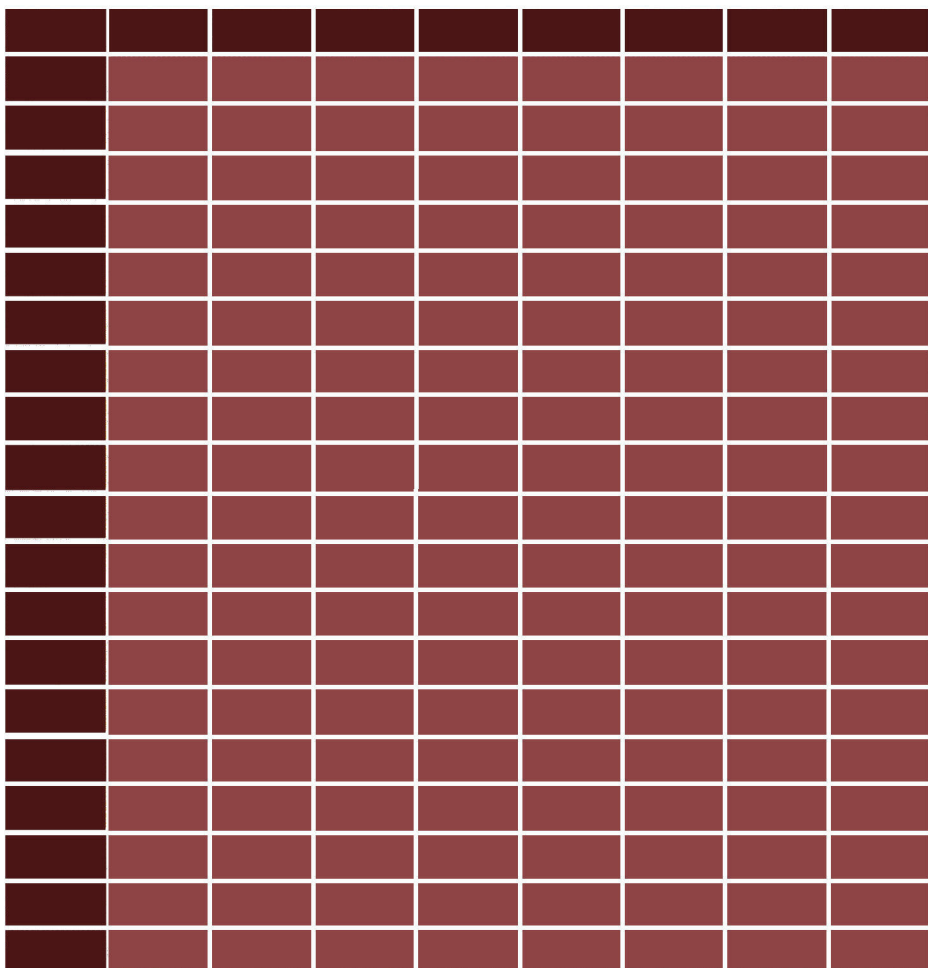


## UltraPlan™ Spreadsheet Calculator





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# UltraPlan<sup>TM</sup> Spreadsheet Calculator

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## ***User Reference Manual***



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***Documentation by Steve Ross • Consultant: William V. R. Smith III***

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## **1. INTRODUCTION**

This manual has two main sections: the Tutorial, and the Reference Guide.

Please take time to read the Tutorial, as it introduces many of the terms used in reference to UltraPlan, and points out concepts that might *not* be immediately apparent.

The Tutorial is a beginner's introduction to UltraPlan "automated calculator" system. It will teach you the basics and get you started using UltraPlan. The Tutorial will not teach you all there is to know about UltraPlan; for more information, commands and features of the system, see the Reference Guide section.

To get the most out of the Tutorial, you should read it while sitting at your computer, running UltraPlan, and actually carrying out the step-by-step instructions given in the manual. The only way to learn UltraPlan is by "hands-on" experience!

As you work through the Tutorial, try to resist the temptation (at least at first) to depart from the instructions and experiment on your own. Stick closely to the instructions, to maintain the continuity of the lesson. Later, after you've acquired a bit of proficiency with UltraPlan, by all means feel free to go off and experiment – it's the best way to learn!

By the time you finish the Tutorial, you'll know enough about UltraPlan to begin building your own models for your own particular applications. You can then learn more from the UltraPlan Reference Guide. The Reference Guide is a concise summary of all aspects of UltraPlan.

Inside the back cover there is a Reference Card which you can remove and keep by your computer for quick reference.

With a little practice, you'll be able to use UltraPlan to put your Personal Computer to work for you in a wide variety of useful ways.

UltraPlan is a program that turns your microcomputer into an "automated calculator". With it you can create, manipulate, modify, and print reports covering a wide variety of calculations, such as:

- Financial statements
- Budgets
- Cost estimates
- Sales forecasts
- Staffing plans
- Development and product schedules and many, many more.

UltraPlan provides you with a spacious "electronic worksheet" of 254 rows and 63 columns — a total of 16,002 cells for information storage. Your video screen becomes a "window" that you can slide up, down, left, or right over the worksheet.

One of the exciting features of UltraPlan is that it allows you to play "what if...?" with your data. What if interest rates rise two points? How will that affect the data for future years? What if sales increase by five percent? In the blink of an eye, UltraPlan will recalculate all of your data and show you the results of your "what if...?" assumptions. You can then save the new data on a floppy diskette, print them, or both.

This manual will show you, step by step, how to create a simple business financial forecast model like the one shown in Figure 1. After you have built this model on your screen, you'll learn how to play "what if...?" by changing some of the data and letting UltraPlan instantly calculate the effects of those changes.

**PROGRAM DOCUMENTATION  
PLANNING MODEL**

<b>TASK</b>	<b>HOURS</b>	<b>RATE</b>	<b>COST</b>
<b>RESEARCH</b>	<b>65</b>	<b>24.48</b>	<b>1591.20</b>
<b>FIRST PASS</b>	<b>112</b>	<b>24.48</b>	<b>2741.76</b>
<b>EDITING</b>	<b>56</b>	<b>24.48</b>	<b>1370.88</b>
<b>REWRITING</b>	<b>68</b>	<b>24.48</b>	<b>1664.64</b>
<b>TYPESETTING</b>	<b>52</b>	<b>19.00</b>	<b>988.00</b>
<b>PRINTING</b>			<b>10547.00</b>
<b>TOTAL</b>	<b>353</b>		<b>18903.48</b>

**Figure 1. The Demonstration Model**

## **2. MICROCOMPUTER BASICS**

This section covers some of the basic things you need to know about your personal computer in order to run UltraPlan. If you're an experienced computer user, you already know how to set it up, how to use the keyboard, and how to handle floppy diskettes: just read the following subsection, titled WHAT YOU WILL NEED, then skip ahead a few pages to STARTING UltraPlan.

### **2.1 What You Will Need**

In order to run UltraPlan, you will need the following:

- A 6502-based computer, preferably with one or more RAM cards.
- A closed-circuit video (TV) monitor and connecting cable.
- One or more disk drives, with controller cards set up to read 16-sector "floppy" diskettes.

**Note:** Instead of a closed-circuit monitor, you can use an ordinary home TV, along with a radio-frequency (RF) modulator. The dealer who sold you your computer can provide you with an RF modulator and show you how to connect it. Connecting your TV set to your computer won't harm the TV in any way.

Although UltraPlan only displays information on the screen in black-and-white, a color monitor or TV set will also work. In general, you will get a clearer display with a black-and-white than with a color unit, and a monitor will give better results than a TV set with modulator. A screen size of 12 inches is recommended, but a 9-inch screen will also give acceptable results.

**Note:** UltraPlan will *not* run on a disk drive that is configured for 13-sector diskettes. If you have the Apple Language System, or version 3.3 or later of the Apple Disk Operating System (DOS), then you are properly equipped to run UltraPlan. If you have an earlier version of DOS and no Language System, you will probably need to upgrade your disk controllers from 13- to 16-sector operation. See your Apple dealer for further information.

The following optional equipment will add to UltraPlan's usefulness:

- A RAM card. UltraPlan supports all language-card compatible RAM cards in various combinations up to 512K (four 128K RAM cards). The usable portion of your worksheet will be expanded by the addition of one or more RAM cards.
- A printer will enable you to print permanent "hard copies" of your UltraPlan models.

In addition, you'll need the UltraPlan program diskette that came with this manual, and a blank diskette to use for storing the models you create.

## **2.2 Setting up your Microcomputer**

If you've just unpacked your microcomputer, here's how to set it up to run UltraPlan:

1. Connect one end of the computer's power cord to the power connector at the left rear of the computer, and plug the other end into a grounded (3-prong) power outlet.
2. Plug in the video monitor and connect it to the jack marked VIDEO OUT on the back of the computer with the proper connecting cable. (If you're using an ordinary TV set with an RF modulator, follow the installation instructions that came with the modulator.)

3. If you have a RAM card, follow the installation instructions supplied by the manufacturer (note: UltraPlan will find your RAM card in whichever slot you place it). NOTE: If you own a Franklin ACE 1000, the RAM card can not be installed in slot 0 unless the internal jumper on the main board is moved to the “Y3” position. If you own a Apple //e, UltraPlan will find and utilize any extra RAM in the extended 80-column slot.
4. Install the disk drive(s), following the instructions given in the manual that came with the disk drive(s), or the instructions provided by the manufacturer.
5. If you have a printer, connect it to the computer by following the instructions given in the printer manual and the interface card manual.

**Note:** The customary slot for printer interface cards is 1, and that is what UltraPlan ordinarily expects. You may, however, configure UltraPlan to recognize your printer in any slot except 0 (see Configuration Subsystem discussion in the Reference Guide for details).

**Note:** The customary slot for 80-column video boards is 3, however UltraPlan does not look for an 80-column board unless you so specify (see Configuration Subsystem discussion in the Reference Guide for details). 80-column boards will not be recognized in slot 0.

When you've completed these installation steps, your computer is ready to run UltraPlan.

## **2.3 The Microcomputer Keyboard**

The microcomputer keyboard is similar to an ordinary typewriter keyboard, but it has a few peculiarities that you should know about.

First, the computer keyboard contains uppercase (capital) as well as lowercase letters. To produce lowercase characters, just press the key all by itself; to produce the upper character, press the key while holding down the SHIFT key at the same time.

**Note:** This action of pressing and holding down one key while typing another is called a combination keystroke. We will use a notation such as SHIFT-M to represent the combination keystroke with the SHIFT and M keys described in the preceding paragraph.

The microcomputer keyboard also contains a few special keys not found on an ordinary typewriter. One of the most important of these is marked CTRL, which stands for ConTRoL. This key is used to type special control characters that tell the computer what you want it to do. These control characters have no graphical representation, and cannot be displayed on the screen or printed on paper. To type one, you use the Ctrl key in the same way as the SHIFT key: press Ctrl and hold it down while typing some other character. Such a combination keystroke with the Ctrl and A keys would be represented by the notation Ctrl – A.

The RETURN key on the computer keyboard corresponds to the carriage return on a typewriter. On a typewriter this key is used to end a line by returning the carriage to the beginning of the next line. As you'll see, the RETURN key is used for a similar end-of-line function in UltraPlan.

The ESC (ESCAPE) key and those marked with left- and right- pointing arrows have special uses in UltraPlan, which you will learn about in due course. When you're running UltraPlan, you should never have occasion to press the key marked RESET.

## **2.4 Handling Diskettes**

With one or more disk drives, your microcomputer has the ability to store and retrieve information on 5-1/4-inch “floppy” diskettes. Each diskette is a mass-storage medium with a capacity of 143 kilobytes (“143K”) of information. (They’re called “floppy” diskettes because they’re made of flexible plastic, to distinguish them from harder “rigid” disks.)

Diskettes are a very convenient way of storing information, but they have to be handled with respect. They’re sensitive to heat, dust, smoke, scratches, fingerprints, and magnetic fields. Each diskette comes sealed in its own black jacket. You should never take a diskette out of its jacket, bend it (much less fold, spindle, staple, or otherwise mutilate!), or touch its surface through any of the holes in the jacket. Never write on a diskette label (once the label is attached to the diskette) with anything but a felt-tip pen – and don’t press too hard! See the Disk Operating System (DOS) Manual for further tips on the proper care and handling of diskettes.



### **3. STARTING UltraPlan**

Once you have all the necessary equipment installed and connected properly, you're ready to start up UltraPlan.

To start UltraPlan:

1. Turn on your video monitor.
2. Open the door to the main disk drive. (The main drive is drive 1 in the highest-numbered peripheral slot containing a disk controller card. By convention, this is slot 6.)
3. Carefully insert your UltraPlan diskette into the disk drive, with the label nearest you and facing up, and push it gently into the disk drive as far as it will go. (If you hold the diskette with your thumb on the label, you will have it facing properly.)
4. Gently close the disk drive door.
5. Turn on your microcomputer.

The computer will issue a short beep, the disk drive light will come on, and the disk drive will begin making whirring and chattering noises. (Don't be concerned by these noises — they are perfectly normal.) In about 5 to 10 seconds the light will go off, and the noises will subside.

**Note:** If you own an Apple II which is not equipped with the Autostart ROM feature, it will simply beep when you turn on the power and display an asterisk (\*) near the bottom of the screen, followed by a blinking white box called the cursor.

To start up UltraPlan, you must now press the RESET key, type the number of the peripheral slot to which the main disk drive is connected (usually 6), then type the combination keystroke Ctrl-P. (Hold down the Ctrl key while typing the letter P.) Press RETURN. The disk drive should then start up, as described above.

6. The message: **LOADING** will appear on your screen, then a title page. At the bottom of the title page will be the prompt:

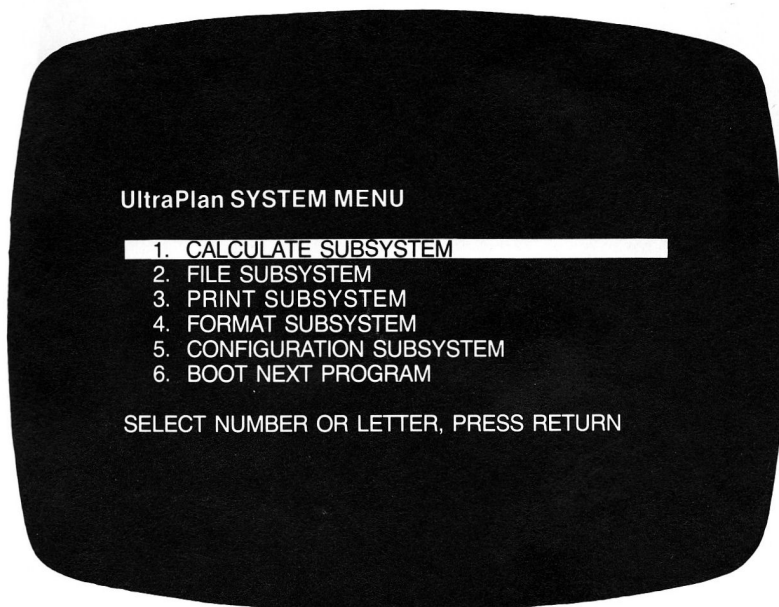
**INSERT CONFIGURATION/DRIVER DISKETTE  
<RETURN> OR ,S,D,V**

What you are being prompted to do is to place the diskette with the configuration options for your system in your disk drive, then press the key marked **RETURN**. The configuration and driver options will be discussed in the Reference Guide. For our purposes, we can use the supplied configurations, so just press **RETURN**.

7. After the disk drive light goes off, open the door again, carefully remove your program diskette, and put it away in a safe place.

## 4. THE MAIN MENU

If all has gone well, your screen should look more or less like figure 2. Let's take a moment to examine UltraPlan System Menu before going on into the Calculate Subsystem.



Notice the use of the word subsystem in the menu. UltraPlan is a *system* comprised of several smaller systems, or subsystems. You will spend most of your time using the Calculate Subsystem, which will often be referred to as *calculate* mode, to distinguish it from *menu mode*. You will also need the File, Print, Format, and Configuration subsystems to do everything you want.

Notice that menu item 1 – Calculate Subsystem is marked with a *highlight* bar. You may move about in the menu, or press the RETURN key to accept the selection marked by this highlight bar. Press the RETURN key now to enter the Calculate Subsystem.

## 5. THE WORKSHEET DISPLAY

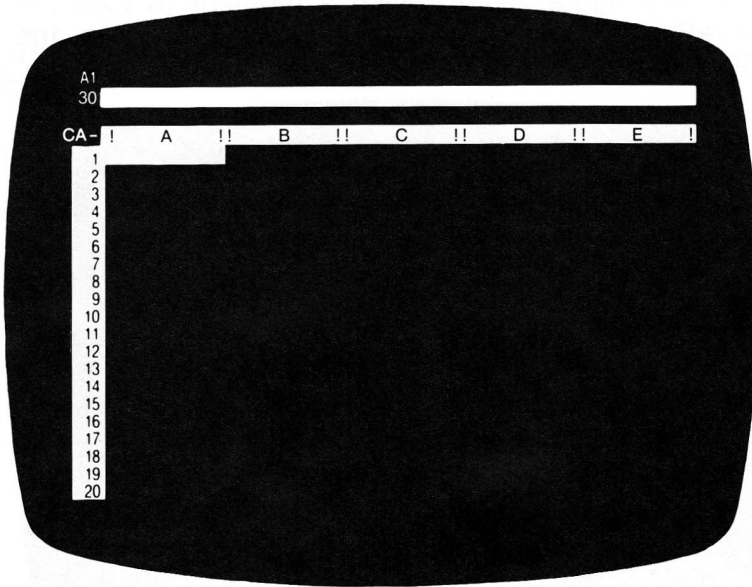


Figure 2.

Let's spend a few minutes looking at the various parts of the worksheet display and the information they contain.

### 5.1 The Information Box

At the very top of the screen is a region, two lines high, called the *information box*. UltraPlan uses this region to keep you informed about where you are and what you can do next.

## **5.2 The Contents Line**

The first line of the information box is called the *contents line*. It tells you which cell of the worksheet is the current cell (more on the current cell in a little while) and what that cell contains. Right now the contents line should be displaying the coordinate A1 at the extreme left; the rest of the line is blank, since you've just started up and every cell of the worksheet (including cell A1) is empty.

## **5.3 The Prompt Line**

Directly below the contents line is the *prompt line*. The prompt line is displayed as a white line, and the characters will appear in black. This line tells you what your options are from moment to moment. It is called the prompt line because UltraPlan uses it to “prompt” you about what you can do next. Right now the prompt line should be blank since you've just started.

## **5.4 The Memory Indicator**

The number at the left end of the prompt line is the *memory indicator*. It tells you how much space is left in the computer's memory for storing information on the worksheet. If your computer is equipped with memory RAM cards, this number should be 30 or more; if not, the number should be 14. This means that right now you have 30 or 14 kilobytes of memory available. (One kilobyte is equivalent to about 1000 characters of information.)

**Note:** As you fill up the worksheet, the number displayed in the memory indicator will get smaller. If it ever falls to zero, the computer's memory is full and there is no room to enter any more information on the worksheet. If this should happen, UltraPlan will display an error message informing you of the problem.

## **5.5 The Entry Line**

Directly below the white prompt line is a black line called the *entry line*. This line is like a temporary storage area for information you wish to place on the worksheet. Any information you type from the keyboard will appear on the entry line. If you wish, you can change, or edit the contents of the entry line at any time (to correct typing mistakes, for example). Then, when you're satisfied the information is correct, you enter it into the worksheet, usually by pressing the RETURN key.

## **5.6 The Worksheet Window**

Along the left edge of the screen is a vertical white column containing the numbers from 1 to 20. Above the column of numbers is a white horizontal stripe containing the letters A to E. These white borders mark the boundaries of *your* window into the worksheet. Each number on the left marks a row of the worksheet, and each letter at the top marks a column. Right now, twenty rows and five columns are visible in your worksheet window. The combination of a column letter and a row number (for example A1 or C17) is called a *coordinate*, and identifies a *cell* of the worksheet.

On the very left of the horizontal window border (containing the column letters), are three characters in a black box. These characters indicate various status information.

The leftmost of these is the *recalculation order indicator*. It will either be a C or an R. This indicates whether your worksheet will be recalculated column by column, or row by row. Recalculation will be discussed in greater detail in the Reference Guide.

The middle character is the *recalculation mode indicator*. It will either be an A or an M. This indicates whether recalculation will take place automatically whenever a new value is entered, or manually (upon request).

The rightmost of the three status characters is the *direction indicator*. It will either be a — or a !. This character indicates the direction the marker will move if an arrow key is pressed. This will often be referred to as the *marker direction*. If the direction indicator is a —, and an arrow key is pressed, the marker will move horizontally across the worksheet.

**Note:** If your computer's keyboard has up and down arrows, the direction indicator makes no difference to you. These keys are recognized by UltraPlan and are used to move up and down the spreadsheet.

**Note:** For the purposes of this tutorial we will be working in 40 columns. Later on, if you wish to switch to UltraPlan's 70-column display, or if you have an 80-column display board, you may do so.

## **5.7 The Current Cell Marker**

You can enter information into only one cell of the worksheet at a time. This cell is called the *current cell*. The current cell is marked by a white rectangle called the *current cell marker* (or simply the marker, which you should now see on on your screen at coordinate A1. The coordinate of the current cell (in this case, A1) is always displayed in the *current cell indicator* on the contents line, in the top-left corner of the screen.

## **6. BEEP!**

Everybody makes mistakes. Sooner or later, as you use UltraPlan, you'll make some kind of procedural error, and the computer will "beep" at you. That's a signal that whatever you've just typed doesn't make sense to UltraPlan. In most cases you can correct the error simply by trying again. If this causes another beep, go back and reread the instructions for whatever you were trying to do, see what you did wrong, then do it again the right way.

Similarly, you may from time to time make typing errors while entering information. That kind of error is easy to fix: see the sections of this manual titled CORRECTING TYPING ERRORS and EDITING A CELL for details.



## **7. MOVING THE MARKER**

Before you can enter information into a cell, you have to make that cell the current cell by moving the marker.

The marker can be moved in two ways: with the arrow keys, and with combination keystroke *control keys*. Let's look at the arrow key technique.

Press the right arrow key (on the right hand side of the keyboard). The marker should move to the right one space. Notice that the direction indicator is a dash (—), indicating horizontal movement.

The current cell indicator should now show B1 (because you've moved the marker).

Now press the space bar once. Notice that the direction indicator changes from a dash (—) to an exclamation point (!). This indicates that your movement direction is vertical now.

Press the right arrow key, and the marker will move down one cell to B2. Notice how the current cell indicator changes to reflect this move.

Press the space bar, then the left arrow key, and you will move the marker to A2.

Press the space bar, then the left arrow key, and you will move the marker back to A1 — right where you began.

If you now hit the left arrow key again, you'll hear a low-pitched tone, called a "thump". This is a signal that you've "bumped into the edge" of the worksheet and can go no further in that direction. Notice that the marker doesn't move and the current cell (A1) doesn't change.

The alternate method of moving the marker is to use combination keystrokes. These keystrokes allow you four direction motion within the worksheet without having to press the space bar, and there are several special options available. Here are the keys:

- Ctrl-Q    Move the marker up one.
- Ctrl-A    Move the marker left one.
- Ctrl-S    Move the marker right one.
- Ctrl-Z    Move the marker down one.

In order to activate one of these sequences, you must hold down the key marked Ctrl while simultaneously depressing the named letter.

The additional options are:

- Ctrl-W    Move the marker up half a screen.
- Ctrl-X    Move the marker down half a screen.
- Ctrl-E    Move the marker to the beginning of the worksheet.
- Ctrl-C    Move the marker to the end of the worksheet.

These marker control options are very useful in getting around in the worksheet quickly.

## **8. SLIDING THE WINDOW**

The electronic worksheet is actually much bigger than your screen. Make certain the direction indicator is a dash (horizontal movement). Press the right arrow key four times, to move the marker to cell E1 at the right edge of the screen. Now press the right arrow once more, and watch the row of column letters across the top of the worksheet window. The letters will shift one column to the left, with A disappearing at the left end and E appearing at the right. The worksheet window has *slid* one column to the right on the worksheet, pushing column A out of view and revealing column F which wasn't visible before.

If you continue to press the right arrow key, the window will continue to slide to the right over the worksheet, bringing new columns into view. You can think of the marker as dragging the edge of the window along as it moves across the worksheet. Try pressing the left arrow five times to move the marker back to the left, and you'll see the window slide to the left along with it. You can also slide the window up or down in the same way (if the direction indicator is vertical).

## **9. HOW BIG IS THE WORKSHEET?**

Now start pressing the right arrow key repeatedly, to move the marker and the window to the right again. Keep going until you reach the end of the alphabet. When you pass column Z, columns AA, AB, AC will appear.

By this time you're probably getting tired of pressing the right arrow key. Try holding down the right arrow for a second. Holding down any key causes that key to be repeated over and over again, at high speed. So in this case it sends a whole string of right arrows, for as long as you hold down the key. This feature is particularly useful for long-range marker moves such as you're doing now. (Certain computers do not have the Hold-Down feature. The same result however, is accomplished by simultaneously depressing the REPT key.) Continue to hold down Right Arrow until you start hearing "thumps" signaling that you're bumping into the right edge of the worksheet. After column AZ comes BA, BB, and so on. When you reach the edge of the worksheet, you will see that the last column is BK. Since K is the eleventh letter of the alphabet, this means that there are  $26 + 26 + 11 = 63$  columns altogether.

Now set the marker direction to vertical (by pressing the space bar). Press and hold down Right Arrow to move the marker repeatedly downward, and watch the column of row numbers at the left edge of the screen. When the marker reaches the bottom of the screen, the window will begin to slide downward over the worksheet, with old rows disappearing at the top and new rows coming into view at the bottom. Keep on holding down Right Arrow until you bump into the bottom edge of the worksheet. It takes quite a while, doesn't it? When you finally reach the bottom, you'll find that the last row on the worksheet is row 254. So altogether the worksheet contains 254 rows times 63 columns, or 16,002 cells. The current cell indicator at the beginning of the contents line should now read BK254, the cell in the bottom-right corner of the worksheet.

**Note:** In 80-column mode, and sometimes in 40-column mode, the screen will not be able to keep up with repeating sequences. This does *not* mean that UltraPlan is ignoring you. On the contrary, it will be updating its marker location internally, and will always update the uppermost row number (for vertical marker moves), and the leftmost column number (for horizontal marker moves).

## **10. JUMPING DIRECTLY TO A CELL**

Now that you have the marker in the bottom-right corner of the worksheet, how can you move it back to the top-left, where you started? You could go back the same way you came, using Left Arrow to slide the window up the worksheet, then pressing the space bar and continuing with Left Arrow to slide it to the left. But there's a quicker way to move the marker directly to any cell you wish. To jump directly to a cell while at command level:

1. Type the character > (hold down the SHIFT key and type a period.)

The character > stands for the Go To command. The prompt message:

### **GOTO: COORD**

will appear on the prompt line, and a small, blinking white box (or underline) will appear on the entry line. This blinking box is called the *edit cursor* (or simply the *cursor*) and means that UltraPlan is waiting for you to type something in on the entry line — in this case, the coordinate of the cell you wish to jump to.

2. Type the coordinate of the cell you wish to jump to.

Since you want to jump back to the top-left corner of the worksheet, type the coordinate A1. Notice that as you type each character, it appears on the entry line and the cursor moves one position to the right to show where the next character will go. If you make a typing error, you can correct it as long as the cursor is still visible on the entry line — see CORRECTING TYPING ERRORS, below.

3. When the coordinate on the entry line is correct, press the RETURN key to complete the Go To command. The marker will immediately jump to the requested coordinate, which will also appear in the current cell indicator at the top of the screen, and you will be back in calculate mode.

## **11. SUMMARY OF MARKER MOVEMENTS**

You have now learned four ways to move the marker from one place to another on the worksheet:

- With the right and left arrow keys, using the space bar to switch from horizontal to vertical movement.
- With the Ctrl – Q, Ctrl – A, Ctrl – S, and Ctrl – Z keys.
- With Right Arrow, and Left Arrow for rapid marker movements.
- Use the Go To command (type the character >) to jump directly to any desired cell.

Take a few minutes to practice these four different ways of moving the marker. Before long, you'll be able to move quickly to any cell you wish.

## **12. INFORMATION AND THE WORKSHEET**

Now you're ready to start entering information into the worksheet. Each individual cell of the worksheet can hold one single item of information, which may be either:

- A *value*: a number, or a formula telling how to calculate a number.
- A piece of *text*: a sequence of characters (letters, digits, spaces, punctuation, and so forth), not necessarily intended to represent a number or a formula.
- A *repeating label*: a pattern of characters that are to be repeated as many times as necessary to fill the cell.

You'll learn about each of these different types of information in the sections that follow.

A cell can hold no more than one item of information at a time. When you enter new information into a cell, it replaces any previous information the cell may have contained. It's a little like recording music on magnetic recording tape: the previous contents are permanently erased and cannot be recovered.



### **13. ENTERING TEXT INTO A CELL**

Let's begin building the demonstration model shown in Figure 1. The first thing we will want to enter is a set of column labels so we can keep our entries straight.

The first column title begins in cell A4, so move the marker to A4 using any of the methods described listed under SUMMARY OF MARKER MOVEMENTS.

Now, simply type the word:

#### **TASK**

As you type the first character, three things happen:

The word LABEL will appear in the prompt line.

The character "T" will appear on the entry line.

The character "T" will appear in cell A4 in the marker.

