

AA-P645A-TV

Rainbow™ 100

Multiplan™-86

Reference Manual

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Preface

This book is written for experienced users who have read and mastered the *Multiplan-86 User's Guide* and for those who have used some version of Multiplan and know the program well.

The book is divided into two parts. Part 1 contains one chapter that gives an overview of the features of Multiplan-86. Part 2, a Reference Section, is divided into a Command Directory and a Function Directory. Command and functions are arranged alphabetically in their respective directories.

Part 1

Overview

Elements of Multiplan-86

This chapter is divided into six sections that describe the structure, features, and operation of Multiplan-86. Detailed information about the commands, functions, and messages appear in Part 2 of this book and are covered only generally in this chapter.

The Multiplan-86 Worksheet

The worksheet is a rectangle arranged in intersecting rows and columns. The sheet can be up to 63 columns wide and 255 rows long. An area one column wide by one row high is called a *cell*.

Each cell has both a value that can be displayed on the Multiplan-86 screen and a formula for computing that value. This formula can be as simple as the number 19.95; or it can be more complex, containing functions and references to other cells; for example, “previous cell times growth rate.”

The potential dependence of the value of one cell on the values in other cells is the key idea behind the worksheet. When cells have been connected by references, a change in one cell (for example, changing 19.95 to 18.50) causes Multiplan-86 to calculate the effect of the change on all other cells. This pro-

cess is called “recalculating the worksheet.” Recalculation may be automatic after every change, or it may be turned off (see the Options command in Part 2). When automatic recalculation is turned off, one-time recalculation can be caused by pressing the RECALC key.

The order of calculating the cells is automatically chosen by Multiplan-86 so that the calculation of each cell precedes the calculation of other cells that depend on it. If such an order is impossible, the “Circular references unresolved” error message is displayed.

The Multiplan-86 screen is a movable “window” through which you can view part of the worksheet. When Multiplan-86 starts, only one window is open. You can open up to eight windows to the worksheet. Each window opened is given a consecutive window number. For the following discussion, assume that only one window is open, just as when you start a Multiplan-86 session.

Across the top of the window are column numbers. Down the left edge of the window are row numbers. The row and column numbers tell you what area of the worksheet you are viewing.

Somewhere within the window is a highlighted cell. The highlight is called the *cell pointer*, and it points to the “active cell.” Many operations do something with the active cell.

Across the bottom of the screen are four lines of text. The top two lines are called the *command line*. The actions you want Multiplan-86 to perform are selected from these commands. The command line is discussed in more depth later in this chapter. The commands are described in Part 2, the “Command Directory.”

Just below the command line is the *message line*. The message line shows either an error message or a prompt message. An error message indicates what the problem is. A prompt message indicates in general terms your next step in entering a command. The prompt message changes as you work your way through a command. See the “Entering Commands” section of this chapter for more information about command entry, and Appendix A, “Prompts and Error Messages” for explanations of message line messages.

The bottom line on the screen is called the *status line*. Here, Multiplan-86 displays the position of the cell pointer, the current contents of the active cell, the percent of free memory, and the name of the active sheet.

The position (row number and column number) of the active cell is shown first on the status line. The formula used for calculating the value of the active cell is shown next to the coordinates. When the contents of the active cell are text or numbers, the status line shows either the text in double quotes or the number itself.

The cell pointer can be moved by using the arrow keys on the keypad on the right-hand side of the Rainbow 100 keyboard (Figure 1).

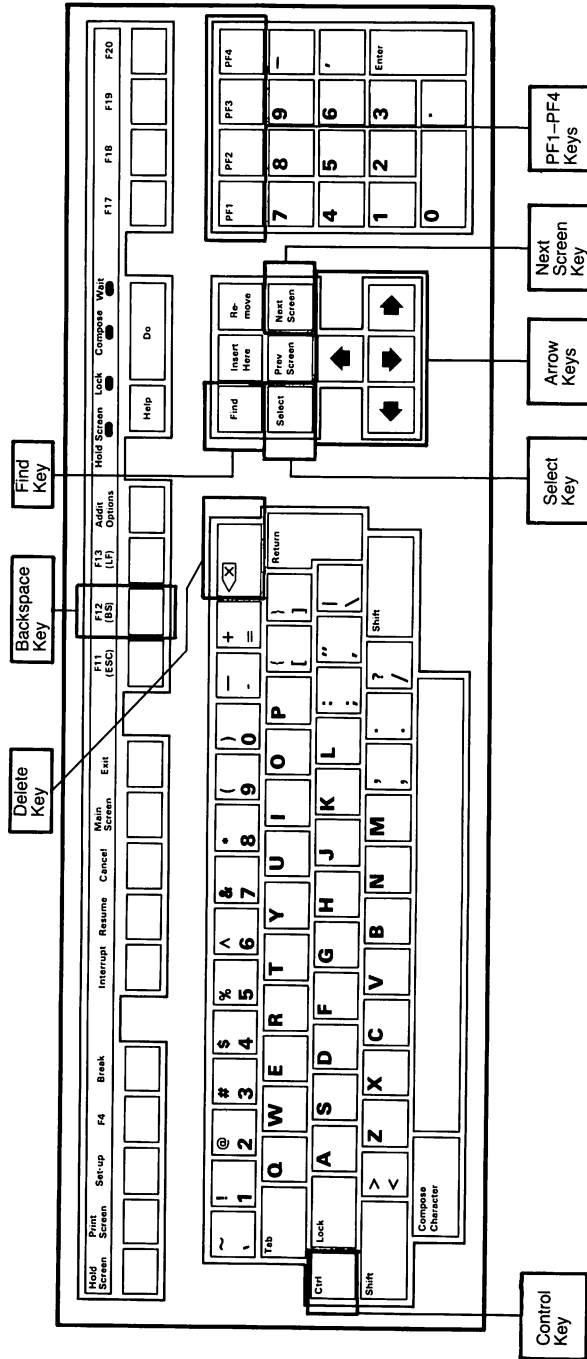
- The up-arrow key moves the cell pointer towards the top of the window.
- The down-arrow key moves the cell pointer towards the bottom of the window.
- The left-arrow key moves the cell pointer towards the left edge of the window.
- The right-arrow key moves the cell pointer towards the right edge of the window.

When the cell pointer reaches the edge of the window, the window begins to move across the worksheet one cell at a time. This is called scrolling. When the cell pointer reaches the edge of the worksheet, the cell pointer stops; and the Multiplan-86 alarm sounds.

To scroll across the worksheet a whole windowful at a time, press the NEXT SCREEN key, followed by the arrow key that points in the direction you want to move (up, down, right, or left).

To go to row 1 column 1 (HOME) quickly, press CTRL/Q. To go to the last row and last column of the active area of the worksheet (the END), press CTRL/Z. The active area is the smallest rectangle that encompasses the cell in the upper left corner of the worksheet (row 1 column 1, referred to as R1C1) and the last cell to the right and down that has been given contents or formatting. When Multiplan-86 starts, HOME and END are both at R1C1.

For an overview of the functions performed by various special keys, see Table 1.



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Figure 1. Rainbow 100 Keyboard: Special Keys

Table 1. Functions Performed by Special Rainbow 100 Keys

Key Name	Key's Function
UP ARROW key	(UP DIRECTION) Moves the cell pointer upward on the worksheet.
DOWN ARROW key	(DOWN DIRECTION) Moves the cell pointer downward on the worksheet.
LEFT ARROW key	(LEFT DIRECTION) Moves the cell pointer leftward on the worksheet.
RIGHT ARROW key	(RIGHT DIRECTION) Moves the cell pointer rightward on the worksheet.
FIND key	(NEXT UNLOCKED CELL) Moves the cell pointer to the next cell that contains data.
CTRL/Q (Press the CONTROL key and the Q key simultaneously)	(HOME) Moves the cell pointer to Row 1, Column 1—the start of the worksheet.
CTRL/Z (Press the CONTROL key and the Z key simultaneously)	(END) Moves the cell pointer to the last row down and right that is formatted.
NEXT SCREEN/ARROW key (Press the NEXT SCREEN key and then the ARROW key appropriate for the direction you want to scroll in. Press <i>and release</i> these keys as often as necessary to arrive at the page you want.)	(NEXT PAGE) Lets you see the next window-size page of the worksheet.
SELECT key	(NEXT WINDOW) Moves the cell pointer to the Next Window when the Window Split command is in effect.
HELP key	(HELP) Causes Multiplan-86 to display HELP information on the screen.
DELETE key or BACKSPACE key	(DELETE/BACKSPACE) Moves cursor leftward in menu; deletes one character at a time, anything you have typed in.
TAB key	(TAB) Moves the edit cursor rightward in the menu and among command fields.
SPACE BAR	(SPACE) Moves the edit cursor rightward in the menu.
RETURN key	(RETURN) Tells Multiplan-86 to carry out a command already selected from the menu or typed in response to a prompt.

Table 1. Functions Performed by Special Rainbow 100 Keys (Cont)

Key Name	Key's Function
CTRL/C (Press the CONTROL key and the C key simultaneously)	(CANCEL) Halts command execution; returns you to the menu.
PF2 key	(CHARACTER LEFT) Moves the edit cursor one character leftward.
PF3 key	(CHARACTER RIGHT) Moves the edit cursor one character rightward.
PF1 key	(WORD LEFT) Moves the edit cursor one word leftward.
PF4 key	(WORD RIGHT) Moves the edit cursor one word rightward.
REMOVE key	(REMOVE) Removes some proposed responses.
@ key	(REFERENCE) Changes relative references to absolute references.
! key	(RECALCULATE) Recalculates the entire worksheet. If typed in a formula, the formula will be replaced by its results.

Selecting the active cell was described previously, in the section entitled "The Multiplan-86 Worksheet." Steps 1 and 2 are described below.

Select a Command

When you are prompted to select an option from a menu, select it in one of two ways:

1. Type the first letter of the option you want.
or
2. Use the SPACE BAR and the BACKSPACE key to move the highlight to the appropriate command word. The SPACE BAR moves the highlight to the right, the BACKSPACE key moves it to the left. Press the RETURN key.

Elements of Multiplan-86

When you have selected a command, Multiplan-86 displays the main command name followed by either a subcommand menu or one or more command fields. Typically, a new subcommand menu follows selection of a main command. Select a subcommand as you would a main command.

The command line shows the command and subcommands you have already selected in capital letters, for example:

WINDOW: Split Border Close Link

Now if “Split” is selected, the command line changes to:

WINDOW SPLIT: Horizontal Vertical Titles

Continue selecting subcommands until the command fields are displayed. The names of command fields are shown in lowercase letters followed by a colon. For example:

WINDOW SPLIT HORIZONTAL at row: 7 linked: Yes(No)

This command line has two fields: the “at row” field and the “linked” field. Note that the “linked” field contains a small menu.

Entering Commands

You direct Multiplan-86 to perform the tasks you want done by entering commands. The commands are described individually in the “Command Directory” in Part 2 of this book. This section describes the methods of command entry.

You select a command when the main command menu is on the screen. The main command menu shows the choice of commands:

COMMAND: Alpha Blank Copy Delete Edit Format Goto Help Insert Lock
Move Name Option Print Quit Sort Transfer Value Window
Xternal.

When this menu is on display, Multiplan-86 is waiting for you to select a command. When Multiplan-86 is computing, the main command menu is not visi-

ble, and no message appears on the message line. When the main command menu reappears, Multiplan-86 is ready for more commands.

Some of the main commands have subcommands. In these cases, when the main command has been chosen, the main command menu is replaced with a subcommand menu.

Remember: the message line shows a prompt message that indicates your next step in entering the command. See Appendix A, "Prompts and Error Messages" for descriptions of these messages. To enter a command:

1. Select an active cell (use the arrow keys on the keypad to move the cell pointer to the appropriate cell), if required by the command to be selected.
2. Select a command.
3. Select responses for the command fields. The responses are used to specify where to Goto, what to Format, where and how to split windows, and so forth.
4. Press the RETURN key to carry out the command. Or, press CTRL/C during the first three steps to cancel, or abort, the command.

Selecting the active cell was described previously, in the section entitled "The Multiplan-86 Worksheet." Steps 2 and 3, above, are described in the next two sections.

Select Responses for the Command Fields

The next step is to enter responses for the command field or fields. There may already be responses in the fields. These are responses proposed by Multiplan-86. If a proposed response suits your purpose, you need not enter a response in that field. In fact, if the proposed responses in all the fields are suitable, you can just press the RETURN key to carry out the command.

Entering responses proceeds field by field, starting at the first one. A highlight indicates the "active" field (the field in which a response is being entered). Other fields do not contain a highlight.

To move the highlight from field to field, press the TAB key. Pressing the TAB key when the highlight is in the last field returns it to the first field.

The message line gives you messages prompting entries in the command fields. Whenever the message line starts with “Enter. . .,” the field must be filled in. To “fill in” the field, either accept the proposed response or simply type the characters, for example:

TRANSFER LOAD filename: INCOME

Enter filename

where INCOME was typed.

In this case, there is only one field, and the TAB key is not needed. Simply press the RETURN key to carry out the command.

When the message line shows “Select option”, the field contains a menu of options. Select the option you want by either of the two methods used for selecting commands: either type the initial letter, or use the SPACE BAR and the BACKSPACE key to move the highlight to your choice. Note that, when a command field with a menu is not active, the current option is shown enclosed in parentheses, as in the “linked” field in the example above.

Proposed Responses

Since the proposed response depends on the specific command, proposed responses are described in detail with the commands in the “Command Directory” Proposed responses do, however, follow a few general principles:

1. When a command field contains a menu, the “proposed” response is the current setting. For example, the Option command initially appears as:

OPTIONS recal:(Yes)No mute:Yes(No)

with the highlight on Yes showing the current setting in the “recal” field and the parentheses showing the current setting in the “mute” field. Thus, the same menu can be used to inspect as well as select options in command fields.

2. In other fields, the proposed response will be the one entered the last time the command was used. This simplifies entering a series of related commands.

3. Yet other fields reflect the position or contents of the active cell. For this reason, positioning the cell pointer before selecting a command may be helpful.

All proposed responses can be edited by using Multiplan-86 editing keys, described in the “Editing” section below.

Editing

Multiplan-86 provides editing keys to edit responses in command fields. Multiplan-86 editing can be used any time you are entering responses in command fields. To edit the contents of cells, move the cell pointer to the cell, then use the Alpha command for cells with text, or the Edit command for cells with formulas, and edit the proposed responses in the command line.

Either just after a command is selected or just after the TAB key is pressed, the whole field containing a proposed response is highlighted.

To *replace* the proposed response: type the replacement. Multiplan-86 automatically deletes the proposed response as you type the new one.

To *delete* the proposed response to leave the field empty: press the DELETE key. All text that is highlighted is deleted.

To *append* to the proposed response: For cell references (when the message line shows “Enter reference to cell or group of cells”), type a colon (:) or other operator. For other responses, press either the CHARACTER RIGHT (CTRL/L) or the WORD RIGHT (CTRL/P) key combination, then type the additional text.

Once the proposed response is altered, one character or word in the field is highlighted. This highlight is the edit cursor. The edit cursor can be moved to designate where or what to edit.

The following keys move the edit cursor:

- PF2 key moves cursor one CHARACTER LEFT
- PF3 key moves cursor one CHARACTER RIGHT

- PF1 key moves cursor one WORD LEFT
- PF4 key moves cursor one WORD RIGHT

The CHARACTER LEFT (PF2) and CHARACTER RIGHT (PF3) key combinations move the edit cursor left or right one character.

The WORD LEFT (PF1) and WORD RIGHT (PF4) key combinations move the edit cursor left or right, highlighting words or the space or punctuation between words. In formulas, the values and the operators are highlighted alternately.

To *insert* new text: type the text. It is inserted in front of the edit cursor.

To *delete* text: use the BACKSPACE key to delete characters on the left side of the cursor. Use the DELETE key to delete what is highlighted by the cursor. CTRL/Y also deletes information.

To *replace* text: delete the old text and type the new.

