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# TASCALC

## THE SPREADSHEET

## A TASMAN SOFTWARE PROGRAM

### FOR THE 128K ZX SPECTRUM + ZX SPECTRUM + 2 ZX SPECTRUM + 3

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# TASCALC

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# Preface

TASCALC is supplied either on tape or disc.

The tape version runs on **both** the 128K Spectrum+ and on the Spectrum +2. The tape version may be transferred to microdrive.

The disc version runs on the ZX Spectrum +3.

This manual describes both versions. In the few instances where there are differences in operation the tape/microdrive version is referred to as the +2 (meaning +2 **and** 128K Spectrum+) and the disc version is referred to as the +3.

# Contents

**1. Getting started with TASCALC** ..... 3
Learning to use TASCALC ..... 3
Exercise 1 ..... 3
Exercise 2 ..... 4
Exercise 3 ..... 7

**2. How TASCALC Works** ..... 8
Introduction ..... 8
The Spreadsheet ..... 8
Cells ..... 8
Cell Contents ..... 8
The Window ..... 8
Entering Information ..... 9
The Command and Control Keys ..... 9
Cell References ..... 9
Cell Ranges ..... 9

**3. Loading and Running TASCALC** ..... 11
**ZX Spectrum 128 and ZX Spectrum +2** ..... 11
Cassette ..... 11
Microdrive ..... 11
**ZX Spectrum +3** ..... 12
Saving TASCALC ..... 12

**4. Cursor Movement** ..... 13
**ARROWS** move cursor ..... 13
**SYMBOL SHIFT** → cursor to next used cell in row ..... 13
**SYMBOL SHIFT** ← cursor to last used cell in row ..... 13
**SYMBOL SHIFT** ↑ cursor to last used cell in column ..... 13
**SYMBOL SHIFT** ↓ cursor to next used cell in column ..... 13
**G** goto specified cell ..... 13

**5. Data Entry** ..... 14
Numerical Data ..... 14
Text Entry ..... 15
Entering Formulae ..... 15
Relative and Absolute Formulae ..... 16

**6. Control Keys** ..... 17
**EDIT** amend contents of cell ..... 17
**DELETE** delete contents of cell ..... 17
**H** show help page ..... 17
**P** prompts on/off ..... 17
**EXTEND MODE** toggle status display ..... 17

7. **Command Mode** ..... 18
**C** enter Command Mode ..... 18
**C COPY** copy specified range of cells ..... 18
**D DESIGN** set grid/program parameters ..... 19
Label search case dependant ..... 19
Cursor auto repeat speed ..... 19
Keyclick length ..... 19
Screen attribute ..... 20
Border attribute ..... 20
Text default justification ..... 20
Default no. of formula figures ..... 20
Calculation order ..... 20
Relative error default ..... 21
Whole grid (top left/bottom right) ..... 21
Cell working printed ..... 21
**E ECHO** fill range with specified cell ..... 21
**F FILES** save/load/delete data file ..... 22
Saving Data Files ..... 22
Loading Data Files ..... 23
Deleting Data Files ..... 24
Data File Names ..... 25
**G GRID** grid commands ..... 25
**A ALIGN** numbers ..... 25
**D DELETE** row or column ..... 26
**I INSERT** row or column ..... 26
**W WIDTH** change column width ..... 26
**J JUSTIFY** justify text/numbers ..... 28
**P PRINT** print spreadsheet ..... 28
**Q QUIT** quit TASCALC ..... 29
**R RUBOUT** delete contents of range of cells ..... 29
**U UNITS** change display of numerical cells ..... 29
**F FIGURES** change number of figures displayed ..... 30
**I INTEGER** display integer numbers only ..... 30
**P PREFIX** prefix numbers ..... 30
**S SUFFIX** suffix numbers ..... 30
**N NORMAL** display numbers as entered ..... 30
**X XECUTE** calculate formulae ..... 30
**Z ZAP** clear spreadsheet ..... 31
**O OPTIMISE** erase redundant formulae ..... 31

8. **Other Commands** ..... 33
**GRAPH** plot line graph/bar chart ..... 33

9. **Formula Functions** ..... 35
Normal Functions ..... 35
Special Functions ..... 39

Appendix 1 Interfaces (Spectrum 128/+2)
Appendix 2 Printing from the ZX Spectrum +3
Appendix 3 Printing Graphs
Appendix 4 Printing — additional information


# 1. Getting Started with TASCALC

## Learning to use TASCALC

We suggest that you learn to use TASCALC by the following steps:

(1) read section 2 on 'How TASCALC works';

(2) load TASCALC following the procedure described in section 3;

(3) try the simple exercises outlined below which explain how to enter data and calculate formulae;

(4) try creating your own simple spreadsheet. As you enter data so you will discover which of the TASCALC commands are most useful to you. The various commands available are outlined on the help page and described in detail in section 7.

## Exercise 1 Entering numerical data Calculating a simple formula

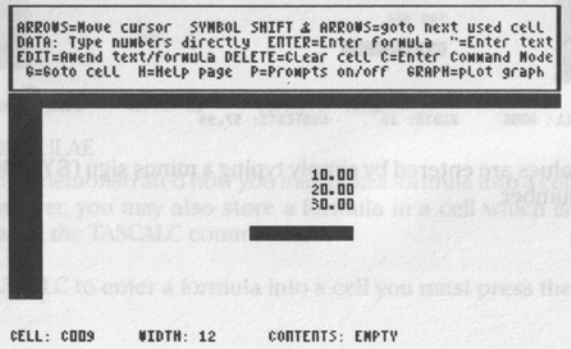
Use the arrow keys to position the grid cursor in cell C005. The cell that the cursor is currently located in (the 'current cell') is displayed on the status line at the bottom of the screen.

To enter any numbers into the spreadsheet you simply position the grid cursor at the appropriate cell and type the required number.

Try entering a value of 10 by pressing the **1** and the **0** keys along the top row of the keyboard. Note that on pressing key **1** the prompt 'Type number:' appears at the bottom of the screen. Continue typing the number by pressing the **0** key. Pressing **ENTER** then enters the number shown at the bottom of the screen into the current cell, in this case cell C005.

Repeat the procedure entering a value of 20 in cell C006 and a value of 30 in cell C007.

Move the grid cursor down to cell C009 so that the spreadsheet appears as follows:



Formulae give a spreadsheet its real power by allowing you to evaluate information contained in one part and to display the result elsewhere. TASCALC allows formulae to be entered in one of two ways. This exercise deals with entering formulae for immediate calculation.

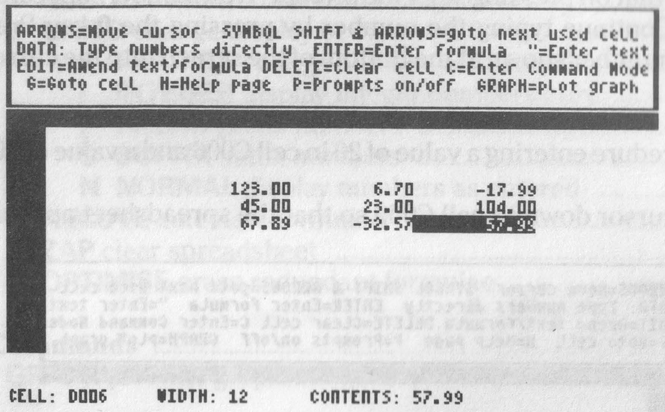
We might, for example, wish to find the sum of the numbers in cells C005, C006 and C007 and return the answer to cell C009. With the cursor in cell C009 type:

10+20+30

As soon as you type the first character the prompt 'Type number:' appears at the bottom of the screen. Although the program is prompting you to enter a number, TASCALC also allows you to enter a formula in the same manner as you enter a number. Entering a formula in such a manner results in the formula being calculated immediately and the result returned to the current cell. Finish typing the formula and press **ENTER**. The result of the calculation is then entered into the current cell.

## Exercise 2 Entering text
## Editing text
## Entering stored formulae
## Calculating formulae using the XECUTE command

Enter the numbers shown so that the spreadsheet appears as follows. If you make a mistake and type the wrong number into a cell use the **DELETE** key to erase the contents of that cell and then retype the number.




The negative values are entered by simply typing a minus sign (**SYMBOL SHIFT** and **J**) before the number.



So far we have only dealt with entering numerical data into a cell. However, a cell may contain one of three types of data:

Numbers
Text
Formulae

ENTERING TEXT

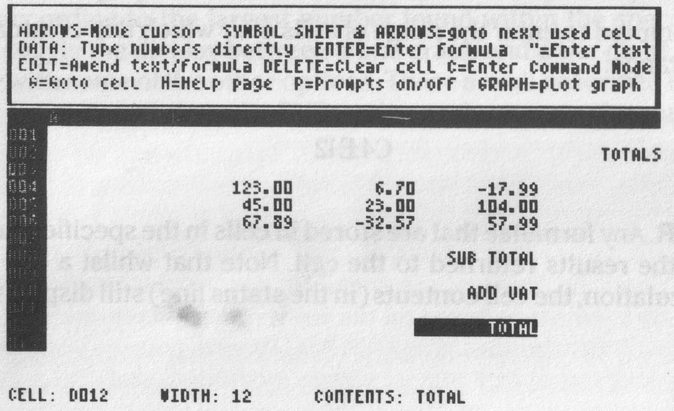
Once you have entered the numerical data displayed above, move the grid cursor to cell E002. To enter text into a cell you must press the " key (quote) on the bottom row of the keyboard. Try entering the text TOTALS into cell E002. Pressing the " key displays the prompt 'Enter text:' at the bottom of the screen. Type the text TOTALS and press **ENTER**.