As you continue to type characters, the letters continue to appear on the entry line, the blinking cursor moves to the right, and the letters appear inside the marker in cell A4.

To terminate the entry of this label, simply press RETURN, or one of the keys that move the marker. The entry will then be accepted, and become part of your worksheet. Until you press one of these keys, the entry is available to be *edited*; that is, it is not yet permanent.

For the purposes of this example, terminate the input with a Ctrl-S, or a right arrow key (if the *marker direction* is horizontal, as shown by a dash in the direction indicator square).

Now, type the labels:

**HOURS** in cell B4

**RATE** in cell C4

**COST** in cell D4

just as you typed TASK.

You should now have all your column labels set up!  
That was easy, wasn't it?

Why not take off on your own for a moment and type in the row labels. Use the Ctrl-Z keystroke to enter these labels:

**RESEARCH** in A5

**FIRST PASS** in A6

**EDITING** in A7

**REWRITING** in A8

**TYPESETTING** in A9

**PRINTING** in A10

**TOTAL** in A11

If you are watching carefully, you will notice something strange happening when you enter the word RESEARCH. The entire word appears on the entry line, but in cell A6, where the marker is located, the word RESEARC appears.

UltraPlan remembers the entire label you type, but it displays only the number of letters it can fit in the column.

The worksheet display that we now have is not quite what we want, but that is where one of the most powerful features of UltraPlan comes into play: variable column width.

In many cases the row titles have to be longer than the amount of space required to display the numbers. It would be a shame, not to mention a waste of space, to set all the columns to a width large enough to accommodate the titles.

## **14. SETTING INDIVIDUAL COLUMN WIDTH**

In order to set the column width, you must have positioned the marker in that column. Position the marker in column A, if it is not already there using any of the marker movement commands discussed earlier.

Now type:

/

Do not hit a RETURN. You should see a new display on the prompt line:

**/: A B C D E F G I L M P R S T W –**

The slash (/) character signals UltraPlan that you are going to enter a command. What you see on the prompt line is the entire list of commands available at that point.

Now type the letter L (again no RETURN key is necessary). The prompt line will change to read:

**COLUMN WIDTH: 0 – 80 D**

The longest title we wish to display is TYPESETTING, which is eleven letters long, so type 11, and press the RETURN key to enter the new column width. Notice how column A expands to eleven spaces, pushing all the other columns over. UltraPlan now can display all of your row titles in their entirety!

## **15. ENTERING A VALUE INTO A CELL**

Now, let's enter the values for the hours.

Entry of values is much the same as entry of labels.

1. Move the marker to the desired cell (in this case B5).
2. Type the number you wish to enter.

Type the number 65. Just as before, what you type will appear on the entry line, with the cursor advancing a character at a time as you type. As long as the cursor is still visible on the entry line, you can edit what you've typed to correct errors, or cancel the entire entry and restore the cell to its previous contents (see CORRECTING TYPING ERRORS, which follows).

3. When the information on the entry line is correct, press the RETURN key to enter the information into the current cell.

When you press RETURN, the contents of the entry line (65) will be transferred to the current cell (B5), replacing any information the cell may have contained previously. The entry line will be cleared, the edit cursor will disappear, and you will be returned to calculate mode.

There is no way to recover what you had in a cell after you have entered new data by pressing the RETURN or marker movement keys, so be sure you are not overwriting valuable data before pressing RETURN (or one of the marker movement keys).

Notice that the contents line (the top line of the screen) has changed to read:

**B5      V:65**

This line always shows you the contents of the current cell. In this case, B6 is the coordinate of the current cell; the V: means that the cell contains a numerical *value*; and 65 is the value the cell contains.

Now enter the values for the rest of the items as follows (remember to terminate each entry with a RETURN or a Ctrl-Z):

<b>FIRST PASS</b>	<b>112</b>
<b>EDITING</b>	<b>56</b>
<b>REWRITING</b>	<b>68</b>
<b>TYPESETTING</b>	<b>52</b>

Do not enter anything for PRINTING.

## **16. CORRECTING TYPING ERRORS**

If you make a mistake while typing something on the entry line, all is not lost. Recall that the entry line is only a temporary storage area – the information you type there doesn't become final until you *enter* it into the worksheet, by pressing the RETURN or marker movement keys. As long as you have not pressed one of these keys, you can modify the entry or back out entirely.

The simplest way to correct a typing error is to just back over the letters you typed in error, then retype the correct ones. This is where the special key marked ESC (for ESCape) comes into play.

The ESC key is your backspace key. It also deletes the characters it backs over, allowing you to enter them again correctly.

**Note:** Using the ESC key to back the cursor all the way out of the beginning of the entry line will cancel the entire entry and return you to calculate mode.

Let's enter the first word of the title: PROGRAM DOCUMENTATION PLANNING MODEL, and get some practice using the ESC key to correct typographical errors.

First, move the marker to cell B1. Now, type:

**PRAGRAM**

Do not press the RETURN or marker movement keys. You will notice that there is an error in the spelling. In order to correct this, press the ESC key. Notice how the M disappears, and the blinking cursor moves one space over to the left.

Continue pressing the ESC key until you have erased all the characters except the PR (press the ESC key four more times).

Now, type:

**OGRAM**

Since what you now see on the entry line is correct, you may press the RETURN or marker movement keys to enter it.

## **17. HINTS ON ENTERING TITLES**

Entering titles into UltraPlan is a very simple task, and will help you identify the nature of the data in your various worksheets.

Using the title we began to enter in the previous section, we now have the partial title:

### **PROGRAM**

Notice that the word PROGRAM completely fills cell B1. We know from previous experience that if we were to continue typing, the entry would be remembered, but only the amount that fit in the column would be displayed.

This time, we will move over to the next column to continue the title, as expanding the column width would interfere with the columns of numbers below.

Move the marker over to cell C1. Note that the continuation of the title must begin with a space. We know that simply typing a space signifies to UltraPlan that we wish to change the marker movement direction.

In order to start a label with a space, a number, or any character that has special significance to UltraPlan, we must first type a quote mark ("). To enter the continuation of our title, type the quote mark now.

The word LABEL should now appear on the prompt line.

Now type a space, then the next word, DOCUMENTATION, watching what happens as you type each letter.

When you reach the first N in DOCUMENTATION, you run out of room in the cell. You can tell this by watching the letters as they appear in the cell. This is a signal to you that it is time to move to the next cell.



Using the ESC key, back up over the N, then enter the word DOCUME (with a space at the beginning) by pressing RETURN or one of the marker movement keys.

Move the marker to cell D1 if it is not already there, and complete the first title line by typing:

**NTATION.**

Now, move the marker in cells B2 and C2 and enter the title:

**PLANNING MODEL**

the same way as you entered the previous line.

## **18. IMMEDIATE CALCULATIONS**

Now, let's enter the values for rates. Say the employees doing the bulk of the work – research, first pass, editing, and rewriting are making \$18.00 per hour, plus fringe benefits and office space considerations amounting to roughly 36% of their hourly salary. We can express the effective rate as 18.00 times 1.36.

Move the marker to cell C5, using any of the marker movement keys, and type the formula:

**18\*1.36**

**Note:** The asterisk (\*) is UltraPlan's multiplication symbol.

As when you entered the values for hours, the prompt line will immediately display the word VALUE.

If you were to press RETURN or a marker movement key, the formula would be entered as is, and the result of the formula would be placed in cell C5. This is not always desirable, as UltraPlan has to reevaluate *all* formulas every time it recalculates the worksheet. Since this number is relatively constant, and has no dependencies on other cells, we can use *immediate calculation* to replace our formula on the entry line with the actual result.

Press the exclamation point (!), and the formula on the entry line will be replaced with 24.48. Now you may press RETURN or one of the marker movement keys to enter the data.

Now enter the rest of the values for rate, either by typing them in directly, or by using the immediate calculation feature.

## **19. INSERTING AND DELETING ROWS AND COLUMNS**

We forgot to put in rows for the dashed lines. It would be a shame if we had to re-key all of our work just to rectify so small an error. We all change our minds about what we want to put in planning models, so UltraPlan has a facility for inserting and deleting rows and columns.

To insert a row in the worksheet:

1. Move the marker to the row below where the new row is to go.

In this case, since you're adding a new row above RESEARCH, you want the marker positioned in row 5.

2. Type the slash (/) key. You will recall that this key signals UltraPlan that you are about to enter a command.

The prompt line will now read:

**/: A B C D E F G I L M P R S T W –**

Indicating your possible choices.

3. Press the I key, indicating that you want to insert.

The prompt line will display the message

**INSERT: R(–) C(!)**

asking whether you wish to insert a row or a column. It might seem trivial, but it is not apparent to some people which are rows and which are columns. That is why the (–) and (!) are included in the prompt. Rows are horizontal (–), and columns are vertical (!). You should be familiar with this convention from the marker direction indicator.

4. Type R (for Row).

A new, empty row will appear at the marker position; the row containing the marker, and everything below it, will be shifted down one place to make room, and you will be returned to the calculate mode.

**Note:** In the future, we will not spell out the commands in such detail – we will simply say, for example:

Type /IR to insert a row. This stands for:

- command
- insert
- row

Now, type /IR (Insert Row) five more times, so that you have six blank rows between TASK and RESEARCH. Note how the row containing the word RESEARCH moves down each time.

Inserting a column in the worksheet is virtually the same. Simply follow this procedure:

1. Move the marker to the column where the new column is to go.
2. Type /I (for Insert).

As before, the prompt line will display the message

**INSERT: R(–) C(!)**

asking whether you wish to insert a row or a column.

3. Type C (for Column).

A new, empty column will appear at the marker position; the column containing the marker, and everything to the right of it, will be shifted one place to the right to make room; and you will be returned to calculate mode.

It's just as easy to delete a row or a column from the worksheet as it is to add one. Let's delete one of the extra rows you just added at the top of the worksheet.

To delete a row or column from the worksheet:

1. Move the marker to the row or column you wish to delete.

For now, place the marker in row 5.

2. Now type /D (for delete).

The prompt line will display the message

**DELETE:      R(–) C(!)**

asking whether you wish to delete a row or a column.

**CAUTION:** Although in this case you're only deleting an empty row, it's just as easy to delete a row or column full of information. Once you type R or C, the contents of the row or column the marker is in will be permanently erased from the worksheet – you will not be able to get them back. Make sure you have the marker in the right place! If you don't, or if you change your mind about deleting the row or column, or have typed D by mistake, you can cancel the Delete command by pressing any key except R or C.

3. Type R (for Row), or C (for Column).

In this case, since you really do mean to delete the row containing the marker, type R. Row 5 will disappear from the worksheet; everything below it will be shifted up one place to close up the space.

Type /DR four more times to delete the excess space and leave room for the row of dashes.

Now, following the procedure you have just learned, insert a blank row for the dashes between PRINTING and TOTAL.

## **20. BLANKING OUT A CELL**

Let's assume you have made a grievous mistake and entered some data in a cell you actually wanted to leave blank. You have the choices of entering a blank label, or simply telling UltraPlan to blank out the cell. The latter method is preferable.

To blank out the contents of a cell of the worksheet:

1. Move the marker to the desired cell.

For this example, move the marker to any cell that has something in it.

2. Type /B (for Blank)

The message

### **BLANK**

will appear on the prompt line. You must press a RETURN or marker movement key to confirm this operation. The ESC key will back you out of it. This extra *confirmation* step protects you from accidentally destroying the information on your worksheet. UltraPlan is asking, "Are you sure you want to blank out the current cell?"

**CAUTION:** When you press RETURN, the contents of the current cell will be permanently erased from the worksheet – you will not be able to get them back. Be sure this is really what you want to do! If you change your mind about blanking out the cell, or have typed /B by mistake, you can still cancel the Blank command by pressing the ESC key.

3. Press the RETURN key to complete the Blank command and return to the calculate mode.

The contents of the cell will disappear from your screen, and you will be back in calculate mode.

**Note:** It isn't necessary to blank out a cell in order to store something new into it. Just entering new information into a cell automatically erases any previous information the cell may have contained.

## **21. EDITING A CELL**

Once labels and values have been entered into cells, you may recall this data for *editing*.

Assume you looked at your worksheet and decided FIRST PASS really would look better if it read PASS ONE.

To edit the contents of a cell:

1. Move the marker to the cell you wish to edit.

In this case, move to cell A7, the cell in which FIRST PASS appears.

2. Type /E (for Edit).

The contents of the current cell,

**FIRST PASS**

will appear on the entry line, with the cursor over the first character. The prompt line will change to read:

**EDIT A LABEL**

since that's the kind of information the cell contains.

3. Edit the contents of the entry line.

The first thing you want to do is delete the letters:

**FIRST**

The right and left arrow keys allow you to move the cursor back and forth on the entry line. Position the cursor so it follows the first character to be deleted – in this case, the space following the word FIRST.



Now use the ESC key to back up over the space, and the word FIRST. The DELETE key, available on some computers, may also be used.

If you try to back up past the beginning of the line, you will hear the familiar “thump”, indicating that you have bumped into the end of the data.

Notice the difference between the action of the arrow keys and the ESC key in edit mode:

Arrow keys are *non-destructive* cursor movement keys.

The ESC (or DELETE) key is a *destructive* backspace key.

Now, using the right arrow key, move the cursor to the end of the word PASS (which is all that is left on the entry line).

If you move the cursor past the end of the data on the line, you will again hear a “thump”, indicating that you have bumped up against the end of the data. The cursor will remain in the position after the last character if you were moving right, or on the first character if you were moving left.

Type a space, then the word ONE. Now, when you press RETURN to accept the edited entry, the label will read PASS ONE.

**Note:** To “escape” from an edit, use the CTRL-V keystrokes.

Let’s assume that after looking at the display you decide that FIRST PASS looked better after all.

Position the marker over cell A7 and type /E (edit a cell).

Again the message:

### **EDIT A LABEL**

will appear on the prompt line. The first thing we want to do is remove the space, and the word PASS, so we will use a new editing key: Ctrl-T. Ctrl-T *truncates* the text on the entry line at the cursor position – that is it deletes all characters from the cursor position to the right end.

Using the right arrow key, position the cursor over the space between PASS and ONE. Now, press Ctrl-T (hold down the Ctrl key, and simultaneously depress the T key).

The space and the word ONE are instantly gone! Now for the exciting part:

Move the cursor back to the first character on the line (in this case, the P in PASS). Now type:

### **FIRST**

and don't forget the space. Did you see how each character you typed pushed all the others to the right?

Of course, you must press a RETURN to enter the modified text.

**Note:** You may enter edit mode from text or value entry mode simply by typing Ctrl-E. Remember, however, that Ctrl-E is a marker movement key also, so in some cases it makes more sense to UltraPlan to move the marker (as you will see later) than to enter edit mode.

## **22. ENTERING A REPEATING LABEL**

How about underlining those column headings, to make them look more professional? You can underline each heading by filling the cell below it with dashes. The easiest way to do this is with a *repeating label*: a pattern of one or more characters that will be repeated as many times as necessary to fill up a cell on the screen.

To enter a repeating label into a cell of the worksheet:

1. Move the marker to the desired cell.

The first underline goes in cell A5, so move the marker there.

2. Now, type /—

The dash stands for the Repeating Label command. The prompt line will display the words REPEAT LABEL. UltraPlan is prompting you to type your repeating label. Whatever you now type on the entry line will be repeated as many times as necessary to fill up the current cell (regardless of the column width!).

3. Type the repeating label.

Since you want to fill cell A5 with dashes, type another dash. The first dash you typed (step 2) was a command to UltraPlan, the Repeating Label command. This second dash (step 3) is the actual repeating label itself. (This particular repeating label happens to be just one character long, but you can type one of any length you wish.)

As usual, you can edit the contents of the entry line or back out of the repeating label operation using the ESC key, or the Ctrl-E edit command until until you press RETURN or a marker movement key.

4. When the repeating label is correct on the entry line, press RETURN or a marker movement key to enter it into the current cell and return to calculate mode.

Cell A5 will fill up with dashes, as advertised! Notice that the contents line at the top of the screen now reads:

**A5    /– L: –**

The /– means that the cell contains a repeating label; the L: means that what follows is the repeating label and the dash after the L: is the actual repeating label itself.

You may be wondering why you couldn't just type in enough dashes to fill up the cell, instead of using a repeating label. One good reason is simply that it's easier to type just one dash and let UltraPlan do the repeating. (That's what computers are for—to do repetitive tasks for you.) But there's an even better reason: if you just type in the dashes and later decide to change the width of the column, you'll suddenly find that you have the wrong number of dashes in cell A5. When you use a repeating label, UltraPlan will always fill up the cell automatically with the right number of dashes, no matter how wide you make the column.

## 23. REPRODUCING A CELL

To underline the three remaining column headings, you could repeat the procedure you've just learned in cells B5, C5, and D5. But (as usual) there is an easier way: you can *reproduce* (just a ten-dollar word for “copy”) the contents of cell A5 into cells B5 through D5.

To reproduce the contents of one or more cells into one or more other cells,

1. Type /R (for Reproduce).

The prompt line will display the message

**REPRO: (, SOURCE RANGE OR RETURN**

and the coordinate of the current cell (A5) will appear on the entry line, followed by the cursor. UltraPlan is prompting you to specify on the entry line the cell you wish to reproduce (the *source*) and where you want to reproduce it to (the *destination*), separated by a colon.

2. Edit the entry line, if necessary, to contain the correct source coordinate(s) (those of the cell or cells you wish to reproduce).

You're only reproducing a single cell this time, so the source will consist of just one coordinate. (In the next section you'll learn how to reproduce more than one cell at a time.) For convenience, UltraPlan assumes that the current cell is the one you're most likely to want to reproduce, so it automatically fills in the coordinate of that cell on the entry line.

In this case, since the current cell is in fact the cell you wish to reproduce, no editing is necessary – just go on to step 3. If you wanted to reproduce some other cell instead, you could correct the coordinate on the entry line just as if you were correcting a typing error.

**Note:** You will always get the right source coordinate filled in for you automatically if you begin by moving the marker to the cell you wish to reproduce, before typing /R (step 1 above). However, if the cell you are reproducing is some distance away from the marker, you may find it easier not to move the marker, but to edit the source coordinate on the entry line instead. Use whichever method seems more convenient in any particular case.

3. When the entry line contains the correct source coordinate(s), type a colon (:) to separate the source from the destination.
4. Supply the destination coordinate(s) (those of the cell or cells you wish to reproduce into) on the entry line.

For now, just type:

**B5.D5**

from the keyboard.

Notice when you type the period, UltraPlan expands it into three periods. This is because three periods is the standard notation for ellipsis, or specification of a series by beginning and ending location.

In the next section you'll learn another way of specifying coordinates that is often more convenient.

The entry line should now read

**A5:B5...D5**

The part before the colon (A5) is the source of the reproduction; the part after the colon (B5...D5) is the destination. A destination of this form, consisting of two coordinates separated by three periods (note: you never have to type the other two periods), is called a range, and means that you want to reproduce the source (A5) into every cell from B5 through D5.

5. When the entry line contains the correct source and destination coordinates, press the RETURN key to complete the Reproduce command and return to command level. The repeating label you entered earlier in cell A5 will be copied (reproduced) into cells B5 through D5, and you'll be back in calculate mode again.

Again, you may be thinking that it would have been easier just to enter the repeating label into each of the cells separately. Well, it might (or might not) have been easier in our tiny example, but what if you had 48 monthly columns to underline instead of four annual ones? One Reproduce command is a lot quicker than filling in 48 cells, one at a time!

## **24. POINTING WITH THE MARKER**

You're going to need another row of dashes to separate the figures for the various tasks from the totals on the "bottom line". In fact, you've already made room for them in row 12 of the worksheet.

You can use the Reproduce command again to copy the row of dashes from row 5 to row 12. But this time, instead of reproducing just one cell, you'll learn how to reproduce a whole *range* of cells at once. And instead of typing the source and destination coordinates from the keyboard, you'll learn how to *point* at the desired cells by moving the marker, letting UltraPlan copy the coordinates to the entry line for you.

You're going to reproduce cells A5 through D5 into cells A12 through D12. Just as you did in the preceding section, begin the Reproduce command by typing /R. As before, the message:

**REPRO: (, SOURCE RANGE OR RETURN**

will appear on the prompt line and the coordinate of the current cell (A5) will automatically be copied to the entry line, followed by the edit cursor. The *source range* is the cell, or range of cells you wish to reproduce.

This time, instead of just the single cell A5, the source of the reproduction will be the *range* of cells from A5 to D5. You can specify a source range the same way you specified the destination range last time, by giving the coordinates of the first and last cells in the range, separated by a period. Since the first cell in the range is the current cell (A5), its coordinate has already been filled in on the entry line. Instead of typing the "... " separator (this is the UltraPlan notation for a range), we're simply going to let UltraPlan fill it in for us. This time, instead of typing in coordinate D5, you're going to *point* at cell D5 with the marker, and let UltraPlan fill in the coordinate for you automatically.



To specify a coordinate by pointing with the marker simply use any of the marker movement keys (the arrow keys, Ctrl-Q, Ctrl-A, Ctrl-S, Ctrl-Z, Ctrl-W, Ctrl-X, Ctrl-R, and Ctrl-C) to move the marker to the cell.

As soon as you press one of the marker movement keys, UltraPlan fills in the “...” separator, and copies the coordinate of the cell upon which the marker is resting onto the entry line as the last cell in the range.

You may use the space bar to switch the marker movement direction at any time during this process, if you have only left and right arrow keys.

As you continue to move the marker, the cell coordinate displayed on the entry line changes. Type Ctrl-S three times to move the marker three cells to the right, to the last cell in the range you wish to reproduce (D5).

3. Now you must supply the punctuation character that is to follow the coordinate on the entry line. In this case it is a colon (:).

A *punctuation character* is a character used as a separator (much the same as punctuation characters are used as separators in the English language). In UltraPlan, you will be using the colon (:) as the punctuation character that separates the source range from the destination range in the Reproduce command, and the period (.) as the punctuation character that separates the beginning and ending cells in each of these ranges.

Other punctuation characters are used in UltraPlan, but they are better thought of as arithmetic operators (+, -, /, \*), or *relational operators* (<, >, =, <=, >=). We will go into the uses of some of the arithmetic operators later in the Tutorial. All the operators will be covered in the Reference Guide.

Once the punctuation character is typed, UltraPlan will display the message:

**REPRO: ENTER TARGET RANGE OR RETURN**

on the prompt line. The *target range* is the cell or range of cells to which you want to reproduce your source cell(s).

UltraPlan will try to prevent you from making obvious errors. For example, if you had typed:

**B1...E1**

on the entry line, and then tried to enter a letter, rather than a colon, UltraPlan would beep at you, then wait for you to make an acceptable entry. Some errors are impossible for UltraPlan to detect, for example, if you had typed a 0, rather than a colon, UltraPlan would assume you meant to use coordinate E10. Fortunately, the ESC key will back up over mistakes of this nature.

**Note:** If you press the RETURN key instead of a punctuation character, UltraPlan will insert a colon (:) and prompt you for the target range. You may make any corrections necessary using the ESC key simply by backing over the colon, and the erroneous letters or numbers.

As shown on the prompt line, the source and destination are to be separated on the entry line by a colon; so type a colon (:), if you haven't already done so. The marker will jump back to cell A5. The entry line should now read:

**A5...D5:**

Now you can supply the destination coordinate in the same way. Use the marker movement keys (either the arrow keys, or the Ctrl keys) to move the marker down to cell A12 (which is the first cell you wish to reproduce into).

Notice that as soon as you press one of the marker movement keys, the cell on which the marker is resting appears on the entry line immediately following the colon (:). By now, you should be getting the idea of pointing with the marker.

The entry line should now read:

**A5...D5:A12**

This means you want to reproduce the range of cells from A5 to D5 (the source) to locations *beginning* at A12 (the destination). Now press RETURN to complete the Reproduce command, and the row of dashes will be copied from cells A5 to D5 into A12 to D12.

**Note:** Notice that you didn't have to specify the entire destination range, just the first cell. When the source you specify is a range and the destination is only a single cell, the actual destination is understood to be a range of cells, with the same dimensions as the source, beginning at the requested destination coordinate.

You've now learned two different ways of specifying the coordinate of a cell: (1) by typing the coordinate directly from the keyboard, and (2) by moving the marker to point at the cell using any of the marker movement keys.

Now that you know both methods, you can use the one that's more convenient in any particular case. If you make a mistake at any point in this process, you are free to use the ESC key to backspace over the error, then either retype the correct information, or point with the marker.

Just for practice, use the Reproduce command to copy the rate from C6 to cells C7 through C9.

Now enter the rate for TYPESETTING in cell C10 just by entering the value 19.

## **25. INITIALIZING A DISKETTE**

By now you've done quite a bit of work on the demonstration model—it would be a pity if the lights went out and you had to reconstruct it all from scratch. It's a good idea to save the contents of your worksheet frequently on a floppy diskette, as insurance against disaster. Then, if someone should happen to trip over your computer's power cord, you can back up to the last version of the worksheet you saved, losing only the work you've done since then. Accidents do happen—don't "play for more than you can afford to lose"!

Before you can store any information on a diskette, you first have to initialize the diskette. Once the diskette has been initialized, you can add more information to it whenever you wish. So there's no need to initialize a diskette every time you want to save your worksheet—you only have to do it the first time you use a particular diskette.

Take a blank diskette and write something descriptive on the label, such as "UltraPlan Storage Diskette" and the date.

**CAUTION:** Never use anything but a felt-tip pen to label a diskette, and don't press down too hard, to avoid damaging the surface of the diskette inside its black jacket. If you're using a gummed label that isn't already attached, it's safest to write on the label *before* attaching it to the diskette.

**Note:** Always label a diskette the first time you store anything on it, so the next time you pick it up you'll know what it contains.

To initialize a diskette:

1. Place the diskette you wish to initialize in one of your disk drives.

Open the door to any disk drive and carefully insert the diskette you just labeled, with the label nearest you and facing up. (If you hold the diskette with your thumb on the label, you will have it facing properly.) Push the disk gently into the disk drive as far as it will go, then gently close the disk drive door.

2. Type /S (for Storage).

The prompt line will change to read:

**ENTER LOWER RIGHT OR RETURN**

You will only need to enter a lower right coordinate if you are using DIF files (DIF files will be covered in the Reference Guide), and do not wish to save the entire worksheet.

Press the RETURN key.

The following menu will be displayed:

FILE SUBSYSTEM

A. STARTING CELL.....	A1
B. ENDING CELL.....	A1
C. USE DIF FORMAT.....	NO
D. ROW ORDER FOR DIF.....	NO
E. DISK SLOT.....	6
F. DISK DRIVE.....	1
G. DISK VOLUME.....	0

**1. UltraPlan SYSTEM MENU**

2. CHANGE OPTIONS
3. SAVE WORKSHEET
4. LOAD WORKSHEET
5. FILE CATALOG
6. LOCK A FILE
7. UNLOCK A FILE
8. INITIALIZE DISK
9. DELETE A FILE

SELECT NUMBER OR LETTER, PRESS RETURN

**Note:** If you press the ESC key twice, it will back you out of the Storage command, and return you to the calculate mode.

3. Make sure the Disk Slot (option E) and Disk Drive (option F) correspond to the disk drive in which you placed your blank diskette.

Slot and drive numbers are explained in the Disk Operating System (DOS) Manual that came with your disk drives. If you only have one disk drive, you don't need to worry about slot and drive numbers: UltraPlan will set them for you automatically. So you can skip this step and just go on to step 4.

If you have more than one disk drive, you must make sure the slot and drive numbers on the prompt line correctly identify the drive the diskette is in. Whenever you start up UltraPlan, the slot and drive numbers are automatically set to those of the main disk drive (the one you used to start up the system). So if you placed the blank diskette in that drive, the slot and drive numbers are guaranteed to be correct, and you can go on to step 4. If you are using a different disk drive, you have to change the slot and drive numbers to the correct ones before going on.

To change any of the options, you may move the highlight bar (which should be resting on UltraPlan SYSTEM MENU) either by using the arrow keys, or by typing the number of the menu item you wish to select.

In order to actually make a selection, you must first move the highlight bar, as described above, then press the RETURN key, or repeat the number or letter of the option to confirm the selection.

For example, we could select item 4—LOAD WORK-SHEET by pressing the arrow keys until the highlight bar was over item 4, then pressing the RETURN key; by typing 4, then pressing the RETURN key; or by typing 4 twice. To change the Disk Drive, type the letter F. The highlight bar will immediately jump to F. DISK DRIVE.

Now, press RETURN to confirm your selection.

At the bottom of the screen the following prompt will appear:

**ENTER, (MIN = 1, MAX = 2);**

Followed by a blinking cursor.

This prompt is telling you the acceptable values for this entry. UltraPlan will beep and wait for reentry if you type any illegal characters or values.

If you simply press RETURN, the entry will remain unchanged.

ESC will always back up, just as in the calculate mode, so if you press ESC, the cursor will back over any entry, and when there is no more data to back over, you will see the highlight bar jump immediately to 1. UltraPlan SYSTEM MENU.

**Note:** The ESC key will back you out of any menu operation, and if you keep pressing it, you will wind up in calculate mode.

You can change the slot number the same way, except you must select item E.

4. Move the highlight bar to item 8. INITIALIZE A DISKETTE using either the arrow keys, or by typing the number 8.
5. Press RETURN to confirm your selection.

The message:

**INSERT DISK TO BE ERASED  
HIT<RETURN>TO CONTINUE  
<ESC> TO ABORT**

will be displayed on the screen.