The following formula-editing keys simplify the typing of formulas. These keys all insert text in front of the edit cursor:

1. As you begin to enter a formula, or just after you enter an operator, the direction keys (as well as the HOME and END keys) can be used to enter a relative cell reference of the form:

R[±n]C[±m]

in the field by pointing to the cell you want. (See the “Formulas” section for an explanation of cell references, relative references, absolute references, and names.) As you move the cell pointer, the reference changes accordingly. The cell pointer returns to its original position as soon as you press any key other than a direction key.

2. Similarly, the direction keys can be used to enter absolute references of the form:

RnCm

in fields that accept a cell reference (when the message line shows “Enter reference to cell or group of cells”).

3. Relative references created with direction keys (described under item 1 above) can be changed to absolute references by pressing the REFERENCE key (@) immediately after the direction keys.
4. Names can be entered easily by pressing the REFERENCE key first, then using the direction keys to step through the list of defined names.
5. Finally, a formula can be replaced with its resulting value by pressing the SHIFT key and the 1 key simultaneously after the formula is entered.

Formulas

Formulas are “recipes” for calculating values. When these values are displayed on the computer screen or printed on a printer, they compose the results of a Multiplan-86 worksheet.

Multiplan-86 works with different types of values, which are appropriate in different circumstances:

numbers:	used for financial, statistical, scientific, and other calculations
text:	characters treated as words, including numbers in special displays, such as \$10.00 or 6/14/81. Text is always shown in double quotes (“text”) in the status line.
references to cells:	used to express dependency of a value in one cell on values, in other cells on the worksheet. Groups of cells can be specified by “intersection,” “range,” and “union” operators.
logical values (true and false):	used in making conditional, “either-or” decisions.
error values:	used as substitutes for values that cannot be calculated because of a mistake in a formula. For example, the “result” of division by 0 is an error value.

New values can be calculated by combining other values with the operators, as described below under the topics “Numbers,” “Text,” and “References to Cells”; or by using functions, such as MIN or MAX, described in the Function Directory in Part 2.

The following sections describe each type of value.

Numbers

Numbers may be written as integers (123), as decimal fractions (123.45), or in scientific notation. In the latter case, an integer or decimal fraction (mantissa) is followed by the letter E and a positive or negative integer exponent. This notation multiplies the mantissa of the number by 10 raised to the given power, for example:

12.1E2 means 1,210 ($12.1 \times 10(2)$)

(note: + sign can be omitted)

1E-5 means .00001 ($1 \times 10(-5)$)

1.5E+6 means 1,500,000

Percentages can be written as numbers followed by % (same as division by 100):

15% means .15 (15/100)

Numbers are calculated with 14 digits of precision and a decimal exponent ranging from -63 to +63. This means that the smallest positive nonzero number is:

$.1 \times 10 (-63)$

and the largest one is:

$9.999999999999 \times 10 (+62)$

Operations that exceed either limit return the #NUM! error value (see "Error Values," later in this chapter).

The following mathematical operators are listed in groups in the order of precedence, and are performed left to right:

- ^ Exponentiation. Calculated by the rule: $a^b = \exp(\ln(a) * b)$.
- * Multiplication.

- / Division.
- % Percent. Written after the value and has the same meaning as /100.
- + Arithmetic addition.
- Subtraction. Can also be used in front of a value to denote “negative.”

Parentheses can be used to alter the order in which Multiplan-86 performs the calculation when more than one operator appears in a formula. In the absence of parentheses, the order shown above holds, followed by the logical operators described under “Logical Values” below.

Multiplan-86 functions for performing mathematical, statistical, and financial calculations are described in detail in the Function Directory in Part 2 of this book.

Text

A text value can contain up to 255 characters. Text is written enclosed in double quotes (“ ”). Text cannot include double quotes as a character, for example:

“salary =” is 8 characters of text

“1.0” is also text, not a number

Two text values can be concatenated using the & operator. The result is a text value that consists of the left text immediately followed by the right, for example:

“\$” & “1.00” concatenates the text value \$1.00

The Function Directory in Part 2 describes functions that operate on or return text values, in particular:

LEN(T) returns the number of characters in a text value.

MID(T,s,c) returns a specified part of a text value.

Functions are also provided for converting numbers into text and vice versa, for example:

FIXED(1,2) returns the text "\$1.00"
 VALUE("0.1") returns the number .1

All functions are described in detail in the Function Directory in Part 2.

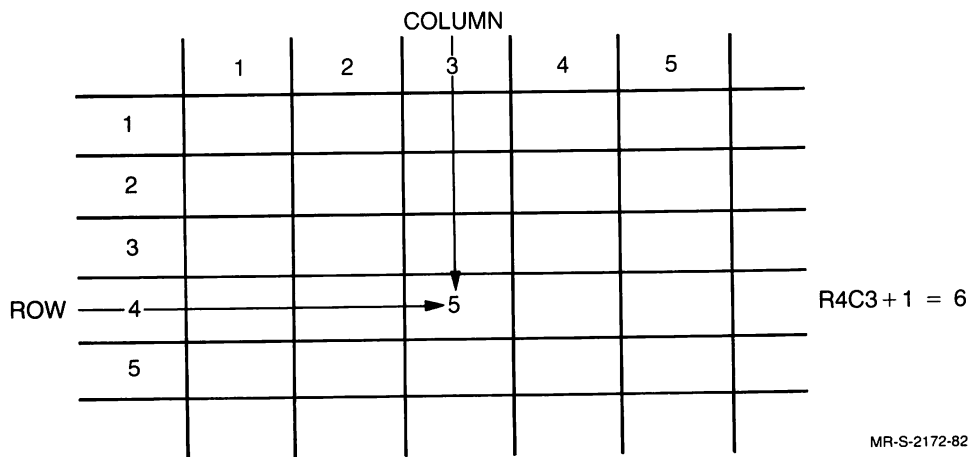
References to Cells

References to cells describe the location of one or more cells on the worksheet. References are the means of access to the values in cells.

A cell reference consists of a row reference and of a column reference, in that order. (You can give cell references by entering the column reference followed by the row reference, but Multiplan-86 stores the reference in row-column order.)

A cell reference indicates the place where a specific row and a specific column intersect.

For example, R4C3 is a reference to the cell at row 4, column 3. Assuming that cell has the value 5, the result of the formula R4C3+1 is 6 (see Figure 2).



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Figure 2. Cell Reference Gives Access to a Value

References can be written three ways:

- as an absolute reference
- as a relative reference
- as a name reference

Absolute References . An absolute reference consists of the letters “R” and “C” and the actual row number and column number (as illustrated above).

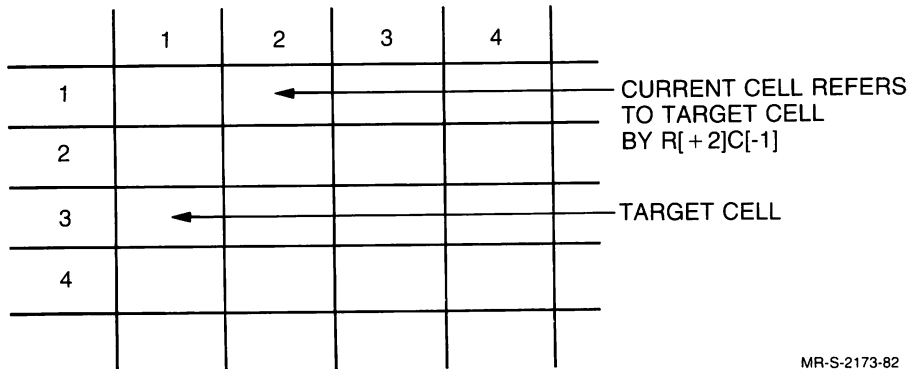
The forms are:

Form	Meaning
Rn	row number n (1-255)
Cn	column number n (1-63)
Rn:m	all rows from n through m
Cn:m	all columns from n through m

Placing an R form and a C form together denotes the rectangle formed by the intersection of the rows and columns:

Form	Meaning
RnCm	single cell at row n, column m
Rn:mCp:q	a rectangle of cells

Relative References . A relative reference describes the location of another cell in terms of the location of the current cell. (“Current” means the cell that contains the cell reference.) A relative reference gives a direction by “+” for right or down or “-” for left or up and a number indicating how many rows or columns away from the current cell (see Figure 3).



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Figure 3. Relative Cell Reference

The “target” cell is 2 rows down from the current cell (+2) and 1 column left of the current cell (-1).

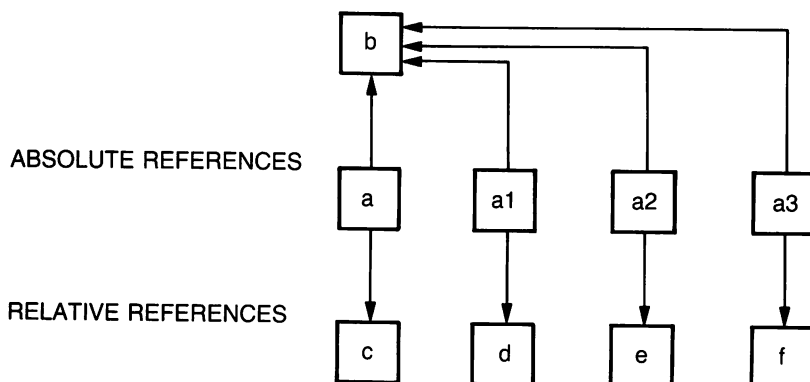
The forms of relative reference are:

Form	Meaning
R	current row
C	current column
R[+n]	the row that is n rows below R (the + can be omitted)
C[+n]	the column that is n columns to the right of C (the + can be omitted)
R[-n]	the row that is n rows above R
C[-n]	the column that is n columns to the left of C

As for absolute references, placing a relative R form and C form together denotes the rectangle formed by the intersection of the rows and columns, for example:

Form	Meaning
RC[-1]	the single cell just to the left of the current cell

The difference between absolute and relative references becomes apparent only when a reference is copied (see the Copy command Part 2). Absolute references refer to exactly the same cell or cells in all of the copies. The cells referred to by relative references, however, are different for each copy (see Figure 4):



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Figure 4. Comparison of Absolute and Relative References

If a reference in cell *a* is absolute and refers to cell *b*, the copied references in cells *a1*, *a2*, and *a3* all refer to cell *b*.

If a reference in cell *a* is relative and refers to cell *c* as 3 rows down [+3], cell *a1* refers to cell *d* (not cell *c*), cell *a2* refers to cell *e*, and cell *a3* refers to cell *f*.

Names . Names are words used to identify a cell or group of cells. A Name can be defined as an absolute reference with the Name command (see Part 2). The spelling rules for names are:

- Names must start with a letter, followed by letters, digits, periods, and underline (___) characters up to 31 characters maximum.
- Words that are the same as absolute or relative references (for instance, R1C1 or R) must not be used for names.
- Once defined, a Name can be used as you use any absolute reference. For example, you might define the name *Sales* to refer to R3C2:8.

- The name of the reference suggests that the calculation involves sales figures. The absolute form, R3C2:8, is not mnemonically suggestive of sales figures. However, to the Multiplan-86 program, the meanings are identical.

The Name in the example is illustrated in Figure 5:

	1	2	3	4	5	6	7	8
1								
2								
3	SALES							
4								
5								

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Figure 5. Names as Cell References

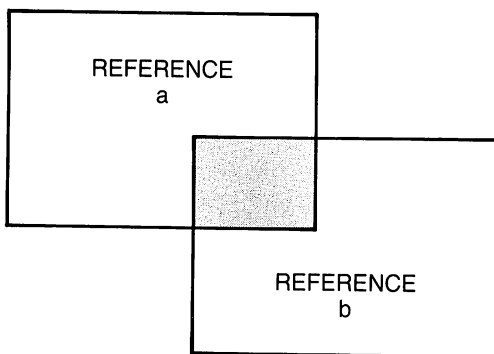
Three operators can be used to combine references: intersection, range, and union.

Intersection Operator . The intersection operator is used to combine two references to refer to all the cells that belong to both references. The intersection operator is a space between two characters. A specific example of an intersection operator is the space that appears between R and C in the following example:

R C3

This example refers to the cell where the current row and column 3 intersect.

Figure 6 illustrates just what an intersection refers to.

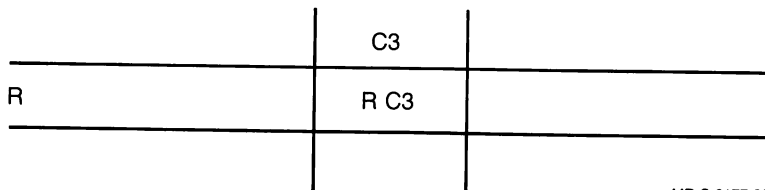


INTERSECTION a b REFERS TO THE SHADED AREA.

Figure 6. Intersection Reference

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When reference forms are combined (that is, an absolute with a relative, an absolute with a Name, a relative with a Name, or a Name with a Name), the intersection operator must separate them to indicate access to the value or values where the two references intersect (see Figure 7).



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Figure 7. Relative-Absolute Intersection Reference

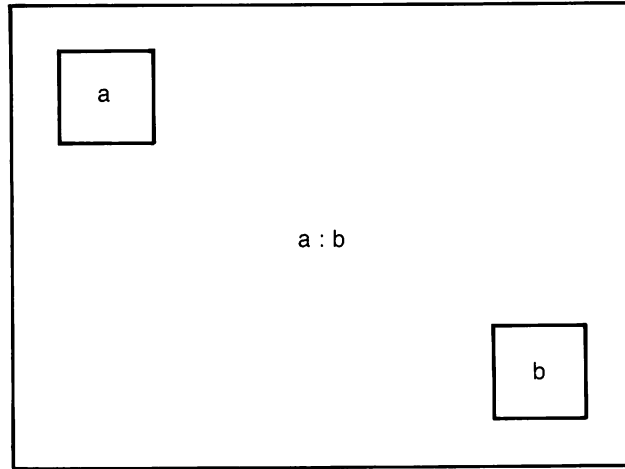
For example, RC3 is not permitted; write R C3 instead.

If the two references do not intersect, Multiplan-86 returns a #NULL! error value.

Range Operator . The range operator is used to combine two references so that the values in a group of contiguous cells can be used. The range operator is a colon between two characters.

The area of a range is the smallest rectangle that includes both references.

Typically, in a reference written as a:b, the “a” reference is in the upper left corner and the “b” reference is in the lower right, as in Figure 8.



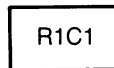
MR-S-2178-82

Figure 8. Range Reference

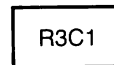
The range operator can be used to combine any of the reference forms (absolute, relative, or Name) in any order.

Union Operator . The union operator is used to combine references to refer to all cells that belong to either reference. The union operator is a comma between two characters. A specific example of a union operator is the comma that appears in the top line of Figure 9.

R1C1,R3C1



: :



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Figure 9. Example of Union Operator

Each reference in a union can be any form (absolute, relative, or Name), an intersection, or a range.

A union usually refers to cells that are not contiguous. Where a union describes contiguous cells, it describes a rectangle as a range reference does, as in Figure 10.

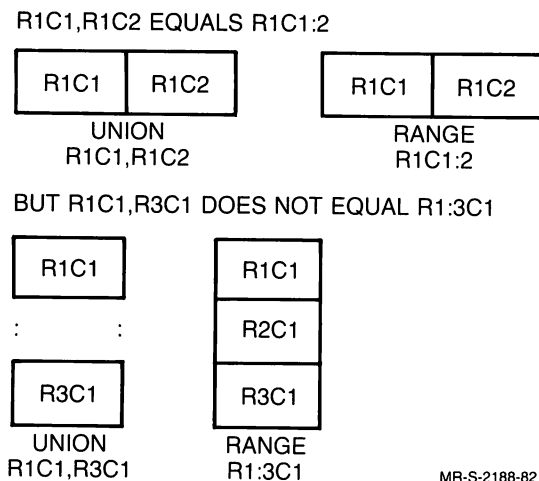
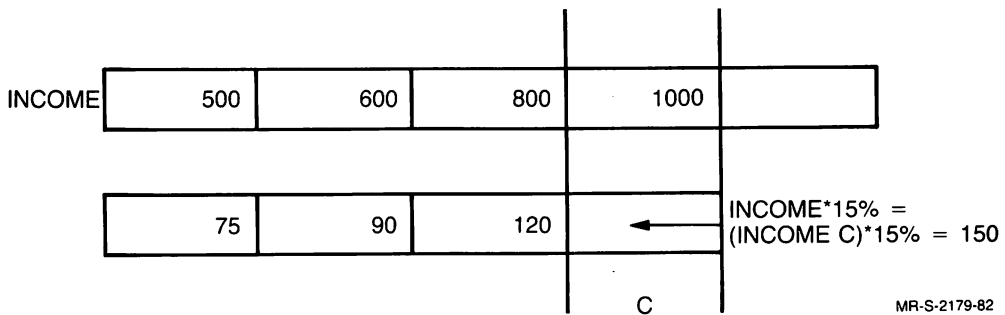


Figure 10. Difference Between Union and Range Operators

The range reference in the second example includes cells not specified by the union reference.