If you want to edit any text after it has been entered into a cell you may do so by moving the grid cursor to the relevant cell and pressing the **EDIT** key. Try using the **EDIT** key on cell E002. The text TOTALS appears at the bottom of the screen with a line shaped cursor. The arrow keys can be used to move the line cursor so you may correct the text. Press **ENTER** to put the text shown at the bottom of the screen back into the current cell.

Try entering the following text into the cells listed below:

D008 = SUB TOTAL
D010 = ADD VAT
D012 = TOTAL

The spreadsheet should now appear as follows.




ENTERING FORMULAE

The first exercise demonstrated how you may type a formula into a cell for immediate execution. However, you may also store a formula in a cell which is only executed upon using one of the TASCALC commands.

To instruct TASCALC to enter a formula into a cell you must press the **ENTER** key.

First move the grid cursor to cell E004. Press the **ENTER** key and the prompt 'Enter formula:' appears at the bottom of the screen. Type the following formula:

B4+C4+D4

and press **ENTER**. This formula, when calculated, adds the contents of cells B4, C4 and D4 and then returns the result into the cell in which this formula is stored. A value of 0.00 is displayed on the left side of the cell showing that the formula has yet to be calculated. Note, however, that the cell contents shown in the status line at the bottom of the screen display the formula that is stored in the cell.

Enter the following formulae into the cells listed. Note that you can correct a mistyped formula after it has been entered by using the **EDIT** key, in the same manner as you would correct text.

| | |
|---|---|
| cell E005 = B5+C5+D5 | (finds the sum of the numbers in cells B5, C5 and D5) |
| cell E006 = B6+C6+D6 | (finds the sum of the numbers in cells B6, C6 and D6) |
| cell E008 = E4+E5+E6 | (finds the sum of the numbers in cells E4, E5 and E6) |
| cell E010 15/100*E8 | (finds 15% of the value in cell E8) |
| cell E012 = E8*1.15 | (adds 15% to the sub total in cell E8) |

To calculate these formulae we must use the XECUTE command.

To use any of the TASCALC commands you must first enter Command Mode. To enter Command Mode press the **C** key. The prompts box changes at the top of the screen to display a list of the various commands available. To minimise the keypresses required you need only type the first letter of a command to select that function. To select the XECUTE command press the **X** key.

You are now prompted to enter the range of cells over which this command is to take place. Type the range:

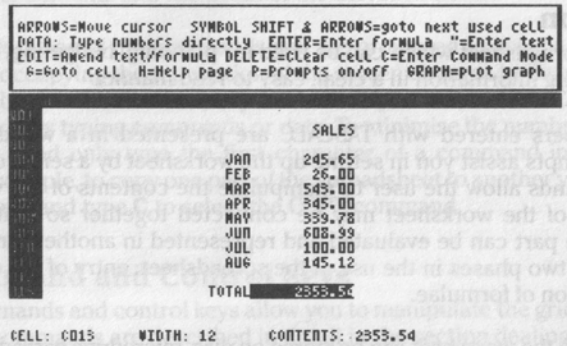
C4:E12

and press **ENTER**. Any formulae that are stored in cells in the specified range are then calculated and the results returned to the cell. Note that whilst a cell displays the result of the calculation, the cell contents (in the status line) still display the formula.



## Exercise 3 Plotting a graph/bar chart

Enter the numbers and text displayed below so that the spreadsheet appears as follows:




You can draw a graph or bar chart using the GRAPH command. The points plotted are the numerical values found within a specified range of cells.

To plot a graph press the **GRAPH** key. You are invited to enter the range of cells for which a graph is to be plotted. Enter the range:

C4:C11

and press **ENTER**. The prompt box at the top of the screen asks if you wish to print a scale on the graph. Press the **Y** key for YES. There is now a short delay whilst TASCALC plots the graph and constructs the scale. The points plotted on the graph are scaled according to the largest number found within the specified range. Press the **F** key to toggle the display between a line graph and a bar chart. You might like to experiment with some of the other options. These are all described in section 8. Press the **E** key at any time to select the END option and return to the spreadsheet.

# 2. How TASCALC Works

## Introduction

TASCALC is a spreadsheet which can be used for planning, budgeting, tabulating or simply presenting information in a clear, easy to read manner.

Text and numbers entered with TASCALC are presented in a worksheet format. On-screen prompts assist you in setting up the worksheet by a series of keypresses. Various commands allow the user to manipulate the contents of the worksheet. In addition parts of the worksheet may be connected together so that information changed in one part can be evaluated and represented in another form elsewhere. There are thus two phases in the use of the spreadsheet: entry of the data followed by the calculation of formulae.

Once produced, the worksheet can be stored on disc, microdrive cartridge or cassette tape to access, edit and print at a later date.

## The Spreadsheet

TASCALC organises the worksheet, or spreadsheet, as a grid of 157 rows by 52 columns. Each column is identified by a letter (A, B to Z, AA to AZ). The spreadsheet rows are identified by a number (1 to 157).

## Cells

The coordinates of the rows and columns — for example A100 — identify specific locations within the spreadsheet called 'cells'. The top left cell of the spreadsheet grid is A1 and the bottom right cell is AZ157.

You enter data into the cells. Only one cell is 'active' at any one time. This cell is called the 'current' cell. When you enter data it is entered into the current cell. The current cell is identified on the screen by the grid cursor. The grid cursor can be moved from cell to cell using the arrow keys on the keyboard.

## Cell Contents

A cell may contain one of three types of data — numbers, text and formulae. Text, such as 'Sales', 'Costs' or 'January' are useful for descriptions or headings. Formulae allow calculations to be made based on the value stored in another cell or in a group of cells. It is these formulae that give TASCALC its real power — whole areas of the grid may be linked together, their contents evaluated and the result produced elsewhere.

## The Window

The spreadsheet grid is too large to be displayed on screen all at once. The screen thus acts as a 'window', moving over the grid to keep the current cell in view. Movement of the window is called 'scrolling'.



## Entering Information

The bottom two lines of the display are used for entering information. On loading TASCALC displays some status information on the last but one line showing the current cell, its contents and the width of the current column.

When you select one of the commands you are prompted to enter a command. The 'prompt box' occupying the top section of the screen changes to display the relevant prompt. The bottom line is the entry line where you instruct TASCALC to perform some operation by typing commands or data. To minimise the number of keypresses required you need only type the first character of a command in response to a prompt. For example, to copy one part of the spreadsheet to another you simply enter Command Mode and type **C** to select the COPY command.

## The Command and Control Keys

Various commands and control keys allow you to manipulate the grid or its contents. All of these commands are described in detail in the section dealing with Command Mode. If you are unsure of a command just press the **H** key to view the TASCALC help page. The help page summarises the various commands available.

## Cell References

Many TASCALC operations require you to identify a cell or a group of cells. Identifying a cell you wish some operation to affect is called a 'cell reference'. Cells can be referenced by two different methods.

1. A **DIRECT** reference identifies a cell by its column and row co-ordinates. For example, A001 indicates the cell located in row 001 of column A. AB100 refers to the cell in row 100 of column AB. The column is always specified first in a cell reference.

2. Reference by **LABELS** identifies a single cell by a text label, e.g. 'Sales' or 'Costs'.

   You can also reference a cell by a text label intersection, for example 'Sales.Costs', using a dot to separate the two labels. When searching for a label intersection, TASCALC finds the cell where the row from the second label (Costs) intersects the column of the first label (Sales). Thus if the text label 'Sales' is located in cell C001 and the text label 'Costs' is located in cell A010, then the intersection 'Sales.Costs' identifies the cell at C010.

## Cell Ranges

Many commands require you to identify a group or 'range' of cells. A range of cells should be represented in the form CELL1:CELL2. CELL1 is the top left cell of the group, CELL2 is the bottom right cell of the range and the two references are separated by a colon.

Cell ranges can be specified by both direct reference and by labels.

A direct range reference, such as A001:B157, identifies the range of cells from A001 to B157.

A label range reference identifies a range using text label intersections, for example:

SALES.COSTS:COSTS.SALES

Single label references (e.g. SALES:COSTS) are *not* allowed. The above example indicates the block of cells from the intersection of the SALES.COSTS labels to the intersection of the COSTS.SALES labels.

You can specify a range by a single label (e.g. SALES). If you specify a range in such a manner than a search is made through the grid for that label. Once the label is found a search is made for the nearest number along the row and down the column from the label. If numbers are found only in the row then the range is taken to be the row from the label to the far right of the grid. If numbers are found only in the column then the range is taken to be that from the label to the bottom of the column. If numbers are found in both the row and the column then the range used depends on the number closest to the label.



# 3. Loading and Running TASCALC

**ZX SPECTRUM 128 AND ZX SPECTRUM +2**

TASCALC can be run from both cassette and microdrive.

Side A of the TASCALC cassette contains a version of the program which runs on cassette. Side B of the cassette contains a program which, after loading, automatically transfers TASCALC to microdrive cartridge.

