Burroughs

User's Guide

B 20 Systems Multiplan

(Relative to Release Level 1.0 Enhanced Multiplan)
(Relative to Release Level 3.0 Multiplan)

Distribution Code SA

Priced Item
Printed in U.S.A.
February 1985

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INTRODUCTION

This guide contains introductory, procedural, training, and reference information for users of the B 20 Systems Multiplan™ and Enhanced Multiplan electronic spreadsheet software packages.

B 20 Multiplan operations are easier if you are familiar with B 20 Executive Level operations; however, all necessary procedures (including sign on and setting your path) are included in this guide.

INTRODUCTORY MATERIAL

Sections 1 through 3 contain general information on Multiplan:

- Section 1 provides an overview of what you can do with Multiplan and describes the display.
- Section 2 describes how you use the keyboard to display and process Multiplan worksheets and includes procedures for accessing Multiplan.
- Section 3 describes the data you can use on Multiplan worksheets.

PROCEDURES

Sections 4 through 9 contain procedures for Multiplan operations:

- Section 4, includes procedures on entering worksheet data, and how to use commands.
- Section 5 includes procedures on display windows and on filing, retrieving, and naming worksheets.
- Section 6 includes procedures on formatting and printing worksheet data.

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- Section 7 includes procedures for copying and sorting cell data on a worksheet.
- Section 8 includes procedures on how to move, delete, and insert worksheet cells.
- Section 9 includes procedures on how to create a network of supporting and dependent worksheets.
- Section 10 includes procedures for the automatic recalculation feature and the Enhanced Multiplan iteration function.
- Section 11 describes functions and contains an alphabetical directory of functions with examples of how to use them.

TRAINING

Appendix B contains four procedures for Multiplan operations (16 exercises). You should review sections 1, 2, 3, and 4 before you use this appendix.

OPTIONAL CAPABILITIES

Section 12 contains procedures on setting up bar, line, and pie graph representations of your worksheet data. To use Multiplan graphics capabilities, you must have the B 20 Business Graphics Package software installed on your system; depending on your workstation, you must also have the following hardware:

- B 21 Color Graphics Workstation (color graphics display)
- B 22 Monochrome Graphics Board installed on a B 22 workstation (graphics display)
- Bit Mapped Graphics Controller Module installed on a B 25 workstation (graphics display)
- B 25 15-inch Color Display Monitor installed on a B 25 workstation (optional - color worksheet and graphics display)

REFERENCE MATERIAL

This guide includes an index and six appendixes with reference information:

- Appendix A lists status and error messages, an explanation of each, and action to resolve the problem.
- Appendix C contains a procedure for transferring VisiCalc files to Multiplan, and a comparison between the functions, commands, and other features of Multiplan and VisiCalc.
- Appendix D explains how the Symbolic Link (SYLK) File Format enables you to create worksheets in other applications and transfer them to Multiplan.
- Appendix E provides procedures for installing Multiplan and Enhanced Multiplan on your work-station.
- Appendix F lists the differences between the operation and features of Multiplan and Enhanced Multiplan.
- Appendix G contains a glossary of Multiplan terms.

CONVENTIONS

This guide uses the term Multiplan to refer to both Multiplan and Enhanced Multiplan except when it is necessary to distinguish between the operational capabilities of these software packages.

The term worksheet is used for spreadsheet throughout the guide.

In all procedures:

- Keys that you use in combination are hyphenated.

  For example, **CODE-V** indicates that you hold down the **CODE** key and press the letter **V**.

- The term "character" includes spaces (blanks) you enter by pressing the **Spacebar**.

- When two or more keys perform the same function, such as moving the highlight, only one key is specified in procedures. An exception is the specification of both **RETURN** and **GO** keys to execute commands.

- Functions are capitalized. They are reserved expressions in Multiplan, recognized by the system only for their special function.

MULTIPLAN KEYBOARD RESPONSE

The B 20 System keyboards respond as follows during a Multiplan session:

- All keys except **FINISH**, **COPY**, **ACTION**, **HELP**, **CANCEL**, **MOVE**, and **GO** have repeat action. For example, if you hold down the **A** key, the system enters the letter A repeatedly until you release the key.

- The system does not distinguish between uppercase and lowercase entries.

- The following keys are not used in Multiplan: **OVERTYPE, COL, PAGE, PARA, SENT, WORD, LINE, DELETE CHAR,** and **JUMP.**

RELATED MATERIALS

For desk-top reference once you are familiar with Multiplan operations, you can use the *B 20 Systems Multiplan Operations Handbook.*

For additional information about the Business Graphics Package, you can refer to the *B 20 Systems Business Graphics Package Reference Manual.*

For additional information on the operating system and Executive level commands, you can refer to:

- *B 20 Operations Learning to Use the System*

- *B 20 Systems Standard Software Operations Guide*

- *B 20 Systems Custom Installation and Reference Manual*

SECTION 1

OVERVIEW

Welcome to B 20 Systems Multiplan and Enhanced Multiplan. This section provides the following general information to help you get started:

- what you can do with Multiplan
- how the Multiplan display helps you to design and use a Multiplan worksheet

NOTE

Throughout this guide, Multiplan and Enhanced Multiplan are distinguished when differences in their operation require it. Otherwise, the term Multiplan refers to both systems.

The term **worksheet** is used in this guide to refer to the Multiplan spreadsheet.

The exercises in appendix B give you practice in creating a Multiplan worksheet.

UNDERSTANDING MULTIPLAN

Multiplan is an electronic accounting worksheet you can use for data calculation and manipulation. When you install it on your system, you can:

- create worksheets of up to 255 rows and 63 columns using words, numbers, and formulas
- compute worksheet values, automatically or on command
- add, delete, move, or copy rows or columns (Multiplan makes automatic space accommodation and computational adjustments)
- open display windows to view up to eight parts of a worksheet at once

- establish links between worksheets to copy existing data from other worksheets
- display a list of an individual worksheet's links to other worksheets
- print worksheets or part of worksheets and monitor the printer
- interface with the Business Graphics application program to print Multiplan data graphically
- display an alphabetical list of Multiplan commands, a description of each, and display relevant screen Help messages during any Multiplan operation

In addition, with Enhanced Multiplan, you can:

- store worksheets in a document exchange format so that you can use a worksheet with the OW25 and the WRITEone word processors
- use the iteration option
- use all available memory in the current partition for a worksheet
- display a worksheet in color on a B 25 workstation color monitor
- be alerted to new mail by a display message from B 20 Mail Manager

THE MULTIPLAN WORKSHEET

You design the Multiplan worksheet to meet your needs. It is helpful if you know how you want to set up the worksheet before you begin constructing it with Multiplan.

You can design a series of worksheets whose information is related, and you can link them so that Multiplan automatically copies changes in one worksheet to other worksheets affected by the change.

Besides designing your worksheets and relating them to one another, you can:

- name each worksheet
- store worksheets on disk files under the Multiplan format or Symbolic Link (SYLK) format
- recall worksheets to edit, expand, or reformat them
- delete whole worksheets or worksheet sections that you no longer need
- print worksheets to disk for edit by the OW25 and WRITEone word processors and by the Editor application program
- print worksheet information as it appears on the screen, as part of a word processing document, or in a graphic representation (in conjunction with the Business Graphics software package)
- display a list of Multiplan files

THE MULTIPLAN DISPLAY

The Multiplan display includes the following sections:

- window(s) containing:
  - rows and columns, numbered
  - cells
  - cell pointer
- command line containing:
  - command menus and forms
  - highlight
  - edit cursor

- message line
- status line

Figure 1-1 shows the initial Multiplan display. The initial Enhanced Multiplan display is exactly the same as the illustration in figure 1-1 except that the worksheet name on the status line is titled **Emultiplan: TEMP.**

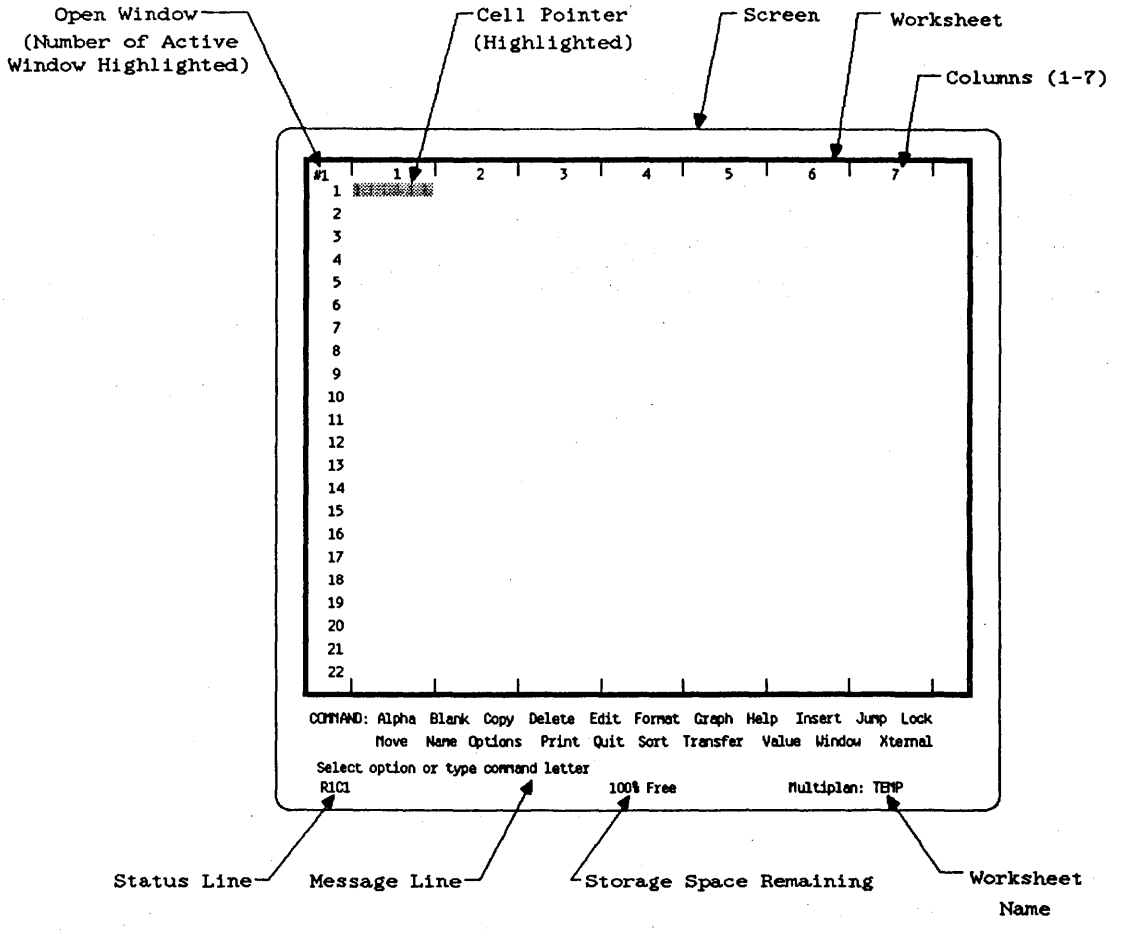


Figure 1-1. Initial Multiplan Display

Windows

The initial Multiplan display shows an open window numbered in the upper-left corner (refer to figure 1-1). The window in the initial display shows the upper-left corner portion of the worksheet (columns 1 through 7 and rows 1 through 22); the remainder of the Multiplan worksheet is offscreen to the right of and below this window.

You can open up to eight windows to display different parts of a worksheet at the same time.

You open and close windows with the Window command (refer to section 5). When you open a window, you display part of the worksheet in that window. When you close a window, you remove the window and its contents from the display. The adjacent windows expand to fill the area of the closed windows.

Rows and Columns

A Multiplan worksheet is made up of 255 rows and 63 columns. The display numbers the rows consecutively at the lefthand side of the window, and numbers columns across the top of the window.

Cells

A cell is the area where a row and column intersect. As the basic working unit of the worksheet, the cell contains text, values, or formulas that you assign to it. A row and column number, with the letters R for row and C for column, identify a cell; for example, R1C1 is the cell in row 1, column 1.

Cell Pointer

The cell pointer is a rectangular, highlighted box that assumes the size of the cell in which you position it. The cell pointer marks the active cell; that is, functions or commands you initiate act on that cell.

In addition, the window containing the cell pointer is the active window; that is, functions or commands you initiate act on cells in that window.

The Command Line

The command line consists of two screen lines immediately below the window on the Multiplan display.

The command line is the display area where you:

- perform all command operations
- enter worksheet text, formulas, and values
- edit cell entries

Menus, Forms, Fields, Prompts, Highlights, and Edit Cursor

Multiplan uses menus, forms, fields, and prompts to assist you in activating commands and other Multiplan functions.

Multiplan displays menus from which you can select commands and subcommands. Figure 1-1 shows the main command menu on the command line. Menus contain:

- initially capped command or subcommand names
- highlight that you can move to specify the command or subcommand you want to activate

After you have activated a command or subcommand, Multiplan displays forms that contain:

- fields for you to complete
- prompts to identify the fields
- highlight to indicate the field that can accept your entry and the field the edit cursor is on
- edit cursor to mark the point of your next keyboard entry in a field

Figure 1-2 shows a Copy Right subcommand form and identifies fields, the highlight, and prompts.

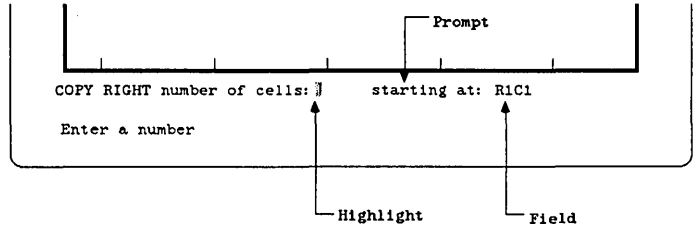


Figure 1-2. Example of Copy Right Subcommand Form

The Message Line

The message line is located one line below the command line. The message line contains:

- prompting messages — instruct you about entries you need to make on the command line
- status messages — alert you about Multiplan's ability to complete a command or function

If a status message describes an error condition that you do not understand, refer to appendix A.

The Status Line

The status line is the last line of the Multiplan display, and contains:

- the active cell location (for example, **R1C1**)
- the active cell content (if any)
- the percentage of remaining worksheet space (for example, **100% free**)
- the worksheet name: **Multiplan: (worksheet name)** for a Multiplan worksheet, and **Emultiplan: (worksheet name)** for an Enhanced Multiplan worksheet

SECTION 2

USING YOUR B 20 SYSTEM FOR MULTIPLAN

The operation of your B 20 keyboard changes when you activate Multiplan.

THE MULTIPLAN KEYBOARD

Figure 2-1 shows the B 25 K1/B 20 keyboards, and figure 2-2 shows the OFIS™ keyboard. These figures show the function keys from **f1** through **f10** at the top of the alphanumeric keys assembled with the Direction/Cell Pointer, Display, and Function keys according to their uses in Multiplan.

NOTE

The B 25 K1/B 20 keyboards are identical for user interface; however, they are two distinct keyboards: the B 25 K1 for use with B 25 workstations, and the B 20 for use with the B 21 and B 22 workstations.

Figures 2-1 and 2-2 identify the five types of keys you use with Multiplan:

- Alphanumeric Keys. You use alphanumeric keys to:
  - type characters, numbers, and spaces
  - activate commands

  All alphanumeric keys have repeat action.

OFIS is a registered trademark of Burroughs Corporation.

- Direction/Cell Pointer Keys. You use direction/cell pointer keys to:

  - move the cell pointer
  - scroll the worksheet one column or row at a time
  - display the following lists: worksheet file names, cell and cell area names, and external worksheet links

  All direction/cell pointer keys have repeat action.

- Display Keys. You use display keys to:

  - scroll the worksheet display by one full screen
  - alternate between 80- and 132-character per inch displays (on B 22 workstations only)

  All display keys have repeat action.

- Edit Cursor Keys. You use the edit cursor keys to move the edit cursor when you enter and edit data.

  The **BACKSPACE** and **Spacebar** are the only edit cursor keys with repeat action.

- Function Keys. You use the function keys to:

  - activate, cancel, and execute Multiplan commands
  - choose command or data entry modes of operation
  - direct Multiplan recalculation and reference functions

  The only function key with repeat action is the **DELETE** key.

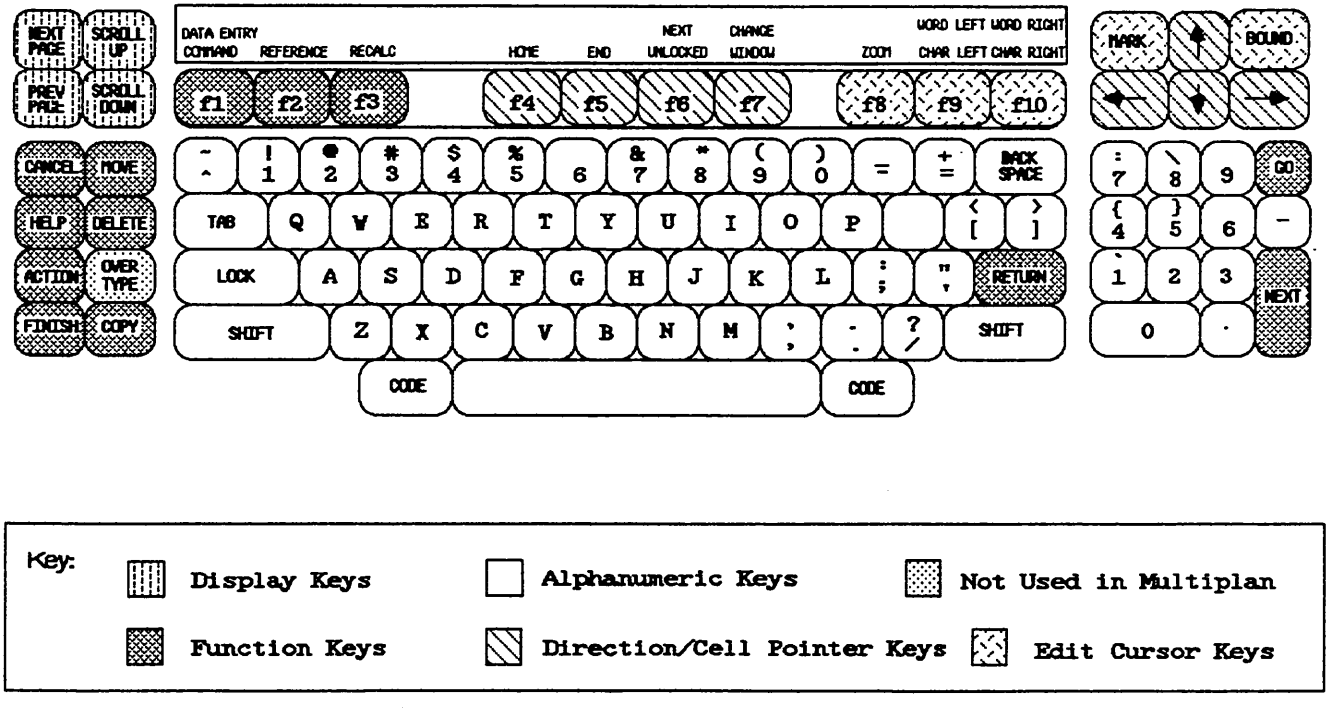
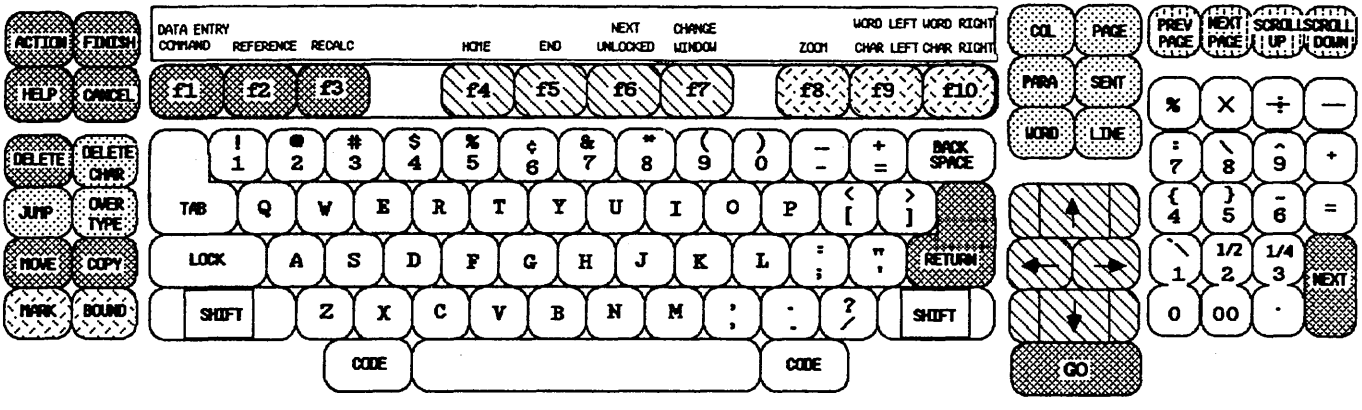


Figure 2-1. B 25 K1/B 20 Keyboards



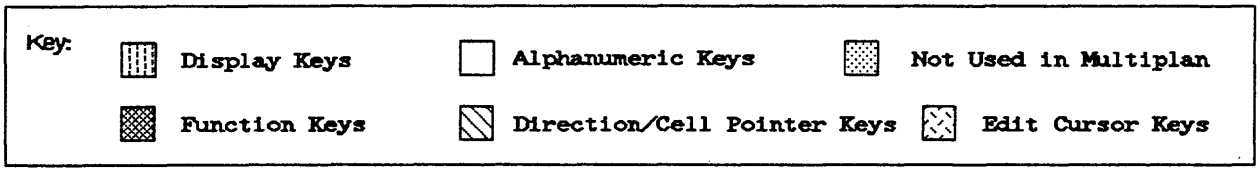


Figure 2-2. OFISkeyboard

This section contains information on the five types of keys and the procedures for:

- Signing on to a B 20
- Setting your path
- Starting Multiplan

The exercises in appendix B give you practice in entering and exiting Multiplan and using the keyboard.

NOTE

In all procedures, keys that you use in combination are hyphenated. For example, **CODE-V** indicates that you hold down the **CODE** key and then press the letter **V**.

MOVING THE CELL POINTER

The initial Multiplan display positions the cell pointer on the first worksheet cell in row 1, column 1 (refer to figure 1-1). The cell pointer remains on a cell until you move it with a cell pointer key (or with the Jump command described in section 5).

The direction/cell pointer keys are illustrated in figures 2-1 and 2-2 and include the following:

- Four arrow keys - an arrow on the top of each key indicates the direction the cell pointer moves when you press the key:
  - Horizontal keys. To move the cell pointer one cell to the left or right, press the **Left Arrow** or the **Right Arrow** key.
  - Vertical keys. To move the cell pointer one cell up or down, press the **Up Arrow** or the **Down Arrow** key. To move the cell pointer to the first worksheet cell, hold down **CODE** while pressing either vertical key.

- Four function keys, **f4** through **f7**,
  - **f4 HOME** key. To move the cell pointer to the first worksheet cell, press the **HOME** key.
  - **f5 END** key. To move the cell pointer to the last nonblank worksheet cell, press the **END** key.
  - **f6 NEXT UNLOCKED** key. To move the cell pointer to the next unlocked cell in the current row (skipping blank cells), press the **NEXT UNLOCKED** key.
  - **f7 CHANGE WINDOW** key. To move the cell pointer to the next window, press the **CHANGE WINDOW** key.

MOVING THE HIGHLIGHT

The highlight appears automatically on the first choice in command or subcommand menus when you activate them. It also appears in the first field of command and subcommand forms when they initially display. Subsequently, you move the highlight with the keys listed in table 2-1 and illustrated in figures 2-1 and 2-2.

Table 2-1. Keys that Move the Highlight

Keys	Move the Highlight
TAB, BACKSPACE, Spacebar	within command and subcommand menus
TAB	from one form field to another in a command or subcommand form
BACKSPACE, Spacebar	from one option to another within a command or subcommand form field

MOVING THE EDIT CURSOR

The edit cursor appears and moves automatically as you enter or edit alphanumeric characters in a form field; you move the edit cursor to edit or enter text by pressing one or more of the cursor keys listed in table 2-2 and illustrated in figures 2-1 and 2-2.

Table 2-2. Keys that Move the Edit Cursor

Keys	Move the Edit Cursor
MARK **CHAR LEFT (f9)**	one character to the left over existing data, without moving or erasing it
BOUND **CHAR RIGHT (f10)**	one character to the right over existing data, without moving or erasing it
Spacebar	one character to the right, making spaces, moving existing data to right
BACKSPACE	one character to the left, erasing that character, and closing the space
WORD LEFT, CODE-(f9)	one word or space to the left
WORD RIGHT, CODE-(f10)	one word or space to the right

DISPLAYING THE WORKSHEET

When you open a worksheet window (for example, window #2 as shown in figure 2-3), the window uses as much of the display area as is currently available. You can scroll the worksheet by window segments and by single row and column segments to display other worksheet sections.

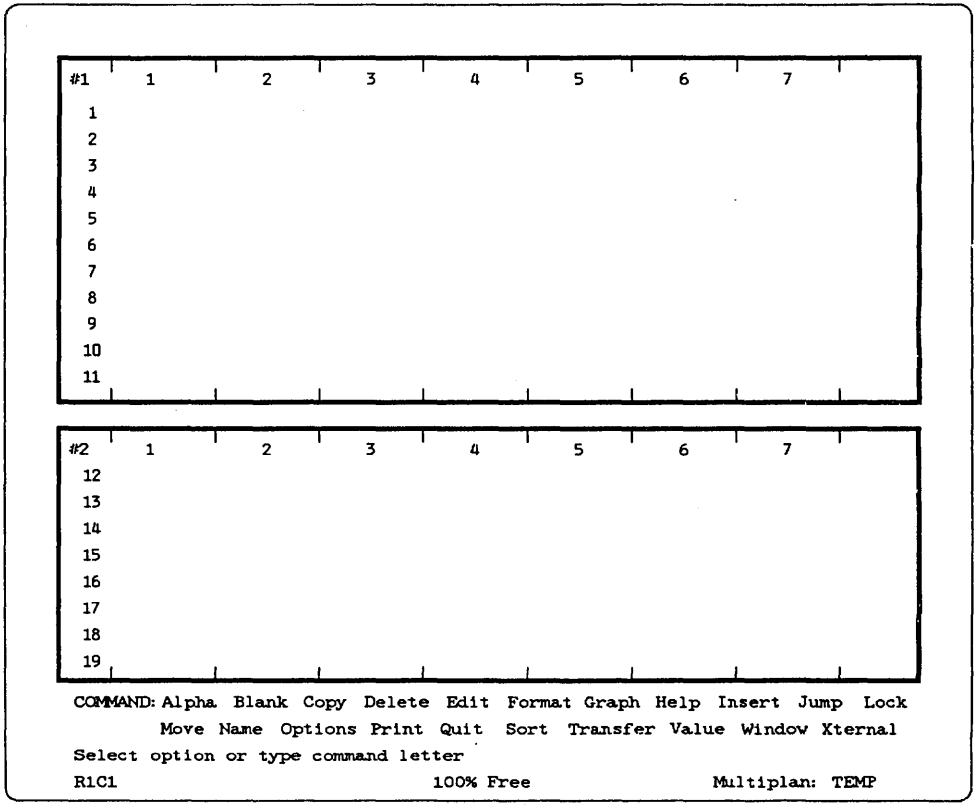


Figure 2-3. Example of Two-Screen Multiplan Display

Displaying the Worksheet by Window Segments

To display the worksheet by window segments, you use the four dedicated display keys illustrated in figures 2-1 and 2-2, and listed in table 2-3.

Table 2-3. Display Keys

Press Keys	To Display
SCROLL UP	the columns to the right of the active window columns (the number of columns displayed depends on window width)
CODE-Left Arrow	duplicates the display function of the **SCROLL UP** key
SCROLL DOWN	the columns to the left of the active window columns (the number of columns displayed depends on window width)
CODE-Right Arrow	duplicates the display function of the **SCROLL DOWN** key
NEXT PAGE	the rows below rows in the active window (the number of rows displayed depends on window length) the next page of the help screen
PREV PAGE	the rows above rows in the active window (the number of rows displayed depends on window length) the previous page of the help screen
ZOOM (f8)	80 (light on keytop is off) or 132 (light on keytop is on) character screen display on a B 22 workstation

Displaying the Worksheet by Row and Column Segments

As the worksheet area you use becomes larger than the window opening, you can:

- Scroll by row segments. Press either vertical key to move the cell pointer to the top or bottom edge of the window, and then press it once more in the same direction; the worksheet text moves up or down one row at a time in the window.

- Scroll by column segments. Press either horizontal key to move the cell pointer to the left or right edge of the window, and then press it once more in the same direction; the worksheet text moves right or left one column at a time in the window.

KEYS FOR ENTERING DATA

You use the alphanumeric keys to type letters, numbers, and symbols (refer to figures 2-1 and 2-2). You also use alphanumeric keys to activate commands (refer to Activating a Command, in section 4). There are two key groups:

- The typewriter keys are arranged like a typewriter keyboard.

- The numeric keys are grouped like a calculator pad to assist you in entering numerical data. In addition, you can also enter numbers 0 through 9 with the top row of typewriter keys.

You use the **SHIFT** key in combination with alphanumeric keys to type some symbols.

When you press the keys listed in table 2-4, the system response differs from the response of a standard typewriter.

Table 2-4. Special Typewriter Keys

Key	Action
BACKSPACE	You press **BACKSPACE** to move the edit cursor one space to the left, deleting the character to the left of the edit cursor. You can also use **BACKSPACE** to move the highlight from one choice to another in menus and from one option to another in form fields.
TAB	You press **TAB** to move the highlight to the next choice in a command or subcommand menu and from one form field to another.
LOCK	You press **LOCK** to type all alphabetic characters in uppercase. **LOCK** does not affect the symbol or numeric characters; you must press **SHIFT** to type the uppercase symbols. The system turns the red **LOCK** key light on when the keyboard is locked into uppercase alphabetic characters.
CODE	The two **CODE** keys are located on either side of the **Spacebar.** You use **CODE** in combination with cell pointer keys to move the cell pointer quickly (refer to Moving the Cell Pointer, in this section).
Spacebar	You use the **Spacebar** to move the cursor forward one space when you enter data. You also press the **Spacebar** to move the highlight from one choice to another in menus and from one option to another in form fields.

FUNCTION KEYS

The Multiplan function keys are illustrated in figures 2-1 and 2-2, and listed in table 2-5.

Table 2-5. Multiplan Function Keys

Key	System Response
ACTION	exits Multiplan in an emergency when pressed in combination with the **FINISH** key
CANCEL	cancels a command and replaces the form or menu with the main command menu
COPY	activates the Copy command (refer to section 7 for procedures)
DELETE	activates the Delete command (refer to section 8 for procedures)
FINISH	activates the Quit command (refer to section 5 for procedures) exits Multiplan in an emergency when pressed in combination with the **ACTION** key returns the system to the Multiplan main menu after execution of the Graph command (refer to section 12 for procedures)
GO	activates and executes Multiplan commands (alternative to **RETURN** key)
HELP	activates the Help command (refer to section 4 for procedures)
MOVE	activates the Move command (refer to section 8 for procedures)
NEXT	duplicates some functions of the **RETURN** and **GO** keys

Table 2-5. Multiplan Function Keys (Cont)

Key	System Response
RETURN	activates and executes commands (cell text entries wrap once on the command line; you do not have to press **RETURN** at the end of a text line).
f1 DATA ENTRY/ COMMAND	moves Multiplan alternately between the Data Entry Mode (keytop light is lit) to the Command Mode (keytop light is out)
f2 REFERENCE	changes relative reference formulas created with horizontal or vertical keys to absolute references (during formula entering or editing) when pressed immediately after horizontal or vertical key
f3 RECALC	performs a one-time recalculation of all worksheet values when the **recalc** option is turned off

The **OVERTYPE, COL, PAGE, PARA, SENT, WORD, LINE, DELETE CHAR,** and **JUMP** keys are not used in Multiplan (refer to figures 2-1 and 2-2).

Opening and Closing Windows

You use the Window command to open and close windows. You can open up to eight windows simultaneously. Refer to section 5 for Window command procedures.

OPENING YOUR MULTIPLAN SESSION

You can begin a Multiplan session by using either:

- a user name dedicated to Multiplan
- the Executive Multiplan or Enhanced Multiplan commands

Activating Multiplan with a Multiplan User Name

When you turn the power on, your B 20 system displays the SignOn form illustrated in figure 2-4, with the highlight in the **User name** field. You activate Multiplan or Enhanced Multiplan by using the following procedure:

1. Enter one of the following user names assigned to the Multiplan application:

   - **Multiplan** for Multiplan
   - **Emultiplan** for Enhanced Multiplan
   - Another name assigned by your System Administrator

2. If your system requires a password, press **RETURN** to move the highlight to the **Password** field and type the password.

   The password displays as a series of pound signs (#).

   NOTE

   If your system requires a password or user name and you do not know them, contact your System Administrator.

3. To change the date or time, press **RETURN** to move the highlight to the **Day/Date/Time** field and type the time and/or date/day.

4. Press **GO**.

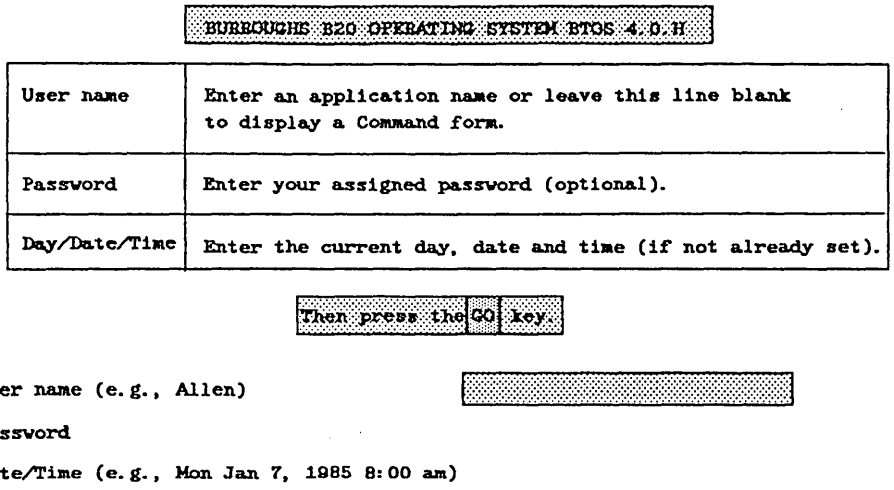


Figure 2-4. B 20 System SignOn Form

The system displays the Multiplan or Enhanced Multiplan screen, and you are pathed to one of the following directories:

User Name	Directory
Multiplan	Multiplan
Emultiplan	Emultiplan
Other name	Assigned by your System Administrator

If an error message appears after you press **GO**, the cursor and highlight appear at the problem field. Re-enter the field information and press **GO** again.

Activating Multiplan with the Executive Command

You access the Executive command level, from the SignOn form that displays after you turn on your system (refer to figure 2-4). Use the following procedure:

1. Enter a user name in the **User name** field if your system requires one.

2. If your system requires a password, press **RETURN** to move the highlight to the **Password** field and type the password.

   The password displays as a series of pound signs (#).

NOTE

If your system requires a password or user name and you do not know them, contact your System Administrator.

3. To change the date or time, press **RETURN** to move the highlight to the **Day/Date/Time** field and type the time and/or date/day.

4. Press **GO**. The system replaces the signon form with the Executive command prompt.

If an error message appears after you press **GO**, the cursor and highlight appear at the problem field. Re-enter the field information and press **GO** again.

If you need to set your path before activating Multiplan, follow the procedures described under Setting Your Path, in this section.

To activate Multiplan or Enhanced Multiplan with the Executive command, use the following procedure:

1. For Multiplan, type **Multiplan** in the Executive **Command** field.

   For Enhanced Multiplan, type **Enhanced Multiplan** in the Executive **Command** field.

2. Press **GO**.

The system replaces the command prompt with the initial Multiplan screen.

Setting Your Path

You set the path for your system to designate a default volume and directory. When you initiate a command or function, your system acts on the default volume and directory unless you specify a different volume (in square brackets) or directory (in angle brackets).

Procedures in this guide include specification of alternate volumes and directories, but it is much easier for you to set your path before you activate Multiplan.

To change your system's path before you activate Multiplan, use the following procedure:

1. At an Executive command prompt, type **path** and press **RETURN**.

   The system displays the Path command form. The highlight is on the **[Volume]** field.

2. To change the default volume, type a volume or device name. Do not use square brackets.

3. To change the default directory, press **RETURN** to move the highlight to the **[Directory]** field and type the directory name. Do not use angle brackets.

4. Press **GO**. The system is pathed to the volume and directory you specify.

To change your system's path during a Multiplan session, use the Transfer Options subcommand (refer to Setting File Transfer Options, in section 5).

For more information on setting your path, refer to the B 20 Systems Standard Software Operations Guide.

Setting Passwords

Multiplan supports system signon passwords or those set with Executive level commands outside of Multiplan sessions (refer to the B 20 Systems Standard Software Operations Guide for information on setting passwords).

You cannot create or enter passwords during Multiplan sessions.

ENDING A MULTIPLAN SESSION

You normally use the Quit command to end a Multiplan session and return to the Executive.

If you want to save your worksheet to a disk file, you use the Transfer Save subcommand before the Quit command.

Refer to section 5 for these command procedures.

In an emergency, you can exit Multiplan by holding down the **ACTION** key while pressing the **FINISH** key.

SECTION 3

MULTIPLAN CELL DATA: TEXT, NUMBERS, FORMULAS

The substance of your Multiplan worksheet is the data you enter into the worksheet cells. This section describes the following aspects of cell data:

- how Multiplan recognizes it
- its length and composition
- its position in cells
- operators
- cell data categories:
  - text - not calculable
  - numerical values - calculable
- types of numerical values
  - numbers
  - cell references/formulas
  - logical values
  - error values

The information in this section is essential to most Multiplan operations; therefore, other sections of this guide reference it frequently.

HOW MULTIPLAN RECOGNIZES CELL DATA

When you want to enter data into cells on the worksheet, you begin with the following steps:

1. Activate the cell with the cell pointer.
2. Activate data entry mode or the appropriate command.
3. Type the data in a field on the command line.
4. Press the appropriate key to insert the data into the cell.

Section 4 explains detailed procedures for entering data in the data entry and command modes.

The system recognizes data according to its mode:

- **command mode** — when no command is activated, the system responds to any digit from 0 through 9 or the characters: equal sign (=), plus sign (+), minus sign (-), period (.), left parenthesis ((), and quotation mark (") as numeric values, and activates the Value command

  when you activate the Alpha command, the system interprets all input as text

- **data entry mode** — the system responds to any digit from 0 through 9 or the characters: equal sign (=), plus sign (+), minus sign (-), period (.), left parenthesis ((), and quotation mark (") as numeric values, and activates the Value command

  the system displays the main command menu in response to the slash (/) character, allowing access to commands

  the system interprets any letter or character, except those for numeric values and the slash character, as text

Length and Composition of Cell Data

The maximum cell width is 32 characters. However, the maximum cell-entry length is 150 characters composed of:

- all alphabetic characters
- all numeric characters
- alphanumeric characters
- alphanumeric characters plus brackets and symbols, as in formulas and functions (refer to Formulas, in this section, and to Functions, in section 11)

To display data longer than 32 characters, you use continuous formatting (refer to Formatting Cells, in section 6). The status line displays the first 28 characters of your entry when the cell containing it is active.

Position of Data in Cells

The default cell format (the format set by the system when you first activate Multiplan) lines up data in the cell:

- text data at the left cell margin
- numeric values at the right cell margin

The Format command lets you change the default format; for example, you can center data (refer to Formatting Cell Data, in section 6).

Position of Formulas

When you enter a formula in a cell, the value the formula generates displays in the cell, and the formula itself displays on the status line each time you activate the cell.

If you want formulas to appear in cells, you can choose this option with the Format Options subcommand (refer to Setting Formatting Options, in section 6).

Cell Width

The default cell width is ten characters. When a cell is not wide enough to display your entry, you can do either of the following:

- accept the system's provision for long entries:
  - when the entry begins with a letter, the first part of the data displays in the cell, and the full entry displays on the status line when you activate the cell.
  - when the entry begins with a number, the system displays the number in scientific notation in the cell, or displays pound (#) signs , and displays the full number on the status line each time you activate the cell (refer to table 6-2).
- widen the cell with the Format command (refer to Formatting Column Width, in section 6)
- use continuous formatting (refer to Formatting Cells, in section 6).

OPERATORS — CELL DATA SYMBOLS AND THEIR MEANING

Operators are logical or mathematical symbols in three categories:

• mathematical	represent a process to be performed on a value called an operand; for example, the plus sign (+) indicates addition
• comparison	represent comparison between two values; for example the left angle bracket (<) indicates one value is less than another
• combination	represent combining of values or references; for example, the colon (:) indicates range from the value that precedes it to the value that follows it

Table 3-1 lists Multiplan operators, their meanings, and examples of their use.

Table 3-1. Multiplan Operators

Operator	Meaning	Example
	MATHEMATICAL OPERATORS	
+	addition	55+35
-	subtraction denotes negative value when it precedes value	R4C5-R3C5 -472.97
*	multiplication	352*37
/	division	24/365
%	percent (written after the value; has same meaning as /100)	37% (is the same as 0.37)
^	exponentiation [calculated by the rule: **a^b = exp(ln(a)*b)**]	
	COMPARISON OPERATORS	
<	less than	IF(sales<50,...)
>	greater than	IF(final>75,...)
=	equal	IF(balance=300,...)
<=	less than or equal to	IF(sales<=1000,...)
>=	greater than or equal to	IF(expense>=50,...)
<>	not equal	IF(exp<>bal,...)

Table 3-1. Multiplan Operators (Cont)

Operator	Meaning	Example
	COMBINATION OPERATORS	
:	range - combines group of contiguous cells	R6C2:12 R5:12C8:16 (figure 3-1)
, (comma)	union - combines non-contiguous references	R1C1,R3C1 (figure 3-2)
space	intersection - combines two intersecting references to refer to the cells that belong to both references	R C3 (cell where active row and column 3 meet) (figures 3-3 and 3-4)

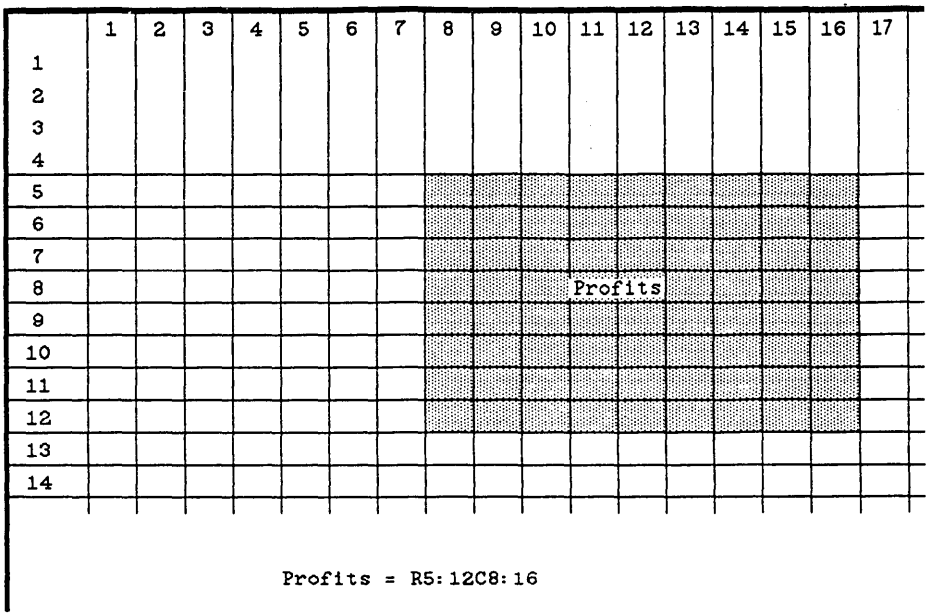


Figure 3-1. Example of Range Operator in Cell Reference

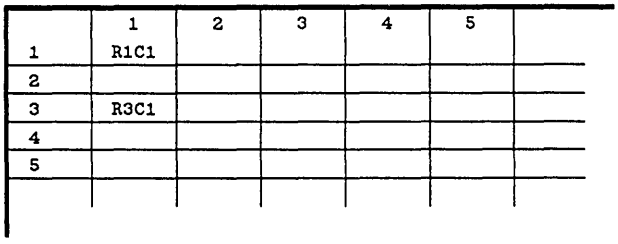


Figure 3-2. Example of Union Operator in Cell Reference

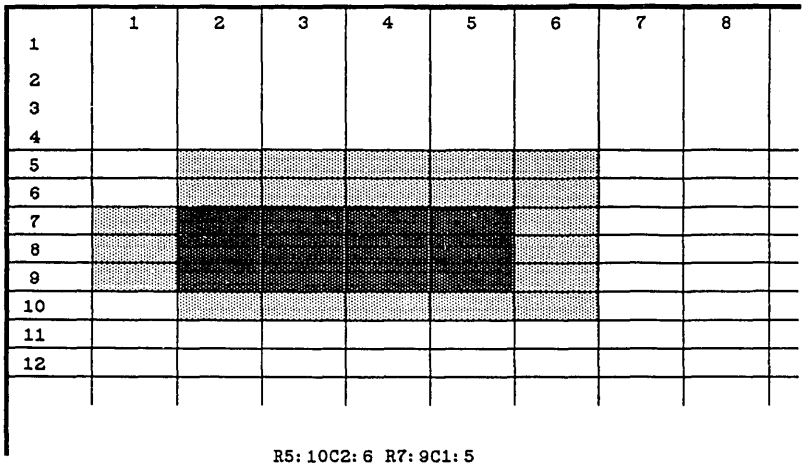


Figure 3-3. Example of Intersection Operator in Cell Reference

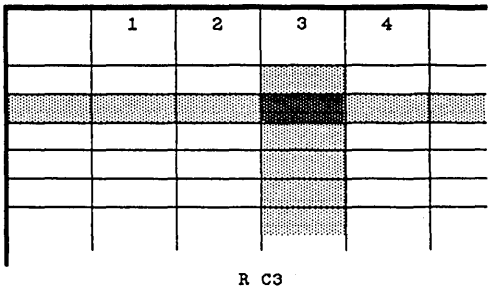


Figure 3-4. Example of Relative-Absolute Intersection Reference

Refer to Categories and Types of Cell Data, in this section, for further information about the use of operators in individual types of data.

The Order for Calculating Mathematical and Comparison Operators

The system calculates mathematical and comparison operators in the following order:

1. - (take the negative value of what follows)
2. %
3. ^
4. * /
5. + -
6. comparison operators

You use parentheses when you include more than one operator in a formula and want to alter the order in which the system performs calculations. The system calculates the operators within parentheses first.

For example, 55+35*8 generates the value 335 (the system multiplies first and then adds); but (55+35)*8 generates the value 720 (the system adds first because of the parentheses, then multiplies).

CATEGORIES AND TYPES OF CELL DATA

You can use varied types of cell data to achieve the purposes of your worksheet with Multiplan. Table 3-2 lists types of Multiplan data under the two main categories: text and numeric values.

Table 3-2. Types of Multiplan Cell Data

Data Type	Definition	Example
TEXT		
Text	characters devoid of numerical value; usually words, but also numbers not intended to be calculated	row or column titles, dates (e.g. 5/1/85)
NUMERIC VALUES		
Numbers	integer or decimal values to be calculated	235 1896.48 12.1E+2
Cell References/ Formulas	absolute or relative row/column references, sometimes denoting dependence of cell value on other worksheet cells	R4C3 R4C3+1 R[+2]C[-1] Sales R5:12C8:16
Logical Values	true/false, either/or and other conditional formulas	IF(count<=50, "OK","cancel")
Error Values	system-inserted values when it cannot calculate a faulty formula	#NAME? #NULL! #DIV/0!

Text Cell Data

The primary characteristic of text data is that it has no numerical value and the system cannot calculate it. To signify that an entry is text and not a numeric value, the system encloses it in double quotation marks, and asks you to enter text with double quotation marks at times (refer to section 4 for further information).