References can be used in formulas that require the value of a single cell. When the reference describes a single cell and a single value is required (for example, R1C1+1), the value meant is the value of the cell described plus the value 1. (Note that this value can be a number, text, logical value, or error value, depending on the value in the cell referred to.)

When the reference describes a group of cells, but a single value is required, Multiplan-86 chooses the value to be used from the cell where the current row or column intersects the group of cells. In particular, for groups that are parts of rows, Multiplan-86 chooses the value in the current column. Similarly, from parts of columns, the value in the current row is chosen. Figure 11 illustrates a use for this feature. Using a group of cells that is not either a row or a column (or a part of one of these) does not yield useful results.



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Figure 11. Single Value from a Reference to a Group of Cells

The Function Directory in Part 2 contains descriptions of the functions that can process a collection of values (SUM(. . .) for instance). Any type of reference can be given as an argument to such a function. The value of all the cells that are described, whether one or many, is processed.

Error Values

When a Multiplan-86 function, operation, or reference is used incorrectly, an error value results. There are different error values for different error conditions, as described below. Error values “propagate,” meaning that operations or functions that result in error values in one cell cause the same error values in all the cells that refer to the first cell. This also means that when you notice an error value in a cell, the propagation has to be unraveled step-by-step until the source of the error is found.

For example, you notice that cell R1C1 displays the #NAME? (undefined name) error value. The formula in R1C1 is a+1. Check the definition of “a” using the Name command. The name “a” is defined to refer to R1C2. That cell is the next step in the search. When you look in cell R1C2, you may find the cause there, but you may also find references to other quantities which have to be inspected. You may have to look at more than one cell to find the source of the error.

The error values and their causes are:

Elements of Multiplan-86

Value	Cause
#DIV/0!	result of an attempt to divide by 0.
#NAME?	result of an undefined label reference.
#N/A	result when the value is not available. Also, #NA is a special value that can be created using the NAO function and which will be propagated by arithmetic.
#NULL!	result of specifying an intersection of disjoint areas, for example, R1 R2 (use union instead, R1,R2).
#NUM!	result of overflow (number is too large or too small) or of an illegal use of an arithmetic function, for example, SQRT(-1).
#REF!	result of a relative reference reaching outside the sheet or of a reference to a deleted area.
#VALUE!	result of using text where a number is needed or vice versa, or of using references when a value is needed.

Files

This section describes how Multiplan-86 uses files, when it reads and writes files, and how links between files are handled.

This information will help you plan your use of Multiplan-86 files better.

File Handling

Files are permanent repositories of information kept on diskettes. Files are identified by filenames, which are kept in a directory. Multiplan-86 uses files mainly to store worksheets.

Multiplan-86 can read files, and it can write them. For both operations, Multiplan-86 requires access to the file.

However, the machine may have more than one disk drive and different files may reside on different diskettes. It is important, then, to make sure that the proper diskette is mounted in the proper drive.

If the filename includes a drive specification (assigned through the Transfer Option command “setup” field), then that drive is the proper one. Otherwise, the “default” drive is used.

Efficient operations with multiple diskettes may require some advance planning. Should the planning fail, however, Multiplan-86 simply displays the message:

Enter Y to retry access to filename

When you see this message, check the diskette and replace it, if necessary, or change the default drive, using the Transfer Options command; then repeat the action to access the file.

The following lists describe when Multiplan-86 reads files, when it writes files, and what problems Multiplan-86 can have with reading and writing files. This information can help you anticipate file access by Multiplan-86.

Multiplan-86 reads files:

1. When a sheet is loaded (Transfer Load command) in any mode (Normal, Symbolic, Other).
2. When a sheet is loaded that has supporting sheets, the supporting sheets are read one by one.
3. When the eXternal Copy command is executed, the source sheet is read.
4. When the eXternal Use command is executed, the affected copies are re-done; and the source sheets are read. (See the eXternal Use command in the Command Directory in Part 2.)
5. The Multiplan-86 system diskette is read for parts of the Multiplan-86 program when commands are executed, and for the Help file when Help is requested.

Multiplan-86 writes the file to the diskette:

1. When a sheet is saved (Transfer Save Command) in any mode.
2. When a sheet is renamed or deleted, the file directory is read or written. The file directory, by definition, shares the diskette with the worksheet files.

3. When the Print File command is executed.
4. When sheet-linking relationships change, a Transfer Save or Transfer Rename command, in addition to normal duties, gains access to all supporting sheets to issue or to revoke receipts.

Problems with File Access

Be aware of problems to consider when trying to read or write a file. If problems with file access persist, check for possible causes from the following lists.

Problems when Reading

1. The information may not be on the diskette. Use the Transfer Load command and the direction keys to display the directory of files on the diskette.
2. The information is not reliably readable or is unreadable. You should maintain backup copies of important files.
3. The information is not in the expected format. Check the mode setting of the Transfer Option command. Remember that the eXternal Copy command requires that sheets be saved in Normal Mode.
4. The information is not up to date. This may happen if incorrect procedures are used for updating a collection of externally linked sheets. See the next section, "External Relationships," for details.

Problems when Writing

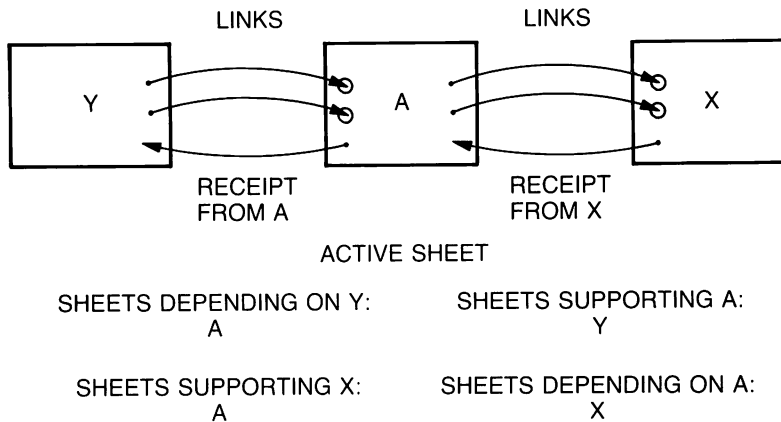
1. The diskette may become filled. Diskettes can store only a limited amount of information. As more files are stored on them, they may fill up. See the *Rainbow 100 User's Guide* for procedures for determining the amount of storage used on a diskette.
2. Previous information stored in a file may be valuable. Multiplan-86 asks you:
Overwrite existing file?
Pause and reflect if this is what you want.

3. The diskette may be write protected by a tab covering an indentation in the sleeve of the diskette. Consider the reason for write-protection before removing the tab.
4. Errors during writing, such as an interruption, may leave incorrect information on the diskette. Make sure that write operations are allowed to complete.

External Relationships

The information in this section applies to the eXternal group of commands. Refer to the discussion of these commands in the Command Directory for additional information.

External relationships between worksheets are illustrated in Figure 12.



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Figure 12. External Relationships Between Worksheets

The set of external links can be reviewed by stepping through the supporting sheet names and the source and target areas in the eXternal Copy command.

Changing data on a supporting sheet has no immediate effect on its dependent sheets. Only when a dependent sheet is loaded is the current information read from its supporting sheet. Thus, when changes are made to sheet Y, nothing changes on sheet A until sheet A is loaded. When sheet A is loaded, then sheet Y is read, and its data is copied to sheet A.

Similarly, when sheet A is changed (including changes from sheet Y), sheet X does not change until it is loaded. When sheet X is loaded, then sheet A is read, and its data is copied to sheet X. Note that for the information read from A to X to be current with the information on Y, A must be loaded *and saved* at least once before X is loaded. Information is copied only one link at a time.

In a more complex set of worksheets, the relationships between the worksheets can be unraveled using the eXternal List command on each sheet and creating a dependency diagram similar to the one above.

Consistency of all data can be assured by starting with a set of sheets that are not supported by any sheets. Load and save a second set of sheets that depend on the set of unsupported sheets; then load and save sheets that depend on the second set of sheets, and so on, until all sheets are loaded and saved.

This process is illustrated in Figure 13.

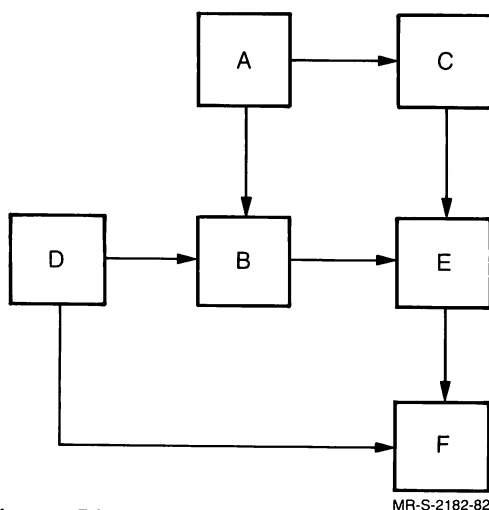


Figure 13. Dependency Diagram

Sheets A and D are not supported by any other sheets. If the information on them is current, then:

1. Load and save sheets C and B.
2. Load and save sheet E.
3. Load and save sheet F.

When preparing the dependency diagram, remember that the list of “depending sheets” on each sheet is not necessarily complete. For example, the listing of sheets depending on A is contingent on a “receipt” being issued when the link is established by B.

A receipt is an entry in the supporting file that says sheet B receives data from this sheet. When you give the eXternal List command, Multiplan-86 looks at the receipts to build the list of “Sheets depending on.” The receipt must be written correctly onto A just after B is saved. If, for any reason, Multiplan-86 cannot enter the receipt onto sheet A, the “depending” list on A is not current. Even so, the data from the supporting sheets can be copied as specified by the eXternal Copy command.

The list of “supporting” sheets is always correct.

Transforming the Worksheet

The information in this section applies to the Delete, Insert, Move, and Sort commands. Refer to the Command Directory in Part 2 for additional information on these commands.

When rows or columns are inserted, deleted, moved, or sorted, sections of the worksheet may be displaced. For example:

1. One column is inserted before column 2. This moves the part of the worksheet that is to the right of column 2 one column farther to the right.
2. Row 2 is moved next to row 10. Besides moving the contents of row 2 to row 9, the former rows 3–9 are displaced one row toward the top of the sheet.

Because these commands may change the location of cells, Multiplan-86 also automatically adjusts any references to the cells, whether they occur in formulas or in the definition of names. However, the adjustments to some references after the worksheet has been transformed may cause problems. The problems fall into the following general categories:

1. References to cells which have been deleted from the sheet are replaced by #REF! error values. All formulas that contained the references must be edited. These formulas are found by inspecting the cells that display the #REF! error value.

2. If the reference is to a group of cells and the transformation would distort a rectangular part of the group into a more complex shape (for example, if a corner cell is deleted from a rectangular area), the name definition is not changed.
3. If cells are inserted adjacent to a group of cells, references to the group are not updated to include the new cells. If the enlargement of the group is desired, the insertion must be made in the interior of the group rather than at the boundary. If necessary, the new cells can be inserted at an unambiguous place (for example, in the interior of the group), then the cell contents copied as required.
4. Related problems may occur when rows or columns containing a boundary of a group are moved. Such moves “drag” the boundary line of the definition of the group along. If this is not desired, the move can still be accomplished by an insert, copy, delete sequence.
5. If a formula is copied into a number of cells using the Copy Down, Copy Right, or Copy From commands, the relative references in all of the formulas are adjusted equally. The model formula for the adjustment is the first one encountered on the sheet. This means, for example, if the formula

`RC[1]*1.05`

is copied from R1C2 to R1C14, and if column 5 is deleted, all formulas are adjusted according to R1C2 (no change in this case). However, if column 1 is deleted, the reference in R1C2 becomes #REF! (see rule 1 above), and the other formulas follow accordingly. To fix undesirable results, edit the model formula and recopy it.

Note that the Sort command can move many rows and, therefore, can cause any of these problems.

Part 2

Reference
Section

2

Command Directory

This directory explains each Multiplan-86 command. At the beginning of each command description, the complete menu for the command or subcommand is shown with proposed responses. In most cases, the proposed response is derived from the position and contents of the active cell. For consistency of reference, a general notation is used for proposed responses, as follows:

- RC indicates the active cell
- R indicates the row number of the active cell
- C indicates the column number of the active cell
- W indicates the active window
- () indicates a description of proposed response; for example, (contents of RC)

Other proposed responses, usually numbers, are shown as they appear when the command is used.

The examples provided are intended to give you a sample of the uses for the command. A short description of the action to be performed precedes a command format with proposed responses in the fields. To recreate the example

Command Directory

yourself, use any of the methods for entering responses until your command line looks like the example.

All commands are carried out only after you press the RETURN key.

Related and similar commands are listed under the heading "See Also." Commands that offer subcommands are described only generally under the main command heading. Refer to the subcommand descriptions for details.

Alpha

ALPHA: (contents of RC)

Enter text (no double quotes)

Description

Places text in the active cell. If the active cell already contains text, that text is the proposed response to the Alpha prompt.

The proposed response may be edited; but, if you simply begin typing, the proposed response is replaced entirely.

The Alpha command is terminated by pressing the RETURN key or one of the direction keys.

The contents of a cell containing text are displayed in double quotes in the status line. Multiplan-86 supplies these double quotes automatically.

The Alpha command cannot be used to blank a cell. Use the Blank command for this.

The Alpha command is highlighted in the command menu when Multiplan-86 is idle. This means that (1) Alpha can be selected by pressing the RETURN key; and (2) if the RETURN key is pressed inadvertently, you may find yourself in the Alpha command.

Example

To enter the text "Net Profit" into the active cell:

ALPHA: Net Profit

See Also

- Format Cells Continuous to permit the display of cell contents to cross a cell boundary.
- Format Width to accommodate text within a column.
- Name to create names for cells.

Blank

BLANK cells: RC

Enter reference to cell or group of cells

Description

Replaces contents of specified cells with blanks. The proposed response permits quick blanking of the active cell.

The format of the cell is not changed. The cell is still available for storing values.

Names are not affected. If a cell was Named before the Blank command was used, that name still applies.

When a formula refers to a blank cell, its number value is taken as zero, or its text value is a blank.

Examples

To blank the cell in row 3 column 2:

BLANK cells: R3C2

To blank all cells in the area named Sales:

BLANK cells: Sales

To blank an irregular area:

BLANK cells: R1:6C1,R7:8

Description

Copies the specified cell the number of times specified in the “number of cells” field into the cells below it.

The proposed response for the “number of cells” field is the number used in the last Copy Down or Copy Right command. If neither the Copy Down nor the Copy Right command was used previously, the proposed response is 1. The total number of identical cells is number specified plus one (for the original).

The command can also copy down a row of cells by specifying a row or part of a row in the “starting at” field.

Examples

To copy the value and format of R1C1 into the 10 cells below it:

COPY DOWN number of cells: 10 starting at: R1C1

To copy the first five cells in row 1 into the next four rows below:

COPY DOWN number of cells: 4 starting at: R1C1:5

Copy From

COPY FROM cells: RC to cells: RC

Enter reference to cell or group of cells

Description

Copies the contents of a cell or group of cells to another location on the sheet. Copy From is used, for example, when the source cells and the destination cells are not in the same row or column.