**Cassette**

Reset the computer and use the ↓ key to select **128 Basic.** Type:

**LOAD ""**

and press **ENTER.** Insert the cassette into the tape recorder with side A upwards and press the play button. TASCALC loads in three parts: the Basic program loads first followed by the machine code programs.

**Microdrive**

To transfer TASCALC to microdrive, reset the computer and use the ↓ key to select **128 Basic**. Type:

**LOAD ""**

and press **ENTER**. Press the play button on the tape recorder to play the TASCALC cassette.

(1) Once the program has loaded select option 3 to enter BASIC. Edit line 10 of the BASIC program so it reads as follows:

```
10  CLEAR VAL "24999": PRINT TAB VAL "7";"TASCALC LOADING...":
    LOAD *"m";SGN PI;"SPS2" CODE:LOAD *"m";SGN PI;"PI 1-CTRL" CODE
```

(2) Execute: GOTO 20

(3) Select option 2 to install your printer (see Appendix 1).

(4) Select option 4 to save TASCALC. Press **M** to save TASCALC to microdrive.

To load TASCALC from microdrive, reset the computer and use the ↓ key to select **128 Basic**. Type:

**RUN**

and press **ENTER.**

**ZX SPECTRUM +3**

Reset the computer and insert the disc into the drive. Use the ↓ key to select **+3 Basic** and press **ENTER**. Type:

**LOAD "TASCALC"**

and press **ENTER**.

After loading you are presented with the following options:

1. Enter spreadsheet
2. Install printer
3. Return to BASIC
4. Save TASCALC

Select option 2 if you want to customise TASCALC for your printer (see Appendix 1 and 2). Press 1 to enter the spreadsheet and you will see a bar-shaped cursor in the first cell of an empty spreadsheet.

The bottom of the screen shows the current location of the cursor along with some other information. The top part of the screen displays a prompt box detailing various commands and options that are available. You can now start entering data into the spreadsheet or load a previously created data file (see section 7).

## Saving TASCALC

*PLEASE NOTE: The facility to save TASCALC has been included to allow you, the purchaser, to make back-up copies of TASCALC and to save your customised versions of TASCALC. Passing copies of TASCALC to a third party is a breach of copyright.*

To make a back-up or customised copy of the TASCALC program select option 4 from the list of options displayed after loading. Follow the screen prompts to save TASCALC onto cassette tape, a blank, formatted cartridge or a blank, formatted disc.



# 4. Cursor Movement

## ARROWS move cursor

The arrow keys at each side of the **SPACE BAR** are used to move the cursor to any cell within the spreadsheet grid. Moving the cursor to the edge of the screen causes the display to scroll either horizontally or vertically across the grid. Keeping an arrow key depressed causes auto-repeat to be implemented and this is a useful way of moving the cursor quickly towards some desired position.

## SYMBOL SHIFT → move cursor right to next used cell in row

Holding down **SYMBOL SHIFT** and pressing the → key moves the cursor right to the next used cell in the current row. Where possible the display is adjusted so that the cursor is located in the centre of the screen. If all the cells in the current row and to the right of the cursor are empty, then the cursor moves to the last cell in the row in column AZ.

## SYMBOL SHIFT ← move cursor left to last used cell in row

Holding down **SYMBOL SHIFT** and pressing the ← key moves the cursor left to the last used cell in the current row. Where possible the display is adjusted so that the cursor is located in the centre of the screen. If all the cells in the current row and to the left of the cursor are empty, then the cursor moves to the first cell in the row in column A.

## SYMBOL SHIFT ↓ move cursor down to next used cell in column

Holding down **SYMBOL SHIFT** and pressing the ↓ key moves the cursor down to the next used cell in the current column. Where possible the display is adjusted so that the cursor is located in the centre of the screen. If all the cells below the cursor are empty, then the cursor moves to the bottom row in the column (i.e. row 157).

## SYMBOL SHIFT ↑ move cursor up to last used cell in column

**SYMBOL SHIFT** and ↑ moves the cursor up the current column to the last used cell. Where possible the display is adjusted so that the cursor is located in the centre of the screen. If all the cells above the cursor are empty then the cursor moves to cell 001 in the column.

## G goto specified cell

The cursor can be moved instantly to any specified cell in the current 'whole grid' (see DESIGN command, section 7). Press the **G** key to select the Goto specified cell command. The prompt 'Goto' appears at the bottom left of the screen. Type in a reference for the cell you wish to move to, for example E005, and press **ENTER**. Just press **ENTER** without typing a cell reference to abandon the goto command. Where possible the display is adjusted so that the cursor is located in the centre of the screen. To search for a text label you must preceed the label with a " (quote) character, e.g. "SALES. No closing quote character is required.

# 5. Data Entry

Each cell can store one of three types of data: numeric data, text and formulae. Any data typed from the keyboard is entered into the spreadsheet at the current cursor position.

64K of memory is available for storing data in the spreadsheet. Formulae are stored separately — 16K of memory is set aside for the storage of formulae. The free memory space can be determined at any time by using the **EXTEND MODE** key to toggle the status display at the bottom of the screen (section 6).

## Numerical Data

Numerical data is typed into a cell by direct entry. To enter a value simply type the figure using the numeric keys on the keyboard. On typing the first numeral the prompt:

Type number:

appears at the bottom left of the screen together with a line-shaped cursor. Complete typing the figure and press **ENTER** to enter the value into the cell at the current grid cursor position.

You can correct any errors whilst typing numerical data using the **DELETE** key to delete the character immediately to the left of the cursor at the bottom of the screen. The ← and → keys can be used to position the line cursor. The **SPACE BAR** moves the cursor to the right by one character position, overwriting any figures with a space character. To abandon entering a number use the **DELETE** key to erase any figures that have been typed and press **ENTER**.

You cannot mix numeric characters with non-numeric characters. According to the numerical value entered, TASCALC may automatically round up a figure or display the value in standard form (e.g. 1E+4 instead of 10000). A number may be entered in full or in standard form (e.g. 100000 or 1E+5). Should it not be possible to display a number TASCALC will insert [n] into the cell, indicating that the cell is not empty but that the number cannot be displayed.

Negative values are entered by typing a minus sign in front of the required value, e.g. −100.

To erase a number from a cell use the **DELETE** key (section 6) or the RUBOUT command (section 7).

By default TASCALC aligns all numbers by decimal point. Numbers are automatically displayed to 2 decimal places and then justified against the right side of the cell. As all numbers are displayed to the same number of decimal places then all numerical values are aligned by decimal point. To alter the justification of numbers refer to the ALIGN command (section 7).



You may also enter a formula in response to the prompt for a number. A formula entered in such a manner is evaluated immediately and the result entered into the current cell. For example, you might enter 15/100*300 to find 15% of 300. The result of 45 is entered into the current cell and the original text of the formula is discarded.

## Text Entry

To enter a text label into a cell press the " (quote) key on the bottom row of the keyboard. The prompt:

Enter text:

appears at the bottom left of the screen. Type the required text and press the **ENTER** key to enter the text into the cell at the current grid cursor position. You can correct any errors whilst you are typing the text using the ← and → keys to position the line cursor at the bottom of the screen — the **DELETE** key deletes the character immediately to the left of the cursor and the **SPACE BAR** overwrites text with a space character.

To amend text after it has been entered into a cell use the **EDIT** key (section 6).

When a text label is entered into a cell it may be automatically justified to the left, centre or right of the cell. By default, TASCALC justifies text to the right of the cell. To change the default justification of text to the centre or left, use the DESIGN command (section 7). To rejustify text *after* it has been entered into a cell use the JUSTIFY command.

Remember that cell ranges can be referenced by text labels. You should note that TASCALC can distinguish between upper and lower case characters when it searches for a particular label reference (see the DESIGN command described in section 7). Although you can type numbers into your text (e.g. SALES 1987), TASCALC does not recognise a text/number label as a cell reference.

## Entering Formulae

Formulae are used for performing calculations. There are two ways of entering formulae. A formula may be entered as a number in which case the formula is calculated immediately, the result returned to the current cell and the original formula then discarded (see exercise 2, section 1). Alternatively, a formula may be stored in a cell for calculation later.

To identify that you wish to store a formula into the current cell press the **ENTER** key. The prompt:

Enter formula:

appears at the bottom of the screen. Type the required formula and press **ENTER**. All of the normal Spectrum functions are available (+ − * SIN COS etc) and these may be used in the usual manner. In addition a number of special functions are available — all of these functions are listed in section 9.

Note that you may also use a direct/label cell reference with any function where you would expect to find a numerical value, e.g. (A001/100)*15 which divides the contents of cell A001 by 100 and multiples the result by 15.

Errors made whilst typing a formula can be corrected using the **DELETE** key. To amend a formula after it has been entered into a cell use the **EDIT** key (section 6).

Formula calculations use the numeric value of a cell. The numeric value of a cell containing a number is the number contained within that cell.

## Relative and Absolute Formulae

A formula may make reference to a cell. For example the formula A1+B1 means add the numerical value in cell A1 to the numerical value in cell B1. Where a formula makes reference to a cell then that formula may be relative or absolute.

Relative: some commands cause a formula to be copied or moved to new locations. It is usually desirable to have formulae automatically adjusted for their new locations. For example, cell C1 might contain the formula A1+B1. If columns A, B and C were subsequently moved right by one column (as would occur if a blank column was inserted at column A) then the formula in cell C1 is relatively adjusted to fit with its new position. The formula, now located in cell D1, would be relatively adjusted to B1+C1.