You use text data for:

- titles of columns and rows
- dates given in numbers; for example, "5/6/85"
- fixed values, such as "$1.00"
- text data returned by the Multiplan functions DOLLAR, FIXED, LEN, MID, REPT, and VALUE (refer to Functions, in section 11)

  You can include text in a formula by:

  - enclosing it in double quotation marks
  - inserting an ampersand (&) between text and string functions

  For example, you can combine text and a string function to arrive at a message; the function written as
  "You owe "&DOLLAR(275) generates the message **You owe $275.00** in the cell.

Numeric Values

The following paragraphs describe the four types of numeric values listed in table 3-2.

Numbers

You can enter numbers into cells as:

- integers (whole numbers)
- decimals (fractions of numbers)

You can use the following general guidelines to format numbers when you enter them:

- convert mixed numbers like 1 3/4 to decimals (1.75) by entering them as **1+3/4**
- omit commas and dollar signs

You should become familiar with information about the Format command, in section 6, to understand all the options available to you for formatting numbers.

Scientific Notation

Multiplan uses scientific notation to abbreviate large numbers or numbers that have many zeros.

The system codes the multiples of 10 in the number with the capital letter **E**, a plus or minus sign, and a whole number exponent. It displays the number with its core integer or decimal (called a mantissa), and the code for multiples of 10.

Table 3-3 presents examples of numbers written with scientific notation.

Table 3-3. Examples of Scientific Notation

Integer or Decimal	Scientific Notation	Mathematical Process
1,500,000	1.5E+6	1.5×10^{6}
0.00001	1E-5	1×10^{-5}
1,210	12.1E+2	12.1×10^{2}

Multiplan Number Range

Multiplan calculates numbers with a decimal exponent ranging from -63 to +63:

- the smallest positive nonzero number is:

  .1E-63 (0.1×10^{-63})

- the largest positive nonzero number is:

  $9.\overline{999}...$ E+62

Cell References and Formulas

The following paragraphs explain the construction of cell references and formulas and give examples of their use.

Cell References

A cell reference expresses the location of a cell or group of cells in row and column numbers, or by the name of the cell or cells, if any. You use cell references in:

- formulas — mathematical instructions for calculating values (refer to Formulas, in this section)

- functions — mathematical, logical, string, or other operations built into expressions the system recognizes, such as, SUM and AVERAGE (refer to Functions, in section 11)
- form fields — instructions to the system during command operations (refer to Using the Command Mode, in section 4)

The system stores and displays cell references first by row number and then by column number (even if you enter the column number first). Table 3-4 lists types of cell references, their definitions, and examples of their use.

Table 3-4. Types of Cell References

Type	Definition	Example
single	one cell reference	R4C3 Orders (refer to example 1)
group	cell group reference	R4C3:12 Income (refer to example 2)
absolute	actual cell location	R13C9 R3C2:R6C5 (refer to example 3)
relative	cell location in relation to the location of the active cell	R[+1]C R[-1]C[-1]+1 (refer to Relative Cell Reference Formulation and to example 4)

Since a name always refers to the exact location of a cell, it is always an absolute reference.

You can combine absolute and relative references in the same field or formula.

Relative Cell Reference Formulation

The relative cell references express the location of another cell in relation to the location of the active cell. The system expresses the relative position by:

- a plus sign (+) for cells to the right of and below the active cell
- a minus sign (-) for cells to the left of and above the active cell

The relative references to cells adjacent to the active cell are:

- R[+1]C for the cell below
- RC[+1] for the cell to the right
- R[-1]C for the cell above
- RC[-1] for the cell to the left

You can compose relative cell references easily using the following general procedures (refer to Using the Command Mode, in section 4, for complete command procedures):

1. Position the cell pointer on the cell where you want to enter or change data.
2. Activate the Value or Edit command.
3. Move the cell pointer away from the active cell to the cell you want to reference.

   As you move the pointer, the system displays in the **VALUE:** or **EDIT:** fields the relative reference of the cell highlighted by the cell pointer in relation to the location of the original cell.

4. Complete the entry in the **VALUE:** or **EDIT:** fields, if necessary, by adding appropriate operators and digits.

5. Execute the command.

Exercise 7 of appendix B trains you in entering formulas using relative references.

Formulas

A formula is a mathematical instruction to the system to calculate specific values. You use formulas to:

- enter an variable value
- enter alphanumeric messages
- calculate logical values

Therefore, the value the system generates from a formula can be a number, text, logical value, or error value (refer to Logical Values and Error Values, in this section).

A simple example of formula use is a cell that reflects the sum of a series of other cells. The formula for the summary cell would specify which cells to add to generate the summary cell value.

Formulas typically contain a combination of:

- numeric and text values
- cell references, absolute or relative
- mathematical and combination operators
- brackets or parentheses

You omit spaces in formulas, unless you want the space to perform the function of an intersection operator.

The system displays the value generated by the formula in the cell, unless you choose the option of having formulas displayed in cells (refer to Setting Formatting Options, in section 6). The system displays the formula on the status line each time you activate the cell.

Cell Reference/Formula Examples

Example 1

In figure 3-5, R4C3 is the reference to the cell at row 4, column 3, which has a value of 5. The formula **R4C3+1** is inserted in cell R4C4, so that this cell always has a value of one more than the value in R4C3.

The value the system displays in cell R4C4 as a result of the formula is 6. The system normally displays the value resulting from the formula in the cell, and the formula in the status line when the cell is active. You can, however, display formulas in cells with the Format Options subcommand (refer to Setting Formatting Options, in section 6).

If the value of cell R4C3 changes to 25, the system automatically updates the result of the formula in R4C4 to 26, assuming the automatic recalculation option is set.

If cell R4C3 had a name, for example **Orders**, the formula in R4C4 could be **Orders+1** (refer to Naming Cells with the Name command, in section 4, for instructions on naming cells).

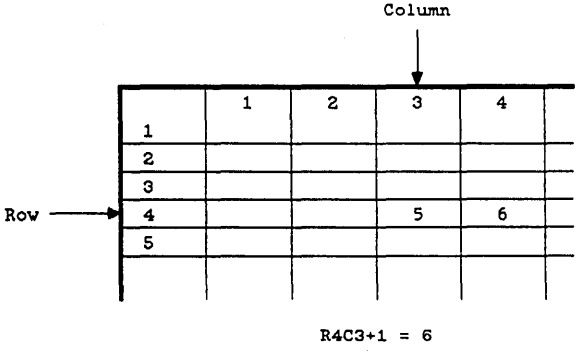


Figure 3-5. Example of a Cell Reference in a Formula (active cell is R4C4)

Example 2

When you reference a group of cells but require only a single value, the system chooses the value from the cell where the active row or column intersects the cell group. Figure 3-6 shows a worksheet example with cell groups from which the system selects one cell value for use in the formula.

In the example:

- cells in row 2 are named **Income**
- cells in row 5 contain the formula **Income*15%**
- R5C4 is the active cell; therefore, column 4 is the active column

The system calculates the formula **Income*15%** using the value in cell R2C4, because that is the cell in the group named **Income** that intersects the active column, column 4.

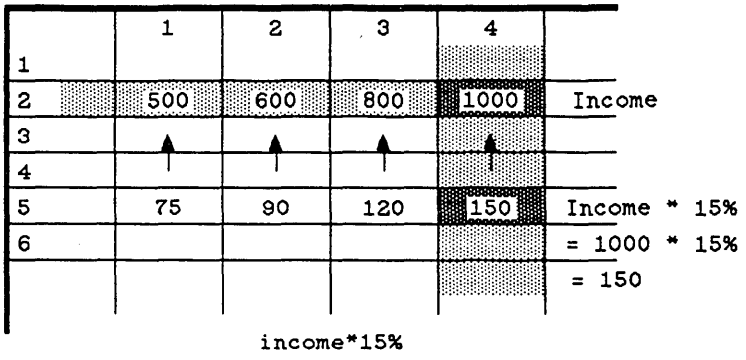


Figure 3-6. Example of a Single Value Computation from a Group Cell Formula Reference

Example 3

Figure 3-7 shows the rectangular cell area referenced by the group absolute cell reference, **R3C2:R6C5.** The reference expresses the actual location of cells joined by the range operator (:).

The reference preceding the range operator is the location of the cell in the upper left corner of the rectangle, and the reference following the range operator is that of the cell in the lower right corner of the rectangle.

Both single and group absolute cell references can make use of cell names in place of the row/column numbers. For example, if you had named the rectangular block of cells in figure 3-7 **Deductions,** you could have written the reference with that word only.

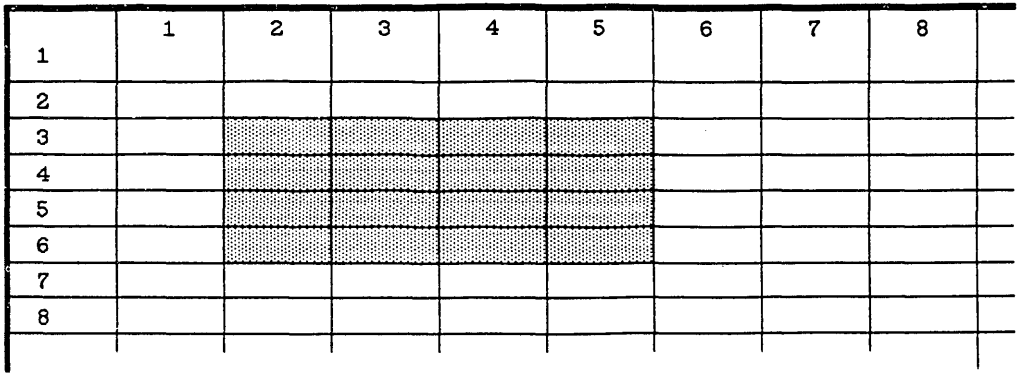


Figure 3-7. Example of an Absolute Reference to a Rectangle of Cells

Example 4

Figure 3-8 duplicates the example in figure 3-5 but uses a relative cell reference in the formula instead of an absolute one. Assuming cell R5C4 is the active cell, cell R4C3 is one cell above and to the left of the active cell.

The formula for cell R5C4 expressed with a relative reference is **R[-1]C[-1]+1.** **R[-1]C[-1]** is the position of cell R4C3 relative to cell R5C4. R5C4 has a value of one more than the value in cell R4C3 as long as this formula is in cell R5C4.

The value the system displays in cell R5C4 as a result of the formula is 6. If the value of cell R4C3 changes to 25, the system automatically updates the result of the formula in cell R5C4 to 26.

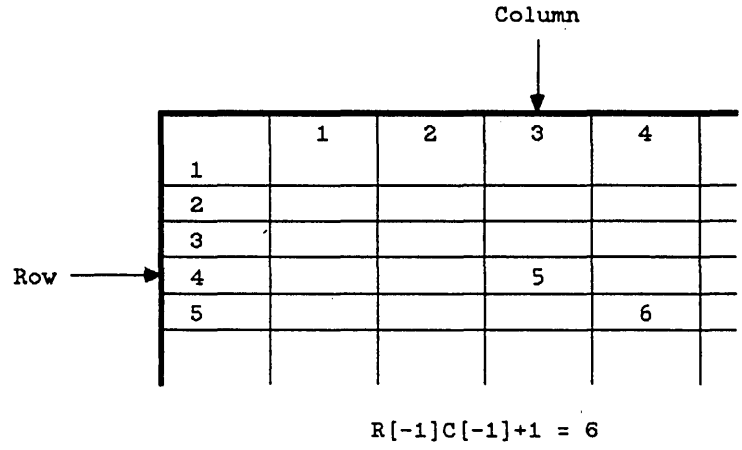
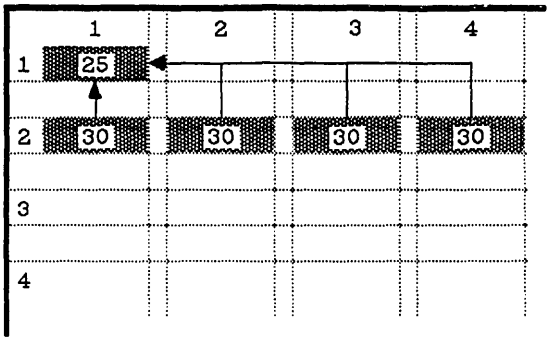


Figure 3-8. Example of a Relative Cell Reference in a Formula (active cell is R5C4)

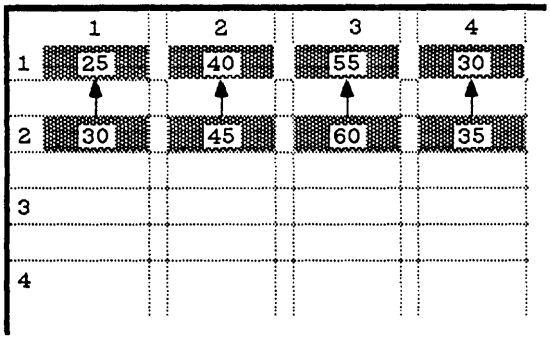
Moving Cells with Absolute and Relative References

When you change the position of a cell containing absolute or relative references, the values generated by the references change. Figure 3-9 compares the results of copying a cell with an absolute reference and a cell with a relative reference, which produced the same values in the original cell.

Refer to Error Values and Changing Cell Data Location, in this section, for further information on handling the adjustment of cell references when you move, copy, delete, or insert cells.



Absolute References
(Formula R1C1+5 Copied to Row 2)



Relative References
(Formula R[-1]C+5 Copied to Row 2)

Figure 3-9. Comparison of Copied Cells with Absolute and Relative References

Logical Values

Logical values are true and false values that the system returns as a result of your use of:

- comparison operators
- functions
- a combination of functions and comparison operators

The following example shows an IF function performing a single test with one operator:

IF(count<=50,"OK","cancel")

This function statement means: If count (the name of a cell containing a numeric value) is less than or equal to 50, the system inserts the text value **"OK"** in the cell; if the count is greater than or equal to 50, the system inserts the text value **"cancel"** in the cell.

The system displays the function statement on the status line each time you activate the cell, and displays the text value generated by the function in the cell.

The following example shows the IF function used with the OR function to combine tests involving several operators (count and fees are names of cells containing numeric values):

IF(OR(count<=50,fees>=200),"OK","cancel")

This function statement means: If either the count is less than or equal to 50 or the fees are greater than or equal to 200, the system inserts the text value **"OK"** in the cell; if neither condition is true, the system inserts the text value **"cancel"** in the cell.

Refer to table 3-1, Multiplan Operators, and to Functions, in section 11, for further information.

Error Values

When you use a Multiplan function, operation, or reference incorrectly, the system generates an error value in the cell. Table 3-5 lists error values, their causes, and steps you can take to remedy them.

When the system generates an error value in a cell, you should find the source of the error immediately and correct it. The system reproduces the error value of one cell in all other cells that refer to it.

Correcting an error value may require you to inspect the data in a number of cells, not only the cell containing the error.

Table 3-5. Error Values

Error Value	Cause	Remedy
#DIV/0!	attempt to divide by 0	change divisor to a real number
#NAME?	data is not clearly a name, text, or numeric value	re-enter data in a form the system can recognize
#N/A	the value is not available	review and adjust the value source
	a calculable numeric value generated by the NA() function	the value in this sense is not an error and requires no remedy
#NULL!	specifying an intersecting reference to disjointed areas	change the references to intersecting cells; or use a union operator (, comma) to join the references instead of the intersecting operator (space)

Table 3-5. Error Values (Cont)

Error Value	Cause	Remedy
#NUM!	an overflow (number is too large or too small)	adjust the number size
	invalid use of an arithmetic function	review and correct the formula or function statement
#REF!	reference to nonexistent cell(s) - relative reference overreaches the worksheet - reference specifies a deleted worksheet area	review and adjust cell references
#VALUE!	using text where system needs number or vice versa	delete erroneous data and insert proper data
	using references when the system needs a value	delete reference and insert value

CHANGING CELL DATA LOCATION

Multiplan automatically adjusts most cell references when you change cell data locations. Sections 7 and 8 provide you with detailed information about copying and sorting cell data, and moving, deleting, and inserting cells.

However, the adjustments of some references after moving, deleting, inserting, and sorting operations require your attention:

- The system replaces references to deleted cells by the **#REF!** error value. You must edit each cell containing this error value after you delete a cell.

- If you distort the shape of a named cell group (for example, by deleting a corner cell of the group), the system does not change the name definition.

- If you insert cells adjacent to a named cell group, the system does not include the new cells in the name definition.

  If you want to enlarge the named cell group, insert new cells in the interior of the group rather than at the group boundary.

- When you move a row or column that forms a boundary of a named cell group, the moved row or column retains its former definition and extends the boundary line of the named cell group to the new location.

  To remedy this effect after a move, you can change the name definition, using the same name and previous boundaries (refer to Naming a Cell and Changing a Name or Name Definition, in section 4).

- When you copy a formula with a relative reference with the Copy command, the system calculates the values in duplicate cells according to the cell they reference (refer to figure 3-9).

  If however, you delete the row or column on which the relative references are based in these cells (row 1 in the example in figure 3-9), the system displays the error value **#REF!** in all the cells containing the relative reference formula; the reference in the formula no longer exists.

- When you use the Sort command, the system can change the position of many cells with formulas, and you may have to troubleshoot a number of error values as a result.

SECTION 4

ENTERING DATA DATA ON YOUR WORKSHEET — HOW TO USE COMMANDS

This section describes procedures for entering and editing data in Multiplan modes, and for using the following commands:

- Alpha — to insert text in the active cell
- Value — to insert numbers or formulas in the active cell, and text enclosed in double quotation marks
- Edit — to change data in the active cell
- Name — to name a cell or group of cells
- Lock — to lock (protect from change) a cell or group of cells
- Blank — to delete data in a cell or group of cells
- Help — to get help at any point in a Multiplan session

To use these procedures and commands effectively, you should be familiar with the description of cell data in section 2.

NOTE

In all procedures, keys that you use in combination are hyphenated. For example, **CODE-V** indicates that you hold down the **CODE** key and then press the letter **V.**

MULTIPLAN MODES FOR ENTERING DATA

Multiplan provides two modes you can use to enter data into worksheet cells:

- data entry mode — holds the command line ready for data entry unless you access a command
- command mode — gives you constant access to all commands unless you have already activated a command

Multiplan is in the command mode when you first activate it, with the main command menu displayed on the command line (refer to figure 1-1). You use the following procedure to alternate between the command and data entry modes:

- To exit the command mode, press (**f1**) **DATA ENTRY/COMMAND.** The keytop light comes on, the system is in the data entry mode, and the following form appears on the command line:

  Data Entry Mode
  Enter Text, Formula, or press "/" for Commands

- To exit the data entry mode, press the **DATA ENTRY/COMMAND** key again. The keytop light goes out, the system is in the command mode, and the main command menu replaces the data entry form on the command line.

ENTERING DATA IN THE DATA ENTRY MODE

Although you can enter alphabetic and numeric characters in both the command and data entry modes, the data entry mode is most useful when you want to enter alphabetic characters in a number of cells.

In the data entry mode, you can:

- insert data into blank cells
- replace existing data with new data

You cannot:

- edit existing cell data
- blank cells

Entering Data Text

To enter data text with the data entry mode, use the following procedure:

1. Press the **DATA ENTRY/COMMAND** key (**f1**). The keytop light comes on, and the following data entry form displays on the command line:

   Date Entry Mode
   Enter Text, Formula, or press "/" for Commands

2. Position the cell pointer on the cell you want to contain the data.

3. Enter the data text. The first letter of your entry causes the system to replace the data entry form with the following Alpha form:

   ALPHA:

   Enter text (no double quotes)

   The letter you entered is at the left margin of a reverse video block the width of the active cell in the **ALPHA:** field, and the edit cursor is at the right of the letter.

   If your entry is longer than the cell width, the system displays the letters that do not fit outside the reverse video block to the right.

4. Press **RETURN** or **GO** to execute the command. The system inserts the text in the cell highlighted by the cell pointer, and the data entry form replaces the Alpha form.

   You can also press **Up Arrow, Down Arrow, Left Arrow, Right Arrow, HOME (f4)**, and **END (f5)** to insert the data in the cell. At the same time, you move the cell pointer to the cell specified by the key you press (refer to Moving the Cell Pointer, in section 2).

When your entry extends beyond cell width, the characters and spaces that do not fit in the cell do not display in the cell. The system records them in the worksheet memory and displays them on the status line when you activate the cell.

Exercise 2 of appendix B trains you in entering data text.

Entering Numeric Values and Formulas

To enter numeric values and formulas with the data entry mode, use the following procedure:

1. Press the **DATA ENTRY/COMMAND** key (**f1**). The keytop light comes on, and the following data entry form displays on the command line:

   Date Entry Mode
   Enter Text, Formula, or press "/" for Commands

2. Position the cell pointer on the cell you want to contain the data.

3. Enter the data text. The first numeric character (any digit from 0 through 9 or the following characters: equal sign (=), plus sign (+), minus sign (-), period (.), left parenthesis (**(**), and quotation mark (")) of your entry causes the system to replace the data entry form with the following Value form:

   VALUE:

   Enter a formula

The number or symbol you entered is the first character in the **VALUE:** field (with the exception of the equal sign (=) which does not display the first time you press it), and the edit cursor is next to it on the right.

If your entry is longer than the cell width, the system displays the numbers that do not fit outside the reverse video block to the right.

4. Press **RETURN** or **GO.** The system inserts the number, or the value derived from the formula, in the cell highlighted by the cell pointer, and the data entry form replaces the Value form.

   You can also press **Up Arrow, Down Arrow, Left Arrow, Right Arrow, HOME** (f4), and **END** (f5) to insert the data in the cell. At the same time, you move the cell pointer to the cell specified by the key you press (refer to Moving the Cell Pointer, in section 2).

When your entry extends beyond cell width, the system translates the value from an integer to a decimal for display in the cell. The system records the integer in the worksheet memory and displays it on the status line when you activate the cell.

NOTE

The Alpha and Value forms in the data entry mode are not the same as the Alpha and Value commands that you access in the command mode.

Accessing Commands in the Data Entry Mode

You can access commands in the data entry mode, although usually it is more convenient to access them by entering the command mode (refer to Using the Command Mode, in this section).

When the system is in the data entry mode, the following data entry form is on the command line:

Date Entry Mode
Enter Text, Formula, or press "/" for Commands

To access a command, use the following procedure:

1. Press the slash key (/). The main command menu replaces the data entry form, with the highlight on the Alpha command.

2. Activate a command by selecting it from the main command menu, using either of the following methods:

   - Type the first letter of the command name.

   - Press the **Spacebar** to move the highlight over the command you want; then press **RETURN.**

   The main command menu disappears, and the command menu or form replaces it. The highlight is on the first option in a menu or on the first field of a form. Proposed responses display in form fields, and the message line displays a message about the input required from you.

3. Follow procedures for the command described elsewhere in this guide.

4. Press **RETURN** or **GO** to execute the command. The system carries out the command operation, and the data entry form replaces the command form on the command line. You are still in the data entry mode.

OVERVIEW OF THE COMMAND MODE

You use commands to perform most Multiplan operations necessary for organizing and constructing your worksheet. You usually access commands through the command mode, although you can also access them through the data entry mode (refer to Accessing Commands in the Data Entry Mode, in this section).

The following paragraphs describe procedures common to all commands accessed from the command mode (refer to Multiplan Modes for Entering Data, in this section, for information on activating the command mode).

Activating a Command

You activate a command by selecting it from the main command menu, using either of the following procedures:

- Type the first letter of the command name.
- Press the **Spacebar** to move the highlight over the command you want; then press **RETURN**.

The main command menu disappears, and the command menu or form replaces it. The highlight is on the first option in a menu or on the first field of a form. Proposed responses display in form fields, and the message line displays a message about the input required from you.

Responding to Command Menus and Forms

You use the following general procedures to respond to command menus and forms:

1. Select a subcommand from the command menu (if any).
2. Fill in fields in command or subcommand form fields.
3. Press **RETURN** or **GO** to execute the command or subcommand.

Messages on the message line vary according to the field or option that is highlighted during these procedures. The messages guide you to enter numbers, formulas, text, or cell references, as required.

NOTE

If you enter data that Multiplan cannot accept, the system displays the message **Invalid parameter** or another appropriate message, and returns the main command menu to the command line. You must re-activate the command and enter acceptable data.

If you attempt to proceed with an operation other than the one you have activated, the system emits an audio signal. For example, if you try to enter data between activating the Blank command and executing it, the system signals you with an audio signal. You must complete the command or cancel it, and then proceed with another operation.

Multiplan Proposed Responses

When the system displays a selected command form, it inserts proposed responses in the form fields based on the position of the active cell and other worksheet information. You can accept the proposed responses or enter different ones by using either of the following procedures:

- To accept a proposed response, press **TAB** to move to the next command field, if there is one; if not, execute the command.
- To insert a different response, move the highlight to the field you want to change and type the data.

Canceling a Command

To cancel a command after you activate it and before you execute it, press **CANCEL.** The main command menu appears, replacing the command menu or form.

Executing a Command

To execute a command after you have chosen an option or filled in the form fields, press **RETURN** or **GO.** You can execute some commands with other keys (refer to individual commands in this guide for further information).

ENTERING DATA WITH COMMANDS

You can enter cell data on your worksheet with two commands:

- Alpha — inserts text in the active cell
- Value — inserts numbers or formulas in the active cell, and text enclosed in double quotation marks9

You can also enter data with the Edit command, but its main function is to change existing data.

Entering Data with the Alpha Command

The Alpha command lets you insert text in an active cell. The system treats all characters you enter with this command as text, even if they are numbers. Multiplan does not calculate any numeric data you enter with this command.

When you enter text in several cells at a time, you may find it easier to use the data entry mode than to activate the Alpha command repeatedly (refer to Entering Data with the Data Entry Mode, in this section).

Exercise 1 of appendix B trains you in entering data with the Alpha command.

To enter text in an active cell with the Alpha command, use the following procedure:

1. Position the cell pointer on the cell where you want text to appear.

2. Activate Alpha. Since Alpha is the highlighted command in the main command menu when it is first displayed, you can activate Alpha by pressing **RETURN** or **GO**, as well as by typing the letter **A**.

   The Alpha form appears with information similar to that in the following example, with the highlight on existing cell text, if any; if there is no cell text, a reverse video block the width of the active cell appears in the form field, with the edit cursor at the left field margin.

   ALPHA:

   Enter text (no double quotes)

   When the active cell already contains data, that data appears on the status line--in quotes if it is text.

3. Choose one of the following:

   - To enter text when the active cell is empty, or when you want to replace its existing text, type the new text.

   - To edit existing text in the active cell, use the edit cursor keys (refer to Editing Cell Data, in this section).

   You cannot remove all data from a cell with the Alpha command; instead, use the Blank command (refer to Removing Cell Data with the Blank Command, in this section).

4. To execute the Alpha command, use either of the following methods:

   - Press **RETURN** or **GO**. The system inserts the text in the active cell, and the main command menu replaces the Alpha form.

   - Press the **Up Arrow**, **Down Arrow**, **Left Arrow**, **Right Arrow**, **HOME** (f4), **END** (f5) **NEXT UNLOCKED** (f6), or **CHANGE WINDOW** (f7) keys. The system inserts the text in the active cell, moves the cell pointer to the cell specified by the key you press, and the main command menu replaces the Alpha form (refer to Moving the Cell Pointer, in section 2).

When you enter text that extends beyond the cell width, the characters and spaces to the right of the reverse video block in the **ALPHA:** field do not display in the cell. The system records them in the worksheet memory, and displays them on the status line whenever you activate the cell with the cell pointer.

To display all text in the cell, you can widen the column or use the continuous format code. You access these options through the Format command (refer to Formatting Cells, in section 6).

Entering Data with the Value Command

The Value command lets you enter numeric data, a number or a formula, in the active cell (refer to Formulas, in section 3, for information on formulas). You can also enter text with the Value command; however, you must enclose it in double quotation marks.

Exercise 5 of appendix B trains you in using the Value command.

To enter data with the Value command, use the following procedure:

1. Activate the Value command by typing the letter **V**, or press **TAB** until the highlight is on **Value**; then press **RETURN**.

You can also activate Value by pressing the following keys:

- any digit from 0 through 9
- any of the following characters: equal sign (=), plus sign (+), minus sign (-), period (.), left parenthesis ((), and quotation mark (")

  Except for the equal sign (=), the system enters the character with which you activate Value as the first character of your cell entry (for example, **VALUE:+-**).

The Value form with information similar to the following example appears, with the edit cursor in the **VALUE:** field.

VALUE:

Enter a **Formula**

2. Enter numbers or a formula (refer to Formulas, in section 3, for detailed information on creating formulas).

3. Use either of the following methods to insert data in the active cell:

   - Press **RETURN** or **GO**. The system stores your entry in the active cell and displays the main command menu in place of the Value form.
   - Press the **Up Arrow, Down Arrow, Right Arrow, Left Arrow, HOME (f4), END (f5), NEXT UNLOCKED (f6)**, or **CHANGE WINDOW (f7)** keys. The system stores your entry in the active cell, moves the cell pointer to the cell indicated by the key you pressed, and displays the main command menu in place of the Value form.

The system accepts only formulas that are correctly formulated. If you attempt to enter a faulty formula, the system:

- emits an audio signal
- displays the message **Error in formula**
- moves the edit cursor to the faulty part of the formula

You must alter the formula and re-enter it.

Formula Displays

When you enter a formula, the system normally inserts into the cell the value it generates from the formula, not the formula itself. The formula displays on the status line when the cell is active.

You can display formulas in cells instead of their values by choosing that option with the Format Options subcommand (refer to Setting Formatting Options, in section 6).

Entering Text with the Value Command

You can enter text with the Value Command, but you must enclose it in double quotation marks.

If you enter alphabetic characters without quotes, or an alphanumeric character combination that the system cannot recognize as a numeric value or a valid formula, the system displays the error value **#NAME?** in the cell, and displays your entry on the status line when you execute the command, (refer to Error Values, in section 3).

You should clear the **#NAME?** error value from the cell by either:

- re-entering the text in double quotation marks
- re-entering an acceptable numeric value

Refer to Naming Cells with the Name Command, in this section, for information about naming cells.

Under the Value command, the system interprets dates you enter in numerical form (1/27/85) as a formula; you must enclose dates entered with the Value command in double quotation marks.

EDITING CELL DATA

You can edit (change) cell data by moving the edit cursor with the keys shown in table 4-1.

Table 4-1. Edit Cursor Keys

Press These Keys	To Move the Edit Cursor
MARK **CHAR LEFT (f9)**	one character to the left over existing data, without moving or erasing it
BOUND **CHAR RIGHT (f10)**	one character to the right over existing data, without moving or erasing it
Spacebar	one character to the right, making spaces in data, moving existing data to right
BACKSPACE	one character to the left, erasing that character, and closing the space
WORD LEFT, CODE-(f9)	one word to the left
WORD RIGHT, CODE-(f10)	one word to the right

You can edit with two commands:

- Edit — set up mainly for editing numeric data, but you can edit text with it by enclosing the text in double quotation marks.
- Alpha — edits text only.

Editing with the Edit Command

The Edit command lets you edit the following data in an active cell:

- numeric data
- text - in quotes (you can also edit text with the Alpha command)

Exercises 13 and 14 of appendix B train you in using the Edit command.

To edit cell contents with the Edit command, use the following procedure:

1. Position the cell pointer on the cell you want to edit.

2. Activate Edit by typing the letter **E**, or press **TAB** until the highlight is on **Edit**; then press **RETURN.**

   The Edit form appears with information similar to the following example, with the edit cursor in the **EDIT:** field after the last character displayed.

   EDIT: R[+1]C1+R[+2]C1

   Enter a formula
   R6C1 R[+1]C1+R[+2]C1

3. To begin your edit, you must press only the keys shown in table 4-1 (pressing any other keys causes the system to clear the cell content in the field, and to enter the character you typed at the left margin).

   Use the keys shown in table 4-1 to move the edit cursor within the data, and press other appropriate keys to change the data.

4. Press **RETURN** or **GO** to execute the command. The system inserts the edited cell content in the active cell, deleting the original contents. The main command menu displays in place of the Edit form.

   The system checks edited formulas for errors after you press **RETURN.** If the formula contains an error, the system moves the edit cursor to the erroneous part, displays the message **Error in formula**, and continues in the Edit command so that you can change your entry.

   You can also press **Up Arrow, Down Arrow, Left Arrow, Right Arrow, HOME (f4), END (f5), NEXT UNLOCKED (f6)**, or **CHANGE WINDOW (f7)** to execute Edit, and move the cell pointer to the cell specified by the key you press (refer to Moving the Cell Pointer, in section 2).

You can enter data in blank cells with the Edit command; the procedures are the same as for the Value command (refer to Entering Data with the Value Command, in this section).

CELL NAMES

Multiplan lets you assign a name to a cell or cell area as an alternative to the usual cell reference (row and column number). Frequently, you can recall a name more quickly and easily than a numerical reference. You use the Name command to name cell data.

Cell Names Versus Cell Text

The name you give a cell can duplicate its textual contents; for example, if a cell contains the text **Costs**, you could name that cell (or the cells adjacent to it) **Costs.**

The functions of cell content and cell name, however, differ in the following ways:

- cell text content — titles a row or column and is not calculated
- cell name — references a cell in a command or formula, and is used by the system for calculations

Refer to Cell References and Formulas, in section 3, for further information about using cell names in references.

Formulating Cell Names

A cell name can have a maximum of 31 characters and must:

- begin with a letter
- after the first letter, contain any combination of letters, numbers, a period (.), or the underscore (_)
- be free of blank spaces
- be free of any character combination that could be confused with a row/column cell reference or with a function (refer to section 11).

NAMING CELLS WITH THE NAME COMMAND

The Name command lets you perform the following operations:

- name a cell or cells
- change a name
- change the definition of a name
- delete a name
- view all worksheet names and their definitions

The procedure for these operations follows the description of Name command proposed responses.

Proposed Responses of the Name Command

The following paragraphs describe the system's proposed responses in the two Name command fields:

- **define name:**

  The system displays the text of the active cell modified to acceptable name parameters. For example, if an active cell contains the text **Sales Force**, the system proposes this text in the **define name:** field as **SalesForce.** Therefore, if you want to use the active cell text as its name (or the name of a cell area), you can accept the proposed response without alteration.

  If the active cell does not contain text, the field is blank.

- **to refer to:**

  The response is the cell you are naming. The proposed response is either of the following:

  - the active cell
  - a name defined as a vector (part of a row or column) of the active cell row or column

If the name you enter in the **define name:** field is already defined, the proposed response in the **to refer to:** field changes, after you press **TAB**, to the reference for that name.

Naming a Cell and Changing a Name or Name Definition

To name a cell or cells, change a name, or change a name definition, use the following procedure:

1. Activate the Name command by typing the letter **N** or press **TAB** until the highlight is on **Name**; then press **RETURN.**

The Name form appears with information similar to the following example, with the highlight in the **define name:** field:

NAME: define name: January to refer to: R3C2

Enter name

2. Enter the name you want, or edit the existing name, and press **TAB**; or press **TAB** to accept the proposed name (refer to Proposed Responses of the Name Command, in this section). The highlight moves to the **to refer to:** field, and the message **Enter reference to cell or group of cells** appears.

3. Enter the reference (row/column) for the name, or edit the proposed response to change the name definition.

4. Press **RETURN** or **GO** to execute the Name command. The system assigns the name you specify to the cell(s) you reference, and the main command menu displays in place of the Name form. You can now reference the cell(s) by name instead of row/column reference in commands and formulas.

Deleting a Cell Name

You use the Name command to delete names for a cell or cells by leaving the second field empty (not giving the name a definition). A name cannot exist without a definition.

To delete cell names, use the following procedure:

1. Activate the Name command by typing the letter **N**, or press **TAB** until the highlight is on **Name**; then press **RETURN**.

   The Name form appears with information similar to the following example, with the highlight in the **define name:** field.

NAME: define name: January to refer to: R3C2

Enter name

2. Enter the name you want to delete and press **TAB**; or press **TAB** to accept the proposed name (refer to Proposed Responses of the Name Command, in this section).

   The highlight moves to the **to refer to:** field, and the message **Enter reference to cell or group of cells** appears.

3. Delete the proposed response (leave the field blank).

4. Press **RETURN** or **GO** to execute the Name command. The system deletes the name you specify, and the main command menu displays in place of the Name form. You reference unnamed cells by row/column numbers.

Viewing Worksheet Names

To view worksheet cell names and their definitions, use the following procedure:

1. Activate the Name command by typing the letter **N**, or press **TAB** until the highlight is on **Name**; then press **RETURN**.

   The Name form appears with information similar to the following example, with the highlight in the **define name:** field.

NAME: define name: January to refer to: R6C2

Enter name

2. Press the **Right Arrow** or **Left Arrow** keys to display each defined name in the **define name:** field and its corresponding definition in the **to refer to:** field.

3. To perform Name command operations on a cell name you view, use edit functions to alter responses in either or both command fields, and press **RETURN** or **GO** to execute the command.

To exit the Name command without performing any other operation, press **CANCEL.** The main command menu replaces the Name form.

PROTECTING CELL DATA WITH THE LOCK COMMAND

The Lock command lets you control the protection status of cells. You can lock cells (protect them from change by certain commands), and unlock them when their content no longer requires protection.

The Lock command consists of two subcommands:

Lock Cells	locks or unlocks a cell or group of cells; shows protection status of active cell
Lock Formulas	locks all worksheet cells containing text and formulas

Extent of Lock Command Protection

When you lock cells with the Lock command, you protect their content from the effects of some Multiplan commands.

Commands that cannot affect locked cell content are:

Alpha, Blank, Copy, Edit, Value and Xternal

Commands that can affect locked cell content are:

Delete, Format Cells, Insert, Move, and Sort

Using the Lock Command

To lock a cell or cells, use the following procedure:

1. Activate the Lock command by typing the letter **L**, or press **TAB** until the highlight is on **Lock**; then press **RETURN.**

The Lock command menu displays with the highlight on the **Cells:** option.

LOCK: Cells Formulas

Select option or type command letter

2. Select a subcommand by choosing one of the following options:

   - For Cells, press C or press **RETURN.**
   - For Formulas, press **F,** or press **TAB** to move the highlight to Formulas and press **RETURN.**

A subcommand description and procedure follow under each subcommand heading.

Locking Cells

The Lock Cells subcommand lets you lock or unlock an individual cell or cells. Proposed responses in the Lock command form fields show the protection status of the active cell. To lock or unlock a cell or cells, use the following procedure:

1. Activate Lock Cells. The Lock Cells form appears with information similar to the following example, with the highlight in the **cells:** field (parentheses indicate protection status of active cell).

   LOCK cells: R6C2 status: Locked(Unlocked)

   Enter reference to cell or group of cells

2. Enter the reference for the cell(s) you want to lock or unlock, and press **TAB.** The highlight moves to the **status:** field, and the message **Select option** appears.

3. To lock cells, press **L**, or press the **Spacebar** to move the highlight to **Locked.**

   To unlock cells, press **U**, or press the **Spacebar** to move the highlight to **Unlocked.**

4. Press **RETURN** or **GO** to execute the Lock Cells subcommand. The system locks or unlocks the cells you specify, and the main command menu displays in place of the Lock Cells form.

Locking All Cells Containing Formulas and Text

The Lock Formulas subcommand lets you lock all worksheet cells containing text or formulas. The Lock Formulas subcommand protects all values generated by formulas; it does not affect cells containing numbers.

NOTE

Formulas, and text entries you make after locking with this subcommand, are unlocked until you lock them by using the Lock Formulas subcommand again.

To lock all cells containing text and formulas, use the following procedure:

1. Activate Lock Formulas. The following Lock Formulas form appears.

LOCK FORMULAS:

Press GO to lock formulas, CANCEL to cancel command

2. Press **GO** to execute the Lock Formulas subcommand. The system locks cells containing text or formulas, and the main command menu displays in place of the Lock Formulas form.

To unlock cells that you lock with the Lock Formulas subcommand, use the Lock Cells subcommand described in this section.

REMOVING CELL DATA WITH THE BLANK COMMAND

The Blank command lets you remove data from a cell or group of cells. A blanked cell:

- is empty of characters and spaces
- is available for storing values
- retains its name, if any
- retains its format
- has a numerical value of zero in formulas that reference the cell

Since the Blank command deletes cell data, you can recover worksheet memory space by using this command to remove unnecessary data from worksheet cells.

Blank Command Procedure

To blank a cell or group of cells, use the following procedure:

1. Activate the Blank command by typing the letter **B**, or press **TAB** until the highlight is on **Blank**; then press **RETURN**.

   The Blank form appears with information similar to the following example, with the highlight in the **cells:** field.

   BLANK cells: R6C2

   Enter reference to cell or group of cells

   If you reposition the cell pointer after you activate the Blank command, the cell pointer returns to the original cell after you execute the command.

2. Choose one of the following:

   - To blank the active cell only, press **RETURN.** The system removes the cell data from worksheet memory; cell data disappears from the display.

   - To blank multiple cells, choose one of the following:

     - To blank a row or column of cells, enter a row or column reference; for example: **R3** or **C2.**

     - To blank all cells in a named worksheet area, enter the area name; for example: **Sales.**

     - To blank an irregular area, enter the reference for the area; for example: **R6:8C1,R12C3:4** (rows 6 through 8 in column 1 and row 12 in columns 3 through 4).

3. Press **RETURN** or **GO** to execute the command. The system blanks the cells you specify and displays the main command menu in place of the Blank form.

USING THE HELP COMMAND

The Help command displays information about how to use Multiplan. The Help command temporarily replaces the worksheet and command line with the help screen and help menu; the worksheet and normal command line information reappear when you exit the Help command.

Help Relevant to Need

You can activate the Help command at any time during a Multiplan session, and the system displays a help screen related to the operation you are performing at that time. The system tailors information to your needs when you activate Help. For example:

- If you highlight a command or command option, and then activate the Help command, the help screen describes that command or option.
- If the message line displays an error message, the help screen describes the error or the previous command.
- If the highlight is in a command field, the help screen describes that field.

Help Command Procedure

To display information from the Help command, use the following procedure:

1. Activate the Help command by typing the letter **H**, or press **TAB** until the highlight is on **Help**; then press **RETURN**. (You can also activate Help by pressing the **HELP** key.)

   The following Help menu appears with the highlight on the **Resume** option, and the system replaces the worksheet with the help screen.

```
HELP:  Resume   Start   Next   Previous
       Commands   Editing   Formulas   General   Keyboard

Select option or type command letter
```

   The help screen displays information relevant to the point in your worksheet operation where you requested help (refer to Help Relevant to Need, in this section).

2. Press the first letter of the option you want, or press **TAB** to move the highlight to the option you want; then press **RETURN** or **GO** (table 4-2 lists the options, their purposes and results).

   The highlight in the Help menu always returns to the first position, Resume, after you select an option.

3. To exit the Help command, you can:

   - Select the **Resume** option by pressing **R**, or press **TAB** to move the highlight to **Resume**; then press **RETURN**. The Worksheet text, exactly as it was when you activated Help, replaces the help screen, and the main command menu replaces the Help menu.

   - Press **CANCEL**. The worksheet text replaces the help screen, with the main command menu replacing the Help menu.

Table 4-2. Help Command Options

Option	Purpose	Result
Resume	display worksheet text at the point where you requested help	help screen disappears and worksheet displays at the point where you activated Help
Start (or press **HOME [f4]**)	access beginning of the help file	first page of help file displays (explains nature and purpose of help file)
Next (or press **NEXT PAGE**)	display next page of help information	the next screen of help information on the option you specified displays, if there is one
Previous (or press **PREV PAGE**)	display previous help information screen	previous screen of help information displays
Commands	access command descriptions	beginning with an overview of how Multiplan uses commands, individual command descriptions display
Editing	access Multiplan editing instructions	Multiplan editing instructions display
Formulas	access rules and functions of formulas	formula rules and functions display
General	access general information on Multiplan operations	second page of help file displays
Keyboard	access key definitions	key definition help text displays

SECTION 5

DISPLAYING AND FILING CELL DATA

This section describes two processes basic to managing cell data once you have entered it:

- how to display your data with more than one window and how to move your cell pointer quickly to any point on the worksheet
- how to conclude your Multiplan sessions successfully, saving your data so that you can access it later

You will learn how to:

- use windows to display and manage data
- move the cell pointer quickly around the worksheet
- identify, file, and store worksheets
- end a Multiplan session
- redisplay worksheet files
- clear a worksheet and delete a worksheet file

You use the following commands to perform these operations (refer to Using the Command Mode, in section 4, for general information on commands):

- Window — manipulate worksheet windows
- Jump — move the cell pointer quickly to any section of a worksheet
- Transfer — display, save, clear, delete, and rename worksheet files
- Quit — terminate a Multiplan session

THE WINDOW COMMAND

The Window command lets you display different sections of your Multiplan worksheet simultaneously in a maximum of eight windows.

The four subcommands of the Window command give you control over all aspects of the window feature:

- Window Split — opens a new window by splitting the active window horizontally or vertically, or opens a window for titles only
- Window Border — adds or removes a window border
- Window Close — closes a window by removing it from the screen
- Window Link — links two windows so that their contents scroll together

Activating Window Subcommands

To activate the Window subcommands, use the following procedure:

1. Activate the Window command by typing the letter **W**, or press **TAB** until the highlight is on **Window**; then press **RETURN**.

   The following Window command menu appears with the highlight on the **Split** subcommand.

   WINDOW: Split Border Close Link

   Select option or type command letter

2. Select a subcommand by choosing one of the following options:

   - For Window Split, press **S** or press **RETURN.**
   - For Window Border, press **B**, or press **TAB** to move the highlight to Border and press **RETURN.**
   - For Window Close, press **C**, or press **TAB** twice to move the highlight to Close and press **RETURN.**
   - For Window Link, press **L**, or press **TAB** repeatedly to move the highlight to Link and press **RETURN.**

A subcommand description and procedure follow under each subcommand heading.

Creating New Windows

The Window Split subcommand lets you open a new window by splitting the active window horizontally or vertically. The Window Split subcommand consists of the following options:

- Horizontal — splits the active window horizontally and gives you a choice to link the windows or not
- Vertical — splits the active window vertically and gives you a choice to link the windows or not
- Titles — splits the active window into two or four linked windows

Each window contains the entire worksheet; that is, you can scroll columns and rows within a window to any part of the worksheet, even if that part of the worksheet is displayed in another window. If you change the content of a cell in one window, the system changes that cell's content in any other window that displays it.

The system maintains borders for each new window if the original window has a border.

NOTE

If you attempt to open more that eight windows, the system emits an audio signal, displays the message **Too many windows**, and displays the main command menu in place of the Window Split subcommand form.

Procedure

To open a new window with the Window Split subcommand, use the following procedure:

1. Activate Window Split. The following Window Split subcommand menu appears with the highlight on the **Horizontal** option.

   WINDOW SPLIT Horizontal Vertical Titles

   Select option or type command letter

2. Select an option by choosing one of the following:

   - For Window Split Horizontal, press **H** or press **RETURN**.
   - For Window Split Vertical, press **V**, or press **TAB** to move the highlight to Vertical and press **RETURN**.
   - For Window Split Titles, press **T**, or press **TAB** twice to move the highlight to Titles and press **RETURN**.

A description of each Window Split subcommand option follows under the option heading.

Splitting Windows Horizontally

To split a window with the horizontal option of the Window Split subcommand, use the following procedure:

1. Activate the Window Split Horizontal option. The following Window Split Horizontal form appears with information similar to the following example, with the highlight in the **at row:** field (parentheses indicate selection).

WINDOW SPLIT HORIZONTAL at row: 12 linked: Yes (No)

Enter a number

2. Enter the number of the row you want as the top row of the new window and press **TAB.** The highlight moves to the **linked:** field and the message **Select option** appears.

3. To link the original window and the new window so they scroll together whenever you scroll one of them horizontally, press **Y,** or move the highlight to the **Yes** response by pressing the **Spacebar,** if necessary.

   To keep the original window and the new window independent of each other, press **N,** or move the highlight to the **No** response by pressing the **Spacebar,** if necessary.

4. Press **RETURN** or **GO** to execute the Window Split subcommand. The system splits the active window horizontally, according to your specifications, leaving the worksheet area above the row you specify in the old window, and the area including and below the row you specify in the new window.

   The system gives the new window the next unused window number, and makes it the active window.

If you specify that the original and new windows be linked, the system displays only one set of column numbers in the original window. If you specify no linking (independent windows), the system displays two sets of column numbers, one set in each window.