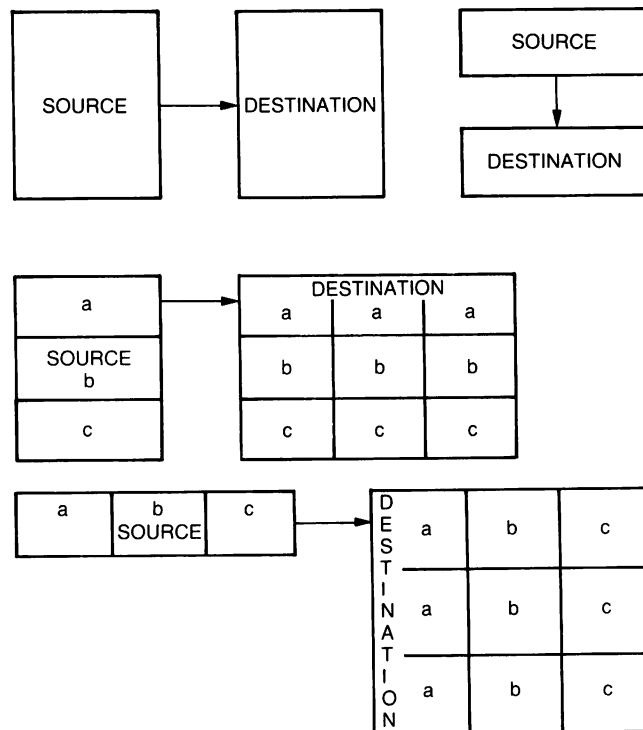
When there is only one source cell, the cell contents are copied into each destination cell.

When the source is a group of cells, the entire group is copied. When only one destination cell is given but the source is a group of cells, the destination cell marks the upper left corner of the destination area.

In general, either the source or the destination should consist of a single cell.

In special circumstances, copying vectors can be accomplished. (A vector is a line of two or more cells, either in a row or in a column.) Copying from a row to a row or from a column to a column is allowed if the source and the destination are the same size. If copying is done from a row vector to a column vector, or from a column to a row, the resulting copy is a rectangle in which the source vector is copied starting at each cell of the target vector.

The diagrams in Figure 14 illustrate the results of copying vectors.



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Figure 14. Results of Copying Vectors

COPY

If other forms of copies are attempted, the system cancels the copy command and displays the “Illegal parameter” message.

Examples

To copy the contents of cell R1C1 into cell R5C3:

COPY FROM cells: R1C1 to cells: R5C3

To copy the contents of cell R1C1 into all cells in column 8:

COPY FROM cells: R1C1 to cells: C8

To copy a square patch of cells in the upper left corner of the worksheet into a square patch beginning at R8C1:

COPY FROM cells: R1:4C1:4 to cells: R8C1

The upper left cell of the new patch is R8C1. After the copying, R8C1 is a copy of R1C1; R8C2 is a copy of R1C2, and so on to R11C4, which is a copy of R4C4.

Likewise, the same copy can be made by also specifying a destination area that matches the source area:

COPY FROM cells: R1:4C1:4 to cells: R8:11C1:4

To copy the first four cells in column three into column six:

COPY FROM cells: R1:4C3 to cells: R1C6 (upper left of area)

COPY FROM cells: R1:4C3 to cells: R1:4C6 (matching area)

To copy the first four cells in column six three times:

COPY FROM cells: R1:4C6 to cells: R1C6:8

The source cells are part of a column, while the destination area is part of a row. The source column is copied down beginning at each cell of the destination.

Copy Right

COPY RIGHT number of cells: 1 starting at: RC

Enter a number

Description

Copies the specified cell the specified number of times into the cells to the right of the specified cell.

The proposed response for the “number of cells” field is the number used in the last Copy Down or Copy Right command. If neither the Copy Right nor the Copy Down command was used previously, the proposed response is 1. The total number of identical cells will be the number specified plus one (for the original).

The command can also copy right a column of cells by specifying a column or part of a column in the “starting at” field.

Examples

To copy the contents of the active cell (R1C1) into the 8 cells to the right of it:

COPY RIGHT number of cells: 8 starting at: R1C1

To copy the contents of the 5 cells in column 1 (R1:5C1) into column 2, giving two side by side columns with the same contents:

COPY RIGHT number of cells: 1 starting at: R1:5C1

Description

Deletes all or part of a column or columns. The proposed response for the starting column is the column of the active cell. This command is most commonly used to delete complete columns by accepting the proposed responses of rows 1 and 255.

Columns to the right of the deleted columns move left, and new columns of blank cells are added at the right edge of the sheet.

Parts of columns can be deleted. The deletion takes place between the specified rows; other rows are not affected.

Examples

To delete the entire column 4:

```
DELETE COLUMN # of columns: 1   starting at: 4  
                between rows: 1   and: 255
```

To delete a rectangular area in columns 3 and 4, between rows 3 and 8:

```
DELETE COLUMN # of columns: 2   starting at: 3  
                between rows: 3   and: 8
```

The portion of the worksheet in rows 3 through 8 which was to the right of column 4 moves two columns to the left.

Delete Row

```
DELETE ROW # of rows: 1   starting at: R  
                between columns: 1   and: 63
```

Enter a number

DELETE

Description

Deletes all or part of a row or rows. This command is most commonly used to delete complete rows by accepting the proposed responses of columns 1 and 63.

Rows below those deleted move up, and new rows of blank cells are added at the bottom of the sheet.

The proposed response for the starting row is the row of the active cell.

Parts of rows can be deleted. The deletion takes place between the specified columns; other columns are not affected.

Examples

To delete the active row (R1):

```
DELETE ROW # of rows: 1    starting at: 1
                between columns: 1        and: 63
```

To delete a rectangular area in rows 6 and 7 between columns 1 and 8:

```
DELETE ROW # of rows: 2    starting at: 6
                between columns: 1        and: 8
```

The portion of the worksheet in columns 1 through 8 which was below row 7 moves up two rows.

Edit

EDIT: (Contents of RC)

Enter a formula

Description

Used to edit a formula or value in the active cell. If the cell contains text, it is probably easier to use the Alpha command to edit the contents because all the text inside the quotation marks is taken as one word. The Word Right and Word Left editing keys cannot be used. If you do decide to edit text with the Edit command, remember to enclose the text in double quotes.

The current contents are shown in the command line. The edit cursor is placed at the end of the current contents.

After you have edited the cell's contents, press RETURN to put the contents into the cell, or press CANCEL to cancel your changes.

If the cell contains a formula, Multiplan-86 checks the formula for errors when RETURN is pressed. If the formula contains an error, the erroneous part is highlighted, and the Multiplan-86 Edit command remains active.

See the "Editing" Section in Chapter 1 for a description of the editing keys.

See Also

Alpha for entering or editing text.

Format

FORMAT: Cells Default Options Width

Select option or type command letter

Description

Presents a choice of various display adjustments.

Format Cells alters the alignment and format of a cell or group of cells.

Format Default sets the default alignment, format, and width for all cells.

Format Options controls the display of formulas and of commas in numbers.

Format Width sets the width of a column or columns.

The display of cell contents is controlled by the settings in the “alignment” and “format” fields of the Format Cells command.

The setting in the “alignment” field controls the placement of the contents within the available spaces of the cell: whether the empty space is placed to the right of the contents, to the left, or on both sides.

The setting in the “format” field, together with the response in the “# of decimals” field, controls how the value is displayed: as a dollar amount, as a percentage, as a decimal value, and so on.

In both the “alignment” and “format” fields, there is a “Default” setting. The “Default” setting is defined by the Format Default Cells command. The settings selected in the “alignment” and “format” fields of the Format Default Cells command define the display of all cells with the “Default” setting.

All cells have the “Default” setting initially. (When Multiplan-86 is first started, the display is controlled by “General” alignment and “General” format. If you insert new rows or columns, the inserted cells receive the default setting.)

The format given to the default settings can be changed at any time by using the Format Default command. This allows you to change easily the format of all cells that have the default code setting, which may be most of the cells.

It is recommended that you define the most common format you will be using as the default, and alter a cell or some cells to display their contents differently from the default with the Format Cells command.

The subcommands are explained individually on the following pages.

See Also

Print Margins to set the format of a printed copy of the sheet.

Format Cells

FORMAT cells: RC alignment: Def Ctr Gen Left Right-
 format code: Def Cont Exp Fix Gen Int \$ * % - # of decimals:

Enter reference to cell or group of cells

Description

Alters the alignment and format codes of one or more cells.

The proposed responses are the format codes of the active cell. So, this command may be used to review the settings for the active cell.

If you are changing the alignment code of a group of cells but not the format code, you must select the hyphen response in the “format code” field to keep the format codes as they are. Otherwise, all cells in the group will receive the format code of the menu setting.

Similarly, if you want to change the format code but not the alignment code of a group of cells, select the hyphen response in the “alignment field.”

The alignment codes are:

Code	Name	Meaning
Def	Default	Align this cell by the default alignment.
Ctr	Center	Center the cell display in the column.
Gen	General	Align text left, numbers right.
Left	Left	Left-justify the cell display in the column.
Right	Right	Right-justify the cell display in the column.
—		Leave all alignment codes as they are. Used when changing the format code of a group of cells but not the alignment codes.

Text is displayed only for the width of the cell unless the Continuous format code is selected.

The format codes are:

Code	Name	Meaning
Def	Default	Display this cell with the default format.
Cont	Continuous	Display text longer than the column width at its full width, crossing into the column on the right if necessary (the cell to the right must be blank and must have the Continuous format also). Numbers are displayed in the General format code. Typically, you should format an entire row when using the Continuous format code.
Exp	Scientific	Display numbers as a decimal notation times a power of ten; for instance, 2.1E6 for 2100000. The number of decimal places used is set in the “# of decimals” field of the Format Cells command.
Fix	Fixed point	Display numbers rounded to a fixed number of digits of decimal fraction. The number of digits is set in the “# of decimals” field of the Format Cells command.
Gen	General	Display numbers as precisely as possible in the available width of the cell, with scientific notation used automatically, as needed.
Int	Integer	Round numbers with a decimal fraction to integers.
\$	Dollar	Display money amounts with a leading dollar sign and two decimal places.
*	Bar graph	When the cell contains a number, round to an integer and display asterisks. For example, all values between 2.5 and 3.5 are displayed as three asterisks. Use the bar graph format code to build a bar graph. Only as many asterisks as the width of the cell allows are shown. To see all asterisks, use the Format Width command to widen the cell.

FORMAT

Code	Name	Meaning
%	Percent	Display numbers as a percentage. The number of decimals is set in the “# of decimals” field of the Format Cells command. For example, the value .1 is displayed as 10% if the # of decimals is zero, or as 10.0% if the # of decimals is 1.
—		Leave all format codes as they are. Use when changing the alignment code of a group of cells but not the format codes.

The “# of decimals” field is used only for the Fix, Exp, and % format codes. If you enter a response to this prompt for the other format codes, your response is ignored. If you are not specifying one of these three format codes, you can simply press the RETURN key after specifying the format code.

Examples

To align the contents of the active cell (R5C15) in the center of the available spaces:

FORMAT CELLS: R5C15 alignment: Def (Ctr) Gen Left Right -
format code: (Def) Cont Exp Fix Gen Int \$ * % - # of decimals: 0

To display the cells in column 2, rows 3 through 6 as dollar values preceded with a dollar sign and displayed with two decimal places:

FORMAT CELLS: R3:6C2 alignment: (Def) Ctr Gen Left Right -
format code: Def Cont Exp Fix Gen Int (\$) * % - # of decimals: 0

Notice that the alignment of all cells in this group is now “Default.” If any of the cells had an alignment setting other than “Default”, and if you want to preserve the special alignment, select the hyphen response instead of the “Def” response in the “alignment code” field.

To display the values in rows 1 through 12 of column 10 as percentages with up to four decimal places accuracy:

FORMAT CELLS: R1:12C10 alignment: Def Ctr Gen Left Right (-)
 format code: Def Cont Exp Fix Gen Int \$ * (%) - # of decimals: 4

Any alignment already specified for any of the cells in this group is retained.

See Also

Format Default to set the default format.

Format Width to set the width of specific columns.

Format Default

FORMAT DEFAULT: Cells Width

Description

Presents a choice of two kinds of defaults to be changed.

Format Default Cells sets default alignment and format codes.

Format Default Width sets the default width of all columns.

See Also

Format Cells to alter the format and alignment codes of specific cells.

Format Width to alter column widths of specific columns.

Format Default Cells

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

FORMAT

Description

Sets the alignment and format for all cells that have the default setting. The initial default alignment and format code is General.

The alignment and format codes are listed and described under the Format Cells command.

Example

To set the default format code to dollar amounts (\$):

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

Format Default Width

```
FORMAT DEFAULT column width in chars: 10
```

Enter a number

Description

Sets the width of all columns that have the default width setting. See Format Width for an explanation of default width.

The initial default width is 10 characters.

Example

To set the default width to 12:

```
FORMAT DEFAULT column width in chars: 12
```

See Also

Format Width to alter the width of some columns.

Format Options

FORMAT OPTIONS commas: Yes No formulas: Yes No

Select option or type command letter

Description

The proposed responses are the current settings of the options.

For cells that have “Fix,” “Int,” “\$,” or “%” format settings, the comma option groups a number into thousands and separates the groups with commas. For example, a number such as 12345678 under the comma option would be displayed as 12,345,678.

The formulas option permits you to see what generates the value in every cell. A cell normally displays the value of a formula placed in it. Selecting “Yes” for the formulas option causes cells that contain formulas to display their formulas instead of their values. The width of all columns is doubled. Cells that contain text display their contents in double quotes.

When the formulas option is off (No), check the formula in a cell by using the Edit command or by moving the cell pointer to the cell. The formula appears in the status line.

Example

To display formulas in the cells that contain them;

FORMAT OPTIONS commas: Yes(no) formulas:(Yes)No

Format Width

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

Enter a number or d for default

Description

Alters the width of one or more columns to the number of characters specified.

The proposed response for the "in chars or d(efault)" field is always d. The "d" is a special "default" setting, similar to the default setting for format and alignment codes. When the width setting is "d", the column width is controlled by the Format Default Width command.

All columns have the default setting initially. The width of all columns with the default setting can be changed easily using the Format Default Width command. You can set the most convenient width as the default with the Format Default Width command, and alter specific columns to other widths with the Format Width command.

If a cell contains text longer than the column is wide, Multiplan-86 cuts off the display at the right edge of the column. Use this command to widen the column or the "Continuous" cell format.

If a cell contains a number that cannot be displayed in the column width, Multiplan-86 displays asterisks instead. This can be fixed by widening the column, or sometimes by using a different format code. (Consider, however, that the asterisks may be the result of Bar graph formatting of values.)

Examples

To change the width of the active column:

FORMAT WIDTH in chars or d(efault): 12 column: 1 through: 1

To change the width of columns 4 through 8 to 20 characters:

FORMAT WIDTH in chars or d(efault): 20 column: 4 through: 8

See Also

Format Cells to set Continuous format code.

Format Default Width to set the default column width.

Goto

GOTO: Name Row-col Window

Select option or type command letter

Description

Presents a choice of ways to move the cell pointer to a new position.

Goto Name makes the first cell of a named area the active cell.

Goto Row-col makes the specified cell the active cell.

If a requested cell is already visible through the active window, only the cell pointer is moved.

If the requested cell is not visible through the active window, the active window is shifted so that the named area appears in the upper left quarter of the specified window.

Goto Window makes the specified cell the active cell and places it at the upper left corner of the specified window.

The subcommands are explained individually on the following pages.

Goto Name

GOTO name:

Enter name

Description

Places the cell pointer on the upper left corner cell of the named area, making that cell the active cell.

Use the direction keys to step through the list of names.

Example

To move the cell pointer to the upper left corner of the area named SumCosts:

GOTO name: SumCosts

Goto Row-col

GOTO row: R column: C

Enter a number

Description

Places the cell pointer on the specified cell, making that cell the active cell.

Examples

To move to row 25 in the active column (column 1):

GOTO row: 25 column: 1

The proposed response in the “column” field was not changed.

If rows 1 through 20 are visible through the window when you enter this command, the window is shifted so that cell R25C1 is visible in the upper left quarter of the active window.

To make row 37, column 9 (R37C9) visible:

GOTO row: 37 column: 9

Goto Window

GOTO WINDOW window number: W row: R column: C

Enter a number

GOTO

Description

Places the specified cell in the upper left corner of the window specified.