**CAUTION:** If you reinitialize a diskette that already has information stored on it, the diskette will be wiped clean and the information it previously contained will be permanently erased. Never initialize a diskette unless you're sure it doesn't contain useful information that you want to keep.

Since initializing a diskette will erase any previous information it contains, UltraPlan is giving you a chance to "back out" safely, without destroying any information.

**Note:** If you change your mind or have made a mistake, you can now cancel (or "abort") the Initialize command by pressing the ESC key.

In this case, you really do want to initialize the diskette, so

6. Press the RETURN key.

The red light on the front of the disk drive will come on, and the disk drive will begin making its usual noises. After about 30 seconds the noises will stop, the light will go off, and you will be returned to the FILE SUBSYSTEM. The diskette is now initialized and ready to receive information.



**Note:** Remember, you don't need to initialize a fresh diskette every time you want to save your worksheet. Once a diskette has been initialized, you can always add more information to it. So the next time you save the worksheet you can just use the same diskette, without reinitializing it. (In fact, if you *do* reinitialize a diskette after storing information on it, all the information it contains will be permanently erased.)

**Note:** The diskette you have initialized is *not* like a normal “master program” diskette as it does not contain the disk operating system on it. What this really means is that you cannot boot it.

Press the ESC key twice to return to calculator mode.

**Note:** It is always safe to use the ESC key to exit a menu – if you use the RETURN key, you may inadvertently select a menu item you had not intended to.

## **26. SAVING THE WORKSHEET**

Now that you've initialized a diskette, you can save the contents of the worksheet on it.

To save the worksheet on a diskette:

1. Make sure the diskette you wish to use is in one of your disk drives.

UltraPlan storage diskette that you've just initialized should still be in the disk drive, so just go on to step 2.

2. From calculator mode, type /S (for Storage), then RETURN.

Once again, your worksheet display will be replaced by the File Subsystem menu.

3. Make sure the Disk Slot and Disk Drive numbers on the menu are the correct ones for the disk drive you're using.

You've already set the slot and drive numbers (or had them set for you automatically) when you initialized the diskette in the preceding section. Since you haven't moved the diskette to a different drive, these settings should still be correct, so just go on to step 4.

4. Move the highlight bar to item 3. SAVE WORKSHEET, and press RETURN to confirm your selection.

Ordinarily, a list of files would be displayed on your screen. These files would be numbered for easier selection. Since you are using a freshly initialized diskette, there will be no file display this time.

At the bottom of your screen the prompt:

**SAVE: FILE NAME, NUMBER, OR (RETURN)**

will be displayed and the edit cursor will appear. UltraPlan is prompting you to supply the name under which you wish to file this worksheet on the diskette (or the number of the file, if it is listed in the file catalog).

**Note:** The word *file* refers to a unit of information stored on a diskette, such as the contents of a worksheet. A diskette may contain any number of files, as long as their total length doesn't exceed the diskette's capacity of 143 kilobytes. Whenever you write a file on the diskette, you must give it a file name, so that you can find it later. A *file name* may consist of any sequence of characters you wish (including spaces and punctuation marks), provided that the first character is a letter of the alphabet.

5. Type the file name you wish to use.

Since this demonstration model does program documentation planning, let's file it under the name PROGRAM PLAN. Type the letters PROGRAM PLAN. What you type will appear on the entry line, followed by the edit cursor. This gives you a chance to edit the name using the ESC key to back up in case you make a typing error.

**CAUTION:** A diskette cannot contain two or more files with the same name. If there is already a file on the diskette with the same name you type now, that file's previous contents will be permanently erased and replaced with the current contents of the worksheet. You will be given no warning that you are about to destroy information on the diskette, and no opportunity to confirm your intentions. Make sure you don't use the same name as any file you want to keep!

You don't have to worry about the name you choose this time, since you've just initialized the diskette and you know it's empty. But be careful the *next* time you save a worksheet!

6. When the file name is correct, press the RETURN key to complete the Save command.

The red light on the front of the disk drive will come on, and the drive will whirl for a few seconds. When the light goes off, a new catalog of the diskette will be displayed, with your new file on it.

**Note:** To interrupt a catalog at any time, press the ESC key. You will be spared the rest of the catalog listing.

The prompt:

**<RETURN> TO CONTINUE**

will appear at the bottom of your screen.

When you press RETURN, you will be returned to the File Subsystem menu.

Press RETURN twice to get back to the calculator mode.

## **27. STARTING A NEW WORKSHEET**

Now that you've saved your model on the diskette, you need to know how to load it back in from the diskette to the worksheet. First let's start a new, empty worksheet, so you can see the information you saved reappear when you load it back in.

**Note:** It is necessary to clear the worksheet every time you load a diskette file unless you want to *overlay* the one that is currently in memory.

To start a new worksheet:

1. Type /C (for Clear).

The message:

**CLEAR: TYPE Y TO ERASE EVERYTHING**

will appear on the prompt line.

**CAUTION:** If you now type Y, a brand-new worksheet will be started, permanently erasing the worksheet's previous contents. Be sure this is really what you want to do! If you're going to need the current worksheet again, always be sure to save it on a diskette file before starting a new one, so it will be available to load back in later.

*Because the effect of the Clear command is irreversible, UltraPlan stops and asks whether you're sure this is what you want to do. This extra confirmation step protects you from accidentally *destroying* the information on your worksheet.*

**Note:** If you change your mind about starting a new worksheet, or have typed /C by mistake, you can still cancel the Clear command by pressing any key except the letter Y.

**Note:** If you change your mind about starting a new worksheet, or have typed /C by mistake, you can still cancel the Clear command by pressing any key except the letter Y.

Since you really do want to start a new worksheet this time,

2. Type Y (for Yes).

All the information on the worksheet will disappear and the marker will jump to the top-left corner (cell A1). You now have a fresh, empty worksheet to work with.

Notice that the width of column A is reset to 7, rather than remaining at the 11 we set it at on the previous worksheet. The reason for this is that all *new* worksheets begin with a set of modifiable defaults, and the default for column width is 7.

If you'd like to take a break and continue your lesson another time, now would be a good time to do it. Turn off your computer and video monitor, remove UltraPlan storage diskette that you've just created, and put it away in a safe place. When you're ready to resume your lesson, start up UltraPlan again (using the procedure given under STARTING UltraPlan at the beginning of this manual) and continue with the next section.

## **28. LOADING THE WORKSHEET**

Now you can load the program documentation planning model back into the worksheet from the diskette file where you saved it.

**CAUTION:** Loading the worksheet from a diskette file permanently overwrites any previous information already on the worksheet. If the worksheet contains information you're going to need again later, always be sure to save the old worksheet on a diskette file before loading a new worksheet.

**Note:** When you load a worksheet over another one, the cells that are blank in the worksheet you load will still have the old data in them. This is why it is important to clear out the old data in most cases.

To load the worksheet from a diskette:

1. Make sure the diskette you wish to load from is in one of your disk drives.

If your UltraPlan storage diskette isn't already in a disk drive, put it in one now.

2. Type /S (for Storage).

The message:

**ENTER LOWER RIGHT OR RETURN**

will appear on the prompt line.

Type RETURN to enter the File Subsystem.

3. Make sure the Disk Slot and Disk Drive numbers on the menu are the correct ones for the disk drive you're using.

If you have only one disk drive, just go on to step 4. If you have more than one drive, recheck the slot and drive numbers on the menu to verify that they correspond to the drive you're using. If you need to change the slot or drive number, refer back to INITIALIZING A DISKETTE, above, for details on how to do it.

You've already used two of the File Subsystem options, Initialize and Save. Now you're going to use the Load option:

4. Move the highlight bar to item 4. **LOAD WORKSHEET** using the arrow keys, or by typing 4.

As before, you will have to press RETURN to confirm your choice. A catalog of the diskette will be displayed on your screen. Since you only have one file on the diskette, you will see the following display:

**1. PROGRAM PLAN**

and at the bottom of the screen the prompt

**LOAD: FILE NAME, NUMBER, OR <RETURN>**

**= =>**

5. Type the file name or number of the worksheet you wish to load.

The file name you used earlier when you saved the worksheet was PROGRAM PLAN, so type that name back in now, or simply type the number 1. What you type will be displayed on the screen followed by the cursor, so you can edit the name if necessary to correct typing errors.

6. When the file name or number is correct on the entry line, press the RETURN key to complete the load command and return to File Subsystem menu.

Now press the RETURN key twice, and you will be back in calculate mode. The demonstration model will reappear on your screen, just as it was when you saved it on the diskette.



## 29. ENTERING A FORMULA

Now we come to UltraPlan's most powerful feature of all, the one that makes it such a useful, versatile tool. Instead of putting a simple numerical value or a piece of text into a cell, you can enter a *formula* representing a calculation, which may be based on the contents of other cells. Then, whenever you change the contents of any of the cells the formula is based on, the value of the formula will be recalculated automatically to reflect the new data.

You're going to enter a formula in cell D6, then reproduce it to other cells in column D. We know that column D is the COST column, and we also know that  $\text{COST} = \text{HOURS} \times \text{RATE}$ .

UltraPlan uses the symbol \* (asterisk) to stand for multiplication, so our formula might better be stated:

**COST = B6\*C6**

We know where the cost cell is, so let's move the marker there now (cell D6).

Here's where the trick comes in: if you enter B6\*C6, UltraPlan will look at the first letter of the formula, and noting it is a letter, will assume you are entering a label. In order to let UltraPlan know that you are entering a *formula*, enter:

+ **B6\*C6**

**Note:** You may use the marker movement keys to point to the cell you want, just as you did when you were using the Reproduce command. The procedure for this is to type the plus sign to signify that a value will be entered, then begin moving the marker. As before, when the marker is moved, the cell coordinates that it passes over will be displayed on the entry line. When you have moved the marker to B6, you simply type the asterisk (\*). The marker will jump back to D6. You may then either enter the coordinate C6 directly, or point to it with the marker.

**Note:** You are free at any time to use the ESC key to back up over incorrect entries. You may also “jump” into edit mode using the Ctrl – E key (see Editing a Cell).

To actually *enter* the formula, press the RETURN key or any of the marker movement keys.

Press the RETURN key now, and watch as your formula is calculated instantly on the screen.

Now, to demonstrate some of the power of UltraPlan, assume the research phase of the project took only 59 hours. Move the marker to cell B6 and type 59.

As soon as you hit the RETURN key, not only is the current cell (B6) updated, but also all cells that rely on it for calculations. Look at cell D6—the contents should reflect the new data for hours!

### **30. TIME OUT FOR SOME HOUSEKEEPING . . .**

This would be a good time to save your work again, so that if anything should go wrong you won't have to reconstruct the formulas you've just entered. If you've been following the instructions carefully, your UltraPlan storage diskette should still be in the same disk drive you left it in when you loaded the worksheet from it earlier. Just as before, type /S (for Storage), then RETURN, in response to the message:

#### **ENTER LOWER RIGHT OR <RETURN>**

You will be presented with the File Subsystem menu (which you have learned to use in previous sections).

Select option 3—SAVE WORKSHEET.

**CAUTION:** Remember, if you save the worksheet now under the same file name as last time, the new version of the file will replace the old one on the diskette, and the previous version will be permanently erased. Be careful not to destroy a file you may want again later!

You will again (as with all File Subsystem commands) get a catalog of the disk you have specified as your data diskette.

Ordinarily there would be no need to hang onto the old version of the model you're building, so you could just type the number of the file name that contained your model to save the new version under the same file name as before. Sometimes, however, you may have some special reason to want both the earlier and later versions of the model available on the diskette at the same time. (For instance, you may be trying out some changes that you're not sure you want to keep permanently.) In cases such as these, you will want to specify a different file name.

**Note:** You may *not* select a new file by number— you will have to type the name in.

Let's save this worksheet under the name PROGRAM PLAN 1. To do this, simply type in PROGRAM PLAN 1 in response to the prompt.

The red light on the disk drive will come on, and the disk will spin for a while, then you will be shown a new catalog of the disk. This new catalog is provided to confirm to you that the operation you requested has indeed taken place.

Just to verify that the old and new versions of the PROGRAM PLAN model are both stored on the diskette, try loading the old version back in, then the new one again. From calculate mode, type:

**IC**

to clear the worksheet. You will be prompted:

**CLEAR: TYPE Y TO ERASE EVERYTHING**

Since you want to clear the worksheet, type Y.

Now type /S (for storage), and a RETURN to enter the file subsystem. Select option 4 – LOAD WORKSHEET.

You will be shown the familiar catalog of the diskette. There should only be two files on the diskette:

- 1. T PROGRAM PLAN**
- 2. T PROGRAM PLAN 1**

Notice the numbers to the left of the file names. These are the numbers referred to in the prompt:

**LOAD: FILE NAME, NUMBER, OR <RETURN>**

**= =>**

In order to load PROGRAM PLAN, simply type the number 1, and press the RETURN key.

Press the ESC or RETURN key twice to return to the calculate subsystem. Your worksheet should appear intact.

Now clear the worksheet as you did before, and load PROGRAM PLAN 1 by selecting number 2.

## **31. REPRODUCING FORMULAS**

In order to fill up the cost column, we must reproduce the formula contained in cell C6 into the cells C7 through C10.

Reproducing a formula is much the same as reproducing a constant cell (a constant cell is one that does not depend on any other cells). Start by placing the marker in cell C6.

Now type:

**/R**

for reproduce. The message:

**REPRO: (, SOURCE RANGE OR RETURN**

will appear on the prompt line. Since you only want to reproduce the one cell, press the RETURN key. UltraPlan will automatically insert the colon (:) punctuation character for you.

The message:

**REPRO: ENTER TARGET RANGE OR RETURN**

will appear on the prompt line. Notice that the contents line shows your formula:

**+ B6\*C6**

Now fill in the target range just the same way as you did when reproducing a value—either by typing the coordinates directly, or by pointing with the marker. The finished entry line should read:

**D6:D7...D10**

As soon as you press RETURN to enter the Reproduce command, something new appears on the prompt line:

**REPRODUCE: N = NO CHANGE, R = RELATIVE**

and your entry line changes to read:

**D6:D7.D10 + B6\*C6**

The blinking cursor will appear over the 6 in B6. What UltraPlan is prompting you to do is specify whether the coordinate B6 in the original formula should be reproduced relative to the position of the location of the destination cell, or should remain B6 in all cases. For example:

If you specify R for relative, the formula in cell D7 will have the coordinate B6 (from the original formula) replaced with B7. Likewise, in D8, B6 will be replaced with B8, etc.

Sometimes, like when you are computing percentage of total, you will want one coordinate to remain the same, and other coordinates in the formula to vary.

For our case, we do want a relative reproduction of the formulas, so type the R key.

The cursor immediately jumps over to the 6 in C6. UltraPlan will ask you the N=NO CHANGE, R=RELATIVE question for each coordinate in your formula.

We also want to reproduce the rate coordinates relatively, so type R.

Your formulas will all be reproduced, and the values will be filled in for all the cells.

To verify that the formulas were reproduced relative to their cell position, move the marker to cell D7.

The contents line should now read:

+ **B7\*C7**

As you move the marker down the cells in column D, you will see that the reproduction of the formula did occur relative to the cell position.

Now, move the marker to cell D11 to enter the cost of printing (an outside cost so we don't have to get the hours or rate). This is a simple value, so all you have to do is type in the number 10547.

## 32. USE OF FUNCTIONS

UltraPlan provides us with a number of useful *functions* with which to manipulate our data. In this example, we are only going to look at one of those functions – the SUM function. All the functions are covered in detail in the Reference Guide.

Let's get a total for hours and for cost. You can probably figure out that the total for hours can be expressed as:

+ **B6** + **B7** + **B8** + **B9** + **B10**

This is rather clumsy, and at a certain point, you will almost certainly begin to create models that have columns of such length that such a method of notation is impossible.

Rather than adding each cell individually, we have the function @SUM (pronounced at-sum). Note the @ (commercial "at sign"). The @ informs UltraPlan that you are entering a value, and that the value is to be derived from one of the built-in functions.

The best way to get the total hours is to move the marker to cell B13 and enter the following:

**@SUM(**

Notice that as soon as you strike the @ key, the prompt line changes to read:

**VALUE**

Most functions have *arguments*. An argument is a parameter that specifies to the function what cells to operate on, and in some cases, what the rules of the operation are.

@SUM requires a range of cells as an argument. This range will be summed, and any cell within the range not containing a numeric value will be disregarded.

You will recall, from the discussion on the Reproduce command, that a range of cells is specified as:

**beginning...ending**

So in our case the sum of the hours column is represented by the sum of the range B6...B11.

Once you have typed the left parenthesis, you may either specify the first cell in the range by typing the coordinate B6, or you can point with the marker, just as you did in the Reproduce command.

The entire formula you will be typing (or retrieving by pointing with the marker) is:

**@SUM(B6...B11)**

You may use the ESC key to edit information on the entry line until it is correct, then use any of the marker movement keys to enter it.

The total is immediately displayed in cell B13.

Now, using the same technique, place the total of the cost column (column D) in cell D13.



### **33. GLOBAL FORMATTING**

Now we have all the numbers and titles in our model, but the formatting is just a little wrong. Wouldn't it be nicer if the rate and cost figures came out in dollars and cents?

We can set the format of the worksheet such that all numeric values display to two decimal places. This is called *global* formatting.

Type:

**/G**

The prompt line will change to read:

**GLOBAL: C O R F A**

As usual, the prompt line is reciting a list of your options. In our case, we want to use F for format.

As soon as you type the F, the prompt line changes to read:

**FORMAT: D G I L R \$ \***

These various choices will be explored in depth in the reference manual. For now, simply type the dollar sign (\$).

Immediately, two things will happen:

- The hours and rate columns will appear in dollars and cents format.
- Most of the cost column will fill up with less-than (<) characters.

### **33.1 What Is Overflow?**

The reason your model now shows less-than signs in column D is that there is no longer enough room in column D to display the number with two trailing decimal digits. As a warning, UltraPlan displays the less-than sign as an *overflow* symbol.

In order to fix this problem, simply move the marker over to column D and use the /L (column width) command as follows:

Type:

**/L**

When the COLUMN WIDTH prompt appears on the prompt line, type:

**9**

When you press the RETURN key, the column will have room to display all the digits required.

### **34. CELL FORMATTING**

Since we are not counting hours to two decimal places, it would be better if we had left them as whole numbers. In computer talk, we call whole numbers *integers*.

Fortunately, UltraPlan allows you to format each cell individually if the global format does not suit the type of data contained in that cell.

The wisest thing to do is to set the global format to the format that will be most often used in your model, then change the exception cells to more appropriate formats individually as follows:

Move the marker to the cell you wish to format. In this case, you want to format cell B6.

Now type:

**/F**

The format prompt that you saw when you performed the global format will appear on the prompt line:

**FORMAT: D G I L R \$ \***

This time, instead of selecting the dollar sign (\$), type I for integer.

Notice how the number is displayed as a whole number? If your number had been 65.7, the integer format would have rounded up following the rounding rule: Less than half rounds down, half or greater rounds up.

Format the rest of the numbers in column B as integers.

Do you notice anything else that would make the worksheet more attractive?

How about right justifying the column headings?

Right justification is done just like integer formatting:

- Move the marker to the cell you want to format (in this case B4)
- Type **/F**

Your familiar prompt line will appear, offering you a variety of formatting choices. This time:

- Type **R** (for right).

The text in the cell will immediately jump to the right hand side of the marker. This feature is excellent for column headings because numbers automatically right justify.

Now follow the same procedure for C4 and D4.

Your demonstration model should look just like our example.

<b>PROGRAM DOCUMENTATION PLANNING MODEL</b>			
<b>TASK</b>	<b>HOURS</b>	<b>RATE</b>	<b>COST</b>
<b>RESEARCH</b>	<b>65</b>	<b>24.48</b>	<b>1591.20</b>
<b>FIRST PASS</b>	<b>112</b>	<b>24.48</b>	<b>2741.76</b>
<b>EDITING</b>	<b>56</b>	<b>24.48</b>	<b>1370.88</b>
<b>REWRITING</b>	<b>68</b>	<b>24.48</b>	<b>1664.64</b>
<b>TYPESETTING</b>	<b>52</b>	<b>19.00</b>	<b>988.00</b>
<b>PRINTING</b>			<b>10547.00</b>
<b>TOTAL</b>	<b>353</b>		<b>18903.48</b>

Figure 1. The Demonstration Model

### **35. PLAYING “WHAT IF . . . ?”**

A forecasting model is never a static entity. What if we assume that we can get the first pass done for 25% less per hour. How will that affect the total cost? Let's ask UltraPlan and find out.

Move the marker to the rate figure for first pass in cell C7. Right now that cell contains the number 24.48, as you can see on the contents line. We want to replace that number with the number that represents 75% of the number that is currently in there. We could type this in, but there is another way to do it: Type a plus sign (+) to indicate that a formula is forthcoming, then either type the coordinate C7, or move the marker back and forth to bring the coordinate onto the entry line. Since what we're really interested in is the value in the cell, and not the coordinate, let's just fetch the value out by pressing the pound sign (#).

You'll see the + C7 immediately replaced by the value from the cell: 24.48.

Now you can continue with the formula by typing:

**\*.75**

to multiply the old value by .75. You may enter the formula as it is, or you may use the immediate calculation feature to enter a value, rather than a formula.

As soon as you enter the new information, the cost figure for first pass, and the total cost are recalculated to reflect the current data.

Obviously, this example is somewhat trivial, but the power of this interactive recalculation should be readily apparent, especially if you are watching annual totals based upon changing assumptions, or bottom line figures based upon package bids submitted by various suppliers.

### **36. DELETING A DISKETTE FILE**

Since you'll only be keeping one version of the PROGRAM PLAN model from now on, you have no further need for PROGRAM PLAN 1, so you might as well delete it from your storage diskette.

To delete a file from a diskette.

1. Make sure the diskette you're deleting from is in one of your disk drives.

Your UltraPlan storage diskette should still be in the disk drive, so just go on to step 2.

2. From calculator mode, type /S (for Storage).

The familiar prompt message:

#### **ENTER LOWER RIGHT OR RETURN**

will appear on the prompt line.

press the RETURN key to enter the File Subsystem.

3. Make sure the Disk Slot and Disk Drive numbers on the menu are the correct ones for the disk drive you're using.

In this case, the slot and drive numbers should already be set correctly from your last Storage operation, so just go on to step 4.

4. Select option 9 – DELETE A FILE by number, or by moving the highlight bar.

A catalog of the files on your disk will be displayed, as in the Save and Load command.

The file you wish to delete is PROGRAM PLAN 1. You've now learned two different ways to supply a file name to the File Subsystem. (1) use the name you see in the catalog; (2) use the number to the left of the name in the catalog.

5. When the file name or number is correct on the entry line, press the RETURN key to complete the deletion.

**CAUTION:** As soon as you press RETURN, the file you've specified will be *erased permanently* from the diskette, and you will not be able to get it back. Be sure this is really what you want to do!

When the deletion is complete, the new catalog (without PROGRAM PLAN 1) will be displayed on your screen. This to let you know that what you specified actually took place.

**Note:** If you change your mind about deleting the file, or have selected option 9—DELETE A FILE by mistake, use the ESC key to back out of this command.

### **37. MORE WHAT IF. . . ?**

Let’s play a few more “what if...?” games with our numbers to demonstrate the flexibility of UltraPlan.

We have made no provision for overhead allowance. Project overhead typically varies from 20 to 40% of the total time (hence cost) of the project.

This means that our cost formula must be modified to include an overhead number.

Currently, we define cost as rate \* hours. What we really mean to do is define cost as: rate \* hours \* (1 + overhead%).

Notice the parentheses in the new formula? UltraPlan will evaluate everything in parentheses before anything else. Here’s an example:

$$24.48 * 65 * 1 + .20 = 1591.40$$

$$24.48 * 65 * (1 + .20) = 1909.44$$

UltraPlan evaluates expressions in a left to right fashion, except as altered by the use of parentheses.

So our formula in D6 really ought to be:

$$+ B6*C6*(1 + .20)$$

Now, let’s change all the other formulas in column D to reflect the change. To do this, we use the Reproduce command.

Simply type:

**/R**



The prompt line will change to read:

**REPRO: (, SOURCE RANGE OR RETURN**

and the coordinate D6 will be filled in on the entry line.

Since D6 is indeed the source coordinate, simply type RETURN or colon (:) to separate the source from the destination. Now the prompt line will request:

**REPRO: ENTER TARGET RANGE OR RETURN**

You may specify the cells D7 through D10 either by pointing with the marker, or by typing them in directly. The finished entry for the Reproduce command is:

**D6:D7...D10**

As soon as you press RETURN, you will be prompted:

**REPRODUCE: N = NO CHANGE, R = RELATIVE**

Just as before, you want both column B and column C treated in a relative fashion in the reproduction. Simply type R twice.

In the blink of an eye, your model is recalculated to reflect the new formula, and the total of column D is adjusted appropriately.

Remember we said that the overhead could vary? The formula we entered still relies on a static overhead number. Changing the formula each time we want to see the effect of a different overhead percentage is one way to play “what if...?”

Perhaps a better way to test the effects of overhead on the bottom line is to create a new cell to contain the overhead percentage and make the formulas in column D dependent on the current value of that cell. Let's do that now.

Move the marker to row 4 (your column titles), and insert two rows by typing:

**/IR**

**/IR**

Now you should have two extra blank rows between your worksheet title and your column titles. Move the marker to cell A4 (if it is not already there).

Type the title:

**OVERHEAD**

Move the marker to cell B4, and enter the proposed overhead figure of 27% by typing:

**27**

Now, move the marker to cell D8 and edit the formula there as by typing:

**/E** (for edit)

Move the cursor to the close parenthesis, and use the ESC key to erase the .2 (press ESC twice).

Now type in the following replacement:

**(B4/100)**

The reason we use the parenthesized expression (B4/100) is that we expressed the percentage in cell B4 as a whole number, but we can only use it in our formula as a decimal fraction. Remember that the parentheses indicate an expression that UltraPlan must evaluate before any others.

The final formula on the entry line will be:

$$+ \mathbf{B8 * C8 * (1 + (B4/100))}$$

To clarify the order of evaluation of this formula, let's take it step by step, just as UltraPlan will.

1. Get value from cell B8.
2. Multiply it by the value in cell C8.
3. Encountered a parenthesized expression – save the current value, which is  $B8 * C8$  and evaluate the expression within parentheses).
4.  $1 + oh$ ,  $oh$  – another parenthesized expression – save off the current value, which is 1, and evaluate it.
5. Get value from B4.
6. Divide by 100.
7. Fetch the last value outside the parentheses (which is 1), and add.
8. Back out of another level of parentheses – get the saved value (which is  $B8 * C8$ ) and multiply.

That may seem like a lot of steps, but it is important to bear this *order of evaluation* in mind when writing formulas.

Now, reproduce the formula in cell D8 into cells D9 through D12.

To demonstrate the kind of flexibility you've now built into your model, move the marker to cell B4 (the overhead percentage cell), and change the percentage figure. Your cost column will automatically adjust to reflect the new overhead figure.

### **38. PRINTING THE WORKSHEET**

If you have a printer connected to your microcomputer, you can use it to print “hard copies” of the worksheet displayed on your screen.

To print a hard copy of the worksheet:

1. From calculate mode, type /P (for Print).

The message:

**ENTER LOWER RIGHT OR RETURN**

will appear on the prompt line.

2. If you wish to print the entire worksheet (which is the normal case), simply press RETURN, otherwise enter the lower right coordinate of the rectangle of cells you wish to print. You may also point with the marker at this cell.

When you press RETURN, you will be placed in the *Print Subsystem*.

PRINT SUBSYSTEM

- A. STARTING CELL..... A1
- B. ENDING CELL..... A1
- C. USE DIF FORMAT..... NO
- D. ROW ORDER FOR DIF..... NO
- E. SINGLE SHEET FEED..... NO

1. UltraPlan SYSTEM MENU

- 2. CHANGE OPTIONS
- 3. PRINT HARDCOPY
- 4. PRINT SOFTCOPY
- 5. PRINT IN SAVE FORMAT
- 6. ENTER SETUP STRING

SELECT NUMBER OR LETTER, PRESS RETURN

The Print Subsystem has a menu much like that of the File Subsystem.

Printers are conventionally connected in slot 1, but you can use any slot except 0. If your printer is not in slot 1, you will have to alter the configuration (see discussion of Configuration Subsystem in the Reference Guide).

Notice options A – STARTING CELL, and B – ENDING CELL. The starting cell is taken from the position of the marker on the worksheet when the Print Subsystem is invoked. You may change that now, if it is incorrect. The ending cell is set to the last cell containing data.

These cells describe the upper left corner and lower right corner of a rectangle of *block* of cells. This is the area that will be sent to the printer.

If you position the marker to cell A1 before typing the /P command, you will almost always get the correct coordinates for these options.

Some printers require a set of control characters to control such things as pitch, inter-line spacing, density of matrix, etc. Such setup strings will be described in your printer manual, but we will provide two examples here.

Select option 6 – ENTER SETUP STRING the same way as you selected items from the File Subsystem menu.

The prompt at the bottom of your screen will change to read:

**USE CNTRL-R FOR (RETURN)**

Now, let's take the Epson printer as an example. In order to print in condensed mode, you must issue a setup string of:

**Ctrl – O**

You may find the ASCII codes in your computer or printer reference manual or in Appendix A of this manual. Some printer manuals refer to the control codes by their ASCII names – for example, Ctrl – O is also called SI (for shift in). In these cases, you do not send the letters S and I, you must look up the SI code in the ASCII chart (it has a decimal value of 15), then find the Ctrl key that generates that code.