The main command menu replaces the Window Split Horizontal form on the screen.

Exercise 9 of appendix B trains you in splitting windows.

Window Split Horizontal Example

The following Window Split Horizontal form shows the proper entries to split an active window at row 14 and to link the new window with the original window:

WINDOW SPLIT HORIZONTAL at row: R14 linked: (Yes) No

Splitting Windows Vertically

To split a window with the vertical option of the Window Split subcommand, use the following procedure:

1. Activate the Window Split Vertical option. The following Window Split Vertical form appears with information similar to the following example, with the highlight in the **at column:** field (parentheses indicate selection).

WINDOW SPLIT VERTICAL at column: 2 linked: Yes (No)

Enter a number

2. Enter the number of the column you want as the left column of the new window and press **TAB.** The highlight moves to the **linked:** field and the message **Select option** appears.

3. To link the original window and the new window so they scroll together whenever you scroll one of them vertically, press **Y,** or move the highlight to the Yes response by pressing the **Spacebar,** if necessary.

To keep the original window and the new window independent of each other, press **N**, or move the highlight to the No response by pressing the **Spacebar**, if necessary.

4. Press **RETURN** or **GO** to execute the Window Split subcommand. The system splits the active window vertically, according to your specifications, leaving the worksheet area to the left of the column you specify in the old window, and the area including and to the right of the column you specify in the new window.

   The system gives the new window the next unused window number, and makes it the active window.

   If you specify that the original and new windows be linked, the system displays only one set of row numbers in the original window. If you specify no linking (independent windows), the system displays two sets of row numbers, one set in each window.

   The main command menu replaces the Window Split Vertical form on the screen.

Exercise 9 of appendix B trains you in splitting windows.

Window Split Vertical Example

The following Window Split Vertical form shows the proper entries to split an active window at column 4 and to link the new window with the original window:

WINDOW SPLIT VERTICAL at column: 4 linked:(Yes)No

Creating Title Windows

The Window Split Titles option lets you split the active window into two or four linked windows that scroll together. You cannot unlink Windows formed by this option.

Format of Title Windows

The proposed responses for this option split the active window so that the active cell becomes the upper left corner cell of the active window. The system forms the windows as follows (refer to figure 5-1):

- The system calculates the number of rows you specify from the top of the active window, and makes these rows a window; if you specify 0 rows, The system does not create a horizontal window at the top of the active window.
- The system calculates the number of columns you specify from the left edge of the active window, and makes these columns a window; if you specify 0 columns, the system does not create a vertical window at the left side of the active window.

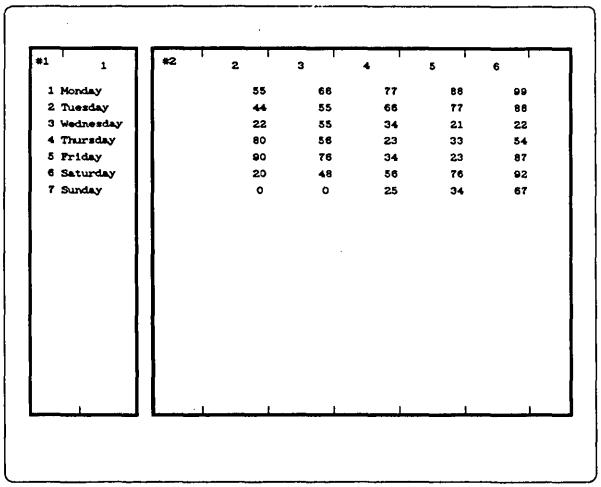


Figure 5-1. Window Split with Window Split Titles Option

- The remaining worksheet area becomes the active window after you execute the Window Split Titles subcommand option. The active window scrolls horizontally with the window above it, if you created one, and scrolls vertically with the window to the left of it, if you created one.

If you attempt to open two sets of title windows, the system emits an audio signal, displays the message **Window will not fit**, and displays the main command menu in place of the Window Split Titles option form.

Procedure

To split a window with the titles option of the Window Split subcommand, use the following procedure:

1. Activate the Window Split Titles option. The following Window Split Titles form appears with information similar to the following example, with the highlight in the **# of rows:** field.

WINDOW SPLIT TITLES: # of rows: 11 # of columns: 1

Enter a number

2. To accept the proposed responses which place the active cell in the upper lefthand corner of the active window, go to step 4.

   To change the proposed responses, enter the number of the rows that you want to allow at the top for a title window in the **# of rows:** field.

   If you do not want a top title window, enter 0.

   Press **TAB.** The highlight moves to the **# of columns:** field.

3. Enter the number of columns you want to allow for the lefthand title window.

   If you do not want a lefthand title window, enter 0.

4. Press **RETURN** or **GO** to execute the Window Split subcommand. The system splits the active window to allow for titles according to your specifications, leaving the remaining worksheet area as the active window.

   The system numbers the new windows with the next consecutive unused numbers, and displays the main command menu in place of the Window Split Titles form.

Window Split Titles Examples

1. Figure 5-1 shows a worksheet where column 1 contains descriptive titles for rows, and columns 2 through 6 contain data matching those titles. The following Window Split Titles form shows the responses the system proposes when cell R1C2 is the active cell; accepting these proposed responses creates the title window shown in figure 5-1:

WINDOW SPLIT TITLES # of rows: 0 # of columns: 1

   If you scroll window 2 in figure 5-1 to the left by moving the cell pointer to R1C8, the titles remain on the screen as shown in figure 5-2.

2. Figure 5-3 shows a worksheet screen split into four windows so that the titles in row 1 and the headings in column 1 remain fixed on the screen if you scroll the data columns. The following Window Split Titles form shows the entries needed to create the windows in figure 5-3:

WINDOW SPLIT TITLES # of rows: 1 # of columns: 1

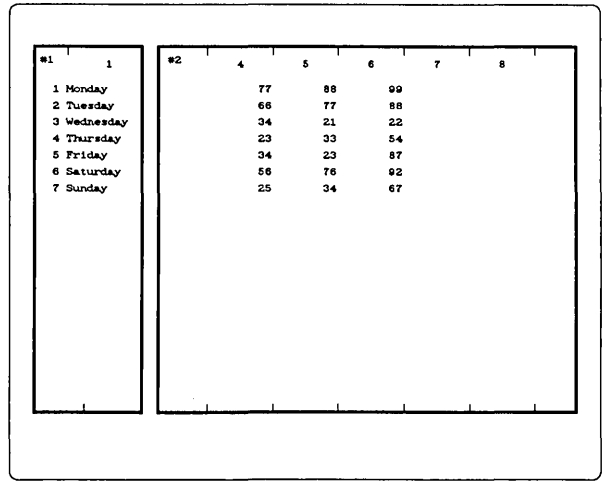


Figure 5-2. Horizontal Scrolling of Windows Split with Window Split Titles Option

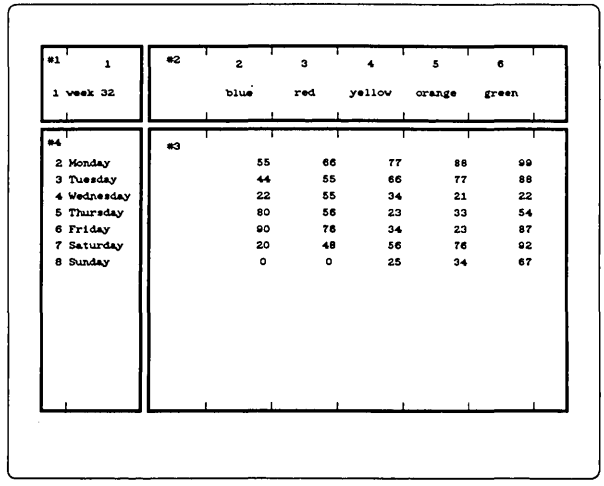


Figure 5-3. Four Windows Resulting from Window Split Titles Option

Inserting and Deleting Window Borders

The Window Border subcommand changes the border of the window you specify. If the window does not have a border, Window Border adds one; if it has a border, Window Border deletes it.

A border takes up one character position on each side of the window, reducing the area for the display of data by two rows horizontally and two characters vertically.

When you remove a border, the window content expands to fill space usually taken up by the border. For example, a window that shows rows 1 through 11 with a border, shows rows 1 through 13 without a border.

To alter window borders with the Window Border subcommand, use the following procedure:

1. Activate Window Border. The Window Border form appears with information similar to the following example, with the highlight in the **change border in window number:** field.

WINDOW change border in window number: 1

Enter a number

2. Enter the number of the window whose borders you want to change.

3. Press **RETURN** or **GO** to execute the Window Border subcommand. The system inserts or deletes a border in the window you specify, and the main command menu replaces the Window Border form.

Closing Windows

The Window Close subcommand closes a window (removes it from the screen). You can still access the cell content of the closed window through moving the cell pointer in the window(s) that are still open.

After you close a window, the system expands the size of the remaining windows so that the entire display area is filled. The system also renumbers the windows, if necessary, so that the lowest digits are in use for the remaining windows.

You use this subcommand only when you have more than one window on your display; if you have one window open only, the system ignores the Window Close subcommand.

To close a window, use the following procedure:

1. Activate Window Close. The Window Close form appears with information similar to the following example, with the highlight in the **window number:** field.

   WINDOW CLOSE window number: 2

   Enter a number

2. Enter the number of the window you want to close.

3. Press **RETURN** or **GO** to execute the Window Close subcommand. The system removes the window you specify from the screen, expands the area of remaining windows, and displays the main command menu in place of the Window Close form.

Exercise 10 of appendix B trains you in closing worksheet windows.

Linking Windows

The Window Link subcommand lets you revise the link status between two windows. This subcommand applies to two windows that are:

- linked
- not linked, but have been split from a common window

You can revise links between any two windows with Window Link, but the windows must have been split from a common window. If you attempt to link pairs of windows that do not share a split relationship, the system displays the message **Cannot link those windows.**

You cannot unlink windows that have been split with the Window Split Titles subcommand option.

Characteristics of Linked Windows

Linked windows have the following characteristics:

- the contents of linked windows scroll together.

  If you split linked windows horizontally, their synchronized scrolling is horizontal; if you split linked windows vertically, their synchronized scrolling is vertical.

- the windows share one set of column or row numbers

  When you link two previously unlinked windows, one set of row or column numbers disappears from the screen. If you have split the pair horizontally, the column numbers remain only in the upper window, identifying columns in both windows. If you have split the pair vertically, the row numbers remain only in the left window, identifying rows in both windows.

Proposed Responses for Window Link Subcommand

The active window is the proposed response in the **window number:** and **with window number:** fields of the Window Link subcommand if you have not split windows prior to activating the subcommand. If you have split windows prior to activating Window Link, both the active window and the window from which you split it, or the window which you split from it, are the proposed responses.

The proposed response in the **linked:** field is **Yes** if the windows in the first two fields are linked and **No** if they are not linked.

To revise the linking of two windows, use the following procedure:

1. Activate Window Link. The Window Link form appears with information similar to the following example, with the highlight in the **window number:** field.

WINDOW LINK window number: 2 with window number: 1 linked: Yes(No)

Enter a number

2. Accept the proposed response by pressing **TAB**, or enter the number of another window; then press **TAB**. The highlight moves to the **with window number:** field.

3. Accept the proposed response by pressing **TAB**, or enter the number of another window; then press **TAB**.

   The highlight moves to the proposed response in the **linked:** field (**Yes** if the windows in the previous fields are linked,and **No** if they are not). The message **Select option** appears.

4. Press **Y**, **N**, or the **Spacebar** to move the highlight to the response you want, if necessary.

   To link unlinked windows, specify the **Yes** response.

   To unlink linked windows, specify the **No** response.

5. Press **RETURN** or **GO** to execute the Window Link subcommand. The system links or unlinks the windows you specify, and displays the main command menu in place of the Window Link form.

Window Link Subcommand Example

The following Window Link form shows the entries necessary to link windows 4 and window 1 (window 4 was previously split from window 1):

WINDOW LINK window number: 4 with window number: 1 linked:(Yes)No

MOVING THE CELL POINTER WITH THE JUMP COMMAND

The Jump command lets you move the cell pointer quickly to a new worksheet position. The three Jump subcommands specify the types of worksheet destinations you can use for your "jumps:"

- Jump Name — moves the cell pointer to the first cell of a named worksheet area
- Jump Row-col — moves the cell pointer to a specified worksheet cell
- Jump Window — moves the cell pointer to a specified worksheet window or moves the active window position on the worksheet

The Jump Procedure

To move the cell pointer with the Jump command, use the following procedure:

1. Activate the Jump command by typing the letter **J**, or press **TAB** until the highlight is on **Jump**; then press **RETURN**.

The following Jump command menu appears with the highlight on the **Name** subcommand.

JUMP: Name Row-col Window

Select option or type command letter

2. Select a subcommand by choosing one of the following options:

   - For Jump Name, press **N** or press **RETURN.**
   - For Jump Row-col, press **R,** or press **TAB** to move the highlight to Row-col and press **RETURN.**
   - For Jump Window, press **W,** or press **TAB** twice to move the highlight to Window and press **RETURN.**

A subcommand description and procedure follow under each subcommand heading.

Jumping to a Named Worksheet Area

To use the Jump Name subcommand, you must have named cells or worksheet areas with the Name command (refer to Naming Cells with the Name command, in section 4).

To move the cell pointer to a named cell or to the first cell of a named worksheet area, use the following procedure:

1. Activate Jump Name. The following Jump Name form appears with the highlight in the **name:** field.

   JUMPTO name:

   Enter reference to cell or group of cells

2. Enter the name of the destination worksheet area.

   You can press the horizontal or vertical keys to display defined worksheet names in the field. When the name you want displays, go to step 3.

3. Press **RETURN** or **GO** to execute the Jump Name subcommand. The system moves the cell pointer to the named area you specify, and the main command menu displays in place of the Jump Name form.

   If the named area is visible in the active window, only the cell pointer moves. If not, the system also moves worksheet text so that the named area appears in the active window.

Jump Name Subcommand Example

The following Jump Name form shows the proper entry to move the cell pointer to a worksheet area named **First.Qtr:**

JUMPTO name: First.Qtr

Jumping to a Row-Column Destination

The Jump Row-col subcommand lets you move the cell pointer to a specified worksheet cell. To jump to a specified cell, use the following procedure:

1. Activate Jump Row-col. The Jump Row-col form appears with information similar to the following example, with the highlight in the **row:** field.

   JUMPTO row: 1 column: 1

   Enter a number

2. Enter the row number of the cell and press **TAB.** The highlight moves to the **column:** field.

3. Enter the column number of the cell.

4. Press **RETURN** or **GO** to execute the Jump Row-col subcommand. The system moves the cell pointer to the cell you specify, and the main command menu displays in place of the Jump Row-col form.

   If the cell is visible in the active window, only the cell pointer moves. If not, the system moves the worksheet text so that the cell appears in the active window.

Jump Row-Col Subcommand Example

The following Jump Row-col form shows the proper entry to move the cell pointer to the cell on row 5 in column 4:

JUMPTO row: 5 column: 4

Window Jumping

The Jump Window subcommand lets you perform the following operations:

- move the cell pointer to the upper lefthand cell of a specific worksheet window
- move the active window so that the active cell appears in its upper lefthand corner

Procedures for each of these operations follow.

Moving to Another Window

To move the cell pointer to another worksheet window, use the following procedure:

1. Activate Jump Window. The Jump Window form with information similar to the following example appears, with the highlight in the **window number:** field.

JUMPTO window number: 1 row: 5 column: 4

Enter a number

2. Enter the number of the window and press **TAB.** The highlight moves to the **row:** field.

3. Enter the row number of the upper lefthand corner cell of the numbered window, or leave this field blank (delete the proposed response), and press **TAB.** The highlight moves to the **column:** field.

4. Enter the column number of the upper lefthand corner cell of the numbered window, or leave this field blank (delete the proposed response).

5. Press **RETURN** or **GO** to execute the Jump Window subcommand. The system moves the cell pointer to the upper lefthand cell in the window you specify. The main command menu displays in place of the Jump Window form.

Moving the Active Window

To move the active window so that the active cell is in its upper lefthand corner, use the following procedure:

1. Activate Jump Window. The Jump Window form with information similar to the following example appears, with the highlight in the **window number:** field.

JUMPTO window number: 1 row: 5 column: 4

Enter a number

2. Press **TAB** without changing the window number. The highlight moves to the **row:** field.

3. Enter the row number of the cell you want to be the upper lefthand corner cell of the active window and press **TAB**. The highlight moves to the **column:** field.

4. Enter the column number of the cell you want to be the upper lefthand corner cell of the active window.

5. Press **RETURN** or **GO** to execute the Jump Window subcommand. The system positions the active window so that the cell you specify is in its upper lefthand corner. The main command menu displays in place of the Jump Window form.

Jump Window Subcommand Examples

Example 1 The following Jump Window form shows the proper entry to move to window number 4:

JUMPTO window number: 4 row: 1 column: 1

Example 2 The following Jump Window form shows the proper entries to position the active window so that cell R44C14 is at its upper lefthand corner:

JUMPTO window number: 1 row: 44 column: 14

STORING AND RECALLING WORKSHEET DATA

Multiplan provides a file system that you can use to store and recall your data in the format in which you entered it, that is, the Multiplan format, or to store it for recall in another format, such as word processing.

The Transfer Command

You create and manipulate your worksheet files with the six subcommands of the Transfer command:

- Transfer Load — loads (displays) a saved worksheet in place of the active worksheet
- Transfer Save — saves the active worksheet in a disk file
- Transfer Clear — clears the active worksheet (destroys all changes made since the last Transfer Save)
- Transfer Delete — deletes a Multiplan disk file

- Transfer Options — specifies the file format for subsequent Transfer Load, Delete, and Save subcommands, and the path for subsequent Transfer commands
- Transfer Rename — saves the active worksheet under a new name and updates external links

Multiplan Filenames

In order to store your worksheets in a file, you must give each one a name so that the system can recognize it when you want to view it again. You name your Multiplan files with the Transfer Save subcommand (refer to Naming and Storing a Worksheet, in this section).

A filename can contain a maximum 50 alphanumeric characters, including upper- and lowercase letters, periods, hyphens, and right angle (>) brackets. For further information about filename formulation, refer to section 3 of the B 20 Systems Standard Software Operations Guide.

Once you have named a file, you must duplicate that name whenever you refer to the file, or the system will not recognize it. The exception is upper- and lowercase letters because the system does not distinguish between cases.

For example, to Transfer Load or Delete the file **SALES.1984**, you can enter **SALES.1984** or **sales.1984** or **Sales.1984**; however, **sale.1984**, **SALES1984**, and **1984.Sales** are unacceptable, and cause the system to display the following messages:

- **Cannot read file** + **flashing Status Code 203** — Transfer Load
- **Invalid parameter** + **flashing Status Code 203** — Transfer Delete

Filename Suffixes

When you save your worksheets with the Transfer Save subcommand, the system identifies their format by appending a suffix to the filename according to the format mode you specify in the Transfer Options subcommand: **.mp** for Normal, and **.sl** for Symbolic files (refer to File Transfer Modes, in this section).

The names of files you load with the Transfer Load subcommand, must have suffixes to identify their format: **.mp** for Normal, **.sl** for Symbolic, and **.vc** for Other files. However, you do not need to specify the suffix in the Transfer Load form.

Normal Mode Suffix

The system appends the Normal format suffix, **.mp**, to the filename when you save a file in the Normal mode. During a Multiplan session, the suffix does not display on filenames, and you do not use it when you enter filenames.

You must include the suffix when you reference the filename outside of Multiplan sessions, and the **.mp** suffix displays in system file lists you access from the Executive.

Symbolic and Other Mode Suffixes

The system appends the Symbolic format suffix, **.sl**, to the filename when you save a file in the Symbolic mode.

The names of files you load in the Symbolic and Other formats must include their respective suffixes, **.sl** and **.vc**. You must add the suffix to filenames by using the Executive **Rename** or **Copy** commands (refer to the B 20 Systems Standard Software Operations Guide); and you must include the suffixes for these files when you access them outside of Multiplan.

However, you do not include the suffix when you type in the filename during the Transfer Load subcommand, and the Multiplan directories for these modes do not show suffixes.

Old Multiplan Files

When you change a worksheet you previously saved, and then save the changed worksheet, the system retains the previous version, adding **-Old** to the filename.

For example, for a file named **NetProfit** saved in the Normal mode, the system assigns the name **NetProfit.mp** to the latest version, and renames the prior version **NetProfit-Old.mp.** You can access the previous version by loading it with that name (omitting the suffix) in the Transfer Load subcommand.

The system only saves the version immediately preceding the latest version with the **-Old** addition to the filename. If you want to save the **-Old** version permanently, you must rename it with the Transfer Rename subcommand.

Deleting Old Multiplan Files

You can delete **-Old** Multiplan files individually with the Transfer Delete subcommand by typing **filename-Old** in the **filename:** field.

You can effect a multiple delete of **-Old** files with the Executive **Delete** command (refer to the B 20 Systems Standard Software Operations Guide).

Activating the Transfer Subcommands

To activate a Transfer subcommand, use the following procedure:

1. Activate the Transfer command by typing the letter **T**, or press **TAB** until the highlight is on **Transfer**; then press **RETURN**.

   The Transfer command menu appears with the highlight on the **Load** subcommand.

   TRANSFER: Load Save Clear Delete Options Rename

   Select option or type command letter

2. Select a subcommand by choosing one of the following options:

   - For Transfer Load, press **L** or press **RETURN**.
   - For Transfer Save, press **S**, or press **TAB** to move the highlight to Save and press **RETURN**.
   - For Transfer Clear, press **C**, or press **TAB** twice to move the highlight to Clear and press **RETURN**.
   - For Transfer Delete, press **D**, or press **TAB** repeatedly to move the highlight to Delete and press **RETURN**.
   - For Transfer Options, press **O**, or press **TAB** repeatedly to move the highlight to Options and press **RETURN**.
   - For Transfer Rename, press **R**, or press **TAB** repeatedly to move the highlight to Rename and press **RETURN**.

A subcommand description and procedure follows under each subcommand heading.

Loading a Filed Worksheet

The following paragraphs describe the types of files you can load in Multiplan, how the active worksheet is affected by loading, and the procedure to use the Transfer Load subcommand.

Types of Files You Can Load in Multiplan

You can load two types of files with the Transfer Load subcommand:

- Files you have created and stored with the Transfer Save subcommand in the Normal or Symbolic modes. The system:
  - maintains a separate file list for each of these formats. Your specification of the file transfer mode in the Transfer Options subcommand determines which list you can access in the Transfer Load and Transfer Delete subcommands.
  - appends the suffix **.mp** or **.sl** to the file depending on the mode (these suffixes display in Executive file lists, and you must use them to access the files outside of Multiplan)
- Files created outside of Multiplan in Symbolic and Other (VisiCalc) modes.

  You must add suffixes to the names of these files before loading them, **.sl** for Symbolic format and **.vc** for Other format (refer to Multiplan Filenames, in this section).

Effect of Loaded Worksheet on Active Worksheet

The Transfer Load subcommand loads a worksheet from a disk file and displays it:

- in place of the active worksheet, in the Normal mode
- merged with the active worksheet, in the Symbolic and Other modes

To avoid destruction or contamination of the active worksheet by the loaded worksheet, you should perform the following steps before activating Transfer Load:

1. Save the active sheet with the Transfer Save subcommand.
2. Clear the active worksheet with the Transfer Clear subcommand.

Procedure

To load a disk file with the Transfer load subcommand, use the following procedure:

1. Activate Transfer Load. The following Transfer Load form appears with the edit cursor in the **filename:** field.

TRANSFER LOAD filename:

Enter a filename, or use direction/page keys to view directory

2. Enter the filename in the **filename:** field using either of the following procedures:
    - Type the name of the file (do not include a filename suffix).

- Press any direction key (**Up Arrow, Down Arrow, Left Arrow, Right Arrow**), the **HOME** (**f4**) or **END** (**f5**) keys to display the disk file directory of the current transfer mode. The directory, containing a movable highlight, replaces the worksheet display.

  Press the direction or **HOME** or **END** keys again to move the highlight to the filename you want (the system inserts the highlighted filename in the **filename:** field).

  If necessary, press the **NEXT PAGE** or **PREV PAGE** keys to view succeeding or preceding directory pages. If you press these keys when there is only one directory page, the system emits an audio signal.

3. Press **RETURN** or **GO** to execute the Transfer Load subcommand. The previous active sheet disappears, the system displays the file you specify, and the main command menu replaces the Transfer Load form.

Exercise 12 of appendix trains you in using the Transfer Load subcommand.

If you press any key other than a horizontal or vertical key, **NEXT PAGE, PREV PAGE,** or the **HOME** or **END** function keys when the disk file directory is displayed, the system redisplays the active worksheet and inserts the character of the key you pressed in the **filename:** field. The system interprets the pressing of other keys as part of the worksheet name.

For further information about Symbolic and Other format modes, refer to Setting File Transfer Options, in this section, and to appendixes C and D.

Naming and Storing a Worksheet

The Transfer Save subcommand lets you save the worksheet to a disk file with a specific name. The system stores all data and formatting characters of the worksheet. The proposed response in the **filename:** field is the name of the last file you loaded with Transfer Load, or **TEMP** if the worksheet is clear or you have not yet named it.

Modes of Saving a Worksheet

You can save a worksheet in the Normal Multiplan mode or in Symbolic mode. You choose the mode for saving a worksheet with the Transfer Options subcommand before you use Transfer Save (refer to Setting File Transfer Options, in this section).

Depending on the mode in which you save a worksheet to disk, you can access it again at any time with the Transfer Load subcommand and/or with other applications such as the OW25 and WRITEone word processors.

You can save the same worksheet in both modes for different purposes; you can use the same filename for both files because the system distinguishes the format by adding a suffix to the name: **.mp** for Normal mode and **.sl** for Symbolic mode.

Procedure

To save the active worksheet to a disk file with the Transfer save subcommand, use the following procedure:

1. Activate Transfer Save. The Transfer Save form appears with information similar to the following example, with the highlight on the name of the active worksheet in the **filename:** field.

   TRANSFER SAVE filename: Monthly.Sales

   Enter a filename

2. To save the worksheet under its current name, go to step 3.

   To change the worksheet name, enter a filename (refer to Multiplan Filenames, in this section).

3. Press **RETURN** or **GO** to execute the Transfer Save subcommand. The system saves the active worksheet to a disk file with the name you specify, and displays the main command menu in place of the Transfer Save form.

   The system lists filenames for Normal mode in a directory list of Normal files, and Symbolic files in a directory list of Symbolic files. You can access these lists during the Transfer Load and Transfer Delete subcommands.

   If the filename you enter in the **filename:** field duplicates the name of an existing disk file, the system displays the message **Press GO to overwrite existing file, CANCEL to cancel command.** Press **GO** to replace the disk file with the worksheet you save; press **CANCEL** to cancel the Transfer Save subcommand.

Exercise 11 of appendix B trains you in saving a worksheet with the Transfer Save subcommand.

NOTE

If the worksheet has external links to supporting worksheets, and you want to rename the worksheet, use the Transfer Rename subcommand. When you rename an active worksheet using the Transfer Save command, the system does not update the receipts on the supporting sheets. For further information about external links and receipts, refer to section 9.

Clearing a Worksheet

The Transfer Clear subcommand preserves options set with the Options command, and Transfer Options and Print Options subcommands, but otherwise alters the active worksheet in the following ways:

- deletes cells
- sets columns to the default width
- sets default alignment and format to **General**
- clears names and links to external worksheets
- names the cleared sheet **TEMP**

The Transfer Clear subcommand affects only the active worksheet; it does not affect disk files of the active worksheet that you have saved prior to the Transfer Clear command.

To clear the active worksheet, use the following procedure:

1. Activate Transfer Clear. The following Transfer Clear form appears.

   TRANSFER CLEAR:

   Press GO to clear sheet, CANCEL to cancel command

2. To clear the worksheet, press **GO.** The system clears the worksheet, preserving only the options you set in the Options command, and in the Transfer Options and Print Options subcommands.

   To cancel the Transfer Clear subcommand, press **CANCEL.**

   The system replaces the Transfer Clear form with the main command menu.

Deleting a Worksheet File

The Transfer Delete subcommand deletes disk files of worksheets stored with the Transfer Save subcommand. You can use this subcommand to gain disk space by deleting files you no longer need.

To delete a disk file with the Transfer Delete subcommand, use the following procedure:

1. Activate Transfer Delete. The following Transfer Delete form appears with the edit cursor in the **filename:** field.

TRANSFER DELETE filename:

Enter a filename, or use direction/page keys to view directory

2. Enter the filename in the **filename:** field using either of the following procedures:

    - Type the name of the file.

    - Press any direction key (**Up Arrow, Down Arrow, Left Arrow, Right Arrow**), the **HOME** (**f4**) or **END** (**f5**) keys to display the disk file directory of the current transfer mode. The directory, containing a movable highlight, replaces the worksheet display.

      Press the direction or **HOME** or **END** keys again to move the highlight to the filename you want (the system inserts the highlighted filename in the **filename:** field).

      If necessary, press the **NEXT PAGE** or **PREV PAGE** keys to view succeeding or preceding directory pages. If you press these keys when there is only one directory page, the system emits an audio signal.

3. Press **RETURN** to select the highlighted file. The system displays the message **Press GO to delete, CANCEL to cancel command.**

4. To delete the selected file, press **GO.** The system deletes the file you specify, and the main command menu replaces the Transfer Delete form.

   To cancel the Transfer Delete subcommand, press **CANCEL.** The main command menu replaces the Transfer Delete form.

If you press any key other than a horizontal or vertical key, **NEXT PAGE, PREV PAGE,** or the **HOME** or **END** function keys when the disk file directory is displayed, the system redisplays the active worksheet and inserts the character of the key you pressed in the **filename:** field. The system interprets the pressing of other keys as part of the worksheet name.

Setting File Transfer Options

The Transfer Options subcommand lets you control two aspects of Transfer Load, Delete, and Save subcommand operations:

- file mode or format
- the path for file transfers

The default for file mode is **Normal** and for path is the path you last specified from the Executive level or with this subcommand.

After you have altered the mode or path with the Transfer Options subcommand, the Transfer Options form reflects your choices in its proposed responses until you change them or terminate your Multiplan session.

File Transfer Modes

You can choose any of the following file transfer modes or formats for storing, loading, or deleting your files with the Transfer Load, Transfer Save, or Transfer Delete subcommands (refer to procedures for these subcommands, in this section:

- Normal - Multiplan binary format (the default)

  This is the standard format for files you create in Multiplan; it requires less transfer time than other modes. To maintain external links, you must use this format for all supporting worksheets.

  You can only Load files in this mode that you have previously saved in it. The system appends the suffix **.mp** to files it saves in this mode (the suffix does not display in Multiplan, but does display in system file lists you access from the Executive).

  When you load a file in this format, the system clears the active worksheet and writes the worksheet you loaded in its place.

- Symbolic - Symbolic Link Format (SYLK)

  Symbolic file format is a means to exchange information between Multiplan and application programs. Symbolic files take up less disk space than files in the Normal and Other formats (refer to appendix D).

  The system appends the suffix **.sl** to the filenames of files you save in this mode. The names of files you load in this format must have the suffix **.sl**; otherwise, the system cannot recognize them.

  If a file does not have the suffix, you can add it by renaming the file with the Executive **Rename** command, or copying it under a name with the suffix.

  The system merges a file loaded in Symbolic format with the active worksheet, unless you have cleared the active sheet with the Transfer Clear subcommand.

The system updates a dependent worksheet loaded in Symbolic format when its supporting worksheet is stored in Normal mode.

- Other - VisiCalc file format

  You can load files in this format, but you cannot save files in it. Appendix C describes this format in detail.

  The names of files you load in this format must have the suffix **.vc**; otherwise, the system cannot recognize them. If a file does not have the suffix, you can add it by renaming the file with the Executive **Rename** command, or copying it under a name with the suffix.

  The system merges a file loaded in this format with the active worksheet, unless you have cleared the active sheet with the Transfer Clear subcommand.

  If you attempt to save a worksheet in the Other format, the system displays the message **Invalid parameter.**

Path

The path is the volume/directory that you want to use for subsequent save and load operations. The default is the volume and directory you last set from the Executive level or from the Transfer Options subcommand (refer to Setting File Transfer Options, in this section, and Setting Your Path, in section 2).

Procedure

To choose transfer format and path options, use the following procedure:

1. Activate Transfer Options. The following Transfer Options form appears with the highlight on **Normal** in the **mode:** field (parentheses indicate selection).

TRANSFER OPTIONS mode: (Normal) Symbolic Other path:[sys]<sales>

Select option

2. Choose a mode by using either of the following procedures:

   - To accept the proposed response (the current setting), press **TAB.**
   - For Normal, press **N,** or press the **Spacebar** to move the highlight to Normal and press **TAB.**
   - For Symbolic, press **S,** or press the **Spacebar** to move the highlight to Symbolic and press **TAB.**
   - For Other, press **O,** or press the **Spacebar** to move the highlight to Other and press **TAB.**

   The highlight moves to the **path:** field, and the message **Enter text** appears.

3. To accept the proposed response (the current path setting), go to step 4.

   To change the path, enter the volume in square brackets ([]) and the directory in angle brackets (<>); for example, **[Win]<Sales>.**

4. Press **RETURN** or **GO** to execute the Transfer Options subcommand. The system sets the file transfer format mode and path you specify, and the main command menu replaces the Transfer Options form.

Renaming a Worksheet File

The Transfer Rename subcommand performs the following operations when you use it to rename a worksheet:

- saves the active worksheet in Normal format mode under a new name
- adjusts external links to supporting and dependent worksheets (refer to section 9)
- deletes the file with the previous name

You cannot use the Transfer Rename subcommand to rename a worksheet previously saved in Symbolic mode. If you attempt to do so, the system displays the message **Invalid option.**

To rename an active worksheet, use the following procedure:

1. Activate Transfer Rename. The Transfer Rename form appears with information similar to the following example, with the highlight on the name of the active worksheet in the **filename:** field.

TRANSFER RENAME filename: Monthly.Sales

Enter a filename

2. Enter the filename you want.

3. Press **RETURN** or **GO** to execute the Transfer Rename subcommand. The system renames and saves the active worksheet in the Normal format mode, deletes the disk file with the previous name, and adjusts external links to supporting and dependent worksheets.

   The main command menu replaces the Transfer Rename form.

ENDING A MULTIPLAN SESSION

You end your Multiplan sessions with the the Quit command. You can use the Transfer Save subcommand to name and store your worksheet before you use the Quit command, or you can end your session with the Quit command without saving the worksheet.

To exit a Multiplan session, use the following procedure:

1. Activate the Quit command by typing the letter **Q**, or press **TAB** until the highlight is on **Quit**; then press **RETURN**. (You can also activate Quit by pressing the **FINISH** key.)

   The following Quit form appears:

   QUIT:

   Press GO to quit, CANCEL to cancel command.

   In Enhanced Multiplan, if you activate the Quit command without having saved a new or edited worksheet, the system displays the message **Sheet has been changed.** at the right on the command line. This message alerts you that your entries since the last Transfer Save operation will be destroyed if you proceed.

2. To exit Multiplan, press **GO**. The screen clears, and the system returns to the Executive command level of operation.

   To cancel the Quit command, press **CANCEL**. The main command menu replaces the Quit form.

NOTE

If you need to exit your Multiplan session in an emergency, hold down the **ACTION** key while pressing the **FINISH** key. The system returns to the Executive level of functioning. Refer to the B 20 Systems Standard Software Operations Guide for further information about resuming Multiplan operations.

SECTION 6

FORMATTING AND PRINTING CELL DATA

This section explains how you can customize the arrangement of worksheet rows and columns and the display of data in cells with the Format command, and how you can specify printing instructions with the Print command.

FORMATTING CELL DATA

You use the four subcommands of the Format command to format your worksheets:

- Format Cells — alters the alignment and format codes of selected cells
- Format Default — sets a most-frequently-used format for the entire worksheet
- Format Options — controls three options:
  - whether or not to include commas in numeric values
  - whether or not to display formulas in cells (instead of values)
  - with a B 22 workstation, whether to use a screen display width of 80 or 132 characters
- Format Width — sets the width of a selected column or columns

Activating Format Subcommands

To activate a format subcommand, use the following procedure:

1. Activate Format by typing the letter **F**, or press **TAB** until the highlight is on **Format**; then press **RETURN**.

   The following Format command menu appears, with the highlight on the **Cells** subcommand:

   FORMAT: Cells Default Options Width

   Select option or type command letter

2. Select a subcommand by choosing one of the following procedures:

   - For Format Cells, press **C** or press **RETURN**.
   - For Format Default, press **D**, or press **TAB** to move highlight to Default and press **RETURN**.
   - For Format Options, press **O**, or press **TAB** to move highlight to Options and press **RETURN**.
   - For Format Width, press **W**, or press **TAB** to move highlight to Width and press **RETURN**.

A subcommand description and procedure follow under each subcommand heading.

Formatting Cells

The Format Cells subcommand lets you perform the following functions:

- alter the format of selected cells that do not conform to the default format
- review the format settings of an active cell
- transfer the format of the active cell to another cell or group of cells

Format Cells Form Fields

The four fields of the Format Cells form are explained in the following paragraphs and in tables 6-1 and 6-2.

The Format Cell fields require the following input:

- **Format Cells:** reference to the cell(s) whose formatting you want to change or review
- **alignment:** selection of cell content alignment options (table 6-1 describes format cell alignment options)
- **format code:** selection of format code options (table 6-2 describes format code options)
- **# of decimals:** specification of the number of decimal points you want in cell values, when you choose Exp, Fix, $ and % in the **format code:** field

Procedure

To access the Format Cells formatting functions, use the following procedure:

1. Activate Format Cells. The Format Cells form appears with information similar to the following example, with the highlight in the **Cells:** field (parentheses indicate selections).

FORMAT Cells: R6C2 alignment: (Def) Ctr Gen Left Right -
format code:(Def) Cont Exp Fix Gen Int $ * % - # of decimals: 0

Enter reference to cell or group of cells

2. Enter the reference for the cells you want to format and press **TAB.** The highlight moves to the **alignment:** field and the following message appears:

   Select option or type command letter

3. To choose the option you want in the **alignment:** field (refer to table 6-1), use one of the following procedures:

   - Press the initial letter or symbol of the option; then press **TAB.**
   - Press the **Spacebar** to move the highlight to the option; then press **TAB.**

   The highlight moves to the **format code:** field.

4. To choose the option you want in the **format code:** field (refer to table 6-2), use one of the following procedures:

   - Press the initial letter or symbol of the option; then press **TAB.**
   - Press the **Spacebar** to move the highlight to the option; then press **TAB.**

   The highlight moves to the **# of decimals:** field and the message **Enter a number** appears.

5. If you have chosen Exp, Fix, $ or % in the **format code:** field, enter the number of decimal points you want. Otherwise, accept the proposed response.

6. Press **RETURN** or **GO** to execute the Format Cells subcommand. The system applies the formatting options you specify to the cells you reference, and the main command menu replaces the Format Cells form.

Table 6-1. Format Cell Alignment Options

Option Name	Meaning	System Action
Def	Default	aligns cell content according to specifications in Format Default Cells subcommand (refer to Setting the Default Format for Cells, in this section)
Ctr	Center	centers cell content between cell margins
Gen	General	aligns text at left cell margin; aligns numbers at right cell margin
Left	Left	aligns cell content at left cell margin
Right	Right	aligns cell content at right cell margin
-	Apply present alignment	applies present cell alignment (choose this option only when you change format codes, not alignment)

Table 6-2. Format Code Options

Option Name	Meaning	System Action
Def	Default	applies format code according to specifications in Format Default Cells subcommand (refer to Setting the Default Format for Cells, in this section)
Cont	Continuous	displays data that is longer than the cell width, beginning at the left cell margin and continuing into the next cell to the right; the cell(s) to the right must be blank and formatted for continuous display
Exp	Scientific	displays numbers as a decimal notation times a power of 10; for example, 2100000 displays as 2.1E+06, with E representing the exponent or 10th power (you set the number of decimals in the **# of decimals:** field of the Format Cells subcommand)
Fix	Fixed point	displays numbers rounded to a fixed number of decimal digits (you set the number of decimal places in the **# of decimals:** field of the Format Cells subcommand); if the integer value is too wide to display with the fixed number of decimals, the system displays pound (#) signs in the cell
Gen	General	displays numbers as precisely as possible in the available cell width, inserting appropriate scientific notation automatically
Int	Integer	rounds numbers with decimal fractions to integers (whole numbers)

Table 6-2. Format Code Options (cont)

Option Name	Meaning	System Action
$	Dollar	displays money amounts with a leading dollar sign and negative numbers in parentheses (you set the number of decimal places in the **# of decimals:** field of the Format Cells subcommand)
*	Bar Graph	rounds numbers to an integer (whole number) and displays that number of asterisks in the cell; for example, three asterisks would represent all values between and including 2.5 and 3.5
%	Percent	displays numbers as percentages (you set the number of decimals in the **# of decimals:** field of the Format Cells subcommand); for example, the value .1 displays as 10% if the number of decimals is 0, or as 10.0% if the number of decimals is 1
-	Apply present format code	enforces current format codes, even when you change the alignment

Format Cells Subcommand Examples

1. The following Format Cells form shows the proper entries to center the contents of the active cell (R6C2) within cell margins (parentheses indicate selections):

```
FORMAT CELLS: R6C2          alignment: Def (Ctr) Gen Left Right -
format code:(Def) Cont Exp Fix Gen Int $ * % -     # of decimals: 0
```

2. The following Format Cells form shows the proper entries to display the cells in column 2, rows 6 through 12, as money values preceded by a dollar sign and displayed with two decimal places (parentheses indicate selections):

```
FORMAT CELLS: R6:12C2          alignment:(Def) Ctr Gen Left Right -
format code: Def Cont Exp Fix Gen Int ($) * % -   # of decimals: 2
```

The alignment selection is the default. If any target cells have an alignment setting other than default that you want to preserve, you should select the hyphen option in the alignment field.

3. The following Format Cells form shows the proper entries to display the values in rows 6 through 12 in column 2 as percentages with an accuracy of a maximum of four decimal points (parentheses indicate selections):

```
FORMAT CELLS: R6:12C2          alignment:(Def) Ctr Gen Left Right -
format code: Def Cont Exp Fix Gen Int $ * (%) -   # of decimals: 4
```

Setting the Default Format

The Format Default subcommand lets you set a default (most-frequently-used) format for all worksheet cells. You can set alignment, format codes, and column width.

The Format Default subcommand consists of the following options:

- Cells — sets default values for cell alignment, format code, and number of decimals
- Width — sets default value for column width in numbers of characters

Activating Default Format Options

To set the default format for a worksheet, use the following procedure:

1. Activate Format Default. The following Format Default menu appears, with the highlight on the **Cells** option.

FORMAT DEFAULT: Cells Width

Select option or type command letter

2. Select an option by choosing one of the following:

   - For Cells, press C or press **RETURN.**
   - For Width, press **W,** or press **TAB** to move the highlight to Width and press **RETURN.**

A description of each Format Default option follows under the option heading.

Setting the Default Format for Cells

To set default values for cell alignment, format code, and number of decimals, use the following procedure:

1. Activate the Format Default Cells option. The following Format Default Cells form appears, with the highlight on the current default alignment in the **alignment:** field (parentheses indicate default).

FORMAT DEFAULT CELLS alignment: Ctr (Gen) Left Right -
format code: Cont Exp Fix (Gen) Int $ * % # of decimals: 0

2. To choose the option you want in the **alignment:** field (refer to table 6-1), use one of the following procedures:

   - Press the initial letter or symbol of the option; then press **TAB.**

- Press the **Spacebar** to move the highlight to the option; then press **TAB.**

The highlight moves to the **format code:** field.

3. To choose the option you want in the **format code:** field (refer to table 6-2), use one of the following procedures:

   - Press the initial letter or symbol of the option; then press **TAB.**

   - Press the **Spacebar** to move the highlight to the option; then press **TAB.**

   The highlight moves to the **# of decimals:** field, and the message **Enter a number** appears.

4. When you have chosen Exp, Fix, $ or % in the **format code:** field, enter the number of decimal points you want. Otherwise, accept the proposed response.

5. Press **RETURN** or **GO** to execute the Format Default Cells subcommand. The system sets default format options you specify, and the main command menu replaces the Format Default Cells form.

Exercise 6 of appendix B trains you to set the Format Default for a group of cells.

Format Default Cells Examples

Example 1. The following Format Default Cells form shows the proper entries to set centered default column alignment, and cell content as percentages with one decimal point (parentheses indicate default selections):

FORMAT DEFAULT CELLS alignment: (Ctr) Gen Left Right
format code: Cont Exp Fix Gen Int $ * (%) - # of decimals: 1

Example 2. The following Format Default Cells form shows the proper entries to set the default format code to dollar amounts (parentheses indicate default selections):

FORMAT DEFAULT CELLS alignment: Ctr (Gen) Left Right
format code: Cont Exp Fix Gen Int ($) * % - # of decimals: 0

Example 3. The following forms for the Format Default Cells and Format Cells subcommands show the proper entries to format the worksheet illustrated in figure 6-1 (parentheses indicate selections):

FORMAT DEFAULT CELLS alignment: Ctr (Gen) Left Right
format code: Cont Exp Fix Gen Int ($) * % - # of decimals: 2

FORMAT Cells: C1 alignment: (Def) Ctr Gen Left Right -
format code: Def Cont Exp Fix Gen Int $ *(%)- # of decimals: 0

#1	1	2	3	4	5	6	7
1	27%	$62.00	$228.00	$673.00	$901.00		
2	35%	$55.00	$156.00	$523.00	$679.00		
3	28%	$25.00	$89.00	$459.00	$548.00		
4	67%	$66.00	$99.00				
5	5%	$29.00	$562.00				
6	34%	$78.00	$229.00				
7	29%	$67.00	$230.00				
8	8%	$24.00	$290.00				
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

Figure 6-1. Example of Formatted Worksheet Cells

Setting the Default Column Width

To set default column width, use the following procedure:

1. Activate the Format Default Width option. The following Format Default Width form appears, with the highlight in the **width in chars:** field (the current column width is the proposed response).

   FORMAT DEFAULT width in chars: 10

   Enter a number

2. Enter the width in number of characters. For example, with pica pitch, you enter 10 for 1-inch width, 15 for 1.5-inch width.

3. Press **RETURN** or **GO** to execute the Format Default Width subcommand. The system sets the default column width you specify, and the main command menu replaces the Format Default Width form.

Setting Formatting Options

The Format Options subcommand lets you specify the following display features:

- You can choose whether or not to have commas separating numbers into hundreds in cells with Fix, Int, $, or % format code settings. For example, the number 12345678 displays as 12,345,678 when you respond **Yes** to the comma option.

- You can choose whether or not to have formulas display in cells instead of the values the formulas generate; a Yes response in the **formulas:** field causes the system to double column width and to display cell text content within double quotation marks.

- If you have a B 22 workstation, you can choose whether to have a screen display width of 80 or 132 characters--performs the same function as pressing the **ZOOM** key **(f8)**; an attempt to select this option on a B 21 or B 25 workstation causes the system to display the message **Invalid parameter.**

Procedure

To access the Format Options functions, use the following procedure:

1. Activate Format Options. The following Format Options form appears with the highlight in the **commas:** field (parentheses indicate selection):

FORMAT OPTIONS commas: Yes(No) formulas: Yes(No) width:(80) 132

Select option

2. To insert commas in numbers, separating them into hundreds, in cells with Fix, Int, $ or % format code settings, press **Y**, or press the **Spacebar** to move the highlight to **Yes**, if necessary; then press **TAB.**

   To format numbers without commas, press **N**, or press the **Spacebar** to move the highlight to **No**, if necessary; then press **TAB.**

   The highlight moves to the **formulas:** field.

3. To display formulas in cells instead of the values they generate, press **Y**, or press the **Spacebar** to move the highlight to **Yes**, if necessary; then press **TAB.**

   To display cell values, not formulas, press **N**, or press the **Spacebar** to move the highlight to **No**, if necessary; then press **TAB.**

   The highlight moves to the **width:** field.

4. To choose an 80-character screen display width for a B 22 workstation, press **8**, or press the **Spacebar** to move the highlight to **80**, if necessary; then press **TAB**.

   To choose a 132-character screen display width for a B 22 workstation, press **1**, or press the **Spacebar** to move highlight to **132**, if necessary; then press **TAB**.