If you use this command with the proposed responses, which are the active window and the active cell, Multiplan-86 redraws the screen, placing the active cell in the upper left corner.

Example

To set the active cell as the upper leftmost cell of window number 3:

```
GOTO WINDOW window number: 3 row: 5 column: 15
```

To set cell R100C45 as the upper leftmost cell of window number 5:

```
GOTO WINDOW window number: 5 row: 100 column: 45
```

See Also

Window Split to open windows.

Help

HELP: Resume Start Next Previous
Applications Commands Editing Formulas Keyboard

Select Option or type command letter

Description

Provides helpful information about Multiplan-86.

Help information is read from a diskette file. Information in the Help file is requested in one of two ways: either (1) selecting Help from the main command menu, or (2) pressing the HELP action key, except when using the Alpha command (this places a question mark as a response to Alpha). When you request Help, the worksheet is replaced by text from the Help file, and the Help command menu appears.

The worksheet display resumes when you either select the "Resume" subcommand (press "R" or RETURN) or press CANCEL.

The information displayed depends on when Help is requested, in particular:

If you use SPACE or BACKSPACE to highlight a command word in a menu, a description of that command is shown when you request Help.

If the edit cursor is in a command field, a description of that field is shown.

If the message line shows an error message, either a description of the previous command or a description of the error is shown.

Once in the Help command, you can request Help information by selecting one of the following options on the Help menu:

Resume:	Return to the menu where you requested Help.
Start:	Show the beginning of the Help file.

HELP

- Next:** Show the next screenful of Help information. Typically, not all the relevant information is shown, and Next (press the letter N) should be used.
- Previous:** Show the previous screenful of Help information.
- Applications:** Show a list of common problems paired with the names of the commands that offer solutions.
- Commands:** Show the description of the first command (Alpha).
- Editing:** Show the description of Multiplan-86 editing.
- Formulas:** Show a list of all functions and the rules about formulas.
- Keyboard:** Show the keytop labels corresponding to Multiplan-86 action keys.

Insert

INSERT Row Column

Select option or type command letter

Description

Presents a choice of ways to insert new cells into the worksheet.

Insert Row inserts new rows, moving the rest down.

Insert Column inserts new columns, moving the rest to the right.

Multiplan-86 adjusts all references affected by the insertion. See “Transforming the Worksheet” in Chapter 1 for the description of how the Insert command affects references.

The Insert command is not carried out if the insertion would push data off the edge of the sheet. If, for example, you have data in column 63, an attempt to insert even one column receives the message “Illegal parameter”. Similarly, if you have data in column 50 and attempt to insert 13 columns, you receive the “Illegal parameter” message.

The subcommands are explained individually on the following pages.

See Also

Move to move rows or columns on the sheet.

Delete to remove rows or columns.

Insert Column

INSERT COLUMN # of columns: 1 before column: C
 between rows: 1 and: 255

Enter a number

Description

Inserts all or part of a column or columns of blank cells. This command is most commonly used to insert complete new columns by accepting the proposed responses of rows 1 and 255.

Parts of columns can be inserted. Insertion takes place between the specified rows; other rows are not affected.

Cells to the right of the inserted ones move right.

Examples

To add a column just left of the active one (column 3):

INSERT COLUMN # of columns: 1 before column: 3
 between rows: 1 and: 255

To insert a rectangular area in columns 5 and 6 between rows 3 and 8, causing parts of rows 3-8 to move right to make room:

INSERT COLUMN # of columns: 2 before column: 5
 between rows: 3 and: 8

Insert Row

INSERT ROW # of rows: 1 before row: R
 between columns: 1 and: 63

Enter a number

Description

Inserts all or part of a row or rows of blank cells. This command is most commonly used to insert complete rows above the active row by accepting the proposed responses of the active cell and columns 1 and 63.

The command can be used to insert parts of rows. Insertion takes place between the specified columns; other columns are not affected.

Cells below the ones added move down.

Examples

To insert a new row above row 7:

INSERT ROW # of rows: 1 before row: 7
 between columns: 1 and: 63

To insert a rectangular area in rows 4 and 5 between columns 1 and 8, causing the lower parts of columns 1-8 to move down to make room:

INSERT ROW # of rows: 2 before row: 4
 between columns: 1 and: 8

Lock

LOCK: Cells Formulas

Select option or type command letter

Description

Provides two ways to lock cells to protect them from accidental change.

Lock Cells locks and unlocks selected cells.

Lock Formulas locks all cells that contain text or formulas.

The values of locked cells cannot be changed by the commands Alpha, Blank, Copy, Edit, Format Cells, or Value.

Locked cells are still affected by the commands Delete, Insert, Move, and Sort.

When some cells are locked, the action key "Next unlocked cell" positions the cell pointer on the next unlocked cell that is not blank. Using Lock and this action key, you can quickly locate variable quantities on a complex worksheet and perform "what if" experiments.

The subcommands are explained individually on the following pages.

Lock Cells

LOCK cells: RC status: Locked Unlocked

Enter reference to cell or group of cells

Description

Displays and changes the protection status of cells.

The proposed responses show the status of the active cell.

Lock or unlock selected cells by selecting the appropriate response in the “status” field.

Example

To lock an unlocked active cell (R1C1):

LOCK cells: R1C1 status: (Locked) Unlocked

To unlock the whole worksheet:

LOCK cells: R1:R255 status: Locked (Unlocked)

Lock Formulas

LOCK FORMULAS:

Enter Y to confirm

Description

Entering Y locks all cells that contain text or formulas. Cells that contain numbers are not affected by the Lock Formulas command.

The Lock Formulas command protects all values generated by formulas. Numbers and any entries made after locking are the exception, and you must decide which unlocked cells you want to lock.

See Also

Lock Cells to lock cells with numbers and to unlock cells.

Move

MOVE: Row Column

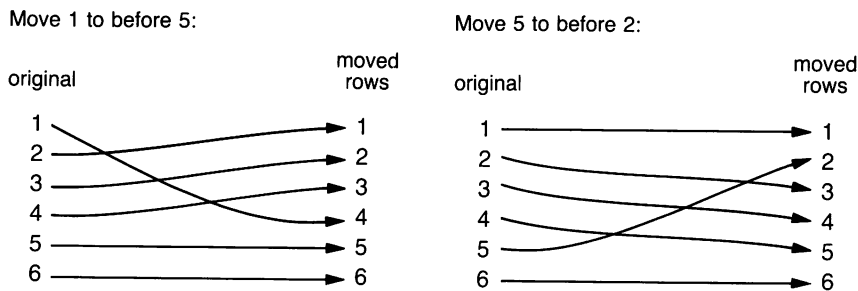
Select option or type command letter

Description

Presents a choice of ways to move cells from one place to another on the sheet. Move Row moves whole rows. Move Column moves whole columns.

More complex moves can be made by inserting blank cells at the destination, copying the source cells into the destination cells, then deleting the source cells.

The destination of a move is identified by the row or column that follows the moved cells. That row may or may not be displaced, depending on the direction of the move. Figure 15 illustrates the possible effects of a move.



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Figure 15. Possible Effects of a Move

Moving cells causes the worksheet arrangement and all references to be adjusted. See "Transforming the Worksheet" in Chapter 1 for the description of how the Move command affects the worksheet.

The subcommands are explained individually on the following pages.

See Also

Copy	to duplicate cells.
Delete	to delete rows or columns.
Insert	to add rows or columns.

Move Column

MOVE COLUMN from column: C to left of column: C # of columns: 1

Enter a number

Description

Moves a group of columns to a new position on the worksheet.

Example

To move the active column to the left edge of the sheet, moving all columns now between the active column and the leftmost column right one column to make room:

MOVE COLUMN from column: 9 to left of column: 1 # of columns: 1

Move Row

MOVE ROW from row: R to before row: R # of rows: 1

Enter a number

Description

Moves a row or group of rows to a new position on the worksheet.

Example

To move the active row to the top of the sheet, moving all rows now between the active row and the top row down one row to make room:

MOVE ROW from row: 5 to before row: 1 # of rows: 1

NAME

Name

NAME: define name: to refer to:

Enter name

Description

Assigns a name to a cell or area of cells. The name can then be used to refer to that cell or area in a command or formula.

The proposed response for the “define name” field is either a blank or text. If the active cell contains text, Multiplan-86 proposes that text, with any illegal characters removed, as the name to be defined. This makes it easy to convert a title already given to a row or column into a name.

If cell R5C1 contains the text Costs as a title, then the Name command can be used to define the name Costs as R5C2:15. Text used as titles and names are very different and should not be confused. However, it is easier to read your formulas if the names in them correspond to the visible titles on your worksheet.

If you want the name to be something besides the proposed response, simply type the new response.

The proposed response for the “to refer to” field is either the active cell or, if the last name defined was a vector (portion of a row or column), the same vector shifted to the active row or column. This feature makes defining parallel groups a simple task.

If the name you enter is already defined, the proposed response in the “to refer to” field is the current definition.

Names must begin with a letter. The rest of the characters of a name can be any combination of letters, numbers, the period (.), and the underscore(_). (These rules are the same ones used in the BASIC programming language.) Proposed responses are automatically made to conform to these rules. Illegal characters are ignored and underscores are substituted for blanks embedded in text strings.

Names can be up to 31 characters long.

Names cannot be a combination of characters that could be confused with a reference. See the descriptions of references in the “Formulas” section of Chapter 1.

To see the names that have been defined, select the Name command. Use the direction keys to display each defined name and its definition in the command fields.

To change the definition of a name after viewing it, use the edit keys to alter the response in the “to refer to” field, and press the RETURN key.

Names are deleted by making them refer to no area. Enter the name in the “define name” field, delete the response in the “to refer to” field, and press the RETURN key.

Example

To define row 10, columns 3 through 15 as Sales:

NAME: define name: Sales to refer to: R10C3:15

See Also

eXternal Copy for names associated with external links.

Options

OPTIONS recalc: Yes No mute: Yes No

Select option

Description

The proposed responses show the current settings.

The “recalc” option controls when Multiplan-86 performs formula calculations. If the “recalc” option is set to “Yes”, Multiplan-86 recalculates all formulas whenever a cell is changed. If the “recalc” option is set to “No”, recalculation is done only when the RECALC control key is pressed or during Transfer Save.

The length of time Multiplan-86 takes to recalculate a sheet depends on how many cells are in use, and on the complexity of the formulas in them. When you want to make many entries on a busy worksheet, set the “recalc” option to “No” for quicker response. Set “recalc” to “Yes” again when you want to see the effect of each change.

The “mute” option controls the Multiplan-86 audible alarm. The initial setting is “No”, which means the alarm sounds when an error is made. Select “Yes” when you want to mute the alarm.

After you press the RETURN key, Multiplan-86 displays in the message line its version number and the total bytes of storage (corresponding to 100% Free) that the computer has.

Print

PRINT: Printer File Margins Options

Select option or type command letter

Description

Presents a choice of four actions related to printing the active worksheet.

Print Printer begins printing.

Print File stores printable output in a disk file.

Print Margins sets the margins for the printed output.

Print Options specifies the part of the worksheet to be printed and controls part of the printed format and printer setup.

The subcommands are explained individually on the following pages.

Print File

PRINT on file:

Enter a filename

Description

Stores printed output in a disk file rather than sending it to the printer. Such files have several uses. The file may be printed at a later time. You might use a text editor to alter the file before printing it, or you could include the file as an illustration in another text file.

If a file of the same name exists, Multiplan-86 displays the message "Over-write existing file?". Press *Y* to start printing. Pressing any other key cancels the Print File command.

PRINT

Example

To write a print-formatted version of a file to the name BUDGET:

PRINT on file: BUDGET

Print Margins

PRINT MARGINS: left: 5 top: 6 print width: 70 print length: 54
page length: 66

Enter a number

Description

Alters the margins and page length for printed output. The left margin and the print width are given as a number of characters. The top margin, print length, and page length are given as a number of lines.

The “print width” field sets the maximum number of characters to be printed on each line. The “print length” field sets the maximum number of lines of print on each page. The “page length” field sets the length of the paper so that a form feed advances the paper the correct number of lines to begin printing on the next page.

When the Print Margins command is complete, the Print command is displayed again.

Example

A sheet of letter-size paper is 8 1/2 inches by 11 inches. Assuming the printer prints 10 characters per inch across a page and 6 lines per inch down a page, the page length is 66 lines, and the page width is 85 characters. To fill these dimensions, you might want a top margin of 3 and a print length of 60 for a bottom margin of 3. A print width of 65 characters leaves 20 characters total for the right and left margins. To center lines on the page, you need a left margin of 10.

Print Printer

PRINT on printer:

Description

Starts printing the sheet under the conditions set up by the Print Margins and Print Options commands.

The time it takes to print depends on the size of the sheet and the speed of the printer.

Empty columns at the right of, and empty rows at the bottom of the sheet are not printed. Each print line begins with a four-character row number. Multiplan-86 prints as many columns across the page as will fit in the print margins. If there are columns left over, it prints a second page, repeating the same rows and showing the remaining columns. When all the columns have been displayed, Multiplan-86 starts the next set of row numbers on a new page. Thus, if the area to be printed is wider than the paper, you can assemble the complete width by cutting and pasting later.

If a printer error occurs during printing, Multiplan-86 displays the "System file error" message.

See Also

- | | |
|---------------|---|
| Print File | to direct output to a disk file. |
| Print Margins | to set the dimensions of a page. |
| Print Options | to print part of a sheet or to add a title. |

Quit

QUIT:

Enter Y to confirm

Description

Ends the Multiplan-86 session. The active sheet is not automatically saved. If you wish to save the worksheet, use the Transfer Save command before using the Quit command.

Multiplan-86 will display the message "Enter Y to confirm". If you press Y, Multiplan-86 terminates, returning control to the operating system. Pressing any other key cancels the command.

See Also

Transfer Save to save the active sheet.

Sort

SORT by column: C between rows: 1 and: 255 order: (>) <

Enter a number

Description

Reorders the rows on the worksheet within the specified column so that the values are sorted.

The proposed response for the column field is the active column. The proposed response for the rows is the whole column. The proposed sorting order is ascending order, from least to greatest.

The column to be sorted can contain numbers, text, or other values. Sorting collects the different types into the following groups:

1st - Numbers

2nd - Text

3rd - Logical and error values

4th - Blank cells

Numbers and text are further sorted into either ascending (>) or descending (<) order. Text is arranged according to the ASCII standard character sequence, which is from "least" to "greatest" as follows:

! " # \$ % & ' () * + , - . / 0-9 : ; < = > ? @ A-Z [\] ^ _ a-z { | } ~

Within each type, equal values are left in the order Multiplan-86 encounters them.

The worksheet can be sorted on multiple columns. To do this, sort the least significant column first. Then, sort the other columns one at a time, from the least significant to the most significant. The example below illustrates this method.

References on the worksheet are updated as described in the “Transforming the Worksheet” section of Chapter 1.

Example

To sort a list of checks into categories (in column 1) by amount (in column 2) with the largest amount at the top of each category, first sort all checks by amount in descending order:

`SORT by column: 2 between rows: 1 and: 255 order: > (<)`

The checks are listed from largest to smallest, but with the categories unsorted. To sort the categories alphabetically:

`SORT by column: 1 between rows: 1 and: 255 order: (>) <`

The checks are now sorted into categories. The checks within each category are arranged from largest to smallest. Because Multiplan-86 leaves equal items in the order it finds them in the column it is sorting, any previous sorting in other columns is retained.

Transfer

TRANSFER: Load Save Clear Delete Options Rename

Select option or type command letter

Description

Offers a choice of five subcommands that affect an entire sheet.

Transfer Load loads a saved sheet, replacing the active sheet.

Transfer Save saves the active sheet in a disk file.

Transfer Clear clears the active sheet, deleting all its contents.

Transfer Delete deletes the disk copy of the active sheet.

Transfer Options specifies which disk drive to use, or which file format.

Transfer Rename saves the active sheet under a new name and updates external links.

The subcommands are explained individually on the following pages.