Once you have entered the Ctrl – O, press RETURN, and you will be back to the menu mode.

Unfortunately there are very few standards in the world of printers. As a matter of fact, you can be assured that what works for one brand will probably not work on another. For example, the C. Itoh Prowriter printer requires the following setup string to set condensed mode:

## **ESC Q**

Covering the various features of different printers is beyond the scope of this manual. These examples were included as examples to demonstrate the technique for entering a setup string.

In order to actually begin the printing process, select option 3 – PRINT HARDCOPY.

The prompt:

### **POSITION DOCUMENT THEN PRESS <RETURN>**

will appear in the middle of your screen. Make sure that the paper in your printer is lined up correctly, and everything is ready (printer on line, etc.), then press the RETURN key.

Your Program Documentation Planning Model will begin to print as soon as you hit the RETURN key.

**Note:** If you need to interrupt the printing operation for any reason (if you've made a mistake in specifying the print options, for example), type ESC. The printer will immediately stop printing after the printer's buffer is empty and you will be returned to the Print Subsystem menu.

### **39. YOU'RE ON YOUR OWN**

By now you've learned enough about UltraPlan to begin putting it to work on your own applications. But there's still a lot more it can do that we haven't covered in this introductory tutorial. Now that you know the basics, we recommend that you read the Reference Guide thoroughly. There you'll find concise summaries of everything you've learned so far, plus information on all the other features not covered here. Feel free to experiment and try things out for yourself until you understand how they work. The Reference Guide or Reference Card are the places to look when you need to jog your memory on some detail you've forgotten. The range of applications you can use UltraPlan for is limited only by your imagination. Good luck!



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## **1. INTRODUCTION**

This Reference Guide is designed for those who have finished the Tutorial or are otherwise comfortable with UltraPlan. The Guide assumes that you are familiar with your computer's Disk Operating System and know basically how to use UltraPlan. Use the Reference Guide for looking up complete explanations of each command available in UltraPlan.

This reference is organized in order of *subsystems*, in the order they appear on the System Menu. In every case except the Calculate Subsystem, the items are discussed in the order they appear in the menu for that particular subsystem. In the Calculate Subsystem, the commands appear alphabetically.

## **2. TYPE-AHEAD IN UltraPlan**

Sometimes, you will be able to type faster than UltraPlan can update the screen. This is particularly evident if you use repeating marker move sequences when in 70- or 80-column mode (see the Tutorial if you do not know how to move the marker). It also crops up when you have Global Recalculation set to Automatic, and are entering data in a reasonably large worksheet.

UltraPlan has a built-in type-ahead buffer. This feature allows you to go ahead and enter data, or move the marker. Your key-strokes will be remembered, and whatever you have done will be entered into your worksheet in the order that you typed it.

Because of UltraPlan's speed, it is doubtful that you will be able to exceed its response speed for very long, and when you slow down to think or turn a page in your data, UltraPlan will catch up.

Should you find this feature disturbing, you have several options to speed up response:

1. For large worksheets, enter data with Recalculation set to Manual (see the Global command).
2. For long-range marker moves, use the >(Go To) command, and/or 40-column mode.

### **3. SUPPORTED HARDWARE**

UltraPlan is capable of supporting a wide variety of hardware on your microcomputer. Let's take the most popular types of hardware:

#### **3.1 RAM cards or Language Cards**

UltraPlan will find *any* common RAM card or Language Card no matter which slot it is in. The only restriction on this is that the card must be DOS Language System compatible. This restriction rules out some "pure" disk emulators (those that are designed to look just like a floppy disk to your computer). Fortunately, many RAM cards of varying memory capacity do utilize the DOS Language System protocols.

You may use any combination up to four 128K boards (or 512K plus the 30K main memory). These boards will be found by UltraPlan in *any* slot. This enables the construction of very large, complex models without the constraints of limited memory.

You may confirm UltraPlan's identification of your RAM card(s) by checking the *memory indicator* on an empty worksheet (see UltraPlan Tutorial or the section on the Display in this manual for more information on the memory indicator). The number displayed should be the amount of RAM you have added with supplemental RAM cards plus 30 (or plus 18 if you are using the 70-column Hi-Res display).

If, for example, you have a 128K RAM card in slot 2, the memory indicator should display 158.

#### **3.2 Printers**

UltraPlan will send output to most popular printers, either through a parallel or serial interface card, or by use of a custom printer driver. For more information about printers and printer drivers, see the section in this manual on the Configuration Subsystem.

### **3.3 80-Column Video Display Boards**

UltraPlan supports most 80-Column video display boards. For more information on 80-column boards, see the section in this manual on the Configuration Subsystem.

### **3.4 Hard Disks**

UltraPlan supports the most commonly used hard disk operating systems (as well as high density floppy disk operating systems).

There is little, if any, advantage in storing the program on a hard disk, because once the program has been loaded, the program diskette is never again referenced—in fact, you should remove the program diskette after the initial program load.

The main advantage of hard disk is increased data storage capacity. In order to run UltraPlan on a system equipped with a hard disk, we recommend you take the following steps, assuming the hard disk is slot 6, and at least one floppy drive in slot 4:

1. Boot from the hard disk, as you normally do.
2. From DOS (or Floating Point BASIC) prompt, simply type:

**RUN HELLO,S4,D1**

This will load the entire UltraPlan program, and you will not have to go back to the floppy drive unless you power down, or leave the program.

In order to access specific volumes on the hard disk, simply make use of the volume option in the File Subsystem. For more information on the File Subsystem, refer to the appropriate section in this manual.

### **3.5 Disk Emulators**

Some RAM disk emulators are compatible with UltraPlan. The only way you can determine if yours is compatible is to try it as follows:

1. Perform any initialization steps your RAM disk emulator requires.
2. Type: **RUN HELLO,S6,D1**

where slot 6, drive 1 is the floppy drive containing the UltraPlan program diskette. If you do not encounter any problems, it's a safe bet that the DOS modifications necessary to enable the disk emulator do not conflict with UltraPlan.

## **4. THE BOOT PROCESS**

UltraPlan may be started by placing UltraPlan program disk in the first disk drive on the controller card in the highest numbered slot and turning on the power.

You may also start UltraPlan from the Floating Point BASIC prompt (]) by typing:

**PR#6**

where 6 is the slot that contains the controller card.

### **4.1 THE TITLE PAGE**

You will be greeted by a page that reads:

**UltraPlan (VERSION 2.00)**

**© COPYRIGHT 1983**

**WILLIAM G. GRAVES**

**PUBLISHED BY**

**ARTSCI INC.**

**INSERT CONFIGURATION/DRIVER DISKETTE**

**<RETURN> OR ,S,D,V**

You may now load a configuration file, printer driver, and/or video driver.

UltraPlan will find these files on the diskette (or hard disk volume) specified by **,S,D,V;B**

For example, if your configuration and driver data were on the floppy disk drive in slot six, drive two, you would simply type:

**,S6,D2**

If your configuration and driver data were on a single drive hard disk in slot six, and they resided on volume 6, you would type:

**,S6,D1,V6**

**Note:** The leading comma is required.

**Note:** If you do not specify a slot, drive or volume, they will default to the slot and drive from which you booted, and the volume number will not be checked on floppies, or will remain the same as your current volume on hard disk.

## **4.2 Configuration Files**

UltraPlan looks for a file called SYS.OPTIONS to define its initial configuration. Configuration will be covered in depth in the section on the Configuration Subsystem.

The initial configuration file saves you the time of reconfiguring the system every time you boot up to use an 80-column card, or use of a special RAM printer driver, etc.

## **4.3 Driver Files**

There are two types of driver files loaded by UltraPlan in the boot process:

- Printer drivers (for making use of special printer options).
- Video drivers (to enable special features of the video display).

Ordinarily, neither printer nor video drivers are necessary.

### **4.3.1 Printer Drivers**

You might want a printer driver to recognize special controls you code into your worksheets, or to drive a non-standard printer interface. The printer driver must meet the following requirements:

- The driver must load at location \$800, and be no longer than \$200 bytes in length.
- The file name of the driver must start with **PRINTER**.

### **4.3.2 Video Drivers**

For most video boards, a driver is not necessary, but for a very few, such as the Videx Videoterm, a special driver is necessary to enable inverse video (if you have an inverse PROM on your board). The requirements for video drivers are:

- The driver must load at location \$1F00, and be no longer than \$100 bytes in length.
- The file name of the driver must start with **VIDEO**.

Several drivers are supplied on the program disk:

**VIDEO.STB80**

**VIDEO.WIZARD80**

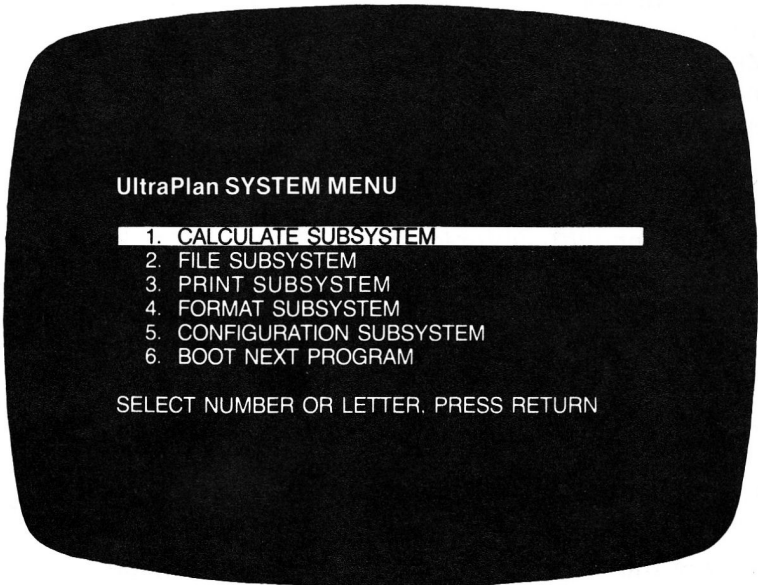
**VIDEO.VIDEX...and others.**

Installation of these drivers is handled by saving the System Configuration Files (Section 11.4).

If you are not sure that you need a driver for your 80-column board, try it without one—it will probably work.



## 5. THE UltraPlan SYSTEM MENU



The UltraPlan *system menu* is your route to all the various *subsystems* of UltraPlan. Before getting into the menu itself, let's define a few terms:

**Menu:** A list of items and options from which you may choose. In a “menu-driven” system, all the available options appear on the screen, and you may choose one, much the same way as you would order a menu item in a restaurant (I'll have a number 1 dinner, please!).

**Subsystem:** A component of a larger system. UltraPlan is an example of the larger system. Within UltraPlan are a number of smaller systems, or *subsystems*, that handle such items as printing, disk I/O, and configuration of system parameters.

## **5.1 Selecting An Item**

All the subsystems except the calculate subsystem present menus much like the one seen in the System Menu. The rules for moving about in the menus, and for making selections from the menus are consistent from one menu to the other.

One line in the menu will have a white background with black lettering—every other line will have a dark background with white lettering. The white background bar is known as the *highlight bar*. This bar must be resting on a particular menu item in order to select it.

### **5.1.1 Moving the Highlight Bar**

There are two ways to move the highlight bar.

- Use the right and left arrows on the keyboard to move the highlight bar up and down in the menu.
- Type the item number or letter of your choice.

### **5.1.2 Selecting a Menu Item**

Once the highlight bar is resting on the item you wish to select, you must confirm that selection either by pressing the RETURN key, or by pressing the number or letter of the option once more.

### **5.1.3 The ESCape Key in Menus**

When you are moving about in the various menus, the ESC (for ESCape) key has a special significance: it automatically selects menu item 1 when pressed, or if you are in the lettered options, it moves the highlight bar to menu item 1 of the menu. Since menu item 1 is always UltraPlan SYSTEM MENU, except on the system menu, pressing ESC repeatedly will eventually place you in the system menu, then pressing ESC once more will select menu item 1 from the system menu, which is CALCULATE SUBSYSTEM.

## **5.2 The Items of the System Menu**

Each subsystem on the System Menu is described in detail in this manual in a separate section. Here is a brief overview of the function of the subsystems.

<b>Subsystem</b>	<b>Function</b>
<b>CALCULATE</b>	The Calculate Subsystem is the actual interactive worksheet. You will be spending most of your time using this subsystem.
<b>FILE</b>	The File Subsystem is the section of UltraPlan that handles disk operations such as loading and saving worksheets.
<b>PRINT</b>	The Print Subsystem handles the printing of data from the worksheet.
<b>FORMAT</b>	The Format Subsystem allows you to define the format of your output (hardcopy) in terms of page layout (width, length, margins).
<b>CONFIGURATION</b>	The Configuration Subsystem allows you to define certain options to UltraPlan. This includes video display, printer slot, upper/lower case generation, etc.
<b>BOOT NEXT PROGRAM</b>	This option allows you to leave UltraPlan and run another program. In order to safely exit, you must select this option, or power down the system.

## **6. THE CALCULATE SUBSYSTEM**

### **6.1 The Display**

The Calculate Subsystem is the only subsystem that does not use menus. To exit the Calculate Subsystem, press Ctrl-@.

The worksheet display consists of the following parts:

The *information box* displays information about what you are doing and what you can do next.

The *entry line* displays information typed from the keyboard for entry into the worksheet.

The *worksheet window* displays a portion of the worksheet itself.

#### **6.1.1 The Contents Line**

The *contents line* is the top line of the information box. It shows information about the contents of the current cell. It includes the following parts:

##### **The Current Cell Indicator**

The *current cell indicator* shows the coordinate of the current cell in the form: Column letter, Row number. For example, the top left cell of the worksheet is column A, row 1. The current cell indicator will display this as:

**A1**

##### **The Type Indicator**

The *type indicator* shows the format of the cell (if specified at the cell level), the attribute of the cell (if specified at the cell level), and the type of data in the cell (if any).

For example, if you had specified cell A1 as a label, had used the format command to right justify it, and had used the attribute command to lock it, the type indicator would appear as follows:

**/FR/AL L:**

These are the commands to set the format to right, the attribute to locked, and the L: indicates that the contents of the cell are a label.

The possible types of a cell are label (L:), and value (V:).

The remainder of the contents line shows the actual contents of the current cell, so if the label you had entered was “UltraPlan”, the contents line would read:

**A1 /FR/AL L: UltraPlan**

### **6.1.2 The Prompt Line**

The prompt line shows what you can do next. It includes the following parts:

#### **The Memory Indicator**

The *memory indicator* tells you the number of available locations the microcomputer has remaining for data storage in thousands. These cells are not to be confused with cells in the worksheet. Each cell of the worksheet can take many computer locations. The memory indicator on an empty worksheet will read 30 (14 without a RAM card), indicating that you have 30,000 remaining locations available for data storage.

## **The Command Name**

In most circumstances, if there is anything on the prompt line, it will consist of two parts: the *command name*, and the *command prompt*. The command name will always be separated from the command prompt by a colon (:). For example, when you press the slash (/) key, indicating that you wish to enter a command, the command name will appear as:

/:

or if you are performing a Reproduce command, the command name will appear as:

**R E P R O :**

## **The Command Prompt**

The *command prompt* completes the prompt line by informing you of the options available for the particular command you are using. For example, if you had invoked the Reproduce command, the command prompt would read:

**(, SOURCE RANGE OR RETURN**

The complete prompt line for this command might appear as follows:

**REPRO: (, SOURCE RANGE OR RETURN**

### **6.1.3 The Entry Line**

The *entry line* displays characters, either labels or values, as you type them. When you enter information into the worksheet (by pressing RETURN or a marker movement key), all characters on the entry line are transferred to the current cell. Until you enter the information with one of these keys, the actual data in the current cell is unaffected.

In order to backspace when making an entry, use the special key marked ESC (for ESCape).

If you back completely out of an entry using the ESC key, the current cell will remain as it was before you began. If, however, you press RETURN, or any of the marker movement keys, the data on the entry line will be transferred to the current cell, destroying forever what was previously there.

#### **6.1.4. The Worksheet Window**

The *worksheet* is an area of 254 rows by 63 columns. The 16,002 units formed by the intersections of rows and columns are known as cells.

Along the left edge of the screen is a vertical white column containing the row numbers. These row numbers range from 1 to 254. Above the column of numbers is a white horizontal stripe containing the column letters. These column letters range from A to BK. These white borders mark the boundaries of your *window* into the worksheet. Notice that only a portion of the entire worksheet is available for viewing at any given time.

#### **6.1.5 The Status Information Box**

On the very left of the horizontal window border (containing the column letters) are three characters in a black box. This box of three characters is called the *status information box*.

There are three components in the status information box:

##### **The Recalculation Order Indicator**

The leftmost character in the status information box is the *recalculation order indicator*. This indicates the order in which UltraPlan will perform recalculations of the worksheet. Its normal value is **C**, for column-wise

recalculation. This means that all values in column A will be recalculated before beginning column B, etc. The alternate value for the recalculation order indicator is **R**, for row-wise recalculation. Column-wise recalculation is the most common recalculation mode for spreadsheet planning. Sometimes, however, you will want UltraPlan to perform recalculation in a row-wise manner. A good example of this is a model that has time going down the rows, and products across the columns. You will most likely want to calculate the entire row for a given time period before beginning the next one.

The recalculation order is changed using the Global command.

### **The Recalculation Mode Indicator**

The middle character in the status information box is the *recalculation mode indicator*. This indicates whether recalculation will take place automatically (the indicator will display an **A**), or manually (the indicator will display an **M**). Manual recalculation mode is selected from the Global command, and is often desirable when working with large models to eliminate the time-consuming recalculation every time the contents of a cell change.

**Note:** When recalculation mode is manual (the indicator displays an **M**), the formulas dependent upon other cells will *not* be updated as the contents of the cell change – the recalculation must be requested manually by pressing the exclamation point (!).

### **The Direction Indicator (or marker direction)**

The rightmost character in the status information box is the *direction indicator* (which is otherwise known as the *marker direction*).



This character displays the direction the marker will move when a right or left arrow key is pressed. It will take on the value of - (a dash) for horizontal marker movement, or ! (an exclamation point) for vertical marker movement.

This direction indicator is changed from horizontal to vertical and vice versa by pressing the space bar.

**Note:** If your computer has up/down arrows, position the direction marker to horizontal ( - ), you may then make use of all four arrows.

### **6.1.6 The Cell**

The *cell* is the smallest division into which labels and values can be entered.

The *rows* of cells are numbered from 1 to 254 and the *columns* are lettered from A to BK.

The cell's *coordinate* consists of a column letter and a row number; it describes the cell's location on the worksheet.

### **6.1.7 The Window**

The window has three important features:

The *frame*, which brackets the top and left edges of the window; it contains the row numbers and column letters of the cells you can see.

The *current cell* is the cell into which you can enter labels or values.

The *marker* is the white rectangle that marks the current cell.

## **6.2 Moving the Marker**

When at command level, the marker can be moved to any location on the worksheet using these commands:

- Left and right arrows move the marker one cell horizontally (if the marker direction is horizontal), or one cell vertically (if the marker direction is vertical).

**Note:** The marker direction is changed from horizontal to vertical, or vice versa, by pressing the space bar.

- Up & Down arrow keys (if available) move the marker one cell vertically.
- Using Ctrl keys in the following table.

<b>Keystroke</b>	<b>Function</b>
------------------	-----------------

Ctrl-Q	Move the marker one cell up.
Ctrl-A	Move the marker one cell left.
Ctrl-S	Move the marker one cell right.
Ctrl-Z	Move the marker one cell down.
Ctrl-W	Move the marker 10 cells up (half screen).
Ctrl-X	Move the marker 10 cells down (half screen).
Ctrl-E	Move marker to top left of worksheet (inside of title area, if titles are set).
Ctrl-C	Move marker to bottom right of worksheet.

The window slides with the marker, so that you can see the area of the worksheet containing the marker.

## **6.3 Entering Labels and Values**

Entering labels and values into UltraPlan is as simple as moving the marker to the desired location, then typing the value or text entry. Let's take the two separately.

### **6.3.1 Entering Labels**

Before you can enter any data into your worksheet, you must first position the marker on the cell into which you want to place that data. You must do this using the marker movement keys described above in the section entitled Moving the Marker.

When the marker is positioned properly, you are free to type in text. Labels are detected by UltraPlan as any sequence of characters beginning with a letter (and in certain cases, a special character). UltraPlan places the word LABEL on the prompt line to confirm that it has recognized your entry as such. If your label begins with a number (for example, a date), or a space, you must take a special step before entering a label.

If your label begins with a space, a number, or a special character that has particular significance to UltraPlan, you must first get into label entry mode by typing a quote mark (“). The word LABEL will appear on the prompt line confirming the fact that your entry will be treated as a label.

Your label will not be transferred to the current cell until you press the RETURN or marker movement keys.

### **6.3.2 Display of Labels**

UltraPlan will accept extremely long labels (up to 229 characters, in fact), but will only display as many characters as can fit in the column in which the label was entered.

When entering titles that will take up more than one column, it is best to watch the characters you type, as they appear in the current cell, to determine when you have exhausted the room you have allocated. At this point, you should move to the next adjacent cell to continue the label.

### **6.3.3 Entering Values**

When entering values, just as when entering labels, the marker must be positioned on the current cell (the cell in which you want the value to appear).

At this point, you may simply key in the number you wish to enter. UltraPlan will display the word VALUE on the prompt line to confirm that it has recognized your entry as such.

### **6.3.4 Display of Values**

UltraPlan displays values with at least one leading space for clarity. Under no circumstances will two adjacent value cells appear run together.

If there is insufficient room within the cell to display the value, and dollar format has been selected (see Format Command), UltraPlan will display an “overflow” symbol in place of the number. The special overflow symbol is the less-than (<) sign. To correct this problem, simply widen the column, or change the format.

If there is insufficient space to display the whole value, and dollar format has not been selected, the number will shift into exponential format, retaining as much significance as possible within the current cell width.

Exponential notation is a shorthand for expressing extremely large, or extremely small numbers in terms of a factor and a power of ten. For example, 15978 can be expressed as 1.5978E4, and .00001348 can be expressed as 1.348E-5. The “E” in this notation can be read as “times ten to the”.

You may also enter values in exponential notation. For example, to enter 1 billion, rather than entering all the zeros necessary to fill out the correct value, you may key in 1E9.

UltraPlan is capable of retaining values to eleven significant digits within the range -10E62 to 10E63. In some cases, you might be able to get twelve digits of significance, but it is not reliable.

As with label entry, values are not transferred to the current cell until either the RETURN or marker movement keys are pressed.

### **6.3.5 Entering a Formula**

Formulas are entered in much the same manner as labels and values. The marker must be positioned on the cell into which you wish to enter your formula.

Formulas are regarded as values, and as such require a bit of care in entry. You may not begin a formula with the letter portion of a cell coordinate. For example, if we wanted to multiply B7 by C7, rather than simply entering:

**B7\*C7**

we are forced to enter:

**+ B7\*C7**

in order to signify that we are entering a value.

### **6.3.6 Special Keys That Affect Label Entry**

<b>Key</b>	<b>Meaning</b>
<b>RETURN</b>	Enter label and leave the marker on the current cell.
<b>Marker Movement Keys</b>	Enter label, then move the marker in the appropriate direction, the appropriate distance (see Moving the Marker).
<b>ESC</b>	Destructive backspace (erases character immediately to the left of the cursor).
<b>Ctrl-E</b>	Enter edit mode (see Editing).
<b>Ctrl-V</b>	Aborts label entry.

### **6.3.7 Special Keys That Affect Value Entry**

During value entry, the following keys have special meanings:

<b>Key</b>	<b>Meaning</b>
<b>RETURN</b>	Enter the value, and leave the marker on the current cell.
<b>Marker Movement Keys</b>	Enter the value, and move the marker in the appropriate direction, the appropriate distance (see Moving the Marker).
<b>ESC</b>	Destructive backspace (erases character immediately to the left of the cursor).
<b>Space Bar</b>	Enter value, then change entry direction.
<b>Ctrl-E</b>	Enter edit mode (see Editing).
<b>Ctrl-V</b>	Aborts value entry.

### 6.3.8 Special Keys That Affect Formula Entry

During formula entry, several keys have special meanings.

<b>Key</b>	<b>Meaning</b>
<b>RETURN</b>	Enter formula, and leave marker on current cell.
<b>Marker Movement Keys</b>	If pressed after an arithmetic or relational operator, move the marker in the appropriate direction, the appropriate distance (see Moving the Marker), and copy the marker's new coordinate onto the entry line. This operation does <b>not</b> enter the formula. If pressed after a number (not a coordinate or an operator), enter the formula, then move the marker in the appropriate direction, the appropriate distance (see Moving the Marker).
<b>Space Bar</b>	If pressed after an arithmetic or relational operator, change the entry direction, and copy the marker's current coordinate to the entry line. If pressed after a number (not a coordinate or an operator), enter the formula, then change the entry direction. If pressed after a coordinate, copies the value found at that coordinate into the entry line in place of the coordinate. If pressed after a number or an operator, the # key is meaningless and will not be allowed.
<b>!</b>	Replace a formula with calculated value if formula is still on the entry line, and has not yet been entered. Also called <i>immediate calculation key</i> .
<b>ESC</b>	Destructive backspace (erases character immediately to the left of the cursor).
<b>Ctrl-E</b>	Enter edit mode (see Editing).
<b>Ctrl-V</b>	Aborts formula entry.



## **6.4 Data and UltraPlan**

UltraPlan accepts two generic types of data:

- Values
- Labels

### **6.4.1 VALUES**

A *value cell* may contain any or all of these:

- A number
- A formula
- A function

#### **Numbers**

A *number* is a series of digits of any length. The value of a number may lie anywhere in the range E + 63 to E – 62. “E” is used here to mean “times 10 to the”. So, E63 is the same as  $10^{63}$ . The following are examples of numbers:

- |                  |         |            |
|------------------|---------|------------|
| • Integer        | 5       | 804        |
| • Floating point | 12.8931 | – .55      |
| • Exponential    | 12.E55  | – 15E + 25 |

## **Formulas**

A *formula* is made up of numbers and cell references which can be combined using the following operators.

( )	Calculates insides first
+ -	Positive and negative signs
^	Exponentiation
* /	Multiplication and division
+ -	Addition and subtraction
><=>=<=<>	Comparison Operators (see following section)

Note: Calculations are made strictly left-to-right, except where modified by parentheses. For example:

$$1 + 2 * 3 = 9$$

$$1 + (2 * 3) = 7$$

### **6.4.2 Functions**

A *function* takes zero or more values in, and puts one value out. Functions take three types of arguments between the parentheses:

A *value*, which can be

1. A *number*, for example: 5
2. A *cell coordinate*, for example: A6
3. A *formula*, for example: 1 + A6 \* 3
4. A *function*, for example: @SUM (A1...A3)

A *range*, which is described by:

1. The coordinate of one cell, for example: A7.
2. The coordinates of two cells in either the same row or the same column separated by three periods, for example: A7...A23. The second coordinate must be greater in magnitude than the first, or the range will be misinterpreted.

A *list*, which is:

A series of coordinates, ranges, or formulas, separated by commas.

For example:

(A1...A10, B1...B10, C1...C10) is a list of ranges.

(A1,B3,C9,D14) is a list of cells.

**Note:** In most cases, individual cells and ranges can be freely intermixed in a list.

## **6.5 Command Reference—Introduction**

The Calculate Subsystem has many commands to enable you to manipulate the data you enter into your worksheets, and to control the display of that data.

A command is begun by pressing the slash (/) key. The slash key may be thought of as the “command” key.

As soon as you press the slash key, the prompt line changes to show your options:

**/: A B C D E F G I L M P R S T W –**

These are the basic commands available in the Calculate Subsystem. Each has its own section in this manual, and will be discussed in order. The following is a brief list, for your reference.

- |                                    |                                    |
|------------------------------------|------------------------------------|
| <b>A</b> - Set Attribute           | <b>L</b> - Set Column Width        |
| <b>B</b> - Blank a Cell            | <b>M</b> - Move a Row or Column    |
| <b>C</b> - Clear Worksheet         | <b>P</b> - Enter Print Subsystem   |
| <b>D</b> - Delete a Row or Column  | <b>R</b> - Reproduce Cell or Range |
| <b>E</b> - Edit a Cell             | <b>S</b> - Enter File Subsystem    |
| <b>F</b> - Format a Cell           | <b>T</b> - Set Titles              |
| <b>G</b> - Set Global Parameters   | <b>W</b> - Set Windows             |
| <b>I</b> - Insert a Row or Column  | <b>–</b> - Enter Repeating Label   |
| <b>Ctrl-@</b> - Invoke System Menu |                                    |

## 6.6 /A-Set Attribute

**Use:** To set either the type of data allowed or the display characteristics of the current cell. The Attribute command does not address format of display (see the /F - Format command for formatting).

To cancel this command, press the ESC key.

### **Prompt Line Response:**

**ATTRIBUTE: D A L V P H**

### **Contents Line Response:**

The contents line will change to show the Attribute command, just as you entered it in front of the type indicator.

### **Options:**

- D** *Default* – Set cell's attribute to the default attribute. The default attribute is the same as the Global attribute (originally none).
- A** *All* – Accept any data keyed in.
- L** *Labels* – Accept labels only. No values or formulas may be keyed in for this cell.
- V** *Values* – Accept values only. No labels will be accepted for this cell.
- P** *Protect* – Protect cell. Nothing may be entered in this cell while this attribute is in effect. Useful for protecting data from accidentally being overwritten. The protect attribute also marks the cell as one that will be skipped by the Ctrl-I, Ctrl-Y, or TAB keys.
- H** *Hide* – Hide the value contained in the cell. The value is retained, but the user cannot see it. Useful if some of the data on your worksheet is confidential. Note: the contents of the cell will be hidden on printouts and on the contents line.