5. Press **RETURN** or **GO** to execute the Format Options subcommand. The display reflects the format options you specify, and the main command menu replaces the Format Options form.

Format Options Subcommand Example

The following Format Options form shows the proper entries to display formulas in the cells that contain them (parentheses indicate selections):

FORMAT OPTIONS commas:Yes(No) formulas:(Yes)No width:(80) 132

Formatting Column Width

The Format Width subcommand lets you increase or decrease the width of columns in relation to the width set by the Format Default subcommand.

To change column width, use the following procedure:

1. Activate Format Width. The Format Width form appears with information similar to the following example, with the highlight on **d** in the **in chars or d(efault):** field.

FORMAT WIDTH in chars or d(efault): d column: 1 through: 1

Enter a number, or d for default

2. To change column width from a non-default value to the default width, enter **d**; then press **TAB**.

To change column width from the default width (the value set by the Format Default subcommand), enter the new width in number of characters, and press **TAB.**

The highlight moves to the **column:** field where the proposed response is the active column, and the following message appears:

Enter reference to cell or group of cells

3. To specify the columns whose width you want to change, enter the starting column reference and press **TAB;** the highlight moves to the **through:** field.

4. Enter the ending column reference.

5. Press **RETURN** or **GO** to execute the Format Width subcommand. The columns you specify display in the width you specify, and the main command menu replaces the Format Width form.

Format Width Subcommand Examples

Example 1 The following Format Options form shows the proper entries to change the width of column 1 to 12 characters instead of the default of 10 characters:

FORMAT WIDTH in chars or d(efault): 12 column: 1 through: 1

Example 2 The following Format Options form shows the proper entries to change the width of columns 4 through 8 to 20 characters:

FORMAT WIDTH in chars or d(efault): 20 column: 4 through: 8

Example 3. The following forms for the Format Default Cells and Format Width subcommands show the proper entries to format the worksheet illustrated in figure 6-2 (parentheses indicate selections):

FORMAT DEFAULT CELLS alignment: Ctr (Gen) Left Right
format code: Cont Exp Fix Gen Int ($) * % - # of decimals: 0

FORMAT WIDTH in chars or d(efault): 12 column: 1 through: 1

#1	1	2	3	4	5
1	Months	Jan.	Feb.	March	
2					
3	Res. & Dev.	$96	$105	$109	
4	Sales	$150	$175	$186	
5	Admin.	$32	$37	$40	
6	Manuf.	$254	$240	$239	
7					
8					
9					
10					

Figure 6-2. Example of Worksheet with Two Column Widths

USING THE PRINT COMMAND

The Print command lets you control the worksheet printing operation. Printing does not alter the worksheet file on your system.

The Print command consists of four subcommands:

- Print Printer — begins printing on the default printer or on a printer you specify
- Print Exchange — stores Enhanced Multiplan files in Document Exchange Format (DEF)

NOTE

The Print Exchange subcommand is an exclusive feature of Enhanced Multiplan; you cannot access it from Multiplan.

- Print File — prints a worksheet to a disk file
- Print Margins — sets the margins for printed output
- Print Options — specifies the portion and format of the worksheet to be printed, and whether or not to print formulas or row and column numbers, or to use manual paper feed

Activating Print Subcommands

To print worksheet data, use the following procedure:

1. Activate the Print command by typing the letter **P**, or press **TAB** until the highlight is on **Print**; then press **RETURN**.

   The following Print command menu appears with the highlight on the **Printer** subcommand.

   PRINT: Printer Exchange File Margins Options

   Select option or type command letter

2. Select a subcommand by choosing one of the following options:

   - For Print Printer, press **P** or press **RETURN**.
   - For Print Exchange, press **E**, or press **TAB** to move the highlight to Exchange and press **RETURN**.
   - For Print File, press **F**, or press **TAB** to move the highlight to File and press **RETURN**.
   - For Print Margins, press **M**, or press **TAB** twice to move the highlight to Margins and press **RETURN**.
   - For Print Options, press **O**, or press **TAB** to move the highlight to Options and press **RETURN**.

A subcommand description and procedure follow under each subcommand heading. Since the Print Margins and Print Options subcommands establish the printing features carried out by the Print Printer, Print Exchange, and Print File subcommands, the Print Margins and Print Options subcommands are explained first.

Setting Print Margins

The Print Margins subcommand lets you set margins and page length for a printed worksheet. The system sets the left margin and print width by number of characters, and it sets the top margin, print length, and page length by number of lines.

The proposed responses in the fields of this subcommand form are those of the last executed Print Margins subcommand.

To set these parameters with the Print Margins subcommand, use the following procedure:

1. Activate Print Margins. The Print Margins form appears with information similar to the following example and with the highlight in the **left:** field.

PRINT MARGINS left: 5 top: 6 print width: 70 print length: 54
page length: 66

Enter a number

2. Enter the number of characters for the left margin in the **left:** field and press **TAB.** The highlight moves to the **top:** field.

3. Enter the number of lines from the top of the page where the text should begin as the top margin and press **TAB.** The highlight moves to the **print width:** field.

4. Enter the number of characters to be printed across the page in the **print width:** field and press **TAB.** The highlight moves to the **print length:** field.

5. Enter the number of lines per page as the print length and press **TAB.** The highlight moves to the **page length:** field.

6. Enter the total length of the page. The number 66 is the default because it is a common line length of an 8-1/2-by-11-inch piece of paper, with the printer set at 6 lines per inch.

7. Press **RETURN** or **GO** to execute the Print Margins subcommand. The system sets the specified margins and print length and width for the worksheet, and displays the print command menu in place of the Print Margins form.

Print Margins Subcommand Example

Assuming a pitch of 10 characters per inch and line spacing of 6 lines per inch, the following Print Margins form shows the proper entries for centering a worksheet on paper 8-1/2 by 11 inches, with an inch margin to the left and right and a half-inch margin top and bottom:

```
PRINT MARGINS: left: 10  top: 3  print width: 65 print length: 60
               page length: 66
```

Setting Printing Options

The Print Options subcommand lets you specify the following aspects of the printing operation:

- the part of the worksheet to be printed
- printer
- whether to print formulas and row/column numbers
- paper feed mode

To set Print Options, use the following procedure:

1. Activate Print Options. The Print Options form appears with information similar to the following example, with the highlight in the **area:** field (parentheses indicate selection).

```
PRINT OPTIONS: area: R1:255      printer:PTRB  formulas: Yes(No)
    row-col numbers: Yes(No)     manual paper feed: Yes(No)

Enter reference to cell or group of cells
```

2. Enter a cell reference, if necessary, to specify the worksheet area you want to print; then press **TAB**.

   The highlight moves to the **printer:** field, and the message **Enter text** appears.

3. Enter a printer name, if necessary, to specify the printer you want to use; then press **TAB**.

   The highlight moves to the **formulas:** field, and the message **Select option** appears.

4. To specify the printing of formulas in cells rather than the calculated value of the formula, press **Y**, or press the **Spacebar**, if necessary, to move the highlight to the **Yes** response; then press **TAB**. The system doubles column width when you specify this option.

   To specify the printing of calculated values in cells, press **N**, or press the **Spacebar**, if necessary, to move the highlight to the **No** response; then press **TAB**.

   The highlight moves to the **row-col numbers:** field.

5. To specify the printing of row and column numbers, press **Y**, or press the **Spacebar**, if necessary, to move the highlight to the **Yes** response; then press **TAB**.

   To specify that row and column numbers not print, press **N**, or press the **Spacebar**, if necessary, to move the highlight to the **No** response; then press **TAB**.

   The highlight moves to the **manual paper feed:** field.

6. To feed printer paper manually, press **Y**, or press the **Spacebar**, if necessary, to move the highlight to the **Yes** response.

   To feed paper with the printer tractor feed, press **N**, or press the **Spacebar**, if necessary, to move the highlight to the **No** response.

7. Press **RETURN** or **GO** to execute the Print Options subcommand. The system sets the options you specify, and displays the main command menu in place of the Print Options form.

   When you specify manual paper feed, the printer pauses after each form feed to let you insert another sheet of paper. If you are using direct printing (the preferred mode with manual paper feed), press **GO** to resume printing after you insert the paper. If you are using spooled printing, refer to the description of the Spooler in the B 20 Systems Standard Software Operations Guide for procedures.

Print Options Subcommand Example

The following Print Options form shows the proper entries for specifying the printing of one area of a worksheet on the line printer:

```
PRINT OPTIONS: area: R5:15C2:10  printer: LPT  formulas: Yes(No)
    row-col numbers: Yes(No)     manual paper feed: Yes(No)
```

Filing the Worksheet with the Print Exchange Subcommand

The Print Exchange subcommand lets you print an Enhanced Multiplan worksheet to a disk file in Document Exchange Format (DEF), using the parameters you specified in the Print Margins and Print Options subcommands.

DEF Format

DEF is a format that processes the control characters of an Enhanced Multiplan worksheet for correct interpretation by the OW25 and WRITEone word processors.

You can merge it with another file, adjust its formatting, or make other changes, and print it from the word processor as you would any other word processing file.

You cannot retrieve a DEF file for use in Enhanced Multiplan, and DEF format does not support external worksheet links, if any.

To save the worksheet in Enhanced Multiplan as well as print it to a DEF file, you can save it first with the Transfer Save subcommand under a different name.

Procedure

To print the active worksheet to a disk file in DEF, use the following procedure:

1. Activate Print Exchange. The following Print Exchange form appears with the highlight in the **on file:** field.

PRINT Document Exchange Format on file:

Enter a filename

2. Enter the filename for the DEF disk file.

3. Press **RETURN** or **GO** to execute the Print Exchange subcommand. The system prints the worksheet to a disk file in DEF format, and displays the main command menu in place of the Print Exchange form.

   If a disk file of the same name exists, the system displays the message **Press GO to overwrite existing file, CANCEL to cancel command.** Press **GO** to overwrite the original file with the one you want to print, or press **CANCEL** to cancel the Print Exchange subcommand.

   If you want to halt printing in progress, press **CANCEL.**

Print Exchange Subcommand Example

The following Print Exchange form shows the proper entry to print a saved active worksheet named **Sales** to a disk file in DEF:

PRINT Document Exchange Format on file: Sales

Filing the Worksheet with the Print File Subcommand

The Print File subcommand lets you store the contents of a worksheet on a disk file, using the parameters you set in the Print Margins and Print Options subcommands. You can use disk files for many purposes, such as editing with the OW25 and WRITEone word processors or merging the worksheet as an illustration in another disk file.

To print a worksheet to a disk file, use the following procedure:

1. Activate Print File. The Print File form appears with the highlight in the **on file:** field.

   PRINT on file:

   Enter a filename

2. Enter the name of the file you want to store on a disk file.

3. Press **RETURN** or **GO** to execute the Print File subcommand. The system prints the worksheet to a disk file, and displays the main command menu in place of the Print File form.

   If a disk file of the same name exists, the system displays the message **Press GO to overwrite existing file, CANCEL to cancel command.** Press **GO** to overwrite the original file with the one you want to print, or press **CANCEL** to cancel the Print File subcommand.

   If you want to halt printing in progress, press **CANCEL.**

Print File Subcommand Example

The following Print File form shows the proper entry to print a saved worksheet named **Budget** to a disk file:

PRINT on file: Budget

Printing the Worksheet

The Print Printer subcommand starts printing the worksheet under the conditions you specify in the Print Margins and Print Options subcommands. To print with the Print Printer subcommand, use the following procedure:

1. Activate Print Printer. The following Print Printer form appears:

   PRINT on printer:

   Press GO to print, CANCEL to cancel command

2. Press **GO.** Printing of the worksheet begins.

If you specify an invalid printer name in the Print Options subcommand, the system displays the message **Printer error.** The system displays the same message if a printer error occurs during printing.

3. To stop printing in progress, press **CANCEL.**

Multiplan Printing Characteristics

Multiplan prints only cells that contain data; it does not print excess unused cells at right and bottom of the worksheet.

Multiplan prints as many columns across the page, and rows down the page, as fit within the print margins. When all the rows cannot fit on one page, the system prints a second page for the same columns as the first page.

In other words, after the system prints all rows of the worksheet, it prints columns that did not fit on the page, beginning from the top of the worksheet, and printing as many pages as necessary to complete printing of the rows of those columns. If all columns still have not printed, the system continues this process until the area you specified is printed.

When your printed worksheet covers several pages, you can assemble them after printing by cutting and pasting.

Worksheet Printing Time

The length of worksheet printing time depends on the following factors:

- printer speed
- worksheet size
- manual versus tractor feed mode
- direct versus spooled printing
- priority of your printing versus existing spooled printing priorities

When you specify manual paper feed, you should use direct rather than spooled printing (refer to the B 20 Systems Standard Software Operations Guide, for further information).

SECTION 7

COPYING AND SORTING CELL DATA

This section describes how you can copy and sort cell data within the active worksheet. When you change cell data location, the system automatically adjusts cell references, with the exceptions listed in section 3 under Changing Cell Data Location.

COPYING CELL DATA

The Copy command lets you copy the contents and format from one cell or cells to another cell or group of cells within the active worksheet. Copying does not alter the cell from which you copy.

The Copy command consists of three subcommands:

- Copy Right — copies data into cell(s) immediately to the right of the cell(s) from which you copy
- Copy Down — copies data into cell(s) immediately below the cell(s) from which you copy
- Copy From — copies data from any cell(s) to any other cell(s)

NOTE

In all copy operations, copied data replaces any existing data in the destination cells.

The system adjusts worksheet formulas and references affected by the Copy command (refer to Changing Cell Data Location, in section 3 for further information on how the Copy command affects the worksheet).

Activating Copy Subcommands

To copy cell data, use the following procedure:

1. Activate the Copy command by typing the letter **C** or press **TAB** until the highlight is on **Copy;** then press **RETURN.** (You can also activate Copy by pressing the **COPY** key.)

   The Copy command menu appears with information similar to the following example, with the highlight on the **Right** subcommand:

   COPY: Right Down From

   Select option or type command letter

2. Select a subcommand by doing one of the following:

   - For Copy Right, type **R** or press **RETURN.**
   - For Copy Down, type **D,** or press **TAB** to move the highlight to Down and press **RETURN.**
   - For Copy From, type **F,** or press **TAB** twice to move the highlight to From and press **RETURN.**

A subcommand description and procedure follow under each subcommand heading.

Copying to Cells to the Right

The Copy Right subcommand copies data into cell(s) immediately to the right of the cell(s) you copy from. To copy with the Copy Right subcommand, use the following procedure:

1. Activate Copy Right. The Copy Right form appears with information similar to the following example, with the highlight in the **number of cells:** field.

   COPY RIGHT number of cells: 1 starting at: R6C2

   Enter a number

2. Enter the number of duplicate cells you want in the **number of cells:** field and press **TAB.** The highlight moves to the **starting at:** field and the following message appears:

   Enter reference to cell or group of cells

3. Enter the reference for the cell(s) you want to copy (for example, R1C1); to copy the active cell, accept the proposed response in this field.

4. Press **RETURN** or **GO** to execute the Copy Right subcommand. The system copies the contents and format of the source cell(s) to the destination cell(s) you specify, and displays the main command menu in place of the Copy Right form.

Copy Right Subcommand Examples

Example 1 The following Copy Right form shows the proper entries to copy R6C2 into row 6 of columns 3, 4, and 5:

COPY RIGHT number of cells: 3 starting at: R6C2

Example 2 The following Copy Right form shows the proper entries to copy column 2 to column 3:

COPY RIGHT number of cells: 1 starting at: C2

Example 3 The following Copy Right form shows the proper entries to copy R9:12C3 into the corresponding rows in column 4:

COPY RIGHT number of cells: 1 starting at: R9:12C3

Copying to Cells Below Source Cells

The Copy Down subcommand copies data into cell(s) immediately below the source cell(s). To copy with the Copy Down subcommand, use the following procedure:

1. Activate Copy Down. The Copy Down form appears with information similar to the following example, with the highlight in the **number of cells:** field.

COPY DOWN number of cells: 1 starting at: R12C2

Enter a **number**

2. Enter the number of duplicate cells you want in the **number of cells:** field and press **TAB.** The highlight moves to the **starting** at: field and the following message appears:

Enter reference to cell or group of cells

3. Enter the reference for the cell(s) you want to copy (for example, R1C1).

4. Press **RETURN** or **GO** to execute the Copy Down subcommand. The system copies the contents and format of the source cell(s) to the destination cell(s) you specify, and displays the main command menu in place of the Copy Down form.

Exercises 8 and 16 in appendix B train you in uses of the Copy Down subcommand.

Copy Down Subcommand Examples

Example 1 The following Copy Down form shows the proper entries to copy R12C2 into rows 13, 14, and 15 of column 2:

COPY DOWN number of cells: 3 starting at: R12C2

Example 2 The following Copy Down form shows the proper entries to copy down row 12 to row 13:

COPY DOWN number of cells: 1 starting at: R12

Example 3 The following Copy Down form shows the proper entries to copy R12C2:4 into row 13, columns 2, 3, and 4, respectively:

COPY DOWN number of cells: 1 starting at: R12C2:4

Copying to and from Any Cells

The Copy From subcommand copies data from any cell(s) to any other cell(s) on the active worksheet. You must use Copy From when the cells you want to copy from and to are not next to one another. To copy with the Copy From subcommand, use the following procedure:

1. Activate Copy From. The Copy From form appears with information similar to the following example, with the highlight in the **cells:** field.

COPY FROM cells: R6C2 to cells: R6C2

Enter reference to cell or group of cells

2. Enter the reference of the source cell(s) in the **cells:** field and press **TAB.** The highlight moves to the **to cells:** field.

3. Enter the reference of the destination cell(s).

   When you copy from more than one source cell and specify only one cell as the destination cell, the system reads that cell as the upper left corner of the destination group.

   When you copy from a row to a row or from a column to a column, be sure the source reference and the destination reference you specify are the same size.

   When you copy from a row to a column or from a column to a row, the resulting copy is a rectangular grid with one side equal to the number of source rows or columns and the other side equal to the number of destination rows or columns.

4. Press **RETURN** or **GO** to execute the Copy From subcommand. The system copies the contents and format of the source cell(s) to the destination cell(s), and displays the main command menu in place of the Copy From form.

Exercise 3 in appendix B trains you in copying text with the Copy From subcommand.

Copy From Subcommand Examples

Example 1 The following Copy From form shows the proper entries to copy R6C2 to row 6 in column 7:

COPY FROM cells: R6C2 to cells: R6C7

Example 2 The following Copy From form shows the proper entries to copy R12C2:4 to cells in row 20, columns 6, 7, and 8:

COPY FROM cells: R12C2:4 to cells: R20C6

Example 3 The following Copy From form shows the proper entries to copy column 1, rows 6 through 12, to column 7:

COPY FROM cells: R6:12C1 to cells: R6:12C7

Example 4 The following Copy From form shows the proper entries to copy row 12, columns 1 through 4, to row 20:

COPY FROM cells: R12C1:4 to cells: R20C1:4

Example 5 The following Copy From form shows the proper entries to copy from column 2, rows 6 through 8, to row 5, columns 4 through 6. The results of this copy operation are shown in figure 7-1.

COPY FROM cells: R6:8C2 to cells: R5C4:6

Example 6 The following Copy From form shows the proper entries to copy from row 12, columns 1 through 3, to column 1, rows 19 through 21. The results of this copy operation are shown in figure 7-2.

COPY FROM cells: R12C1:3 to cells: R19:21C1

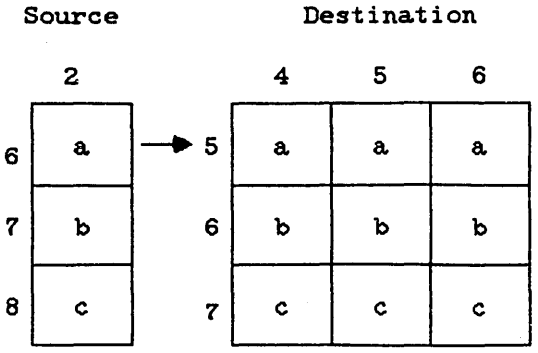


Figure 7-1. Copying from a Column to a Row

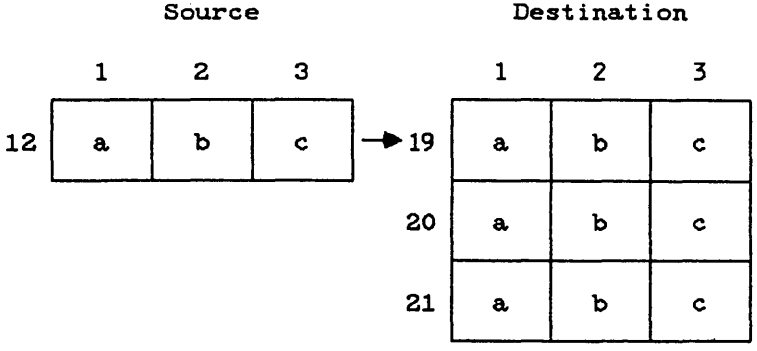


Figure 7-2. Copying from a Row to a Column

SORTING CELL DATA

The Sort command lets you reorder the rows on a worksheet by column according to a specified ascending or descending order of cell values.

Multiplan Sorting Order

Cells within the column to be used as a sorting group can contain numbers, text, or other values. The system collects varied types of cell content into the following groups:

- numbers
- text
- logical and error values
- blank cells

The system further sorts numbers and text into an ascending (>) or descending (<) order.

Multiplan uses the ASCII standard character sequence which follows; the sequence is arranged from least to greatest:

! " # $ % & ` ( ) * + , - . / 0-9 :;

< = > ? @ A-Z [\ ] _ a-z { | }

Within each sorting group, the system leaves equal values in the order in which it encounters them.

When numbers and text are joined in a cell value, the system sorts them by standard alphabetization rules. For example, **A10** is sorted as less than **A9**; **C71** is sorted as less than **P345**.

Sorting One Column in Relation to Another

You can sort column values on a worksheet in relation to one another by using the least significant column as the sorting group first, and then using related columns as the sorting group one at a time, from the least significant to the most significant. The Sort command example, in this section, shows how to produce this type of sort.

Sorting and Cell References

During the Sort command, the system adjusts references to sorted column rows. If the system is set for automatic recalculation, it recalculates the worksheet values as the sort progresses.

However, you can generate and print a sorted worksheet without adjustment of references by turning off automatic recalculation during the sort command (refer to The Options Command, in section 10). The system displays the sorted values that have not been recalculated.

NOTE

Be sure you do not save a sorted worksheet whose values have not been recalculated; a save misplaces some relative references after the sort. When you load the worksheet again to recalculate the values, recalculation would be incorrect.

Refer to Changing Cell Data Location, in section 3, for further information about the effect of a sort on worksheet values.

Proposed Responses of the Sort Command

Multiplan proposes the following responses in the Sort command form fields:

- **by column:** the column to use for the sorting group
- **between rows:** the first row to sort
- **and:** the last row to sort
- **order:** ascending, from least to greatest

Procedure

To sort rows, use the following procedure:

1. Activate the Sort command by typing the letter **S**, or press **TAB** until the highlight is on **Sort;** then press **RETURN.**

   The Sort form appears with information similar to the following example, with the highlight in the **by column:** field.

SORT by column: 2 between rows: 1 and: 255 order:(>)<

Enter a number

2. Enter the number of the column you want to sort, or accept the proposed response by not making an entry; then press **TAB.** The highlight moves to the **between rows:** field.

3. Enter the number of the first row you want to sort, or accept the proposed response by not making an entry; then press **TAB.** The highlight moves to the **and:** field.

4. Enter the number of the last row you want to sort, or accept the proposed response by not making an entry; then press **TAB.** The highlight moves to the **order:** field, and the message **Select option** appears.

5. To specify an ascending sort, press the **Spacebar**, if necessary, to move the highlight to the ascending symbol (>).

   To specify a descending order, press the **Spacebar**, if necessary, to move the highlight to the descending symbol (<).

6. Press **RETURN** or **GO** to execute the command. The system sorts the column cells in the order you specify and reorders the entire row; the main command menu replaces the Sort form.

   If you set Multiplan options for automatic recalculation, the system adjusts references to sorted rows; the cell values reflect those changes. If you do not set Multiplan options for automatic recalculation, the original values appear sorted in the column.

Sort Command Example

The following Sort forms show proper entries for sorting a categorized list of checks (in column 1) by the amount of each check (in column 2), with the largest amount at the top of each category.

Step 1 Sort check amounts in descending order:

SORT by column: 2 between rows: 1 and: 255 order: > (<)

The system arranges the amounts in column 2, with the largest amount in row 1.

Step 2 Sort list of check payees:

SORT by column: 1 between rows: 1 and: 255 order:(>) <

The system arranges the categories (for example, payees or check types) into ascending order (that is, alphabetically from A to Z), carrying their corresponding check amounts with them. When there is more than one check within a specific category, the order remains the same as the first sort.

SECTION 8

MOVING, DELETING, AND INSERTING WORKSHEET CELLS

This section describes how you can move worksheet cells that contain data, insert blank cells at specific locations on your worksheet, and delete cells (with or without data) at locations where you no longer need them.

MOVING CELLS

The Move command lets you move whole rows or columns from one location to another on the worksheet.

NOTE

The system adjusts worksheet formulas and references affected by the Move command (refer to Changing Cell Data Location, in section 3, for further information on how the Move command affects the worksheet).

The Move command consists of two subcommands:

- Row — moves a whole row or rows
- Column — moves a whole column or columns

A subcommand description and procedure follow under each subcommand heading.

Activating Move Subcommands

To move a whole row or column of cells, use the following procedure:

1. Activate Move by typing the letter **M**, or press **TAB** until the highlight is on **Move**; then press **RETURN**. (You can also activate the Move command by pressing the **MOVE** key.)

The Move command menu displays with the highlight on the **Row** subcommand.

MOVE: Row Column

Select option or type command letter

2. Select a subcommand by choosing one of the following options:

   - For Row, press R or press **RETURN.**
   - For Column, press **C,** or press **TAB** to move the highlight to Column and press **RETURN.**

Moving Rows of Cells

To move a row or rows, use the following procedure:

1. Activate Move Row. The Move Row form appears with information similar to the following example with the highlight in the **from row:** field (proposed responses derive from the active cell).

MOVE ROW from row: 6 to before row: 5 # of rows: 1

Enter a number

2. Enter the number of the row you want to move (or the number of the first row if you want to move more than one) and press **TAB.** The highlight moves to the **to before row:** field.

3. Enter the number of the row that you want to be below the moved row or rows and press **TAB.** The highlight moves to the **# of rows:** field.

4. Enter the number of rows you want to move.

5. Press **RETURN** or **GO** to execute the Move Row subcommand. The system moves the rows you specify. The main command menu displays in place of the Move form.

When the system moves rows down, some cells below the moved rows can shift up. When the system moves rows up, some cells above of the moved row can shift down.

Moving a Column of Cells

To move a column or columns, use the following procedure:

1. Activate Move Column. The Move Column form appears with information similar to the following example with the highlight in the **from columns:** field (proposed responses derive from the active cell).

MOVE COLUMN from columns: 2 to left of column: 1 # of columns: 1

Enter a number

2. Enter the number of columns you want to move (or the number of the first column if you want to move more than one) and press **TAB**. The highlight moves to the **to left of column:** field.

3. Enter the number of the column that you want located to the right of the moved column and press **TAB**. The highlight moves to the **# of columns:** field.

4. Enter the number of columns you want to move.

5. Press **RETURN** or **GO** to execute the Move Column subcommand. The system moves the columns you specify. The main command menu displays in place of the Move Column form.

   When the system moves columns to the left, some cells to the left of the moved columns can shift right. When the system moves columns to the right, some cells to the right of the moved column can shift left.

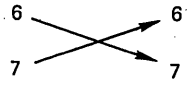
Move Command Examples

A diagram follows each Move command example to illustrate the movement of rows and columns.

Example 1 The following Row form shows the proper entries to move row 7 before row 6:

MOVE ROW from row: 7 to before row: 6 # of rows: 1

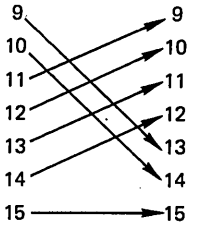
Original Row Moved Rows



Example 2 The following Row form shows the proper entries to move rows 9 and 10 to before row 15:

MOVE ROW from row: 9 to before row: 15 # of rows: 2

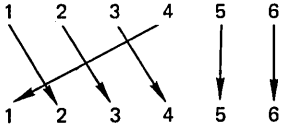
Original Row Moved Rows



Example 3 The following Column form shows the proper entries to move column 3 to the left edge of the worksheet:

MOVE COLUMN from columns: 3 to left of column: 1 # of columns: 1

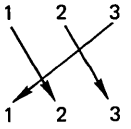
Original Columns **Moved Columns**



Example 4 The following Column form shows the proper entries to move columns 1 through 3 to a position before column 5:

MOVE COLUMN from columns: 1 to left of column: 5 # of columns: 3

Original Columns **Moved Columns**



Moving Parts of Rows or Columns

When you move part of a row or column that forms the boundary of a named cell group, you must use the Move command and redefine the cell group name after the move (refer to Changing Cell Data Location, in section 3).

To move parts of rows or columns that do not form the boundary of a named cell group, you use the Insert, Copy, and Delete commands in sequence:

1. Insert blank cells at the destination location.
2. Copy the source cell content to destination cells.
3. Delete source cells.

DELETING CELLS

The Delete command lets you delete a row or column, or part of a row or column on the active worksheet.

NOTE

The system automatically adjusts any cell references and formulas affected by deletions (refer to Changing Cell Data Location, in section 3, for further information on how deleting cells affects the worksheet).

The system also adjusts the placement of the remaining cells on the worksheet. Cells below those you delete move up, and the system adds new blank cells at the bottom of the worksheet. Cells to the right of cells you delete move left, and the system adds new columns of blank cells at the right edge of the worksheet.

The Delete command consists of two subcommands:

- Delete Row — deletes a row or part of a row
- Delete Column — deletes a column or part of a column

A subcommand description and procedure follow under each subcommand heading.

Activating Delete Subcommands

To delete a row or column or part of a row or column of cells, use the following procedure:

1. Activate the Delete command by typing the letter **D**, or press **TAB** until the highlight is on **Delete**; then press **RETURN**.

   The Delete command menu displays with the highlight on the **Row** subcommand:

   DELETE: Row Column

   Select option or type command letter

2. Select a subcommand by choosing one of the following options:

   - For Row, type **R** or press **RETURN**.
   - For Column, type **C**, or press **TAB** to move the highlight to Column and press **RETURN**.

Deleting Rows

The Delete Row subcommand deletes a row or part of a row. To delete with the Delete Row subcommand, use the following procedure:

1. Activate Delete Row. The Delete Row form appears with information similar to the following example, with the highlight in the **# of rows:** field.

```
DELETE Row # of rows: 1      starting at: 6
           between columns: 1        and: 63

Enter a number
```

2. Enter the number of rows you want to delete and press **TAB.** The highlight moves to the **starting at:** field.

3. Enter the row number where the delete starts and press **TAB.** The highlight moves to the **between columns:** field.

4. Enter the column number where the row deletion starts and press **TAB.** The highlight moves to the **and:** field.

5. Enter the column number where the row deletion ends.

6. Press **RETURN** or **GO** to execute the Delete Row subcommand. The system deletes the cells you specify, and adds new blank cells to the bottom of the worksheet as necessary. The main command menu displays in place of the Delete Row form.

Delete Row Subcommand Example

The following Delete Row form shows the proper entries to delete row 12 from columns 2 through 4:

```
DELETE Row # of rows: 1      starting at: 12
           between columns: 2        and: 4
```

Deleting Columns

The Delete Column subcommand deletes a column or part of a column. To delete with the Delete Column subcommand, use the following procedure:

1. Activate Delete Column. The Delete Column form appears with information similar to the following example, with the highlight in the **# of columns:** field.

```
DELETE Column # of columns: 1      starting at: 2
           between rows: 6        and: 255

Enter a number
```

2. Enter the number of columns you want to delete and press **TAB**. The highlight moves to the **starting at:** field.

3. Enter the column number where the delete starts and press **TAB**. The highlight moves to the **between rows:** field.

4. Enter the row number where the column deletion starts and press **TAB**. The highlight moves to the **and:** field.

5. Enter the row number where the column deletion ends.

6. Press **RETURN** or **GO** to execute the Delete Column subcommand. The system deletes the cells you specify, and adds new blank cells to the right of the worksheet as necessary. The main command menu displays in place of the Delete Column form.

Delete Column Subcommand Example

The following Delete Column form shows the proper entries to delete columns 1 and 2 from rows 6 through 7:

```
DELETE Column # of columns: 2      starting at: 1
           between rows: 6        and: 7
```

INSERTING CELLS

The Insert command lets you insert new cells into a worksheet.

NOTE

When you insert new cells, the system automatically adjusts all references and formulas affected by the insertion (refer to Changing Cell Data Location, in section 3, for further information on how inserting cells affects the worksheet).

Insert consists of two subcommands:

- Row inserts rows
- Column inserts columns

Activating Insert Subcommands

To insert a row or column or part of a row or column of cells, use the following procedure:

1. Activate the Insert command by typing the letter **I**, or press **TAB** until the highlight is on **Insert**; then press **RETURN**.

   The Insert command menu displays with the highlight on the **Row** subcommand.

   INSERT: Row Column

   Select option or type command letter

2. Select a subcommand by choosing one of the following options:

   - For Row, press R or press **RETURN.**
   - For Column, press **C,** or press **TAB** to move the highlight to **Column** and press **RETURN.**

A subcommand description and procedure follow under each subcommand heading.

Inserting Rows

To insert a row of new cells, use the following procedure:

1. Activate Insert Row. The Insert Row form appears with information similar to the following example, with the highlight in the **# of rows:** field.

```
INSERT Row # of rows: 1      before row: 6
          between columns: 1        and: 63

Enter a number
```

2. Enter the number of rows you want to insert in the **# of rows:** field and press **TAB.** The highlight moves to the **before row:** field.

3. Enter the number of the row where the insert starts and press **TAB.** The highlight moves to the **between columns:** field.

4. Enter the number of the column where the row insertion starts and press **TAB.** The highlight moves to the **and:** field.

5. Enter the number of the column where the row insertion ends.

6. Press **RETURN** or **GO** to execute the Insert Row subcommand. The system inserts the cells you specify. Cells below the inserted cells move down to accommodate the added cells. The main command menu displays in place of the Insert form.

Exercise 15 in appendix B trains you in inserting rows on a worksheet.

Insert Row Subcommand Example

The following Insert Row form shows the proper entries to insert 12 rows before row 6 and between columns 2 and 4:

```
INSERT Row # of rows: 12          before row: 6
           between columns: 2     and: 4
```

Inserting Columns

To insert a column of new cells, use the following procedure:

1. Activate Insert Column. The Insert Column form appears with information similar to the following example, with the highlight in the **# of columns:** field.

```
INSERT Column # of columns: 1     before column: 2
             between rows: 6      and: 255

Enter a number
```

2. Enter the number of columns you want to insert in the **# of columns:** field and press **TAB.** The highlight moves to the **before column:** field.

3. Enter the number of the column where the insert starts and press **TAB.** The highlight moves to the **between rows:** field.

4. Enter the number of the row where the column insertion starts and press **TAB.** The highlight moves to the **and:** field.

5. Enter the number of the row where the column insertion ends.

6. Press **RETURN** or **GO** to execute the Insert Column subcommand. The system inserts the cells you specify. Cells to the right of the inserted cells move right to accommodate the added cells. The main command menu displays in place of the Insert form.

Insert Column Subcommand Example

The following Insert Column form shows the proper entries to insert 2 columns before column 5 and between rows 3 and 8:

INSERT Column # of columns: 2 before column: 5
between rows: 3 and: 8

NOTE

The system does not implement an Insert command that would push existing data off the worksheet page. For example, the system would respond with the message **Invalid parameter** to the following insert requests:

- insert one column when there is data in column 63 (63 is the maximum number of worksheet columns)
- insert fourteen columns to the left of column 50 when there is data in column 50

SECTION 9

COPYING DATA FROM ONE WORKSHEET TO ANOTHER

This section describes how you can:

- copy information from one worksheet to another on a one-time basis
- form links between worksheets through which the system automatically updates specific data from one worksheet to another.

THE XTERNAL COMMAND

You use the Xternal command to interchange information between worksheets. You can make a one-time access of information, or you can link worksheets in on-going supporting and dependent relationships to one another.

NOTE

You must save and load a worksheet in the normal mode to use the Xternal command (refer to File Transfer Modes, in section 5).

The Xternal command consists of three subcommands:

- Xternal Copy — copies data from an inactive worksheet to the active worksheet

  establishes (or eliminates) an external link (permanent tie) between worksheets that automatically copies data from a source worksheet to the active worksheet every time you load the active worksheet with the Transfer Load subcommand

- Xternal List — displays lists of supporting and dependent worksheets linked to the active worksheet
- Xternal Use — assigns a real or logical substitute name for a specified worksheet

Activating Xternal Subcommands

To access the Xternal subcommands, use the following procedure:

1. Activate the Xternal command by typing the letter **X**, or press **TAB** until the highlight is on **Xternal**; then press **RETURN**.

   The following Xternal command menu appears with the highlight on the **Copy** subcommand.

   EXTERNAL: Copy List Use

   Select option or type command letter

2. Select a subcommand by choosing one of the following options:

   - For Xternal Copy, press **C** or press **RETURN**.
   - For Xternal List, press **L**, or press **TAB** to move the highlight to List and press **RETURN**.
   - For Xternal Use, press **U**, or press **TAB** twice to move the highlight to Use and press **RETURN**.

A subcommand description and procedure follow under each subcommand heading.

Copying with the Xternal Copy Subcommand

The Xternal Copy subcommand lets you copy data from inactive (external) worksheets to an active worksheet. You can copy one-time values only, or you can establish an external link between the worksheets that updates the copied data on the dependent worksheet every time you load it with the Transfer Load subcommand.

The worksheet from which you copy is a source or supporting worksheet for the active worksheet. The active worksheet receiving the copy is the dependent worksheet. The same worksheet can play supporting and dependent roles in different external links.

The destination cells on the active worksheet must be blank; if you attempt to copy to cells that are not blank, the system displays the message **Cannot copy into nonblank cell,** and the main command menu replaces the Xternal Copy form.

External Links between Worksheets

The Xternal Copy subcommand copies cell values only, not formulas. For example, if you copy a cell containing the formula 100*rate (* means multiplied by) from an external worksheet, the destination cell receives the constant value of 20 (assuming rate = .20). However, a value does not show its dependence on changes in cells on the external sheet.

Therefore, you can make an external link with the source worksheet to provide automatic copying of the updated value of source cell(s) to the destination cell(s) on the dependent worksheet. The system copies updated values through the link every time you load the the dependent worksheet with the Transfer Load subcommand.

You cannot copy the same cells to different parts of the same worksheet. External linking provides:

- protection for destination cells just as if they were locked
- a status line reference in the form [sheetname sourcename] to indicate an active cell's dependence on a link.

Supporting worksheets that share external links must be stored in the normal mode for an update of the destination cells to take place. However, the system updates the dependent worksheet whether you load it in the normal or symbolic modes.

When you rename linked worksheet files, you must use the Transfer Rename subcommand so that Multiplan can adjust link references; you must not rename a linked file, for example, with the Executive rename command or with the OW25 or WRITEone word processor rename commands.

Filling in Xternal Copy Subcommand Fields

The following Xternal Copy form shows the Xternal Copy subcommand fields:

EXTERNAL COPY from sheet: **name:**

to: R6C2 **linked:(Yes)No**

Enter filename

The Xternal Copy form fields require the following input:

- **from sheet:** the filename of the source worksheet (the proposed response is the most recently created supporting sheet)
- **name:** the name of the cell area on the source worksheet that you want to copy, or an absolute reference to those cells; for example, R2C1:12
- **to:** a single-cell or group-cell reference to the destination on the active worksheet (the proposed response is the active cell)
- **linked:** a Yes or No response to establishing an external link to the source worksheet

Procedure

To copy from an inactive worksheet with the Xternal Copy subcommand, use the following procedure:

1. Activate Xternal Copy. The Xternal Copy form appears with information similar to the following example, with the highlight in the **from sheet:** field (parentheses indicate selection).

EXTERNAL COPY from sheet: **name:**

to: R6C2 **linked:(Yes)No**

Enter filename

2. Enter the filename of the worksheet you want to copy from and press **TAB.** The highlight moves to the **name:** field, and the message **Enter name on external sheet** appears.

3. Enter the name of the cell area on the external worksheet that you want to copy, or enter the absolute reference to those cells, and press **TAB.** The highlight moves to the **to:** field, and the message **Enter reference to cell or group of cells** appears.

4. Enter a reference for the blank destination cell(s).

   If you specify a single cell, the system copies the source cell group starting at that cell.

   If you specify a group of cells, the shape of the group must correspond exactly to the shape of the source cell group.

   Press **TAB.** The highlight moves to the **linked:** field, and the message **Select option** displays.

5. Press **Y**, **N**, or the **Spacebar**, if necessary, to move the highlight to the option you want.

   If the source cells are subject to change, you specify **Yes** to establish an external link between the active worksheet destination cells and the source worksheet cells you copy.

   If the source cells are not subject to change, you specify **No** to proceed with the copy operation without establishing an on-going external link with the source worksheet.

6. Press **RETURN** or **GO** to execute the Xternal Copy subcommand. The system copies the contents and format of the source cells to the destination cell(s) you specify, and displays the main command menu in place of the Xternal Copy form.

   If you specify **Yes** in the **linked:** field, the system establishes an external link between the active and source worksheets, and protects the destination cells from change as if they were locked.

When you link a block of cells with one name, the name appears in the cell you specify, and the sheetname and sourcename appear in square brackets on the status line whenever you highlight any cell of the block with the cell pointer.

When you change the shape of source cell references, you must also change the shape (size) of the destination cells to which they are linked so that Multiplan's automatic updating of dependent cells takes place. Each time the system copies values between linked cells, it checks the definition of the name for the source cells.

Reviewing, Redefining, and Removing External Links

You can review, redefine, or remove external links between worksheets by using the Xternal Copy subcommand procedure with the following specifications:

- review — With the highlight in the **from sheet:** field to view source filenames, or in the **name:** field to view source names, press the **Up Arrow, Down, Arrow, Right Arrow,** or **Left Arrow** keys to display existing links for the active worksheet (refer to Listing External Worksheet Links, in this section).

  The system automatically inserts highlighted names in the proper fields, as well as the destination cell reference in the **to:** field.

  If you enter a filename/name combination that does not exist, the message **Name not defined: (filename name)** appears, and the main command menu replaces the Xternal Copy form.

- redefine — Fill in the fields as you did for the first external copy, except enter a new destination cell reference in the **to:** field (you can link specific source cells to a worksheet only once).

  The system copies the source cells to the new destination you specify, unlocks and blanks the original destination cells, and establishes the external link with the new destination cells.

- remove — Specify the source worksheet in the **from sheet:** field, the source name in the **name:** field, and leave the **to:** field blank (the **linked:** field should show a **Yes** response since the worksheets are linked).

The system removes the external link between the worksheets and unlocks and blanks the destination cells. The filenames remain on the external list until you file the worksheet to a disk file with either the Transfer Save, Print Exchange, or Print File subcommands (refer to sections 5 and 6).

Naming the Destination Cells of External Links

You can name destination cells on the active worksheet and use this name in formulas on the active sheet when you refer to the copied data. You name the cells in the form **sheetname.sourcename.**

To name the destination cells on the active worksheet, you activate the Name command immediately after the Xternal Copy command. The system proposes the relevant response, and you accept it by pressing **RETURN** to apply the name to the cells.

Xternal Copy Subcommand Example

The following Xternal Copy form shows the entries needed to copy the value of an area named Sales from a worksheet named Income to the area starting at cell R13C2 on the active worksheet, and to set a permanent link:

EXTERNAL COPY from sheet: Income name: Sales

to: R13C2 linked:(Yes)No

Assuming that the area names Sales is a 12-cell-wide section of a row, the destination for the copy is R13C2:13. To name these destination cells, the Name command proposes the following responses when you activate it:

NAME: define name: Income.Sales to refer to: R13C2:13

Listing External Worksheet Links

The Xternal List subcommand lets you view the filenames of worksheets supporting, and depending on, the active worksheet.

The List of External Links

When you link worksheets, the system records the name of the supporting worksheet on the dependent worksheet's list of links. It also sends a message called a receipt from the dependent to the supporting worksheet that records the dependent worksheet on the supporting worksheet's list of links.

The list of supporting worksheets is always correct, and it includes substitute names you specify with the Xternal Use subcommand.

The system can list a maximum of eight dependent worksheets. Therefore, the list of dependent worksheets can be incomplete if the system has been unable to record a receipt to the supporting worksheet. An incomplete list means only that the system has not recorded receipt of a link; the link still exists and copying takes place.

Displaying Link Lists

To display lists of worksheet links, use the following procedure:

1. Activate Xternal List. The Xternal List screen similar to the screen shown in figure 9-1, for an active worksheet named Department, displays in place of the worksheet.

2. Press any key to redisplay the worksheet.

When no external links exist, the following headings display:

No sheets support Department

No sheets depend on Department

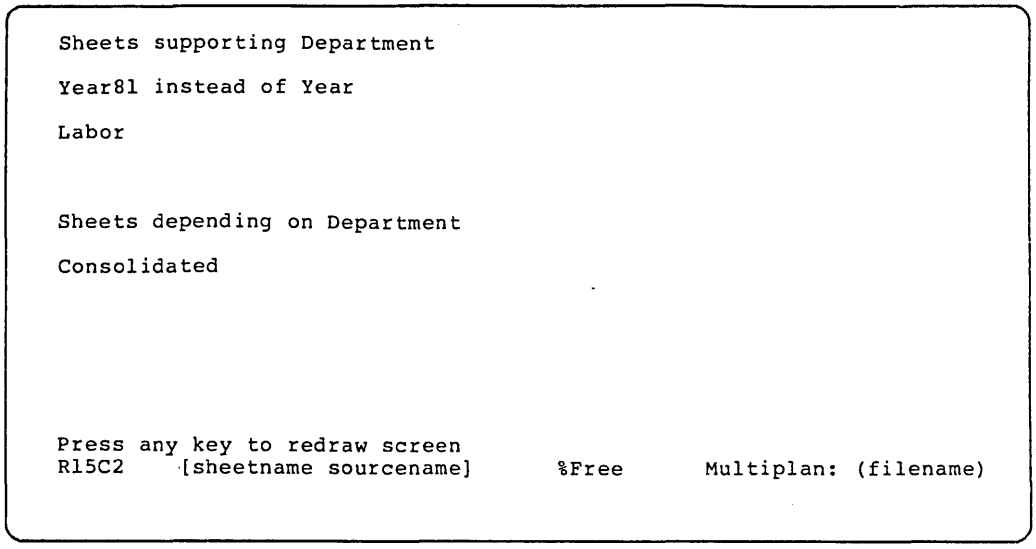


Figure 9-1. Sample Xternal List Screen

Diagramming External Links

Figure 9-2 is a diagram showing the dependency of several worksheets on each other (arrows point from supporting to dependent worksheets). You begin a diagram with supporting worksheets that do not depend on any other worksheets (in figure 9-2, these are worksheets A and D).

Because changing data on a supporting sheet has no immediate effect on its dependent sheets, a diagram of external links helps you to see which dependent worksheets you need to update when you change information on the supporting worksheets. You update the dependent worksheets by loading and saving them.

Using the diagram in figure 9-2 as an example, when you change values on worksheets A and D, you load and save, in sequence, worksheets B, C, E, and F in order to copy the changes to those dependent worksheets.

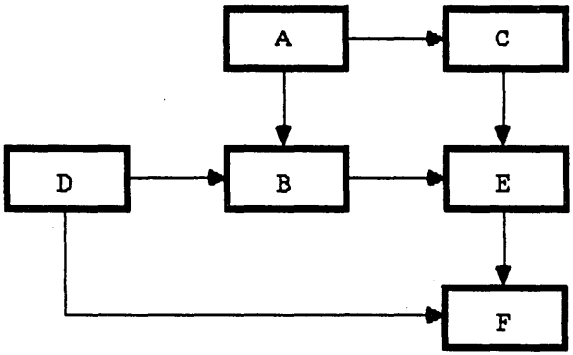


Figure 9-2. A Diagram of External Worksheet Links

Transferring Established Worksheet Links to Other Worksheets

The Xternal Use subcommand lets you make use of established external links between worksheets by doing either of the following:

- applying the supporting link of one worksheet to another worksheet by temporarily substituting the second worksheet's name in the link. Making this substitution lets you see the effects of the link on the active worksheet without having to remove and redefine the original links.
- applying a logical name to a worksheet in a linked worksheet pair. You can then refer to this name in the Xternal Use subcommand without having to remember which file is the basic pattern for substitutions you intend to make.

