	=	$15,000.00

Your worksheet must be expanded to make room for this new information. You will need space for *Material*, *Labor*, and *Overhead*, as well as *Total Costs*. It would be logical to place this information between the *Costs* and the *Gross Profits* titles. To prepare for inserting this new information, move the cell pointer to R6C2.

To insert either empty rows or empty columns, use the Insert command. Press the (PASTE) key.

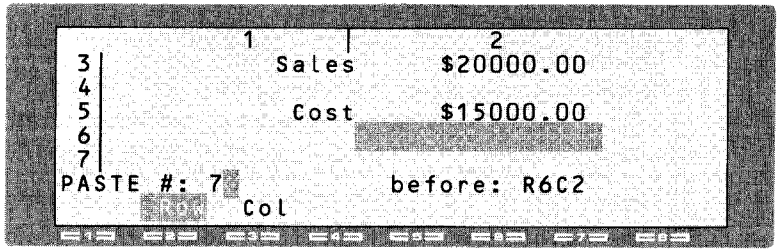


There are two switches indicated on the command line: Row and Column. Notice that ROW is highlighted. This is Multiplan's proposed response, and this is what you want. (You need to add some extra rows of space.) Press (F2) to select "Row."

The "PASTE #" prompt indicates how many rows/columns to insert. The "before" prompt indicates where the rows/columns should be added.

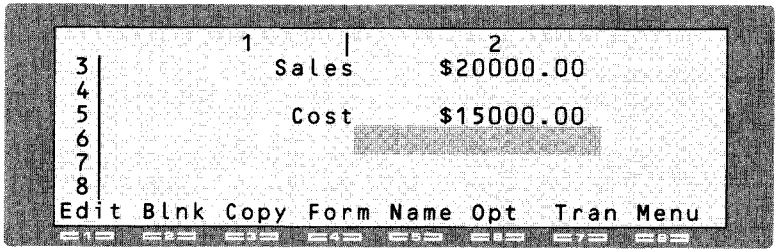
Notice that the proposed responses are based on the position of the cell pointer. Because the cell pointer is at row 6, Multiplan proposes the insertion of 1 row of space before row 6, column 2

The new figures require at least 5 rows (4 for figures and 1 for the total costs). Allow yourself enough room by adding 7 rows. Press 7.



Look at the second field. In the "before" field, you tell Multiplan where to insert the new space by filling in which row the space should go in front of. You need the space between row 5 and row 8. You may put the new rows above row 6 or 7 or 8. Since the proposed response of row 6 is all right, you don't need to change it. Press (ENTER) to carry out the command as it stands.

You see:



To see that the rows have indeed been added, use the (↓) to move the pointer down to row 15. *Gross Profits* is now in row 15, column 1.

Now that you have inserted new rows, you have to format the cells again. You have done this once before. Press (F4). Select (F2). Type:

R1C1:R15C15

for the "cells" prompt. Choose the dollar format by pressing (F8) and then press (ENTER). Now you are ready to continue.

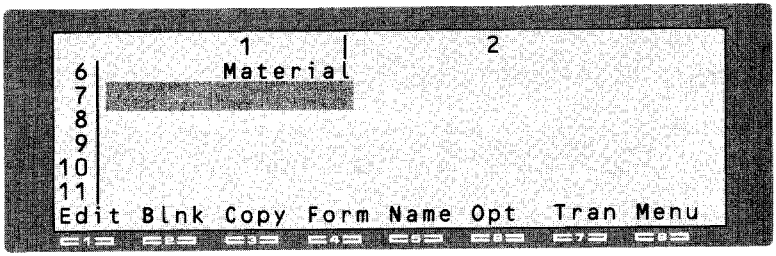
Entering Additional Text

You will be able to add the new information in the space you have created. Under *Cost* (row 5), you will type the sub-categories of *Material* in row 6, *Labor* in row 7, and *Overhead* in row 8. Leave a row between *Overhead* and *Total Costs* for a line, and type *Total Costs* in row 10. The procedure is the same as given in Chapter 2, and is summarized here:

Move the cell pointer to row 6, column 1 (using either the direction keys or the Goto command).

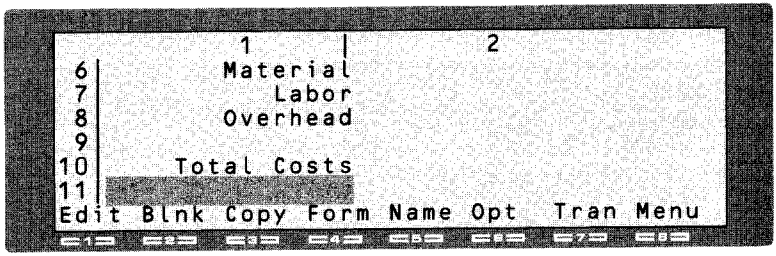
Type *Material*. If you make a mistake in entering text, backspace and type over the mistake.

Press the ↵ key to enter *Material*. Your screen now looks like this:



Now, enter *Labor* in row 7 and *Overhead* in row 8 by simply typing the title then pressing the ↵ key.

Leave row 9 empty for now, and move the cell pointer to row 10. Enter *Total Costs*, as you entered *Labor* and *Overhead*. Your screen should now look like this:



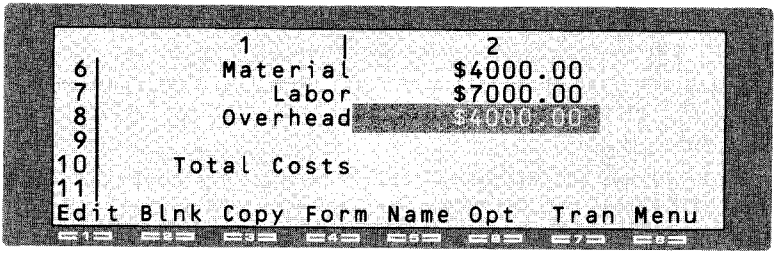
Entering Additional Numbers

Now you are ready to enter the numbers.

Move the cell pointer to row 6, column 2. Type *4000*. Press the ↓ key.

Type *7000*, and press the ↓ key.

For the last number (by *Overhead*), type *4000*, and press ENTER. You will see:

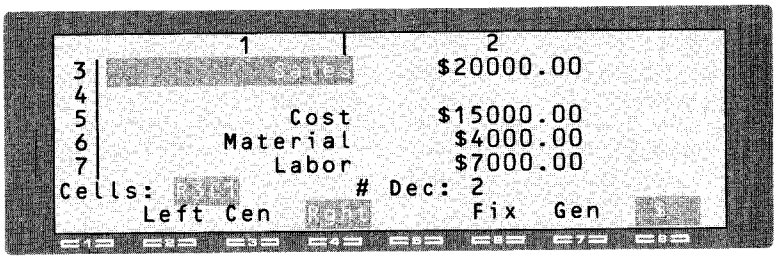


Aligning Cell Contents

To make it clear that the four entries under *Cost (Material, Labor, Overhead*, and *Total Costs)*, are subcategories, you will want to align them to the right side of column 1 and the other categories to the left side of column 1.Multiplan automatically aligns to the right of a column, so we must move *Sales*, *Cost*, and *Gross Profits* to the left of column 1.

First position the cell pointer on the first cell to be aligned (row 3, column 1).

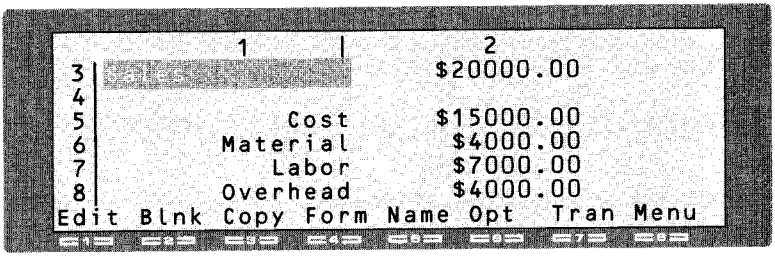
To align cells, use the Format command. Press F4, then F2 to select Format Cells.



The first field ("cells") shows the "active" cell (where the cell pointer is located, R3C1). We want first to align this single cell to the left to see how it looks. So, leave the proposed response as it is. The "# Dec" doesn't concern you now.

The next choice is the alignment. Press F2 to select Left.

The proposed response in the "format code" field is suitable, so now press ENTER. The display shows:



You also want to align rows 5, 10 and 15 in column 1 to the left as follows:

1. Move the pointer to row 5 column 1.
2. Press F4, then F2. This selects Format Cells.
3. Press F2 for left alignment. Press ENTER

To align row 10 position the pointer to row 10 column 1 and repeat steps 2 and 3. Do the same for row 15, column 1.

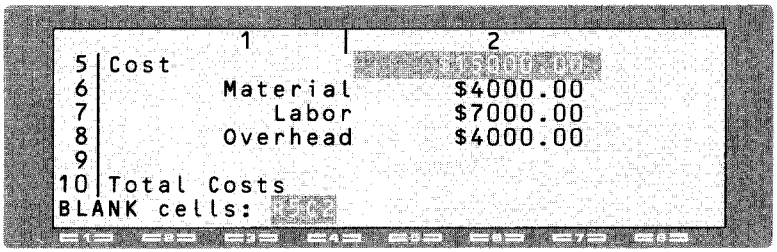
The Blank Command

Now you are ready to enter values for *Total Costs* in row 10. When you do so, you will have two rows showing total costs. You started with *Costs* in row 5, and now you have another row for *Total Costs*.