**Example:**

1. Type: **/CY** to clear the worksheet.
2. Type: **/AV** to set the attribute to values only.
3. Type: **OOPS**.

UltraPlan will beep at you, and the prompt line will change to read:

**CELL ATTRIBUTES CONFLICT WITH COMMAND**

4. Type: **/AP** to set the attribute to protected.
5. Type: **PROTECTED**

UltraPlan will beep at you, and the prompt line will change to read:

**CELL ATTRIBUTES CONFLICT WITH COMMAND**

**Note:** The only way to remove an attribute is to replace it with another one. Attribute **D** returns the cell to the global attribute, while attribute **A** overrides the global attribute.

## **6.7 /B-Blank Cell**

**Use:** To remove the contents of the current cell, and replace them with a blank cell.

To cancel this command press the ESC key.

### **Prompt Line Response:**

**BLANK**

### **Example:**

1. Move the marker to the cell you wish to blank.
2. Type **/B**.

When you press the RETURN key, or any of the marker movement keys, the previous contents of the cell are removed forever.

## **6.8 /C-Clear Worksheet**

**Use:** To clear the entire contents of the current worksheet and restore all defaults.

If you execute this command, and you have not saved your worksheet, it will be irretrievably lost.

To protect you from mistakenly clearing a worksheet before it has been saved, you will be asked to confirm the Clear command by typing **Y**.

To cancel the Clear command, type any key except **Y**.

### **Prompt Line Response:**

**CLEAR: TYPE Y TO ERASE EVERYTHING**

### **Example:**

1. Type: **/C**

The prompt line will display the above message.

2. Type: **Y**.

The screen will blink, then be “repainted” with an empty worksheet.

**Note:** Column widths will be reset to the default of 7, and the memory indicator will be reset to the full amount of available memory. All windowing and titling options will have been forgotten as well as any global or local attributes or formats.



## **6.9 /D—Delete a Row of Column**

**Use:** To remove the row or column on which the marker currently rests. The Delete command *completely and irretrievably removes the row or column in question from your worksheet.*

When the Delete command is issued for a row, UltraPlan moves all rows below the deleted row upward to fill the space, renumbers them, and adjusts any formula references to the rows that are moved.

When the Delete command is issued for a column, UltraPlan moves all columns to the right of the deleted column left, re-letters them, and adjusts any formula references to the columns that are moved.

**Note:** If there are formula references to a cell in a row or column, and that row or column is deleted, the reference to the cell will be changed to the function @ERROR, and the word ERROR will be displayed in the cell containing the reference.

To cancel the Delete command, press ESC, rather than **R** or **C**.

### **Prompt Line Response:**

DELETE: R(-) C(!)

### **Options:**

**R**-Delete the row upon which the marker currently rests.

**C**-Delete the column upon which the marker currently rests.

**Example:**

Assuming you wanted to delete row 7:

1. Move the marker to row 7 (the column is not important),
2. Type: **/D**.

The prompt line will change to read:

**DELETE: R(-) C(!)**

3. Type: R (for row).

## 6.10 /E-Edit Cell

**Use:** Labels or values can be *edited* to correct errors or to make changes for any reason. You can do this either before the characters have actually been entered into the cell (that is while they are on the entry line, but not in the cell), or after they have been entered.

### Prompt Line Response:

EDIT A LABEL

EDIT A VALUE

### Editing During Entry

You can make changes before the contents of the entry line have been entered into the current cell by using the ESC key to erase characters backwards from the current cursor position, then reentering the correct characters.

In addition, you may “jump” into edit mode while you are entering data by pressing Ctrl-E. Once you are in edit mode, it is functionally the same as if you had actually entered the data, then typed /E.

Use the following keystrokes for editing text or values in a cell:

**Left arrow**      Backspaces cursor one character; this is known as a *non-destructive* backspace because it does not erase the characters it backspaces over.

**Right arrow**    Advances cursor one position to right.

**ESC**                Deletes the character immediately to the left of the cursor; this is known as a *destructive* backspace because it erases the characters it backspaces over.

<b>Ctrl-T</b>	Deletes all characters from the cursor position to the end of the line.
<b>Ctrl-V</b>	Aborts an edit, restoring original cell contents.
Any Other Key	Inserts character on keycap of key pressed at cursor position.

**Example:**

If cell C6 contains 132.56, and you determine that it should actually contain 1320.46:

1. Move the marker to cell C6.
2. Type: /E.

The prompt line will change to read:

**EDIT A VALUE**

and there will be a blinking cursor over the first character.

3. Press the right arrow key three times to position the cursor over the . in the number 132.56.
4. Type: 0

The 0 will be inserted before the character the cursor is resting on, pushing all the following characters over one place.

5. Press the right arrow key twice to move the cursor to the 6.
6. Press the ESC key once to delete the 5.
7. Type: 4

You will now have the number 1320.46 on the entry line. Pressing RETURN will enter that number into the current cell.

Editing labels and formulas is done exactly the same way.

Assume cell B10 contained the formula:

**@ SUM(B1...B8) \* 1.07/A3.**

UltraPlan does check to make certain that your changes make sense. For example, assume you wanted to change this formula so that you were dividing by A4.

1. Move the marker to B10.
2. Type: **/E.**

The prompt line will change to read:

**EDIT A VALUE**

3. To demonstrate the error handling, press the right arrow key twice to position the cursor over the U in SUM. Now type: **1.**

Obviously, UltraPlan will not understand @S1UM, but let's see what happens when we try to enter it.

4. Press RETURN.

UltraPlan beeps, and the cursor is positioned over the first offending character, in this case the 1.

5. Press the right arrow key to move the cursor over 1 place.
6. Press the ESC key to delete the 1.
7. Press the right arrow key until the cursor is at the end of the line (19 times).
8. Press the ESC key to delete the 3 in A3.
9. Type: **4.**

When you press RETURN, your entry will be accepted.

## **6.11 /F-Set Cell's Format**

**Use:** The Format command is used to modify the display of data in an individual cell from the default format. The default format for a cell is whatever you set the Global format to be. If you have not modified the Global format, the format is General.

Prompt Line Response:

**FORMAT: D G I L R \$ \***

### **Options:**

- D** *Default* – Use the Global format setting, or if none, display in format G (general).
- G** *General* – This is the default setting when you start UltraPlan, and uses decimal or exponential notation to display values to the largest number of significant digits within the column width. General format is right justified in the field, and allows at least one leading space, so if the column width is 7, the maximum number of digits that can be displayed is 6. General format has no effect on labels.
- I** *Integer* – Display values as whole numbers. All values are rounded to their closest whole number following the rule: less than half rounds down, half or greater rounds up. Integer format has no effect on labels. If the number is too large to display in the field, exponential notation is used.
- L** *Left Justify* – Display both values and labels left justified in the cell. Labels will be displayed starting in the first column of the cell and padded with enough trailing spaces to fill out the cell. Values will be displayed starting in the second column of the cell and padded with enough trailing spaces to fill out the cell. For value display, format L acts as a left justified format G.

- R** *Right Justify* – Display both values and labels right justified in the cell. Labels will be displayed with enough leading blanks to force the last character of the label to the last space of the cell. This format is very good for column headings. Values will be displayed in format G.
- \$** *Dollars* – Display values in dollars and cents format. Values will be displayed to two decimal places significance (whether or not the number has that degree of significance). If the number is too large to fit in the column, an overflow symbol is printed instead as a warning. This symbol is the less-than (<) sign. Labels are unaffected by format dollars.
- \*** *Line Graph Format* – This format takes the truncated value of the number and displays that number of asterisks (\*) in the cell if they fit. Truncation involves taking the integer part of the number, and *dropping* the fractional part. No rounding takes place in this operation (see the @INT function for examples). There will always be at least one leading blank in the cell, and only as many asterisks as can fit in the cell will be displayed. This means that the greatest number of asterisks that can be displayed is 80, if the cell is at its widest. This format is useful for getting a rough graphic picture of your data. Labels are unaffected by format

**Examples:**

1. Clear the worksheet by typing **/CY**.
2. In cell A1, type the number **123.456**.
3. 123.46 is your value to the greatest number of significant digits that UltraPlan can fit in a cell 7 columns wide. Widen the column by typing: **/L10**.

You will note that the entire number is now displayed.

4. Type: **/FI** to set the format to Integer. Note that the whole number displayed rounded down.

5. Type: **/F\$** to set the format to dollars and cents.
6. Now to demonstrate the overflow symbol, enter the number: 1876587.56.

Notice the display now reads: <<<<<<. This indicates that your number will not fit in the column, at its current width.

7. To find out how this number would have been displayed in general format, type: **/FG**.

Note that since General format does not have to print the decimal point and two fractional digits, it can fit the number (rounded one digit shorter) into the cell.

8. Type: **/L7**.

The display shifts into exponential notation in order to fit in the cell.

9. Now, clear the worksheet by typing: **/CY**.
10. Move the marker to cell A1, then type the number **1**.
11. Move the marker to cell A2, and type the formula:  
**+ A1 + 1**
12. Move the marker to cell A1, and type: **/F\*** to set the format to graphic. Move the marker to cell A2, and repeat this process.
13. Reproduce the formula in A2 by moving the marker to A2, if it is not already there, and entering the following keystrokes:

**/R:A3.A10**  
**RETURN**  
**R**

You should see a rough graphic representation of your data. Notice how the data all seems to be the same starting at cell A6 and continuing down to A10? That is because UltraPlan can only display as many asterisks (\*) as will fit in the cell with one leading space.



## 6.12 /G-Set Global Parameters

**Use:** Set certain defaults for the entire worksheet. If windowing is in effect, both windows may have different global parameters in effect. When windowing is cleared (set to 1), the global parameters will be taken from the window in which the marker was resting when the /W1 command was issued.

Certain of these options are available either at the individual column, or individual cell level. In these cases, the option set for the individual column, or cell has precedence over the Global setting.

To cancel the Global command, press the ESC key, rather than one of the options keys.

### Prompt Line Response:

**GLOBAL: C O R F A**

### Options:

- C** *Set column width* for the entire worksheet. This option may be overridden for an individual column by the /L command.

Prompt Line Response: **COLUMN WIDTH: 1-80 D**

You may enter any column width from 1 to 80, or the letter D (default). The default column width is 7, so specifying D is the same as specifying 7.

- O** *Set calculation order.* Ordinarily, the worksheet will be calculated column by column. This is because in spreadsheet planning applications, column dependencies are more common than row dependencies. A good example of a column dependent model would be one that calculated sales (rows) across time (columns) given a growth factor. Should you wish to alter the model to show the sales items across the columns and the time periods down the rows, you would want to alter the calculation order to row-wise.

**Prompt Line Response:**

**CALCULATION ORDER: R(-) C(!)**

**Options:**

- R Set order to row-wise.
- C Set order to column-wise.

**Note:** It is possible to create a model that will require more than one calculation. This is because, try as we might, it is not always possible to organize a model so it breaks cleanly into either a row-wise, or a column-wise order. In these cases, you must force a recalculation by pressing the exclamation point (!) key.

It is also possible to create a calculation that cannot, under any circumstances, be resolved. This is done by entering a formula that depends upon the cell it is in. For example: if row 3 had the projected costs for 1983 through 1985, in columns B through D, and column F was to be the percentage of total costs, the correct formula, assuming total costs were in cell E11, would be: `+E11/@SUM(B3...D3)*100`. If you made a slight error, and entered the formula as: `+E11/@SUM(B3...F3)/100`, you would have a formula the could not be resolved. No matter how many times you press the ! key, the result will not be correct. These errors are somewhat difficult to detect, as they do not generate an outright error message, just erroneous results. They can be avoided by careful entry of formulas.

- R *Set recalculation mode.* Normally, recalculation of the entire worksheet will take place each time an entry is made. When you begin to work with larger models, this recalculation is not quite so instantaneous, and impedes quick data entry. For this reason, there is a Global option to set recalculation to manual.

Prompt Line Response: **RECALCULATION: A M**

**Options:**

**A** Set recalculation to *automatic*.

**M** Set recalculation to *manual*.

**Note:** When recalculation is set to manual, the only way to update your calculated cells is to press the recalculate key (!).

- F** *Set Global format.* You may set the format of the entire worksheet using the Global format option. The Global format will be overridden by any individual cell format you might specify.

Prompt Line Response: **FORMAT: D G I L R \$ \***

**Options:**

See the /F—Format command for a complete description of the formatting options.

- A** *Set Global attributes.* You may set the attributes of the entire worksheet using the Global attribute option. The Global attribute will be overridden by any individual cell attribute you might specify.

Prompt Line Response: **ATTRIBUTE: D A L V P H**

**Options:**

See the /A—Attribute command for a complete description of the attribute options.

**Example:**

Assume you wanted to design a template for easy data entry. The first thing you would want to do is to make certain data could not be entered in cells that contained formulas or constant data. You might do this by setting the Global attribute to protected.

1. Type: **/GAP.**

Now that all the cells are protected, you would want to modify the cells that are designated for data entry using the /A command – remember, individual cell attribute settings take precedence over the Global setting.

2. Move the marker to the first cell designated for data entry and type: **/AV** (assuming it is value entry).
3. Repeat the process in step (2) for all other cells designated for data entry.

Now, to speed up the process of data entry, we would make Global recalculation manual.

4. Type: **/GRM.**

What we have accomplished is to set up a worksheet that will allow data entry only in the cells we have specified, and that will only recalculate the worksheet on request, rather than every time an entry is made. A fringe benefit of this process is that the person using this model can tab to the next entry field using TAB, and tab to the previous entry field by using Ctrl-Y.

Say most of the fields are dollars and cents. We would wish to set the Global format to dollars and cents.

5. Type: **/GF\$.**

Now all your numbers appear with two decimal places.

### **6.13 /I-Insert a Row of Column**

**Use:** To insert a row above the current marker position, or a column to the left of the current marker position.

When the Insert command is issued for a row, UltraPlan moves all rows below the inserted row downward to make space, renumbers them, and adjusts any formula references to the rows that are moved.

When the Insert command is issued for a column, UltraPlan moves all columns to the right of the inserted column right to make space, re-letters them, and adjusts any formula references to the columns that are moved.

To cancel the Insert command, press ESC, rather than **R** or **C**.

Prompt Line Response:

**INSERT: R(-) C(!)**

**Options:**

- R** Insert a row above the row in which the marker currently rests.
- C** Insert a column to the left of the column in which the marker currently rests.

**Example:**

Assuming you wanted to insert a row between row 7 and row 8:

1. Move the marker to row 8 (the column is not important).
2. Type: **/I**

The prompt line will change to read:

**INSERT: R(-) C(!)**

3. Type: **R** (for row).

## **6.14 /L-Set Individual Column Width**

**Use:** This command allows individual columns to have widths other than the width specified in the Global command. This enables the worksheet to contain more information displayable on the same screen, improves readability, and ease of data entry.

**Note:** If your worksheet has more than one window specified, the individual column widths can be different from window to window. The widths adopted when the windows are united (/W1) are taken from the window in which the marker is resting when the /W1 command is issued.

To cancel the /L command, press the ESC key.

### **Prompt Line Response:**

**COLUMN WIDTH: 0-80 D**

### **Options:**

You may enter any number from 0 through 80 to set the width of the column on which the marker is currently resting. Notice that if you set the width to 0, the column will no longer be displayed on the screen or in printouts. You will not be able to move the marker to the column with the marker movement keys. Instead, you have to use >(Go To) command to reach it.

When you move the marker to a column of width 0, the marker will disappear from the worksheet, and will reappear on the contents line over the current cell indicator.

If you enter **D** (for default), the column width will be set to the width specified in the Global command (if any), or 7 (if none).

**Example:**

If you wanted to type row labels in column A, and you have determined that the widest label you will have is 14 characters:

1. Move the marker to column A.
2. Type: /L.

The prompt line will change to read:

**COLUMN WIDTH: 0-80**

3. Enter 14.

When you press RETURN, column A will expand to 14 characters. All columns to the right will be pushed over to make room for the new column width.

**Note:** In order to make a zero width column visible again, you must first Go To (>) that column, then use the /L command to give it a length.

## **6.15 /M-Move a Row or Column**

**Use:** The Move command is used to rearrange the order in which you present your data. You may decide that it makes more sense to present a given row or column in a different place than it appears in your working model. Rather than retyping the entire changed portion of the model, you can simply move the row or column to the desired location.

To cancel the Move command, press the ESC key until the MOVE prompt disappears from the prompt line.

### **Prompt Line Response:**

**MOVE: FROM. TO**

You will note that as soon as the /M command is typed, the current cell coordinate is copied onto the entry line. This may be edited using the ESC key, if you so desire.

### **For row moves:**

If you are moving a row to a position below it in the worksheet, specify the coordinate of the cell directly below the place you want the row to appear.

For example, if you wish to move row 7 such that it appears just before row 11 (it will take on the number 10).

1. Position the marker on row 7 (say cell A7).
2. Type: **/M**.
3. Now type: **.**

The expected three dots will appear. Now you will be entering a destination cell.

4. Move the marker to row 11 — the row below where you with row 7 to appear.

The coordinate A11 will be copied into the entry line.



**Note:** In the Move command, the fact that the column is the same tells UltraPlan that you wish to move a row. It is not important which column you choose so long as the FROM column is the same as the TO column.

When you press RETURN, the rows that were 8, 9, and 10 will be moved up and renumbered 7, 8, and 9, respectively.

If you had wanted to move the row to a position above its original position, for the TO location specify the exact row number where you wish the row moved (notice the difference between moving rows up and down on the worksheet).

**For column moves:**

Column moves are specified in much the same manner as row moves except that the FROM and TO rows must be the same in the specification. If the FROM and TO rows are the same, UltraPlan knows it must move the entire column.

The same rules apply to specification of a TO column as to a TO row, except the whole process is tipped on its side.

If you are moving a column to a location to its right, place the marker on the column immediately to the right of the actual column you wish the column to occupy.

If you are moving a column to a location to its left, place the marker on the exact column you wish the column to move to.

With either row or column moves, the value references throughout the worksheet are adjusted to reflect the new location of the row or column.

**Warning:** If you move a row upwards or a column leftwards, be certain that you are not moving it above some of the calculated values it needs for its calculations – this is one of the easiest ways to generate a situation where multiple recalculations are required to cause a model to converge.

## **6.16 /P-Invoke the Print Subsystem**

**Use:** This command is used to enter the Print Subsystem directly from the Calculate Subsystem.

To cancel the /P command, press the ESC key.

Prompt Line Response:

### **ENTER LOWER RIGHT OR RETURN**

If you enter a coordinate for lower right, the Print Subsystem will automatically use that coordinate as the lower right of the worksheet, unless subsequently changed. You may specify this coordinate by pointing with the marker.

This feature is useful if you wish to print only a portion of the worksheet.

The Print Subsystem will be discussed in detail below.

## **6.17 /R-Reproduce**

**Use:** The Reproduce command copies a cell, a range of cells, or a block of cells (with or without formats, attributes, or blank entries) to another cell, or another range of cells. This is particularly handy in the case of formulas, since Reproduce has the option of adjusting the coordinate references so that they are correct relative to the coordinate of the cell.

To cancel the Reproduce command, press the ESC key until the prompt line clears or enter a Ctrl-V to abort the command.

Prompt Line Response:

**REPRO: (, SOURCE RANGE OR RETURN**

( The parenthesis command specifies to UltraPlan that you wish to exercise the special reproduce options. the following will appear on the prompt line:

**LIMIT: A F C V N R)**

**A** Copy attributes only (no data).

**F** Copy formats only (no data).

**C** Copy contents of cell only (no formats or attributes).

**V** Copy values and labels only (leave formulas behind).

**N** Copy all cells NO CHANGE, and do not prompt.

**R** Copy all cells RELATIVE, and do not prompt.

) Exit options section of Reproduce command.

<RETURN> also exits.

The C (contents) option is exclusive of the A (attributes) and the F (format) options. That is they may not both be invoked (and do not make sense together). You may, however, use the A and F options together.

The N (NO CHANGE) and R (RELATIVE) options are exclusive, and may not be specified together.

Complete information on the NO CHANGE and RELATIVE options is contained below.

When the /R (Reproduce) command is entered, the current cell coordinate is copied onto the entry line. You are being prompted to enter a *source* cell or range of cells.

The source range specification is terminated either by pressing the RETURN key, or by pressing the colon (:) key.

Examples of a source cell are:

A22

B36

Examples of a source range are:

A1...A10 A1...D1

A range must be either in the same row, or in the same column.

A source range that is specified with a different beginning and ending row, and a different beginning and ending column is called a *block*. A block is a rectangle of cells described by an upper left cell (the beginning cell of the range), and a lower right cell (the ending cell of the range).

A1...B7 C1...D11

When either the RETURN or colon (:) keys are pressed, the prompt line changes to read:

**REPRO: ENTER TARGET RANGE OR RETURN**

Cell and range specification rules are the same for the target range as for the source range.

Several cases are possible:

1. A Single cell was specified as the source range, and a single cell was specified as the target range.

In this case, the contents of the source cell will be copied to the target cell.

2. A single cell was specified as the source range, and a range was specified as the target range.

In this case, the contents of the source cell will be copied into each of the cells in the target range.

3. A range was specified as the source range, and a single cell was specified as the target range.

In this case, the contents of each cell in the source range will be copied starting in the cell specified as the target range, and proceeding row-wise, if the source was a row, or column-wise if the source was a column until there is a complete replica of the source range.

4. A range was specified as the source range, and a range was specified as the target range.

In this case, the contents of each cell in the source range will be copied starting in the first cell of each member or the target range.

**Note:** If you specify a range to Reproduce and the two ranges are in opposite directions (in other words, if the source range spans a row, and the target range spans a column) the entire source range will be copied repeatedly to each destination column (or row).

5. A block was specified as the source range, and a cell was specified as the target range.

In this case, the contents of each cell in the block will be copied using the target cell as the new upper left cell.

6. A block was specified as the source range, and a range was specified as the target range.

If the range is smaller than the block size in the direction of the range, the block will be copied only once. If the range is larger than the block size in the direction of the range, the block will be copied as many times as necessary to make sure that all cells in the range are filled.

For example: assume you specified the source range as A1...C7, and the target range as D1. The cells A1...C1 will be copied into D1...F1; A2...C2 will be copied into D2...F2; etc. through A7...C7 copied into D7...F7.

Assuming the same source range, if the target range were specified as D1...F1 the result would be the same. If, however, the target range were D1...G1, two copies of the block would occur. The upper left cells would be D1 and G1. In this case it took two copies of the block to cover the entire range.

The above example of reproducing a block into a range covered range of column reproduction. Reproducing a block into a range of rows follows the same rules.

Once you have specified both source and target ranges, you will, under certain circumstances encounter a new prompt:

**REPRODUCE: N = NO CHANGE, R = RELATIVE**

When you see this prompt, it means you have encountered a formula. What UltraPlan wants to know is how to reproduce the coordinates of the source formula.

**Note:** This prompt will not appear if you exercised either the N or the R options, or if you are reproducing constant data rather than formulas.

For example:

If, in cell F1, you had the formula:

**+ B1 + C1**

and you Reproduce F1 to F2 through F5, the cursor will appear over the 1 in B1 and the

**REPRODUCE: N = NO CHANGE, R = RELATIVE**

prompt will appear.

You really want the formula in F2 to read **+ B2 + C2**; the formula in F3 to read **+ B3 + C3**; etc.

What you want to do is reproduce the formula using the *relative* option. If you had typed **N** instead of **R**, the formulas in each cell (F2 through F5) would read **+ B1 + C1**.

In some cases, you will want to reproduce one coordinate relative to the target cell, and another with no change. That is why you will be prompted for each coordinate reference.

## **6.18 /S-Invoke File Subsystem**

**Use:** The /S (or storage) command is used to invoke the File Subsystem. This allows you to perform many useful functions such as:

- Loading a worksheet from disk.
- Saving a worksheet to disk.
- Deleting a disk file.
- Locking or unlocking a disk file.
- Obtaining a catalog of disk files.
- Initializing a new storage diskette.

To cancel the /S command, press the ESC key.

Prompt Line Response:

### **ENTER LOWER RIGHT OR RETURN**

Under certain circumstances, you will not want to save the entire worksheet to disk. This option is only available for DIF files, and will be discussed under the File Subsystem. If you enter a lower right coordinate, the File Subsystem will take it as the lower right cell to save in the DIF file. If no coordinate is specified, the lower right cell of the worksheet will be assumed.

For further discussion of the options available in the File Subsystem, see the section on that subsystem.



## **6.19 /T-Set Titles**

**Use:** UltraPlan allows you to fix titles on the screen such that when you move the marker far enough to cause the window to slide, the titles will remain on the screen. This is particularly handy for clear display of large models where your titles would ordinarily disappear when viewing certain portions of the worksheet.

**Note:** You may specify separate titles in different windows if you are working with multiple windows. When you unite the windows using the /W1 command, the titling is taken from the window in which the marker is resting when the command is issued.

The /T (titles) command affects the marker movement keys. If you fix titles, UltraPlan assumes that they will not be changed, and prevents you from moving the marker into the title region any way except with the >(Go To) command. If you attempt to do so, you will hear a “thump”, indicating that you have reached the edge of the worksheet.

Since the Ctrl-E key moves the marker to the top left cell of the worksheet, its function is modified by the /T (titles) command such that it moves the marker to the top left cell that is not fixed as a title.

To cancel the /T (titles) command, press the ESC key.

Prompt Line Response:

**TITLES: H V B N**

Options:

- H** *Horizontal Titles.* Define the row the on which the marker is currently resting, and every row above it as a title row. These titles will remain on the screen as you move the marker down the worksheet. You will not be able to move the marker back to the row you used to define the titles once it has been moved into your worksheet space (the part that is not titles).
- V** *Vertical Titles.* Define the column in which the marker is currently resting, and every column to the left of it as a title column. These columns will remain on the screen as you move the marker to the right across the worksheet. You will not be able to move the marker back to the column you used to define the titles once it has been moved into your usable worksheet space.
- B** *Both.* Define the row on which the marker is currently resting, and all rows above it, and the column in which the marker is currently resting, and all rows to the left of it as titles. In this manner, you may keep both your row and column titles on the screen at all times.
- N** *None.* Remove all title definitions.

Under certain circumstances UltraPlan will remove vertical title definitions for you. For example, if you had column B as the first column on your screen (the window has already slid one column), and fixed vertical titles, then issued a >(Go To) command to column A, the title definition would be removed. The rule, in this case is that if you cause the title column to scroll, the title definition will be removed. The other circumstance under which vertical titles will be removed is when you modify the width of the title columns so that they will not all fit on the screen at the same time.

**Examples:**

1. Type: **/CY** to clear the worksheet.
2. Type the following:

<b>Cell</b>	<b>Label</b>
<b>B1</b>	<b>JAN</b>
<b>C1</b>	<b>FEB</b>
<b>D1</b>	<b>MAR</b>
<b>E1</b>	<b>APR</b>
<b>A2</b>	<b>COST</b>
<b>A3</b>	<b>SALES \$</b>
<b>A4</b>	<b>PROFIT</b>

Now, to fix the titles horizontally, move the marker to row 1 and

3. Type: **/TH**.
4. Now, move the marker down until the window scrolls (the row numbers will change). The titles should stay in place.
5. To fix the titles both ways, move the marker to cell A1.
6. Type: **/TB**.
7. Now, move the marker around on the worksheet – the titles should stay in place, both horizontally and vertically.
8. Press Ctrl-E. The marker will move to cell B2, which is the top left usable cell, as you have defined it.
9. Press the left arrow key. You should hear a “thump”, indicating that you have bumped into the edge of the worksheet.
10. Now, type: **/TN** to remove the titles.

## **6.20 /W - Set Window**

**Use:** UltraPlan allows you to take a look at your model through multiple “windows”. The normal mode is single window. If you have a large worksheet, and you want to keep a totals line in view at all times, you might want to split the screen horizontally, so that the totals appeared in the lower window, and the components of those totals were in the upper window.

If you wanted to keep an annual total in view, you might want to split the screen vertically so that the year-to-date figure was always in view in the right hand window, and the monthly figures were in the left hand window.

To cancel the /W (window) command, press ESC.

Prompt Line Response:

**WINDOW: H V 1 S U**

Options:

- H** *Horizontal split.* This command will split the screen horizontally at the marker position. The row the marker is resting on, and all below it will appear in the bottom window, and the rows above the marker position will appear in the upper window. When the H is pressed in the /W command, a new row of column headings will appear above the row the marker was resting on, and the marker will be moved up one row into the top window.
  
- V** *Vertical split.* This command will split the screen vertically at the marker position. The column the marker is resting in, and all to the right of it will appear in the right-hand window, and the columns to the left of the marker position will appear in the left-hand window. When the V is pressed in the /W command, a new column of row headings will appear to the left of the column the marker was in, and the marker will be moved one column to the left, into the left-hand window.

- 1** *Use one window.* This command unites the window (if you have multiple windows active), and the worksheet assumes the formatting, attributes, and global settings of the window the marker is in when the /W1 command is issued.
  
- S** *Synchronize windows.* This command specifies that if one window scrolls, the other must be dragged along with it. In the case of a vertical split, this means that if you move the marker up or down far enough to make the window slide, the other window will slide along with it. In the case of a horizontal split, the /WS command specifies a left-right synchronization.
  