To substitute an actual filename or a logical filename for a worksheet in a linked worksheet pair, use the following procedure:

1. Activate Xternal Use. The following Xternal Use form appears with the highlight in the **filename:** field.

EXTERNAL USE filename: **instead of:**

Enter filename

2. Enter the filename for the substitute worksheet in the linked pair, or enter the logical substitute name, and press **TAB.** The highlight moves to the **instead of:** field, and the message **Enter sheet name** appears.

3. Enter the worksheet filename for which you want to substitute the name entered in step 2.

4. Press **RETURN** or **GO** to execute the subcommand. The system makes the substitution you specify, copies the source cells to the active worksheet, and replaces the Xternal Use form with the main command menu.

   To return the external link to the original worksheet, enter the original worksheet filename in both the **filename:** and **instead of:** fields.

Xternal Use Subcommand Examples

Example 1 Assuming that the active worksheet has links to a supporting file **BUDGET82,** the following Xternal Use form shows the entries needed to substitute **BUDGET83** as the supporting worksheet to view the effects of 1983 data on the active worksheet:

EXTERNAL USE filename: BUDGET83 **instead of: BUDGET82**

Example 2 As an alternative to example 1, you can assign a logical name, **BUDGET**, to the links between the supporting file **BUDGET82** and the active worksheet by making the following entries in the Xternal Use form:

EXTERNAL USE filename: BUDGET82 instead of: BUDGET

The name, **BUDGET**, is not a file but a logical name defining links; you can use it to set up links in the Xternal Copy subcommand, and as the response in the **instead of:** field in the Xternal Use subcommand for future substitutions. For example, when you want to view the results of your budget for 1983, you make the following entries:

EXTERNAL USE filename: BUDGET83 instead of: BUDGET

SECTION 10

ADVANCED MULTIPLAN FUNCTIONS

This section discusses Multiplan and Enhanced Multiplan advanced mathematical functions and the options of automatic recalculation and muting of the system's audio signal. You access these functions and options with the Options command.

THE OPTIONS COMMAND

The Options command lets you specify the following functions in Multiplan and Enhanced Multiplan:

- recalc — automatic recalculation
- mute — silencer for automatic error alarm

With Enhanced Multiplan, you can also access the iteration function and its associated completion test with the Options command:

- iteration — worksheet formulas involving circular dependencies
- completion test — cell reference that contains a convergence test specifying the end of the iteration process

The following paragraphs describe the procedure for using the Options command, and then discuss each option in detail.

Options Command Procedures

To access functions of the Options command in Multiplan and Enhanced Multiplan, use the following procedure:

1. Activate the Options command by typing the letter **O**, or press **TAB** until the highlight is on **Options;** then press **RETURN.**

With Multiplan, the Options form appears with information similar to the following example, with the highlight in the **recalc:** field (parentheses indicate selection).

OPTIONS recalc: (Yes) No mute: Yes(No)

Select option

With Enhanced Multiplan, the Options form appears with information similar to the following example, with the highlight in the **recalc:** field (parentheses indicate selection).

OPTIONS recalc: (Yes) No mute: Yes(No)

iteration: Yes (No) completion test at:

Select option

2. To view the option settings only (proposed responses in the Option form indicate current option settings), go to step 7.

3. To specify automatic recalculation, press **Y**, or press the **Spacebar** to move the highlight to the **Yes** response, if necessary, and press **TAB**.

   To specify that the system not recalculate automatically, press **N**, or press the **Spacebar** to move the highlight to the **No** response, if necessary; then press **TAB**.

   If you want to step through the iteration process in Enhanced Multiplan, you must respond **No** in this field.

   The highlight moves to the **mute:** field.

4. To specify that the automatic error alarm be silent, press **Y**, or press the **Spacebar** to move the highlight to the **Yes** response, if necessary; then press **TAB**.

   To specify that the automatic error alarm sound, press **N**, or press the **Spacebar** to move the highlight to the **NO** response, if necessary; then press **TAB**.

With Multiplan, go to step 7.

With Enhanced Multiplan, the highlight moves to the **iteration:** field.

5. To specify the iteration function, press **Y**, or press the **Spacebar** to move the highlight to the **Yes** response, if necessary; then press **TAB**.

   To specify that you do not want the iteration function to be operative, press **N**, or press the **Spacebar** to move the highlight to the **No** response, if necessary, and press **TAB**.

   The highlight moves to the **completion test at:** field, and the message **Enter reference to cell or group of cells** appears.

   If you respond **Yes** in the **iteration:** field and you want to monitor the iteration, follow the procedures under Stepping Through an Iteration, in this section.

6. Enter the cell reference for the completion test associated with the iteration option.

   If you respond **Yes** in the **iteration:** field and leave the **completion test at:** field blank, the system applies the formula **DELTA()<0.001** as the convergence test for the iteration process (refer to the DELTA() function, in section 11).

7. Press **RETURN** or **GO** to execute the Options command.

   With Multiplan and Enhanced Multiplan, the system sets the recalculation and mute options according to your specifications.

   With Enhanced Multiplan, if you have specified a **Yes** response in the **iteration:** field, the iteration process begins.

   If you entered a cell reference with a formula that can be TRUE or FALSE in the **completion test at:** field, the system stops the iteration process when the test value is TRUE. When the value is FALSE, the system continues iteration.

During iteration, the system ignores any key you press except the **CANCEL** key; it checks **CANCEL** at the beginning of each iteration.

8. To stop the iteration process, press the **CANCEL** key. The system completes the iteration in process when you press **CANCEL**, checks the completion test, and stops the iteration.

   If the completion test result is **FALSE** when you cancel an iteration, the system displays the message **Circular references unresolved.**

   The main command menu replaces the Options form.

Stepping through an Iteration

Stepping through an iteration model, one iteration at a time, permits you to:

- monitor an iterative process
- debug and/or illustrate an iterative solution to a complex problem

To step through an iteration, follow the procedure under Options Command Procedures, in this section, through step 5, specifying **No** in the **recalc:** field and **Yes** in the **iteration:** field; then execute the following steps:

1. Enter a cell reference with a TRUE function in the **completion test at:** field so that the system will stop after each iteration.

2. Press the **RECALC** (**f3**) key each time you want to repeat the iteration.

3. Repeat step 2 until you no longer want to monitor the iteration.

4. To cancel the iteration, press **CANCEL**.

NOTE

ITERCNT() returns the error value **#N/A** when you single-step through a model. Refer to Providing for Initial Values, in this section, for procedures on setting initial values when single-stepping.

The Automatic Recalculation Option

The recalculation option in the Options command lets you control whether or not the system automatically recalculates all worksheet values associated with a cell you change. Automatic recalculation, (a **Yes** response in the **recalc:** field), is the default.

When you respond **No** in the **recalc:** option field, the system recalculates values of cells affected by changed cells when you:

- press the **RECALC** key (**f3**)
- execute the Options command with a **Yes** response in the **recalc:** field
- execute the Transfer Save subcommand on the worksheet

When you want to make many cell entries, your operation proceeds more efficiently if you respond **No** in the **recalc:** field; otherwise, the system delays your subsequent entries by recalculating after each cell entry.

You must respond **No** in the **recalc:** field when you want to monitor an iteration process.

The length of time necessary for the system to perform a recalculation depends on the following factors:

- how many worksheet cells are in use
- how many cells the recalculation involves
- how complex the formulas associated with the recalculation are

The Mute Option

The Mute option controls the Multiplan audio signal that sounds when you make an error in Multiplan operations (the default is **No**).

When you respond **Yes** in the **mute** field, the system mutes the audio signal. If you make an error, you have only visual feedback to guide you.

When you respond **No** in the **mute** field, the system alerts you to errors in the Multiplan operation by sounding an audio signal when they occur.

Enhanced Multiplan Iteration Option

The following paragraphs describe the iteration function of Enhanced Multiplan and its associated completion test.

Defining Iteration

To iterate means to repeat a calculation using the results of the previous calculation instead of an unknown quantity. With the iteration option, you use sets of references that involve circular dependencies; the default for this option is **No** (iteration is not in effect).

The iteration option lets you create a checks-and-balances type of worksheet using IF tests to ensure that entries and values fit specified parameters (for example, $\geq$ 0 or cash > investments).

You can apply iteration to problems such as simultaneous equations, internal rates of return, and roots of equations (refer to Solving Extended Problems with the Iteration Option, in this section).

NOTE

Iteration lags behind the actual iteration pass number by one. For example, if you stop the model after three passes, iteration count returns a value of two.

Defining the Completion Test

The completion test is related to the iteration option. It is a formula in a referenced cell that returns a logical value (TRUE or FALSE) as a result of the iteration process.

To use the completion test, you enter a reference to the cell that contains a formula in the **completion test at:** field. After each iteration, the system tests the value of the cell, with the following results:

- If the value is TRUE, the system stops iteration.
- If the value is FALSE, the system continues iteration.

If you respond **Yes** in the **iteration:** field and leave the **completion test at:** field blank, the system applies the formula **DELTA()<0.001** as the convergence test for the iteration process (refer to the DELTA() function, in section 11).

NOTE

When you use the default completion test, having the ITERCNT function alone in a cell anywhere on your worksheet prevents convergence.

Saving Iteration and Completion Test Field References

Using the **completion test at:** field with the iteration option lets you store and display a complex test as a part of the worksheet. When you save a worksheet on which you have used iteration, the system also saves the Options form and your responses in the **iteration:** and **completion test at:** fields; they are available to you when you reload the worksheet.

For information about other modes of saving the worksheet, refer to Storing and Recalling Worksheet Data, in section 5.

Automatic Iteration

Enhanced Multiplan enters an iteration phase at the end of any worksheet recalculation if the following conditions exist:

- the worksheet contains at least one circular chain of references
- you have specified the **Yes** response in the **iteration:** field
- the **completion test:** is not TRUE at the end of the first recalculation.

Options Command Example

The following Options form shows the proper entries to recalculate a worksheet using iteration and to place a completion or convergence test in a cell named **Done** (R12C7).

OPTIONS recalc:(Yes)No mute: Yes(No)

iteration:(Yes)No completion test at: Done

Refer to Solving Extended Problems with the Iteration Option, in this section, for actual worksheet models that include iteration.

Solving a Sample Problem with the Iteration Option

Consider the example of a company that pays a bonus equal to 10 percent of its profits. The company calculates the bonus, and then subtracts it from the profits to yield the net profit.

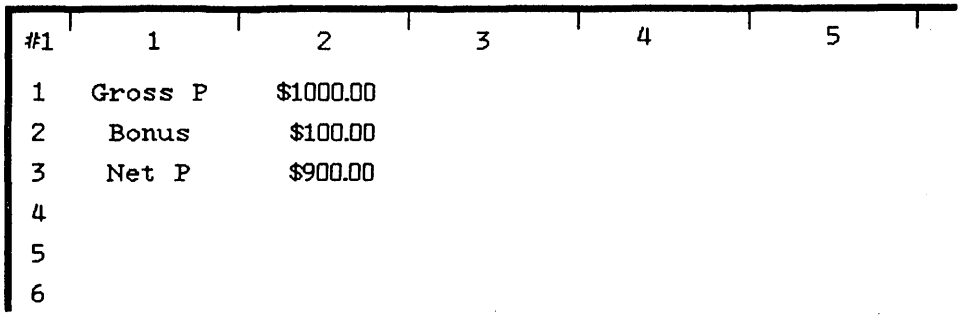
Figure 10-1 shows a worksheet for calculating the company bonus. The following cells shown in the figure have names:

Cells	Names
R1C2	Gross_P
R2C2	Bonus
R3C2	Net_P

The following cells shown in Figure 10-1 contain formulas:

Cells	Formula
R2C2	Gross_P*10%
R3C2	Gross_P-Bonus

For procedures for constructing the worksheet illustrated in figure 10-1, refer to section 4.



#1	1	2	3	4	5
1	Gross P	$1000.00			
2	Bonus	$100.00			
3	Net P	$900.00			
4					
5					
6					

Figure 10-1. Sample Worksheet for Iteration Problem

The company has entered into a contract that calls for the bonus to be calculated on net instead of gross profit. If you try to make the necessary change in calculating the bonus by inserting the formula **Net_P*10%** in R2C2, the system displays the error message **Circular references unresolved.**

This error message tells you that the formula **Net_P*10%** in R2C2 has set up a circular reference (the bonus depends on the net profit, which depends on the bonus subtracted from gross profit).

You can solve this problem with the iteration process. Use the following procedure:

1. Activate the Options command.
2. Specify **Yes** in the **recalc:** field.
3. Press **TAB** twice to move the highlight to the **iteration:** field.
4. Press **Y**, or press the **Spacebar** to move the highlight to **Yes.**
5. Press **RETURN.**

The system calculates with the iteration option until the numbers in R2C2 and R3C2 become $90.91 and $909.09, respectively. If you change the gross profit to $1100, the system recalculates the bonus to $100 and the net profit to $1000.

Since iteration means to repeat a calculation using the results of the previous calculation instead of an unknown quantity, the system calculates the following initial values:

Bonus	$90.00
Net P	$900.00

The calculation process follows the following pattern:

```
      90

     900    900*.1 =  90

       1000 - 90 = 910   910*.1 =  91

            1000 - 91 = 909    909*.1 =  90.9

                 1000 - 90.9 = 909.1
```

. . . and so on.

The Process of Convergence

The process iteration uses to calculate more precise values is called convergence. Convergence depends on:

- the mathematical model (not all models converge and some converge partially only)
- initial values

Unless you specify otherwise, however, the system stops iterating when the maximum change in all cell values on the worksheet is less than 0.001. This limit ensures that the results are precise to the penny or percent without jeopardizing the chances for normal termination.

If a model fails to converge within the limit, you can press **CANCEL** to interrupt the recalculation at the end of the iteration that is in progress.

The Order of Calculating Cell Values during Iteration

Since the current value of cells referred to in the formulas affects the iteration process, the system orders its evaluation of each cell value. In some cases, the order of evaluation determines whether the solution converges or diverges; if your original order of evaluation does not converge, you can change the order to obtain convergence.

You can avoid divergence by:

- placing all circular references in a single column
- making sure that the ordering is correct for the iterative model you use

The system orders its evaluation of cells one column at a time, top to bottom, starting with the first cell of the first column.

Providing for Initial Values

You can enter a conditional formula to provide an initial value for formulas on the worksheet (refer to the ITERCNT() function, in section 11).

For example, because ITERCNT() returns the error value **#N/A** the first time it is called, a simple IF statement such as

```
IF(ISNA(ITERCNT()),initial_value,formula)
```

provides initial value for the first calculation and for the formula in subsequent iterations.

When single-stepping through a model, however, you must adjust this formula. ITERCNT() and DELTA() will always return an error value of **#N/A.** You must set initial values without using the ITERCNT() or DELTA() functions. For example, you can use a formula such as the following:

IF(count=1,initial_value,formula)

where **count** is the name of a cell containing the expression **[RC+1].**

After you complete single-stepping, you must reset the cells containing expressions for the initial values.

Obtaining Local Values for DELTA()

To obtain a DELTA that applies only to the differences of a part of the worksheet, use the following procedure:

1. Bracket the cells with cells that contain the DELTA() function.

   Each DELTA() resets the DELTA value to 0.

2. Enter the first DELTA() function in the cell immediately above the block of cells for which you want a local DELTA value. This placement is in line with the system's order of cell evaluation.

   For example, you enter a formula such as

   IF(TRUE(),"",DELTA())

   which clears the maximum DELTA value (it does not display).

3. Enter the test DELTA() formula in the cell immediately below the block of cells to return a local DELTA value.

Refer to the DELTA() function, in section 11, for further information.

ITERCNT() and DELTA() Interaction

You can create divergence if you enter the following functions together in a model:

- the DELTA() function with a specific limit
- the ITERCNT() function as a formula by itself

When you enter these together, the DELTA() function reads the cell that contains the ITERCNT() function. Because ITERCNT() changes by 1 during each iteration, DELTA() always returns at least 1 unless you do either of the following:

- set up the worksheet model to return local values of DELTA()
- eliminate the ITERCNT() formula

The formula **ITERCNT()>20** returns TRUE or FALSE after each iteration and therefore does not affect convergence.

Refer to Enhanced Multiplan Iteration Function, in this section, for further information. For details on the mathematical theories of iterative methods, consult any handbook on numerical analysis.

Two Models of Iterative Worksheets

The following paragraphs contain two models of iterative worksheets:

- Financial (an income statement and balance sheet)
- Binary Search (a worksheet for finding roots of equations using the binary search technique)

Financial Model

The financial model uses a common business application of iteration, an integrated Income Statement, Statement of Retained Earnings, and Balance Sheet worksheet (refer to figures 10-2 and 10-3).

This model contains examples of values depending on the result of preceding calculations in a circular pattern. The result of a balance sheet calculation should be:

total assets = total liabilities
+ retained earnings

To achieve this balance, you vary both investments and borrowings. This process is iterative because such variation alters the interest on both sides, affects the profit, and therefore changes the retained earnings. This circular calculation throws the worksheet out of balance.

1		2	3	4	5	6
1	sales	$100.00	$300.00	$800.00		
2	costs	$50.00	$420.00	$620.00		
3	profit	$50.00	($120.00)	$180.00		
4	int income		$3.89	$23.21		
5	int expense		$0.00	$0.00		
6	net profit	$50.00	($116.11)	$203.21	delta	0.000415
7	beg ret earns	$75.00	$125.00	$8.89	intercnt	13
8	end ret earns	$125.00	$8.89	$212.10		
9	cash	$10.00	$10.00	$10.00		
10	investments	$155.00	$38.89	$232.10	done	TRUE
11	total assets	$165.00	$48.89	$242.10	max i	50
12					max d	0.001
13	liabilities	$40.00	$40.00	$30.00		
14	borrowings	$0.00	$0.00	$0.00		
15	tot liab	$40.00	$40.00	$30.00		
16	tot liab + re	$165.00	$48.89	$242.10		
17	difference	$0.00	$0.00	$0.00		
18	net investments		$38.89	$232.10		

Figure 10-2. Worksheet for the Financial Model

	1	2
1	"sales	100
2	"costs"	0.5*R[-1]C
3	"profit"	R[-2]C-R[-1]C
4	"int income"	
5	"int expense"	
6	"net profit"	R[-3]C+R[-2]C-R[-1]C
7	"beg ret earns"	75
8	"end ret earns"	R[-2]C+R[-1]C
9	"cash"	10
10	"investments"	155
11	"total assets"	R[-2]C+R[-1]C
12		
13	"liabilities"	40
14	"borrowings"	0
15	"total liab"	R[-2]C+R[-1]C
16	"tot liab + re"	R[-1]C+R[-8]C
17	"difference"	R[-6]C-R[-1]C
18	"net investments"	

	3	4
1	300	800
2	300+(0.4*R[-1]C)	300+(0.4*R[-1]C)
3	R[-2]C-R[-1]C	R[-2]C-R[-1]C
4	0.1*R[+6]C	0.1*R[+6]C
5	0.1*R[+9]C	0.1*R[+9]C
6	R[-3]C+R[-2]C-R[-1]C	R[-3]C+R[-2]C-R[-1]C
7	R[+1]C[-1]	R[+1]C[-1]
8	R[-2]C+R[-1]C	R[-2]C+R[-1]C
9	10	10
10	MAX(0,R[+8]C)	MAX(0,R[+8]C)
11	R[-2]C+R[-1]C	R[-2]C+R[-1]C
12		
13	40	30
14	-MIN(0,R[+4]C)	-MIN(0,R[+4]C)
15	R[-2]C+R[-1]C	R[-2]C+R[-1]C
16	R[-1]C+R[-8]C	R[-1]C+R[-8]C
17	R[-6]C-R[-1]C	R[-6]C-R[-1]C
18	IF(ISNA(ITERCNT()), 0,RC-diff)	IF(ISNA(ITERCNT()), 0,RC-diff)

	5	6
1		
2		
3		
4		
5		
6	"delta"	DELTA()
7	"itercnt"	ITERCNT()
8		IF(TRUE(),"",DELTA())
9		
10	"done"	OR(R[-4]C<R[+2]C,R[-3]C>R[+1]C)
11	"max i"	50
12	"max d"	0.001
13		
14		
15		
16		
17		
18		

Figure 10-3. Formulas for Financial Model Worksheet

Investments and borrowings are both related to the value of net investments (refer to row 18 of figure 10-2). Either investments or borrowings are always equal to 0. If the value of net investments is positive, there is a surplus; if it is negative, there is a deficit.

The formula for investments, **MAX(0,R[+8]C)** (refer to row 10 of columns 3 and 4 in figure 10-3), returns the value of net investments only if net investments is positive; otherwise, it returns 0.

The formula for borrowings, **-MIN(0,R[+4]C)** (refer to row 14 of columns 3 and 4 in figure 10-3), returns the absolute value of net investments when net investments is negative. Since investments is a fixed amount, and there is no interest income (refer to column 2 of figure 10-3), no circular calculation requiring iteration exists.

The conditional formula, **IF(ISNA(ITERCNT()),0,RC-diff)**, (refer to row 18 of columns 3 and 4 in figure 10-3), provides an initial value for formulas on the worksheet. Because ITERCNT() returns **#N/A** the first time it is called, this conditional formula provides 0 for the first calculation, then **RC-diff** in subsequent iterations. **Diff** is a name reference for **R17C3:4**.

The formula **IF(TRUE(),"",DELTA())** in R8C6 (refer to figure 10-3) keeps the ITERCNT() function in R7C6 from interfering with the DELTA() function in R6C6.

The completion test is in R10C6 (refer to figure 10-3). It checks both the DELTA value and the ITERCNT value. When one of the two returns TRUE (that is, either a maximum DELTA of 0.001 or an ITERCNT of 50), iteration stops.

Columns 3 and 4 show two new time periods (refer to figure 10-2). Column 3 shows a large increase in expenses and an increase in sales that is not large enough to offset it. Therefore, the profit line (R3) shows a loss. In column 4, however, sales are large enough to offset the increased expenses, and the profit line (R3) shows a profit.

The delayed effect of increased expenses on sales is typical of a business balance sheet. You can apply these formulas when you want to analyze how much of a sales increase you need to offset a particular expense.

Binary Search Model

The binary search model of iteration searches for the roots of arbitrary equations using the binary search technique.

For this model, assume a polynomial **x^3+4*x*x+5**, and assume that you want to solve for a value of **x** that yields a result of 30. The model shown in figure 10-4 solves for one root of the polynomial using the binary search technique.

Table 10-1 defines names for this model.

Table 10-1. Names for the Binary Search Model

Name	Definition
c_low	R2C2 (current low value)
c_high	R2C3 (current high value)
x	R2C4
low	R2C5 (low value you enter)
high	R2C6 (high value you enter)
fx	R2C1
res	R6C1 (desired result you enter)

The calculation proceeds as follows:

1. The system evaluates the IF() function in cell R2C2 (refer to figure 10-4). During the first iteration, the ITERCNT() function returns the **#N/A** error value, making the ISNA() function return TRUE. Therefore, IF() selects the value of low, which in this model is 0.

2. For all other iterations, ITERCNT() returns an integer, making ISNA() return FALSE. Therefore, IF selects the else value, which is another conditional formula.

3. The second IF() formula in R2C2 compares the result of using the value of **x** (calculated in R2C4) in the polynomial **f(x)** in R2C1 with the desired result, 30, in R6C1. If the value of **f(x)** is more than 30, IF() selects the current value of the cell (for the second iteration, 0). If the value of **f(x)** is less than 30, IF() selects the value of **x** calculated in R2C4.

	1	2	3
1	"f(x)"	"c_low"	"c_high"
2	x^3+4*x*x+5	IF(ISNA (ITERCNT()), low,IF(fx>res, RC,x))	IF(ISNA (ITERCNT()), high,IF(fx<res, RC,x))
3			
4			
5	"result"		
6	30		

	4	5	6
1	"x"	"low"	"high"
2	(c_low+c_high)/2	0	100

Figure 10-4. Solution for One Root of a Polynomial Using the Binary Search Technique

4. The same steps apply to the conditional formula in R2C3, except that this formula selects the high value during the first iteration. During subsequent iterations, IF() selects the current value of the cell if **f(x)** is less than 30, or the value of **x** in R2C4 if **f(x)** is more than 30.

Once the system begins iteration, the calculations proceed rapidly, and it is difficult to see the numbers clearly before they change.

Figure 10-5 lists values for each cell, describing part of the iteration process.

	1	2	3	4	5	6
1		0		50	0	100
2		0	100	25	0	100
3		0	50	12.5	0	100
4		0	25	6.25	0	100
5		0	12.5	3.125	0	100
6		0	6.25	1.5625	0	100
7		0	3.125	2.34375	0	100
8		1.5625	3.125			
.						
.						
.						
16	29.999762	2.0352602	2.035284	2.0352721	0	100

Figure 10-5. Iterative Process during Binary Search Method

In the example shown in figure 10-5, the process stops at the sixteenth iteration because the maximum change in any value is less than 0.001, the internal DELTA value in Enhanced Multiplan. The root the system calculated is 2.0352721. You must now find the changing values of **f(x)** in column 1.

For greater precision, you can:

1. Enter a DELTA() formula in a cell that sets a limit smaller than 0.001, or an ITERCNT() formula that sets a limit higher than 16.

2. Enter an absolute reference to that cell or the name of the cell in the **completion test at:** field of the Options command.

SECTION 11

FUNCTIONS

This section presents general information about Multiplan functions, describes each function, and gives examples of how to use them. Function descriptions are arranged alphabetically by function name.

OVERVIEW

A function is an expression that converts one or more values into another value. For example, the function SUM adds numbers and displays the total in the cell containing the function statement.

Functions are reserved words in Multiplan. The system recognizes them only for the mathematical operation they perform, and you cannot use them for other purposes.

For clarity, this section presents functions in uppercase letters, and presents variables that you enter in lowercase letters. In practice, you can use upper- or lowercase letters for function entries since Multiplan does not distinguish cases.

FORMULATING A FUNCTION STATEMENT

You formulate a function statement by combining:

- the function name
- the function argument, in parentheses

The argument is the independent variable values you want the function to operate on.

For example, in the statement **SUM(R7:19C2)**, **SUM** is the function name, and **R7:19C2** is the argument. This statement instructs the system to add the values in cells in column 2 from rows 7 through 19, and to display the sum in the cell containing the statement.

NOTE

You must not leave a space between the function name and the left parenthesis of the argument.

Function statements and formulas do not admit spaces. If you leave a space, the system interprets the space as an intersection operator.

ARGUMENT ABBREVIATIONS

Function titles use abbreviations defined in table 11-1 to indicate appropriate argument content.

Table 11-1. Argument Abbreviations

Abbreviation	Definition
N	a number, or a formula that yields a number (used only once per function)
T	text, or a formula that yields text
Logical	represents a logical value (TRUE or FALSE) referencing • a single cell • a formula expressing a relation (=, <, >, <=, >=, <>) • a function that returns a logical value Any value other than a logical one causes the system to return a **#VALUE!** error value in cells containing this abbreviation.

Table 11-1. Argument Abbreviations (Cont)

Abbreviation	Definition
List	items separated by commas that can be: • actual values • references to a group of cells For example, **1,B** is a list, where **B** is defined as R1C2:3, and R1C2 contains the value 2 and R1C3 contains the value 3. The list actually represents the collection of values 1,2,3. Lists can contain a maximum of five items; however, they can represent any number of values through cell references.

CATEGORIZING MULTIPLAN FUNCTIONS

Table 11-2 lists Multiplan functions alphabetically under function categories.

Logical functions return TRUE or FALSE values.

String functions:

- convert numeric values to text strings
- convert numeric constant text strings to numeric values
- reproduce all or a portion of a text string

Table 11-2. Functions Grouped in Categories

Arithmetic

ABS(N)
AVERAGE(List)
COUNT(List)
EXP(N)
INT(N)
LN(N)
LOG10(N)
MAX(List)
MIN(List)
MOD(Dividend, Divisor)
ROUND(N,Digits)
SQRT(N)
STDEV(List)
SUM(List)

Financial

INDEX(Area, Subscripts)
LOOKUP(N,Table)
NPV(Rate,List)

Trigonometric

ATAN(N)
(also used to calculate ASIN, ACOS and Radians)
COS(N)
SIN(N)
TAN(N)
PI()

Logical

AND(LIST)
FALSE()
IF(Logical,Then Value,Else Value)
ISERROR(Value)
ISNA(Value)
NOT(Logical)
OR(List)
TRUE()

String

DOLLAR(N)
FIXED(N,Digits)
LEN(T)
MID(s,n,m)
REPT(T,Count)
VALUE(T)

Miscellaneous

COLUMN()
NA()
ROW()
SIGN(N)

Enhanced Multiplan Iteration Functions

DELTA()
ITERCNT()

COMBINING FUNCTIONS

You can combine several functions in one formula.

For example, assume that the interest rate on charge card purchases is 12% for purchases over $1000 and 10% for purchases under $1000. Using the IF and SUM functions to determine the interest on the charge card purchases, you can write the following formula:

```
IF(SUM(R5)>1000,.12*SUM(R5),.1*SUM(R5))
```

ABS (N)

Description Returns the absolute value of the argument N.

Examples

1. ABS(-3)

   Yields 3, the positive value of the argument.

2. ABS(first-second)

   Yields the absolute difference between the first and the second items. Assuming **first** equals 15, and **second** equals 24, this expression yields ABS(-9), or 9.

3. DOLLAR(ABS(first-second))

   Yields the absolute difference, in dollars, between first and second.

4. ABS(AVERAGE(R1C1:10)-R1C1)

   Yields how far the first item is from the average of row 1. Assuming row 1 contains the values 5, 15, 6, 8, 9, 11, 2, 3, 4, and 3 in columns 1 through 10, then:

   (AVERAGE(R1C1:10)) yields 6.6

   ABS(6.6-R1C1) yields 1.6

AND (LIST)

Description Returns the logical value TRUE if all the conditions in List are TRUE; otherwise, it returns the value FALSE.

You use the AND function with the IF function when you test multiple conditions (refer to example 2).

Requirements The argument entries must be logical expressions (yielding TRUE or FALSE values).

Examples

1. `AND(Credit>Limit,Liabilities<15000)`

   Returns the value TRUE if Credit is greater than Limit, and Liabilities is less than 15000.

2. ```
   IF(AND(SUM(Homework)>82,Final>50),
      SUM(Homework,Final),0)
   ```

   If the scores on Homework are greater than 82 and the score on the Final is greater than 50, the student receives points equal to the sum of Homework + Final. The minimum passing grade is 133.

   If the scores on Homework are less than or equal to 82, or the score on the Final is less than or equal to 50, the grade is 0.
   ```

ATAN (N)

Description Calculates the arc tangent (inverse tangent) function of the argument, yielding an angle in radians in the range ($-\pi/2$ to $+\pi/2$).

You can use ATAN to calculate arc sine and arc cosine and radians. The function statement for arc sine is:

```
ATAN(N/(1-N^2)^0.5)
```

The function statement for arc cosine is:

```
PI()/2 - ATAN(N/(1-N^2)^0.5)
```

Examples

1. `ATAN(ratioC)`

   Yields the angle whose tangent is ratio C.

2. `ATAN(0.5)`

   Yields 0.4636476.

AVERAGE (LIST)

Description Calculates the average of the specified argument values (the function ignores cells containing non-numeric values). Yields the same result as if you entered the formula **SUM(list)/COUNT(list)**.

Examples

1. AVERAGE(Balance)

   Yields the average of the values in the group of cells named **Balance**.

2. AVERAGE(1,5,6.5,5)

   Yields the average of the four numeric values in the parentheses, or 4.375.

3. AVERAGE(R1)

   Yields the average of the cells in row 1.

COLUMN ( )

Description Returns the number of the column in which the formula containing this function appears (takes no arguments).

Examples

1. COLUMN()+5

   Assuming this formula is in a column 8 cell, it yields the value 13.

2. 1981+COLUMN()-4

   This formula can yield a series of sequential numbers beginning with 1981.

   Assuming you want to enter sequential years across 40 columns, starting with 1981 in column 4, you enter this formula in column 4, and then Copy Right from column 4 for 39 columns.

   In column 4, the value of COLUMN() is 4; in column 5, the value of COLUMN() is 5, and so on; therefore:

   in column 4, 1981+4-4 = 1981

   in column 5, 1981+5-4 = 1982

   in column 6, 1981+6-4 = 1983

   In this way, the system enters the years 1981 through to 2021 across the worksheet.

COS (N)

Description

Calculates the cosine of the argument, an angle in radians.

The function statement for calculating arc cosine is:

```
PI()/2 - ATAN(N/(1-N^2)^0.5)
```

Examples

1. COS(theta)

   Yields the cosine of the angle theta.

2. COS(0.9)

   yields 0.62161.

COUNT (LIST)

Description Returns the count of number values represented by List. The function ignores cells containing non-numeric values.

Example

1. COUNT(55,600,223,45,62)

   Yields 5.

2. COUNT(r1)

   Yields the count of number values in row 1:

   - Assuming row 1 contains (5,66,23,45), returns 4.
   - Assuming row 1 contains (203,896,"AAA",48), returns 3.

3. COUNT(checks)*0.15+1.00

   Yields the service charge (the number of checks written, multiplied by 0.15, plus 1.00).

DELTA ()

Description Returns the maximum absolute value of the changes in values from one iteration to the next when used with the iteration option (refer to section 10 for further information).

Returns the error value **#N/A** if you select **No** in the **iteration:** field of the Options command.

The system counts only the values in cells that it evaluates between two successive DELTA functions.

The DELTA function returns the **#N/A** error value when ITERCNT()=1 or when ISNA(ITERCNT()) returns a value of **TRUE** during the first iteration of a circular model, because no previous values exist from which it can calculate changes.

You can enter the DELTA function in a convergence test formula to calculate the results of an iteration to any desired precision. For example, the formula **DELTA()<0.000001** returns the value of **TRUE** when convergence results are less than 0.000001.

Placing the DELTA Function

Each time the system encounters a DELTA function, it resets the internal DELTA value to 0. By entering more than one DELTA function, you can isolate the maximum change in a particular part of the worksheet.

To create a DELTA() that applies only to the differences of a part of the worksheet, you bracket the cells with cells that contain the DELTA function. Each DELTA() resets the DELTA value to 0.

To avoid problems with order of evaluation, you enter the first DELTA function in the cell immediately above the block of cells for which you want a local DELTA value. Then you enter the test DELTA formula in the cell immediately below the block of cells to return a local DELTA value.

Figure 11-1 illustrates how the system recalculates the block of cells column by column. This model provides local values of DELTA only if these columns contain no other circular references. For the results of DELTA to be useful in this example, the area it calculates should contain only one set of circular references.

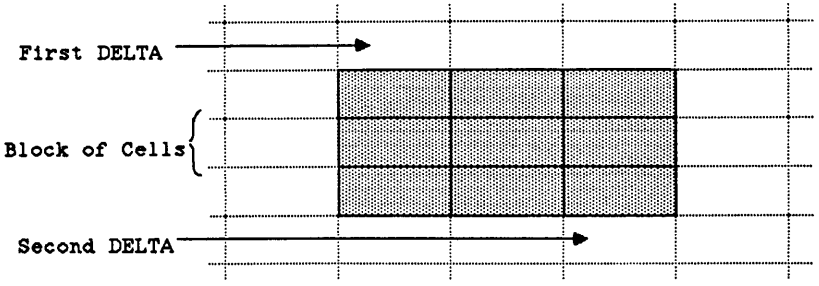


Figure 11-1. Entering DELTA Above and Below a Block of Cells

Figure 11-2 illustrates how the system recalculates one column. This is a more precise model design than the one used in figure 11-1 because it evaluates by column, and the system places circular references in a single column.

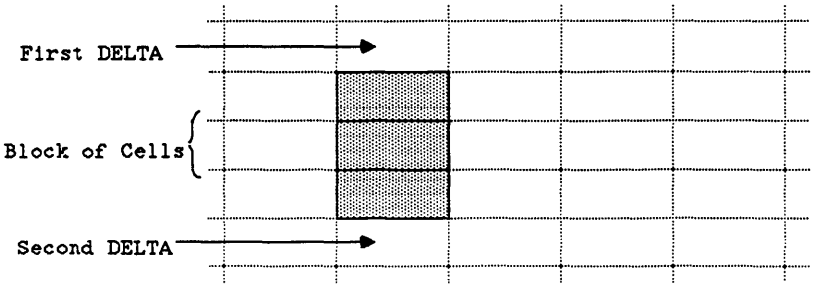


Figure 11-2. Entering DELTA Above and Below a Column of Cells

Using IF with DELTA

Subsequent iterations of the second DELTA function normally include changes to the cell with the first DELTA function. The simple formula DELTA() is usually not sufficient to isolate local values of DELTA.

To obtain local values of DELTA, you enter a formula such as **IF(TRUE(),"",DELTA())** that clears the maximum DELTA value (it does not appear on the screen and does not present a value for the following DELTA to evaluate).

The system only looks for the DELTA() function in the cell, and resets its value; it does not return a value.

Using DELTA with ITERCNT

If you enter the DELTA function as a completion test and the ITERCNT function in a model by itself, you may create divergence (refer to the ITERCNT function, in this section). The DELTA function also reads the cell that contains the ITERCNT function.

Because ITERCNT changes by 1 during each iteration, DELTA always returns at least 1, unless you set up the worksheet model to return local values of DELTA or eliminate the ITERCNT formula.

The formula **ITERCNT()<20** returns the value **TRUE** or **FALSE** after each iteration and therefore does not affect convergence.

Examples

Refer to iteration examples and models in section 10.

DOLLAR (N)

Description Converts the argument to text showing a dollar amount.

The system:

- rounds the argument to two decimal places
- inserts a 0 in the units position if the argument is less than 1
- adds a dollar sign before the leftmost digit
- encloses the result in parentheses if the argument is less than zero

Examples

1. DOLLAR(2.715)

   Yields $2.72.

2. DOLLAR(.15)

   Yields $0.15.

3. DOLLAR(0)

   Yields $0.00.

4. DOLLAR(-1)

   Yields ($1.00).

EXP (N)

Description Calculates e (2.7182818..., the base of the natural logarithm) to the power of the argument. This is the inverse function of LN(N).

The system calculates powers of other bases using the exponentiation operator (^).

Examples

1. EXP(1)

   Yields 2.7182818 (the value of e).

2. EXP(10)

   Yields 22026.466 (e to the power of 10) with the default column width.

FALSE ()

Description Returns the logical value **FALSE.**

Example You use FALSE() to put a logical value into a cell to test a condition on the worksheet before substituting into the cell a more complicated logical expression.

FIXED (N,DIGITS)

Description Converts the specified value to text, showing a fixed-decimal number rounded to the number of decimal digits you specify.

If the number is negative, the system inserts a minus sign before the leftmost digit.

If Digits is negative, the system rounds to the left of the decimal point.

Requirements Digits must be an integer less than or equal to 30.

Examples

1. FIXED(3.14159,3)

   Yields the text string 3.142.

2. FIXED(R1C3,4)

   Assuming R1C3 contains the value -2.7182818, yields the text string -2.7183.

3. FIXED(459.5962,-2)

   Yields the text string 500.

4. FIXED((first/second)*100,2)&" percent"

   Yields a text string **N percent** obtained by dividing the first value by the second value, then multiplying by 100. If the numbers do not divide evenly, the system rounds the decimal in the resulting value to two places.

IF (LOGICAL,THEN VALUE,ELSE VALUE)

Description

If Logical is TRUE, returns Then Value; otherwise, returns Else Value. The Then and Else Values can be numbers, text, or logical values.

You combine the IF function with the AND function to test multiple conditions. You can also use IF to test for errors (refer to example 4.)

Examples

1. `IF(credits>=debits,"OK","overdrawn")`

   Returns the text **"OK"** if credits are greater than or equal to debits; otherwise, returns the text **"overdrawn".**

2. `IF(credits-debits>=250, "no_charge","service_charge")`

   Returns the text **"no charge"** if the difference between credits and debits is greater than or equal to 250. If the difference is less than 250, returns the text **"service charge".**

3. `IF(grade>80,"excellent",grade)`

   Returns the text "excellent" if the grade is greater than 80. If the grade is less than 80, the value returned is that contained in the variable **grade.**

4. `IF(RC[-8]=0,"NA",RC[-1]/RC[-8])`

INDEX (AREA, SUBSCRIPTS)

Description Returns the value of a cell selected by Subscripts from Area.

The Area can be either part of a row or column, or a rectangular area consisting of parts of several rows and columns.

If the Area is part of one row or one column, you specify one subscript. A subscript value of 1 selects the first cell in the row or column, a subscript value of 2 selects the second cell in the row or column, and so on.

For example, as illustrated in figure 11-3, if Area is row 1, subscript value 4 is the fourth value in row 1, or row 1 column 4.

If the Area is rectangular, you specify two subscripts, separated by commas. The first subscript selects the row of the area, and the second subscript selects the column of the area.

For example, as illustrated in figure 11-4, if Area is defined as the rectangle named **Sales**, and the subscripts specified are 5,4, the system returns the value of cell R5C4.

If you enter a Subscript that exceeds the limits of the Area, the system returns the **#N/A** error value.

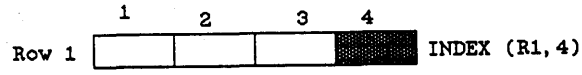


Figure 11-3. INDEX Function with One Subscript

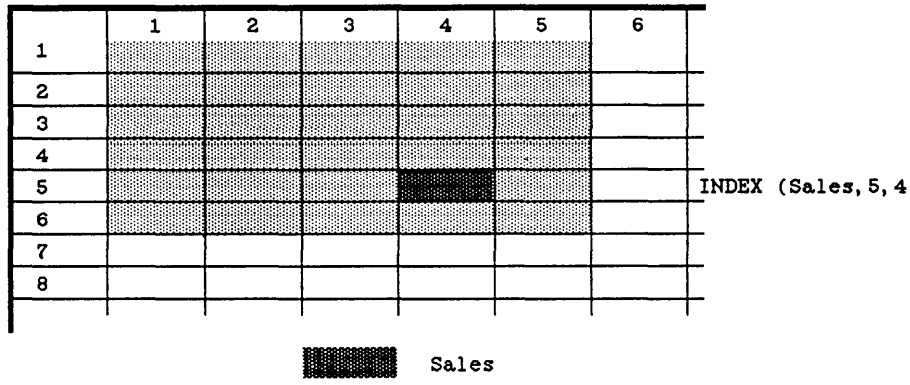


Figure 11-4. INDEX Function with Two Subscripts

Examples

1. INDEX(R4,10)

   Yields the value found in the tenth cell of row 4 (R4C10).

2. INDEX(R1:3C1:5,3,2)

   Yields the value found in row 3 column 2.

3. INDEX(R4:9C5:8,3,4)

   Yields the value found in row 6 column 8.

4. INDEX(C1,COLUMN())

   Copying this formula across the first row yields the value of R1C1 in every cell.

INT (N)

Description Returns the largest integer less than or equal to N.

Examples

1. INT(6) is 6.
2. INT(8.9) is 8.
3. INT(-123.999) is -124.

ISERROR (VALUE)

Description Returns the logical value **TRUE** if the argument is an error value. Otherwise, returns **FALSE.** This function is useful for testing error conditions.

Example ISERROR(R1C1)

Returns **TRUE** if cell R1C1 contains an error value.

ISNA (VALUE)

Description Returns the logical value **TRUE** if the argument is the **#N/A** error value. Otherwise, returns **FALSE.**

Examples

1. ISNA(R6C8)

   Returns **TRUE** if cell row 6 column 8 contains the error value **#N/A.**

2. ISNA(costs)

   Returns **TRUE** if the cell **costs** contains the error value **#N/A.**

3. IF(ISNA(balance),"NA",balance)

   Returns the text **"NA"** if the cell named **balance** contains the error value **#N/A.** Returns the value of the balance if the cell **balance** does not contain the error value **#N/A.**

ITERCNT ( )

Description Returns the current iteration count, starting with 1 for the first iteration.

You use this function with the iteration option (refer to section 10). During the first recalculation after each change to the worksheet, ITERCNT returns the **#N/A** error value.

NOTE

Iteration lags behind the actual iteration pass number by one. For example, if you stop the model after three passes, iteration count returns a value of two.

The ITERCNT function provides:

- initial values for iterative models
- a table of iteration results
- a completion test

Providing Initial Values for Iterative Models

Many worksheet models require:

- an explicit initial value
- a formula for subsequent iterations.

To fulfill both requirements, you substitute a conditional formula (with the IF function) in place of the formula that requires an initial value.

For example, to start with the initial value of **Initial_Net_Profit** and then switch to the formula **Gross_Profit-Bonus**, you enter the formula:

```
IF(ISNA(ITERCNT()),Initial_Net_Profit,
Gross_Profit-Bonus)
```

IF selects **Initial_Net_Profit** when the condition is **TRUE.** In other words, ITERCNT() returns the **#N/A** error value, and ISNA() returns **TRUE.** Then ITERCNT returns a number, making ISNA return **FALSE**, and IF selects the formula **Gross_Profit-Bonus.**

Creating a Table of Iteration Results

You create a table of partial results from an iteration by copying a formula similar to the following one.

```
IF(ITERCNT()=ROW()-9,Net_Profit,RC)
```

For example, when you copy this formula into successive rows starting at row 10, each row receives the value of **Net_Profit** during a particular iteration and stays unchanged (**RC**) for all other iterations, before and after.

Creating a Completion Test

You enter a formula that includes ITERCNT to create a completion test and thereby limit the number of iterations. The following procedure gives an example of how to create a completion test:

1. Enter **ITERCNT()>20** in the cell to contain the completion test.

2. Enter the reference to the cell that contains this formula in the **completion test at:** field of the Options command.

   During subsequent iterations, the system stops after completing 20 iterations.

Examples Refer to iteration examples and models in section 10.

LEN (T)

Description Returns the number of characters in the text value.

Examples

1. LEN("canal")

   Returns 5, the number of characters in the text "canal".

2. LEN(R1C1)

   Returns the number of letters in the text in row 1 column 1.

3. LEN(oshkosh)

   Returns 9 when "oshkosh" refers to row 1 column 3 and that cell contains the text "wisconsin".

LN (N)

Description Calculates the natural logarithm of the argument.

Requirements N must be positive. The system returns a **#NUM!** error value if N is less than or equal to zero.

Examples

1. LN(5.5)

   Yields the natural logarithm of 5.5, or 1.7047481.

2. LN(EXP(1))

   Yields the natural logarithm (log to the base e) of e, which is 1.

LOG10 (N)

Description Calculates the base 10 logarithm of the argument.

Requirements N must be positive. The system returns a **#NUM!** error value if N is less than or equal to 0.

Examples

1. LOG10(6)

   Yields the base 10 logarithm of 6, or 0.7781513.

2. LOG10(R5C10)

   Presuming R5C10 contains the value 50, yields the base 10 logarithm of 50, or 1.69897.

LOOKUP (N,TABLE)

Description Returns the contents of a cell from Table.

Requirements Table should be a cell reference to a rectangular area on the active worksheet. The value the function returns can be either a number, text, or a logical value.

How LOOKUP Operates

Table usually contains scaled comparative values in several columns or rows, such as the tax rate columns in figure 11-5. Once you have defined Table area, you use this function to look up appropriate values for use in formulas or on other worksheets.

To achieve the purpose of the LOOKUP function, the system performs three operations:

1. It searches down the first row or column of Table definition until it finds the the first value that is greater than N.

   If you define more rows than columns in Table, or if the number of rows and columns is equal, the system searches down the first column; if you define Table with more columns than rows, the system searches across Table's first row.

2. It chooses the previous smaller value (less than or equal to N) as the target value (if there are two identical values preceding the first value greater than N, the system chooses the last identical value).