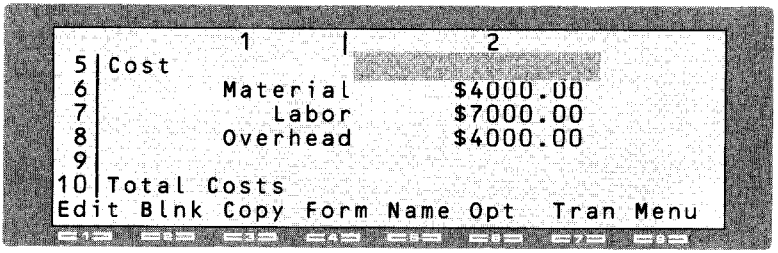
To correct this duplication, you will want to blank out the number $15000.00 in row 5, column 2. The worksheet will be clearer if the heading *Cost* is left as a major category heading in column 1, but you want the number to appear next to *Total Costs*.

Use the Blank command to blank out the $15000.00. First move the cell pointer to row 5, column 2.

Press (F2) (for Blank). The command line shows:



Look at the cell number highlighted. It shows you that the cell pointer is in row 5, column 2. All you have to do is press (ENTER) to erase the contents of that cell. Watch R5C2 as you press (ENTER).



Formulas

Now you are ready to enter a formula for calculating the total costs. The total costs in row 10 will be figured by adding the three rows above it. (Move the cell pointer down next to *Total Costs*, row 10, column 2.)

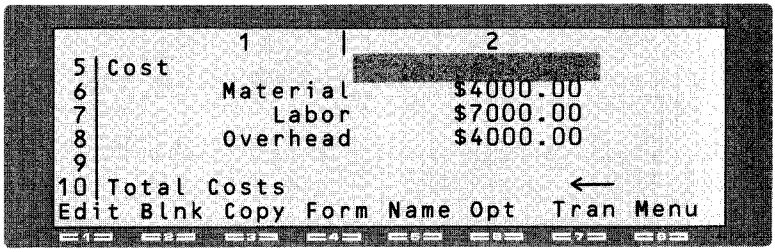
Building a Formula

You might be tempted not to bother with a formula. After all, you could just enter $15000.00 because you already know that number belongs there. You need a formula, however, because costs may change; you need something that will work for other months, too, so that you don't have to calculate costs yourself every time.

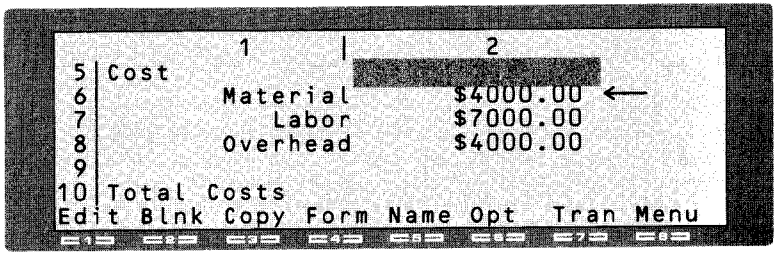
Without touching any keys for a moment, think about what you will be doing. Point with your fingers to row 10, column 2 (next to *Total Costs*) on your display screen.

Think:

Total Costs (row 10, column 2) . . .

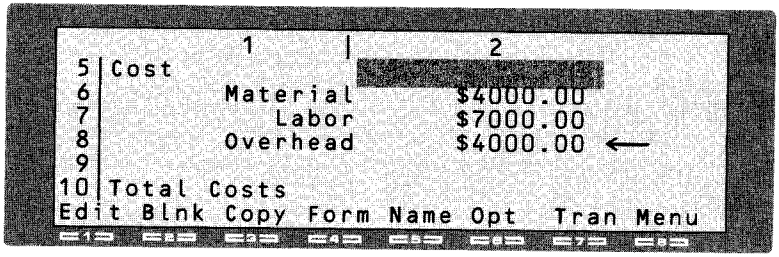


"will be the sum of (now point to row 6, column 2) *Material* . . .



"plus (now point to row 7, column 2) *Labor* . . .

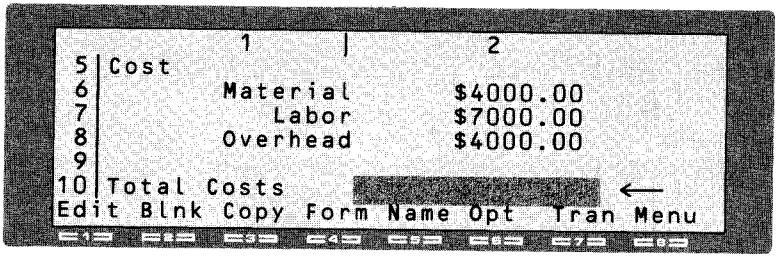
"plus (now point to row 8, column 2) *Overhead*.



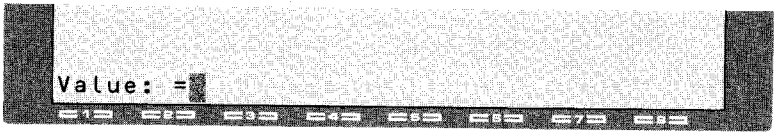
You will follow the same procedure using your cell pointer.

Say to yourself: Do this:

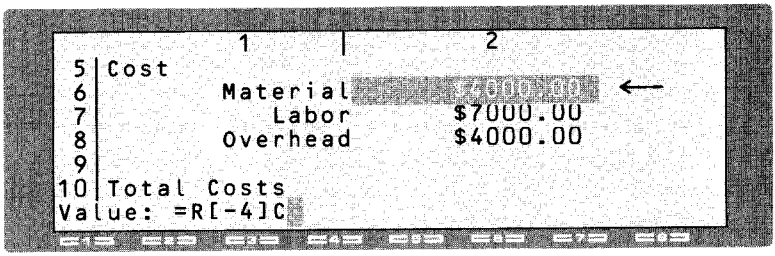
Total Costs . . . 1. Place the cell pointer next to *Total Costs* (row 10,column 2).



equals . . . 2. Press =. (To begin a formula in Multiplan, press =.) Look at the command line.



row 6 (Material) . . . 3. Move the cell pointer up 4 rows to row 6. (Watch the formula being built on the command line. The entry R[-4]C is a formula to tell Multiplan to go up 4 rows in this column to find a value).

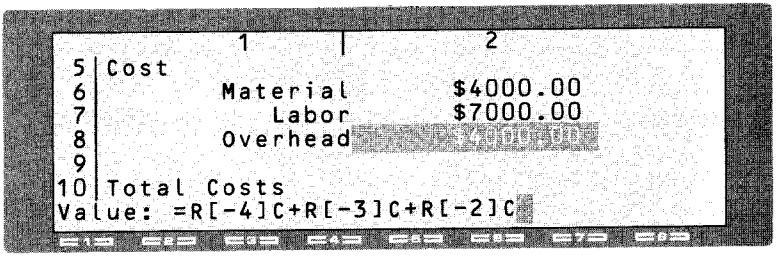


plus . . . 4. Press +. Watch how the formula builds. Notice that the cell pointer moves back to its original position.

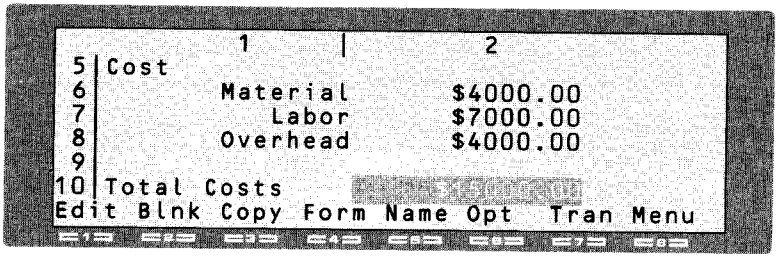
row 7 (Labor) . . . 5. Move the cell pointer to row 7.

plus . . . 6. Press +.

row 8 (Overhead). 7. Move the cell pointer next to *Overhead*.



8. Press (ENTER). You will see $15000.00 now appear next to *Total Costs*. Look at the status line to see the formula Multiplan used to calculate the total.



The dollar format you selected in "Building a Worksheet" with the Format Cells command automatically gives you two decimal places. Because of this setting, any numbers you enter will appear in dollars unless you specifically change them with the Format Cells command.

Press the (F1) key. This is the Edit command which will be discussed later. The formula you see on the command line is the way Multiplan states what you said as you built the formula. Multiplan states:

```
   1    2      3    4    5      6      7
R10C2 = R[-4]C + R[-3]C + R[-2]C
```

1. This cell is the active cell.
2. It contains . . .
3. The cell 4 rows up from here (or 'this row minus 4') in this column . . .
4. plus . . .
5. the cell 3 rows up from here . . .
6. plus . . .
7. the cell 2 rows up from here.
   Note: When a formula in Multiplan does not give a row or column number, it means "this" row or "this" column.