- U** *Unsynchronized windows (default).* This command specifies that the two windows will scroll independently of one another. This is useful if you want to see two separate portions of your worksheet independently of one another.

To move from one window to another, simply press the semicolon (;) key. If you are in synchronized mode, the marker will remain in the same row for a vertical split, or column for a horizontal split. If you are in unsynchronized mode, the marker will jump to wherever it was last in the alternate window.

**Note:** You may set Column Width (/L), Global Column Width (/GC), Global Format (/GF), and Global Attribute (/GA) separately for each window. If you wish to display the worksheet in several different formats (for example, numeric and graphic), this is very handy. When you issue a /W1 command, the worksheet format, attributes, etc. are taken from the window in which the marker is resting when the command is issued.

**Example:**

1. Type: **/CY** to clear the worksheet.
2. Enter the following in your worksheet:

<b>Cell</b>	<b>Label</b>
<b>B1</b>	<b>JAN</b>
<b>C1</b>	<b>FEB</b>
<b>D1</b>	<b>MAR</b>
<b>E1</b>	<b>APR</b>
<b>F1</b>	<b>YTD</b>
<b>A2</b>	<b>COST-A</b>
<b>A3</b>	<b>COST-B</b>
<b>A4</b>	<b>COST-C</b>
<b>A5</b>	<b>T-COST</b>
<b>A6</b>	<b>SALES\$</b>
<b>A7</b>	<b>PROFIT</b>

Now, suppose you wanted to play with the monthly numbers, while retaining the year-to-date totals on the screen.

3. Move the marker to column F. You will note that one column is required to display the totals, so move the marker to column G to obtain the space, then back to column F.
4. Type: **/WV**.

A new column of row numbers appears just to the left of column F, and the marker is placed in column E.

5. Move the marker to A1.

Notice that the other window is still in place.

6. Press the semicolon (;) key.

The marker will jump to the other window.

7. Press the semicolon (;) key again.

The marker will return to the original window.

The key to using windows effectively is the allocation of the proper amount of space in each window. For example, if we had wanted to see two columns in the right window, we would have had to position the marker such that there were two columns to the right of it before typing the /WV command.

### **6.21 /— Repeating Label**

**Use:** The /— command is used to enter a repeating label, one or more characters in length. This label will occupy the entire width of the cell. The advantage of the repeating label is the fact that if you change the width of the cell, the label expands to fill it.

Prompt Line Response:

**REPEAT LABEL**

**Example:**

If you wanted to fill a cell with dashes, you would type:

/—



## **7. FUNCTIONS—INTRODUCTION**

UltraPlan has a very convenient way of performing operations that occur frequently in planning models. Rather than entering these operations as complex formulas every time they are needed, you may invoke one of UltraPlan's built-in functions.

A *function* follows the following rules:

- Accepts zero or more *arguments* and returns a value. An argument is defined as a value, a cell coordinate, a range of cells, or a formula.
- Begins with the special character @ (the commercial "at" sign).

## **7.1 @ABS-Return Absolute Value**

**Form of Reference:** @ABS (value)

**Use:** Return the magnitude of a number, or formula.

**Note:** You may only specify one value for the @ABS function.

**Example:**

If the value in cell C1 is -16,

@ABS(C1) returns the value 16.

@ABS(C1\*3/2) returns the value 24.

## 7.2 @ AND-Return the “AND” of Multiple Logical Values

**Form of Reference:** @AND(logical values)

**Note:** Return TRUE if all logical values are TRUE, or FALSE if any of the logical values are FALSE. If any values in the list are not of type logical, the result will be ERROR.

**Note:** You may specify a list of logical values, separated by commas, or you may specify a range of the form:

beginning cell...ending cell

All values *must* be logical, or logical expressions, otherwise the result will be ERROR.

### **Example:**

@AND(@TRUE,@TRUE) yields TRUE

@AND(@TRUE,@FALSE) yields FALSE

@AND(3 = 1,5 = 5) yields FALSE

### **7.3 @ AVERAGE-Return the Average of a List**

**Form of Reference:** @AVERAGE(list)

**Use:** @AVERAGE is used to obtain the average of a list, a range of cells, or a list of ranges of cells. Only cells having values will be used in the average. Labels and blank cells are ignored.

**Example:**

@AVERAGE(B3,B9,C14) returns the average of the cells B3, B9, and C14.

@AVERAGE(B3...H3) returns the average of the cells B3 through H3 inclusive (range of cells).

@AVERAGE(B3...H3,B4...H4) returns the average of the cells B3 through H3 and B4 through H4 (list of ranges).

## **7.4 @ CHOOSE-Choose an Element From a List of Values.**

**Form of Reference:** @CHOOSE(index,list)

**Use:** The @CHOOSE function is useful for picking a value out of a pre-determined list. It is somewhat analogous to @LOOKUP, except that the table need not be in your worksheet.

### **Example:**

Assume you knew that for case 1 you wanted to use a 17% discount rate on your merchandise, for case 2 a 13% discount rate, and for case 3, an 11% discount rate. You might define cell B3 to be the case number, then the discount rate might be obtained anywhere else in the worksheet in the following manner:

**@CHOOSE(B3,.17,.13,.11)**

Now, if cell B3 contains a 1, the value returned is .17, if B3 contains a 2, the value returned is .13, etc.

## **7.5 @COL-Return Column Number**

### **Form of Reference: @COL**

**Use:** @COL is useful to index certain things such as dates. For column A, the value returned by @COL is 1, for column B, 2, etc.

**Note:** @COL takes *no* arguments.

### **Example:**

For quick generation of date headings across a worksheet, try this technique:

**1979 + @COL**

If you reproduce this formula across the worksheet, you will get 1981 in column B, 1982 in column C, etc.

**7.6 @ COUNT-Count the Number of Values in a Range**

**Form of Reference:** @COUNT(range)

**Use:** @COUNT will tell you how many values were actually used in an average, an NPV, or any other calculation. In certain formulas, it is important to know the N, or number of values upon which a result is based.

**Note:** @COUNT will only count values, not labels or blank cells, so if labels or blank cells fall within the specified range, they are not included in the result returned by @COUNT.

For the range argument, you may specify a range, a list, or a list of ranges.

**Example:**

(@COUNT(C3...F3)/10)

@COUNT(C3...F3,C4...F4)

## **7.7 @ERROR-Return the value ERROR**

**Form of reference:** @ERROR

**Use:** @ERROR displays the word **ERROR** in the current cell, as well as all cells containing formulas with value references to the current cell.

You may use this function in combination with the @IF or @LOOKUP functions to generate error messages for values that you wish to exclude from the acceptable range.

**Note:** @ERROR does not accept any arguments.

### **Example:**

If you wanted to calculate a formula only if cell C1 is between 50 and 100, you might write the following formula for cell:

**@IF(@AND(C1 > 50,C1<=100),your formula,@ERROR)**



## **7.8 @EXP-Return the Value of e Raised to a Power**

**Form of Reference:** @EXP(value)

**Use:** @EXP function returns the value of e to the value's power. @EXP is the inverse function to @LN.

**Note:** You may only specify a single value, coordinate, or formula as an argument of @EXP.

**Example:**

@EXP(B5)

**7.9 @FALSE-Return the value FALSE**

**Form of Reference: @ FALSE**

**Use:** This function returns the value FALSE. Use the @FALSE function for comparison operations (@IF).

**Example:**

**Set: B3 equals @ FALSE**

**IF(B3,5,2)**

**Returns: 2**

## **7.10 @IF-Conditional Evaluation of Expressions**

**Form of Reference:** @IF(logical expression,true,false)

**Use:** The @IF function is used to test the contents of another cell, or cells for various *logical conditions*. If the logical expression evaluates to TRUE, the formula represented by *true* is evaluated. If the logical expression evaluates to FALSE, the formula represented by *false* is evaluated.

**Note:** Logical operators are:

<b>Operator</b>	<b>Name</b>	<b>Example</b>	<b>Meaning</b>
>	Greater Than	value1 > value2	TRUE if value1 is larger than value2, otherwise FALSE.
<	Less Than	value1 < value2	TRUE if value1 is smaller than value2, otherwise FALSE.
=	Equal To	value1 = value2	TRUE if value1 equals value2 exactly, otherwise FALSE.
>=	Greater Than or Equal To	value1 >= value2	TRUE if value1 is larger than value2, or if value1 is exactly equal to value2, otherwise FALSE.
<=	Less Than or Equal To	value <= value2	TRUE is value1 is exactly equal to value2, otherwise FALSE.
<>	Not Equal	value < > value2	TRUE is value1 is not equal to value2, otherwise FALSE.

Value1 and value2 must follow the rules for a value. That is: they may be constant values, they may be cell references, and they may be formulas. The formulas may contain the logical operators @AND, @OR, @NOT, @ISNA, @ISERR.

**Example:**

Assume your freight rates are \$50/ton for quantities up to and including 500 tons, and \$35/ton over 500 tons. If your quantity is contained in cell C3, you express your freight rate as follows:

**@IF(C3<= 500,50,35)**

You may use formulas as either side of the logical expression, and in either the “true” or “false” conditions. For example:

**@IF(C3/100\*A5 @ D3/100\*A6,B7\*C3,B8\*C3)**

**Note:** You may be able to better visualize how some of these logical tests work by using the following trick:

First, evaluate all the formulas in the logical expression. Take our first example. Assuming C3 contains the number 350, we have the expression  $350 <= 500$ .

Next, determine the truth of the expression. In this case 350 is smaller than 500, so the expression evaluates to TRUE.

Now, if the result is true (which it is in this case), evaluate the “true” expression, otherwise evaluate the “false” expression.

### **7.11 @INT-Return the Integer Portion of a Value**

**Form of Reference:** @INT(value)

**Use:** To obtain an integer by *truncating* the decimal portion of a number. This option allows you to discard significant digits you either do not need or do not want in your calculations or displays.

**Note:** The fractional portion of the value is discarded entirely in the result, and will not, under any circumstances be available for future calculations. Since this is a truncation operation, no rounding takes place—the fractional part of the number is simply dropped.

**Example:**

If you want to obtain the remainder from a division, you might employ the following technique (assuming the dividend is in cell B4, and the divisor in cell B3):

+ B4 – B3\* @INT(B4/B3)

## **7.12 @ ISERROR-Is Value ERROR**

**Form of Reference:** @ISERROR(value)

**Use:** The @ISERROR function takes an argument of any type, and returns the value TRUE if the argument is ERROR, and the value FALSE if the argument is not ERROR.

This is a good way to test whether one or more of your calculations has generated an ERROR condition.

**Example:**

**@ IF(@ ISERROR(C3),0,C3\*D5)**

### **7.13 @ISNA-Is value NA**

**Form of Reference:** @ISNA(value)

**Use:** The @ISNA function takes an argument of any type and returns TRUE if the argument has the value NA, otherwise, FALSE.

This is a good way of making your calculations conditional on the availability of the data.

**Example:**

@IF(@ISNA(C3),@NA,C3\*D5)

**7.14 @ LN-Natural (base e) Logarithm**

**Form of Reference:** @ LN(value)

**Use:** The @ LN function returns the natural, or base e logarithm of a value.

**Example:**

@ LN(C3)

@ LN(D4/C1)



**7.15 @ LOG10-Common (base 10) Logarithm**

**Form of Reference:** @ LOG10(value)

**Use:** The @ LOG10 function returns the common, or base 10 logarithm of a value.

**Example:**

@ LOG10(C3)

@ LOG10(D4/C1)

## **7.16 @LOOKUP-Perform a Table Lookup**

**Form of Reference:** @LOOKUP(value,range)

**Use:** @LOOKUP looks up a value in a table then returns the corresponding value in another table.

**Example:**

If we are printing a document and we know that there are price breaks based on quantity, and we have the following table:

<b>Quantity</b>	<b>Price/Document</b>
100	5.47
300	5.25
500	5.05
700	4.95
1000	4.75

we can enter this table in two columns (say E and F). Now we can look up the price per document in the table from elsewhere in the worksheet as follows:

**@LOOKUP(C3,E1...E5)**

The @LOOKUP function finds the value in cell C3, then looks through the table in E1...E5. @LOOKUP will search the table until it finds a value *larger* than the number specified (say the number in C3 was 350), then backs up one entry. The value returned will be that of the cell in the next column to the right of the range you specified, at the same row location, so the value returned will be 5.25.

It is possible to specify a range across a row, rather than down a column. In the case of a horizontal table, the return values are taken from the next row.

### **7.17 @MAX—Return the Largest Value in a List**

**Form of Reference:** @MAX(list)

**Use:** The @MAX function returns the largest value in a list of values, a range of values, or a list of ranges.

**Example:**

@MAX(B3...G3)

@MAX(B3...G3,B4...G4,H5)

## **7.18 @MIN—Return the Smallest Value in a List**

**Form of Reference:** @MIN(list)

**Use:** The @MIN function will return the smallest value in a list of values, a range of values, or a list of ranges.

**Example:**

@MIN(B3...G3)

@MIN(B3...G3,B4...G4,H5)

**7.19 @NA—Return the value NA  
(Not Available)**

**Form of Reference:** @NA

**Use:** The @NA function is useful if you are creating a “template” that will be used for data entry. The cells that have @NA in them, and all cells referencing those cells will display the value NA. As real data is entered over the NA’s, the formulas throughout your worksheet will be resolved. You may use the @IFNA function to determine whether data has been entered for a particular cell.

**Example:**

@NA

## **7.20 @NOT-Return the Logical Complement**

**Form of Reference:** @NOT(condition)

**Use:** Some logical conditions are more clearly or more concisely expressed with a NOT operator. @NOT returns a value of TRUE if the condition is false, and a value of FALSE if the condition is true.

**Example:**

@IF(@NOT(@AND(A3 = A9,B3 = B9)),2,5)

## **7.21 @ NPV-Calculate Net Present Value**

**Form of Reference:** @ NPV(discount,range)

**Use:** The @NPV function calculates the net present value of the range of cash flows at the given discount rate. The discount rate must be expressed as a decimal.

**Note:** The formula used for calculating the Net Present Value is as follows:

$$\frac{\text{cash}_1}{(1+i)} + \frac{\text{cash}_2}{(1+i)^2} + \dots + \frac{\text{cash}_n}{(1+i)^n}$$

Where:  $i$  = effective discount rate (expressed as a decimal fraction).

## **7.22 @OR-Return the “OR” of Multiple Logical Values**

**Form of Reference:** @OR(logical values)

**Use:** Returns TRUE if any logical values are TRUE, and FALSE if all of the logical values are FALSE. If any values in the list are not of type logical, the result will be ERROR.

**Notes:** You may specify a list of logical values, separated by commas, or you may specify a range of the form:

beginning cell...ending cell

All values *must* be logical, or logical expressions, otherwise the result will be ERROR.

**Example:**

**@OR(A1 = B3,B1 = B3)**

If A1 = 3, B1 = 5, and B3 = 5, the result is TRUE (at least one expression evaluated to TRUE).

If A1 = 3, B1 = 5, and B3 = 7, the result is FALSE (all expressions evaluated to FALSE).



### **7.23 @PI-Return the Value of Pi**

**Form of Reference:** @PI

**Use:** Use the @PI function to obtain the value of PI to 11 significant digits.

**Example:**

If the radius of a circle is in cell B3, to obtain the area use the following formula:

**@PI\*(B3^2)**

## **7.24 @ ROUND-Round a Number**

**Form of Reference:** @ ROUND(value,number decimals)

**Use:** Often it is desirable to round a number to a certain decimal precision using the financial rounding algorithm: less than half rounds down; half or greater rounds up. The @ROUND function allows you to define the decimal significance of your result.

**Note:** The value specified for number of decimals must be between -61 and 61 (inclusive).

### **Example:**

If cell B3 contains the value 1234.5678:

@ ROUND(B3,2) yields the value 1234.57

@ ROUND(B3,0) yields the value 1235 – Note: this is different from @INT because it performs rounding.

@ ROUND(B3,-2) yields the value 1200 (if you wanted your precision to the nearest hundred).

## **7.25 @ROW-Return the Row Number**

**Form of Reference:** @ROW

**Use:** @ROW is used to get a constantly increasing index (much like @COL) for numbering items in a list or dates.

**Example:**

If you want a numbered list starting in row 7, you might use the following formula:

@ROW-6

## **7.26 @SQRT-Obtain the Square Root of a Number**

**Form of Reference:** @SQRT(value)

**Use:** The @SQRT function obtains the square root of positive values. If a negative value is entered the result will be ERROR.

**Example:**

**@SQRT(B3)**

## **7.27 @SUM-Obtain the Sum of the Values in a List**

**Form of Reference:** @SUM(list)

**Use:** @SUM returns the sum of the values in a list of values, a range, or a list of ranges. Any labels or blank cells encountered in the argument list are ignored.

This is particularly useful for totalling columns or rows.

### **Example:**

Assuming you have a column of figures for January in column B, to obtain the total, without regard to labels (repeating labels or 54 normal labels), or blank cells, use the following notation:

**@SUM(B1...B10)**

It should be noted that if an @AVERAGE function had not been provided, it would have been easy to duplicate it in the following manner:

**@SUM(B1...B10)/@COUNT(B1...B10)**

**7.28 @TRUE-Return the value TRUE**

**Form of Reference:** @TRUE

**Use:** The @TRUE function is useful in comparison statements (@IF) to test against the value TRUE.

**Example:**

@IF(B3 = @TRUE,B5,B10)

## 7.29 Short Forms of Entry

When you are specifying a function, you need enter only as many characters as it takes to make it unique. For example:

@SU is the same as @SUM.

@S can be interpreted as @SUM or @SQRT.

UltraPlan will pick a function if you do not enter enough characters for a unique specification. For example, @S will be interpreted as @SUM. The order in which these functions are picked (when not specified uniquely) is *not* alphabetical order, but rather in order of most frequent use.

### Function Access Order

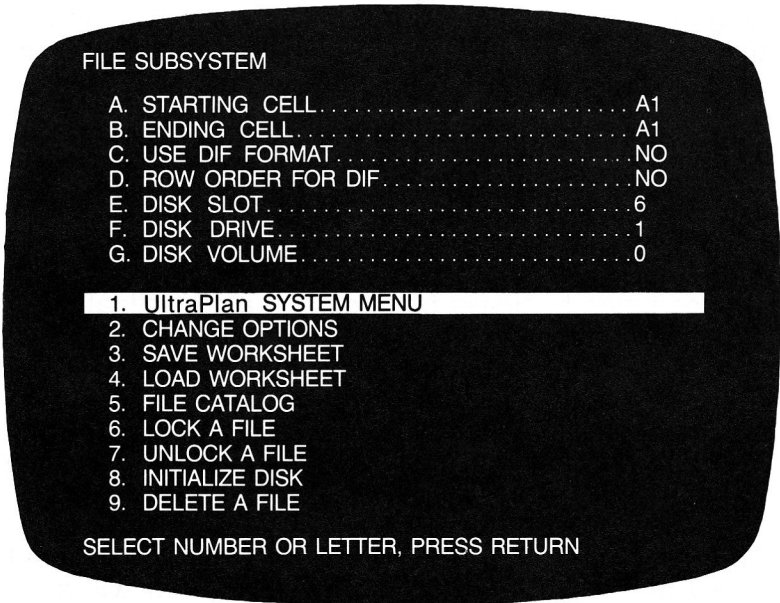
- @A – @AVERAGE, @ABS, @AND
- @C – @COUNT, @CHOOSE, @COL
- @E – @EXP, @ERROR
- @F – @FALSE
- @I – @INT, @ISNA, @ISERR, @IF
- @L – @LOOKUP, @LOG10, @LN
- @M – @MIN, @MAX
- @N – @NPV
- @O – @OR
- @P – @PI
- @R – @ROUND, @ROW
- @S – @SUM, @SQRT
- @T – @TRUE

For functions that require arguments, you need not include the closing parenthesis if the function falls at the end of a line. For example:

@SUM(A1...D1 is the same as @S(A1...D1  
is the same as @SUM(A1...D1)



## 8. File Subsystem



The *File Subsystem* is your means of storing and retrieving data from disk. Since you will almost certainly wish to store your models to disk, and later recall them, you will need to use the File Subsystem.

The File Subsystem is invoked either by selecting option 2 from the System Menu (FILE SUBSYSTEM), or by using the /S (storage) command in the Calculate Subsystem.

The File Subsystem is completely menu-driven, and follows the menu rules set forth in the section on the System Menu.

## **8.1 DIF™ Files**

DIF™ is an acronym for Data Interchange Format. Many programs by various publishers can read and write files in this format. If you want to move data from one program to another, DIF™ files can be extremely useful to you.

**Note:** DIF™ is a trademark of Software Arts, Inc.

DIF™ files serve another, very important purpose: moving blocks of data from one model to another.

One common business function is the consolidation of multiple models into one summary model. For example, say you owned a chain of 10 shoe stores. The manager of each store is required to create a plan that details his sales of each style of shoe, his expenses, and his profits. You, as the owner want to know how each style of shoe did overall, total expenses, and total profits.

The best way to do this is to have the values written out in a DIF™ file, then read into a model that will summarize them.

Another use for DIF™ files is to transpose rows and columns. That is to write a column out to disk, then read it back in as a row (or vice versa). This option is invoked by using the ROW ORDER FOR DIF option of the File Subsystem.

There are several books on spreadsheet modelling that describe this process in greater detail, and provide examples.

### 8.1.1 Format of DIF™ Files

DIF™ files contain three types of records:

- *Header Records*—Which define the parameters of the file.
- *Data Records*—Which contain the actual data values. Note: no calculations are carried over into the DIF™ file, only values.
- *End of Data Records*—Which signal the end of the DIF file.

#### The Header Record

The header record has four sets of three records that specify how much of what sort of information to expect in the file. It has the following format.

**TABLE**      This is a standard header record  
**O,1**  
“ ”

**VECTORS**    This portion specifies the number of vectors. A *vector* is defined as a column or row, V = number of vectors to expect.  
**O,V**  
“ ”

**TUPLES**      This portion specifies the number of elements or *tuples* contained in each vector. T = number of tuples to expect. “ This actually specifies how wide the vector is. A handy way to think of this is as a V-long by T-wide rectangle.  
**O,T**  
“ ”

**DATA**  
**O,0**  
“ ”

### **The Data Record**

The data record consists of a pair of special header records that identify the beginning of the tuple, then a pair of records for each tuple.

– 1,0  
**BOT**            This is the standard header record for each element in a vector. BOT = Beginning of Tuple records.

**T<sub>1</sub>, N<sub>1</sub>**  
**string<sub>1</sub>**        Value for first element of the tuple.

**T<sub>2</sub>, N<sub>2</sub>**  
**string<sub>2</sub>**        Value for second element of the tuple.

.  
. .  
. .

**T<sub>n</sub>, N<sub>n</sub>**  
**string<sub>n</sub>**        Value for last element of the tuple.

### **The End of Data Record**

The End of Data Record The End of Data record signals end of a DIF™ file, and has the following format:

– 1,0  
**EOD**

## **8.2 UltraPlan SYSTEM MENU**

Selection 1 – UltraPlan SYSTEM MENU simply returns you to the System Menu. You may also return to the system menu by pressing the ESC key, unless you are in the options section (lettered menu items), in which case you will have to press the ESC key twice.

### **8.3 CHANGE OPTIONS**

Selection 2 – CHANGE OPTIONS moves the highlight bar into the options section of the menu (the options section is the section containing lettered menu items).

## 8.4 SAVE WORKSHEET

Selection 3—SAVE WORKSHEET allows you to save the worksheet currently in memory to disk.

The worksheet will be saved *in its entirety* unless you specify USE DIF FORMAT (see Option C, section 8.13). The file will be saved on the disk drive, in the slot specified in the options portion of the menu.

Once you select the 3—SAVE WORKSHEET menu item, a list of files on the disk will be displayed on your screen. If the list of files exceeds one screen, the prompt:

### (RETURN) TO CONTINUE

will appear at the bottom of the screen.

Each file is given a number that you can use to select with, so that you can give your files meaningful names, yet not have to type the entire name each time. When the catalog is complete, the prompt:

### SAVE: FILE NAME, NUMBER, OR (RETURN)

= =>

will appear at the bottom of the screen. You may select an existing file by number, type in the file name of an existing file, or type in a completely new file name.

If you press the RETURN key, the save command is cancelled, and you will be back in the File Subsystem menu.

**Warning:** If you choose an existing file name, the previous contents of that file will be erased, and there will be no way to recover the data that was previously stored there.

At the completion of the save process, the catalog will be redisplayed to confirm the fact that your file has indeed been put on disk, and to inform you of its length.

At the bottom of the screen, the prompt:

**<RETURN> TO CONTINUE**

will be displayed. When you press the RETURN key, you will be in the File Subsystem.

**Note:** You may interrupt the catalog that is displayed on the screen at any time by pressing the ESC key. You will proceed directly to the next prompt. You may not select a file by number that has not yet been displayed on the screen. You may, however, select a file that has not yet been displayed by name.

**Note:** If, at any point in the save process, you decide that you would rather not complete the save, you may interrupt it by pressing the ESC key. The file saved to disk will not be a complete file, so it will give you an error if you try to load it.

If your disk should fill up, an error message will be displayed:

**SYSTEM ERROR NUMBER 9**

*your file name*

**DISK IS FULL**

**A NEW DISK IS NEEDED**

**HIT <RETURN> TO CONTINUE**

**<ESC> TO ABORT**

**OR ,S,D,V**

At this point, you have the following choices:

- Press the RETURN key to continue on another disk.
- Press the ESC key to terminate the file save.
- Switch the continuation of this file save to a new diskette specified by ,S,D,V (for example: ,D2).



If you choose to continue the save, the following message will appear on your screen:

**HIT <RETURN> TO USE DISK**

**<ESC> TO ABORT**

**Y TO INIT DISK**

The ESC key will return you to the File Subsystem.

If you press the Y key, you will initialize the disk in the slot and drive specified (see INITIALIZE DISK, below). This option is provided in case you did not have an initialized data disk handy.

If you choose to continue the save, UltraPlan makes the following assumptions:

If the last character of the file name is a letter, the continuation file name will be the same name with the number 1 appended. For example, if you were saving file TOO BIG, the first continuation file name would be TOO BIG1.

If the last character of the file name is a number, the continuation file name will be the same file name except the number will be incremented by 1. For example, if you were saving file TEST1, the first continuation file name would be TEST2.

The real purpose of this scheme is to deal with worksheets that are extremely large (it is possible to create a worksheet in UltraPlan that is larger than the capacity of a diskette if you have enough RAM cards!).

If you do create models that must be saved to files that span multiple diskettes, please read the section under LOAD WORKSHEET on loading such files.

## **8.5 LOAD WORKSHEET**

Selection 4 – LOAD WORKSHEET allows you to retrieve your files from disk for further manipulation, or printing.

The worksheet you load will be loaded starting in cell A1, regardless of the STARTING CELL you specify, unless you are using DIF™ format (option C). If you specify DIF™ format, the file will load starting at whatever cell appears as STARTING CELL in option A.

The file will be loaded from the drive and slot specified in the options portion of the menu.

Once you select the 4 – LOAD WORKSHEET item from the menu, a catalog of files on the disk will appear on your screen. These files will be numbered, just like the files in the SAVE WORKSHEET catalog display.

You may now select the file you want to load by name or number, as outlined above. You still cannot specify a file number that has not been displayed on the screen.

The prompt:

### **OVERLAY OR DESTROY WORKSHEET**

**HIT <RETURN> TO CONTINUE**

**<ESC> TO ABORT**

This is your last chance to back out of the file load. If you had a worksheet in memory, and had forgotten to clear it out (/CY), two things will happen when you initiate the load:

1. The worksheet that is currently in memory will be overlaid, and the integrity of the old data will be corrupt.
2. Any places in the model you load that do not contain data that did contain data in your previous worksheet will retain their old values, thus corrupting the new data.

Your choices are to press the RETURN key, which allows you to go ahead with the load, or the ESC key which will return you to the File Subsystem menu.

Should you choose to go ahead with the load, the cells that are loading in will be displayed in the upper left corner of the screen as they are loaded in, and you will be returned to the File Subsystem menu upon completion.

**Note:** The STARTING CELL and ENDING CELL specifications will be updated to reflect the specifications of the new model.

**Note:** Under some rare circumstances you may wish to load a worksheet over an old one to combine the data from the two models. There is a good argument for doing this rather than using DIF™ files if the formulas are necessary. If you intend to do such overlaying of worksheets, it is of paramount importance to design the worksheets with space for the data to be overlaid.

If your file was so large it had to be saved to more than one floppy (see SAVE WORKSHEET, above), the load process will halt in the following error message:

**SYSTEM ERROR NUMBER 5**

*your file name*

**SUDDEN END OF DATA**

**CONTINUATION FILE IS**

*continuation file name*

**<RETURN> TO CONTINUE**

The continuation file name will follow the conventions listed under SAVE WORKSHEET, above. The display of the continuation file name is purely informational.

When you press the RETURN key, you will be returned to the File Subsystem menu.

You must then select item 4—LOAD WORKSHEET again to load the continuation file.

When the message:

**OVERLAY OR DESTROY WORKSHEET**

**HIT <RETURN> TO CONTINUE**

**<ESC> TO ABORT**

is displayed, press the RETURN key. You actually wish to overlay the portion of the worksheet that is currently in memory with the rest of the worksheet from the continuation file.

## **8.6 FILE CATALOG**

Menu Selection 5 – FILE CATALOG provides you with a complete list of all the files on the diskette.

As with all other catalogs that are presented in UltraPlan, this catalog may be interrupted at any time by pressing the ESC key.