3. It returns, from the last row or column of Table definition, the value that is in line with the target value.

	1	2	3
1	**Taxable Income**	**Base Tax**	**Marginal Tax Rate**
2			
3	0	0	0%
4	2300	0	14%
5	3400	154	16%
6	4400	314	18%
7	6500	692	19%
8	8500	1072	21%

(N,Table)	Target Value	Return Value
5900,C1:2	4400	314
1345,C1:3	0	0%
924,C2:3	692	19%

Figure 11-5. Examples of Column LOOKUP Operations

Figures 11-5 and 11-6 show examples of LOOKUP column and row operations, respectively.

Using a tax rate table as an example, both figures show how the system determines target values and return values with three different N and Table definitions.

Regarding figure 11-5, if the values in all cells in the first column of Table were less than N, the target value would be the last value in the first column of Table, and the system would return the value opposite it in the last column of Table.

If the values in all cells in the first column of Table were greater than N, the system would return an **#N/A** value.

	1	2	3	4	5	6	7
1	Taxable Income	0	2300	3400	4400	6500	8500
2	Base Tax	0	0	154	314	692	1072
3	Marginal Tax Rate	0%	14%	16%	18%	19%	21%

(N,Table)	Target Value	Return Value
2900,R1:3	2300	14%
568,R2:3	314	18%
7860,R1:2	6500	692

Figure 11-6. Examples of Row LOOKUP Operations

Figure 11-6 shows the tax rate information reversed, progressing to greater values in rows rather than in columns.

Regarding figure 11-6, if the values in all cells in the first row of Table were less than N, the system would return the value of the last column of Table.

If the values in all cells in the first row of Table are greater than N, the system would return a **#N/A** value.

Other Examples

1. LOOKUP(35,000,R1:2)

Assuming you wanted to invest $35,000 in mutual funds, you could use this formula to determine the commission from the following chart:

	1	2	3	4	5	6	7
1	Amount of Purchase	10,000	25,000	50,000	100,000	250,000	500,000
2	Total Acquisition Cost	8.50%	7.50%	6.00%	4.50%	3.50%	2.50%

The system searches in row 1 until it finds the largest value less than or equal to 35,000 (25,000). The system returns the value in row 2 of that column, 7.50%.

2. LOOKUP(1.67,C1:2)

The formula applies to the following table:

	1	2
1	0.25	0.02
2	0.50	0.03
3	0.75	0.05
4	1.00	0.07
5	1.25	0.08
6	1.50	0.10
7	1.75	0.11
8	2.00	0.13
9	2.25	0.15

The system searches in column 1 until it finds the largest value less than or equal to 1.67 (1.50). The system returns the value in column 2 of that row, 0.10.

MAX (LIST)

Description Returns the largest number value from List. Returns zero if List represents no number values.

Examples

1. MAX(144,144.5,144.75,143.25)

   Returns 144.75.

2. MAX(prices)

   If a row named **prices** contains the values $1.56, $2.08, $3.45, $6.50, and $6.95, returns the value $6.95.

3. FIXED(MAX(scores),2)

   Converts the maximum score to a text value rounded to 2 decimal places.

MID (s, n, m)

Description Returns the characters for the count (m) for string (s) starting at position (n).

In the argument:

- Start (n) specifies the position of the first character to be returned.
- Count (m) specifies the number of characters to be returned. You start count at the Start position (n) (include it in the count).

If Count is zero, or if start is greater than the length of the result of s, the system returns 0.

If Count is negative, the system returns a **#VALUE!** error value.

Requirements Start and Count must be numeric expressions (the system uses only integers, truncating decimals).

Examples

1. `MID("11112223345",5,3)`

   Returns the characters **222** (starting at the fifth character of the string, counting three positions).

2. `MID("FFFFFFDCBAA",10,1)`

   Returns the character **A** (starting at the tenth character of the string, counting one position).

3. `MID("FFFFFFDCBAA",1+INT(grade/10),1)`

   Returns the character **B** assuming grade equals 82 and Start equals 9 (starting at the ninth character, counting one position).

MIN (LIST)

Description Returns the smallest number value from List.

Examples

1. `MIN(-1.2,-4.5,-1.3,-1.5,1.2)`

   Returns the value -4.5.

2. `MIN(times)`

   Returns the value .34, assuming the area named **times** contains the values .456, 1.5, .34, and .78.

3. `FIXED(MIN(times),0)`

   Converts the minimum time to a text value rounded to the nearest whole number.

MOD (DIVIDEND,DIVISOR)

Description Returns the remainder of Dividend divided by Divisor (the result has the same sign as Divisor).

Requirements Both parts of the argument must be numeric values. If Divisor is zero, the system returns a **#DIV/0!** error value.

Examples

1. MOD(680,42)

   Yields the value 8.

2. MOD(-38,4)

   Yields the value 2.

3. MOD(3,-2)

   Yields the value -1.

4. MOD(-3,-2)

   Yields the value -1.

In general, MOD(x,y)=x-INT(x/y)*y

NA ()

Description Returns the **#N/A** error value. You use this value to mark data points that are yet to be defined.

Example Assuming you assign NA() to an interest rate, all values depending on that rate change to **#N/A.**

NOT (LOGICAL)

Description Returns the opposite of the logical value argument (**FALSE** if the argument is TRUE; **TRUE** if the argument is FALSE).

For example, you can use the NOT function with the IF function to test multiple conditions.

Examples

1. NOT(interest<=.10)

   Returns **FALSE** if interest is less than or equal to .10. Returns **TRUE** if interest is greater than .10.

2. NOT(SUM(C5)>2100)

   Returns **FALSE** if the sum of column 5 is greater than 2100. Returns **TRUE** if the sum of column 5 is less than or equal to 2100.

NPV (RATE,LIST)

Description Net Present Value (NPV) calculates the amount of money required now to produce a specified cash flow in the future, given a specific interest rate.

This function is based on the formula

$$\sum_{i=1}^{n} \frac{list_i}{(1+rate)^i}$$

Requirements Rate is an interest rate, expressed as a decimal fraction.

The first value represented by List is income required at the end of the first period; the second value is the income required at the end of the next period, and so on.

Example NPV(.15,flow)

This formula applies to the following table:

	1	2	3	4	5	6
1	$15,000	$19,500	$25,350	$32,955	$42,842	$84,598.24

Assume that you can lease a parking lot for five years for an $80,000 one-time payment. The lot currently generates $15,000 net operating income annually. Based on research and profit studies, you expect the income to increase 30% annually.

The table in this example is generated by:

- entering $15,000 in cell R1C1
- entering RC[-1]*1.3 in cell R1C2 and copying it right to the next three cells
- naming R1C1:5 **flow**

To calculate the NPV of the cash flow assuming your opportunity rate is 15%, you enter NPV(.15,flow) in R1C6. The result is $84,598.24.

OR (LIST)

Description Returns the logical value **TRUE** if any value in List is TRUE. Otherwise, returns **FALSE.**

You use the OR function with the IF function when you test multiple conditions.

Requirements The argument entries must be logical values. If they are not, the system returns the **#VALUE!** error value.

Examples

1. OR(R4C7>R5C6,R7C1<R2C2)

   Returns **TRUE** if either row 4 column 7 is greater than row 5 column 6, or row 7 column 1 is less than row 2 column 2.

2. OR(grade>80,final>150)

   Returns **TRUE** if grade is greater than 80 or if final is greater than 150.

3. IF(OR(grade>80,final>=150),"good_work","")

   If either grade is greater than 80 or final is greater than or equal to 150, the system returns the text **"good work".** If neither of the conditions are met, the system returns no value.

PI ()

Description Returns the value 3.1415926535898, an approximation of the mathematical constant π (pi).

The function statement to calculate Radians is:

```
degrees/180*PI()
```

Examples

1. `PI()*5`

   Yields 15.707963 if column width is 10 characters.

2. `SIN(PI()/4)`

   Yields 0.707106781 if column width is 12 characters.

3. `PI()*radius*radius`

   Yields the area of a circle. Assuming the cell named radius equals 15 feet, yields 706.85835 feet if column width is 10 characters.

REPT (T,COUNT)

Description Returns a text value consisting of Count repetitions of T across a row.

If Count is 0 or negative, the system returns the **#VALUE!** error value. Otherwise, the length of the result is the length of T multiplied by Count.

You use this function to create bar graphs or to repeat patterns, such as printer's rules, to separate areas of the worksheet.

Requirements T must be a text value. It is usually a single character, but it can be any number of characters.

Count must be a numeric value (the system uses integers only, truncating decimals).

Examples

1. REPT("*",80)

   Returns a line consisting of 80 *'s in cells formatted with the Continuous cell formatting code.

2. REPT(R3C1,5)

   Repeats the text found in R3C1 five times assuming that row 3 cells are formatted with the Continuous cell formatting code.

3. REPT("+",Score/3)

   Returns a series of +'s equal to the number of Score divided by 3. If Score equals 90, returns 30 +'s; if Score equals 89, returns 29 +'s.

ROUND (N,DIGITS)

Description Returns a value, rounded to the number of decimal places specified by Digits.

The system rounds the value it returns according to the value of Digit:

Digit Value	Rounding
greater than zero	to the number of decimal places specified in Digits (refer to example 1)
equal to zero	to the integer (refer to example 2)
less than zero	into the integer (refer to examples 3 and 4)

Requirements Digits must be a numeric value.

Examples

1. ROUND(3.1416,3)

   Returns the value 3.142.

2. ROUND(3.1416,0)

   Returns the value 3.

3. ROUND(21,-1)

   Rounds to the tens place and returns 20.

4. ROUND(899,-2)

   Rounds to the hundreds place and returns 900.

ROW ( )

Description Returns the number of the row in which the formula containing this function appears.

Examples

1. Assuming the active cell is R4C6, **ROW()** returns the value 4.

2. Copying the expression **ROW()*10** throughout column 1 creates the following sequence of numbers:

```
10
20
30
.
.
.
```

SIGN (N)

Description Returns a number representing the algebraic sign of the argument according to the following table:

Argument Sign	Returned Value
positive	1
0	0
negative	-1

Examples

1. SIGN(-344.56)

   Returns -1.

2. SIGN(9000)

   Returns 1.

3. SIGN(899.756*0)

   Returns 0.

SIN (N)

Description Calculates the sine of the argument, where the argument is an angle in radians.

The function statement for calculating arc sine is:

```
ATAN(N/(1-N^2)^0.5)
```

Examples

1. `SIN(theta)`

   Yields the sine of the angle theta.

2. `SIN(0.6)`

   Yields 0.5646425.

SQRT (N)

Description Returns the square root of the argument.

Requirements N must be positive. If N is negative, the system returns a **#NUM!** error value (the square root of 0 is 0).

Examples

1. SQRT(R3C2+R4C2)

   Assuming row 3 column 2 equals 9, and row 4 column 2 equals 7, returns the value 4.

2. SQRT(599)

   Returns the value 24.474477 using a column width of 10 characters.

3. SQRT(x*x+y*y)

   Assuming x equals 5, and y equals 45, returns the value 45.276926 using a column width of 10 characters.

STDEV (LIST)

Description Calculates the sample standard deviation of the number values represented by List according to the formula

$$s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}}$$

The function ignores cells containing non-numeric values.

Examples

1. STDEV(R1)

   Assuming row 1 contains the values 5, 6.5, 7.1, 7.2, and 5.75, yields the value 0.9330059 using a column width of 10 characters.

2. STDEV(grades)

   Assuming grades contains the values 89, 92, 99, 86, 91, 89, 95, yields the value 4.3149794 using a column width of 10 characters.

SUM (LIST)

Description Returns the sum of the number values represented by List.

You use the SUM function to add a series of numbers.

Examples

1. SUM(C1)

   Returns the sum of column 1 cells.

2. SUM(deposits_January)

   Returns the sum of the values contained in the cells named **deposits_January.**

3. (1+rate)*SUM(deposits_January)

   Returns the balance, including interest, at the end of January.

   Assuming **rate** equals 0.15, and the sum of the January deposits equals 2500, returns the balance 2875.

TAN (N)

Description Calculates the tangent of the argument, where the argument is an angle in radians.

Example TAN(theta)

Yields the tangent of the angle theta.

TRUE ( )

Description Returns the logical value **TRUE.**

Example You can use TRUE() to put a logical value into a cell to test a condition on the worksheet before substituting into the cell a more complicated logical expression.

VALUE (T)

Description Returns the number in the argument.

Requirements The argument must be the text form of a number within double quotation marks. It can contain a leading dollar sign or minus sign, or can be written in scientific notation.

For example, the following text forms yield the numeric value 10:

```
10
$10.00
1E1
```

The following text forms yield the numeric value negative 10:

```
-10
-1E1
```

If the contents of T do not describe a number (for example, if they include letters, or two decimal points), the system returns a **#VALUE!** error value. You must first isolate numbers mixed with nonnumeric characters, as in example 2 below.

Examples

1. `VALUE("$45.62")`

   Returns 45.62 as a numeric value.

2. `VALUE(MID(date,3,2))`

   Assuming date contains the text **"6/14/83"**, starting at the third character and counting 2 returns the number 14.

SECTION 12

GRAPHIC REPRESENTATIONS OF CELL DATA

This section describes how you can produce graphic representations of Multiplan worksheet data. You must have the B 20 Business Graphics Package software installed on your system; depending on your workstation, you must also have the following hardware:

- B 21 Color Graphics Workstation (color graphics display)
- B 22 Monochrome Graphics Board installed on a B 22 workstation (graphics display)
- Bit Mapped Graphics Controller Module installed on a B 25 workstation (graphics display)
- B 25 15-inch Color Display Monitor installed on a B 25 workstation (optional - color worksheet and graphics display)

THE GRAPH COMMAND

You choose graphic ways to present the worksheet values with the subcommands of the Graph command. The Graph command is dependent upon Business Graphics Package software, (refer to the B 20 Systems Business Graphics Package (BGP) Reference Manual for further information).

If you attempt to use the Graph command when the Business Graphics Package is not installed on your system, the system alerts you after you attempt to execute the Graph command. The message **Business Graphics Package required for this function** appears, and the main Multiplan command menu displays in place of the Graph subcommand form.

The system reserves 4000 bytes of memory for each graphing operation (approximately 1000 cells). Each text character requires 1 byte, and each number requires 4 bytes. If the cells you want to graph exceed 4000 bytes, the system displays the error message **Too many cells have been selected for graphing.**

The Graph command consists of four subcommands:

- Graph Bar — produces a labeled bar graph from selected worksheet values
- Graph Line — produces a labeled line graph from selected worksheet values
- Graph Pie — produces a labeled pie graph from selected worksheet values
- Graph Options — controls three options:
  - assigning a graph title
  - selecting a palette of colors on B 21 and B 25 color graphics workstations
  - selecting graph labels

Activating Graph Subcommands

To select a Graph subcommand, use the following procedure:

1. Activate the Graph command by typing the letter **G**, or press **TAB** until the highlight is on **Graph**; then press **RETURN**.

   The following Graph command menu appears, with the highlight on the **Bar** subcommand.

   GRAPH: Bar Line Pie Options

   Select option or type command letter

2. Select a subcommand by choosing one of the following procedures:

   - For Graph Bar, press B or press **RETURN.**
   - For Graph Line, press **L,** or press **TAB** to move highlight to Line and press **RETURN.**
   - For Graph Pie, press **P,** or press **TAB** to move highlight to Pie and press **RETURN.**
   - For Graph Options, press **O,** or press **TAB** to move highlight to Options and press **RETURN.**

A subcommand description and procedure follow under each subcommand heading.

Making a Bar Graph

The Graph Bar subcommand lets you produce a labeled bar graph of selected worksheet values. You must have the Business Graphics Package software installed on your system to use this subcommand.

Bar Graph Axes

Figure 12-1 shows the basic elements of a bar graph. The bar graph has two axes:

- X axis
  - runs horizontally along the bottom edge of the graph
  - contains labels for bar groups that extend upward from it
  - contains an axis label
- Y axis
  - runs vertically along the left side of the graph
  - contains the numerical values for plotting bars
  - contains a label located above and to the right of the Y axis

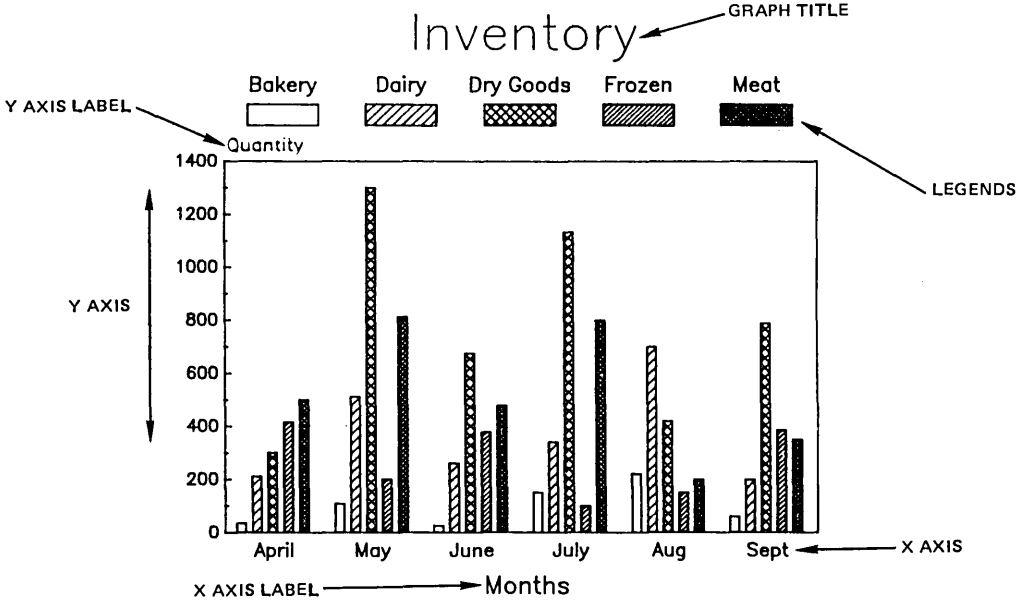


Figure 12-1. Elements of a Bar Graph

Bars and Legends

The system varies the appearance of bars in accordance with specifications in the bar graph format file (refer to Bar Graph Format Files, in this section). The following options are available:

- patterns — examples are: open, slanted lines, cross-hatched
- colors — on B 21 and B 25 color graphics workstations

The system positions a pattern or color legend above the bar graph, just below the graph title. The legend includes a sample pattern or color bar and a label for each (refer to figure 12-1).

You can plot a maximum of twelve bar groups along the X axis, and a maximum of five bars in each group.

Procedure

To create a bar graph, use the following procedure:

1. Activate Graph Bar. The Graph Bar form appears with information similar to the following example, with the highlight in the **group by:** field.

GRAPH BAR group by: R2:8 legends: C2:6

Y axis label: Notebooks format file: [sys]<sys>Bar

Enter reference to cell or group of cells

2. Enter the reference for the cells (rows or columns) you want grouped along the X axis and press **TAB.** The highlight moves to the **legends:** field.

   The system uses the text of the first cell in each row or column specified in this field as labels for the groups of bars ranged along the X axis (refer to figure 12-2).

3. Enter the reference for the cells you want used as legends; then press **TAB**. The highlight moves to the **Y axis label:** field, and the message **Enter text** appears.

NOTE

If the **group by:** field references rows, the **legends:** field must reference columns and vice versa (refer to Correspondence between Rows and Columns, in this section).

4. Enter the label text and press **TAB**. The highlight moves to the **format file:** field, and the following message appears:

Enter a filename or use direction/page keys to view directory

5. Enter the filename (refer to Bar Graph Format Files, in this section).

6. Press **RETURN** or **GO** to execute the Graph Bar subcommand. The system exits Multiplan, enters the Business Graphics Package (BGP) application, and displays a bar graph according to your specifications.

7. To print the graph, follow procedures given in the B 20 Systems Business Graphics Package (BGP) Reference Manual.

8. To return to Multiplan, press **FINISH** to activate the BGP Finish function; then press **GO**.

Correspondence between Rows and Columns

Because the system calculates values from the intersection of references in the **group by:** and **legends:** fields, if you specify rows in one field, you must specify columns in the other (refer to figure 12-2).

Figures 12-3 and 12-4 show bar graph examples of the same worksheet information, the former calculated with rows aligned on the X axis, and the latter calculated with columns aligned on the X axis.

X Axis Label

The system uses the text of the cell at the upper lefthand corner of the grid, formed by references you enter in the **group by:** and **legend:** fields, as the X axis label.

In figure 12-4, the reverse configuration of figure 12-3, the X axis label has been changed by inserting **Dollars** in cell R1C1 instead of **Year.** You can also modify the label by using a Business Graphics Package command (refer to the B 20 Systems Business Graphics Package (BGP) Reference Manual).

Graph Bar Subcommand Proposed Responses

If the worksheet is wider than it is long, the proposed response for the **group by:** field is in rows; for example, **R2:n,** where **n** is the last worksheet row. The proposed response for the **legends:** field is five columns (the maximum number of legend labels) or fewer if less than five columns contain values.

If the worksheet is longer than it is wide, the proposed response for the **group by:** field is in columns; for example, **C2:n** where **n** is the last worksheet column. The proposed response for the **legends:** field is five rows, the maximum number of legend labels, or fewer if less than five rows contain values.

Bar Graph Format Files

The **format file:** field lets you select a customized format file or the Business Graphics Package system format file. The format file specifies standard formatting options for bar graph design, such as annotations, grids, scaling, and colors.

The Business Graphics Package bar graph format filenames are:

- **[sys]<sys>Bar** B 22 graphics workstation
- **[sys]<sys>ColorBar** B 21 and B 25 color graphics workstations

#1	1	2	3	4	5	6
1		blue	red	yellow	orange	green
2	Mon.	55	66	77	88	99
3	Tues.	44	55	66	77	88
4	Wed.	22	55	34	21	22
5	Thurs.	80	56	23	33	54
6	Fri.	90	76	34	23	87
7	Sat.	20	48	56	76	92
8	Sun.	0	0	25	34	67

GRAPH BAR group by: R2:8 legends: C2:6
Y axis label:notebooks format file: [sys]<sys>Bar

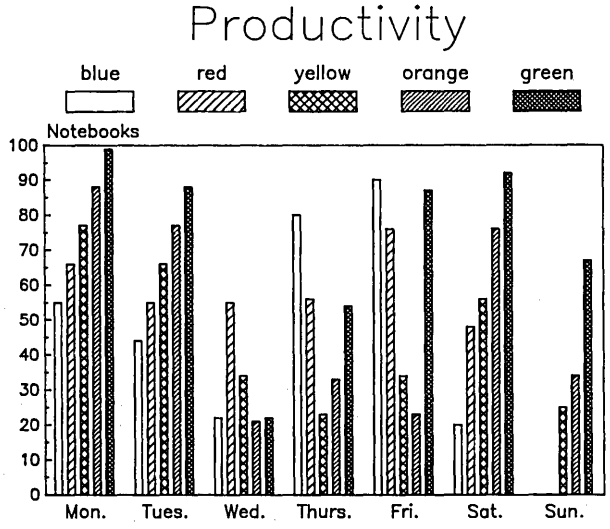


Figure 12-2. Intersection of Bar Graph Groups and Legends

#1	1	2	3	4	5	6
1	Year	under $10	$50	$100	$150	$200
2	1983	56	25	20	24	15
3	1984	60	35	21	25	18

GRAPH BAR group by: R2:3 legends: C2:6
Y axis label: Nbr. of Gifts format file: [sys]<sys>Bar

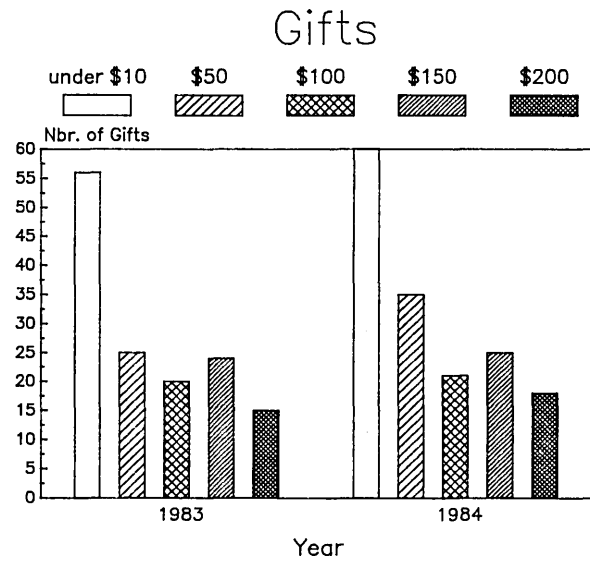
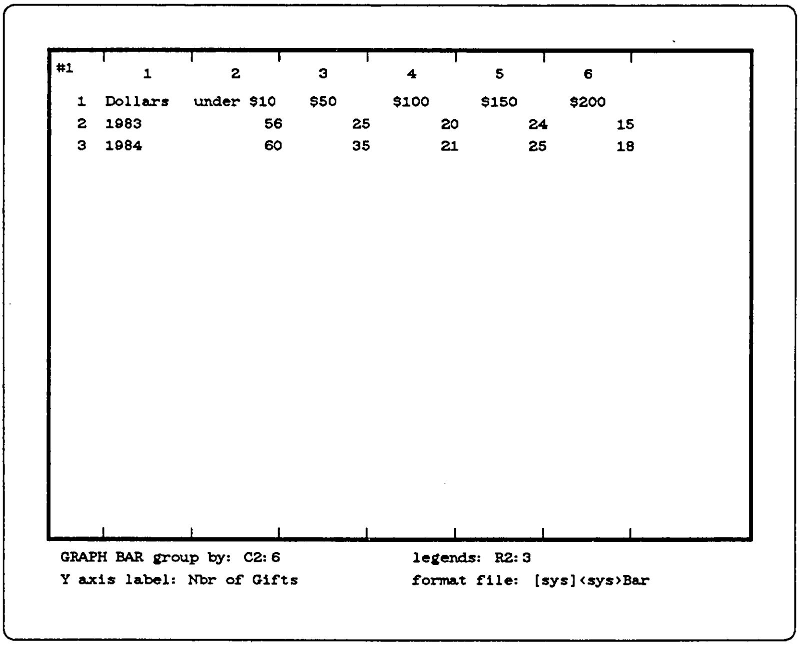


Figure 12-3. Example of a Bar Graph: Groups Are Row Aligned



#1	1	2	3	4	5	6
1	Dollars	under $10	$50	$100	$150	$200
2	1983	56	25	20	24	15
3	1984	60	35	21	25	18

GRAPH BAR group by: C2:6 legends: R2:3
Y axis label: Nbr of Gifts format file: [sys]<sys>Bar

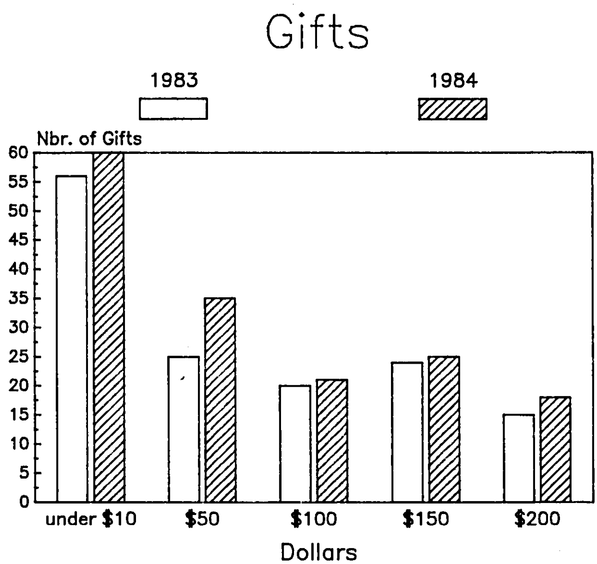


Figure 12-4. Example of a Bar Graph: Groups Are Column Aligned

Making a Line Graph

The Graph Line subcommand lets you produce a labeled line graph of selected worksheet values. You must have the Business Graphics Package software installed on your system to use this subcommand.

Line Graph Axes

Figure 12-5 shows the basic elements of a line graph. The line graph has two axes:

- X axis
  - runs horizontally along the bottom edge of the graph
  - contains a centered axis label
- Y axis
  - runs vertically along the left side of the graph
  - contains the numerical values for plotting each graph line
  - contains a label located above and to the right of the Y axis

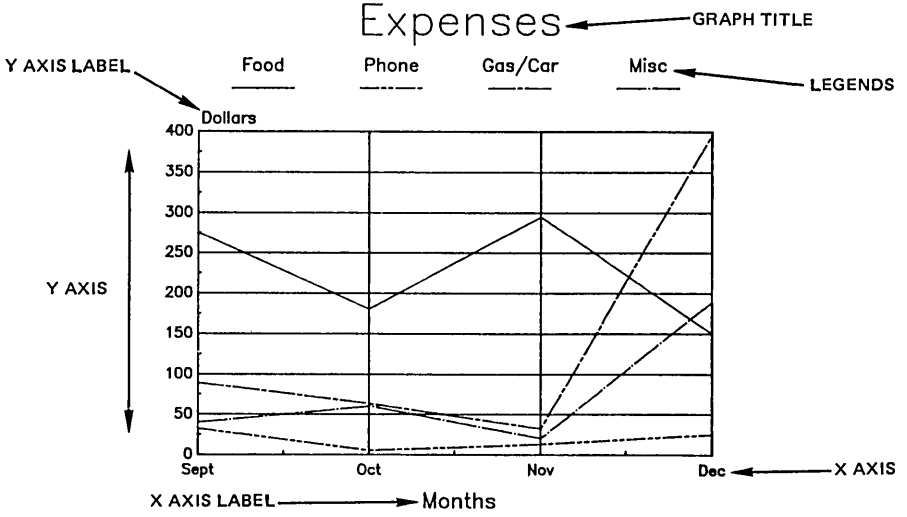


Figure 12-5. Elements of a Line Graph

Lines and Legends

The system varies the appearance of lines in accordance with specifications in the line graph format file (refer to Bar Graph Format Files, in this section). The following options are available:

- patterns — examples are: solid line, broken line, alternating dots and dashes
- colors — on B 21 and B 25 color graphics workstations

The system positions a pattern or color legend above the line graph, just below the graph title. The legend includes a sample pattern or color line and a label for each (refer to figure 12-5).

Procedure

To create a line graph, use the following procedure:

1. Activate Graph Line. The Graph Line form appears with information similar to the following example, with the highlight in the **X cells:** field.

GRAPH LINE X cells: C1 Y cells: C2

Y axis label: format file: [sys]<sys>Line

Enter reference to cell or group of cells

2. Enter the reference for the row or column cells you want to plot along the X axis and press **TAB.** The highlight moves to the **Y cells:** field.

   The cells you reference must be from one row or column only. The system uses the contents of these cells as labels for the lines leading upward from the X axis (refer to figure 12-6).

3. Enter the reference for the cells you want to plot on the Y axis.

   The references in this field must:

   - be from rows only or columns only
   - correspond to values in the **X cells:** field; if you reference rows in the **X cells:** field, you must reference row cells in this field--the same applies to columns (refer to Correspondence between X and Y Cell Values, in this section)
   - be a single-column or single-row reference to plot a single line (refer to figure 12-6)
   - be a multiple-column or multiple-row reference to plot multiple lines (refer to figure 12-7)

   After you have made an entry, press **TAB.** The highlight moves to the **Y axis label:** field and the message **Enter text** appears.

4. Enter the label text and press **TAB.** The highlight moves to the **format file:** field, and the following message appears:

Enter a filename or use direction/page keys to view directory

5. Enter the filename (refer to Line Graph Format Files, in this section).

6. Press **RETURN** or **GO** to execute the Graph Line subcommand. The system exits Multiplan, enters the Business Graphics Package (BGP) application, and displays a line graph according to your specifications.

7. To print the graph, follow procedures given in the B 20 Systems Business Graphics Package (BGP) Reference Manual.

8. To return to Multiplan, press **FINISH** to activate the BGP Finish function; then press **GO.**

Correspondence between X and Y Cells

The system calculates values linearly; that is, it places values in line with one another on the worksheet. Therefore, references in the **X cells:** and **Y cells:** fields must correspond; if you specify rows in one field, you must specify rows in the other--the same applies to columns (refer to figure 12-6).

X Axis Label

The system uses the first cell in the column or row in the **X cells:** field as the X axis label; it is not plotted as a value (refer to figure 12-6).

Line Labels

The system uses the first cell in the column or row in the **Y cells:** field as the line label in the legend; it is not plotted as a value (refer to figure 12-6).

Graph Line Subcommand Proposed Responses

If the worksheet is wider than it is long, the proposed response for the **X cells:** field is R1; the proposed response for the **Y cells:** field is R2.

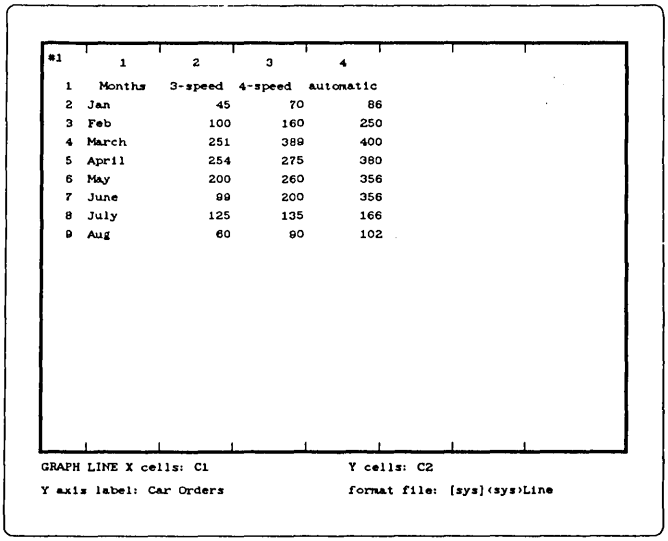
If the worksheet is longer than it is wide, the proposed response for the **X cells:** field is C1; the proposed response for the **Y cells:** field is C2.

Line Graph Format Files

The **format file:** field lets you select a customized format file or the Business Graphics Package system format file. The format file specifies standard formatting options for line graph design, such as annotations, scaling, and colors.

The Business Graphics Package line graph format filenames are:

- **[sys]<sys>Line** B 22 graphics workstation
- **[sys]<sys>ColorLine** B 21 and B 25 color graphics workstations



#1	1	2	3	4
1	Months	3-speed	4-speed	automatic
2	Jan	45	70	86
3	Feb	100	160	250
4	March	251	389	400
5	April	254	275	380
6	May	200	260	356
7	June	99	200	356
8	July	125	135	166
9	Aug	60	90	102

GRAPH LINE X cells: C1 Y cells: C2

Y axis label: Car Orders format file: [sys]<sys>Line

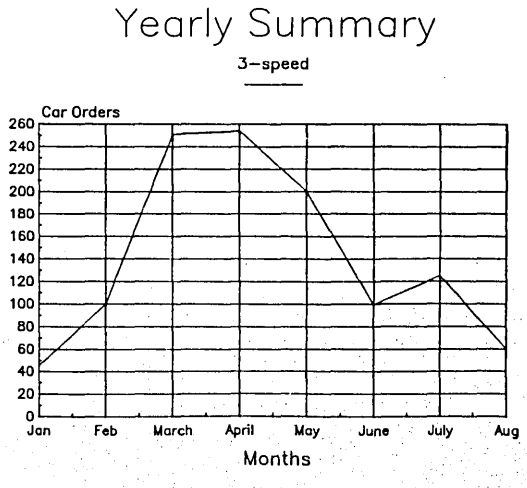


Figure 12-6. Single Line Graph

#1	1	2	3	4
1	Months	3-speed	4-speed	automatic
2	January	45	70	86
3	Febuary	100	160	250
4	March	251	389	400
5	April	254	275	380
6	May	200	260	356
7	June	99	200	356
8	July	125	135	166
9	August	60	90	102

GRAPH-LINE X cells: C1 Y cells: C2:4

Y axis label: Car Orders format file: [sys]<sys>Line

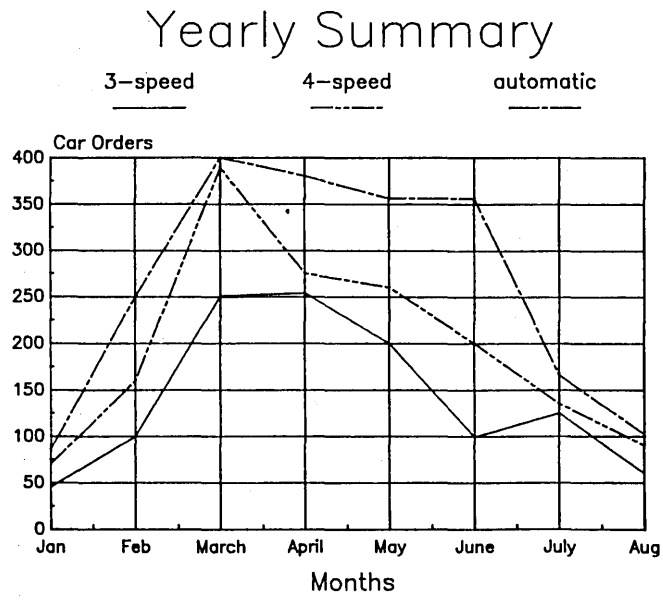


Figure 12-7. Multiple Line Graph

Making a Pie Graph

The Graph Pie subcommand lets you produce a labeled pie graph of selected worksheet values. You must have the Business Graphics Package software installed on your system to use this subcommand.

Pie Graph Segments

Figure 12-8 shows the basic elements of a pie graph. A pie graph can be divided into a maximum of eight segments, each consisting of the following:

- value defines segment size
- label identifies the segment

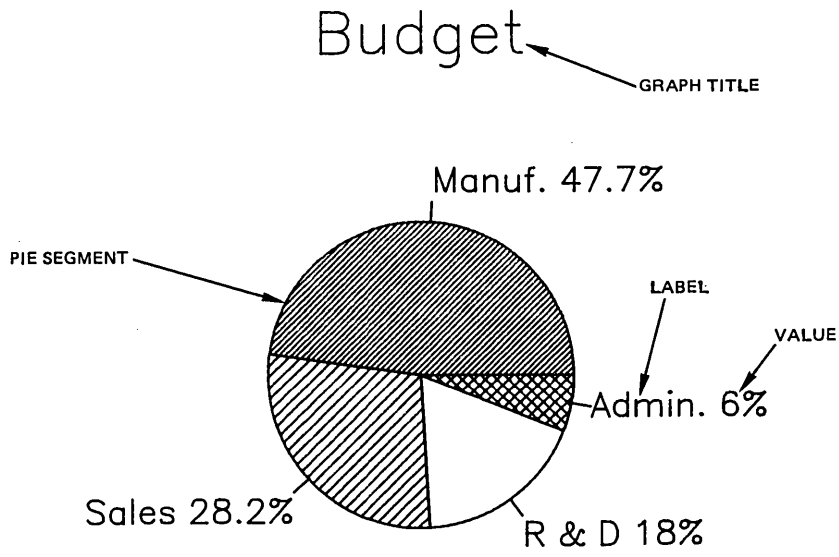


Figure 12-8. Elements of a Pie Graph

Procedure

To create a pie graph, use the following procedure:

1. Activate Graph Pie. The Graph Pie form appears with information similar to the following example, with the highlight in the **segment labels:** field:

GRAPH PIE segment labels: C1 values: C2

format file: [sys]<sys>Pie

Enter reference to cell or group of cells

2. Enter the reference for the row or column cells you want to appear as segment labels.

   The cells you reference must be from one row or column only, but need not be consecutive; for example **R1C1:3,R1C6:8** is a valid entry.

   After you have made your entry, press **TAB.** The highlight moves to the **values:** field.

3. Enter the reference for the cells you want to plot as pie segments.

   The reference in the **values:** field must be from one row only if you specified a row in step 2, or from one column only if you specified a column in step 2 (refer to figure 12-10).

   If you specified a non-consecutive reference in step 2, you need only specify a row in the **values:** field; the system automatically chooses the column values you specified in step 2. For example, if you entered **R1C1:3,R1C6:8** in step 2, you can enter R6 in the values: field, and the system will graph the values of R6C1:3,R6C6:8.

   After you have made your entry, press **TAB.** The highlight moves to the **format file:** field, and the following message appears:

Enter a filename or use direction/page keys to view director

4. Enter the filename (refer to Pie Graph Format Files, in this section).

5. Press **RETURN** or **GO** to execute the Graph Pie command. The system exits Multiplan, enters the Business Graphics Package (BGP) application, and displays a pie graph according to your specifications.

6. To print the graph, follow procedures given in the B 20 Systems Business Graphics Package (BGP) Reference Manual.

7. To return to Multiplan, press **FINISH** to activate the BGP Finish function; then press **GO**.

Correspondence between Segment Labels and Values

The system calculates values linearly; that is, it places values in line with one another on the worksheet. Therefore, references in the **segment labels:** and **values:** fields must correspond; if you specify rows in one field, you must specify rows in the other--the same applies to columns (refer to figure 12-9).

Graph Pie Subcommand Proposed Responses

If the worksheet is wider than it is long, the proposed response for the **segment labels:** field is R1; the proposed response for the **values:** field is R2.

If the worksheet is longer than it is wide, the proposed response for the **segment labels:** field is C1; the proposed response for the **values:** field is C2.

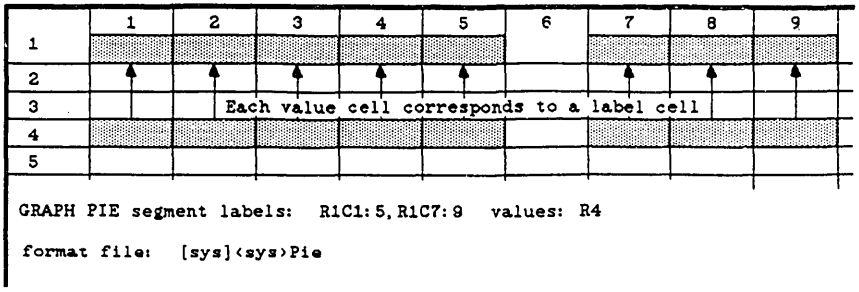


Figure 12-9. Matching Pie Graph Values to Labels

Pie Graph Format Files

The **format file:** field lets you select a customized format file or the Business Graphics Package system format file. The format file specifies standard formatting options for pie graph design, such as annotations, scaling, and colors.

The Business Graphics Package pie graph format filenames are:

- **[sys]<sys>Pie** — B 22 graphics workstation
- **[sys]<sys>ColorPie** — B 21 and B 25 color graphics workstations

Pie Segments

The system varies the appearance of pie segments in accordance with specifications in the pie graph format file (refer to Bar Graph Format Files, in this section). The following options are available:

- patterns — examples are: open, slanted lines, cross-hatched
- colors — on B 21 and B 25 color graphics workstations
- extraction — allows removal of selected pie slices from pie graph (refer to figure 12-10)

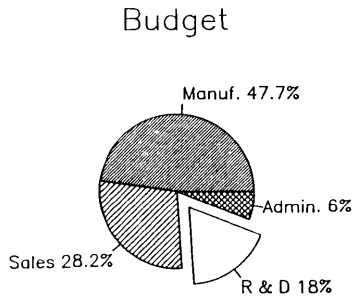


Figure 12-10. Pie Graph with Pie Slice Removed

#1	1	2	3	4	5	6	7
1	year	under $10	$50	$100	$150	$200	$300
2	1983	56	25	20	24	15	10
3	1984	60	35	21	25	18	12

GRAPH PIE segment labels: R1 values: R2
format file: [sys]<sys>Pie

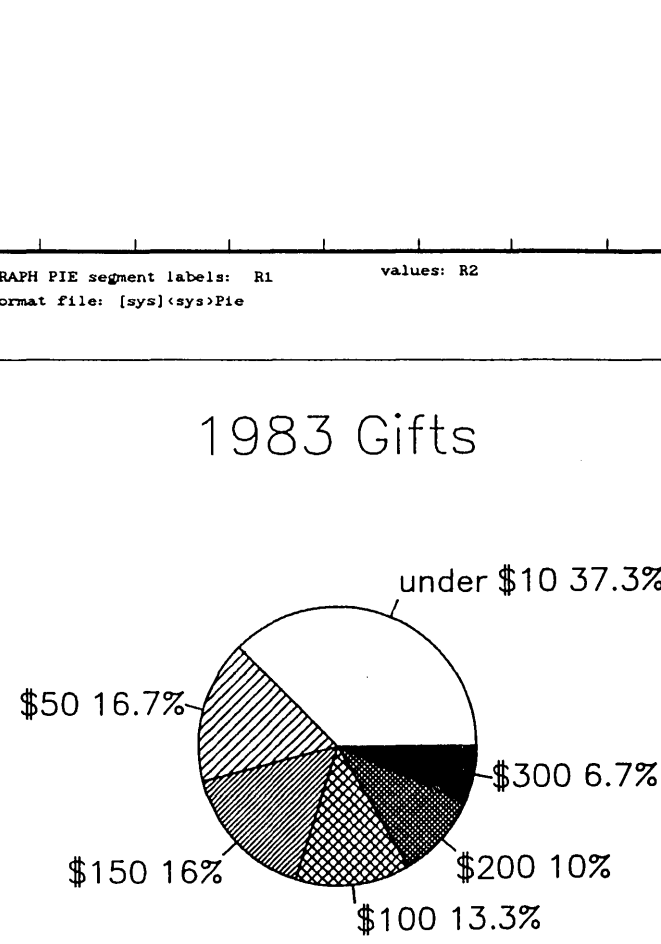


Figure 12-11. Sample Pie Graph: Labels and Values Are Row Aligned

```
#1          1          2
  1  January           10
  2  Febuary           45
  3  March             80
  4  April             91
  5  May              124
  6  June             135
  7  July              90
  8  August            50
  9  September         92
```

GRAPH PIE segment labels: R1:6C1 values: C2

format file: [sys]<sys>Pie

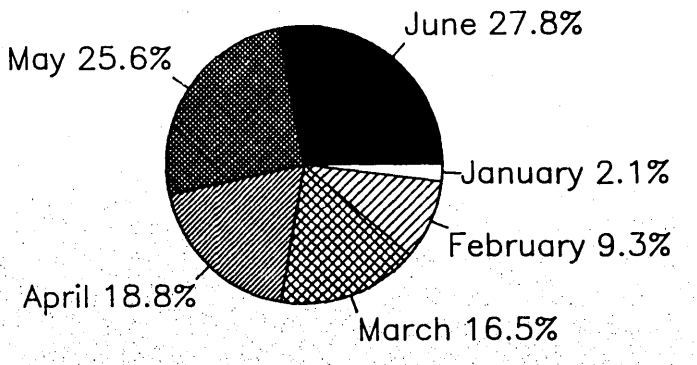


Figure 12-12. Sample Pie Graph: Labels and Values Are Column Aligned

Choosing Graph Titles, Colors, and Labels

The Graph Options subcommand lets you control three factors of bar, line, and pie graphs:

- the graph title
- the colors (on B 21 and B 25 color graphics systems)
- the graph labels

Procedure

To change graph titles or labels, or the color palette on a B 21 or B 25 color graphics workstation, use the following procedure:

1. Activate Graph Options. The Graph Options form appears with information similar to the following example, with the highlight in the **title:** field.

GRAPH OPTIONS title: TEMP palette file name: Default
use labels from sheet:(Yes)No

Enter text

2. For a graph title different from the worksheet title, enter the desired title and press **TAB.**

   For a graph title that is the same as the worksheet title, press **TAB** (the default for this field is the worksheet title).

   The highlight moves to the **palette file name:** field, and the following message appears:

Enter a filename or use direction/page keys to view directory

3. Enter the name of the file containing the desired color specifications for the graph and press **TAB.** Refer to the B 20 Systems Business Graphics (BGP) Reference Manual for information on creating a palette file.

   The highlight moves to the **use labels from sheet:** field, and the message **Select option** appears.

4. To specify graph labels from the worksheet, press **Y,** or press the **Spacebar** to move the highlight to **Yes,** if necessary; then press **TAB.**

   To specify graph labels from a format file, press **N,** or press the **Spacebar** to move the highlight to **No,** if necessary. Refer to the B 20 Systems Business Graphics Package (BGP) Reference Manual for information on creating a format file.

5. Press **RETURN** or **GO** to execute the Graph Options subcommand. The system sets the options you specify, and the main command menu replaces the Graph Options form.