CAUTION: *When accessing a specific file, be sure to spell the filename correctly. If the filename is misspelled, the system displays the message: "Enter Y retry access to filename." The best way to respond to this message is to re-enter the filename, being careful to spell it correctly.*

Transfer Clear

TRANSFER CLEAR:

Enter Y to confirm

Description

Clears the active sheet after you type *Y* to confirm the command. Typing any other key cancels the command.

Using the Transfer Clear command is almost the same as starting up Multiplan-86: that is, all cells are deleted; all columns are set to the default width; the default alignment and format are set to General; all names and all links to external sheets are cleared; and the sheet name is set to TEMP. The exceptions are that options set with the Options, Format Options, Transfer Options, and Print Options commands are preserved.

If a copy of the active sheet has previously been saved with Transfer Save, that copy is not affected.

See Also

Blank	to replace the contents of specified cells with blanks.
Delete	to delete specified cells.
Transfer Save	to save the active sheet as a disk file.

Transfer Delete

TRANSFER DELETE filename: (name of active sheet)

Enter a filename, or use direction keys to view directory

Description

Deletes a saved worksheet from a diskette.

The proposed response is the active worksheet name. Pressing one of the direction keys when you see the proposed response causes Multiplan-86 to display a directory of files on the diskette. To use the direction keys, see the directory display explanation under the Transfer Load command. Press the RETURN key to select the filename that is highlighted.

When you press the RETURN key, Multiplan-86 displays the message "Enter Y to confirm". Press Y to delete the file. Pressing any other key cancels the Transfer Delete command.

Use Transfer Delete to clear your diskette of unwanted files.

TRANSFER

To view a directory of files on a diskette in other than the default drive (drive A), specify the drive name before entering the filename. If a directory of drive B is required, type:

TRANSFER DELETE filename: B:

NOTE: *The system is case conscious regarding device names. For example, if a file was originally saved as B:SPENCER, uppercase letters, it must always be referenced this way. The same applies to the original use of lowercase letters for device names. In this command, the directory listing will depend on how the drive name was specified in the TRANSFER LOAD command and on how the file was originally saved with the TRANSFER SAVE command.*

Transfer Load

TRANSFER LOAD filename:

Enter a filename, or use direction keys to view directory

Description

Loads a sheet from a disk file. The disk file's name must be spelled and punctuated exactly as it was when the sheet was saved with the Transfer Save command.

Pressing any one of the direction keys causes Multiplan-86 to display a directory of files on the diskette. The direction keys may be used whether the "filename" field is empty or has a filename filled in. (See NOTE above.)

When the "filename" field is empty, the whole directory is displayed.

When you enter a filename in the "filename" field and then press a direction key, Multiplan-86 uses the filename you enter as a pattern and displays only those filenames on the default diskette that match the pattern.

Once the directory is on the screen, use the direction keys to move the highlight among the filenames. As you do, the highlighted filename also appears as a proposed response in the "filename" field in the command line. Press the RETURN key to load the highlighted file.

While the directory is visible, pressing any other key besides a direction key causes the worksheet previously on the screen to reappear. This other key has the same effect as it does while editing responses in command fields that need to be filled in, as described in the “Editing” section of Chapter 1.

When a “Normal” mode Multiplan-86 worksheet diskette file is loaded, it replaces the sheet on display and becomes the active sheet.

Example

To load a sheet saved in a file named INCOME:

TRANSFER LOAD filename: INCOME

See Also

Transfer Save to save the active sheet as a disk file.

Transfer Options

TRANSFER OPTIONS setup: mode: Normal Symbolic Other

Enter text

Description

The “setup” field changes the default disk drive from the drive currently being used to the drive specified for all subsequent Transfer commands.

The “mode” field specifies the file format for all subsequent Transfer Load and Transfer Save commands.

The format choices are:

Normal: Multiplan-86 binary format. External references require that the referenced worksheet be saved in Normal format. This format is also the most efficient use of disk space and requires the least transfer time.

TRANSFER

- Symbolic:** The format for data interchange with other programs.
- Other:** Visicalc (tm) file format. Multiplan-86 can load files in this format. The loaded file is merged with the active sheet. See the Transfer Load command, above. Worksheets cannot be saved in Other format. If you try to do so, Multiplan-86 displays an "Illegal parameter" error message.

The proposed responses show the current settings.

Example

Multiplan-86 was started on drive B:. To simplify use of a data diskette in drive A:

TRANSFER OPTIONS setup: A: mode: (Normal)Symbolic Other

Transfer Rename

TRANSFER RENAME filename: (name of active sheet)

Enter a filename

Description

Saves the active sheet under a new name and adjusts external links to supporting and dependent sheets. Deletes the file with the previous sheet name. (See the "Files" section of Chapter 1 for a description of external links.)

Examples

To rename the active sheet JUNE82:

TRANSFER RENAME filename: JUNE82

See Also

Transfer Load	to load a saved sheet.
Transfer Save	to save the active sheet as a disk file.

Transfer Save

TRANSFER SAVE filename: (name of active sheet)

Enter a filename

Description

Saves the active sheet as a disk file, which can later be loaded with Transfer Load. The proposed name for the disk file is: the name last given with Transfer Rename; the name last loaded with Transfer Load; TEMP if the sheet is clear or was not previously named.

If the filename is a duplicate of one that exists on the diskette already, the message "Overwrite existing file?" appears when you press RETURN. Press Y to replace the file on diskette with the worksheet on the screen. Pressing any other key cancels the Transfer Save command.

If the worksheet has a name other than TEMP and you want to rename the sheet, use the Transfer Rename command if you have any external links to supporting sheets. Transfer Save does not update the "receipts" on the supporting sheets if you rename the active sheet using the Transfer Save command. Refer to "Files" in Chapter 1 for a discussion of external links and "receipts."

You can save your Multiplan-86 files in either Normal or Symbolic mode.

Examples

To save the active sheet under the proposed name, simply press RETURN.

TRANSFER

To save the active worksheet under the name PRACTICE:

TRANSFER SAVE filename: PRACTICE

See Also

Print File	to put the displayed form of the sheet in a disk file.
Transfer Load	to load a sheet saved previously.
Transfer Options	to set the mode.
Transfer Rename	to save the worksheet under a new name and to update "receipts."

Value

VALUE:

Enter a formula

Description

Used to enter a formula or a number into the active cell.

Besides selecting Value from the command menu by highlighting Value and pressing the RETURN key or by typing *V*, the Value command can be selected by:

1. typing any digit: 0-9
2. typing one of the characters: = + - . (

Except for the equal sign (=), these characters are also entered as the first character of the formula.

Terminate the Value command by:

1. Pressing the RETURN key
or
2. Pressing a direction key or the “Next unlocked cell” key at the end of a number of complete formula. The formula or number is stored in the active cell, and the cell pointer is moved as directed.

Inside formulas the direction keys enter relative references into the formula. See the “Editing” section of Chapter 1 for more information about editing responses to a command.

Example

The simple method of entering a list of numbers, using a direction key:

31 right 28 right 31 right 30 right 31 right

is a series of Value commands.

See Also

Alpha for entering text.

Edit for editing formulas.

Window

WINDOW: Split Border Close Link

Select option or type command letter

Description

Presents a choice of window operations.

Window Split opens a new window by splitting the active window horizontally or vertically, or opens a window used for titles.

Window Border adds or removes a border around a window.

Window Close closes a window by removing it from the screen.

Window Link links two windows so that their contents scroll together.

The Next Window key moves the cell pointer from one window to another.

The subcommands are explained individually on the following pages.

Window Border

WINDOW change border in window number: W

Enter a number

Description

Changes the border of the specified window. If the window currently has a border, it is removed. If the window lacks a border, one is added.

A border takes up one screen position on each side of the window, reducing the area for the display of data by two screen lines and two screen columns.

Window Close

WINDOW CLOSE window number: W

Enter a number

Description

Removes the specified window from the screen. The active window is the proposed response.

The size of the remaining windows is increased to occupy the screen area used by the closed window. Windows are renumbered. Cell contents are not affected by closing a window.

If there is only one window open, the Window Close command is ignored.

See Also

Window Split to open windows.

Window Link

WINDOW LINK window number: W with window number: W linked: Yes No

Enter a number

Description

Reviews and revises the links between two windows. The links may have been established under the Window Split command, or they may not exist yet, in which case you can establish links between windows split from a common window so that the two windows scroll together.

The proposed responses specify the active window and either a window split from the active window or the window from which the active window was split. If no window splitting has occurred, both proposed window responses are the active window.

You can enter any two window numbers as responses. But, only those pairs that share the split relationship can be linked. Attempts to link other pairs receive the “Cannot link those windows” message in the message line.

When windows are linked, the contents of the two windows scroll together. If the window split was horizontal, the synchronized scrolling is horizontal. If the window split was vertical, the synchronized scrolling is vertical.

When two previously unlinked windows are linked, one set of row or column numbers disappears from the screen. If the pairs are related by a horizontal split, the column numbers disappear. Columns are identified by the numbers in the window above.

If the pairs are related by a vertical split, the row numbers disappear. Rows are identified by the numbers in the window to the left.

Example

Window # 4 was split from window #1. To link them so that they scroll together:

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

See Also

Window Split for a description of window links.

Window Split

WINDOW SPLIT: Horizontal Vertical Titles

Select option or type command letter

Description

Presents a choice of three ways to open a window by splitting the active window.

Window Split Horizontal splits the active window across the screen, giving two windows, one on top of the other.

Window Split Vertical splits the active window between columns.

Window Split Titles splits the screen both vertically and horizontally to display titles in separate windows.

Up to eight windows can be opened using the Window Split commands.

The Window Split commands retain window borders, giving both windows a border if the original window has one.

See Also

Window Close to close a window.

Window Split Horizontal

WINDOW SPLIT HORIZONTAL at row: R linked: Yes No

Enter a number

Description

The active window is split horizontally. The display space used by the given row and the rows below it becomes the new window. The space above the given row remains part of the original window.

The new window is given the next unused window number and is made the active window.

The original window and the new window can be linked. If you select “Yes” in the “linked” field, whenever you scroll one of the windows horizontally, both windows scroll together. Notice also that the column numbers of the lower window do not appear on the screen. Rather, the column numbers of the window above are used to identify columns in the linked window.

Examples

To split the active window at the active row, just press the RETURN key.

To split the active window at the display line currently showing row 34, and to link the windows:

```
WINDOW SPLIT HORIZONTAL at row: 34  linked: (Yes)No
```

See Also

Window Link to review or revise links between windows.

Window Split Titles

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

Enter a number

Description

The active window is split to form two or four windows. The windows formed are linked so that they scroll together. Windows linked by this command cannot be unlinked.

The specified number of rows becomes a window at the top of the display space occupied by the original window, unless the number is 0.

The specified number of columns becomes a window at the left of the display space occupied by the original window, unless the number is 0.

WINDOW

The remaining display space becomes the active window. The active window is linked for horizontal movement with the window above it, and for vertical movement with the window to its left, if any.

The proposed responses split the window so that the active cell becomes the upper left corner cell of the active window.

Example

Suppose that column 1 contains descriptive titles for the rows of the worksheet, and that columns 2 through 25 contain data matching those titles. You would like to scroll the data columns horizontally while holding the titles fixed on the screen. If you scroll vertically, both titles and data should move so that the titles remain aligned with the matching data. Move the cell pointer to R1C2, then the proposed response will be:

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

See Also

Window Border to draw a border around any of the windows.

Window Split Vertical

WINDOW SPLIT VERTICAL at column: C linked: Yes No

Enter a number

Description

The active window is split vertically. The display space used for the given column and the columns to its right is used for the new window. The space used for columns to the left of the active column remains part of the original window.

The new window is given the next unused window number and becomes the active window.

The original window and the new window can be linked. If you select “Yes” in the “linked” field, whenever you scroll one of the windows vertically, both windows scroll together. Notice also that the row numbers of the right window do not appear on the screen. Rather, the row numbers of the window to the left are used to identify rows in the linked window.

Examples

To split the window at the active column, just press RETURN.

To split the window at the column presently displaying column 3:

```
WINDOW SPLIT VERTICAL at column: 3  Linked:(Yes)No
```

See Also

Window Link to review or revise links between windows.

eXternal

EXTERNAL: Copy List Use

Select option or type command letter

Description

Presents a choice of actions relating to the use of data on inactive (external) sheets.

The eXternal Copy command copies data from an inactive worksheet to the active worksheet. This command can also establish an external link, a permanent relationship that automatically causes data to be copied from a source, or supporting sheet, to the active, or dependent, sheet every time the latter is loaded into Multiplan-86.

The eXternal List command displays the lists of supporting and dependent worksheets.

The eXternal Use command assigns a substitute name for a specified sheet.

See the “Files” section in Chapter 1 for more information on external links and file accesses.

The subcommands are explained individually on the following pages.

eXternal Copy

EXTERNAL COPY from sheet: name:
 to: RC link: Yes(No)

Description

Copies values from a group of cells on an external worksheet to the active sheet. The source sheet is defined in the “from sheet” field of the command. The proposed response for the “from sheet” field is the sheet name used in the last eXternal Copy command.

The cells to be copied from the source sheet are described in the “name” field. This field may contain a name which is defined on the source sheet to refer to a group of cells, or it may be an absolute reference to a single rectangle on that sheet (for example, R2C1:12; see also the discussion of absolute references in the “Formulas” section of Chapter 1).

The “to” field is used to specify the destination of the copy on the active sheet. The proposed response is the active cell. If a single cell is specified in this field, the source group is copied starting at that cell. If a group of cells is specified in the “to” field, the shape of the group must correspond to the shape of the source group, cell by cell. Otherwise, an error message is displayed, and the copy does not take place.

The integrity of the active sheet is further protected by checking that all destination cells are blank. An attempt to copy into a nonblank cell also causes an error message, and copying is canceled.

The eXternal Copy command does not copy formulas, but only the values derived from formulas. This is different from the “Copy” group of commands because those commands copy formulas as well as values. For example, if a cell containing the formula $100 * \text{rate}$ is copied from an external sheet, the destination cell may receive the constant value 20 (assuming $\text{rate} = .20$). This value alone does not show the dependence of the result on changes to the “rate” cell on an external sheet. The external link facility is provided to express permanently the relationship between the value on the “dependent” sheet and the source of the value (the formula on the “supporting” sheet).

External links are controlled by the options in the “link” field of the eXternal Copy command. If “No” link is selected, the command has no other effect than copying the values as described above. Information on possible dependencies is not recorded at all. If the source data is not expected to change, this option is the most convenient.

Selecting “Yes” in the “link” field establishes an external link between the source data and the destination. The source sheet supports the active, or dependent, sheet. Of course, the same sheet may be in supporting and dependent roles in different external links.

eXTERNAL

After an external link is established, every time the dependent sheet is loaded (using the Transfer Load command), all the data described in the external links is automatically copied from the source sheets to the specified destinations. Any change in the source data is reflected on the dependent sheet.

The “formulas” associated with the destination cells — as seen on the status line or using the “formulas” Format Option — also show the data in the cells as dependent on a link, in the form:

[sheetname sourcename]

Destination cells are protected from changes just as if they were locked. They can be “unlocked” only by removing or redefining the external link in which the cells participate.

To remove a link, specify the source sheet, source name, empty destination, and “Yes” for linking in the external Copy command.

To redefine a link so that it has a different destination on the active sheet, redefine the link with a new destination on the active sheet. Because a source area on an inactive sheet can be copied only once by each active sheet, the new destination replaces the former one in the link.

Both the removing and redefining of links, as well as the review of the existing links, is simplified by the use of the direction keys to step through the source (supporting) sheet names or the names of source cells in a given sheet. The “to” field is filled in by Multiplan-86 to show the destination of the external link, as currently defined.

The Name command, when used immediately after an eXternal Copy, proposes to define the name

sheetname.sourcename

to refer to the destination of the copy. When defined (by pressing the RETURN key), this name can be used in other formulas on the active sheet to refer to the copied data.

The automatic copying process from supporting sheets requires that the files that contain the sheets be available to Multiplan-86. This topic is discussed in the “Files” section in Chapter 1.

Before copying the data in each link, the definition of the name for the source cells is checked. If the name definition has been changed since the link was established, an error message is displayed, and the copy does not take place. Otherwise, the cells are copied to the destination cells, even if the destination cells are not blank but contain the results of the previous external copy.