When the screen fills up, you will receive the:

**<RETURN> TO CONTINUE**

prompt. You may press the RETURN key to view the rest of your catalog, or the ESC key if you have seen enough.

## **8.7 LOCK A FILE**

Menu item 6—LOCK A FILE, allows you to mark a file on your disk as locked. This means it cannot be overwritten or deleted without first unlocking it.

The procedure for specifying the file name is identical to the Load and Save functions—you may either specify the name or the number (if the number has been displayed in the catalog).

## **8.8 UNLOCK A FILE**

Menu item 7 – UNLOCK A FILE is the reverse of item 6 – LOCK A FILE. It allows you to make a locked file available for deletion or overwriting.

The procedure for specifying the file name is identical to the Load and Save functions -- you may either specify the name or the number (if the number has been displayed in the catalog).

## **8.9 INITIALIZE A DISK**

Menu selection 8—INITIALIZE A DISK allows you to take a previously unformatted diskette and format it as a data storage diskette for UltraPlan C.

**Warning:** If you initialize a diskette that has data on it, you will lose that data permanently. Take care when exercising this option.

Diskettes initialized in this manner should only be used for UltraPlan data storage, as there is no disk operating system image on the first three tracks. You may, however, use a disk initialized with the DOS INIT command as a storage diskette.

The prompt:

**INSERT DISK TO BE ERASED**

**HIT <RETURN> TO CONTINUE**

**<ESC> TO ABORT**

will be displayed on your screen. Check to make certain the disk you want to initialize is the correct one before pressing the RETURN key.

**Note:** The disk in the slot and drive specified in the options portion of the File Subsystem menu will be the one that is initialized.

**Warning:** Hard disk users should *never* exercise this option.

When you press the RETURN key, the disk drive will turn on, and there will be some whirring and clicking sounds for a few seconds.

At the end of the initialization procedure, you will be returned to the File Subsystem menu.



## **8.10 DELETE A FILE**

Menu item 9—DELETE A FILE allows you to remove a file from the diskette. You might want to do this for several reasons:

- Housekeeping; it is never a wise idea to keep more versions of data around than absolutely necessary for backup purposes.
- To make room for new files.

Once you select the Delete function, a numbered catalog will be displayed, as in the Load and Save function.

You may select the file by name or number.

You will *not* be asked to confirm your selection. The file will be deleted as soon as you press the RETURN key.

Remember, once a file is deleted, it is very difficult to recover the data, so be absolutely certain you have made the correct selection before pressing the RETURN key.

## **8.11 STARTING CELL**

Option A – STARTING CELL is only used when saving or loading DIF™ files. In all other cases, it is ignored.

The default value for the starting cell is the marker location when the /S command is executed from the Calculate Subsystem, or A1, if the Calculate Subsystem has not yet been entered.

You may modify the default to any cell you choose by simply selecting option A (press the A key), confirming your selection (RETURN or press the A key again), then entering the new value for the starting cell.

## **8.12 ENDING CELL**

Option B – ENDING CELL is only used when saving or loading DIF™ files. In all other cases, it is ignored.

The default value for the ending cell is the bottom right of the worksheet (assuming one is in memory). You may modify the ending cell from the Calculate Subsystem's /S (storage) command by entering an alternate value in response to the prompt:

### **ENTER LOWER RIGHT OR RETURN**

In the File Subsystem, you may modify the ending cell by selecting option B, and entering the desired ending cell (if the value displayed there is incorrect).

### **8.13 USE DIF FORMAT**

Option C – USE DIF FORMAT is a YES/NO option. It defaults to NO, but may be modified if you wish to use DIF™ files (see above discussion of DIF files).

If you select option C, the NO will change to YES. If you press RETURN or C again, the YES will turn to NO. The only other key that is acceptable is the ESC key, which will return you to menu item 1 – UltraPlan SYSTEM MENU.

## **8.14 ROW ORDER FOR DIF**

Option D – ROW ORDER FOR DIF is a YES/NO option. It defaults to NO (which implies column order). This option allows you to write a DIF™ file of a column in *row* order, so that you may read it back in as a row.

The key to this transposition is to write the data out in *row order*, and read it back in *column* order.

**Note:** You may reverse this procedure and write the data out in *column* order and read it back in *row* order. The point to remember is that the transposition only occurs if the order of the save is different from the order of the load.

## **8.15 DISK SLOT**

Option E – DISK SLOT allows you to specify the slot of the disk drive in which your data diskette resides.

Simply select option E. The prompt:

**ENTER, (MIN = 0, MAX = 7):**

will appear on your screen. You may select any slot in your computer, but be careful, because unpredictable things may happen if the slot you specify contains something other than your disk controller card, and data loss may result.

## **8.16 DISK DRIVE**

Option F – DISK DRIVE allows you to specify which of the two drives possible on a controller card contains your data diskette.

Simply select option F. The prompt:

**ENTER, (MIN = 1, MAX = 255):**

will appear on your screen. Any values beyond 255 are unacceptable, and UltraPlan will just beep at you.

## **8.17 DISK VOLUME**

Option G – DISK VOLUME is primarily for the use of hard disk users. This allows you to select the volume on which your data resides.

**Note:** The disk volume parameter may also be used with floppies as a precaution against using the wrong diskette. If you specify an incorrect volume number, you will get an error message, and UltraPlan will not perform any functions except file catalog. If you specify 0 for the disk volume, it acts as a “wild card”. In other words a volume number of 0 matches all volume numbers.

To set the disk volume, select option G. The prompt:

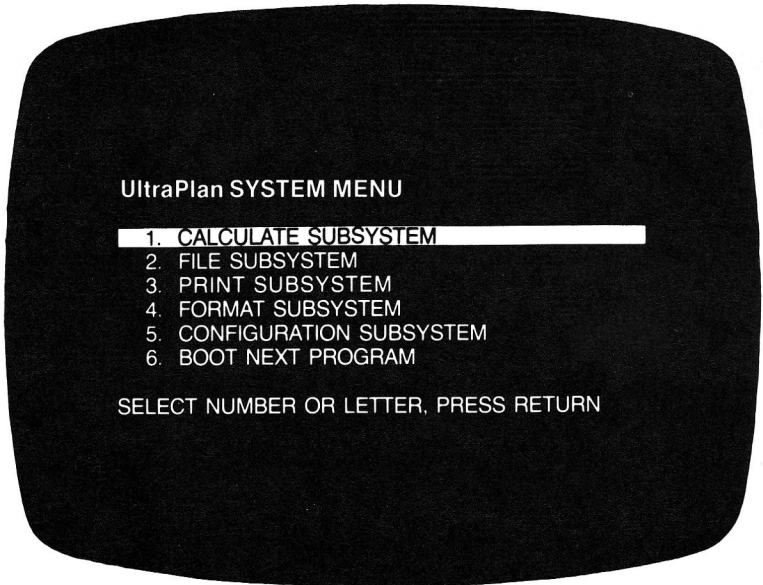
**ENTER, (MIN = 0, MAX = 255):**

will appear on your screen. Enter the number of the desired volume.

**Note:** Hard disk users should obtain a file catalog after switching volumes to ascertain that they are working with the correct volume.



## 9. PRINT SUBSYSTEM



The *Print Subsystem* allows you to transfer your worksheets to a printer (hardcopy), or to disk in a format readable by your word processor (softcopy).

You have the additional option of printing in *save format*, which will allow you to see the formulas used in your models. This option is excellent documentation for worksheets you use often.

The Print Subsystem, like all the other subsystems except the calculate subsystem, is completely menu driven. The Print Subsystem menu follows the rules set forth in the section on the System Menu.

You may enter the Print Subsystem either by selecting item 3 (PRINT SUBSYSTEM) on the System Menu, or by using the /P (invoke Print Subsystem) command from the Calculate Subsystem.

## **9.1 UltraPlan SYSTEM MENU**

Selection 1 – UltraPlan SYSTEM MENU returns you to the System Menu. The ESC key will also return you to the System Menu unless you are in the options section of the menu, in which case, the ESC key will cause the highlight bar to jump to the UltraPlan SYSTEM MENU item on the Print Subsystem menu.

## **9.2 CHANGE OPTIONS**

Selection 2 – CHANGE OPTIONS moves the highlight bar into the options section of the menu (the options section is the section containing lettered menu items).

### **9.3 PRINT HARDCOPY**

Selection 3 – PRINT HARDCOPY, allows you to transfer your worksheet to your printer. The format UltraPlanuses is defined in the Format Subsystem (see the section on the Format Subsystem for more details).

The default format is for an 80-column 66-line page, and allows for six line top and bottom margins, and eight space left and right margins.

Once you select item 3, (PRINT HARDCOPY), the prompt:

**POSITION DOCUMENT**

**THEN PRESS <RETURN>**

will appear on your screen. Before pressing RETURN, be sure your printer is on, and it is online. Also be certain that the paper in your printer is aligned properly.

When you press RETURN, your screen will clear, and the printer will come on. When the printing of your worksheet is complete, you will be returned to the Print Subsystem menu.

To interrupt the print process prematurely, simply press the ESC key. You will be returned to the Print Subsystem menu.

#### **9.3.1 What is Printed**

When you enter the Print Subsystem from the Calculate Subsystem (using the /P command), the prompt:

**ENTER LOWER RIGHT OR RETURN**

is displayed on the prompt line. The lower right coordinate you enter (either by typing it in, or by pointing with the marker) becomes the ending cell displayed on the Print Subsystem options menu.

The position of the marker when the /P command is entered becomes the beginning cell displayed on the Print Subsystem options menu.

When you select options 3 or 4 (PRINT HARDCOPY, PRINT SOFTCOPY), the rectangle defined by the starting cell (upper left) and ending cell (lower right) is transferred to the printer or disk.

### **9.3.2 Order of Printing**

If your document is wider than your page, or longer than your page, UltraPlan will split it up into multiple pages. This pagination is also discussed in detail in the Format Subsystem section.

The order in which this pagination is done is as follows:

1. UltraPlan determines how many columns will fit within the defined margins.
2. The correct number of lines are skipped to give you a top margin.
3. The columns that fit are printed until the bottom margin is reached.
4. The correct number of lines are skipped to provide a bottom margin, then a top margin for the next page.
5. The next page is printed, etc. until the bottom of the worksheet is reached.
6. UltraPlan skips over to the next set of columns (if any) and repeats the above process until the bottom right of the worksheet is reached.

The resultant printout is in a form that allows you to tape the sheets together to show the entire worksheet.

## **9.4 PRINT SOFTCOPY**

Selection 4—PRINT SOFTCOPY allows you to “print” a copy of your worksheet (as defined by the starting and ending cells in the options portion of the Print Subsystem menu).

This is a tremendously useful option if you want to incorporate some of the data from your spreadsheet model in a document. All you have to do is print softcopy, and read the disk file you create into your word processor.

You may also use this option for generating data files that can be sent to another computer via modem.

When you select item 4 (PRINT SOFTCOPY), you will be presented with a numbered catalog, just like most of the functions in the file subsystem. The prompt:

**PRINT: FILE NAME, NUMBER, OR <RETURN>**

**= = >**

will appear on your screen. If you wish to overwrite an existing file, you may select by number.

**Warning:** If you select an existing file, the previous contents of that file will be permanently overwritten, and the data lost. Exercise this option with care.

If you wish to create a new file, simply enter a new name.

Once you have entered a name or number, the disk drive selected as your data drive in the File Subsystem menu will whirl, and upon completion, a new catalog of the disk will be shown.

As with the functions of the File Subsystem, the ESC key will terminate the catalogs, and if you are in the middle of “printing” the worksheet to disk, the ESC key will interrupt the process.

The softcopy will have the same format as hardcopy, including margins, etc., and its content is defined by the rectangle described by the starting cell and ending cell.

**Hint:** If you want to eliminate any pagination, simply enter the Format Subsystem and set the page length to 1, the text length to 1, and the top margin to 0. You may deal with the page width, text width, and left margin as you wish to see it in the file.

## **9.5 PRINT IN SAVE FORMAT**

Option 5 – PRINT IN SAVE FORMAT allows you to print a hardcopy of the actual contents of your worksheet. This includes the formulas, formatting, etc.

This option, like the other print options follows the formatting specifications set in the Format Subsystem.

Hardcopy of this nature is excellent for documentation of worksheets.

Unlike the other print options (hardcopy, softcopy), the PRINT IN SAVE FORMAT item ignores the starting and ending cell specifications.

When you select this menu item, you will receive the prompt:

**POSITION DOCUMENT**

**THEN PRESS <RETURN>**

As was noted for the PRINT HARDCOPY menu item, you must be certain that your printer is on and ready, and that the paper is aligned correctly before pressing the RETURN key.

Once you have pressed the RETURN key, your screen will go blank until the printing has completed.

Upon completion, you will be returned to the Print Subsystem menu.



## **9.6 ENTER SETUP STRING**

Use menu item 6 – ENTER SETUP STRING to enter any special printer characters you might wish to use.

For example, you might want to issue a special code that signals your printer to use condensed print mode (so you can fit more characters across a page).

Unfortunately, there are absolutely *no* standards in printer setup codes, so you will have to refer to your own printer manual to find out how to set it for the particular modes you might need.

Once you select this menu item, the prompt:

### **USE CNTRL-R FOR <RETURN>**

will appear at the bottom of your screen. You may begin entering your setup string.

The characters of the setup string will not be printed on the screen. If you need to generate the code for a RETURN, but do not wish to terminate the setup string, use the Ctrl-R keystroke. For printer setup strings, typing Ctrl-R generates a (RETURN) in the string. Typing Ctrl-R twice results in a Ctrl-R in the setup string. If you want a Ctrl-R followed by a RETURN, you must type:

### **Ctrl-R, Ctrl-R, any-char, Ctrl-R**

The first two generate a Ctrl-R, the “any-char” will be included in the string (but maybe an ESC or space might be ignored by your printer), the last Ctrl-R generates a RETURN.

To terminate the entry of the setup string, press the RETURN key.

Obviously, some compromises had to be made in setup string entry. The codes that cannot be generated directly from the keyboard with the Ctrl key, the shift key, and any other given key are unavailable to you. If your printer requires a setup string with an unaccessible code, your best bet is to set the printer up before starting UltraPlan, and leaving it in the particular mode you desire.

UltraPlan will remember your setup string, and use it each time any data is sent to the printer, until you either power down or enter a new setup string.

## **9.7 STARTING CELL**

Option A – STARTING CELL is the upper leftmost cell to be printed in the PRINT HARDCOPY and PRINT SOFTCOPY commands.

When you enter the Print Subsystem from the Calculate Subsystem using the /P command, the starting cell defaults to the current marker location. If you have not been in the Calculate Subsystem, the starting cell defaults to A1.

## **9.8 ENDING CELL**

Option B – ENDING CELL is the lower rightmost cell to be printed in the PRINT HARDCOPY and PRINT SOFT-COPY commands.

When you enter the Print Subsystem from the Calculate Subsystem using the /P command, the prompt:

### **ENTER LOWER RIGHT OR RETURN**

If you enter a coordinate, or point with the marker, the coordinate you choose will be the ending cell. If you press RETURN, or have not yet been in the Calculate Subsystem, the ending cell will default to the lower right cell of the worksheet.

## **9.9 USE DIF FORMAT**

Option C – USE DIF FORMAT affects only the PRINT IN SAVE FORMAT operation. If this option is selected, the SAVE FORMAT print will be in DIF™ format, rather than save format.

Under normal circumstances, you will not want to print out DIF™ files, except as an example of how DIF™ format actually looks.

**Warning:** Printing worksheets of any size in DIF™ format will use a great deal of paper.

## **9.10 USE ROW ORDER FOR DIF**

Option D – USE ROW ORDER FOR DIF applies only to the PRINT IN SAVE FORMAT option. If you select USE ROW ORDER FOR DIF, the printout will be done in row order.

**Note:** This option has no effect if you have not selected USE DIF FORMAT (option C).

## **9.11 SINGLE SHEET FEED**

Option E – SINGLE SHEET FEED is a provision for printing cut sheets. If you are not using continuous form, fan-fold paper, and must load a new sheet for each page, select this option.

When printing hardcopy of any kind, the prompt:

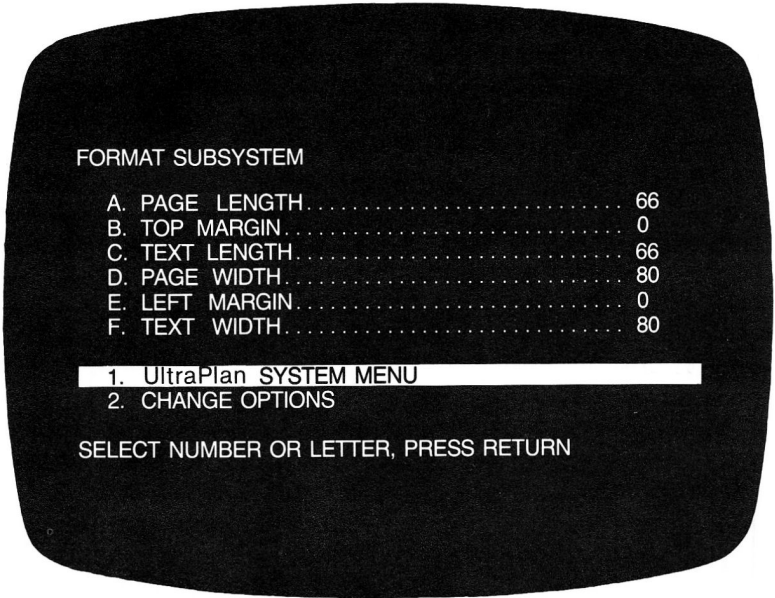
**POSITION DOCUMENT**

**THEN PRESS <RETURN>**

will appear on your screen before the print process begins to allow you to align your paper and ascertain that the power to the printer is on and everything is set up correctly.

If you select SINGLE SHEET FEED, you will get this message at the end of each page. This is to allow you to change paper between pages.

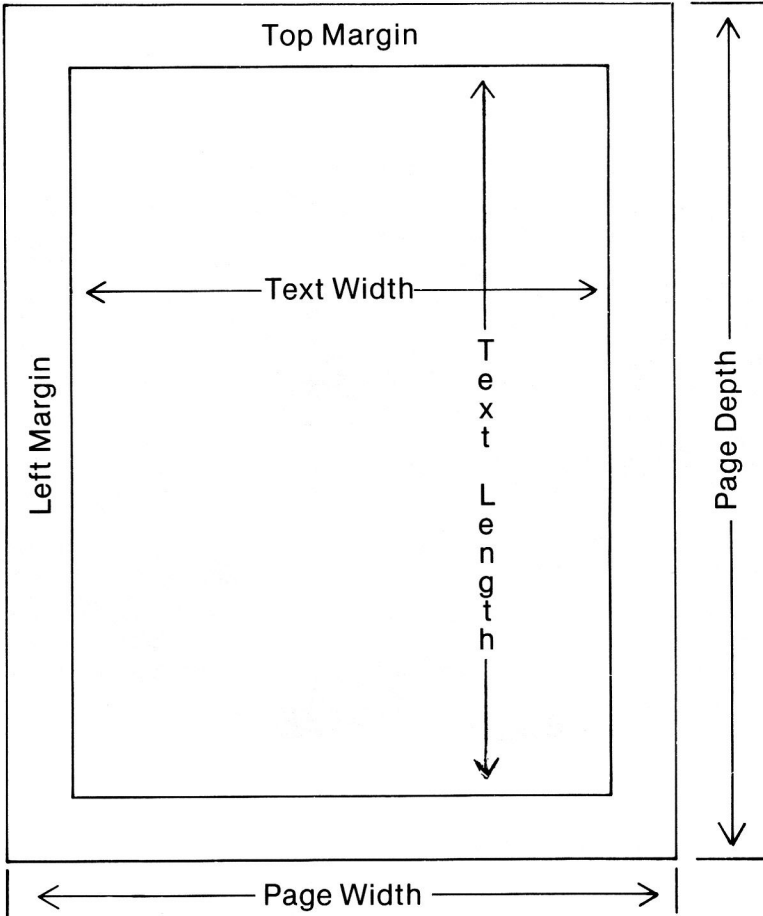
## 10. Format Subsystem



### 10.1 What Does the Format Subsystem Do?

The *Format Subsystem* allows you to specify the format in which you wish your spreadsheets to be printed. This set of specifications will govern the output generated by the print subsystem.

## 10.2 The Page Layout



By *format*, we mean the actual page layout of the output. This includes the top and bottom margins, as well as the left and right margins. Let's refer to the picture above: the sample page layout.

As you can see in the figure above, there are six main specifiers required to define the centering of your printed data on a page:



- **Page Length:** The page length is the number of *lines* of print that can fit on a page if you print from the top to the bottom. This number is obtained by measuring the page (in inches) and multiplying by the number of lines per inch you intend to print (usually six). The normal page length for eleven inch forms is 66.
- **Top Margin:** The number of lines to skip from the actual top of the page before beginning to print the data.
- **Text Length:** The actual number of lines you wish to print on a page. UltraPlA will not allow you to enter a text length greater than the page length minus the top margin.
- **Page Width:** The actual number of characters you could put on a line if you printed from the very left of the page to the very right. For eight and one half inch paper, this is normally 80 to 85. Many printers have optional controls for varying the *pitch* or number of characters printed per inch. The most popular pitches are 10-pitch (80 characters/line), 12-pitch (96 characters/line), and 17-pitch compressed print (132 characters/line). Compressed print is very handy for getting a great deal of information across a page, but can be somewhat straining on the eyes, especially if the reports are long.
- **Left Margin:** The number of spaces from the actual left side of the page to skip before beginning to print the data. If you plan to put your printouts in a loose-leaf report folder, it is wise to allow a left margin of one to one and one half inches (normally 10 to 15 spaces).
- **Text Width:** The number of characters you actually wish to print across the page. UltraPlA will not allow you to enter a number for text width that is greater than the page width minus the left margin.

### **10.3 What's Not There**

If you are used to typing, you'll notice that the right and bottom margins are not discussed. The main reason for this is that UltraPlan calculates these settings from the six it already has as follows:

Bottom Margin = Page Length – Text Length – Top Margin

Right Margin = Page Width – Text Width – Left Margin

For example, if you had the page length set to 66, the text length set to 54, and the top margin set to 6, the bottom margin would be 6 spaces.

### **10.4 How About Printing Big Worksheets?**

If you read the previous material, and have been following along in this manual, you will already realize that UltraPlan is capable of handling worksheets that are far greater in width and length than a single page of paper no matter how much the print is compressed. What happens when the program encounters such a problem?

UltraPlan uses the settings you supply it in the Format Subsystem to print as much of its worksheet area as it possibly can fit within the boundaries you specify, then goes to the next page. There are actually three cases that can occur here:

Case 1: The worksheet is too long for the printed page, but not too wide.

In this case, UltraPlan prints as many lines of your worksheet as you specified for Text Length, then goes on to the next page and resumes printing where it left off, taking as many pages as necessary to finish printing the worksheet out formatted and margined according to your specifications.

Case 2: The worksheet is too wide for the printed page, but not too long.

In this case, UltraPlan prints as many columns of your worksheet as it can fit in your specified Text Width, then goes on to the next page and resumes printing at the next column. UltraPlan will take as many pages as necessary to print the entire worksheet formatted and margined according to your specifications.

Case 3: The worksheet is both too long and too wide for the printed page.

In this case, UltraPlan prints as many columns of your worksheet as it can fit in your specified Text Width, for as many lines as it can fit in your specified Text Length. It continues printing these columns until it reaches the bottom, then it moves to the top of the next block of columns to resume the print process. In this way, the separate sections may be taped together to give a printed representation of the entire worksheet.

## **10.5 Hints on Page Formatting**

The object of formatting your pages is to produce an attractive printed copy of your worksheet on which data are easy to find, and columns are attractively laid out. There are several key points to bear in mind when designing a format for your output:

- The printout of a spreadsheet is more attractive and more readable if you allow a certain amount of “white space” around the actual data. The actual amount of white space will vary depending on the way you wish to present your report. A loose-sheet report will require a narrower left margin than a bound one. If you intend to annotate your report further through the use of a word processor, you might wish to leave even more white space in the border areas. You may define the amount and distribution of white space, through the use of margin setting.

- You should try to format your page, and your worksheet so that if there is need to go to a separate page to print the entire width of the model, the column breaks occur in logical places. After all, if you have a cost estimate and the dollar values column does not appear on the same page as the hours, it will force the reader to skip to the next page to find out the actual costs (and that's what is really the focus of the model).

**Note:** UltraPlan has no way of knowing how many characters your printer can actually put on a page — this is a function of the size of the paper, the density of the type, etc. The purpose of the format subsystem is to allow you a flexible way of defining these settings.

If you fail to define the settings correctly, UltraPlan will attempt to print the data as you have specified it, and may run off the edge of the paper to the right (if you specified too large a text width), or it may print over the perforation (if you specified too large a text length).

### **10.6 When Do You Need To Set New Format Specifications?**

When you start UltraPlan, the settings for the margins and page length will be appropriate for most printers using  $8\frac{1}{2} \times 11$  paper. You only need change these if you are using a different size paper, compressed or expanded print, or wish to achieve special effects. The following are the “default”, or normal settings UltraPlan uses if you make no changes:

#### **Default Format Specifications**

Page Length	66
Text Length	54
Page Width	80
Text Width	66

## 10.7 How Do You Redefine The Specifications?

In order to redefine any of the format specifications, you must be *in* the Format Subsystem. In order to enter the Format Subsystem, you must first get to UltraPlan Main Menu. This is accomplished by choosing option 1 from any of the subsystem menus except the Calculator Subsystem. If you are in the Calculator Subsystem, you must type Ctrl-@, followed by a RETURN

Once in UltraPlan Main Menu, select option 4-Format Subsystem. This may be done by moving the highlight bar with the arrow keys, or by typing the number 4. Once the highlight bar is resting on option 4-Format Subsystem, press either the RETURN key or the 4 key to accept your choice. You will immediately be transferred to the Format Subsystem menu.

Now that you are in the Format Subsystem, you may change any setting you wish simply by following the menu selection rules:

Move the highlight bar to the appropriate item by either typing the number or letter of your selection or using the arrow keys. You will note that when you enter the Format Subsystem, the highlight bar is resting on 1. RETURN TO UltraPlan SYSTEM MENU. You may use the arrow keys to move the highlight bar to item 2. CHANGE OPTIONS using the arrow keys, but you must either select CHANGE OPTIONS or type the letter of the option you wish to move the highlight bar into the options portion of the menu.

As with all the menus in UltraPlan, you must either type the RETURN key, or the selection letter or number to confirm your choice once the highlight bar is resting in the proper place. For example, assume we wished to choose 2. CHANGE OPTIONS. We could move the highlight bar to the appropriate line using the arrow

keys, then hit the RETURN key to confirm the selection. Alternatively, we could type 2, to move the highlight bar, then 2 to confirm the selection.

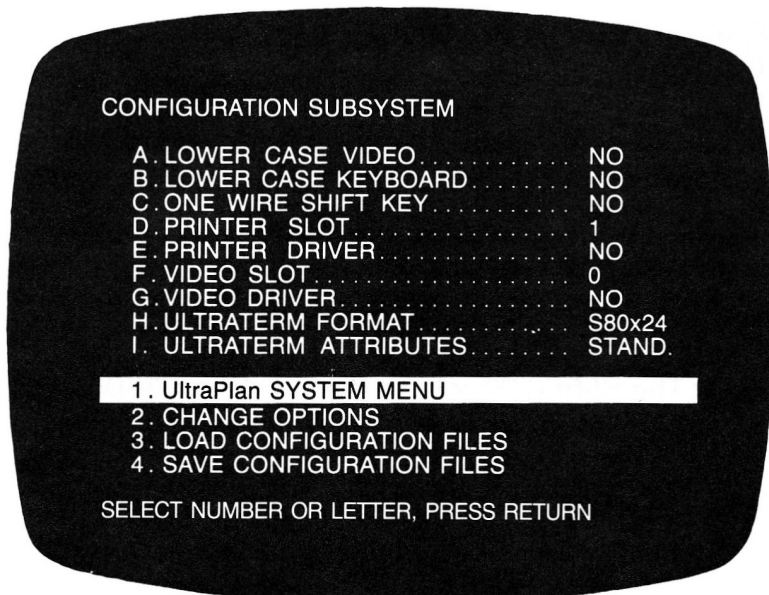
If you select one of the options, you will be prompted to enter a replacement value for the current setting. You will also be informed of the acceptable values. If you type conflicting information, UltraPlan will catch you and your computer will beep at you. You will have an opportunity to enter correct information.

As with all menus in UltraPlan, if a value is being changed, and you simply type RETURN, the original value is left unchanged.

Again, following the rules of the menus, typographical errors may be corrected by using the ESC key to back up. If you back completely out of the entry, you will leave the original value unchanged.

Typing ESC repeatedly will progress you back through the menus to the Calculator Subsystem.

## 11. CONFIGURATION SUBSYSTEM



The *Configuration Subsystem* allows you to configure UltraPlan to your microcomputer. Although UltraPlan is able to recognize some of the hardware options, there are some you have to explicitly define to use.

You may save the configuration options to disk so that you do not have to reenter the Configuration Subsystem each time you boot UltraPlan. You may also load configuration files after the program is running.

## **11.1 UltraPlan SYSTEM MENU**

Selection 1 – UltraPlan SYSTEM MENU simply returns you to the System Menu. You may also return to the system menu by pressing the ESC key, unless you are in the options section (lettered menu items, in which case you will have to press the ESC key twice).