A relative formula thus refers to the contents of another cell as measured from the cell in which that formula is stored.

Absolute: an absolute formula refers to the contents of the specified target cell, irrespective of later changes in the grid. For example, cell C1 might contain the formula A1+B1. If columns A, B and C were subsequently moved right by one column, then the formula in cell C1 (if absolute) would not be adjusted to fit in with its new location. The formula would still read A1+B1.

To specify that a formula is absolute you must prefix the cell reference with a $ character. Thus to specify that the formula A1+B1 is an absolute formula you would enter $A1+$B1.

Remember that you may also enter a formula in response to the prompt to enter a number. A formula entered in such a manner is evaluated immediately and the result entered into the current cell.



# 6. Control Keys

## EDIT amend contents of cell

The **EDIT** key is used to amend the contents of text or formulae cells. Cells containing numbers cannot be amended using this control key. To amend a number position the grid cursor over the appropriate cell and re-type the number.

Use the arrow keys to move the cursor to the cell whose contents you wish to edit. Press **EDIT** and the contents of the current cell are displayed at the bottom of the screen. The ← and → keys can be used to position the line cursor at the bottom of the screen. The cell contents can be edited using the **DELETE** key to delete the character immediately to the left of the line cursor or by simply typing over the existing text or formula.

Press **ENTER** to copy the amended contents back into the current cell.

Note that editing a formula does not destroy the old formula from memory. The old, now redundant formula still occupies memory space. To erase redundant formulae completely you should use the OPTIMISE command.

## DELETE delete contents of cell

This control key deletes the contents of the cell at the current cursor position in the spreadsheet. All numbers, text and formulae are erased.

Although the **DELETE** key erases formulae from a cell, it does not erase a formula from memory. To erase unwanted formulae permanently you should use the OPTIMISE command described in section 7.

## H show HELP page

Pressing the **H** key displays the TASCALC help page. This help page summarises the various commands available in Command Mode. These commands are described in detail in the section dealing with Command Mode. Press **ENTER** to return to the spreadsheet when viewing the help page.

## P prompt on/off

The top section of the screen normally displays the 'prompt box'. This box summarises the various commands available as well as displaying the necessary prompts when using the TASCALC commands. The prompts are on when this information is shown at the top of the screen. The prompts are off when no information is shown at the top of the screen. Pressing the **P** key toggles the prompt information between on and off. Switching the prompts off enables a larger portion of the grid to be displayed. The screen displays 17 rows when the prompts are off and 13 rows when the prompts are on.

## EXTEND MODE toggle status display

The **EXTEND MODE** key toggles the status line display at the bottom of the screen. By default the TASCALC status line displays the current cell, column and current cell contents. Pressing the **EXTEND MODE** key changes the status line to display the free memory space and the memory space remaining for formulae. Pressing the **EXTEND MODE** key a second time toggles the status line back again.

# 7. Command Mode

This section details the various commands available in Command Mode. In order to minimise the number of keypresses required, all of the commands are invoked by a single key entry in response to screen prompts.

## C enter Command Mode

To use any of the TASCALC commands it is first necessary to enter Command Mode. Pressing **C** selects Command Mode. A > prompt appears at the bottom left of the screen to indicate that the program is now in Command Mode and the prompts box changes to list the various commands available.

To select any of the commands simply press the key corresponding to the first letter of the command. For example, press **E** to select the ECHO command or press the **G** key to select the GRID command. The functions of all the Command Mode commands are described in detail below.

Pressing the **ENTER** key in response to the > prompt exits Command Mode.

With the exception of the XECUTE command the **BREAK** key halts all of the Command Mode operations.

## C COPY copy specified range of cells Command Mode C

The COPY command copies the contents of a specified range of cells into another range of cells at some other location in the spreadsheet.

Press **C** to enter Command Mode. A > prompt appears at the bottom of the screen indicating that you are now in Command Mode. Press the **C** key to select the COPY command.

You are asked to enter the range of cells to be copied. Type the appropriate range and press **ENTER**. Pressing the **ENTER** key alone without typing a cell range copies the block of cells currently defined as the 'whole grid' (see the DESIGN command described later in this section). Typing a . (full stop) character selects the last range entered.

You must enter the top left cell of the range you wish to copy to. Type the appropriate cell reference and press **ENTER**. The contents of the named range are then copied to another part of the spreadsheet starting at the specified cell. TASCALC displays the 'working cell' at the bottom of the screen. Switching the working cell off can result in an increase in speed of between 300%-600% (the working cell is described under the DESIGN command later in this section). Pressing the **BREAK** key during a COPYing operation aborts the process.

Unless specified as absolute, any formulae are relatively adjusted to fit in with their new positions. If TASCALC cannot copy the named cells into the specified range then an error message is displayed. Such an error may occur if the range to be copied extends beyond the grid boundaries at its new position.



## D DESIGN set grid/program parameters Command Mode D

TASCALC allows the user to set various parameters which affect both the program and the display. Any changes made to these parameters are saved with the spreadsheet contents whenever you save a data file.

Use the **C** key to enter Command Mode. A > prompt appears at the bottom of the screen indicating that you are now in Command Mode. Press the **D** key to select the DESIGN option.

The ↑ and ↓ arrows keys move the cursor to the option you wish to change. Use the ← and → keys to change the default values: the → key increases a numerical value, the ← key decreases a numerical value. Press the **SPACE BAR** at any time to exit the DESIGN command and return to the spreadsheet.

**Label search case dependent**
You can reference a cell by a text label. When TASCALC searches the spreadsheet for a text label you can specify that the search should be case dependent. If you specify that a label search is not to be case dependent then TASCALC will treat upper and lower case letters as being the same. Use the ← or → key to change the default value to YES if you wish case to be taken into consideration during a label search.

**Cursor auto repeat speed**
The cursor keys at each side of the **SPACE BAR** move the grid cursor about the spreadsheet. If pressure is kept on any one of these keys then, after a slight delay, the key action is repeated. The delay between each repeat can be increased or decreased. Auto repeat speed is set in units of 1/50th of a second.

**Keyclick length**
If the ZX Spectrum is connected to a television, then a soft click sounds through the TV loudspeaker each time a key is pressed on the keyboard. By default TASCALC sets the keyclick to zero — the sound is so short that it sounds like a soft click. Increasing the keyclick value increases the duration of the click. Note that increasing the keyclick length also increases the cursor auto repeat delay.

**Screen attribute**
The TASCALC screen colours can be changed by setting the screen attribute parameter. The screen attribute is equal to:

$$(8 \times \text{paper colour}) + \text{ink colour}$$

For example, to generate white text (white = 7) on black paper (black = 0):

$$(8 \times 0) = 0 \qquad 0 + 7 = 7$$

Adding 64 to the screen attribute value makes the display bright.

**Border attribute**
The border colour attribute is calculated using the same formula for the screen attribute.

**Text default justification**
Text entered into any cell can be automatically centred or justified to the left or right of the cell. The ← and → keys toggle text justification between centre, left and right.

Changing this parameter only affects text entered *after* this option has been changed. Text already entered into a cell is still displayed according to the text justification setting when the text was entered. To rejustify existing text use the JUSTIFY command or position the grid cursor over the relevant cell and press the **EDIT** key to edit the text label. Pressing the **ENTER** key (without editing the text) enters the text back into the cell which is then justified according to the new 'text default justification' setting.

**Default no. of formula figures**
The number of formula figures is the number of digits displayed in a cell which contains a formula. The maximum number of formula figures that can be displayed in any one cell is 14. The number of formula figures *includes* the decimal point.

Changing this parameter only affects formulae entered *after* this option has been changed. Any formulae that have been entered before this parameter is changed are still displayed according to the 'default number of formula figures' setting when those formulae were entered. If you wish to display existing formulae according to the new setting you must enter each formula again. The simplest method of achieving this is to position the grid cursor over the formula to be re-entered and press the **EDIT** key. Press **ENTER** to re-enter the formula into the current cell without editing the formula. The formula is then displayed according to the new 'default no. of formula' figures parameter.

**Calculation order**
By default calculation of formulae takes place by column. The ← and → keys toggle the calculation order of formulae to take place by row.



**Relative error default (letter)/(number)**
A formula may make reference to the contents of another cell. The relative error default is the cell that is inserted if a formula contained within a cell cannot be relatively adjusted without going outside of the boundaries of the grid.

For example, cell A1 might contain the formula A157*10. If A1 was copied to cell A2 then the formula should be relatively adjusted to read A158*10. This is not possible as the formula now references a non-existent cell beyond the boundaries of the grid. The A157 in the formula is thus replaced by the cell which is named as the 'relative error default'.

The relative error default affects all commands that involve relatively adjusting a formula.

**Whole grid top left (letter)/(number)**
During certain operations (COPY, RUBOUT, UNITS, ECHO and XECUTE), pressing the **ENTER** key in response to the prompt to enter a cell range, causes that operation to take place over the 'whole grid'. By default the 'whole grid' is defined to be the complete spreadsheet.

The 'whole grid' can be defined by the user. Redefining the 'whole grid' to the area you are working in results in increased program speed. Use the ← and → keys to identify the cell which you require to be the top left cell of the 'whole grid'.