Reviewing or Changing a Formula

At some time later, you may forget exactly how you calculated the figure in a particular cell. You can see the contents of a cell by moving the cell pointer to it and selecting the Edit command or the Option command. Both let you view the formula.

If you wish to change the formula, place the cell pointer on that cell and use the Edit command (press F1) to bring the formula onto the command line. Then use the ←, →, DELETE and BACKSPACE keys to make the changes you want. The → key moves the edit cursor one character to the right; ← moves the edit cursor one character to the left; DELETE erases the character that is highlighted rather than the character to its left, as BACKSPACE does.

These four keys are part of the editing keys that Multiplan provides you. All the editing keys are explained in the *Multiplan Reference Guide*. In a nutshell, with the editing keys you can move the highlight around the command line, insert new text, and delete or replace old text.

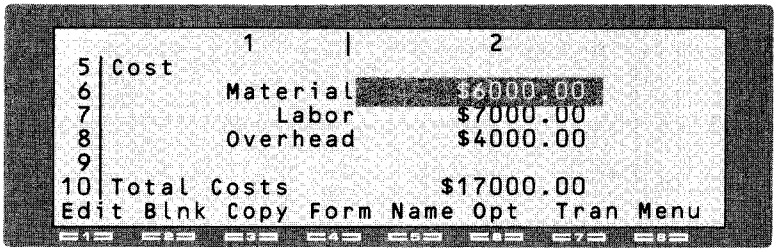
Notice that the direction keys function differently in the Edit command than when entering data at the "Value" prompt.

To exit the Edit command, press ENTER to keep your changes or BREAK to cancel any changes you made.

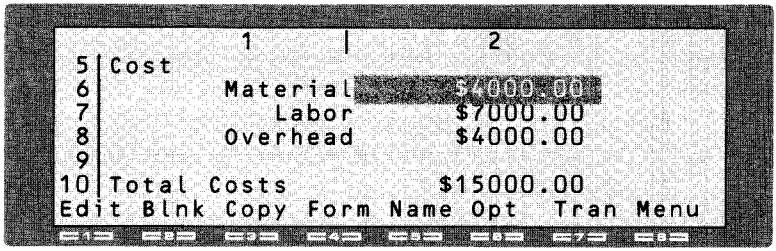
The Edit Line: Cell Contents

The line displayed by the Edit command (the edit line) shows what is actually contained in the active cell. While the active cell may display the number $15000.00, the edit line tells what formula governs that cell. The value displayed for the cell may change, but the formula remains constant. If, for example, the cost of materials was $6000 instead of $4000, the figure displayed in the *Total Costs* cell would change to $17000.00. Yet, the edit line would still show the same formula.

Try it. Move the cell pointer to R6C2 ($4000.00). Type *6000*. Press ENTER and watch the display change to the following:



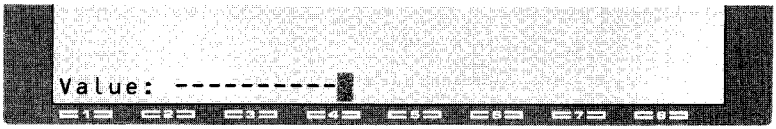
Total Costs now shows $17000.00. Now, change the cost of materials back to $4000.00 and watch *Total Costs* change back to $15000



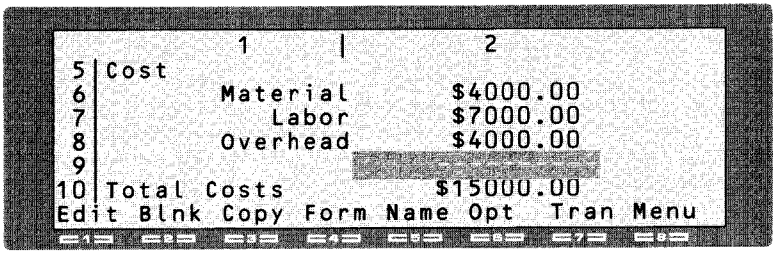
Drawing Lines

To make the worksheet easier to read, draw a line in row 9, column 2, using dashes to separate the subcategories from Total Costs. Follow the same procedure you used earlier to enter text:

1. Move the cell pointer to row 9.
2. Type the dash 10 times.



4. Press (ENTER). You now see:



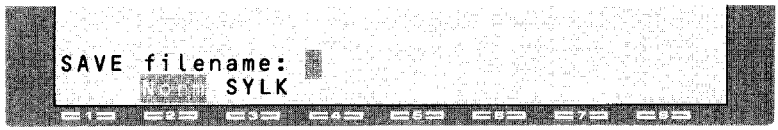
You will learn later how to extend this line across the entire worksheet, or across as many columns as you wish. Later, you will also get more practice in entering formulas using the cell pointer.

Saving Work: The Transfer Save Command

You already know that when you exit Multiplan, your worksheet is automatically saved to RAM. But you may want to periodically save your work on cassette or disk. This is especially true of important worksheets that you want to keep a backup copy of.

To save your worksheet, use the Transfer Save command. Press (F7). The command line shows:

Choose Save by pressing (F3). Now the command line shows:



The proposed response is Norm. This lets you save files to either cassette or disk which is what you want. (SYLK files are discussed in the Appendix section.)

Before saving your worksheet, insert a blank cassette into your cassette recorder. Rewind the tape to the beginning. If you are not using a leaderless tape, make sure you are past the leader.

Make sure your cassette recorder is properly connected and the PLAY and RECORD buttons are pushed in. Answer the *filename:* prompt by answering with *CAS:SPENCE.*

Press (ENTER) and the file is saved to cassette.

To save the worksheet to disk, make sure the disk drive is properly connected and turned on. Insert a formatted disk and answer the *filename* prompt with "*disknumber:filename*", such as 0:SPENCE.

You can now exit Multiplan by pressing the (F8) key which returns you to the main menu.

NAMING CELLS AND COPYING

In the last session, you entered cost figures into the worksheet. You then built a formula for *Total Costs* using the cell pointer.

In this session you will practice building more formulas. You will also learn how to copy cells and how to name them.

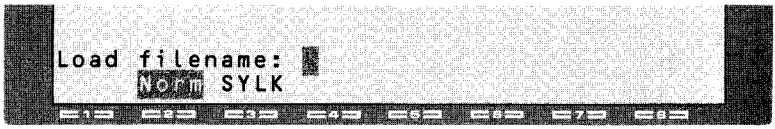
Loading a File: The Transfer Load Command

In the last section you learned how to save your Multiplan worksheets to either cassette or disk. Now you will load that file back in.

Start up Multiplan by positioning the Model 100 cursor over the *MP.BA* file and pressing (ENTER). When asked to enter a filename, type *SPENC2*. This opens a new file called *SPENC2*.

To load your worksheet, use the Transfer Load command. Press (F7). The command line shows:

Choose Load by pressing (F2). Now the command line shows:



The proposed response is Norm. This lets you load files from either cassette or diskette. (SYLK files are discussed in the Appendix section.)

To load the worksheet from cassette, rewind the tape to the beginning. Make sure your cassette recorder is properly connected and the PLAY button is pushed in. Answer the *filename:* prompt by answering with *CAS:SPENCE.*

Press (ENTER) and the first file on the cassette is loaded into RAM.

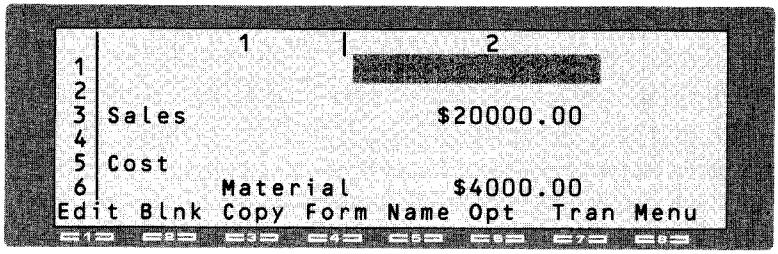
To load the worksheet from diskette, make sure the disk drive is properly connected and turned on. Insert the disk that contains the file into the drive and answer the *filename* prompt with the same name you used to save the file, such as 0:SPENCE.

Your screen now shows your worksheet.

Press (LABEL) key to display the command line.

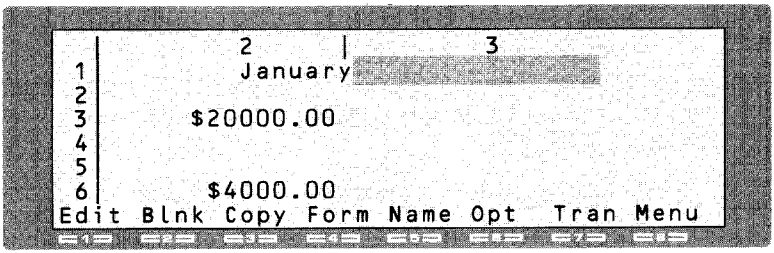
Titles

You need to be able to tell which month is which, so you will want to put the names of the months across the top of the worksheet. Move the cell pointer to row 1, column 2.