Some of the key items you will define in the Configuration Subsystem are:

- In what slot your printer interface is located.
- Whether or not a printer driver is necessary.
- In what slot your 80-column board is located (if you have an 80-column board).
- Whether or not a video driver is required.

**Note:** The HI-RES 70-column display driver, “VIDEO 70” requires the VIDEO SLOT to be 0.



## **11.2 CHANGE OPTIONS**

Selection 2—CHANGE OPTIONS moves the highlight bar into the options section of the menu (the options section is the section containing lettered menu items).

### **11.3 LOAD CONFIGURATION FILES**

Selection 3—LOAD CONFIGURATION FILES allows you to load the files which contain the configuration for the system on which you are currently working.

The configuration file is named **SYS.OPTIONS**, and can only be created by the Configuration Subsystem.

When you select item 3 (LOAD CONFIGURATION FILES), the following prompt will appear at the bottom of your screen:

#### **INSERT CONFIGURATION/DRIVER DISKETTE**

**<RETURN> OR ,S,D,V**

At this point, you may change the diskette with the proper configuration file on it, or specify a slot, drive, and volume for the correct SYS.OPTIONS file.

If you specify a slot, drive, or volume, you must enter a comma (,), then your slot, drive, and volume parameters. All of these parameters are optional, and the default values are the slot, drive, and volume settings from the File Subsystem.

For example, if you wanted to tell UltraPlan to look for the configuration file on drive 2, slot 6, you would type:

**,S6,D2**

**Note:** The leading comma (,) is required, as are the letters **S6** for slot, **D** for drive, and **V** for volume.

If the default slot, drive, and volume are correct, you may simply press the RETURN key.

In some cases, your configuration file will specify the loading of video drivers (see below for more on drivers). If this is the case, the message:

**CHANGE OF VIDEO DRIVER WILL**

**OVERLAY OR DESTROY WORKSHEET**

**HIT <RETURN> TO CONTINUE**

**<ESC> TO ABORT**

This message is your last warning. The room required for a video driver will ordinarily be utilized for data, unless otherwise specified. If you have created a worksheet in 40-column mode, then decide to switch to, for example 70-column mode, the driver code will overlay the worksheet, thus destroying the integrity of the data. When you invoke a video driver load, you may expect the worksheet to be cleared. If you have an active worksheet that you wish to preserve, this is your chance to back out of the configuration option and save it.

If you press the RETURN key, the configuration file will be loaded, and you will be placed in the UltraPlan System Menu. All your configuration options will have been updated as specified in your configuration file.

When a configuration file referencing video or printer driver is loaded, the drivers will also be loaded. The drivers are loaded from the system files "VIDEO" and "PRINTER". Whenever a configuration is saved, any drivers in use at the time will be saved in "VIDEO" and/or "PRINTER".

**Note:** If you are not specifying the load of a video driver, the above warning message will not be displayed, and the configuration will simply take place automatically, with no extra confirmation step.

## **11.4 SAVE CONFIGURATION FILES**

Selection 4 – SAVE CONFIGURATION FILES, allows you to create a file on disk called SYS.OPTIONS that contains all the parameters displayed in the Configuration Subsystem menu. The system will also save active drivers in the files “VIDEO” and/or “PRINTER”.

You have two opportunities to reload this file:

- When initially booting UltraPlan (at the prompt **INSERT CONFIGURATION/DRIVER DISKETTE**)
- From the Configuration Subsystem, by exercising item 3 – LOAD CONFIGURATION FILES.

The advantage of saving configuration files is that you will be able to have UltraPlan boot in the configuration your system requires, saving you the trouble of entering the Configuration Subsystem each time you use the program.

The only time you should have to use the Configuration Subsystem is when you first begin using UltraPlan (to define the system parameters), and when you make a modification to your microcomputer.

You might, however, decide to enter the Configuration Subsystem to change certain parameters periodically if you are more comfortable entering data in 40-column mode, but prefer to view the worksheet in 70- or 80-column mode.

When you select item 4 (SAVE CONFIGURATION FILES), the following prompt will appear at the bottom of your screen:

**INSERT CONFIGURATION/DRIVER DISKETTE**

**<RETURN> OR ,S,D,V**

At this time, you may insert a diskette that will contain the configuration files, or specify the slot, drive, and volume of the disk to contain the configuration file.

For example, if you wanted to place the configuration files on disk in slot 6, drive 1, volume 52, you would respond:

**,S6,D1,V52**

If you press RETURN, the default slot, drive, and volume are selected (as last defined in the File Subsystem).

## **11.5 LOWER CASE VIDEO**

Option A – LOWER CASE VIDEO is a YES/NO option, and specifies to UltraPlan whether or not your computer has the capability of displaying lower case. This option is “toggled” (i.e. switched from YES to NO) by pressing the option letter, or RETURN key.

If LOWER CASE VIDEO is set to NO, your worksheets may contain lower case, but it will be converted to upper case for display purposes. You will still be able to enter lower case in several ways. The methods of lower case data entry will be discussed below in the section under LOWER CASE KEYBOARD.

**Note:** Regardless of the setting of LOWER CASE VIDEO, if your worksheet contains lower case characters, and your printer is capable of printing true lower case, the data will print in its true case.

**Note:** If you are using an 80-column board, or the “soft” 70-column display, this option should be set to YES.

**Note:** Due to a restriction of the computer, it is impossible to display lower case text in inverse mode on the 40-column text screen. If you have specified a lower case video capability, any lower case characters displayed under the marker will be converted to uppercase characters. The characters will be displayed properly as soon as you move the marker to another cell.

## **11.6 LOWER CASE KEYBOARD**

Option B – LOWER CASE KEYBOARD tells UltraPlan whether your keyboard can generate true upper and lower case.

True upper and lower case are generated by most modern microcomputers.

This option is a YES/NO “toggle,” and is activated either by pressing the letter B twice, or by positioning the highlight bar on option B, and pressing the RETURN key.

**Note:** UltraPlan allows you to enter lower case with an upper case only keyboard by using the Ctrl-L key to toggle case. The blinking cursor on the entry line will show you what case you have selected as follows:

Blinking underline:      Lower case data entry

Blinking Box:              Upper case data entry

In order to make the first letter of a word upper case, and the rest lower case, simply press Ctrl-L, then begin typing. The first letter will be capitalized, and the rest lowercase.

To enter shift lock mode, press Ctrl-L twice. All subsequent data entry will be in upper case (Caps Lock).

To exit shift lock mode, press Ctrl-L once. You will be in lower case mode, once again.

## **11.7 ONE WIRE SHIFT KEY**

Option C – ONE WIRE SHIFT KEY specifies to UltraPlan whether to look for the “one wire,” or “push button 2” shift key modification. This modification uses the PB2 game I/O port to signal whether or not your shift key is depressed. If you do not have a one-wire shift key modification in your Apple, and want one, you should contact your dealer to investigate having one installed.

The shift key will select uppercase/lowercase characters (as normal) whenever the “\_” cursor is shown. Typing a Ctrl-L will change the cursor to “\_” and “■”. Whenever the block cursor, ■, is shown the keyboard is in Apple ][ mode. In this mode the characters @, ^, and ] can be typed by pressing shift-P, shift-N, and shift-M, respectively.

- Pressing Ctrl-L once – defeats the “one-wire” shift key modification thereby establishing normal computer keyboard entry for the next character only. Useful for entering @, ^, ].
- Pressing Ctrl-L twice – defeats the “one-wire” shift key modification thereby establishing normal Apple // keyboard entry for all subsequent characters. Useful for “caps lock” or uppercase alpha character typing.
- Pressing Ctrl-L a third time – defeats normal Apple // keyboard entry and reestablishes “one-wire” shift key mode.

Option C (ONE WIRE SHIFT KEY) is a YES/NO “toggle,” and is activated either by pressing C twice, or by moving the highlight bar to option C and pressing RETURN.



### **11.7.1 Special Character Generation**

The following special characters are available by pressing Ctrl-B, then another character:

<b>Keystroke</b>		<b>Result</b>
Ctrl-B 0		HEX 9C, or FS control character
Ctrl-B 1		(vertical bar)
Ctrl-B 2	@	(commercial “at” sign)
Ctrl-B 3		HEX 9F or US control character
Ctrl-B 4	~	(tilde)
Ctrl-B 5	\	(back slash)
Ctrl-B 6	^	(up arrow)
Ctrl-B 7	‘	(open quote)
Ctrl-B 8	[	(left square bracket)
Ctrl-B 9	]	(right square bracket)
Ctrl-B		HEX 82 or Ctrl-B character

## **11.8 PRINTER SLOT**

Option D–PRINTER SLOT, allows you to inform UltraPlan which slot your printer interface card is in.

**Warning:** If you specify an incorrect slot, you may “hang” the computer, lose data, or worst of all, clobber a diskette. Be very careful that the slot you specify is the slot the printer interface card is in.

## **11.9 PRINTER DRIVER**

Option E – PRINTER DRIVER is a YES/NO “toggle” that specifies to UltraPlan whether or not you have a custom printer driver.

Under normal circumstances, the answer to this question is NO.

If you specify YES, in answer to this option the system will display a list of available drivers for your selection. This display will occur when you leave the Configuration Subsystem.

## **11.10 VIDEO SLOT**

Option F – VIDEO SLOT specifies the slot in which your video display board resides. If you do not have an 80-column board, specify zero (0) for your video slot.

**Warning:** If you specify a value other than 0 for your video slot, be certain that the number you specify is the actual number of the slot of your 80-column board. If you make an incorrect specification, you will probably lose your data, or find the program inoperable.

The HI-RES 70-column display drive requires that the VIDEO SLOT be 0.

## **11.11 VIDEO DRIVER**

Option D–VIDEO DRIVER is a YES/NO “toggle”, and specifies to UltraPlan whether or not you need to load a driver program for display generation.

### **11.11.1 80-Column Board Video Drivers**

The video driver for 80-column boards must be named VIDEO, and reside on your configuration/driver diskette. Under most circumstances, you will not need a driver program for video display. If, however, you are unable to successfully generate the video display you want using UltraPlan’s default display handler, you should try using the video driver supplied on the disk. Experience has shown that many 80-column boards do not require a driver of any sort.

### **11.11.2 70-Column Video Drivers**

If you want to use the “soft” seventy-column display capability, simply set the VIDEO DRIVER option to YES, and the VIDEO SLOT option to 0.

**Warning:** Do not, under any circumstances, delete or rename the seventy-column video display drivers (VIDEO70), because if you do, UltraPlan will be unable to provide a seventy-column display.

**Note:** The seventy-column video display drivers occupy approximately 12K of space that would ordinarily have been available for data storage.

### **11.11.3 Requirements for Video Drivers**

Custom 80-column board drivers must be machine language programs designed to load at location \$1F00. They must be \$100 bytes in length or shorter. Their name must begin with the word “VIDEO”.

To use any of the supplied drivers (VIDEO.STB80, VIDEO.WIZARD80, or VIDEO.VIDEX), select them from the list displayed when you exit the Configuration Subsystem with VIDEO DRIVER set to YES.

## 11.12 LOADING DRIVERS

The manner in which the **Configuration Subsystem** loads and saves the system configuration file (SYS.OPTIONS) has been changed. The change also affects the way in which video and printer drivers are selected. The methods discussed in the manual still work and you may continue to use them. The new capabilities presented below should be easier to use.

### 1) Loading System Configuration Files (**Configuration Subsystem: Load Configuration File**).

The system will load a saved configuration from your slave driver-data disk if you have saved one. If the configuration calls for video and/or printer drivers, they will be loaded from the files named VIDEO and PRINTER respectively.

### 2) Saving System Configuration Files (**Configuration Subsystem: Save Configuration File**).

The system will save a configuration file on your slave driver-data disk. If you are using video and/or printer drivers at the time you save the configuration, they will also be saved (to the files named VIDEO and PRINTER respectively).

If you attempt to save a configuration file which shows use of a video driver before the driver has been loaded, the system will show:

**CHANGE OF VIDEO DRIVER WILL**

**OVERLAY OR DESTROY WORKSHEET**

**HIT <RETURN> TO CONTINUE**

**<ESC> TO ABORT**

A <RETURN> acknowledging acceptance of this condition will generate the additional request for a disk (usually the master program disk) containing the drivers:

**INSERT UltraPlan DISKETTE**

**<RETURN> or ,S,D,V, ■**

The user will be given a list of the files on this disk which have a prefixed VIDEO file name. Select the appropriate one and it will be loaded into the system.

In addition, if you attempt to save a configuration file which shows use of a printer driver before the driver has been loaded, the system will show a second directory of files which have a prefixed PRINTER file name. Select the applicable one.

The occurrence of the **Insert Configuration/Driver Diskette <RETURN> or ,S,D,V** prompt requires insertion or disk drive specification of the preinitialized diskette the user wishes to make a slave driver-data diskette. The new VIDEO and PRINTER files will be written to this disk and the video **Configuration Subsystem** menu will return.

- 3) Loading Driver Files (**Configuration Subsystem: Change Options – Printer Driver . . . or Video Driver . . .**).

When you select video and/or print drivers and then try to exit from the **Configuration Subsystem**, the drivers will be loaded following the same procedure as outlined for saving a system configuration file above.

The files selected will be loaded and integrated into the program, but the drivers will not be saved to a slave driver-data disk (therefore, no **Insert Configuration/Driver . . . ,S,D,V** prompt) and the user is returned to the program's main menu.



### **11.13 ULTRATERM FORMAT**

Option H – ULTRATERM FORMAT may be changed at any time. UltraPlan will only use this value if the VIDEO.ULTRATERM Driver has been loaded. When the ULTRATERM Driver is loaded and an ULTRATERM card is installed in the computer, ULTRATERM FORMAT selects which of 6 display sizes are to be used. The 6 sizes are:

- a. S80X24 (not interlaced or “Standard” 80 × 24)
- b. 96 × 24
- c. 80 × 24
- d. 80 × 32
- e. 80 × 48
- f. 128 × 32

To select a screen format type the option letter “H” twice. When the second “H” is typed the message

#### **USE ARROWS TO SELECT, PRESS RETURN**

appears. Use the arrow keys to scroll the text descriptions of the available screen formats. A RETURN selects the format that will be used upon exit from the Configuration Subsystem.

### **11.14 ULTRATERM ATTRIBUTE**

In a manner similar to option “H” above, Option “G” – ULTRATERM ATTRIBUTE selects the intensity attributes of the ULTRATERM. An ULTRATERM card must be installed and the VIDEO.ULTRATERM driver loaded before this option affects the UltraPlan display. To change ULTRATERM attributes, press the option letter “I” twice. The message:

#### **USE ARROWS TO SELECT, PRESS RETURN**

will appear. Use the arrow keys to scroll the text descriptions of the available attributes. A RETURN selects the attribute that will be used upon exit from the Configuration Subsystem. The following attributes are available:

- STAND** (Standard Apple type display)
- LO-LVL** (Low intensity Apple type display)
- LO-INV** (Low level inverse intensity/  
high level normal)
- HI/LOW** (All inverse display with a high level  
background and a low level foreground)
- LOW/HI** (All inverse display with a low level back-  
ground and a high level background)

## **12. Boot Next Program**

If you select menu item 6 – BOOT NEXT PROGRAM on the System Menu, the following prompt will appear:

**INSERT MASTER DISK THEN PRESS RETURN**

You must then insert the disk that you wish to boot, and press the RETURN key.

If you press the ESC key, you will be placed in the System Menu.

If you press the RETURN key, the disk will be booted.

**Note:** If you are in 80-column mode, you will not be switched back to 40 columns, so when some programs boot, you may see no display. This is because they are sending their display to the 40-column text screen. The safest thing to do in this case is power down the computer, and power back up again.

### **13. UltraPlan ERROR MESSAGES**

UltraPlan is designed to be easy to use, but occasionally something will happen that simply does not make sense (Disk I/O error, for example). In these cases, UltraPlan informs you with an error message.

The following error messages appear on a screen by themselves, and if they are file related, a file name is provided so you know where the problem occurred.

<b>Message Number</b>	<b>File Name Provided</b>	<b>Reason</b>
0-3	no	Software Error
4	no	Disk Write Protected
5	yes	Sudden End of Data (During Load)
6	yes	File Not Found
7	no	Wrong Disk Volume
8	no	Disk I/O Error
9	yes	Disk Is Full
10	yes	File Is Locked (During Save)
11	no	Our of Memory (During Disk Load or in Calculate Subsystem)
12	yes	Wrong File Type
13	no	No B (No Buffers Available)
14	no	Not a DIF File

In the Format Subsystem, several specifications can be set so they do not make sense. UltraPlan will detect these problems and let you know so you can correct the error.

The following are the Format Subsystem errors:

**TOP + TEXT > PAGE** This error message is displayed when you have set a page length that is shorter (in lines) than the top margin plus the number of lines of text you have specified.

**LEFT + TEXT > PAGE** This error message is displayed when you have set a page width that is narrower (in characters) than the left margin plus the text width you have specified.

In the Calculate Subsystem, there are three messages that can be displayed on the prompt line.

<b>Message</b>	<b>Meaning</b>
<b>COLUMN WIDTH IS ZERO</b>	The marker is currently on a cell that is invisible (zero width).
<b>COLUMN IS TOO WIDE TO SHOW</b>	The column cannot fit on the screen due to titles.
<b>CELL ATTRIBUTES CONFLICT WITH COMMAND</b>	The cell is protected, or data of an illegal type is being entered.

***Blank Page***

# ***ASCII Keyboard Entry***

# UltraPlan Appendix A – ASCII Keyboard Entry

Hex	Chr\$	Char	Apple //gs/4	One-wire Mod	Apple I/IIe	Franklin 1000/1200	Albert
00	0	NUL	CONTROL SHIFT P0	CONTROL SHIFT P0	CONTROL SHIFT Z0	CONTROL Z0	CONTROL 0^
01	1	SOH	CONTROL A	CONTROL A	CONTROL A	CONTROL A	CONTROL A
02	2	STX	CONTROL B	CONTROL B	CONTROL B	CONTROL B	CONTROL B
03	3	ETX	CONTROL C	CONTROL C	CONTROL C	CONTROL C	CONTROL C
04	4	EOT	CONTROL D	CONTROL D	CONTROL D	CONTROL D	CONTROL D
05	5	ENQ	CONTROL E	CONTROL E	CONTROL E	CONTROL E	CONTROL E
06	6	ACK	CONTROL F	CONTROL F	CONTROL F	CONTROL F	CONTROL F
07	7	BEL	CONTROL G	CONTROL G	CONTROL G	CONTROL G	CONTROL G
08	8	BS	CONTROL H	CONTROL H	CONTROL H	CONTROL H	CONTROL H
09	9	HT	CONTROL I	CONTROL I	CONTROL I	CONTROL I	CONTROL I
0A	10	LF	CONTROL J	CONTROL J	CONTROL J	CONTROL J	CONTROL J
0B	11	VT	CONTROL K	CONTROL K	CONTROL K	CONTROL K	CONTROL K
0C	12	FF	CONTROL L	CONTROL L	CONTROL L	CONTROL L	CONTROL L
0D	13	CR	CONTROL R	CONTROL R	CONTROL R	CONTROL R	CONTROL R
0E	14	SO	CONTROL N^	CONTROL N^	CONTROL N	CONTROL N	CONTROL N
0F	15	SI	CONTROL O	CONTROL O	CONTROL O	CONTROL O	CONTROL O
10	16	DLE	CONTROL P0	CONTROL P0	CONTROL P	CONTROL P	CONTROL P
11	17	DC1	CONTROL Q	CONTROL Q	CONTROL Q	CONTROL Q	CONTROL Q
12	18	DC2	CONTROL R	CONTROL R	CONTROL R	CONTROL R	CONTROL R
13	19	DC3	CONTROL S	CONTROL S	CONTROL S	CONTROL S	CONTROL S
14	20	DC4	CONTROL T	CONTROL T	CONTROL T	CONTROL T	CONTROL T
15	21	NAK	CONTROL U	CONTROL U	CONTROL U	CONTROL U	CONTROL U
16	22	SYN	CONTROL V	CONTROL V	CONTROL V	CONTROL V	CONTROL V
17	23	ETB	CONTROL W	CONTROL W	CONTROL W	CONTROL W	CONTROL W
18	24	CAN	CONTROL X	CONTROL X	CONTROL X	CONTROL X	CONTROL X
19	25	EH	CONTROL Y	CONTROL Y	CONTROL Y	CONTROL Y	CONTROL Y
1A	26	SUB	CONTROL Z	CONTROL Z	CONTROL Z	CONTROL Z	CONTROL Z
1B	27	ESC	CONTROL ESC	CONTROL ESC	CONTROL ESC	ESC	ESC
1C	28	FS	CONTROL B 0	CONTROL B 0	CONTROL V^	CONTROL B 0	CONTROL V^
1D	29	GS	CONTROL SHIFT M	CONTROL SHIFT M	CONTROL J^	CONTROL SHIFT M	CONTROL J^
1E	30	RS	CONTROL SHIFT N^	CONTROL SHIFT N^	CONTROL 6^	CONTROL SHIFT N^	CONTROL 6^
1F	31	US	CONTROL B 3#	CONTROL B 3#	CONTROL -^	CONTROL B 3#	CONTROL SHIFT 0



# UltraPlan Appendix A – ASCII Keyboard Entry

Hex	Chr\$	Char	Apple //, //+	One-wire Mod	Apple IIe	Franklin 1800/1200	Albert
20	32	SPACE	SPACE BAR	SPACE BAR	SPACE BAR	SPACE BAR	SPACE BAR
21	33	!	SHIFT 1'	SHIFT 1'	SHIFT 1'	SHIFT 1'	SHIFT 1'
22	34	"	SHIFT 2"	SHIFT 2"	SHIFT 2"	SHIFT 2"	SHIFT 2"
23	35	#	SHIFT 3#	SHIFT 3#	SHIFT 3#	SHIFT 3#	SHIFT 3#
24	36	\$	SHIFT 4\$	SHIFT 4\$	SHIFT 4\$	SHIFT 4\$	SHIFT 4\$
25	37	%	SHIFT 5%	SHIFT 5%	SHIFT 5%	SHIFT 5%	SHIFT 5%
26	38	&	SHIFT 6&	SHIFT 6&	SHIFT 7&	SHIFT 7&	SHIFT 6&
27	39	'	SHIFT 7'	SHIFT 7'	'	'	SHIFT 7'
28	40	(	SHIFT 8(	SHIFT 8(	SHIFT 9(	SHIFT 9(	SHIFT 8(
29	41	)	SHIFT 9)	SHIFT 9)	SHIFT 0)	SHIFT 0)	SHIFT 9)
2A	42	×	SHIFT :×	SHIFT :×	SHIFT 8×	SHIFT 8×	SHIFT :×
2B	43	+	SHIFT ;+	SHIFT ;+	SHIFT ;+	SHIFT ;+	SHIFT ;+
2C	44	,	, '	, '	, '	, '	, '
2D	45	-	- '	- '	- '	- '	- '
2E	46	.	. '	. '	. '	. '	. '
2F	47	/	/ '	/ '	/ '	/ '	/ '
30	48	0	0	0	0)	0)	0
31	49	1	1'	1'	1'	1'	1'
32	50	2	2"	2"	20	20	2"
33	51	3	3#	3#	3#	3#	3#
34	52	4	4\$	4\$	4\$	4\$	4\$
35	53	5	5%	5%	5%	5%	5%
36	54	6	6&	6&	6^	6^	6&
37	55	7	7'	7'	7^	7^	7'
38	56	8	8(	8(	8X	8X	8(
39	57	9	9)	9)	9(	9(	9)
3A	58	:	:×	:×	SHIFT ;:	SHIFT ;:	:×
3B	59	;	;	;	;	;	;
3C	60	<	SHIFT ,<	SHIFT ,<	SHIFT ,<	SHIFT ,<	SHIFT ,<
3D	61	=	SHIFT =	SHIFT =	=	=	SHIFT =
3E	62	>	SHIFT .>	SHIFT .>	SHIFT .>	SHIFT .>	SHIFT .>
3F	63	?	SHIFT /?	SHIFT /?	SHIFT /?	SHIFT /?	SHIFT /?

# UltraPlan Appendix A – ASCII Keyboard Entry

Hex	Chr\$	Char	Apple //gs//+	One-wire Mod	Apple IIe	Franklin 1000/1200	Albert
40	64	e	SHIFT pe	CONTROL B 2*	SHIFT 2e	SHIFT 2e	e'
41	65	A	CONTROL L A	SHIFT A	SHIFT A	SHIFT A	SHIFT A
42	66	B	CONTROL L B	SHIFT B	SHIFT B	SHIFT B	SHIFT B
43	67	C	CONTROL L C	SHIFT C	SHIFT C	SHIFT C	SHIFT C
44	68	D	CONTROL L D	SHIFT D	SHIFT D	SHIFT D	SHIFT D
45	69	E	CONTROL L E	SHIFT E	SHIFT E	SHIFT E	SHIFT E
46	70	F	CONTROL L F	SHIFT F	SHIFT F	SHIFT F	SHIFT F
47	71	G	CONTROL L G	SHIFT G	SHIFT G	SHIFT G	SHIFT G
48	72	H	CONTROL L H	SHIFT H	SHIFT H	SHIFT H	SHIFT H
49	73	I	CONTROL L I	SHIFT I	SHIFT I	SHIFT I	SHIFT I
4A	74	J	CONTROL L J	SHIFT J	SHIFT J	SHIFT J	SHIFT J
4B	75	K	CONTROL L K	SHIFT K	SHIFT K	SHIFT K	SHIFT K
4C	76	L	CONTROL L L	SHIFT L	SHIFT L	SHIFT L	SHIFT L
4D	77	M	CONTROL L M	SHIFT M	SHIFT M	SHIFT M	SHIFT M
4E	78	N	CONTROL L N*	SHIFT N*	SHIFT N	SHIFT N	SHIFT N
4F	79	O	CONTROL L O	SHIFT O	SHIFT O	SHIFT O	SHIFT O
50	80	P	CONTROL L Pe	SHIFT Pe	SHIFT P	SHIFT P	SHIFT P
51	81	Q	CONTROL L Q	SHIFT Q	SHIFT Q	SHIFT Q	SHIFT Q
52	82	R	CONTROL L R	SHIFT R	SHIFT R	SHIFT R	SHIFT R
53	83	S	CONTROL L S	SHIFT S	SHIFT S	SHIFT S	SHIFT S
54	84	T	CONTROL L T	SHIFT T	SHIFT T	SHIFT T	SHIFT T
55	85	U	CONTROL L U	SHIFT U	SHIFT U	SHIFT U	SHIFT U
56	86	V	CONTROL L V	SHIFT V	SHIFT V	SHIFT V	SHIFT V
57	87	W	CONTROL L W	SHIFT W	SHIFT W	SHIFT W	SHIFT W
58	88	X	CONTROL L X	SHIFT X	SHIFT X	SHIFT X	SHIFT X
59	89	Y	CONTROL L Y	SHIFT Y	SHIFT Y	SHIFT Y	SHIFT Y
5A	90	Z	CONTROL L Z	SHIFT Z	SHIFT Z	SHIFT Z	SHIFT Z
5B	91	[	CONTROL B 8(	CONTROL B 8(	[	[	[
5C	92	\	CONTROL B 5/	CONTROL B 5/	\	CONTROL /?	\
5D	93	]	SHIFT H	CONTROL B 9)	] )	SHIFT ]	] )
5E	94	^	SHIFT N*	CONTROL B 6^	SHIFT 6^	SHIFT 6^	^^
5F	95	-	n.a.	CONTROL B 6_	SHIFT -	SHIFT -	SHIFT 0

# UltraPlan Appendix A – ASCII Keyboard Entry

Hex	Chr\$	Char	Apple //,/+	One-wire Mod	Apple IIe	Franklin 1600/1200	Albert
68	96	`	CONTROL B 7'	CONTROL B 7'	~	CONTROL , "	SHIFT e'
61	97	a	A	A	A	A	A
62	98	b	B	B	B	B	B
63	99	c	C	C	C	C	C
64	100	d	D	D	D	D	D
65	101	e	E	E	E	E	E
66	102	f	F	F	F	F	F
67	103	g	G	G	G	G	G
68	104	h	H	H	H	H	H
69	105	i	I	I	I	I	I
6A	106	j	J	J	J	J	J
6B	107	k	K	K	K	K	K
6C	108	l	L	L	L	L	L
6D	109	m	M	M	M	M	M
6E	110	n	N	N	N	N	N
6F	111	o	O	O	O	O	O
70	112	p	Pe	Pe	P	P	P
71	113	q	Q	Q	Q	Q	Q
72	114	r	R	R	R	R	R
73	115	s	S	S	S	S	S
74	116	t	T	T	T	T	T
75	117	u	U	U	U	U	U
76	118	v	V	V	V	V	V
77	119	w	W	W	W	W	W
78	120	x	X	X	X	X	X
79	121	y	Y	Y	Y	Y	Y
7A	122	z	Z	Z	Z	Z	Z
7B	123	(	n.a.	n.a.	SHIFT [(	(	SHIFT [(
7C	124	)	CONTROL B 1!	CONTROL B 1!	SHIFT \)	CONTROL 1!	SHIFT \)
7D	125	,	n.a.	n.a.	SHIFT ,)	SHIFT (	SHIFT ,)
7E	126	~	CONTROL B 4\$	CONTROL B 4\$	SHIFT ~	CONTROL 6^	SHIFT ~
7F	127	DEL	n.a.	n.a.	DELETE	CONTROL LeftArrow	FUNCTION



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