**Whole grid bottom right (letter)/(number)**
The ← and → keys toggle the default values to identify the bottom right cell of the 'whole grid' described above.

**Cell Working printed**
The 'working cell' is the cell displayed at the bottom of the screen during some particular operations (XECUTE, COPY etc). Keeping the working cell switched on can have advantages. For example, the XECUTE operation recalculates all formulae within a given range. If an error occurs in a formula and the working cell is on, then the cell to which that error refers is shown on the screen.

Switching the working cell off can result in program speed increases of between 300%-600%.

## E ECHO fill range with contents of specified cell

Command Mode E

The ECHO command fills a range of cells in the spreadsheet with the contents of a specified cell. This command differs from the COPY command in that you can only copy the contents of a single cell.

Press **C** to enter Command Mode and **E** to select the ECHO command. The message 'Echo, expands cell over range' appears at the bottom of the screen indicating that you have selected the ECHO command.

A prompt at the top of the screen informs you to press **ENTER** to continue or any other key to exit the ECHO command.

Press **ENTER** to continue. You must enter a reference for the cell you wish to echo. References may be direct (A001) or by text label intersections (COSTS.SALES). You cannot reference a cell by a text label (e.g. COSTS).

You are then prompted for the range over which the contents of the specified cell are to be echoed. Type the specified range and press **ENTER** or just press the **ENTER** key to echo the cell over the 'whole grid'. Typing a . (full stop) character selects the last range entered.

The contents of the named cell are then copied into the specified range. Pressing the **BREAK** key halts the operation.

If the contents of the named cell are a formula, then the program asks you whether the absolute formula is to be echoed or whether the formula is to be relatively adjusted for each new position. Press **A** for absolute or **R** for relative. If the formula contained in the cell to be echoed is absolute (i.e. preceded by a $ character) then the absolute formula is echoed irrespective of whether you press **A** or **R**.

## F FILES save/load/delete data file Command Mode F

Information entered into the spreadsheet can be saved to microdrive, cassette or 3 inch disc as a 'data file'. The FILES command deals with saving, loading and deleting data files.

### SAVING DATA FILES

**ZX SPECTRUM 128 AND ZX SPECTRUM +2**

Enter Command Mode and press **F** to select the FILES command. The program asks whether you wish to save, load or delete a data file. Press **S** to select the save data file option.

You are now given the option of saving the data to microdrive cartridge or cassette. The current drive number is also shown at the top of the screen. The current microdrive is the drive number that the save and load operations will use. The drive number can be changed by pressing key **2** for drive 2, key **3** for drive 3 and so on. Press **D** to save the data to microdrive or **T** to save the data to cassette.

If you choose to save the data to microdrive TASCALC asks if you want to catalogue the drive before typing a filename. Cassette tapes cannot be catalogued.

You are then prompted to enter a filename for the data you wish to save. Type in a name of your choice and press **ENTER**. The maximum number of characters you may enter as a filename is 9, if saving to cassette, or 10 if saving to microdrive. Once you have typed a name press **ENTER** to save the data file or any other key to abandon the operation and return to the spreadsheet. When the save is complete you are returned to the spreadsheet.



**ZX SPECTRUM +3**

Enter Command Mode and press **F** to select the FILES command. Press **S** to select the save data file option.

You are now given the option of saving the spreadsheet data to disc or cassette tape. Press **D** for disc or **T** for tape.

If you choose to save the data to disc, TASCALC then asks you if you wish to perform a catalogue of the disc before typing a filename. Press **Y** to catalogue the disc or **N** for NO. Cassette tapes cannot be catalogued.

You are then prompted to enter a filename for the data you wish to save. Type in a name of your choice and press **ENTER**. When the save is complete you are returned to the spreadsheet.

A filename may be up to 8 characters in length. Note that TASCALC automatically adds the file extension .SPS to each file saved.

### LOADING DATA FILES

Warning: LOADING A DATA FILE WILL CLEAR ALL THE DATA THAT IS CURRENTLY IN THE SPREADSHEET

**ZX SPECTRUM 128 AND ZX SPECTRUM +2**

To load a data file use the **C** key to enter Command Mode and press **F** to select the FILES option. The program asks whether you wish to save, load or delete a data file. Press **L** to select the load data file option.

You are now given the option of loading the data from microdrive cartridge or cassette. The current drive number is also shown at the top of the screen. The current microdrive is the drive number that the save and load operations will use. The drive number can be changed by pressing key **2** for drive 2, key **3** for drive 3 and so on. Press **D** to load the data from microdrive or **T** to load the data from cassette.

If you choose to load the file from microdrive you are asked if you want to catalogue the cartridge. Press **Y** to catalogue the cartridge or **N** for NO.

Type the name of the file you wish to load and press **ENTER**. If you are loading from cassette pressing **ENTER** for a filename loads the first file on the tape. Having entered a filename you should press **ENTER** to continue or any other key to abandon the loading operation. Once the data file has been loaded you are returned to the spreadsheet.

|+3| **ZX SPECTRUM +3**

Enter Command Mode and press **F** to select the FILES command. Press **L** to select the load data file option. You are given the choice of loading data from disc or tape — press **D** for disc or **T** for tape.

If you choose to load the data from disc then TASCALC asks you if you wish to perform a catalogue of the disc before typing a filename. Press **Y** to catalogue the disc or **N** for NO. Cassette tapes cannot be catalogued.

You are then prompted to enter a filename. Type in the name of the data file you wish to load and press **ENTER**. When the load is complete you are returned to the spreadsheet.

TASCALC automatically adds the extension .SPS to each file saved. On loading there is no need to type the file extension — TASCALC assumes each file is terminated with the extension .SPS.

## DELETING DATA FILES

|+2| **ZX SPECTRUM 128 AND ZX SPECTRUM +2**

Data files saved to microdrive cartridge can be erased using the FILES command. You cannot erase a file stored on cassette tape using this command.

Enter Command Mode and press the **F** key to select the FILES command. Press **D** to select the delete data file option. The current drive number is shown at the top of the screen — the current drive is the microdrive that the delete operation will use. The current drive can be changed by pressing key **2** for microdrive number 2, key **3** for drive 3 etc.

You are then asked if you want to perform a catalogue of the cartridge in the current drive. Press **Y** for YES or **N** for NO. Type the name of the data file you wish to erase and press **ENTER**. You are returned to the spreadsheet once the specified data file has been erased from the cartridge.

|+3| **ZX SPECTRUM +3**

Data files saved to disc can be erased using the FILES command.

Enter Command Mode and press **F** to select the FILES command. Press **D** to choose the delete data file option. You are asked if you wish to perform a catalogue of the disc before entering the name of the file to be erased. Press **Y** for YES or **N** for NO. Type the name of the file you wish to delete from the disc and press **ENTER**. You are returned to the spreadsheet as soon as the operation is complete.



### Data File Names

|+2| **ZX SPECTRUM 128 AND ZX SPECTRUM +2**

Files saved to cassette tape may have names up to 9 characters long. Files saved onto microdrive cartridge may have names of up to ten characters in length.

Filenames may be made up of both letters and numbers. Note that TASCALC distinguishes between upper and lower case letters so a file called 'data' is different from a file called 'DATA'.

|+3| **ZX SPECTRUM +3**

Files saved to disc may have names of up to 8 characters in length. All files saved onto +3 disc are automatically terminated with the extension .SPS. Files saved to cassette tape may have names up to 9 characters in length.

Filenames may be made up of both letters and numbers. On the Spectrum +3 TASCALC does *not* distinguish between upper and lower case letters. Filenames typed with lower case letters are automatically converted into upper case characters.

# G GRID grid commands

Command Mode G

There are 4 grid commands:

| | |
|---|---|
| **ALIGN** | numbers |
| **DELETE** | row or column |
| **INSERT** | row or column |
| **WIDTH** | change column width |

To invoke these commands you must first select the GRID option. Enter Command Mode and press the **G** key to select the GRID commands. You are presented with the four sub options:

## A ALIGN numbers

GRID, A

The ALIGN option aligns numbers by decimal point. There are three sub options:

**DEFAULT**
**WHOLE**
**BLOCK**

The DEFAULT option allows numbers to be aligned automatically as they are typed. A number may be displayed to a DEFAULT number of decimal places — the number is then justified against the right side of the cell. As all numbers are displayed to a set number of decimal places then all values entered are automatically aligned by decimal point. Any integer numbers entered into the spreadsheet after changing this option are padded out with zeros up to the specified number of decimal places. TASCALC is supplied with the DEFAULT parameter set to two. If the DEFAULT alignment is set to zero then this function does not operate.

Press **D** to select the DEFAULT option, type the number of decimal places to which numerical values are to be displayed and press **ENTER**. Pressing **ENTER** alone enters a value of zero — numbers are not automatically aligned but are displayed as entered and justified against the left side of the cell.

Pressing the **W** key for WHOLE aligns *all* the numbers in the column starting from the current cursor position. Pressing **B** aligns the numbers in the BLOCK of cells starting from the current cursor position. The end of a block is taken to be a cell containing text or an empty cell and decimal point alignment halts at the occurrence of such a cell.

With the WHOLE or BLOCK commands the largest integer number is justified against the left side of the cell — all other numbers are then aligned according to the position of the decimal point in the largest integer number.