Graph Options Subcommand Example

The following Graph Options form shows the proper entries to assign the title **Yearly Summary** to a graph (parentheses indicate selections):

GRAPH OPTIONS title: Yearly Summary palette file name:
use labels from sheet: (Yes)No

APPENDIX A

STATUS AND ERROR MESSAGES

Multiplan status and error messages assist you in your worksheet operations.

Table A-1 lists some messages and provides additional information to help you solve a problem:

- messages are listed alphabetically, by the first word in the message
- ..... represents an actual file, list or directory name that the system enters in the message
- messages that begin with an actual name are grouped at the end of the table

Table A-1. Status and Error Messages

Message	Explanation/Action
A number is required at RnCn	You referenced a cell in the Graph subcommand that does not have numeric value. Reference only cells with numeric values.
Bar graphs are limited to 5 legends	Select fewer legends (a maximum of five).
Bar graphs are limited to 12 groups	Select fewer groups (a maximum of twelve).
Business Graphics Package required for this function	You cannot use the Graph command without the B 20 Systems Business Graphics Package being installed on your system.

Table A-1. Status and Error Messages (Cont)

Message	Explanation/Action
Cannot copy into nonblank cell	The destination of an Xternal Copy subcommand operation contains a nonblank cell. Check the destination cell(s); if appropriate, blank the nonblank cell(s).
Cannot copy specified area from: (sheetname)	You have changed the name of the supporting worksheet, or entered its name incorrectly; type any character to acknowledge the message. The system copies the remainder of your specified linked areas, if any. Reactivate the subcommand using a proper supporting sheetname.
Cannot link those windows	You attempted to link two windows that were not split from one another; you can link only windows you have split.
Cannot read file Status Code:	The system cannot read the file. The system cannot find the file under the name you specified. The system cannot find files with the suffix you specified. Check your filename entry. Refer to the B 20 Systems Status Codes Reference Manual for an explanation of the status code number.

Table A-1. Status and Error Messages (Cont)

Message	Explanation/Action
Cannot write file Status Code:	The system cannot write to disk the worksheet file you are trying to store. Check your filename entry. Refer to the B 20 Systems Status Codes Reference Manual for an explanation of the status code number.
Cell contains a value which cannot be graphed at RnCn	You referenced a cell that has value the system does not recognize for graphing; for example, the system cannot graph a cell with the value TRUE, or #DIV/0. Replace that cell in the reference, or remove it.
Cell locked by Xternal Copy	You tried to unlock or copy a cell that is the destination of a link formed by the Xternal Copy subcommand. You cannot change a linked destination cell. To regain access to the cell, exclude it from copying, and redefine the Xternal Copy subcommand.
Cells to recalculate: (number) (appears only if there are more than 32 cells to be recalculated to indicate recalculation progress)	You entered a new value while the system was recalculating automatically, or you pressed **RECALC** (f3) after entering a new value. Continue with your session after number reaches zero.

Table A-1. Status and Error Messages (Cont)

Message	Explanation/Action
Circular references unresolved	Cells you referenced depend on each other in a chain so that the last refers back to the first. When the system recognizes circular references, it stops calculating, leaving the chain in an unresolved state. Alter the logic of the sheet so that there is no circularity, or apply the iteration function (refer to Error Values, in section 3, and Enhanced Multiplan Iteration Function, in section 10).
Command is too long	Your entry is too long to be displayed on the command line. Shorten your entry.
Data Entry Mode Enter text, formula, or press "/" for commands	You are in Data Entry mode (the f1 key light is on).
Disk error Status Code:	The system recognizes an operating system error when it attempts to read or write a file. Refer to the B 20 Systems Status Code Reference Manual for an explanation of the code.
Disk full	There is no more room on the disk. Save the sheet on another disk, or delete unnecessary files on the full disk (refer to Deleting a Worksheet File, in section 5).

Table A-1. Status and Error Messages (Cont)

Message	Explanation/Action
Enter a filename	Enter a filename in the form field.
Enter a filename, or use direction/page keys to view directory	Enter a filename for an existing file in the form field.
Enter a formula	Enter a formula, a number, or text (enclosed in double quotation marks) in the form field.
Enter a number	Enter a single number in the form field (the system accepts a formula yielding a single number).
Enter a number, or d for default	You can enter a specific column width (a number of characters from 3 to 32), or enter **d** to specify the width set by the Format Default Width subcommand.
Enter name	Enter a name in the form field (refer to Cell Names, in section 4).
Enter name on external sheet	You attempted to execute the Xternal Copy subcommand without specifying a names area or absolute reference from the supporting sheet. Activate the subcommand again and enter a name or absolute reference in the **name:** field.
Enter reference to cell or group of cells	Enter a cell reference in the form field.

Table A-1. Status and Error Messages (Cont)

Message	Explanation/Action
Enter sheet name	Enter a worksheet name in the form field.
Enter text (no double quotes)	Enter text in the form field.
Error calling Business Graphics	The system encounters an error when it tries to link to the B 20 Systems Business Graphics Package software. Make sure the graphics software is properly installed (refer to B 20 Systems Business Graphics Package Reference Manual).
Error in formula	The formula you entered is not acceptable (the edit cursor is on the first character of the error). Review and alter your formula (refer to Formulas, in section 3).
Field has too many words	The **WORD LEFT** (f9) and **WORD RIGHT** (f10) keys cannot manipulate the text. Edit the text with other keys.
File format error: line (number)	The file the system is reading is not in Multiplan format: reading stopped at this line number. Be sure that the mode setting in the Transfer Options subcommand is the same as the file format.

Table A-1. Status and Error Messages (Cont)

Message	Explanation/Action
File is not a saved worksheet	The file you are trying to load or link was not saved with the Transfer Save subcommand. Check the filename. Be sure that the mode setting in the Transfer Options subcommand is the same as the file format.
Groups are not in same row or column	Groups for a bar graph must be from the same row or column. Alter your group references. To graph an irregular shaped cell area, copy the data to another section of the worksheet in a shape acceptable for graphing.
Help file not available	The system cannot find the online reference information. See your System Administrator to reinstall the Help file on your system (Mp.Hlp for Multiplan and MP.HLP1.0 for Enhanced Multiplan).
Insufficient memory	Your system's storage space is full. Save your worksheet. Blank unnecessary worksheet cells, contract sheet size, and/or separate the worksheet into several smaller worksheets.
Invalid option	The letter you typed does not correspond to any option on the menu.

Table A-1. Status and Error Messages (Cont)

Message	Explanation/Action
Invalid parameter	A field contains an invalid numeric value (one the system cannot execute). Reactivate the command and enter a valid response in the form field.
Invalid width of column	The column width you specified is outside the 3-32 character range. Enter a valid width.
Labels and values do not match	Pie graph label references must have values in the same row or column. Alter your references.
Legends are not in same row or column	Legends for a bar graph must be from the same row or column. Alter your references. To graph an irregular shaped cell area, copy the data to another section of the worksheet in a shape acceptable for graphing.
Line graphs are limited to 5 lines	You have selected more than five rows or columns as Y cells. Select fewer rows or columns.
Locked cell may not be changed	You attempted to modify the value of a locked cell. Unlock the cell with the Lock Cells subcommand, or remove it from an external link (you cannot unlock a cell locked by the Xternal Copy subcommand).

Table A-1. Status and Error Messages (Cont)

Message	Explanation/Action
Name not defined: (sheet name)	You tried to copy from a named area not defined on the source worksheet. Enter the correct name, or redefine the external link.
Name too long	Names can have a maximum of 31 characters. Shorten the name.
No more than 8 segments are allowed in a pie graph	Reference fewer segments.
Overwrite existing file?	The disk file you instructed the system to create has the same name as an existing file; the new file will overwrite (erase) the existing one. Press **GO** to overwrite; press **CANCEL**, then reactivate the command to enter a new file-name.
Place paper in printer and Press GO to continue	You specified manual paper feed with the Print Options subcommand.
Press any key to redraw screen	The Xternal List subcommand replaced the Multiplan screen with an information screen. After you have the information you need, press any key.
Press GO to clear sheet, CANCEL to cancel command	This is a message of caution; the system will destroy the information in memory by clearing the worksheet, unless you have already saved it.

Table A-1. Status and Error Messages (Cont)

Message	Explanation/Action
Press GO to delete, CANCEL to cancel command	This is a message of caution; the system will destroy the worksheet file by deleting it.
Press GO to lock formulas, CANCEL to cancel command	This is a message of caution; the system will lock all cells containing formulas, a major worksheet change.
Press GO to overwrite existing file, CANCEL to cancel command	The disk file you instructed the system to create has the same name as an existing file; the new file will overwrite (erase) the existing one. Press **GO** to overwrite; press **CANCEL**, then reactivate the command to enter a new filename.
Press GO to print, CANCEL to cancel command	You activated the Print Printer subcommand. Be sure you specified the correct printer in the Print Options subcommand if you are not using the default printer.
Press GO to quit, CANCEL to cancel command	You activated the Quit command. Be sure you have saved the worksheet if you want to file it, before you press **GO** to quit (end the Multiplan session).
Printer error Status Code	The printer is not responding. Check printer connections. Refer to the B 20 Systems Status Code Reference Manual for an explanation of the status code.

Table A-1. Status and Error Messages (Cont)

Message	Explanation/Action
Reading line (number)	You instructed the system to read a symbolic file. The line number increases as Multiplan reads through the file. When the system has finished reading the file, you can continue your Multiplan session.
Selection contains no data to graph	Your graph cell reference contains all blank cells. Enter cell references with numeric values.
Selection is ambiguous	A group or legend specification for a bar graph is incomplete. Make sure your references for these graph features intersect and do not overlap.
Selection is outside the logical sheet boundary	A portion of your graph selection is an area either below the last row, or to the right of the last column, of the sheet and contains no data.
Selections for groups and legends	The cell references for groups and legends must intersect. Alter your group and legend selections so that if groups are in rows, legends are in columns, and vice versa.
Select option	Type the initial letter of the option you want or press **TAB** to move the highlight to the option, then press **RETURN.**
Select option or type command letter	Type the initial letter of the option you want or press **TAB** to move the highlight to the option, then press **RETURN.**

Table A-1. Status and Error Messages (Cont)

Message	Explanation/Action
Shapes of areas do not match	The destination area you specified is not the same shape (size) as the source area. Match the size of source and destination areas.
Sheet has been changed.	A new or edited worksheet will be destroyed if you proceed with the Quit command. If you want to save the worksheet, cancel the Quit command and execute the Transfer Save subcommand.
Sheet is empty	You tried to graph from a blank worksheet.
Sorting directory files.....	You pressed a direction key after activating the Transfer Load subcommand. When the system
Too many cells have been selected for graphing	Multiplan reserves 4000 bytes for graphing functions (approximately 1000 cells); each text character requires 1 byte and each number 4 bytes. Reference fewer cells.
Too many depending sheets	The Xternal List subcommand can list a maximum of eight depending worksheets. No action is required; the worksheet links exist, but the list of links is incomplete.
Too many windows	You attempted to open more than eight windows at one time, the maximum. Review your need for another window or close an existing window.

Table A-1. Status and Error Messages (Cont)

Message	Explanation/Action
Values are not from same row or column	Cell references for pie graph values must be from the same row or column. Alter your references. To graph an irregular shaped cell area, copy the data to another section of the worksheet in a shape acceptable for graphing.
Window will not fit	The window you are trying to border or split is too small. Close an adjacent window to obtain more screen room, or rethink your screen layout.
X values are not in same row or column	The X values in a line graph must be from the same row or column. Adjust your references.
Y values do not correspond with X values	In a line graph, each X cell must have a corresponding Y cell that lies in the same row or column. For example, the value for the label at R3C10 can be from cells in row 3 or column 10. Alter your references.

APPENDIX B

MULTIPLAN TRAINING EXERCISES

Using basic Multiplan commands in the following training exercises, you can create and change the worksheets illustrated in figures B-1 through B-4. You can also use the exercises individually, if you remember that each one is dependent on prior exercises.

These exercises are based on the assumption that you are familiar with the Multiplan operations described in sections 1 through 5.

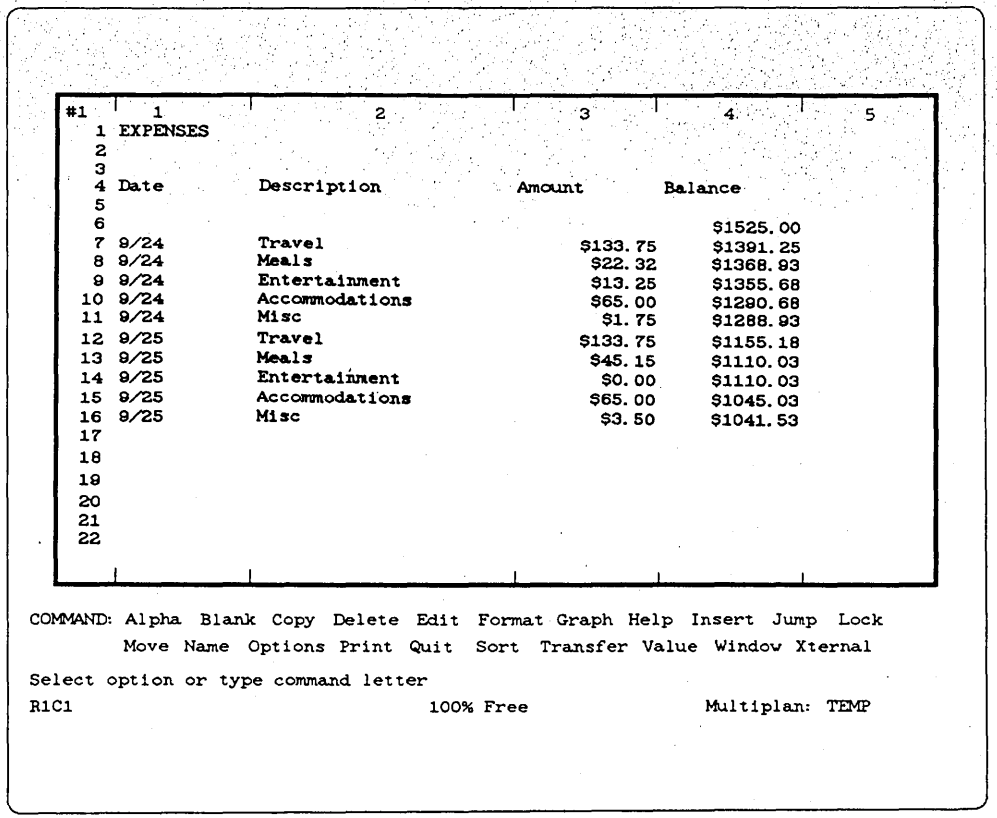


Figure B-1. Business Expense Worksheet

CREATING A MULTIPLAN WORKSHEET

Exercise 1: Using the Alpha Command to Enter Text

In this exercise, you enter text in rows 1 through 6 of figure B-1.

STEP	YOUR ACTION	SYSTEM ACTION
1	Access **Multiplan**	A blank Multiplan screen appears.
2	Type **A**	The Alpha command form appears.
3	Type **EXPENSES**	
4	Press **Down Arrow** key 3 times	The system enters **EXPENSES** in R1C1 and cell pointer moves to R4C1.
5	Type **A**	The Alpha command form appears.
6	Type **Date**	
7	Press **Right Arrow** key	The system enters **Date** in R4C2 and the cell pointer moves to R4C2.
8	Type **F**	The Format command menu appears. (You are widening column 2 to accommodate the word **Description.**)
9	Type **W**	The Format Width sub-command form appears.
10	Type **20**	(The **column:** and **through:** fields should contain the number 2.)

STEP	YOUR ACTION	SYSTEM ACTION
11	Press **GO**	The system changes the width of column 2 to 20 (2 inches).
12	Type **A**	The Alpha command form appears.
13	Type **Description**	
14	Press **Right Arrow** key	The system enters **Description** in R4C2 and the cell pointer moves to R4C3.
15	Type **A**	The Alpha command form appears.
16	Type **Amount**	
17	Press **Right Arrow** key.	The system enters **Amount** in R4C3 and the cell pointer moves to R4C4.
18	Type **A**	The Alpha command form appears.
19	Type **Balance**	
20	Press the direction keys until cell the pointer is at R7C2	Your worksheet should look like rows 1 through 6 in figure B-1.

Exercise 2: Using the Data Entry Mode to Enter Text

In this exercise, you enter text in rows 7 through 11 of column 2, figure B-1.

STEP	YOUR ACTION	SYSTEM ACTION
1	If necessary, press the direction keys until the cell pointer is at R7C2	
2	Press **f1**	The system enters the Data Entry mode. (The **f1** key-top light is on.)
3	Type **Travel**	
4	Press **Down Arrow**	The system enters **Travel** in R7C2 and the cell pointer moves to R8C2.
5	Type **Meals**	
6	Press **Down Arrow**	The system enters **Meals** in R8C2 and the cell pointer moves to R9C2.
7	Type **Entertainment**	
8	Press **Down Arrow**	The system enters **Entertainment** in R9C2 and the cell pointer moves to R10C2.
9	Type **Accommodations**	
10	Press **Down Arrow**	The system enters **Accommodations** in R10C2 and the cell pointer moves to R11C2.

STEP	YOUR ACTION	SYSTEM ACTION
11	Type **Misc**	
12	Press **Down Arrow**	The system enters **Misc** in R11C2 and the cell pointer moves to R12C2.
13	Press **f1**	The system exits Data Entry mode. (The **f1** key-top light is off.)

Exercise 3: Using the Copy From Subcommand to Repeat Text

In this exercise, you copy text entered in exercise 2 to complete column 2 of figure B-1.

STEP	YOUR ACTION	SYSTEM ACTION
1	If necessary, press the direction keys until the cell pointer is at R12C2	
2	Type **C**	The Copy command menu appears.
3	Type **F**	The Copy From subcommand form appears.
4	Type **R7:11C2**	(This reference tells the system to copy rows 7 through 11 in column 2.) The system proposes the correct response in the **to cells:** field, R12C2. (This reference tells the system to copy to column 2 cells, starting at row 12.)
5	Press **GO**	The system performs the copy and returns to the main command menu. Column 2 of your worksheet should now look like column 2 in figure B-1.

Exercise 4: Entering Dates

In this exercise, you enter the dates in column 1 of figure B-1.

STEP	YOUR ACTION	SYSTEM ACTION
1	If necessary, press the direction keys until the cell pointer is at R7C1	
2	Type **A**	The Alpha command form appears.
3	Type **9/24**	(Alpha accepts numbers as text; in the Value command and Data Entry mode, you must enclose text numbers in quotation marks.)
4	Press **RETURN**	The system enters **9/24** in R7C1, the cell pointer remains on R7C1, and the main command menu reappears.
5	Type **C**	The Copy command menu appears. (You are copying **9/24** into the next four rows.)
6	Type **D**	The Copy Down subcommand form appears.
7	Type **4**	(The system proposes the correct response in the **starting at:** field, R7C1.)
8	Press **GO**	The system copies **9/24** into the cells you specify and returns to the main command menu.

STEP	YOUR ACTION	SYSTEM ACTION
9	Press the direction keys until the cell pointer is at R12C1	
10	Type **A**	The Alpha command form appears.
11	Type **9/25**	
12	Press **RETURN**	The system enters **9/25** into R12C1, the cell pointer remains on R12C1, and the main command menu reappears.
13	Type **C**	The Copy command menu appears. (You are copying **9/25** into the next four rows.)
14	Type **D**	The Copy Down subcommand form appears. The system proposes the correct responses: 4 in the **number of cells:** field (from your last execution of this subcommand), and R12C1 in the **starting at:** field.
15	Press **GO**	The system performs the copy and returns to the main command menu. Column 1 of your worksheet should now look like column 1 in figure B-1.

Exercise 5: Using the Value Command to Enter Numbers

In this exercise, you enter the beginning balance in column 4 and amounts in column 3 of figure B-1.

STEP	YOUR ACTION	SYSTEM ACTION
1	If necessary, press the direction keys until the cell pointer is at R6C4	
2	Type **1525**	The system automatically accesses the Value command when you type the first number. The system enters 1525 in R6C4.
3	Press the direction keys until the cell pointer is at R7C3	
4	Type **133.75**	(You enter the amounts as positive numbers; you subtract them from the beginning balance later; refer to exercise 7.)
5	Press **Down Arrow**	The system enters **133.75** in R7C3 and the cell pointer moves to R8C3.
6	Type **22.32**	
7	Press **Down Arrow**	The system enters **22.32** in R8C3 and the cell pointer moves to R9C3.

STEP	YOUR ACTION	SYSTEM ACTION
8	Type **13.25**	
9	Press **Down Arrow**	The system enters **13.25** in R9C3 and the cell pointer moves to R10C3.
10	Type **65**	
11	Press **Down Arrow**	The system enters **65** in R10C3 and the cell pointer moves to R11C3.
12	Type **1.75**	
13	Press **Down Arrow**	The system enters **1.75** in R11C3 and the cell pointer moves to R12C3.
14	Type **133.75**	
15	Press **Down Arrow**	The system enters **133.75** in R12C3 and the cell pointer moves to R13C3.
16	Type **45.15**	
17	Press **Down Arrow**	The system enters **45.15** in R13C3 and the cell pointer moves to R14C3.
18	Type the number **0**	
19	Press **Down Arrow**	The system enters, **0** in R14C3 and the cell pointer moves to R15C3.

STEP	YOUR ACTION	SYSTEM ACTION
20	Type **65**	
21	Press **Down Arrow**	The system enters **65** in R15C3 and the cell pointer moves to R16C3.
22	Type **3.5**	
23	Press **RETURN**	The system enters **3.5** in R16C3, the cell pointer remains on R16C3, and the main command reappears.

Exercise 6: Changing the Format Default of a Group of Cells

In this exercise, you change the default format for the worksheet so that numbers display as dollar amounts with two decimal points.

STEP	YOUR ACTION	SYSTEM ACTION
1	Type **F**	The Format command menu appears.
2	Type **D**	The Format Default subcommand form appears.
3	Type **C**	The Format Default Cells form appears.
4	Press **TAB**	The system leaves **Gen** in parentheses in the **alignment:** field (text flush left and numbers flush right), and the highlight moves to the **format code:** field.
5	Type $	The highlight moves to the **$** (dollar sign).
6	Press **TAB**	The system encloses **$** in parentheses, and the highlight moves to the **# of decimals:** field.

STEP	YOUR ACTION	SYSTEM ACTION
7	Type 2	(This number specifies two decimal places in numbers.)
8	Press **RETURN**	The system changes the default, and displays dollar signs and decimal places with numbers you entered. The system adds these attributes to subsequent numbers until you specify a different default format.

Exercise 7: Entering Formulas Using Relative References

In this exercise, you enter the formula used to calculate the balances in column 4 of figure B-1.

STEP	YOUR ACTION	SYSTEM ACTION
1	If necessary, press the direction keys until the cell pointer is at R7C4	
2	Type **V**	The Value command form appears.
3	Press **Up Arrow**	The cell pointer moves to R6C4, and the system displays **R[-1]C** in the **VALUE:** form. (**R[-1]C** is a relative reference translated as **move one row up in the same column.**)
4	Type - (minus sign)	The system displays **R[-1]C-** in the **VALUE:** form, and the cell pointer automatically moves back to R7C4 as its base cell. (Remember that you want to subtract the expenses from the beginning balance.)

STEP	YOUR ACTION	SYSTEM ACTION
5	Press **Left Arrow**	The cell pointer moves to R7C3, and the system displays **R[-1]C-RC[-1]** in the **VALUE:** form. (The completed formula translates as **move one row up in the same column and subtract from it the cell one row down and one column to the left.**)
6	Press **RETURN**	The system calculates the formula you entered and displays the result **$1391.25** in R7C4. The system displays the formula on the status line.

Exercise 8: Using the Copy Down Subcommand to Repeat Formulas

In this exercise, you copy the formula created in exercise 7 to calculate the remaining balances in column 4 of figure B-1.

STEP	YOUR ACTION	SYSTEM ACTION
1	If necessary, press the direction keys until the cell pointer is at R7C4	
2	Type **C**	The Copy command menu appears.
3	Type **D**	The Copy Down subcommand form appears.
4	Type **9**	(You are copying the formula into nine rows.) The system proposes the correct response in the **starting at:** field, R7C4.)
5	Press **GO**	The system performs the copy, displaying all resulting balances in column 4, rows 8 through 16, and returns to the main command menu. Column 4 of your worksheet should now look like figure B-1.

Exercise 9: Splitting a Worksheet into Windows

In this exercise, you divide the worksheet into windows, first vertically as illustrated in figure B-2, then horizontally as illustrated in figure B-3.

STEP	YOUR ACTION	SYSTEM ACTION
1	Press the direction keys until the cell pointer is at R7C2	
2	Type **W**	The Window command menu appears.
3	Type **S**	The Window Split sub-command form appears.
4	Type **V**	The Window Split Vertical form appears. The system proposes the correct response in the **at col:** field.
5	Press **TAB**	The system enters **2** in the **at col:** field, and the highlight moves to the **linked:** field.
6	Type **Y**	
7	Press **GO**	The system splits the worksheet vertically between column 1 and 2, as illustrated in figure B-2. The cell pointer is on R7C2 in window #2, and the system returns to the main command menu.

STEP	YOUR ACTION	SYSTEM ACTION
8	Press the direction keys until the cell pointer is at R12C2	
9	Type **W**	The Window command menu appears.
10	Type **S**	The Window Split sub-command form appears.
11	Type **H**	The Window Split Horizontal form appears. The system proposes the correct response in the **at row:** field.
12	Press **TAB**	The system enters **12** in the **at row:** field, and the highlight moves to the **linked:** field.
13	Type **Y**	
14	Press **GO**	The system splits the worksheet horizontally between rows 11 and 12, as illustrated in figure B-3; the system returns to the main command menu.

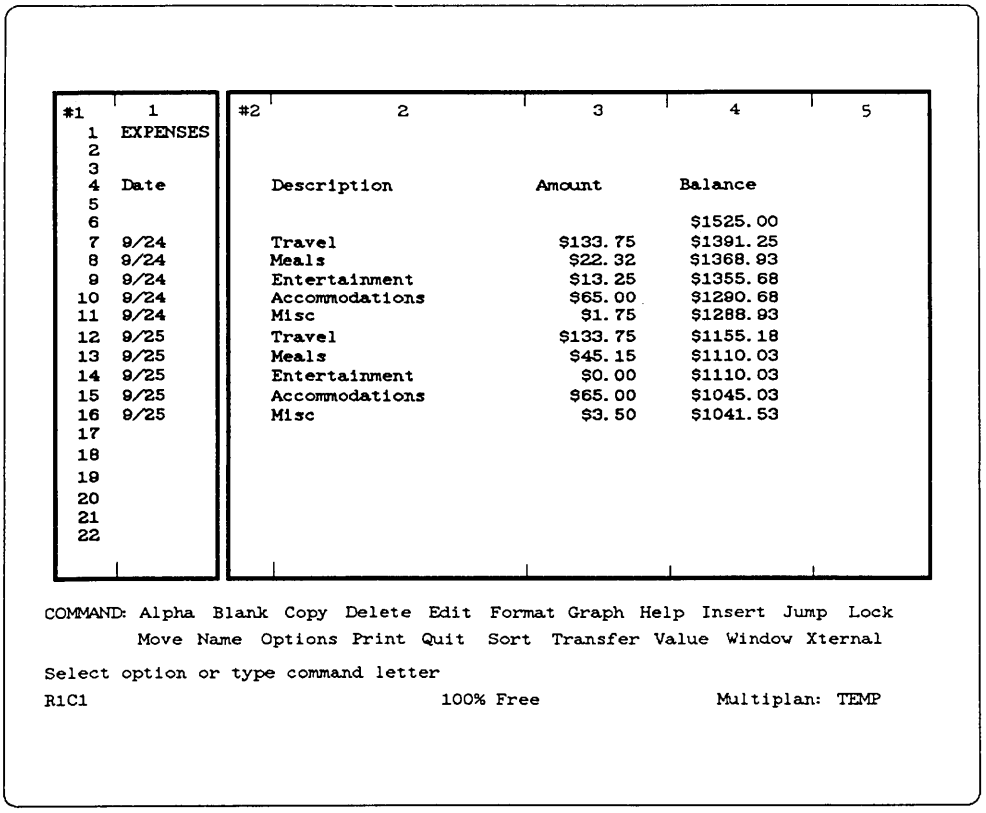


Figure B-2. Vertical Window Split

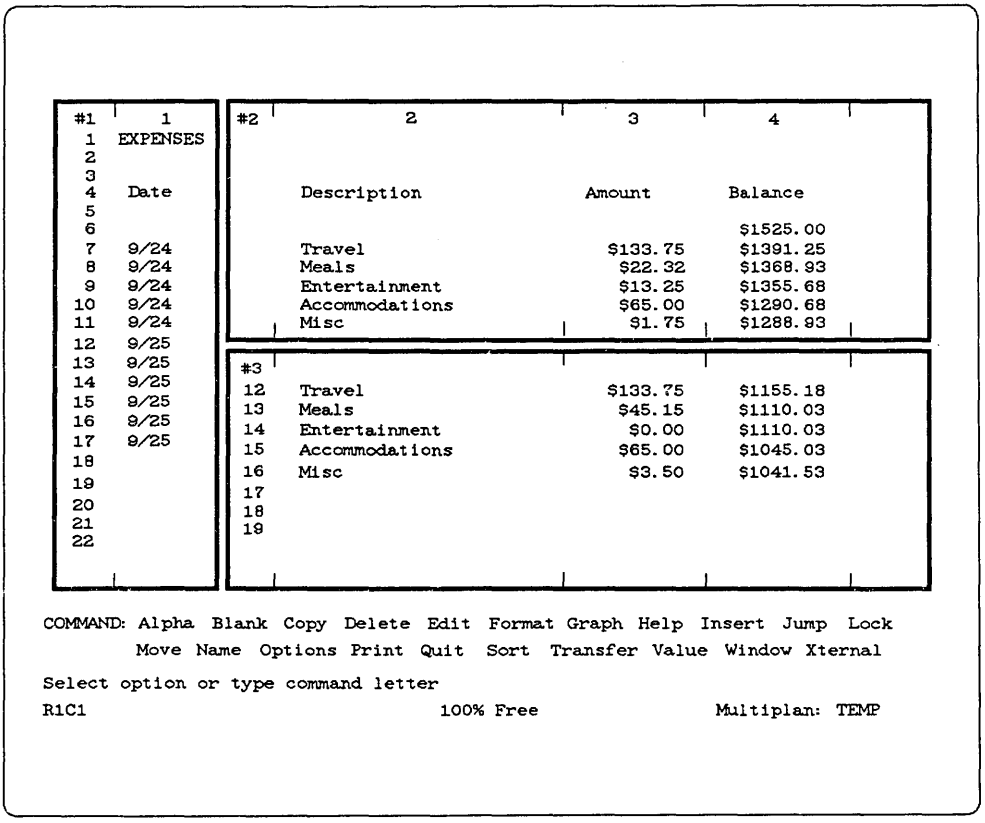


Figure B-3. Horizontal Window Split

Exercise 10: Closing Worksheet Windows

In this exercise, you close the windows created in exercise 9; your worksheet again looks like figure B-1.

STEP	YOUR ACTION	SYSTEM ACTION
1	If necessary, press **f7** to move the cell pointer into window #3	
2	Type **W**	The Window command menu appears.
3	Type **C**	The Window Close subcommand form appears. The system proposes the correct response, **3**, in the **window number:** field.
4	Press **GO**	The system closes the third window, and window #2 fills its space. The system returns to the main command menu, and the cell pointer is in window #2.
5	Type **W**	The Window command menu appears.
6	Type **C**	The Window Close subcommand form appears. The system proposes the correct response, **2**, in the **window number:** field.
7	Press **GO**	The system closes the second window, and window #1 fills the screen. Your worksheet should look like figure B-1.

CLOSING AND NAMING A MULTIPLAN WORKSHEET

Exercise 11: Using the Transfer Save Subcommand and Quit Command to Exit Multiplan

In this exercise, you store your worksheet under the name **Expenses** and exit Multiplan.

STEP	YOUR ACTION	SYSTEM ACTION
1	Type **T**	The Transfer command menu appears.
2	Type **S**	The Transfer Save subcommand form appears.
3	Type **Expenses**	
4	Press **GO**	The system stores the worksheet under the filename **Expenses** and returns to the main command menu.
5	Type **Q**	The Quit command form appears.
6	Press **GO**	The system exits Multiplan and returns to the Executive.

ACCESSING AN EXISTING MULTIPLAN WORKSHEET

Exercise 12: Using the Transfer Load Subcommand

In this exercise, you access the worksheet named **Expenses** illustrated in figure B-1.

STEP	YOUR ACTION	SYSTEM ACTION
1	Access **Multiplan**	The initial Multiplan screen appears.
2	Type **T**	The Transfer command menu appears.
3	Type **L**	The Transfer Load subcommand form appears.
4	Type **Expenses**	(Refer to note.)
5	Press **GO**	The system displays the worksheet named **Expenses** (figure B-1).

NOTE

If you are not sure of the filename you want to access, press any of the direction keys or **f4** or **f5** to view the disk file directory of the current transfer mode.

Move the highlight until the filename you want is highlighted (pressing **NEXT PAGE**, if necessary, when there is more than one page of filenames); then press **GO**.

EDITING A MULTIPLAN WORKSHEET

Exercise 13: Using the Edit Command to Change Values

In this exercise, you change the amount in row 9, column 3 of your worksheet to the amount in figure B-4.

STEP	YOUR ACTION	SYSTEM ACTION
1	Press the direction keys until the cell pointer is at R12C3	You are going to change 133.75 to 143.75.
2	Type **E**	The Edit command form appears with the edit cursor after the last digit of 133.75.
3	Press **f9** 5 times (you can experiment with other edit keys to change the number)	The edit cursor moves over the second digit of 133.75.
4	Type **4**	
5	Press **DELETE**	
6	Press **GO**	The data in R12C3 is **$143.75.** The system recalculates the balances in column 4, and returns to the main command menu. Row 12 of your worksheet should now look like figure B-4.

NOTE

When you replace the contents of an entire cell, it is more efficient to use the Value or Alpha commands, instead of using Edit.

Exercise 14: Using the Edit Command to Edit Text

In this exercise, you change the description in row 7, column 2 of your worksheet to the description in figure B-4.

STEP	YOUR ACTION	SYSTEM ACTION
1	Press the direction keys until the cell pointer is at R7C2	You are going to add **-Air** to **Travel.**
2	Type **E**	The Edit command form appears with the edit cursor after the second quotation mark of the text **"Travel".**
3	Press **f9**	The edit cursor moves over the last quotation mark.
4	Type **-Air**	The text in the Edit form is **"Travel-Air".**
5	Press **GO**	The system changes the text in R7C2 to read **Travel-Air** and returns to the main command menu. Row 7 of your worksheet should now look like figure B-4.

Exercise 15: Using the Insert Row Command to Add Rows

In this exercise, you add the new row 12 in figure B-4.

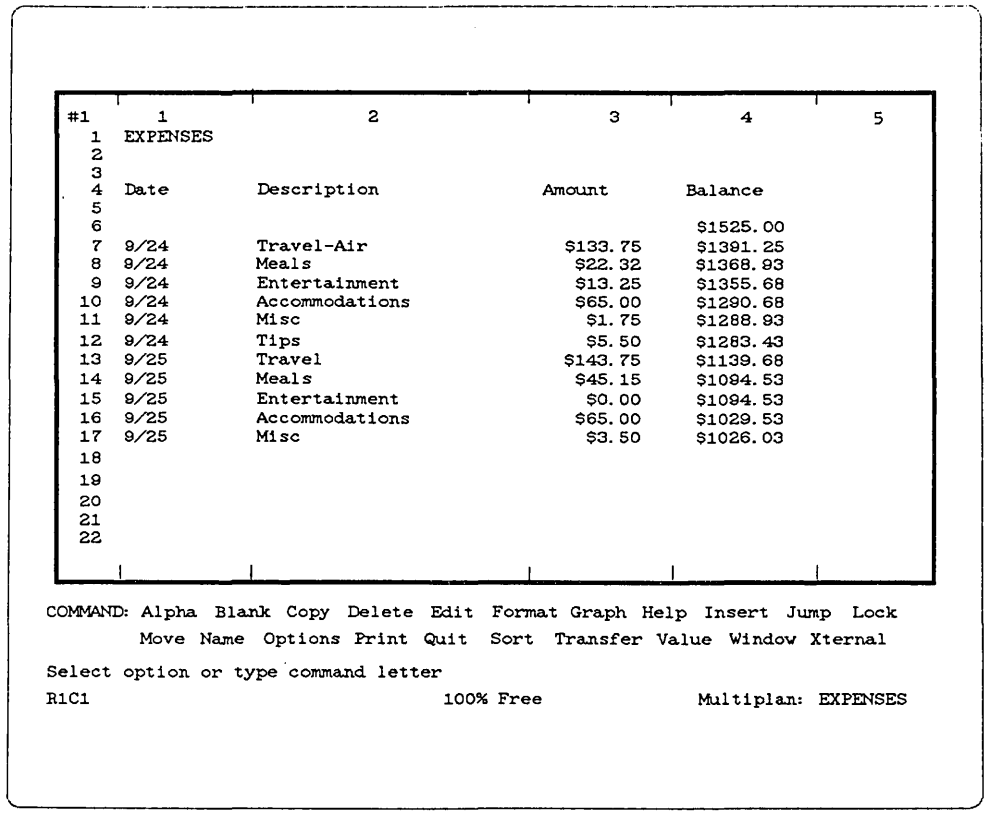
STEP	YOUR ACTION	SYSTEM ACTION
1	Press the direction keys until the cell pointer is at R12C1	
2	Type **I**	The Insert command menu appears.
3	Type **R**	The Insert Row subcommand form appears. (The command line reads, **INSERT ROW # of rows: 1; before row: 12; between columns: 1 and: 63.**)
4	Press **GO**	The system inserts a blank row and returns to the main command menu. (The cell pointer remains at R12C1.) The system alters the balances starting at R13C4 in column 4. The next exercise shows you how to correct them.
5	Type **A**	The Alpha command form appears.
6	Type **9/24**	

STEP	YOUR ACTION	SYSTEM ACTION
7	Press **Right Arrow**	The system enters **9/24** in R12C1 and the cell pointer moves to R12C2. The system returns to the main command menu.
8	Press **f1**	The system enters the Data Entry mode. (The **f1** key-top light is on.)
9	Type **Tips**	
10	Press **Right Arrow**	The system enters **Tips** in R12C2 and the cell pointer moves to R12C3.
11	Type **5.5**	
12	Press **Right Arrow**	The system enters **$5.50** in R12C3 and the cell pointer moves to R12C4.
13	Press **f1**	The system exits Data Entry mode (the **f1** key-top light is off), and returns to the main command menu.

Exercise 16: Using the Copy Down Subcommand to Recalculate Formulas

In this exercise, you use the formula created for your original worksheet to compensate for the added row and recalculate the balances in column 4.

STEP	YOUR ACTION	SYSTEM ACTION
1	Press the direction keys until the cell pointer is at R11C4	
2	Type **C**	The Copy command menu appears.
3	Type **D**	The Copy Down subcommand form appears.
4	Type **1**	(You only need to copy the formula into the new row since the other rows retain their original formula until you delete or change it.) The system enters **1** in the **Number of cells:** field. The system proposes the correct response in the **starting at:** field, R11C4.
5	Press **GO**	The system performs the copy, displaying recalculated balances in column 4, and returns to the main command menu. Your worksheet should look like figure B-4.



#1	1	2	3	4	5
1	EXPENSES				
2					
3					
4	Date	Description	Amount	Balance	
5					
6				$1525.00	
7	9/24	Travel-Air	$133.75	$1391.25	
8	9/24	Meals	$22.32	$1368.93	
9	9/24	Entertainment	$13.25	$1355.68	
10	9/24	Accommodations	$65.00	$1290.68	
11	9/24	Misc	$1.75	$1288.93	
12	9/24	Tips	$5.50	$1283.43	
13	9/25	Travel	$143.75	$1139.68	
14	9/25	Meals	$45.15	$1094.53	
15	9/25	Entertainment	$0.00	$1094.53	
16	9/25	Accommodations	$65.00	$1029.53	
17	9/25	Misc	$3.50	$1026.03	
18					
19					
20					
21					
22					

Figure B-4. Edited Business Expense Worksheet

APPENDIX C

USING VISICALC FILES IN MULTIPLAN

This appendix presents the following information about Multiplan in relation to VisiCalc:

- how to transfer VisiCalc files to Multiplan
- a comparison of Multiplan and VisiCalc functions and commands
- a description of some other significant differences between Multiplan and VisiCalc

For further information about VisiCalc, consult the vendor's manual.

HOW TO TRANSFER A VISICALC WORKSHEET TO MULTIPLAN

You transfer VisiCalc files to Multiplan with the Multiplan Transfer command by:

1. Setting the file mode for the transfer with the Transfer Options subcommand.
2. Transferring the file with the Transfer Load subcommand.

When files are in standard VisiCalc format, you use the Other mode to transfer them to Multiplan.

When files are in DIF™ (Data Interchange Format), a format for exchanging VisiCalc information with other applications, you must first convert them into the Multiplan SYLK format described in appendix D. Then you can transfer them to Multiplan with the Symbolic mode.

DIF is a trademark of Visicorp.

Setting the Transfer Mode

You set the transfer mode with the Transfer Options subcommand, using the following procedure:

1. Press **T** to activate the Transfer command. The Transfer command menu appears.

2. Press **O** to activate the Transfer Options subcommand.

   The following Transfer Options form appears with the highlight on **Normal** in the **mode:** field (parentheses indicate selection).

TRANSFER OPTIONS mode: (Normal) Symbolic Other path:[sys]<sales>

Select option

3. Choose a mode by using either of the following procedures:

   - For Symbolic (when VisiCalc DIF files have been converted to SYLK format), press **S**, or press the **Spacebar** to move the highlight to Symbolic; then press **TAB**.

   - For Other (when the file is in standard VisiCalc format), press **O**, or press the **Spacebar** to move the highlight to Other and press **TAB**.

   The highlight moves to the **path:** field, and the message **Enter text** appears.

4. To specify the current path setting (the proposed response), go to step 5.

   To change the path, enter the volume in square brackets ([]) and the directory in angle brackets (<>); for example, **[Win]<Sales>**.

5. Press **RETURN** or **GO** to execute the Transfer Options subcommand. The system sets the file transfer format mode and path you specify, and the main command menu replaces the Transfer Options form.

Transferring the File

When you load a VisiCalc file with the Transfer Load subcommand, the system merges the VisiCalc file with the active worksheet. To prevent merging, perform the following operations before loading the VisiCalc file:

- Save the active worksheet with the Transfer Save subcommand (refer to Naming and Storing a Worksheet, in section 5).
- Clear the active worksheet with the Transfer Clear subcommand, (refer to Clearing a Worksheet, in section 5).

To load a VisiCalc file in Multiplan, use the following procedure:

1. Rename the VisiCalc file with the Executive Rename or Copy commands to add the suffix **.vc** to the file (Multiplan will not recognize the file without this suffix).
2. Press **T** to activate the Transfer command. The Transfer command menu appears.
3. Press **L** to activate the Transfer Load subcommand. The following Transfer Load form appears with the edit cursor in the **filename:** field.

TRANSFER LOAD filename:

Enter a filename, or use direction/page keys to view directory

4. Enter the filename in the **filename:** field using either of the following procedures:
   - Type the name of the file (do not include the suffix).
   - Press any direction key (**Up Arrow, Down Arrow, Left Arrow, Right Arrow**), the **HOME** (**f4**) or **END** (**f5**) keys to display the disk file directory. The directory, containing a movable highlight, replaces the worksheet display.

Press the direction or **HOME** or **END** keys again to move the highlight to the filename you want (the system inserts the highlighted filename in the **filename:** field).

If necessary, press the **NEXT PAGE** or **PREV PAGE** keys to view succeeding or preceding directory pages. If you press these keys when there is only one directory page, the system emits an audio signal.

5. Press **RETURN** or **GO** to execute the Transfer Load subcommand. The the system displays the file you specify. It is merged with the previous active worksheet unless you cleared the active worksheet before loading. The main command menu replaces the Transfer Load form.

If you press any key other than a horizontal or vertical key, **NEXT PAGE, PREV PAGE,** or the **HOME** or **END** function keys when the disk file directory is displayed, the system redisplays the active worksheet and inserts the character of the key you pressed in the **filename:** field. The system interprets the pressing of other keys as part of the worksheet name.

When you transfer VisiCalc files to Multiplan, the system automatically compensates for the following differences between the applications:

- arithmetic operator precedence
- names and order of functions
- cell reference format (Multiplan converts all VisiCalc cell references to relative references)

MULTIPLAN/VISICALC FUNCTIONS

Multiplan supports all the functions used in VisiCalc, as well as other functions unique to Multiplan. Table C-1 compares Multiplan functions with their VisiCalc counterparts. Multiplan function names do not begin with @ as they do in VisiCalc.

Table C-1. Multiplan Functions and Their VisiCalc Counterparts

Multiplan	VisiCalc
ABS(N)	@ABS(N)
use PI()/2-ATAN(N/SQRT(1-N*N))	@ACOS(N)
AND(List)	@AND(List)
use ATAN(N/SQRT(1-N*N))	@ASIN(N)
ATAN(N)	@ATAN(N)
AVERAGE(List)	@AVERAGE(List)
INDEX(Area,Subscripts)	@CHOOSE
COS(N)	@COS(N)
COUNT(List)	@COUNT(List)
use undefined name	@ERROR
EXP(N)	@EXP(N)
FALSE()	@FALSE
IF((l,vl,v2)	@IF(l,vl,v2)
INT(N)	@INT(N)
ISERROR	@ISERROR(N)
ISNA(N)	@ISNA(N)
LN(N)	@LN(N)
LOG10(N)	@LOG10(N)
LOOKUP(N,Area)	@LOOKUP(N,Range)
MAX(List)	@MAX(List)
MIN(List)	@MIN(List)
NA()	@NA
NOT(l)	@NOT(l)
NPV(dr,List)	@NPV(dr,Range)
OR(List)	@OR(List)
PI()	@PI
SIN(N)	@SIN(N)
SQRT(N)	@SQRT(N)
SUM(List)	@SUM(List)
TAN(N)	@TAN(N)
TRUE()	@TRUE

Table C-2 lists functions unique to Multiplan, and table C-3 lists those unique to Enhanced Multiplan (refer to section 11 for descriptions of all Multiplan functions).

Table C-2. Functions Unique to Multiplan

Function	Description
COLUMN()	current column number
DOLLAR(N)	text form of N formatted as dollar amount; negative N shown in parentheses
FIXED(N,d)	text form of N formatted with d decimal places
LEN(T)	length of text T in characters
MID(T,s,c)	the c characters of text value T starting at s
MOD(N1,N2)	remainder of N1/N2
REPT(T,N)	text made of N repetitions of text T
ROUND(N,d)	value of N rounded to d decimal places
ROW()	current row number
SIGN(N)	-1, 0, or +1, depending on N
STDEV(List)	standard deviation
VALUE(T)	number value of text T

Table C-3. Functions Unique to Enhanced Multiplan

DELTA()	maximum absolute value changes from one iteration to the next
ITERCNT()	returns the current iteration count, starting with 1 for the first iteration

MULTIPLAN/VISICALC COMMANDS

Table C-4 shows Multiplan commands and their VisiCalc counterparts (refer to section 4 for general Multiplan command information, and to individual commands, in this guide). Table C-5 lists commands unique to Multiplan and table 3-6 lists those unique to Enhanced Multiplan.

Table C-4. Multiplan Commands and Their VisiCalc Counterparts

Multiplan	VisiCalc
Blank	/B
Transfer Clear	/C
Delete Columns, Delete Rows	/D
Edit, Alpha	/E
Format Cells	/F
Format Width	/GC
Format Default	/GF
/GO is not needed (refer to Some Features of Multiplan Commands, in this appendix)	/GO
Option	/GR
Insert Columns, Insert Rows	/I
Move Columns, Move Rows	/M
Print	/P
Copy	/R
Transfer Load	/SL
Quit	/SQ
Transfer Save	/SS
Window Split Titles	/T
No corresponding command	/V
Window Open, Window Split, Window Close	/W
Window Link	/WS, /WU
Jumpto Row-col	>
CHANGE WINDOW (f7) key	;
RECALC (f3) key	!
use references	#
REPT function (refer to table C-2)	/-

Table C-5. Commands Unique to Multiplan

- Format Options
- Graph
- Help
- Lock
- Name
- Sort
- Transfer Options
- Window Border
- Xternal

Table C-6. Commands Unique to Enhanced Multiplan

- `Print Exchange
- Options (Iteration and Completion Test)

Some Features of Multiplan Commands

You access Multiplan command fields with the **TAB** key. The **RETURN** (or **GO**) key executes Multiplan commands.