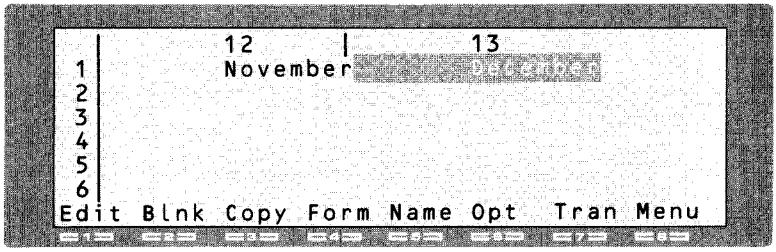


You want to enter the months starting with January in row 1, column 2, so type *January*.

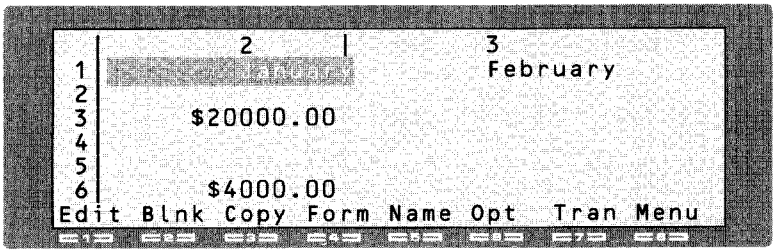
Press the → key to move the cell pointer to the next cell, row 1, column 3. Remember that moving the cell pointer automatically enters the word and moves the cell pointer to the next cell.



Follow the same procedure until you have listed all twelve months. You will automatically scroll the screen as you move the cell pointer. Press ENTER after the last month to enter the final title and to return to the main command menu.



Move the pointer back to January (row 1, column 2).



Format: Align Center

The names of the months are aligned to the right which is Multiplan's default. The worksheet would look nicer and be easier to follow if the names of the months were centered over the columns. Use the Format Cells command with the "Center" alignment to accomplish this.

Press F4 and then F2.

You want to format all twelve months, so you could follow the same procedure you used earlier to format a range of cells (the headings *Sales*, *Costs*, and *Gross Profits*). But it is much faster and more efficient to format the whole row at once.

To format the entire row, we can simply delete the reference to the column (C2). To do this, press (F1) to enter the Edit mode. Notice the double arrows in the upper left corner. Now press (→) to move the cursor. You can now press the (BACKSPACE) key twice.

This leaves the response as R1, which tells Multiplan to format the whole row. (Similarly, C1 would mean format all of column 1.)

Now press (F3) choose "Center" and press (ENTER) because the proposed response in the "format code" field is correct and the "# Dec" field does not apply.

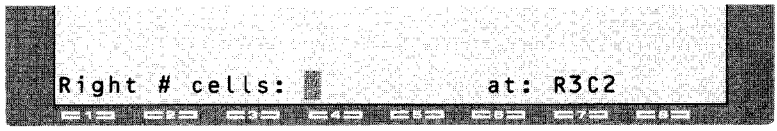
The names of the months are now aligned in the center over the columns of numbers and are easier to read.

The Copy Right Command

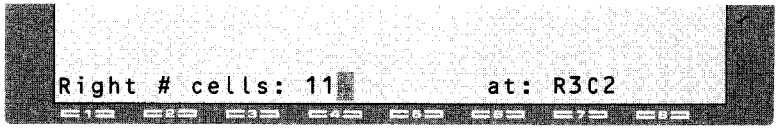
The figures you entered for Spencer Ceramics were for only one month. You will also want to show the rest of the year. Start by copying the figures you have for January into the remaining months of the year (the next 11 columns). You can later change some figures for costs or sales to see the effects of the changes on Spencer Ceramics' profits.

To copy the number for *Sales* ($20000.00) into the next eleven cells, move the cell pointer to $20000.00 (row 3, column 2). Press (F3) for Copy. Your command line shows:

Choose the Right subcommand to copy from one cell (for January) into the cells to its right. Press (F2). The command line shows:



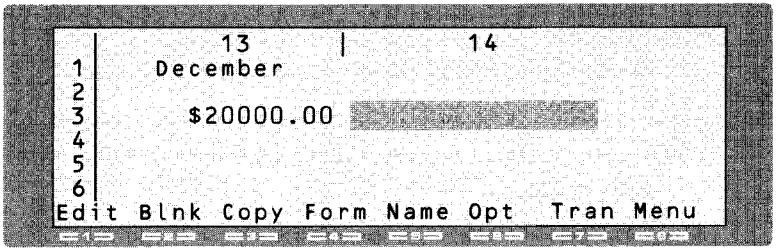
Where the command line cursor is located, type 11, for the number of times you want the formula in R3C2 copied.



Multiplan has proposed the cell you want to copy (the location of the cell pointer) as the starting point. You have already specified how many copies of that cell you want.

Press (ENTER). The Copy command copies the content of the R3C2 cell into the next 11 cells to the right.

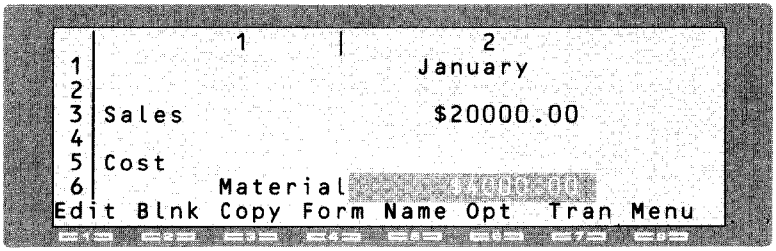
The screen is too small to display the whole year at one time, but you can see the rest of the year by using the → key to scroll the sheet beneath the pointer. Scroll until both columns 13 and 14 are visible. The sales figures stop at column 13 (the last of the twelve months of the year).



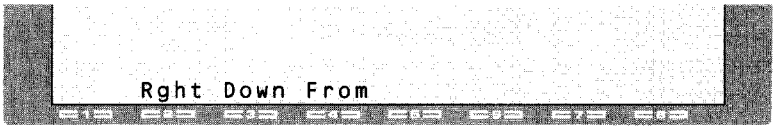
Now, fill in the cost figures, again using the Copy command. Instead of copying one row at a time (as you did when you copied the $20000.00 for Sales), use the Copy Right command to copy a group of cells. You do this by selecting a "range" of cells.

Ranges: The Colon

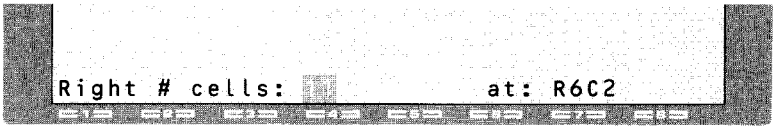
First, move the cell pointer to the upper left corner of the area you want to copy. You want to copy the information from rows 6 through 10 in column 2, to the same rows in columns 3 through 13 to fill in the rest of the months. Move the cell pointer to row 6 in column 2.



Press F3 (for Copy).



Press F2 (for Right).

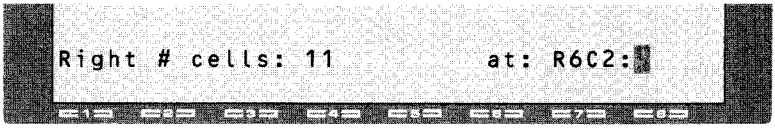


Notice that the "# cells" field shows 11, the same number you typed the last time you used the Copy Right command. Multiplan will always propose the number you used for the last Copy Right command. The number you want is the number 11 (this copying is just like the one for Sales).

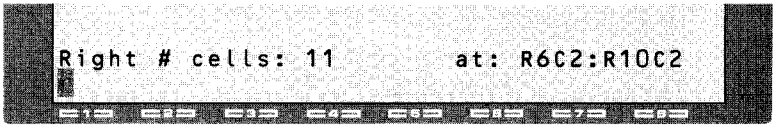
Press (TAB) to move to the "at" field.

If you were copying only one row, the proposed response would be right. But you want to copy 5 rows of column 2 to the right, so you need to enter a range which lets you select a group of cells

Press : (colon).



Press the (↓) key until the cell pointer is on $15000.00 (next to *Total Costs*).



Notice how easily the range has been built.

Press (ENTER) and watch the values appear across the screen. The values for *Total Costs* appear last because they involve copying a formula; Multiplan has to calculate the value after it finishes copying the formulas. Use the (→) key to scroll through the worksheet.

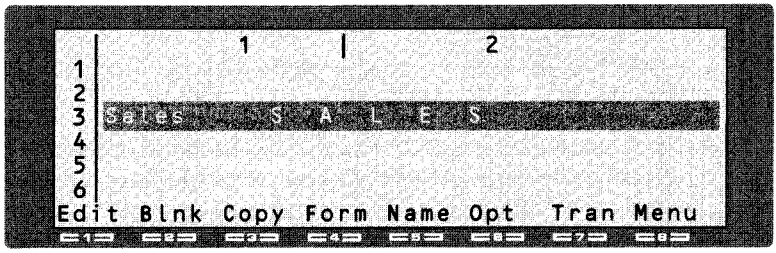
Formulas (Review)

A formula will do calculations for you, plus it allows you to change the numbers and have Multiplan recalculate the result. So you want to build formulas wherever you can.