### D DELETE row or column

GRID, D

The DELETE command deletes the row or column that the cursor is currently located in. Press **D** to select the DELETE command. You are prompted to indicate whether you wish to delete the current row or the current column. Press **R** to delete the row or **C** to delete the current column.

Deleting a row moves all subsequent rows upwards to fill the blank space. Deleting a column moves all subsequent columns to the left to fill the space created by deleting the column. A blank column/row is inserted at the end of the grid. All formulae are relatively adjusted.

### I INSERT row or column

GRID, I

The INSERT command inserts a row or column at the current cursor position.

Press **I** to invoke the INSERT command. You are prompted to indicate whether you wish to insert a row or a column. Press **R** to insert a row or **C** to insert a column.

Inserting a row or column results in the loss of the final row or column. All formulae are relatively adjusted.

### W WIDTH change column width

GRID, W

The WIDTH command allows you to change the display width of a column.

Press **W** to select the WIDTH command. You are prompted to enter the range of columns for which the display width is to be changed. Enter the first column of the range and press **ENTER**. Enter the second column of the range and press **ENTER**. You are now required to enter the new column width. The minimum column width is 3, the maximum column width is 30. Type the required value and press **ENTER**. The screen display is then adjusted accordingly. There is no space between adjacent columns — this enables labels to be placed right up to the numbers they refer to.

Note that the WIDTH command has no effect on the number of formula figures displayed. The number of formula figures that are displayed is changed using the DESIGN command.



## J JUSTIFY justify text/numbers

Command Mode J

The JUSTIFY command justifies text or numbers within a specified range of cells. Enter Command Mode and press **J** to select the JUSTIFY command. You are prompted to enter the range of cells over which you wish the justification to take place. Type the appropriate reference and press **ENTER**. Pressing **ENTER** instead of typing a cell range results in the JUSTIFY command taking effect over the 'whole grid'. Typing a . (fullstop) character selects the last range entered.

You must identify if justification of numbers or text is to take place. Press **N** to justify numbers or **T** to justify text. Finally you are asked whether the text or numbers are to be justified to the left, right or centre of the cell. Press **L** for left, **R** for right, **C** for centre or **BREAK** to abandon the command.

## P PRINT print spreadsheet

Command Mode P

You may print part or the complete spreadsheet at any time using the PRINT command.

Before printing you must ensure that you have customised TASCALC for your printer or interface (Appendix 1 and 2).

Enter Command Mode and press **P** to select the PRINT command. You must enter the range of cells that you wish to print. Type the required range and press **ENTER**. Pressing the **ENTER** key alone in response to the prompt for a range prints the range of cells currently defined as the 'whole grid'. Typing a . (fullstop) character selects the last range entered.

You are then prompted with the following sequence of questions:

| | |
|---|---|
| Copies= | Enter the number of copies you wish to print. Type 1 for a single copy, 2 for two copies etc. Pressing **ENTER** abandons the PRINT command and returns to the spreadsheet. |
| Pre-title ESCape codes | The pre-title ESCape codes are a sequence of codes that are sent to the printer before the spreadsheet is printed. The use of these codes is discussed in more detail in the following section. Type the required codes and press **ENTER**. Just press **ENTER** if you do not wish to send a pre-title ESCape code sequence. The maximum number of characters that may be sent in the pre-title ESCape code sequence is 55. |
| Post-title ESCape codes | The post-title ESCape codes are a sequence of codes that are sent to the printer after the title is printed at the top of the spreadsheet. The use of these codes is discussed in more detail in the following section. Type the required codes and press **ENTER**. Just press **ENTER** if you do not wish to send a post-title ESCape code sequence. The maximum number of characters that may be sent in the post-title ESCape sequence is 55. |

Enter title — You may, if you wish, print a title at the top of each copy printed. Type the title you wish to be printed at the top of the spreadsheet and press **ENTER**. Press the **ENTER** key alone if you do not wish any title to be printed.

Form feed after each copy — Specifying that a form feed should be performed results in the printer performing a form feed (advancing to the top of the next page) after each copy of the spreadsheet has been printed. Press **Y** for YES or **N** for NO and press **ENTER**.

TASCALC then prints the specified range of cells. Printing can be halted at any time by pressing the **BREAK** key. Once printing has been completed you are returned to the spreadsheet.

Selecting the PRINT command always switches the 'working cell' to OFF. To switch the working cell to ON again use the DESIGN command.

**Pre- and post-title ESCape codes**

The pre- and post-title ESCape code sequences are useful for sending codes to the printer. You may, for example, want to make use of the various print styles on your printer such as the NLQ mode or the condensed printing mode. The pre- and post-title ESCape codes can be used to send such codes.

Any codes should be entered in the following format:

CODE1,CODE2,CODE3 etc

with a comma separating each code. The maximum number of characters that may be sent for each sequence is 55.

For example, the DECIMAL codes used by Epson-type printers for emphasised printing are:

27 69

You should enter the sequence 27,69. Alternatively you may enter the codes as ASCII codes. The equivalent codes in ASCII are:

27,E

Another application may be to print the title in the enlarged print type and the spreadsheet data in the condensed print type. On Epson-type printers the code to turn enlarged printing on is 14, the code to turn enlarged printing off is 20 and the code to turn condensed printing on is 15.



You would enter the following sequences:

| | | |
|---|---|---|
| Pre-title ESCape codes: | 14 | (to invoke the enlarged print type) |
| Post-title ESCape codes: | 20,15 | (to cancel enlarged printing and start condensed printing). |

Further information with regard to printing is covered in Appendix 4.

## Q QUIT quit TASCALC — Command Mode Q

The QUIT command exits TASCALC. Any data currently shown in the spreadsheet is lost. If you wish to save the data before exiting the program you must save the spreadsheet contents using the FILES command.

Press **C** to enter Command Mode, then **Q** to select the QUIT command. A prompt at the top of the screen informs you to press **ENTER** to continue or any other key to abandon the operation. Pressing **ENTER** executes a system reset, returning you to the Spectrum 128 or +3 menu. A return to 128K Basic is not possible after you have entered the spreadsheet as TASCALC uses every byte of memory, erasing the parts used by the BASIC system.

## R RUBOUT delete contents of range of cells

Command Mode R

The RUBOUT command deletes the contents of a specified range of cells.

Enter Command Mode and press **R** to select the RUBOUT command. You are now prompted to enter the range of cells whose contents are to be erased. Cells may be referenced directly (e.g. A001) or by label intersections (e.g. SALES.COSTS:COSTS.SALES). Type the range of cells whose contents you wish to erase and press **ENTER**. Just press **ENTER** to erase the contents of the block of cells currently defined as the whole grid (refer to the DESIGN command described in section 7). Typing a . (fullstop) character selects the last range entered.

Press **ENTER** to confirm that you wish to continue the operation or any other key to abandon the command.

## U UNITS change display of numerical cells

Command Mode U

The UNITS commands modify the way in which a range of numbers are displayed on screen. All of these commands affect the display on screen only — the number held in memory is not affected.

Enter Command Mode and press the **U** key to invoke the UNITS command. You must enter the range over which you wish the command to take effect. If **ENTER** is pressed in response to specifying a range, the program assumes you wish the command to take effect over the 'whole grid' (refer to the DESIGN command, section 7). Typing a

. (fullstop) character selects the last range entered. You must then specify which of the UNITS commands you wish to use. These commands are described below.

**F FIGURES change number of figures displayed** UNITS, F

The FIGURES option changes the number of numerical figures displayed in a cell. The number of figures *includes* the decimal point. Note that this option only affects the number of figures displayed if the DEFAULT parameter (GRID, D) is set to zero, i.e. if automatic decimal point alignment is set to OFF.

Press **F** to select the FIGURES option. Type the number of figures you wish to be displayed and press **ENTER**. The minimum number of figures that can be displayed is 1, the maximum number is 15.

**I INTEGER display integer numbers only** UNITS, I

The INTEGER command displays only the integer part of any number in the specified range. Press **I** to display integer numbers only. This command is cancelled by selecting the NORMAL option described below.

**P PREFIX prefix numbers in specified range** UNITS, P

The PREFIX command allows a single character prefix to be placed in front of any numbers in the specified range. Press **P** to select the prefix option. You are then prompted to enter the prefix character. Type the required character and press **ENTER**.

To cancel a prefix press **ENTER** in response to the prompt for a prefix character.

**S SUFFIX suffix numbers in specified range** UNITS, S

The SUFFIX option allows a single character suffix to be placed after any numbers in the specified range. Press **S** to select the SUFFIX command. You are prompted to enter the suffix character. Type the required character and press **ENTER**.

To cancel a suffix press **ENTER** in response to the prompt for a suffix character.

Note that you cannot have both a prefix and a suffix. Entering a prefix cancels any existing suffixes in the specified range and vice versa.

**N NORMAL display figures as entered** UNITS, N

The NORMAL option displays any numbers in the specified range as they were originally entered into the cell, cancelling any changes made by using the FIGURES and INTEGER commands described above.

## X XECUTE calculate formulae Command Mode X

The XECUTE command calculates all the formulae within a specified range. The results from calculating formulae are entered into the cells in which each formula is stored.

Enter Command Mode and press the **X** key to select the XECUTE command. Press **ENTER** to continue or any other key to abandon the operation and reutrn to the spreadsheet.