Multiplan's Insert, Delete, and Move commands can operate on more than one row or column at a time, and Multiplan automatically adjusts all references (absolute or relative) and name definitions following these commands (refer to Changing Cell Data Location, in section 3).

Since Multiplan automatically recalculates cells until all have reached the correct values (or until Multiplan finds a circular chain of references), the VisiCalc /GO (order of calculation) command is not needed. Multiplan orders calculation and takes care of forward references.

The Multiplan Format command sets the format of one cell or of a group of cells.

The Data Entry mode of Multiplan is the same as the /Command of VisiCalc.

SOME OTHER DIFFERENCES BETWEEN MULTIPLAN AND VISICALC

The following paragraphs describe some other significant differences between Multiplan and VisiCalc.

Cell References

Multiplan numbers both rows and columns, with the row number stated first. For example, you write the VisiCalc reference B3 as R3C2 in Multiplan.

In another example, you can write the VisiCalc formula

```
B1*B2*(1-B3)
```

in the following Multiplan formula, assuming that B1, B2, and B3 are named areas in Multiplan:

```
Quantity*Price*(1-Discount)
```

Text in Cells and Formulas

In Multiplan, unlike VisiCalc, a cell can contain text (refer to section 4). Multiplan also allows text within formulas, requiring that you enter it in quotation marks.

You can name worksheets or worksheet areas in Multiplan and use these names as references, either alone or in formulas (refer to Cell Names, in section 4).

Operators

Unlike VisiCalc, Multiplan evaluates formulas according to the precedence of operators (refer to Operators, in section 3). The & (concatenate) and % (percent) operators are unique to Multiplan.

Multiplan Windows

The active Multiplan worksheet area is also known as a window. It can be split into a maximum of eight windows (VisiCalc allows two).

With Multiplan, you can also specify the following window features with the Window command (refer to section 5):

- size and placement
- to have window borders or not
- to form title, horizontal, or vertical windows
- to link windows or not

APPENDIX D

SYMBOLIC LINK (SYLK) FILE FORMAT

This appendix states the purpose of Symbolic Link (SYLK) file format and describes in detail the structure of SYLK format.

THE PURPOSE OF SYLK FORMAT

SYLK file format is a means to exchange information between Multiplan and B 20 applications (for example, the OW25 word processor). SYLK files take up less disk space than files in the Normal and Other formats (refer to File Transfer Modes, in section 5).

Since SYLK files can represent an entire worksheet, you can generate a worksheet in an application in SYLK format for use in Multiplan. You can also store worksheets generated in Multiplan in SYLK format for access by other B 20 applications.

The following B 20 applications can create or edit SYLK files:

- Multiplan
- OW25 and WRITEone Word Processors
- Editor
- a user-written application

When you save a file created in Multiplan in the SYLK format, the system adds the suffix **.sl** to the name you give the file in the Transfer Save subcommand operation.

To load a SYLK file created in another application, you must first add the suffix **.sl** to the filename with the Executive Rename or Copy commands. However, you do not type the suffix as part of the filename during the Transfer Load subcommand (refer to procedures for loading files, in section 5).

STRUCTURE OF SYLK FORMAT

The following paragraphs identify the levels of SYLK format, describe in detail the content of each level, and list the restrictions on the order of records in SYLK files.

SYLK Format Levels

There are three levels of SYLK file formatting:

- SYLK record and field formats

  These formats provide:

  - the identification of the files
  - a degree of data compression
  - an easy way for a program to distinguish information that it needs from information that it does not need

- The C (cell or data point) records
- Other Multiplan-specific records and fields

  This collection of formats gives the communicating program complete control of a Multiplan session, including active features such as the number of windows, and format options.

The following paragraphs define SYLK format levels in detail.

SYLK Records and Field Formats

The system divides the contents of an ASCII SYLK file into records by CR (carriage return) or LF (linefeed) characters. In this process, the system:

- ignores empty records
- subdivides nonempty records into a record-type descriptor (RTD) optionally followed by a list of fields (a field-type descriptor (FTD) precedes each field in the list)

The RTD and the FTD determine the field contents, as follows:

- An RTD consists of one or two letters. It determines the meaning of the record according to the standards described in this section.
- An FTD consists of a semicolon and a single letter that determines the meaning of the field. The meanings of FTDs ;U, ;V, ;W ;X ;Y and ;Z are the same for all records. The meanings of other FTDs depend on the record type.
- The field contents can be arbitrary, except that CRs or LFs cannot be included, and semicolons must be doubled.

The system achieves a degree of data compression by automatically substituting the last field value in empty fields. Such fields are differentially encoded and are marked (diff) in their description.

For example, the FTDs ;X and ;Y determine x and y coordinates in a worksheet or other two-dimensional space containing data points. Coordinates of the first cell are 1,1. FTDs ;X and ;Y are differentially encoded; that is, the system omits them from records if it uses the last defined value for the required FTD.

The following paragraphs describe data records and fields that are currently defined. Figure D-1 shows a Multiplan worksheet and its corresponding SYLK file.

Multiplan Worksheet:

	1	2	3	4	5	
1	$567.23	$245.30	$5790.50	$600.00	$234.50	
2	$85.08	$36.80	$868.58	$90.00	$35.18	
3						

The area R1C1:5 is named **cost.**
The cells in R2 contain the formula R[-1]C*0.15

SYLK File:

```
ID;PMP
F;DG0G10
F;F$2D;R1
F;F$2D;R2
F;F$2D;R3
F;F$2D;R4
F;F$2D;R5
B;Y2;X5
NN;Ncost;ER1C1:5
C;Y1;X1;K567.23
C;X2;K245.3
C;X3;K5790.5
C;X4;K600
C;X5;K234.5
C;Y2;X1;ER[-1]C*0.15;D;K85.0845
C;X2;S;R2;C1;K36.795
C;X3;S;K868.575
C;X4;S;K90
C;X5;S;K35.175
W;N1;B;A1 1
E
```

Figure D-1. Multiplan Worksheet and Corresponding SYLK File

C Records

C records describe a data point that exists in a two-dimensional space with coordinates ;X and ;Y. The Multiplan cell concept is one example of a data point.

In addition to its coordinates, a data point can also possess a number or text value, an expression, a protection state (locked or unlocked), and several Multiplan-specific properties. The system can specify formatting properties for data points in a separate record type (refer to F Records, in this section).

C record fields are:

;X, ;Y — Differentially encoded (diff). Cell coordinates.

;K — Value of the data point. Numerical values are in decimal or exponential form (refer to Multiplan **Gen** format code, in section 6, under Formatting Cells). Text values, as well as logical values (TRUE and FALSE) are enclosed in quotation marks. Error values are preceded by a pound sign (#) and appear as they do in Multiplan.

;P — Protection state. If ;P accompanies the data, it is locked; otherwise, it is not locked.

;E — An expression that computes the value of the data point. The field contents duplicate Multiplan formulas.

;R, ;C — (diff). Used by ;S.

;S — Expression for the data point is given at another coordinate. ;C (column) represents the x coordinate; ;R (row) represents the y coordinate. The field contents are decimal coordinates.

;E must not appear with ;S. The data point at (;R, ;C) must be marked with either ;D or ;G. In the latter case, the value of the data point is taken to be the (constant) expression.

;D The ;E expression is shared by some other data point.

;G The ;K value is shared by some other data point. The ;E expression must not appear.

Other Multiplan-Specific Records and Fields

The following paragraphs describe other SYLK file records and fields that relate to Multiplan.

B Records

B records define the bounds of the two-dimensional space of data points, and appear at the beginning of a SYLK file.

E Records

E records define the end of the SYLK file (refer to figure D-1).

F Records

F records describe the Multiplan formatting properties of individual cells or of the whole worksheet (refer to Formatting Cell Data, in section 6).

The F record fields are:

;X, ;Y Differentially encoded (diff). Cell coordinates.

;Fc1nc2 The contents define (diff) cell formatting properties, where c1 is a one-character formatting code (D, C, E, F, G, $, or *), n is the "# of decimals" argument, and c2 is a one-character alignment code (D, C, G, L, or R).

;R, ;C — ;F properties are applied to a whole row or whole column of the Multiplan worksheet. Contents are decimal row or column numbers, respectively.

;Dclnc2n3 — Default format properties are defined as in ;F (except that the D codes cannot be used). The default column width is indicated by n3.

;K, ;E — These fields appear if Format Options are set for commas and formulas, respectively.

;Wnl n2 n3 — Define the widths of a group of columns in the worksheet, where nl is the first column (x), n2 is the last column in the group, and n3 is the width of the columns in the group expressed as the number of characters. Columns that are not mentioned in any format record have the default width setting.

ID Record

The first record in the SYLK file must be an ID record. This convention helps with the identification of the file as a SYLK file.

The ID record field is:

;Pname — The name of the program that produced the file (for example, MP).

NN Records

The NN record defines a Multiplan name as a union of rectangular areas expressed with absolute references.

The NN record fields are:

;Nname The name to be defined.

;Ee An expression describing the area. Its general form is

Rn1l:nl2Cnl3:nl4,Rn2l:n22Cn23:n24, . . .

You can write ranges over single values without the ":" operator. You can omit ranges Rl:255 or Cl:63 (but not both).

NE Records

The NE record describes a link to an inactive sheet.

The NE record fields are:

;F Filename (or logical filename) for source sheet.

;S Description of the source area, typically a name of a group of cells.

;E Expression defining target area, as in NN.

NU Records

The NU record describes an external filename substitution.

The NU record fields are:

;L Filename (or logical filename).

;F Filename to be used instead of ;L.

W Records

The window structure of a Multiplan screen is described in part by the states of the windows and in part by the operations that create the windows. To discover the correct description for a particular combination of windows, you use Multiplan to set up the windows and then inspect SYLK output from Multiplan.

The W record fields are:

;N	Multiplan window number.
;Ay x	Coordinates of the cell shown in the upper left corner of window ;N.
;B	Window ;N is bordered if (and only if) ;B appears.
;STcy cx ;SHl cy ;SVl cx	Split window ;N to create new window. The window number of the new window is one greater than the largest number previously in use. The letters T, H, or V define Title, Horizontal, or Vertical splits, respectively. The symbol l stands for the letter L if the windows are to be linked for scrolling; otherwise it is omitted. The term cx is the number of character positions in the new window; cy is the number of screen lines in the new window.

Order of Records in SYLK Files

The following are restrictions on the order of records in SYLK files:

- ID must be the first record.
- B should be used for Multiplan input, but it is not required.
- For Multiplan C records, ;D or ;G must appear before another C record that refers to it (with ;S, ;R, ;C).
- Name definition should precede name use for efficiency, although this is not required.
- Window splits and window properties must be in strict logical order.
- NU records must precede NE records.
- E must be the last record.

APPENDIX E

INSTALLING MULTIPLAN AND ENHANCED MULTIPLAN

This appendix describes Multiplan and Enhanced Multiplan installation procedures.

Before installing either Multiplan or Enhanced Multiplan, you should copy the master diskette to another floppy disk to make a working copy of the software diskette. Then you should file the master diskette in a safe place.

INSTALLING MULTIPLAN ON A HARD DISK

You can install Multiplan on the hard disk of a master or cluster workstation or on both. The software is installed in the System files of the System directory. If you install it on the hard disk of a master workstation, you can access Multiplan and Multiplan files from the master and from the cluster.

If you install Multiplan on the hard disk of a cluster workstation, you can access it only from the cluster. You can store Multiplan files created on the cluster on the master or on the cluster.

To install Multiplan on a hard disk, use the following procedure:

1. Turn on your workstation.

2. Insert your working copy of the B 20 Systems Multiplan 3.0 diskette in the floppy drive [f0]. Do NOT press the **RESET** button.

3. If your system is Password-protected, make sure that you are logged onto the [Sys]<Sys> directory with the proper password.

4. If you have the Software Installation command on your system, activate it by typing **Software Installation** in the Executive command field; then press **GO**. Proceed to step 5.

If you do not have the Software Installation command on your system, activate the Submit command by typing **Submit** in the Executive command field; then press **RETURN.** The following Submit command form appears:

```
Submit

     File list
     [Parameters]
     [Force expansion?]
     [Show expansion?]
```

Type **[f0]<sys>Install.sub** in the **File list** field; then press **GO.**

5. Follow the instructions the system displays on the screen during the installation process.

6. When the Multiplan installation is complete, remove the working Multiplan software diskette, and store it in a safe place.

USING MULTIPLAN ON A DUAL FLOPPY STANDALONE WORKSTATION

You do not install Multiplan on a dual floppy standalone workstation. You activate Multiplan from the floppy diskette each time you want to use it.

To activate Multiplan on a dual floppy standalone workstation, use the following procedure:

1. Boot your system using a working copy of the BTOS boot diskette and log onto the Executive.

2. Remove the BTOS diskette and insert the working copy of the B 20 Systems Multiplan 3.0 diskette in the same drive you use to boot the system.

3. Type **Multiplan** in the command line; then press **GO.**

4. Insert a write-enabled, properly initialized diskette for the saving of Multiplan data in the other drive.

5. After you terminate the Multiplan session by executing the Quit command, remove the working Multiplan diskette. The system prompts you to insert a system diskette.

6. Insert the system-bootable diskette in the drive you use to boot the system; then press **GO.** The system returns to the Executive.

INSTALLING ENHANCED MULTIPLAN ON A HARD DISK

You can install Enhanced Multiplan on the hard disk of a master or cluster workstation, or on both. If you install it on the hard disk of a master workstation, you can access Enhanced Multiplan and its files from the master and from the cluster.

If you install Enhanced Multiplan on the hard disk of a cluster workstation, you can access it only from the cluster. You can store Enhanced Multiplan files created on a cluster on the master or on the cluster.

To install Enhanced Multiplan on a hard disk, use the following procedure:

1. Turn on the workstation.

2. Insert your working copy of the B 20 Systems Enhanced Multiplan diskette B20EM1-1 in the floppy drive [f0]. Do NOT press the **RESET** button.

3. If your system is Password-protected, make sure that you are logged onto the [Sys]<Sys> directory with the proper password.

4. Activate the Software Installation command by typing **Software Installation** in the Executive command field; then press **GO.**

5. Follow the instructions the system displays on the screen during the installation process. You are instructed to specify by the following numbers the type of installation you are making:

   1 - installation on a B20 system from a B20 standalone, master, or cluster station.

   2 - installation on an XE520 system from a B20 cluster.

6. When the Enhanced Multiplan installation is complete, remove the working software diskette, and store it in a safe place.

INSTALLING ENHANCED MULTIPLAN FOR USE ON A DUAL FLOPPY STANDALONE WORKSTATION

You install Enhanced Multiplan for use on a dual floppy standalone workstation by transferring a file from the working copy of the BTOS diskette number 2 to the working copy of the B20EM1-1 diskette.

You then activate Enhanced Multiplan from the B20EM1-1 floppy diskette each time you want to use it.

To install Enhanced Multiplan on the working copy of your B20EM1-1 diskette, use the following procedure:

1. Boot your system using a working copy of the BTOS boot diskette and log onto the Executive. Remove the boot diskette.

2. Insert a working copy of the BTOS diskette number 2 in floppy drive [f0]. Be sure this diskette is write-enabled.

3. Insert a working copy of diskette B20EM1-1 in floppy drive [f1]. Be sure this diskette is write-enabled.

4. Activate the Submit command by typing **Submit** in the Executive command field; then press **RETURN.** The following Submit command form appears:

Submit

File list
[Parameters]
[Force expansion?]
[Show expansion?]

Type **[fl]<Sys>EMFloppy.sub** in the **File list** field; then press **GO.**

6. Follow the instructions the system displays on the screen during the installation process.

7. When the Enhanced Multiplan installation is complete, remove and write-protect both the BTOS and B20EM1-1 working diskettes.

The Enhanced Multiplan diskette is now ready to use as a dual floppy run diskette.

APPENDIX F

SUMMARY OF DIFFERENCES BETWEEN MULTIPLAN AND ENHANCED MULTIPLAN

This appendix lists the differences between the Multiplan and Enhanced Multiplan software packages. The differences fall into two categories: (1) software and hardware requirements, and (2) operational capabilities exclusive to Enhanced Multiplan.

You can load Multiplan worksheets under Enhanced Multiplan. You can also load Enhanced Multiplan worksheets under Multiplan with a size limitation of 64K.

NOTE

The memory available for an Enhanced Multiplan worksheet is dependent upon hardware, operating system, and installed systems services. You should assess available memory before attempting to load an Enhanced Multiplan worksheet on a workstation different from the one where it was created.

On the status line of the Multiplan display, the worksheet name is **Multiplan: (Worksheet Name)**; on the Enhanced Multiplan display, the Worksheet name is **Emultiplan: (Worksheet Name)**.

You can activate Multiplan with a user name directly from the SignOn form, or you can use the Executive command. The proper entries and the directory you access are shown in table F-1.

You can configure a user file to activate Multiplan using personalized names, passwords, and directories (refer to the B 20 Systems Standard Software Operations Guide).

Table F-1. Entries that Activate Multiplan and Enhanced Multiplan

Application	User Name	Executive Command
Multiplan	**Multiplan** (logged in directory is **Multiplan**) Customized user name and directory	**Multiplan** (directory is that of the current path)
Enhanced Multiplan	**Emultiplan** (logged in directory is **Emultiplan**) Customized user name and directory	**Enhanced Multiplan** (directory is that of the current path)

SOFTWARE AND HARDWARE REQUIREMENTS

Table F-2 lists the similarities and differences between the hardware and software requirements of Multiplan and Enhanced Multiplan.

Table F-2. Software and Hardware Requirements

MULTIPLAN	ENHANCED MULTIPLAN
HARDWARE	
B 20 Systems hard disk operating as a standalone or as a master workstation in a clustered environment	B 20 Systems hard disk operating as a standalone or as a master workstation in a clustered environment
B 25 dual floppy system	B 25 dual floppy system
XE520 master with a B 20 System workstation as a cluster	XE520 master with a B 20 System workstation as a cluster
Disk Space	
minimum hard disk requirement - 5 mb for B 21, 10 mb for B 22 and B 25 workstations, and 36 mb for XE520 master/cluster workstation	minimum hard disk requirement - 5 mb for B 21, 10 mb for B 22 and B 25 workstations, and 36 mb for XE520 master/cluster workstation
software disk space requirements - 366 pages	software disk space requirements - 647 pages
129 additional pages with Business Graphics Package	129 additional pages with Business Graphics Package
Memory	
minimum memory for hardware configuration - 256K for B 25 workstations; 384K for B 21 workstations	minimum memory for hardware configuration - 512K for B 25 workstations; 384K for B 21 and B 22 workstations
memory range for executing software: minimum - 90K maximum - 172K	memory range for executing software: minimum - 200K maximum - all memory available on the current partition

Table F-2. Software and Hardware Requirements (Cont)

MULTIPLAN	ENHANCED MULTIPLAN
SOFTWARE	
B 20 Operating System Release 3.0 and higher	B 20 Operating System Release 4.0 and higher
Business Graphics Package Release 3.0 and higher (a B 25 Graphics workstation requires release 4.0.3)	Business Graphics Package Release 4.0.3 and higher

OPERATIONAL CAPABILITIES EXCLUSIVE TO ENHANCED MULTIPLAN

The following paragraphs describe operational capabilities that are exclusive to Enhanced Multiplan.

Document Exchange Format (DEF)

Document Exchange Format (DEF) is a disk file format accessible with the Print Exchange command that lets you file an Enhanced Multiplan worksheet in a format compatible with the OW25 and WRITEone word processors (refer to Filing a Worksheet with the Print Exchange Subcommand, in section 6).

Iteration Option

The iteration option, accessible under the Options command, allows you to resolve problems such as simultaneous equations, internal rates of return, and roots of equations. Iteration is a repeated calculation that uses the results of the previous calculation instead of an unknown quantity (refer to Enhanced Multiplan Iteration Function, in section 10).

Total Memory Usage

Enhanced Multiplan uses all available memory in the current partition for a worksheet. The minimum memory requirement is 200K.

Color Display

Enhanced Multiplan lets you display a worksheet in color on a B 25 system color monitor.

Communication with B 20 Mail Manager

When your workstation is properly connected to the B 20 Mail Manager electronic mail system, the Enhanced Multiplan system displays a message in the lower righthand corner of your screen to alert you when you have new mail.

APPENDIX G

GLOSSARY

ABS(N)

ABS(N) is a function that returns the absolute value of the argument N.

Absolute Cell Reference

An absolute cell reference expresses the exact location of a cell or cells.

ACTION Key

The **ACTION** key can be used with the **FINISH** key to exit Multiplan in an emergency.

Alpha Command

The Alpha command allows you to insert text in the active cell.

Alphanumeric Keys

You use alphanumeric keys to type characters, numbers, and spaces, and to activate commands. All alphanumeric keys have repeat action.

AND(List)

AND(List) is a function that returns the logical value TRUE if all the conditions in List are true; otherwise, it returns the value FALSE.

Argument

An argument is the independent variable value on which a function operates.

ATAN(N)

ATAN(N) is a function that calculates the arc tangent (inverse tangent) function of the argument, yielding an angle in radians in the range (- /2 to + /2). You can use ATAN to calculate arc sine and arc cosine.

AVERAGE(List)

AVERAGE(List) is a function that calculates the average of the specified argument values.

BACKSPACE Key

When you press the **BACKSPACE** key, the edit cursor moves one space to the left, deleting the character to the left of the edit cursor. You can also use the **BACKSPACE** key to move the highlight from one choice to another in menus and from one option to another in form fields.

Bar Graph Option (Format Code)

The Bar Graph option allows you to round numbers to an integer (whole number) and display asterisks to represent that number in the indicated cell.

Binary Search Model

The binary search model is a mathematical iteration process that searches for the roots of arbitrary equations using the binary search technique.

Blank Command

The Blank command allows you to delete data in a cell or group of cells.

B Records (SYLK Format)

B records define the bounds of the two-dimensional space of data points, and appear at the beginning of a SYLK file.

Business Graphics Package

The Business Graphics Package is a B 20 application program supported on all B 20 graphics workstations. It enables you to produce bar, line, and pie graphs with the Multiplan Graph command.

CANCEL Key

You press the **CANCEL** key to cancel a command and replace a displayed form or menu with the main command menu.

Cell

A cell is the worksheet area where a row and column intersect. You use it to store all worksheet information.

Cell Name

You can assign a cell name to a cell or cell area as an alternative to the usual cell reference.

Cell Pointer

The cell pointer is a rectangular, highlighted box that assumes the size of the cell in which you position it. It marks the active cell.

Cell Reference

A cell reference expresses the location of a cell or group of cells in row and column numbers, or by the name of the cell or cells, if any. You use cell references in formulas, functions, and form fields.

Center Option (Cell Alignment)

The Center option allows you to center cell content between cell margins.

CHANGE WINDOW Key (f7)

When you press the **CHANGE WINDOW** key, the cell pointer moves to the next window.

CODE Keys

You press one of the two **CODE** keys in combination with cell pointer keys to move the cell pointer quickly.

COLUMN()

COLUMN() is a function that returns the number of the column in which the formula containing this function appears (you do not enter any argument value).

Combination Operators

Combination operators represent combining of values or references; for example, the colon (:) is a combination operator indicating range from the value that precedes it to the value that follows it.

Command Mode

The Command mode is one of two modes in which you can enter data into worksheet cells. When in command mode, the system gives you constant access to all commands unless you have already activated a command.

Comparison Operators

Comparison operators represent comparison between two values; for example greater than (>), less than (<), or equal (=) are comparison operators.

Completion Test

The Completion test is related to the Enhanced Multiplan iteration option. It is a formula in a referenced cell that returns a logical value (TRUE or FALSE) as a result of the iteration process.

Continuous Option (Format Code)

The Continuous option allows you to display data that is longer than cell width, beginning at the left cell margin and continuing into the next cell to the right; the cell(s) to the right must be blank and formatted for continuous display.

Convergence

Convergence is the concept enabling the Enhanced Multiplan iteration option to calculate more precise values. It depends on the mathematical model and initial values.

Copy Command

The Copy command allows you to copy the contents and format from one cell or cells to another cell or group of cells within the active worksheet. It does not alter the cell from which you copy.

Copy Down Subcommand

The Copy Down command allows you to copy data into cell(s) immediately below the cell(s) from which you copy.

Copy From Subcommand

The Copy From command allows you to copy data from any cell(s) to any other cell(s).

COPY Key

You press the **COPY** key to activate the Copy command.

Copy Right Subcommand

The Copy Right subcommand allows you to copy data into cell(s) immediately to the right of the cell(s) from which you copy.

COS(N)

COS(N) is a function that calculates the cosine of the argument, an angle in radians.

COUNT(List)

COUNT(List) is a function that returns the count of number values represented by List.

C Records (SYLK Format)

C records describe a data point that exists in a two-dimensional space with coordinates ;X and ;Y. The Multiplan cell concept is one example of a data point.

DATA ENTRY/COMMAND Key (f1)

Each time you press the **DATA ENTRY/COMMAND** key, you move Multiplan alternately between the Data Entry Mode (keytop light is lit) and the Command Mode (keytop light is out).

Data Entry Mode

Data entry mode is one of two modes in which you can enter data into worksheet cells. When in data entry mode, the system holds the command line ready for data entry unless you access a command.

Data Point (SYLK Format)

In addition to its coordinates, a data point (C record) can also possess a number or text value, an expression, a protection state (locked or unlocked), and several Multiplan-specific properties. The system can specify formatting properties for data points in a separate record type.

Default Cell Format

The default cell format is the format the system sets when you first activate Multiplan.

Default Cell Width

The default cell width is ten characters.

Default Option (Cell Alignment)

The default option allows you to align cell content according to specifications in the Format Default Cells subcommand.

Default Option (Format Code)

The default option allows you to apply format code according to specifications in the Format Default Cells subcommand.

DEF Format

DEF is a disk file format that is accessible with the Print Exchange command; it lets you print an Enhanced Multiplan worksheet to a disk file in a format compatible with the OW25 and WRITEone word processors.

Delete Column Subcommand

The Delete Column subcommand allows you to delete an entire column or part of a column.

Delete Command

The Delete command allows you to delete a row or column, or part of a row or column on the active worksheet.

DELETE Key

You press the **DELETE** key to activate the Delete command.

Delete Row Subcommand

The Delete Row subcommand allows you to delete an entire row or part of a row.

DELTA()

DELTA() is a function that returns the maximum absolute value of the changes in values from one iteration to the next when used with the iteration option of Enhanced Multiplan (refer to section 10 for further information).

Dependent Worksheet

A dependent worksheet is one that receives information from another worksheet through an external link.

Direction/Cell Pointer Keys

You use the Direction/Cell Pointer keys to move the cell pointer, scroll the worksheet one column or row at a time, or display the following lists: worksheet file names, cell and cell area names, and external worksheet links.

Display Keys

You use display keys to scroll the worksheet display by one full screen, or to alternate between 80- and 132-character per inch displays (B 22 workstations only). All display keys have repeat action.

DOLLAR(N)

DOLLAR(N) is a function that converts the numerical argument to text showing a dollar amount.

Dollar Option (Format Code)

The Dollar option allows you to display money amounts with a leading dollar sign, and to display negative numbers in parentheses.

Edit Command

The Edit Command allows you to change data in the active cell.

Edit Cursor

The edit cursor is a cursor that appears and moves automatically as you enter or edit alphanumeric characters in a form field.

END Key (f5)

When you press the **END** key, the cell pointer moves to the last nonblank worksheet cell.

Enhanced Multiplan

Enhanced Multiplan is an electronic accounting worksheet you can use for calculating and manipulating data. Enhanced Multiplan is two to four times faster than Multiplan in many operations (refer to Operational Capabilities Exclusive to Enhanced Multiplan, in appendix F).

E Records (SYLK Format)

E records define the end of the SYLK file.

Error Values

The system generates an error value when you use a Multiplan function, operation, or reference incorrectly.

EXP(N)

EXP(N) is a function that calculates e (2.7182818..., the base of the natural logarithm) to the power of the argument. This is the inverse function of LN.

The system calculates powers of other bases using the exponentiation operator (^).

FALSE()

FALSE() is a function that returns the logical value FALSE.

Financial Model

The financial model is a mathematical model you can use for business applications of the iteration process.

FINISH Key

You press the **FINISH** key to conclude a Multiplan session. You also press the **FINISH** key at the conclusion of the Graph command; the system executes the Graph command and displays the Multiplan main menu.

FIXED(N,Digits)

FIXED(N,Digits) is a function that converts the specified value to text, showing a fixed-decimal number rounded to the number of decimal digits you specify.

Fixed Point Option (Format Code)

The Fixed Point option allows you to display numbers rounded to a fixed number of digits of decimal fraction.

Format Cells Subcommand

The Format Cells subcommand allows you to alter the alignment and format codes of selected cells.

Format Command

The Format command allows you to set and change the default cell format; for example, you can center data, or widen a cell. It also allows you to choose whether or not to include commas in numeric values, display formulas in cell, or to have 80- or 132-character screen display width on a B 22 workstation.

Format Default Subcommand

The Format Default subcommand allows you to set a "most frequently used" format for the entire worksheet.

Format File

A format file is a file you specify in the Graph command that saves the format of a graph without saving the actual graph data. The format includes the size, location, and relative dimensions of the graph, and its text, patterns, and colors. The system adds the suffix **.fm** to format files and displays the suffix in the Executive file list.

Format Options Subcommand

The Format Options subcommand allows you to specify the following display features: the inclusion of commas in numeric values, displaying formulas in cells instead of values, and a screen display width of 80 or 132 characters (B 22 workstation only).

Format Width Subcommand

The Format Width subcommand allows you to set the width of selected columns.

Form Fields

Form fields contain instructions to the system during command operations.

Formulas

Formulas are mathematical instructions to the system for calculating specific values.

F Records (SYLK Format)

F records describe the Multiplan formatting properties of individual cells or of the whole worksheet.

Function Keys

You use function keys to activate, cancel, and execute Multiplan commands, to choose command or data entry modes of operation, and to direct Multiplan recalculation and reference functions. The only function key with repeat action is the **DELETE** key.

Functions

Functions are expressions that perform a transformation of the input arguments. They are built into expressions the system recognizes, such as SUM and AVERAGE.

Function Statement

A function statement is composed of a function name and the argument for the function; the argument is enclosed in parentheses.

General Option (Cell Alignment)

The General option allows you to align text at the left cell margin and align numbers at the right cell margin.

General Option (Format Code)

The General option allows you to display numbers as precisely as possible in the available cell width, inserting appropriate scientific notation automatically.

GO Key

When you press the **GO** key, you activate and execute Multiplan commands. It is used as an alternative to pressing the **RETURN** key.

Graph Bar Subcommand

The Graph Bar subcommand allows you to produce a labeled bar graph from selected worksheet values.

Graph Command

The Graph command allows you to choose the graphics option to present worksheet values with the subcommands of the Graph command. You must have the Business Graphics Package installed on your system.

Graph Line Subcommand

The Graph Line subcommand allows you to produce a labeled line graph from selected worksheet values.

Graph Options Subcommand

The Graph Options subcommand allows you to specify the following three options: a graph title, a palette of colors on B 21 and B 25 color graphics workstations, and graph labels.

Graph Pie Subcommand

The Graph Pie subcommand allows you to produce a labeled pie graph from selected worksheet values.

Help Command

The Help command allows you to get help at any point in the Multiplan session.

HELP Key

When you press the **HELP** key, you activate the Help command.

Highlight

The highlight is a lighted area that indicates at which point you can make a choice of options. It appears automatically on the first choice in command or subcommand menus when you activate them. It also appears in the first field of command and subcommand forms when they initially appear on the screen.

HOME Key (f4)

When you press the **HOME** key, the cell pointer moves to the first worksheet cell.

Horizontal Key

The **Left Arrow** and **Right Arrow** keys are referred to as horizontal keys. When you press the **Left Arrow** key, the cell pointer moves one cell to the left; when you press the **Right Arrow** key, the cell pointer moves one cell to the right.

ID Record (SYLK Format)

The first record in the SYLK file must be an ID record. This convention helps with the identification of the file as a SYLK file.

IF(Logical,Then Value,Else Value)

IF(Logical,Then Value,Else Value) is a function. If Logical is true, it returns Then Value; otherwise, it returns Else Value. The Then and Else Values can be numbers, text, or logical values.

INDEX(Area,Subscripts)

INDEX(Area,Subscripts) is a function that returns the value of a cell selected by Subscripts from Area.

Insert Column Subcommand

The Insert Column subcommand allows you to insert a column of new cells into a worksheet.

Insert Command

The Insert command allows you to insert new cells into a worksheet.

Insert Row Subcommand

The Insert Row subcommand allows you to insert a row of new cells into a worksheet.

Integer Option (Format Code)

The Integer option allows you to round numbers with decimal fractions to integers (whole numbers).

Internal Rate of Return

The Internal Rate of Return (IRR) of a group of cash flows is the rate for which NPV(Rate,Cash_Flow)=0.

INT(N)

INT(N) is a function that returns the largest integer less than or equal to N.

ISERROR(Value)

ISERROR(Value) is a function that returns the logical value TRUE if the argument is an error value; otherwise, it returns FALSE. You test for error values with this function.

ISNA(Value)

ISNA(Value) is a function that returns the logical value TRUE if the argument is the #N/A error value. Otherwise, returns FALSE.

Iteration Option

The iteration option of Enhanced Multiplan repeats calculations using the results of a previous calculation instead of an unknown quantity. Iteration allows you to resolve problems such as simultaneous equations, internal rates of return, and roots of equations.

ITERCNT()

ITERCNT() is a function that returns the current iteration count, starting with 1 for the first iteration, when you have specified the iteration feature in the Enhanced Multiplan Options command.

Jump Command

The Jump command allows you to move the cell pointer quickly to any section of a worksheet.

Jump Name Subcommand

The Jump Name subcommand allows you to move the cell pointer to the first cell of a named worksheet area.

Jump Row-col Subcommand

The Jump Row-col subcommand allows you to move the cell pointer to a specified worksheet cell.

Jump Window Subcommand

The Jump Window subcommand allows you to move the cell pointer to a specified worksheet window or allows you to move the active window position on the worksheet.

Left Option (Cell Alignment)

The Left option allows you to align cell content at the left cell margin.

LEN(T)

LEN(T) is a function that returns the number of characters in the text value.

List

List is an argument abbreviation that indicates actual values or cell references separated by commas.

LN(N)

LN(N) is a function that calculates the natural logarithm of the argument.

Lock Cells Subcommand

The Lock Cells subcommand lets you lock or unlock an individual cell or cells.

Lock Command

The Lock command allows you to lock (protect from change) a cell or group of cells.

Lock Formulas Subcommand

The Lock Formulas Subcommand allows you to lock all worksheet cells containing text or formulas. It protects all values generated by formulas, but does not affect cells containing numbers.

LOCK Key

You press the **LOCK** key to type all alphabetic characters in uppercase. Pressing the **LOCK** key does not affect the symbol or numeric characters; you must press **SHIFT** to type the uppercase symbols.

LOG10(N)

LOG10(N) is a function that calculates the base 10 logarithm of the argument.

Logical

Logical is an argument type that describes a formula expressing a logical relation.

Logical Values

Logical values are TRUE and FALSE values that the system returns as a result of your use of comparison operators, functions, or a combination of functions and comparison operators.

LOOKUP(N,Table)

LOOKUP(N,Table) is a function that returns the contents of a cell from the last row or column of Table. Table is a group of cells on the worksheet. The dimensions of Table determine the direction of the search.

Mathematical Operators

Mathematical operators represent a process to be performed on a value called an operand; for example, the plus sign (+) is a mathematical operator that indicates addition.

MAX(List)

MAX(List) is a function that returns the largest number value from List. Returns zero if List represents no number value.

Message Line

Prompting messages and status messages appear on the message line. It is located one line below the command line.

MID(s,n,m)

MID(s,n,m) **is a function that** returns the characters for the count (m) for string (s) starting at position (n). In the argument: Start (n) specifies the position of the first character to be returned; Count (m) specifies the number of characters to be returned; You start count at the Start position (n) (include it in the count).

MIN(List)

MIN(List) is a function that returns the smallest number value from List.

MOD(Dividend,Divisor)

MOD(Dividend,Divisor) is a function that returns the remainder of Dividend divided by Divisor (the result has the same sign as Divisor).

Move Column Subcommand

The Move Column subcommand allows you to move one whole column or several columns.

Move Command

The Move command allows you to move whole rows or columns from one location to another on the worksheet.

MOVE Key

When you press the **MOVE** key, you activate the Move command.

Move Row Subcommand

The Move Row subcommand allows you to move a row or several rows.

Multiplan

Multiplan is an electronic accounting worksheet you can use for calculating and manipulating data.

Mute Option

You use the Mute option to control the Multiplan audio signal that sounds when you make an error in Multiplan operations.

N

N is an argument abbreviation that indicates a number or a formula that yields a number (used only once per argument).

NA()

NA() is a function that returns the **#N/A** error value.

Name Command

The Name command allows you to name a cell or group of cells.

NE Records (SYLK Format)

The NE record describes a link to an inactive sheet.

NEXT Key

When you press the **NEXT** key, you can duplicate some functions of the **RETURN** and **GO** keys.

NEXT PAGE Key

You press the **NEXT PAGE** key to display the rows below the active window rows.

NEXT UNLOCKED Key (f6)

When you press the **NEXT UNLOCKED** key, the cell pointer moves to the next unlocked cell in the current row (skipping blank cells).

NN Records (SYLK Format)

The NN record defines a Multiplan name as a union of rectangular areas expressed with absolute references.

Normal Mode Suffix

The normal mode suffix is .mp which the system appends to the filename when you save a file in the Normal mode. During a Multiplan session, the suffix does not display on filenames, and you do not use it when you enter filenames. You must include the suffix when you reference the filename outside of Multiplan sessions, and the .mp suffix displays in system file lists that you access from the Executive.

NOT(Logical)

NOT(Logical) is a function that returns the opposite of the logical value argument (FALSE if the argument is true; TRUE if the argument is false).

NPV(Rate,List)

NPV(Rate,List) is a function that calculates the amount of money required now to produce a specified cash flow in the future, given a specific interest rate. NPV means Net Present Value.

Numeric Keys

The numeric keys are grouped like a calculator pad to assist you in entering numerical data. You can also use the typewriter keys at the top of the keyboard to enter numbers 0 through 9.

NU Records (SYLK Format)

The NU record describes an external filename substitution.

Operators

Operators are logical or mathematical symbols in three categories: mathematical, comparison, and combination.

Options Command

The Options command allows you to specify the following Multiplan functions: recalc (automatic recalculation), mute (silencer for automatic error alarm). Additionally, with Enhanced Multiplan, you can specify the following functions: iteration (numerical approximation methods involving circular dependencies) and completion test (cell reference that contains the TRUE function of the iteration process).

OR(List)

OR(List) is a function that returns the logical value TRUE if any value in List is true. Otherwise, it returns FALSE.

Other Mode Suffix

The other mode suffix is .vc; you must add it to the name of any VisiCalc file you want to load in Multiplan; however, you must not enter the suffix in the Transfer Load form.

OVERTYPE Key

The **OVERTYPE** key is not used in Multiplan.

Palette File

A palette file is a file that saves the palette colors of a graph. You can use it only on B 21 and B 25 color graphics workstations. The palette includes the colors of the text, data representations, axes specifications, and pen numbers. The system adds the suffix **.pl** to palette files and displays the suffix in the Executive file list.

Path

Your path is the default volume and directory, unless you specify a different volume (in square brackets) or a different directory (in angle brackets). You change the path at the Executive command level, or with the Transfer Options subcommand.

Percent Option (Format Code)

The Percent option allows you to display numbers as percentages.

PI()

PI() is a function that returns the value 3.1415926535898, an approximation of the mathematical constant π (pi).

PREV PAGE Key

You press the **PREV PAGE** key to display the rows above the active window rows.

Print Command

The Print command allows you to control the worksheet printing operation.

Print Exchange Subcommand

The Print Exchange subcommand lets you print an Enhanced Multiplan worksheet to a disk file in Document Exchange Format (DEF) using the parameters you specified in the Print Margins and Print Options subcommands.

Print File Subcommand

The Print File subcommand allows you to print output to a disk file.

Print Margins Subcommand

The Print Margins subcommand allows you to set the margins and page length for a printed worksheet.

Print Options Subcommand

The Print Options subcommand allows you to specify the following aspects of the printing operation: the part of the worksheet to be printed, the printer, printing of formulas and row/column numbers, and the paper feed mode.

Print Printer Subcommand

The Print Printer subcommand allows you to begin printing on the default printer, or on another printer that you specify.

Prompting Messages

Prompting messages give you information about the entries you need to make on the command line. Prompting messages appear on the message line.

Proposed Responses

When the system displays a selected command form, it inserts proposed responses in the form fields based on the position of the active cell and other worksheet information. You can either accept the proposed responses or enter different ones.

QUIT Command

You use the QUIT command to end a Multiplan session and return to the Executive.

RECALC Key (f3)

When you press the **RECALC** key, you perform a one-time recalculation of all worksheet values when the recalc option is turned off.

Recalc Option

The Recalc option in the Options command allows you to specify whether or not the system recalculates the worksheet values automatically when you change one cell value or formula.

REFERENCE Key (f2)

When you press the **REFERENCE** key immediately after pressing the horizontal or vertical key, you change relative reference formulas to absolute references.

Relative Cell Reference

A relative cell reference expresses the location of a cell in relation to the location of the active cell. The system expresses the relative position by a plus sign for cells to the right of and below the active cell, or a minus sign for cells to the left of and above the active cell.

REPT(T,Count)

REPT(T,Count) is a function that returns a text value consisting of Count repetitions of T across a row.

RETURN Key

You press the **RETURN** key to activate and execute commands. Cell text entries wrap once on the command line; you do not have to press **RETURN** at the end of a text line.

Right Option (Cell Alignment)

The Right option allows you to align cell content at the right cell margin.

ROUND(N,Digits)

ROUND(N,Digits) is a function that returns a value, rounded to the number of decimal places specified by Digits.

ROW()

ROW() is a function that returns the number of the row in which the formula containing this function appears.

Scientific Notation

Scientific notation is the system that Multiplan uses to abbreviate large numbers, or numbers that have many zeros.

Scientific Option (Format Code)

The Scientific option allows you to display numbers as a decimal notation times a power of 10.

SCROLL DOWN Key

You press the **SCROLL DOWN** key to display the columns to the left of the active window columns.

SCROLL UP Key

You press the **SCROLL UP** key to display the columns to the right of the active window columns.

SIGN(N)

SIGN(N) is a function that returns a number representing the algebraic sign of the argument. If the argument sign is positive, the returned value is 1; if it is negative, the returned value is -1; if it is 0, the returned value is 0.

SIN(N)

SIN(N) is a function that calculates the sine of the argument, where the argument is an angle in radians.

Sort Command

The Sort command allows you to reorder the rows on a worksheet within a column according to a specified ascending or descending order of cell values.

Spacebar

You press the **Spacebar** to move the cursor forward one space when you enter data. You also press the **Spacebar** to move the highlight from one choice to another in a menu and from one option to another in a form field.

SQRT(N)

SQRT(N) is a function that returns the square root of the argument.

Status Line

The status line gives you information about the active cell location, the active cell content, the percentage of remaining worksheet space, and the worksheet name. The status line is the last line of the Multiplan display.

Status Messages

Status messages tell you if Multiplan can complete a command or function. Status messages appear on the message line.

STDEV(List)

STDEV(List) is a function that calculates the sample standard deviation of the number values represented by List according to the formula

$$s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}}$$

SUM(List)

SUM(List) is a function that returns the sum of the number values represented by List.

Supporting Worksheet

A supporting worksheet is one whose information is copied to another worksheet by an external link.

SYLK File Format

The SYLK file format is a means to exchange information between Multiplan and application programs.

SYLK Mode Suffix

The SYLK mode suffix is .sl which the system appends to the filename when you save a file in the SYLK mode. You need to add this suffix to the name of a SYLK file created outside Multiplan before you load it in Multiplan; however, you must not enter the suffix in the Transfer Load subcommand form.

T

T is an argument abbreviation that indicates text or a formula that yields text.

TAB Key

When you press the **TAB** key, you move the highlight to the next choice in a command or subcommand menu, and from one form field to another.

TAN(N)

TAN(N) is a function that calculates the tangent of the argument, where the argument is an angle in radians.

Transfer Clear Subcommand

The Transfer Clear subcommand allows you to clear the active worksheet (delete all contents).

Transfer Command

The Transfer command allows you to display, save, clear, delete, and rename worksheet files.

Transfer Delete Subcommand

The Transfer Delete subcommand allows you to delete a Multiplan disk file.

Transfer Load Subcommand

The Transfer Load subcommand allows you to load (display) a saved worksheet in place of the active worksheet.

Transfer Options Subcommand

The Transfer Options subcommand allows you to specify the file format for subsequent Transfer Load, Delete, and Save subcommands, or allows you to specify the path for subsequent Transfer commands.

Transfer Rename Subcommand

The Transfer Rename subcommand allows you to save the active worksheet under a new name and update external links.

Transfer Save Subcommand

You use the Transfer Save subcommand when you want to save your worksheet to a disk file. You use it before the Quit command when you conclude a Multiplan session.

TRUE()

TRUE() is a function that returns the logical value of TRUE.

Typewriter Keys

The typewriter keys are arranged like a standard typewriter keyboard. Located in the center of your keyboard, they allow you to type the standard typewriter characters as well as some special symbols.

Value Command

The Value command allows you to insert numbers or formulas in the active cell. It also allows you to enter text, but you must enclose texty in double quotation marks.

VALUE(T)

VALUE(T) is a function that returns the number in the argument.

Vertical Keys

The **Up Arrow** and **Down Arrow** keys are referred to as vertical keys. When you press the **Up Arrow** key, the cell pointer moves one cell up. When you press the **Down Arrow** key, the cell pointer moves one cell down.

VisiCalc

VisiCalc is a widely-used electronic spreadsheet software program.

Window Border Subcommand

The Window Border subcommand adds or removes a window border.

Window Close Subcommand

The Window Close subcommand closes a window by removing it from the screen.

Window Command

You use the Window command to open and close windows, to link and unlink them, and to place or remove window borders. You can open up to eight windows simultaneously.

Window Link Subcommand

The Window Link subcommand links two windows that have been split from one another so that their contents scroll together.

Window Split Horizontal Option

The Window Split Horizontal option allows you to split the active window horizontally and gives you a choice to link the windows or not.

Window Split Subcommand

The Window Split subcommand opens a new window by splitting the active window horizontally or vertically, or opens windows for titles only.

Window Split Titles Option

The Window Split Titles option allows you to split the active window into two or four linked windows that scroll together.

Window Split Vertical Option

The Window Split Vertical option allows you to split the active window vertically and gives you a choice to link the windows or not.

Worksheet

The term worksheet is used in this guide to refer to the Multiplan spreadsheet.

W Records (SYLK Format)

The W record describes the window structure of a Multiplan screen. The window structure is described in part by the states of the windows and in part by the operations that create the windows.

X Axis

The X Axis runs horizontally along the bottom edge of a graph. It contains a centered axis label.

Xternal Command

The Xternal command allows you to interchange information between worksheets.

Xternal Copy Subcommand

The Xternal Copy subcommand allows you to copy data from an inactive worksheet to an active worksheet. It also establishes (or eliminates) an external link (permanent tie) between worksheets that automatically copies data from a source worksheet to the active worksheet every time you load the active worksheet.

Xternal List Subcommand

The Xternal List subcommand displays lists of supporting and dependent worksheets linked to the active worksheet.

Xternal Use Subcommand

The Xternal Use subcommand assigns a real or logical substitute name for a specified worksheet.

Y Axis

The Y Axis runs vertically along the left side of a graph. It contains the numerical values for plotting each graph line and contains a label located above and to the right of the Y axis.

ZOOM (f8) Key

The **ZOOM** (**f8**) Key alternates between 80- (light on the keytop is off) and 132-character (light on the keytop is on) screen display on a B 22 workstation.

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