In "Entering Formulas," you built a formula to calculate *Total Costs*. Now, you want to build a formula to calculate *Gross Profits*. Say to yourself, *"Gross Profits* is *Sales* minus *Total Costs*." A formula that uses these names is easily recognizable and as easy to build as the formulas you have built already. Before you can build such a formula, you must define names for some cells.

Naming Cells

Multiplan has a way to name cells or groups of cells, so that you can refer to them easily. You can, for example, name a whole row, such as row 3; you can name it *Sales*, meaning the whole line of numbers showing sales. If you could see your whole screen at once, you could imagine the row named *Sales*. It would look like this:



Note: When you name a cell or group of cells, make the name one long word; do not use spaces or hyphens. (For more information, see the discussion of the Name command in Part 2 of *Multiplan Reference Guide*.)

To build a formula for *Gross Profits*, you must first name the groups of cells that contain sales and total cost figures. Then these names can be used to build your formula.

Start by naming row 3 *Sales*.

Move the cell pointer to R3C1 (row 3, column 1).

Press (F5) (for Name).

Text in active cell used for proposed response

In the first field, Multiplan proposes *Sales* as the name to be defined. This is helpful for quickly turning titles on a worksheet into names. Titles are text that you place in a cell. Names are references to areas on the worksheet. A name may be the same as a title, as it is here. But, the area the name refers to may be different from the area that contains the title, again as it is here.

Press (TAB) to move to the next field. Multiplan is asking you to specify which cells this name refers to.

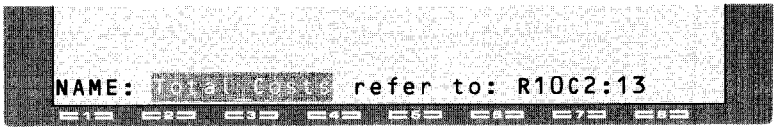
You want *Sales* to refer to the cells in row 3, columns 2 through 13. Press the (→) key once; the response in the "refer to" field is now R3C2. Press (:) (colon), then the (→) direction key to move the cell pointer to column 13 (December). Press (ENTER).

You could have typed 13 after the colon instead of using the cell pointer. This method is faster if you know which cells compose the group you are naming.

Now Name the group of cells that defines *Total Costs*.

Move the cell pointer to *Total Costs* (R10C1).

Press (F5) (for Name).



Notice *Total Costs* in the "NAME" field and R10C2:13 in the "refer to" field (the C2:13 part is the same as for *Sales*!). You need only press (ENTER) to define *Total Costs*.

> **Note:** Multiplan changes any spaces in titles to underlines and deletes any illegal characters when titles are defined as names. The titles themselves are unaffected.

The same procedure would work for *Material*, *Labor*, and *Overhead*, if you wanted to define these or any other names, too (it's not necessary for the Spencer Ceramics example):

1. Move the cell pointer to the title.
2. Press (F5) (for Name).
3. Press (ENTER).

By proposing responses, Multiplan makes it easy to define quickly names for groups of cells that have similar shapes. In other cases, the proposed reponses may not be suitable. You should always check the definition proposed for a name before you press (ENTER).

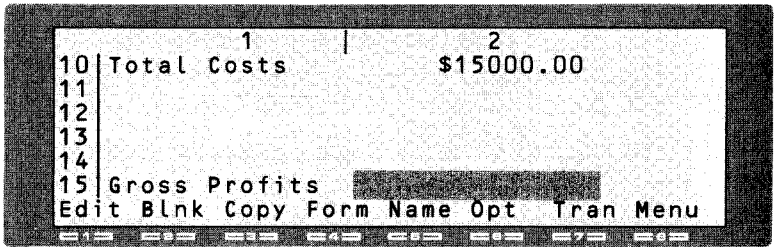
The names do not appear on the screen. Nevertheless, the name can be used later in a formula or any other way that cell references can be used.

If you forget which cells a name refers to, you can use the Name command to find out. Press F5, then use the → key to "step forward through" the list of names. Each time you press the → key, another name appears, and the group of cells it refers to appears in the second field. If you forget which name you used, follow the same procedure until the name you are searching for appears. (Press BREAK to return to the regular command line.)

> **Note:** The only way you can remove a name is to define it as blank. For example, to remove the name *Sales*, press F5, then the → key until *Sales* appears, then TAB. Now, simply press the DELETE key to erase the row and column number to which it refers. For your Spencer Ceramics example, do not remove the name *Sales*.

Building a Formula Using Names

Move the cell pointer to row 15, column 2, next to *Gross Profits*.

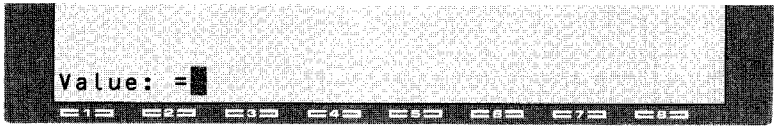


Again, say to yourself, "*Gross Profits* is *Sales* minus *Total Costs*."

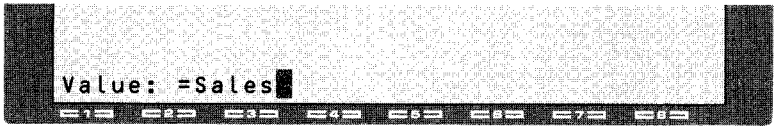
Gross Profits = Sales – Total Costs

Now build the formula.

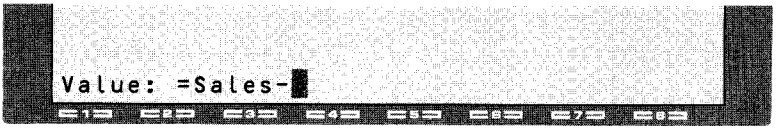
Press =.



Type *Sales*.

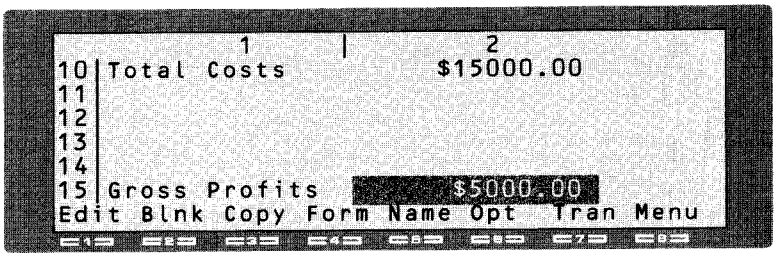


Press – (minus).



Now type *Total Costs* (names must be typed exactly as defined; be sure to include the underline character between *Total* and *Costs*).

Press ENTER.



Look at the cell for *Gross Profits* (row 15, column 2). When you pressed (ENTER), Multiplan calculated your formula and placed the results in the cell. *Gross Profits* now shows $5000.00.

Now copy this formula to the right 11 times (type (F3) (Copy), (F2) (Right), 11, (ENTER)).

You can see that Multiplan did the copy by using the (→) to scroll through the worksheet.

Remember that *Sales* is defined as a 12 cell area (January through December). And so is *Total Costs*. The $5000.00 is, of course, the correct result for each month. But why does a formula that subtracts all of *Total Costs* from all of *Sales* give the correct result each month? (If you change either a sales figure or a cost figure for one month, the *Gross Profits* figure changes in that column only.)

Even though you specify part or all of a row, as you did here by using the names *Sales* and *Total_Costs*, Multiplan calculates in only one column at a time when it needs only one value for the result. Multiplan works the same way if you specify all or part of a column; it calculates in only one row at a time when it needs only one value for the result. This topic is discussed thoroughly in the "Formulas" section of Part 1 in the *Multiplan Reference Guide*.

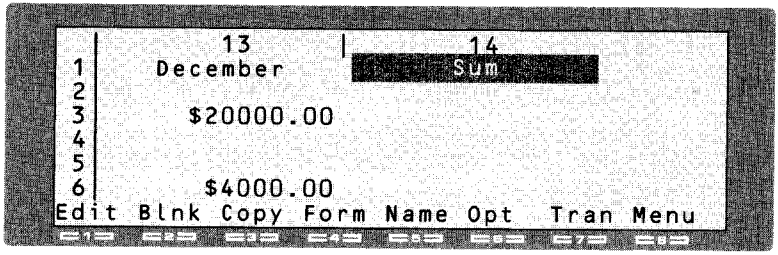
Calculating Functions: SUM

It looks as if Spencer Ceramics has made a lot of money. Wouldn't you like to see how much? Then, let's add another column heading in column 14, row 1, for the sums. Use the Goto command to move the cell pointer to R1C14.

Press (F7)(F5) (for Goto)
Type *R1C14*
Press (ENTER)

Enter the title *Sum* in row 1, column 14, by typing the word *Sum* and pressing (ENTER).

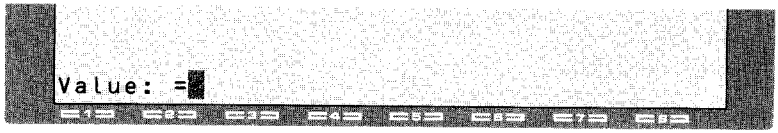
Now your screen should show:



The word *Sum* is centered over column 14 because you used the Format Cells command earlier to "center" the whole row.