Example

To copy the value of the area named Sales from the worksheet named INCOME to the area starting at cell R5C5 on the active worksheet, and to set a permanent link:

```
EXTERNAL COPY from sheet: INCOME   name: Sales
                  to: R5C5         linked:[Yes]No
```

Assuming that the area named “Sales” is a 12-cell-wide part of a row, the destination for the copy is R5C5:16. The Name command will propose:

```
NAME define name: INCOME.Sales   to refer to R5C5:16
```

eXternal List

EXTERNAL LIST:

Description

Produces a display of the names of worksheets supporting the active sheet and those dependent on the active sheet. The “supporting” and “dependent” relationships are explained in detail under eXternal Copy and in the “Files” section in Chapter 1.

The list of supporting sheets includes the “alias” names defined by eXternal Use.

Example

Sheets supporting Department:

Year81 instead of Year
Labor

Sheets depending on Department:

Consolidated

eXternal Use

EXTERNAL USE filename: instead of:

Enter name

Description

Sets a substitute name (alias) for a sheet.

The proposed response in the second field is the previous response, if any; otherwise, the proposed response is a blank.

All references to the name in the “instead of” field will be directed to the name in the “filename” field. Copies from the affected file, if any, will be redone.

The name in the “instead of” field need not be the name of an actual file. However, it must not be a substitute name. The example shows how the substitution is used.

Example

Assume that an active sheet has links to the supporting file BUDGET82. To view the figures that result from using the data on BUDGET83 instead (which must be identical in format to BUDGET82):

EXTERNAL USE filename: BUDGET83 instead of: BUDGET82

This saves removing the links from BUDGET82 and then redefining links to BUDGET83. Also, you can return to BUDGET82 easily by specifying BUDGET82 in both fields of this command.

As an alternative, you could use a “logical name” when referring to supporting sheets. (A “logical name” is not the name of an actual file, but a name used only for setting up external links.) Under this method, a substitution must be made through the eXternal Use command before setting up links between sheets:

EXTERNAL USE filename: BUDGET82 instead of: BUDGET

Then, the name BUDGET, which is not a file but a “logical name” used for defining links, can be used to set up the links in the eXternal Copy command and as a response in the “instead of” field in the eXternal Use command in future substitutions. For example, when you want to see the results of your budget for 1983:

EXTERNAL USE filename: BUDGET83 instead of: BUDGET

and all links will now be changed to refer to BUDGET83.

This method permits you to refer to any file you choose in the eXternal Use command without having to remember which file is the pattern for the substitutions.

Function Directory

This section provides an alphabetical reference to all the functions that can be used in Multiplan-86 formulas. Each entry describes the operation of a function and any special requirements for its argument.

Use one of the methods described under the Value command in the Command Directory to enter a formula. The functions are entered as part of a formula.

The argument to a function, enclosed in parentheses, follows the function name. No space is permitted between the function name and the left parenthesis.

Entries within the parentheses describe the argument to the function. The following abbreviations are used in argument descriptions.

N represents a number, a formula that yields a number.

Wherever N is shown, only one entry is allowed. When more than one is allowed, List is shown.

T represents text, a formula that yields text.

Logical represents a logical value, which must be a reference to a single cell, a formula expressing a relation (=,<,>,<=,>=,<>), or a function that returns a logical value. Otherwise, a #VALUE! error value is returned.

List represents a list of items, separated by commas. An “item” can be either a value that represents itself or a reference to a group of cells that represent the collection of values in those cells. For example, the list

1,B

where “B” is defined as R1C2:3; and R1C2 contains the value 2, and R1C3 contains the value 3. The list then represents the collection of values 1,2,3.

Lists can be up to five items long, but they can represent any number of values through references.

See the “Formulas” section in Chapter 1 to review the descriptions of numbers, formulas, and text.

Related functions are listed under the heading “See Also.”

ABS(N)

Description

Returns the absolute value of the argument *N*.

Examples

```
"Difference:"_&DOLLAR(ABS(first-second))  
ABS(AVERAGE(R1C1:10)-R1C1)
```

yields how far the first item is from the average.

See Also

SIGN	for the sign of a number; ABS is equivalent to number*SIGN(number).
MAX	for the maximum of two or more values.
MIN	for the minimum of two or more values.

AND(List)

Description

Returns the logical value true if all of the specified argument values are true. Otherwise, returns false.

Requirements

The argument entries must be logical values. If not, the #VALUE! error value is returned.

Example

```
IF(AND(SUM(Homework)>82,Final>50),credit,"not qualified")
```

See Also

OR and NOT	to operate on logical values.
IF	to test a logical value.

ATAN(N)

Description

Calculates the Arctangent (inverse Tangent) function of the argument yielding an angle in radians in the range $(-\pi/2$ to $+\pi/2)$.

Example

ATAN (thetarow C)

See Also

TAN for the Tangent function.

AVERAGE(List)

Description

Calculates the average of the specified argument values. Yields the same result as entering the formula `SUM(list)/COUNT(list)`.

Example

`AVERAGE(Balance)`
`AVERAGE(1,5,6.5,5)`

See Also

<code>STDEV</code>	for the standard deviation of the number values.
<code>SUM</code>	for the sum of number values.
<code>COUNT</code>	for a count of number values.

COLUMN()

Description

Returns the number of the column in which the formula containing this function appears.

Example

`1981+COLUMN()-4`

can produce the sequence of years 1981, 1982, . . ., starting in column 4. (Place this formula in column 4, then Copy Right from column 4 as many cells as the number of years you want in the series.)

COS(N)

Description

Calculates the Cosine of the argument, an angle in radians.

Example

COS(thetarow C)

See Also

SIN and TAN for the other trigonometric functions.

COUNT(List)

Description

Returns the count of number values represented by the List. Cells are counted only if they contain number values.

Example

COUNT(checks)*0.15+1.00&" is service charge"

See Also

AVERAGE for the average value.

SUM for the sum of the number values.

DOLLAR(N)

Description

Converts the argument to text showing a dollar amount, just like the “\$” format code under the Format Cells command.

The argument is rounded to two decimal places. If the argument is less than 1, a zero appears in the units position. A dollar sign is added before the leftmost digit. If the argument is less than zero, the result is enclosed in parentheses (the standard way of showing a negative balance in bookkeeping).

Examples

```
“Total:”&DOLLAR(SUM(deposits))  
DOLLAR(2.715) produces $2.72  
DOLLAR(.15) produces $0.15  
DOLLAR(0) produces $0.00  
DOLLAR(-1) produces ($1.00)
```

See Also

FIXED to format a number without the dollar sign.
VALUE to change text back to a number.

FALSE

FALSE()

Description

Returns the logical value false.

Example

If you are planning on putting a complicated condition into a cell, you can use FALSE() to put a logical value in for testing before you construct the more complicated expression.

See Also

AND, OR, and NOT to operate on logical values.
IF to test a logical value.

FIXED(N,Digits)

Description

Converts the specified value to text showing a fixed-decimal number with the number of decimal digits specified, just like the “Fix” format code under the Format Cells command.

If the value is negative, a minus sign is placed before the leftmost digit.

Requirements

Digits must be an integer between 0 and 30.

Example

```
FIXED((first/second)*100,2)&'percent'
```

See Also

DOLLAR	to format money amounts.
VALUE	to convert text back to a number.
ROUND	to return the number value of rounding.

IF(Logical,Then Value,Else Value)

Description

If Logical is true, returns Then value. Otherwise, returns Else value. These values can be numeric, text, or logical values.

Example

```
IF(grade>80,"excellent",grade)
```

See Also

AND, OR, and NOT	to operate on logical values.
ISNA and ISERROR	to check for error values.

INDEX(Area,Subscripts)

Description

Returns the value of a cell selected by Subscripts from the rectangular area.

One or two subscripts may be given. When one subscript is given, the area must be part of one row or one column. Subscript value 1 selects the first cell in the row or column, value 2 the second cell, and so on.

If two subscripts (separated by commas) are given, the area may be rectangular. The subscripts select the row and column in the area, starting at 1 in each case.

If any index exceeds the limits of the area, the #NA! (not available) error value is returned.

Example

To repeat the first column in the first row, copy the formula:

```
INDEX(C1,COLUMN())
```

throughout the first row.

If the area Score is a table giving adjusted composite scores for raw scores on two components in a test, then:

```
INDEX(Score,Raw1 C,Raw2 C)
```

gives the appropriate composite score, based on the two raw scores.

INT(N)

Description

Returns the argument as an integer, truncating any fraction it may have.

Example

```
“fraction=”&FIXED(number-INT(number),4)
```

INT(6) is 6

INT(8.9) is 8

INT(-123.999) is -124

See Also

ROUND to round a number to a certain decimal place.

ISERROR(Value)

Description

Returns the logical value true if the argument is any of the error values (#N/A, #VALUE!, #REF!, #DIV/0!, #NUM!, #NAME?, #NULL!). Otherwise, returns false.

Example

```
IF(ISERROR(ratio),"check your numbers"," ")
```

See Also

IF to test a logical value.

ISNA(Value)

Description

Returns the logical value true if the argument is #N/A (not available). Otherwise, returns false.

Example

IF(ISNA(balance),"0",balance)

See Also

NA	to produce #N/A! value.
IF	to test a logical value.
ISERROR	to test for all error values.

LEN(T)

Description

Returns the number of characters in the text value.

Example

MID(T,LEN(T),1) is the last character of the text T.

See Also

MID to return specified characters from a text value.

LN(N)

Description

Calculates the natural logarithm of the argument.

Requirements

N must be positive. A #NUM! error value is returned if *N* is less than zero.

Example

```
"log2="&FIXED(LN(value)/LN(2),8)
```

See Also

ABS	to ensure that the argument is positive.
EXP	for the inverse of LN.
LOG10	for logarithms to the base 10.

LOG10(N)

Description

Calculates the base 10 logarithm of the argument.

Requirements

N must be positive. A #NUM! error value is returned if *N* is negative.

Example

"Order of Magnitude:"&FIXED(LOG10(value),0)

See Also

ABS to ensure that the argument is positive.
LN for logarithm to the base e, and other bases.

LOOKUP(*N*,*Table*)

Description

Searches for *N* in the first row or column of *Table*. 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.

If *Table* is square, or higher than it is wide, Multiplan-86 searches in the first column of *Table* until it finds the cell that has the largest value that is less than or equal to *N*. The value in the last cell in that row of *Table* is returned as the result of the function. If the values in all cells in the first column are less than *N*, the last row of *Table* is used. If the values in all cells in the first column are greater than *N*, a #N/A value is returned.

If *Table* is wider than it is high (has more columns than it has rows), then Multiplan-86 searches for *N* in the first row of *Table*. The value in the last cell in that column of *Table* is returned as the result of the function. If the values in all cells in the first row are less than *N*, the last column of *Table* is used. If the values in all cells in the first row are greater than *N*, a #N/A value is returned.

Requirements

Table should be a cell reference to a rectangular area in the active worksheet. The result returned can be either a number value or a text value.

Example

Assume that column 1 (C1) lists base salaries, column 2 (C2) lists minimum tax, and column 3 (C3) lists marginal tax rates as percents:

C1	C2	C3
0	0	0%
2300	0	14%
3400	154	16%
4400	314	18%
6500	692	19%
8500	1072	21%
...

Also assume that a name 'Salary' has been defined and that it contains a value *N*.

The tax on a salary in one of the brackets in Table can be expressed as:

$$\text{LOOKUP}(\text{Salary}, \text{C1:C2}) + (\text{Salary} - \text{LOOKUP}(\text{Salary}, \text{C1})) \\ * \text{LOOKUP}(\text{Salary}, \text{C1:C3})$$

Notice in the first lookup, you find the tax on the "base" amount (using C1 to find a value in C2). In the second lookup you find the actual base amount (using C1 to find a value in itself; in fact, Table could only be one column wide or one row high). And in the third lookup you find the marginal tax rate for the amount of the salary that exceeds the base amount (using C1 to find a value in C3).

MAX

MAX(List)

Description

Returns the largest number value from List. Returns zero if List represents no number values.

Example

"Best of"&FIXED(COUNT(scores),0)&
"is"&FIXED(MAX(scores),2)

See Also

MIN for the minimum of two or more values.

MID(*T*,*Start*,*Count*)

Description

Returns specified characters from *T*.

Start specifies the position of the first character of *T* to be taken, counted from the left end of *T*. The first character is position 1.

Count specifies the number of characters to be taken.

If *Count* is zero, or if *start* is greater than the length of the result of *T*, no characters are returned.

If *Count* is negative, a #VALUE! error value is returned.

Requirements

Start and *Count* must be *N* values. If either *Start* or *Count* has a fraction, the fraction part is truncated before the integer part is used.

Example

```
MID("EEEEEEEDCBAA",INT(grade/10),1)
```

See Also

LEN for the length of the text value.

MIN

MIN(List)

Description

Returns the smallest number value from List.

Example

```
"Lowest of"&FIXED(COUNT(times),0)&  
"is"&FIXED(MIN(times),0)
```

See Also

MAX for the maximum of two or more values.

MOD(Dividend, Divisor)

Description

Returns the remainder of Dividend divided by Divisor. The result has the same sign as Dividend.

Requirements

Both parts of the argument must be an *N* value. If Divisor is zero, a #DIV/0! error value is returned.

Examples

$$\text{MOD}(3,2) = 1$$

$$\text{MOD}(-3,2) = -1$$

$$\text{MOD}(-3,-2) = -1$$

$$\text{MOD}(3,-2) = -1$$

In general: $\text{MOD}(x,y) = x - \text{INT}(x/y) * y$

NA

NA()

Description

Returns the #N/A (not available) special value. This value may be used to mark data points that are yet to be defined.

Example

If you assign NA() to the interest rate, all values on the worksheet that depend on the interest 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).

Example

```
IF(OR(credit>limit,NOT(AND(conditions))),  
  "not qualified"," ")
```

where “conditions” is a group of cells, and each cell contains one necessary condition of credit worthiness.

See Also

AND and OR	to operate on logical values.
IF	to test a logical value.

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 some interest rate.

The formula used is:

$$\sum_{i=1}^n \frac{\text{list}_i}{(1 + \text{rate})^i}$$

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Requirements

Rate is an interest rate, expressed as a decimal fraction (0.11 is a rate of 11%). The rate must be an *N* value.

The first value represented by List is income required at the end of the first period; the second the income required at the end of the next period, and so on.

Example

You are given the opportunity to 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 have done, you expect the income to increase 30% annually.

Place \$15,000 in cell R1C1. Place RC*1.3 in cell R1C2, and copy it down to the next three cells. Name the area Flow. Now, you can figure the net present value of the cash flow.

If your opportunity rate is 15%, then NPV(15%,Flow) gives you the present value of \$84,598.24. Since this is greater than the cost of the lease, you conclude that it is a worthwhile investment.

OR(List)

Description

Returns the logical value true if any value in List is true. Otherwise, returns false.

Requirements

The argument entries must be logical values. If not, the #VALUE! error value is returned.

Example

`IF(OR(grade>80,final>=150),"good work"," ")`

See Also

AND and NOT to operate on logical values.

IF to test a logical value.

PI

PI()

Description

Returns the value 3.1415926535898, an approximation of the mathematical constant π .

Example

SIN(PI()/4)

REPT(*T*,*Count*)

Description

Returns a text value consisting of *Count* repetitions of *T*. If *Count* is zero or negative, no characters are returned. Otherwise, the length of the result is the length of *T* multiplied by *Count*.

This function can be used to create bar graphs or repeating patterns (such as printer's rules) to separate areas of the worksheet.

Requirements

T is usually a single character, but it can be any number of characters.

Count must be an *N* value, which is truncated to an integer.

Example

REPT("+",Score/3)

ROW()

Description

Returns the number of the row in which the formula containing this function appears.

Example

Copying the expression `ROW()*10` throughout the first column creates the sequence of numbers:

10
20
30
.
.
.

See Also

`COLUMN` for the current column number.

SIGN(N)

Description

Returns a number representing the algebraic sign of the argument.

If the sign of the argument is positive, the function returns 1.

If the argument value is zero, the function returns 0.

If the sign of the argument is negative, the function returns -1.