You are required to enter the range of cells over which the calculation of formulae is to take place. Enter the required range or simply press the **ENTER** key to select the 'whole grid' (see the DESIGN command, section 7). Typing a . (fullstop) character selects the last range entered.

All formulae within the given range are then recalculated. It is not possible to halt an XECUTE command using the **BREAK** key whilst the recalculation process is in operation. Note also that the calculation order of formulae, i.e. whether calculation takes place by row or by column may be important. The calculation order is established using the DESIGN command.

## Z ZAP clear spreadsheet Command Mode Z

The ZAP command clears the contents of the spreadsheet. All information currently entered into the spreadsheet is erased as well as all formulae stored in memory. If you wish to save the data before clearing the spreadsheet you must use the FILES command.

Enter Command Mode using the **C** key and press **Z** to erase the contents of the spreadsheet. Press **ENTER** to continue or any other key to abandon the operation. Pressing **ENTER** erases the contents of the spreadsheet from memory. The column widths are reset to their default widths of 12 characters and the cursor is returned to cell A001.

## O OPTIMISE erase redundant formulae Command Mode O

When a formula is DELETED or EDITed the original formula, although redundant, is not erased from memory. The time needed to erase such redundant formulae automatically would be a considerable inconvenience. Eventually an error report may advise you that you have run out of memory space.

The OPTIMISE command reclaims all the memory space which is occupied by redundant, unused formulae.

Enter Command Mode and press **O** to select the OPTIMISE command. Press **ENTER** to continue or any other key to abandon the operation and return to the spreadsheet.

You are presented with a screen detailing the total number of formulae in memory. TASCALC works through the spreadsheet, erasing redundant formulae from memory. The display indicates the number of formulae which have been preserved as well as the number of redundant formulae which have been deleted.

Once the operation is complete press any key to return to the spreadsheet.

The time taken to perform this operation varies according to the number of formulae in memory and how much of the grid has to be searched to ascertain if a formula is still valid. It is strongly recommended that the working cell is switched off during an OPTIMISE operation to increase program speed (refer to the DESIGN command described in section 7). The OPTIMISE operation can be halted at any time by pressing the **BREAK** key and then pressing **ENTER** to return to the spreadsheet.

The OPTIMISE command can also be useful before saving the grid contents as a data file. By erasing any unwanted formulae the amount of data saved, and the space taken up on a disc, microdrive cartridge or cassette tape, is reduced.



# 8. Other Commands

## GRAPH plot line graph/bar chart

The GRAPH command plots a graph or bar chart of the numerical values in a specified range of cells.

Press the **GRAPH** key to select the graph option. You are prompted to enter the range of cells for which you wish to plot a graph. Type the required range or press the **ENTER** key to plot a graph for the 'whole grid'. Typing a . (fullstop) character selects the last range entered.

You are then asked whether you wish the scale to be printed on the y (vertical) axis. Press **Y** for YES or **N** for NO. If you choose to print a scale then four values are printed at quarterly intervals along the axis.

There is a short delay while TASCALC plots the graph. The graph is scaled according to the highest numerical value found within the specified range. You should note that values are plotted by column and from left to right. For example, plotting a graph over the range A001:C010 plots the values for the figures in column A, followed by the figures in column B and finally the figures in column C. If you require the figures to be plotted by row you should change the calculation order parameter (DESIGN command). The maximum number of points that can be plotted on a single graph is 100.

The graph is then displayed on screen. The 'value' message at the bottom left of the screen displays the exact value of each point. Use the ↑ and ↓ keys to display the exact numerical values of each point plotted on the graph. There are a number of sub options:

**END return to spreadsheet**
Press the **E** key to return to the spreadsheet.

**SAVE save graph to disc/microdrive/tape**
The graph can be saved as a SCREEN$ file. This file may be loaded after quitting TASCALC for printing (see Appendix 3).

**ZX SPECTRUM 128 AND ZX SPECTRUM +2**

Press the **S** key to select the save graph option. You are now given the option of saving the graph to microdrive cartridge or cassette. The current drive number is also shown at the top of the screen. The current microdrive is the drive number that the save operation will use. The drive number can be changed by pressing key **2** for drive 2, key **3** for drive 3 and so on. Press **D** to save the graph to microdrive or **T** to save the graph to cassette. You are returned to the spreadsheet after the graph has been saved.

**ZX SPECTRUM +3**

Press the **S** key to select the save graph option. You are given the option of saving the graph to disc or cassette. Press **D** to save the graph to disc or **T** to save the graph to cassette tape. You are returned to the spreadsheet after the graph has been saved.

**INK change ink colour**

Pressing the **I** key changes the ink colour of the graph. You may wish to alter the screen colours if your screen copy software prints a grey scale representation of the Spectrum screen colours.

**PAPER change paper colour**

The **P** key toggles the paper colour of the graph. You may wish to change the paper colour if your screen copy software prints a grey scale representation of the Spectrum screen colours.

**TEXT enter text**

Text can be entered onto the graph by pressing the **T** key. Pressing the **T** key causes a line-shaped cursor to appear at the centre of the screen. The ↑, ↓, ← and → keys move the cursor about the screen. Any text typed is overlaid onto the graph starting at the current cursor position. Note that entering text overwrites the graphic display. You can correct errors in the text by overtyping with the **SPACE BAR** — the **DELETE** key has no effect. Press the **ENTER** key to finish entering text.

**FORMAT display line graph/bar chart**

The FORMAT option toggles the display from a line graph to a bar chart and vice versa. Note that if you change the format of the graph, any text you have entered is lost. This can be useful if you have made errors in entering text and wish to begin again. Simply toggle the format of the graph to display a line graph or bar chart and then change the format back again.

Using the GRAPH command always switches the 'working cell' OFF.

**NOTE:**
TASCALC cannot plot negative values on a graph. If a negative value is found in the range of cells to be plotted then TASCALC plots the ABSOLUTE value only (see page 36 for a description of a number's ABSOLUTE value).



# 9. Formula Functions

Formulae are used to perform calculations. Each formula consists of operands and operators combined to produce a numerical value.

A maximum of 120 characters may be entered into any one cell as a formula. To construct longer formulae you should enter parts of the formula into separate cells and then reference those cells.

## Normal Functions

### OPERATORS

TASCALC uses three types of mathematical operators. These are:

1. Arithmetical Operators
2. Relational Operators
3. Parentheses Operators

### Arithmetic Operators

An arithmetic operator defines the arithmetic operation that is to take place between two operands. An operand may be either a numeric value or a cell reference. The TASCALC operators are:

| | | |
|---|---|---|
| ^ | Exponent | (**SYMBOL SHIFT** and **H**) |
| * | Multiplication | (**SYMBOL SHIFT** and **B**) |
| / | Division | (**SYMBOL SHIFT** and **V**) |
| + | Addition | (**SYMBOL SHIFT** and **K**) |
| – | Subtraction | (**SYMBOL SHIFT** and **J**) |

The operators shown above are listed in algebraic precedence. All operators are evaluated according to this precedence. Thus the exponent operator is calculated first, followed by the multiplication exponent, the division exponent, etc.

### Relational Operators

A relational operator compares two operands and returns a value of true or false. A true comparison has a value of 1, a false comparison has a value of zero.

**A = B** Equal: The relation is true if, and only if, the value of **A** is equal to the value of **B**.

**A <> B** Not Equal: The relation is true if **A** does not equal **B**.

**A < B** Less Than: The relation is true if **A** is less than **B**. All other cases are false.

**A > B** Greater Than: The relation is true if **A** is greater than **B**.

**A<=B** Less Than or Equal To: The comparison is true if **A** is less than or equal to **B**. The relation is false if **A** is greater than **B**.

**A=>B** Greater Than or Equal To: The comparison is true if **A** is greater than or equal to **B**. The relation is false if the value of **A** is less than **B**.

## Parentheses Operators

Parentheses operators define the order of calculations in a formula. Operations that are enclosed within parentheses are calculated first and using parentheses overrides the algebraic order of precedence listed above.

For example: (2+2)*4 equals (2+2) = 4*4 = 16

## ARITHMETIC FUNCTIONS

The normal Spectrum functions are fully implemented as TASCALC arithmetic functions. Note that the value of a cell may be used by naming the coordinates of that cell. For example:

INT(C10)

returns the INTeger of the value in cell C10. Each of the functions may be entered in either upper or lower case characters.

**ABS(number/cell reference)**
Returns the absolute value of the number or cell reference.

For example: **ABS(−123)** = 123

The absolute value is equivalent to the number itself if positive.

The absolute value is equivalent to zero if the number is zero.

The absolute value is equivalent to the number without its minus sign if the number is negative.

**ACS(number/cell reference)**
Returns the radian angle of the cosine value given.

For example: **ACS(1)** = 0

**ATN(number/cell reference)**
Returns the radian angle of the tangent value given.

For example: **ATN(3)** = 1.2490458



**ASN(number/cell reference)**
Returns the radian angle of the sine value given.

For example: **ASN(.5)** = 0.52359878

**COS(number/cell reference)**
Returns the cosine of the radian angle value given.

For example: **COS(PI)** = 1

**EXP(number/cell reference)**
Raises the number e exponentially to the number/cell reference. The value of e is 2.718281828459045.