To calculate the sales total for Spencer Ceramics for the twelve months, use the Multiplan function SUM. Begin by moving the cell pointer to the cell where the result will appear, row 3, column 14.

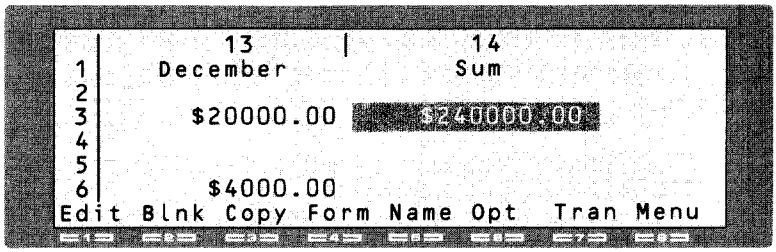
Press =. The command line will show:



Type *SUM(Sales)*.

> **Note:** When using any of the Multiplan functions, type the function name followed immediately by an opening parenthesis, "(." Do not leave any space between the function name and the opening parenthesis.

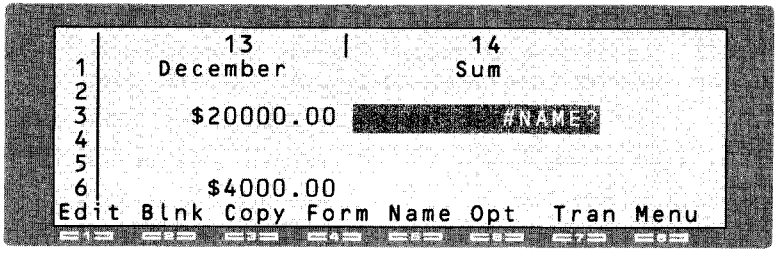
Press ENTER. You will see:



Error Values

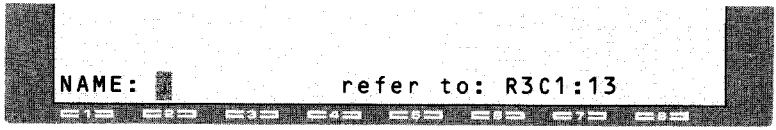
If you enter a formula that Multiplan cannot calculate to a number or text, Multiplan uses one of the special error values as the result. Error values start with a number sign (#). For example, look at the value in cell R3C14, which is the sum of sales. (If the cell pointer is not there already, move it to R3C14.) The formula is SUM(Sales). Let's "undefine" *Sales*. Press F5 for Name. Press the → key until *Sales* appears in the "NAME" field. Press TAB. Now press the DELETE key. The reference for *Sales* disappears. Press ENTER and the name *Sales* no longer exists.

Notice at the same time what happens in cell R3C14. The value changes from $240000.00 to #NAME?. The formula for calculating the value of *Gross Profits* also utilizes the name *Sales*. Notice that the values for *Gross Profits* also reflect the error #NAME?.

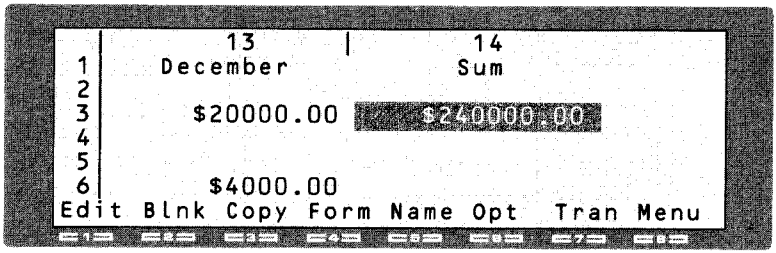


This means that Multiplan found a name you haven't defined yet.

Now, redefine *Sales* to refer to R3C2:13. Press (F5); the "NAME" field is blank, but the "refer to" field shows R3C2:13.



Type *Sales*, then press (ENTER). The value $240000.00 reappears in cell R3C14.



Remember, when you defined *Total Costs*, the "refer to" field had a proposed response that fit. Because *Sales* will refer to a group of cells with the same shape as the group of cells of the last name defined (*Total Costs*), the proposed response is correct for redefining *Sales*, as long as the cell pointer is in the correct row before starting the Name command.

The other error values you might see as you build a worksheet are: #DIV/0!, #N/A, #NULL!, #NUM!, #REF!, #VALUE!. All of the error values are described fully under "Error Values" in the "Formulas" section in Part 1 of *Multiplan Reference Guide*.

Relative References and Absolute References

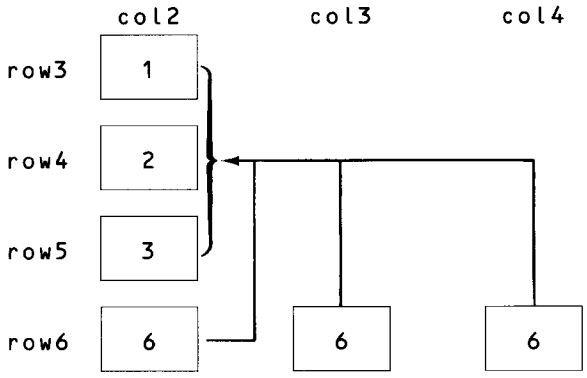
So far we've been using three different ways to refer to cells. Sometimes, we referred to a cell as R3C14 or a group of cells as R3C2:13. Sometimes, we referred to a group of cells by name, as when we built the formula SUM(Sales) or *Sales-Total Costs*. Sometimes, we referred to a cell by R[-4]C, as when we built the formula for *Total Costs*.

When you refer to cells by R3C14, R3C2:13, or similar references to specific row numbers and specific column numbers, you are using absolute references. When you refer to a cell by R[-4]C and similar references to the current row plus or minus a number of rows, you are using relative references (which can also be used for columns).

The major difference between absolute and relative references appears when copying formulas. When you copied the formula for *Total Costs* across all 12 months, the correct value appeared in each column. You wouldn't see any difference between a formula with absolute references and one with relative references in this case because the values for *Material*, *Labor*, and *Overhead* are the same in each column. But, if one or more values were changed in one column, the value of *Total Costs* in that one column would differ.

On the other hand, if the formula contained absolute references, all copies of *Total Costs* would depend on the values in column 2 rather than on the values in each column.

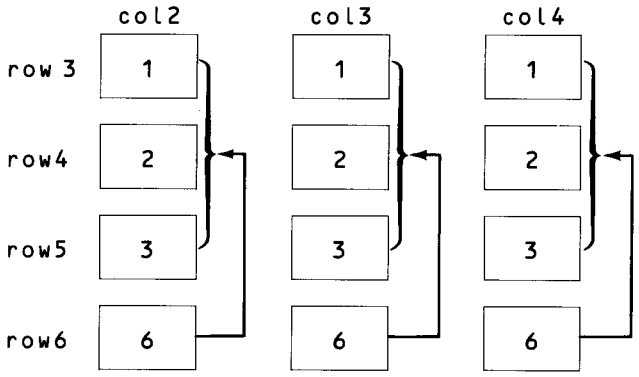
If you had specified the exact row and column number for *Material*, *Labor*, and *Overhead* by making an absolute reference to their position, such as R6C2 + R7C2 + R8C2, you would have had to change each of the references for the *Total Costs* formula in each column for the formula to remain correct.



Absolute Formula in row6: R3C2 + R4C2 + R5C2

Copied Absolute Formulas Refer to the Same Cells

If the 2 in col2 becomes a 3, then all 6's in row6 become 7's; if any value in row3, row4, or row5 of col3 or col4 changes, there is no effect in row6.




```
Relative Formula in row6:
R[-3]C + R[-2]C + R[-1]C
```

Copies Relative Formulas Refer to Different Cells

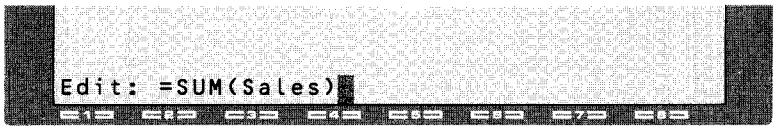
If one of the 2's in row4 becomes a 3, then the value in row6 in that one column becomes a 7.

For reasons of flexibility, you used a formula with relative references, built by using the cell pointer, to calculate *Total Costs*. Similarly, using a formula with relative references to calculate the sum of *Sales* allows you to copy a flexible formula for calculating the sums of *Total Costs* and *Gross Profits*.

First, you need to edit the formula in row 3, column 14 (R3C14). Right now it contains the formula SUM(Sales). because names are defined by absolute references, *Sales* is handled the same as an absolute reference. You need to change *Sales* to relative references.

Move the cell pointer to R3C14.

Press F1 (for Edit). The command line shows the current formula in the active cell:

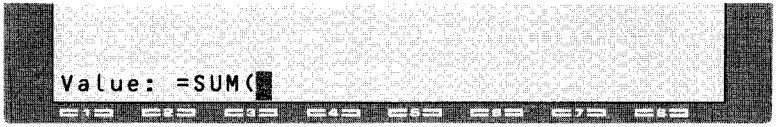


To change the *Sales* reference to relative cell references, we will use the direction keys to enter the cell references. Press the ← key and notice what happens. The cell pointer did not move, but the cursor on the edit line did. The Edit command changes the function of the direction keys. Instead of moving the cell pointer, they move the edit cursor. Notice the double arrows in the upper left corner of the display. This tells you that the Edit command is in control and the direction keys have a new function.