Example

To display both the logarithm of a number and its sign:

```
REPT(MID('-',SIGN(num)+2,1),ABS(num))
```

See Also

ABS to return the absolute value of a number.

SIN(N)

Description

Calculates the sine of the argument, an angle in radians.

Example

SIN(θ C)

See Also

COS and TAN for the other trigonometric functions.

SQRT(N)

Description

Returns the square root of the argument.

Requirements

N must be positive. If *N* is negative, a #NUM! error value is returned.

Example

SQRT(x*x+y*y)

STDEV(List)

Description

Calculates the sample standard deviation of the number values represented by List according to the formula:

$$s = \sqrt{\frac{(\sum x)^2 - \frac{\sum x^2}{n}}{n - 1}}$$

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Example

STDEV(grades)

See Also

AVERAGE for the average value.

SUM

SUM(List)

Description

Returns sum of number values represented by List.

Example

$(1+rate)*SUM(\text{deposits January})$

See Also

MAX	for the maximum of two or more values.
MIN	for the minimum of two or more values.
AVERAGE	for the average value.
COUNT	for the count of the number values.

TAN(N)

Description

Calculates the tangent of the argument, an angle in radians.

Example

TAN(θ C)

See Also

COS and SIN

for the other trigonometric functions.

ATAN

for the inverse tangent function.

TRUE

TRUE()

Description

Returns the logical value true.

Example

If you are planning on putting a complicated condition into a cell, you can use TRUE() to put a logical value in for testing before you construct the more complicated expression.

See Also

AND, OR, and NOT	to operate on logical values.
IF	to test a logical value.

VALUE(T)

Description

Returns the number in the argument, represented as text. The argument must be the text form of a number, similar to those produced by the formatting codes used by Multiplan-86. It can contain leading or trailing spaces, a leading dollar sign, a leading minus sign, or it can be enclosed in parentheses. It can contain commas or a decimal point. It can be written in scientific notation.

For example, all the following text forms yield the value 10: 10, \$10.00, 1E1. The following text forms yield negative 10: -10, -1E1, (10), (\$10.0000).

Requirements

If the contents of *T* do not describe a number — if they include letters, for instance, or two decimal points — a #VALUE! error value is returned. You can avoid this problem by first isolating numbers mixed with nonnumeric characters, as the example below shows.

Example

Suppose that the cell named date contains the text “6/14/83”. Then,

```
VALUE(MID(date,3,2))
```

returns the number 14.

Appendices

A

Prompts and Error Messages

This appendix lists in alphabetical order all the possible messages that Multiplan-86 may display, along with descriptions of possible causes and what actions you may take in response to them. This appendix does not include CP/M-86/80 operating system error messages, which may appear while you are running Multiplan-86. Refer to the *Rainbor 100 User's Guide* for information on how to deal with operating system error messages.

Cannot copy into non-blank cell

Cause. The destination area of an eXternal Copy contains a nonblank cell.

Action. Review the response to the eXternal Copy command. Make sure that the destination area you specify is not used for any other purpose. If appropriate, blank the cells that are not blank.

Cannot link those windows

Cause. An attempt was made to link two windows that were not split from each other.

Action. Refer to the Window Link command in Chapter 2.

Cannot read file

Cause. Confirms a negative response to the “Enter Y to retry access to filename” message.

Action. No special action is necessary. See the “Files” section in Chapter 1 for more information.

Cannot write file

Cause. The file last named is available but cannot be written to disk; either because (1) the diskette is full, or (2) the diskette is write-protected.

Action. First, save your work on a different diskette. Check the available space and write protection of the diskette that caused the error message. See the “Files” section in Chapter 1.

Cell locked by External Copy

Cause. Either an attempt was made to modify the value of a cell that is the destination of a linked eXternal Copy, or an attempt was made to copy from an area of the worksheet that is the destination of a linked eXternal Copy.

Action. Such cells must not be changed, for any change is erased the next time the sheets were loaded and the external copies executed. To regain access to the cell, exclude it from copying. Redefine the eXternal Copy command accordingly.

Circular references unresolved

- Cause.** Cells refer to each other in a chain so that the last refers back to the first. (The simplest case is a cell containing a reference to itself — RC — but the chain may be many steps long.) Multiplan-86 has calculated all the cells of the chain once and found itself starting over. It stops calculating, leaving the cells in the circular chain in an undefined state.
- Action.** Alter the logic of the sheet so that there is no circularity. Use the same methods described in the “Formulas” section of Chapter 1 for finding the source of error values.

Command is too long

- Cause.** The command, formula, or text on the command line is too long to be displayed there (includes a blank line).
- Action.** The command, formula, or text must be shortened.

Confirm change: sheet name

- Cause.** The name of an area, which is the source of a linked eXternal Copy, has been changed on the supporting sheet. Copying does not take place. The system waits for a character to be typed.
- Action.** Type any character. The rest of the specified files, if any, is loaded. Review the eXternal Copy command in light of the change on the supporting sheet. Redefine the eXternal Copy command as appropriate.

Disk error

- Cause.** While attempting to read or write a file, Multiplan was told of a serious error by the operating system.
- Action.** See the “Files” section in Chapter 8 for possible problems with reading or writing files.

Appendix A

Disk full

Cause. There is no more room on the diskette.

Action. Use the Transfer Delete command to look at the file directory on the diskette, and delete unneeded files. As an alternative, use a different diskette.

Enter a filename

Cause. The active field of the command takes the name of a file to be written.

Action. Enter a filename, or press CTRL/C to cancel the command.

Enter a filename, or use direction keys to view directory

Cause. The active field of the command takes a filename existing on a disk.

Action. If you know the name of the file desired, enter it. If you want to examine the names of all saved sheets, use the direction keys as described under the Transfer Load command. Or, press CTRL/C to cancel the command.

Enter a formula

Cause. Multiplan-86 awaits a formula. The direction keys can be used to put a reference into the formula.

Action. Enter a formula, a number, or text (enclosed in quotes), or press CTRL/C to cancel the command.

Enter a number

- Cause.** The active field of the command takes a single number: a row or column number; or a quantity, such as margin spacing.
- Action.** Enter a number or press CTRL/C to cancel the command. Note that it is possible to enter a formula, though it must result in a small integer.

Enter a number, or d for default

- Cause.** In the Format Width command, the width of a column can be set to a specific width in characters, or to the width set by the Format Default Width command.
- Action.** Enter a number from 3 to 32, or the letter d, or press CTRL/C to cancel the command.

Enter reference to cell or group of cells

- Cause.** The active field of the command takes a reference of any kind, including a range, intersection, or a list (a union) of references.
- Action.** Enter a reference to a cell (or cells), or press CANCEL to cancel the command. The direction keys can be used to enter references to particular cells.

Enter name

- Cause.** The active field of the command takes a name. See the Name command in the Command Directory for the rules governing names.
- Action.** Enter a name, or press CTRL/C to cancel the command.

Appendix A

Enter sheet name

Cause. In the eXternal Use command, prompts for the sheet name for which a substitution will be made.

Action. Supply the sheet name, or press CTRL/C to cancel the command.

Enter text (no double quotes)

Cause. The active field of the command takes text. Double quotes are not permitted because they are used to delimit text in formulas.

Action. Enter text, or press CTRL/C to cancel the command.

Enter Y to confirm

Cause. You have asked Multiplan-86 to make a major change in the active sheet. Please carefully consider whether this action is correct.

Action. If it is safe for the command to proceed, type a Y. If it is not safe press any other character, and Multiplan-86 returns to the main command menu without changing the worksheet.

Enter Y to retry access to filename

Cause. The file named is not accessible to Multiplan-86.

Action. Enter N if the file is not appropriate. Make sure that the correct diskette is mounted in the correct drive. Change the "default drive" if necessary. See the "Files" section in Chapter 1. Then try "Y" again. If you still get this message, "N" cancels the command and returns the main command menu and worksheet display.

Error in formula

- Cause. See the rules for formulas in the “Formulas” section in Chapter 1. The highlighted area begins at the point an error was noted.
- Action. Check all punctuation, especially parentheses, quotes, and brackets. Check the spelling of function names. Check for a mismatch of data types, as in concatenating text to a number.

Field has too many words

- Cause. The formula or text being edited has more numbers or words than Multiplan-86 can handle for purposes of moving from word to word with the Word Left and Word Right keys.
- Action. None needed; the formula or text is valid and can be used. However, the Word Left and Word Right keys cannot be used while editing it.

File is not a saved worksheet

- Cause. The file you are trying to load or link to was not saved with the Transfer Save command.
- Action. Check the spelling of the filename. Make sure the “mode” of the transfer is correct if you are trying to load other than Normal format files.

Help file not available

- Cause. The disk file containing the on-line reference information can't be found.
- Action. See the “Files” section in Chapter 1.

Illegal option

- Cause. A menu is displayed, and a character is typed that does not appear as a starting letter of any of the menu options.
- Action. Check the menu for the option that you wish to select, and type the first letter of the menu item; or press CTRL/C to cancel the command.

Illegal parameter

- Cause. One field of the command last entered had a numeric response that was illegal. For instance, if the "number of cells" field of Copy Down is given the response 299, this message appears when RETURN is pressed. There are only 255 rows, so 299 copies can never be made.
- Action. The command had no effect, so reenter it correctly.

Illegal width of column

- Cause. The column width you requested is out of range.
- Action. Reenter the command. Make sure you specify the width as a number between 3 and 32 inclusive.

Insufficient memory

- Cause. Multiplan-86 has run out of storage space; it has no space left for new cell contents.
- Action. Save the sheet at once. Then consider ways to simplify it. Blank cells take little space, so blank any unwanted cells. If you have large areas of blanks between areas in use, make the sheet more compact. The Delete commands remove cells from your sheet. Beyond that, you may have to break the application into additional sheets to fit in all the information.

Locked cells may not be changed

- Cause. An attempt was made to modify the value or the formatting properties of a locked cell.
- Action. If you need to change the cell, unlock it first, using the Lock Cells command.

Name not defined

- Cause. The active command field requires a name that has been defined previously with the Name command. The name you've entered has not been.
- Action. Check the spelling of the name. You can abort the command, then use the Name command to review the names that exist.

Name too long

- Cause. Names can not exceed 31 characters. The name you have entered exceeds this.
- Action. Use a shorter name.

Overwrite existing file?

- Cause.** The disk file Multiplan-86 is about to create — either a saved worksheet or a file of printer lines from the Print File command — has the same name as an existing file. If Multiplan-86 continues, it will replace the existing file with the new one.
- Action.** Think carefully! If you agree that the existing file is of no importance, reply Y to let the command proceed. If the file might be important, reply N and reenter the command giving a different, unique filename.

Press any key to redraw screen

- Cause.** The eXternal List command has put an information display on the screen in place of the usual.
- Action.** When you have seen enough of the information display press any key to return to the normal display.

Select option

- Cause.** Multiplan-86 is waiting for your choice from a short list of options.
- Action.** Selection in this case is similar to command selection. Move the edit cursor to the desired option using the SPACE BAR and the BACKSPACE key (as necessary). Or type the initial letter of the option.

Select option or type command letter

- Cause.** Multiplan-86 awaits your choice from a list of options.
- Action.** Select one of the items shown by moving the edit cursor to it with the SPACE BAR and the BACKSPACE key, then pressing RETURN. Or, just type the initial letter of the item you want.

Shapes of areas do not match

- Cause.** The destination area of an eXternal Copy command does not have the same “shape” (size) as the source area.
- Action.** Specifying a single cell as the upper left corner of the destination suppresses the shape check. However, the mismatch suggests a review of the names on the supporting sheet and on the active sheet.

System file error

- Cause.** While attempting to read or write a file, Multiplan-86 was told of a serious error by the operating system. Perhaps there was a hardware error with the disk drive, perhaps the diskette is full, or perhaps there is a printer error.
- Action.** See the “Files” section in Chapter 1 for possible problems with reading or writing files. If you were printing at the time of the error, check the printer.

Too many depending sheets

- Cause. Multiplan-86 can keep track of at most eight dependent sheets. The message signals that there are more than eight dependent sheets.
- Action. No action is necessary, but you cannot rely on the accuracy of the eXternal List command. See also the discussion of External Relationships in the “Files” section in Chapter 1.

Too many windows

- Cause. There is a limit of eight windows and the Window Split command has been used in an attempt to open a ninth.
- Action. Review the existing windows; use the Window Close command to delete some of them.

Window will not fit

- Cause. The window you are trying to Border or Split is too small.
- Action. Close an adjacent window to get more room on the screen, or rethink your screen layout.

B

Helpful Hints

This appendix offers hints for saving space in memory and on your diskettes, for saving time during your Multiplan-86 sessions, and for making Multiplan-86 easier to use.

1. Use the eXternal commands to split sheets at logical places. The method of splitting up your work should follow the natural breaks in your tasks. By splitting up your task into smaller tasks, you can keep your worksheets smaller and faster to work with.
2. Keep the worksheet compact. Keep the amount of blank space within the worksheet to a minimum. Also, avoid extending the worksheet size unnecessarily.

Placing any number outside the general work area, even formatting a cell unintentionally, can use more memory and diskette storage than necessary.

If you suspect that too much memory is being used (check the % Free indicator at the bottom of the screen), try deleting all columns to the right and all rows below your work area on the sheet. This ensures the minimum size for your worksheet.

3. Place common subexpressions in an intermediate cell, then refer to that cell when the subexpression is needed in a formula in another cell. This saves retyping and recomputing the same information. For example, if SUM(Sales) appears in several formulas:

```
MIN(1000,SUM(Sales))  
SUM(Sales)*commission%  
AVERAGE(Sales)
```

(this example has it hidden)

it is more efficient to compute SUM(Sales) once in a cell, then refer to that cell from the formulas. Having the intermediate result visible also helps with tracing problems in the setup of the formulas.

4. Define names for the common areas on your worksheet. By defining names, you speed up references to a group of cells. For example, it is much easier and faster to type "Sales" than R2C3:15, or "Hotspots" than R3C4,R5C6,R5C8. Use the Reference key (@) to enter names directly from the name table.
5. Use the Copy commands for filling in cells with identical values, especially formulas, but also numbers and text. Copying is simpler, less error prone, and more space efficient than manually entering repeated values into cells individually.
6. To copy quickly the format of a group of cells into another part of the worksheet, first copy the group of cells as they are. Then, blank the cells in the new area.
7. Use primitive forms of references wherever possible. For example, it is more efficient to use R2C2 than R2 C2; or R1:2C1 than R1C1:R2C1.
8. Turn off automatic recalculation, and use the Recalc key (!). This way you can enter new values and edit current values without waiting for each recalculation.
9. Use "Continuous" cell format code sparingly, formatting whole rows with "Continuous" format or specifying "Continuous" as the default setting is expensive in terms of using memory.
10. Format entire rows or columns at one time, except for "Continuous" format. Formatting entire rows or columns does not extend your worksheet.

11. Avoid functions or operations over unnecessarily large ranges. For example, instead of SUM(R2), specify only the range of columns that contain values, for instance SUM(R2C1:5). Or, try to restructure the function or operation so that large ranges are not necessary.
12. Avoid extensive use of forward references because they are slower to recalculate. For example, a reference to cell R10C10 from cell R5C5 is slower than a reference to R5C5 from R10C10.
13. Use the Page, Home, and End keys to scroll rapidly across and down the worksheet.
14. Perform similar operations together. Try to define all names at once. Copy all cells at once. Many Multiplan-86 commands offer you proposed responses. By performing similar operations together, you can make maximum use of the proposed responses, which saves considerable time.
15. Simply press the RETURN key to select the Alpha command whenever the main command menu is displayed.
16. Position the cell pointer before selecting a command. This also makes it easier to use proposed responses.
17. Use the Normal mode for saving and loading files, whenever possible (see Transfer Options command). If you load a file that is in Symbolic or Other mode, save it in Normal mode when you are finished with it. Files in Normal mode load much faster than files in the other modes.

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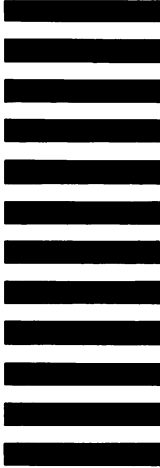
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