For example: **EXP(2)** = 7.3890561

**INT(number/cell reference)**
Returns the integer of the value given.

For example: **INT(1.234)** = 1

**LN(number/cell reference)**
Returns the natural log, log base e, of the value given.

For example: **LN(7)** = 1.9459101

**PI**
Returns the value of PI to 7 decimal places.

For example: **PI** = 3.1415927

**RND**
Returns a random number between 0 and 1.

**SQR(number/cell reference)**
Returns the square root of the value given.

For example: **SQR(16)** = 4

**TAN(number/cell reference)**
Returns the tangent of the radian angle given.

For example: **TAN(0.75*PI)** = −1

## LOGICAL FUNCTIONS

A logical function consists of a relational comparison connected by a relational operator.

**AND**

Syntax: value1 **AND** value2

If both value1 and value2 are true then the AND function returns a value of 1. If the comparison is false, i.e. if either value1 and/or value2 are false, then the AND function returns a value of zero.

| | | | | | |
|---|---|---|---|---|---|
| True | AND | True | = | True | (1) |
| True | AND | False | = | False | (0) |
| False | AND | True | = | False | (0) |
| False | AND | False | = | False | (0) |

For example: **C10=12 AND B10<100**

**D5<>25 AND C5=C6**

The AND function returns a value of 1 if BOTH conditions are true or a value of 0 if EITHER condition is false.

**OR**

Syntax: value1 **OR** value2

The OR function has a value of 1 if either value1 and value2 are true. If both values are false then the OR function returns a value of 0.

| | | | | | |
|---|---|---|---|---|---|
| True | OR | True | = | True | (1) |
| True | OR | False | = | True | (1) |
| False | OR | True | = | True | (1) |
| False | OR | False | = | False | (0) |

For example: **C3=C4 OR B10>200**

**NOT(value)**

The NOT function returns the opposite truth value of the stated value.

| | | |
|---|---|---|
| NOT(True) | = | False |
| NOT(False) | = | True |

For example: **NOT(C5=9.67)**

returns the value of 0 if the expression is true and the value of 1 if the expression is false.



# Special Functions

There are a number of special functions unique to TASCALC. Each of these functions may be implemented just as any other normal function.

All of the special functions must be entered in the following format:

FUNCTION(range/cell reference)

For example:

AVE(B001:B100)

find the AVErage of all the numeric cells in the range B001 to B100.

**ASK("prompt")** Halts the XECUTE program and displays the text between quote marks at the bottom of the screen. You MUST respond to this prompt by typing a numerical value and pressing **ENTER**. The numerical value is placed into the 'ASK' cell and the calculation of formulae then continues. The maximum number of characters that can be entered as the "prompt" text is 20.

**AVE(range)** Finds the average of all the numeric cells within the specified range.

**COL( )** Returns the column number of the cell in which this function is located. A=1, B=2 etc.

**COUNT(range)** Returns the number of used (non-empty) cells within the specified range.

**LEN(cell)** Returns the length of the text in the specified cell.

**MAX(range)** Returns the largest numerical value in the specified range.

**MIN(range)** Returns the smallest numerical value within the specified range.

**ROW( )** Returns the row number of the cell in which this function is located.

**SUM(range)** Finds the sum of all the numerical cells in the specified range.

**WIDTH( )** Returns the width of the column in which this function is located.

# Appendix 1 – Interfaces (ZX Spectrum 128/+2)

To customise TASCALC for your printer interface you must select the install printer option (2) from the menu displayed on screen after loading TASCALC.

A list of printer interfaces is displayed on screen. Use the ↓ and ↑ keys to move the cursor to select the interface in use and press **ENTER**. The interface currently selected is shown at the bottom of the list. Use the ↓ to select the EXIT option. Select option 4 to save your customised TASCALC to cassette or microdrive.

If you are using the built in RS232 port then you are presented with the option of selecting the required baud rate on EXITing from the printer installation option. Use the ↑ and ↓ keys to select the baud rate appropriate for your printer and press **ENTER**.

**ZX Interface 1**

To customise TASCALC to print through the RS232 port of ZX Interface 1 select the 'UNSPECIFIED' option from the list of interfaces and press **ENTER**. Use the ↓ key to EXIT from the install printer option.

Select option 3 to return to BASIC. Add the following line to the TASCALC BASIC program:

20 FORMAT "b"; XXXX: OPEN #3; "b"

where XXXX = printer baud rate.

Execute GOTO 20 and select option 4 to save TASCALC to cassette or microdrive.



# Appendix 2 – Printing from the ZX Spectrum +3

As supplied TASCALC is set up to print through the +3 parallel port. TASCALC can be customised to print through the +3 serial port by following the procedure detailed below. You must customise TASCALC on loading the program. You are also given the option of saving your configured TASCALC to disc.

1. Load TASCALC in the usual way, selecting the **+3 BASIC** option from the menu and typing:

   LOAD "TASCALC"

2. Once TASCALC has loaded, select option 2 to install your printer and press **ENTER**.

3. Use the arrow keys to select the built in RS232 option and press **ENTER**. Use the ↓ key to select the EXIT option. You are then required to select the baud rate. Use the ↓ and ↑ keys to select the appropriate baud rate and press **ENTER**.

4. Save your configured TASCALC program onto a blank, formatted disc by selecting option 4.

5. Your configured TASCALC may be loaded in the usual manner.

# Appendix 3 – Printing Graphs

It is not possible to print graphs produced with the GRAPH command from directly within TASCALC. Any graphs or bar charts generated with TASCALC must be printed from BASIC using the method described below.

Graphs generated with TASCALC must first be saved to microdrive or cassette tape. You should then enter BASIC by resetting the computer.

As graphs are saved as a SCREEN$ file it is essential that you have software that can print a high resolution screen copy on your printer.

+2 **ZX SPECTRUM 128 AND ZX SPECTRUM +2**

+2 (1) Save the graph or bar chart to microdrive or cassette as described in section 8.

+2 (2) Reset the computer, use the ↓ key to select **128 Basic** and press **ENTER**.

+2 (3) If your screen copy software is saved onto microdrive cartridge or cassette tape you should load the software using the appropriate procedure. If your screen copy software is held in ROM (e.g. as with Eprom interfaces such as the Kempston E) then proceed to 4.

+2 (4) Enter the following BASIC program:

```
10 LOAD "graphname" SCREEN$      (if on tape)
or
10 LOAD *"m";1;"graphname" SCREEN$      (if on microdrive)

20 insert statement which prints a screen copy on your printer
```

+2 (5) Execute **RUN**. The graph is then loaded and printed.

+3 **ZX SPECTRUM +3**

+3 (1) Save the graph or bar chart to disc or cassette tape as described in section 8.

+3 (2) Reset the computer, use the ↓ key to select **+3 Basic** and press **ENTER**.

+3 (3) Enter the following BASIC program:

```
10 LOAD "graphname" SCREEN$
20 COPY
```

+3 (4) Type **RUN** and **ENTER**. The graph is then loaded and printed.

+3 Entering the command COPY EXP in line 20 of the above program prints a grey scale representation of the screen colours instead of a monochrome black and white copy.



# Appendix 4 – Printing – Additional Information

## 1. Double linefeeds

If, on printing, you obtain double line spacing, execute the following procedure to customise TASCALC to print with single line spacing.

(1) Load TASCALC in the usual manner. Select option 2 from the menu to enter BASIC.

(2) Execute:

**Spectrum 128 /+2**

```
POKE 48527,0
```

**Spectrum +3**

```
POKE 48572,0
```

(3) Execute: GOTO 20

(4) Select option 3 from the menu to save your customised TASCALC.

## 2. Setting an indentation on printing

You can obtain an indentation on printing by sending a sequence of codes that sets the left margin on the printer. The codes required will be detailed in your printer manual.

The codes to set a left margin on Epson type printers are ESC 1 n, where n sets the left margin to the specified column.

These codes may be sent to the printer by entering the relevant sequence as the pre- or post-title ESCape code sequence (PRINT command, section 7). For example, entering the codes 27,1,56 sets the left margin on the printer to column 8 (where 56 is the ASCII code for 8). Alternatively you may enter the codes as DECIMAL codes, e.g. 27 108 8.

Note that setting the left margin on a printer usually sets the margin according to the width of the *current* character size. Thus if you sent the above codes after sending a sequence of codes to select the condensed print type, then the margin set is equivalent to 8 condensed sized columns as opposed to 8 normal sized columns.

## 3. TASWORD/TASPRINT compatibility

TASCALC files are *not* compatible with either TASWORD or TASPRINT. TASCALC files cannot be loaded into TASWORD nor is it possible to print TASCALC files using TASPRINT.

## 4. Printing £ Signs

The pound sterling sign is not a standard ASCII symbol. Different printers use a variety of codes for the £ sign. The common ones are 35, 96 and 129.

It is often necessary to alter a switch inside the printer to select the UK character set. This normally selects a £ sign instead of a hash.

As supplied, TASCALC sends a code 35 for the £ sign. You can change the code sent by the program by executing the following procedure:

(1) Load TASCALC in the usual manner.

(2) Select option 3 after loading to return to BASIC.

(3) Execute the following POKE:

**ZX Spectrum 128/+2**

POKE 48722,x

**ZX Spectrum +3**

POKE 48894,x

where x = the code required by your printer for the £ sign.

(4) Execute GOTO 20.

(5) Select option 4 to save your configured TASCALC.