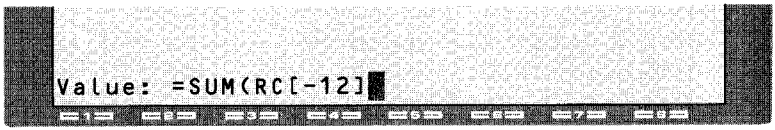
Press the → to move the edit cursor to the end of the formula.

To enter relative cell references in the Edit command, press F1 again. The "Value" prompt replaces the "Edit" prompt and the double arrows on the display disappear. This means that you can use the direction keys to enter cell references.

Press BACKSPACE to erase *Sales)*, but leave *SUM(*.

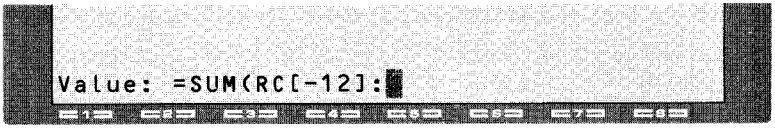


Press the ← key until the cell pointer reaches R3C2.



Multiplan inserts a relative reference into your formula.

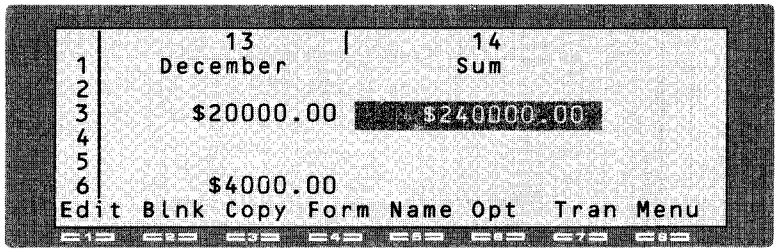
Press : (colon).



Press the ← key once (to R3C13).

Press) (right parenthesis).

Press ENTER.

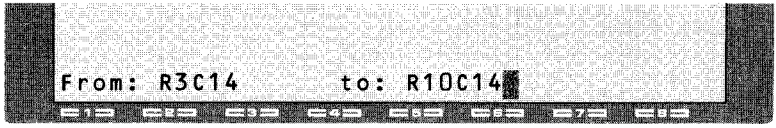


Now, you can easily use this same formula to calculate the sums for *Total Costs* and *Gross Profits* by copying the formula into cells R10C14 and R15C14 using the Copy From command.

Copying a Formula: The Copy From Command

Press F3 (for Copy), then F4 (for From).

Multiplan proposes that you copy from the active cell, which is what you want to do. Press TAB. The proposed response in the "to" field is not correct. Press the ↓ key until the cell pointer reaches row 10.

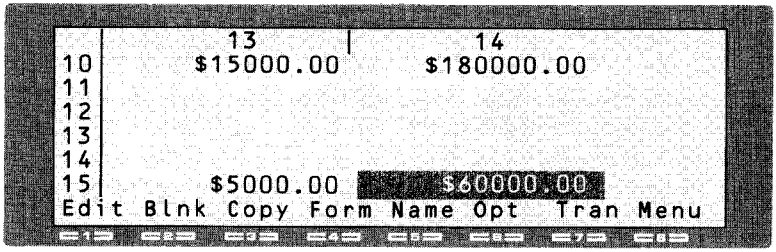


This is one of the cells to receive a copy of the formula. The other is in row 15. Because the cells are not next to each other, you can't use a range as you've done before with the colon. You need, instead, to make a list of cells. To make a list, use the comma.

Press , (comma).

Now press the ↓ key until the cell pointer reaches row 15.

Press ENTER, and watch the values appear in rows 10 and 15 of column 14. Use the ↓ key to scroll through the worksheet:



It's time to take a break. To make it easier when you return, move the cell pointer back to the beginning of the worksheet. Multiplan always loads a worksheet exactly as it was when you saved it. Use Goto command (F7 F5) to move the cell pointer to row 3, column 2, and press ENTER.

In the next session, you will see how Spencer Ceramics' profits change as costs and sales change.

Save your work to cassette or disk using the Transfer Save command.

Press (F7) for Transfer, then select Save by pressing (F3). To save the worksheet to cassette, make sure your cassette recorder is properly connected and the PLAY and RECORD buttons are pushed in. Answer the *filename:* prompt with: CAS:SPENC2.

Press (ENTER) and the file is saved to cassette.

To save the worksheet to disk, make sure the disk drive is properly connected and turned on. Insert a formatted disk and answer the *filename* prompt with "*disknumber:filename*," such as 0:SPENC2.

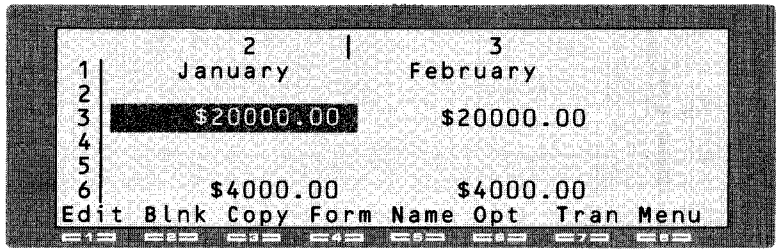
You can now exit Multiplan by pressing the (F8) key which returns you to the main menu. Remember that when you exit Multiplan your worksheet is automatically saved to RAM. Since you opened a new file at the beginning of this section, the worksheet is stored in RAM as SPENC2.CO.

COPYING FORMULAS AND OPTIONS

In the last session you reviewed the procedure for building formulas, and you learned how to copy cells into other cells on the worksheet. You also learned how to name cells and how to do a calculation using a name and a function.

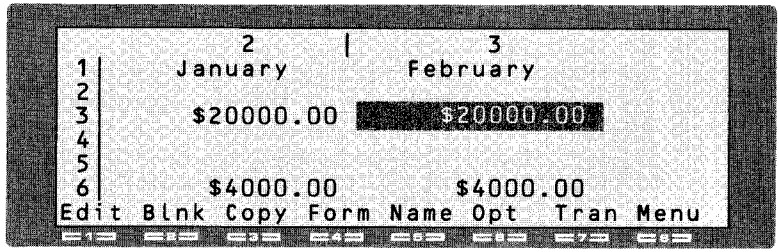
Turn on your Model 100 and position the cursor over SPENC2.CO. Press (ENTER) to start up Multiplan with the Spencer Ceramics example. If you wish you may Transfer Load the file from cassette or disk. Press (LABEL) key to display the command line.

The screen should look just as it did when you left it last time:

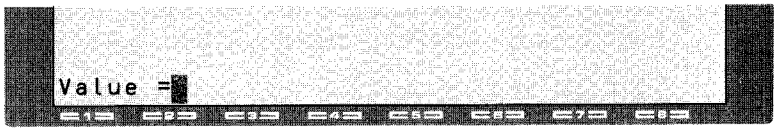


Building a Formula to Show Increasing Sales

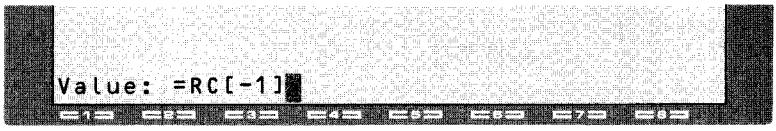
Your information on Spencer Ceramics indicates that sales have been increasing by about 1% a month. To see the effect of a 1% monthly increase in sales, first move the pointer to row 3, column 3, under February, which is the first month that will show an increase.



Press =. Your command line shows:

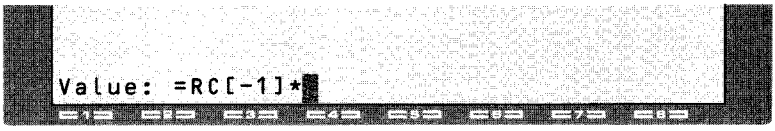


Using January sales as a base for the remaining months, type in a formula that will calculate each month's sales as a 1% increase over the preceding month's sales. Move the cell pointer back to row 3, column 2, under January. The command line shows:

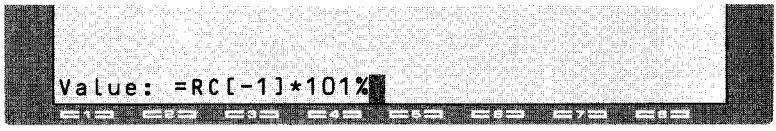


To show February's sales as a 1% increase over January's, you need to multiply January's sales by 101% (that is, February sales are 101% of January's).

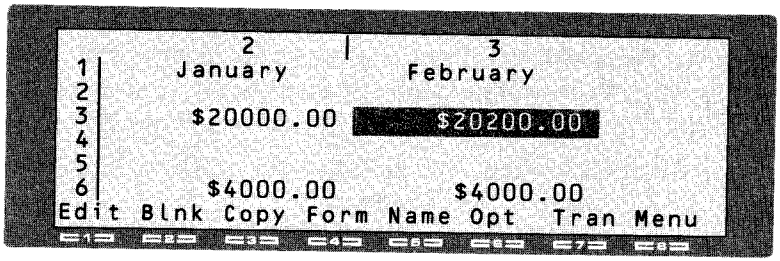
Press * (the asterisk is the sign for multiplication).



Now type *101%* (use the number 1, not the lowercase letter l).



Press (ENTER). You should see the new cell value for February showing a 1% increase over the previous month, January.

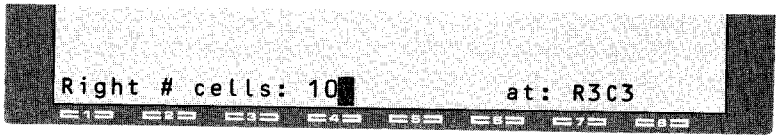


Copying a Formula to the Right: The Copy Right Command (Review)

Because January acts as the "base" month for the 1% increase, the cell for January Sales does not contain a formula. You will therefore be copying the formula for February Sales into the remaining 10 months of the year. To copy this formula to the right, be sure the cell pointer is on R3C3 (under February), and press (F3) for Copy.

Press (F2) for Right.

In the first field ("# cells"), type 10.



In the second field ("at"), you see that R3C3 (the active cell) is the proposed response. That is where you want to start because the other 10 cells are to be copies of this cell.

Press (ENTER), then use the → to scroll through the worksheet to see the results.

January	equals	$20000.00
February	equals	$20200.00
March	equals	$20402.00
April	equals	$20606.02
May	equals	$20812.08
June	equals	$21020.20
July	equals	$21230.40
August	equals	$21442.71
Septmeber	equals	$21657.13
October	equals	$21873.71
November	equals	$22092.44
December	equals	$22313.37
SUM	equals	$253650.06

Move the cell pointer to row 3, column 14, to see the sales figures resulting from a 1% monthly increase. The formula was copied to the remainder of the year, and the cells that depended on sales figures (*Gross Profits* and sum of *Sales*, for example) have been updated to include the new information.

Before you go on, save your work to cassette or disk (Transfer Save).

What If...?

The SPENCER worksheet is based on the assumption that the company will have $20,000.00 in sales in the "base" month (January). The rest of the sales figures are calculated from a formula that assumes a sales increase of 1% per month. All the cost figures are the same for each month.

What if the actual "base" figures (figures you typed in rather than figures calculated from formulas) are different from the estimates you typed in? You would want to change the "base" figures, but would want to protect your formulas (especially those for calculating *Total Costs* and *Gross Profits*) from alteration. How do you protect your formulas from accidental alteration? And, how do you quickly find which cells contain the "base" figures?

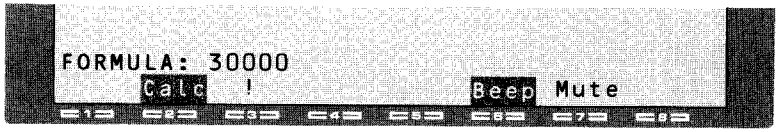
The Options Command

As you have seen, if you change the contents of a cell, such as January Sales, Multiplan recalculates all of the cells that depend upon that cell.

Use the Goto command to move your pointer to row 3, column 2. Change January sales by typing *30000*. Press (ENTER) and scroll through the worksheet to see how the remaining sales and profits figures change.

Likewise, if you change the formula in row 3, column 3 (under February), to reflect a 2% increase (*102%), Multiplan will automatically recalculate the worksheet.

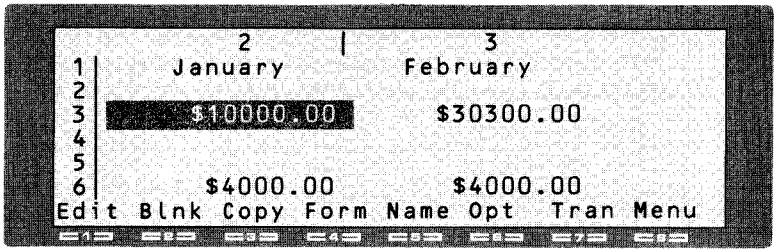
If your worksheet contains many formulas, each change may require several moments to complete the recalculation. To speed up entering a number of changes, you can turn off the automatic recalculation option by using the Options command. Press (F6).



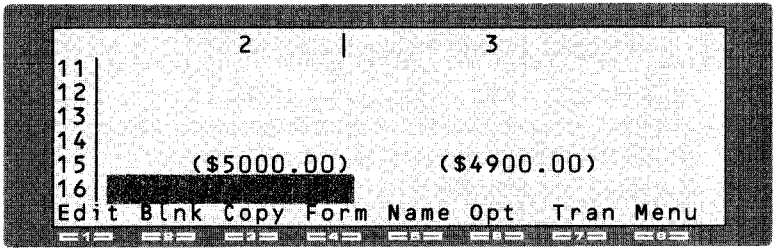
Select (F3) to turn off the automatic recalculation.

Press (ENTER).

Now change the number for January sales to *10000* and press (ENTER). You will see that only the cell for January sales changed.



During the time the option to recalculate is turned off, you can do a one-time calculation by pressing the RECALC key. Press the RECALC key, (!) ((SHIFT)(1)) and watch the screen. The worksheet has been recalculated. *Gross Profits* (row 15) now shows losses in parentheses.



Use the Options command to change back to automatic recalculation ((F6) for Options, (F2) for automatic recalculation, (ENTER)). (Your work has already been saved by the earlier Transfer Save command.)

PRINTING A WORKSHEET

You have now become familiar with the basic command structure of Multiplan, using the keyboard and commands to build a worksheet that responds quickly and accurately to changes.

In this session you will learn to use the Multiplan Print command to print a copy of the summary operating budget that you developed to show Spencer Ceramics' projected sales and profits.

The Print Current Screen Command

Before you print your worksheet, be sure the printer is connected properly, turned on, and ready to print.

Start up Multiplan and load the SPENCE file from cassette or diskette. Next, use the Multiplan Print command to get a paper copy of the information currently displayed on your screen.

Press the PRINT key.

Multiplan uses a width of 40 characters (the width of the Multiplan screen.

The Print Worksheet Command

Before you print your worksheet, be sure the printer is connected properly, turned on, and ready to print.

To print the entire worksheet, press SHIFT PRINT. The command line shows:

Multiplan proposes 70 character for the "width" prompt. This is the number of characters to be printed on a line. For the "from" prompt, Multiplan proposes the entire worksheet (from row 1 to row 99. These responses are what we want so simply press ENTER.

Multiplan will print as many columns across the page as will fit within the margins. Any columns left over will be printed on a second page, with row and column numbers continued.

This method of printing permits you to cut and paste the printed pages to form a worksheet with the same dimensions you set up on the screen.

The printed pages should look something like the next illustration.

	January	February	March
Sales	$10000.00	$10100.00	$10201.00
Cost			
Material	$4000.00	$4000.00	$4000.00
Labor	$7000.00	$7000.00	$7000.00
Overhead	$4000.00	$4000.00	$4000.00
Total Costs	$15000.00	$15000.00	$15000.00
Gross Profits	($5000.00)	($4900.00)	($4799.00)

April	May	June	July
$10303.01	$10406.04	$10510.10	$10615.20
$4000.00	$4000.00	$4000.00	$4000.00
$7000.00	$7000.00	$7000.00	$7000.00
$4000.00	$4000.00	$4000.00	$4000.00
$15000.00	$15000.00	$15000.00	$15000.00
($4696.99)	($4593.96)	($4489.90)	($4384.80)

August	September	October	November
$10721.35	$10828.57	$10936.85	$11046.22
$4000.00	$4000.00	$4000.00	$4000.00
$7000.00	$7000.00	$7000.00	$7000.00
$4000.00	$4000.00	$4000.00	$4000.00
$15000.00	$15000.00	$15000.00	$15000.00
($4278.65)	($4171.43)	($4063.15)	($3953.78)

December	Sum
$11156.68	$126825.03
$4000.00	
$7000.00	
$4000.00	
$15000.00	$180000.00
($3843.32)	($53174.97)

By changing the response in the "from" prompt of the Print Worksheet command, you can select the portion of the worksheet you want to print. For example, you could specify just the column showing the sums for sales, costs, and gross profits (column 14).

Note: If you should accidently press (PRINT) or (SHIFT)(PRINT), when the printer is not connected or not turned on, press (BREAK) to regain control of Multiplan.

The example of Spencer Ceramics is completed.

There are other tasks and other problems to be solved that require additional commands and functions. Multiplan provides them.

Multiplan is described completely in *Multiplan Reference Guide*. Multiplan provides mathematical, financial, and statistical functions for calculations and problem solving. So far you've only seen SUM.

In addition, in *Multiplan Reference Guide*, you'll find descriptions of additional editing keys that make building a worksheet easier. And, you'll find an alphabetical list of all the messages Multiplan can display on the message line. An appendix of "Helpful Hints" suggests ways to save time and space while using Multiplan.

Now that you've learned how to use Multiplan in this manual, you can use the reference manual to explore the full potential of Multiplan.

Cat. No. 26-3829

Printed in U.S.A.