1.0

CAMPION
THE SPREADSHEET

User's Guide

		Feb-92	Mar-92	Apr-92	May-92	Jun-
Salaries	410					
Property Tax	456	25000	25000	25000	25000	
Travel	611	0	0	15000		2500
Insurance	701	1000	1000	1000		
Legal/Accounting	702	450	450	450	10	1000
Amortization	716	1250	0	1250	450	450
Depreciation	717	400	400	400	1250	
Benifits	718	600	600	600		400
Interest	719	3500	3500	3500	3500	600
Bank Charges	720	250	250	250	3500	3500
Office Supplies	805	85	85	85	250	250
	806	550	550	550	85	85
	807	1250	1250	1250	550	550
	808	340	340	340	1250	1250
	809	6000	6000	6000	340	340
	812	0	0		6000	
	813	400		400	40	3200
	814	500			500	
	815	300				50
	868	1250			0	
	910	6000	6000			0
	312	800	800	3000	30	3000
		2185	2185	2185		800

Lets quality shine through

CAMPION

THE SPREADSHEET

Version 1.0

User's Guide

Campion - The Spreadsheet User's Guide, First Edition, February 1992

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For Sam Coupé Users Everywhere

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1: Introduction

Congratulations on your purchase of Campion - The Spreadsheet! Your reward is the best spreadsheet for the Sinclair ZX Spectrum SAM Coupé with a large amount of functions and advanced printing features in a character-based window environment. It combines ease-of-use. numerous features and flexibility in a way the Spectrum/SAM Coupé user has never seen before.

The spreadsheet is designed to make your working life easier. It reduces the amount of time spend on keeping records, and performing complex analysis with multiple factors involved by doing all the repetitive work for you. It does the hard work and provides you with the time you need to make decisions and think about the future.

Development philosophy

In the summer of 1989 we made a market survey concerning business software for the Spectrum which among other things showed us that the Spectrum software market needed a powerful spreadsheet. A spreadsheet that could provide the Spectrum user with some of the features that can be found in well-known spreadsheets, such as Lotus 1-2-3 and Quattro Pro for the IBM PC. We began the development of a spreadsheet, and you are now holding the final result in your hands.

We developed Campion, with these high-end programs in mind, even though we had to compromise more often than we wanted to due to the memory limitations of the Spectrum. During the development period we had four major goals which we wanted to pursue. The four design goals were.

- Ease-of-use for beginners

- Advanced features for experienced users

- Comprehensive error handling

- Room for a large spreadsheet

It is evident that the first three goals contradict the last one, but we believe that we have fulfilled our goals in a balanced way. Technically, it should be noted that the program uses only 16K of memory in spite of the huge amount of features included. This leaves approxi-

mately 25K RAM for your spreadsheet on the Spectrum, which should be enough for a large spreadsheet.

The SAM Coupé version is almost an exact copy of the Spectrum version, so this *User's Guide* covers both versions. The SAM Coupé version leaves 64K RAM for your spreadsheet and it is generally faster to work with. The SAM Coupé version can read spreadsheet files which have been made on the Spectrum, and the two versions are 100% file-compatible. The Spectrum version cannot, however, read spreadsheet files which have been made on the SAM Coupé.

An overview

This *User's Guide* will provide you with the information you need to use Campion. It explains how to get Campion up and running and explains every feature and function in easy-to-follow tutorial manner. You will get immediate hands-on experience with the program through well-chosen examples. We have listed an overview of the chapters in this book as it serves as a tutorial manual as well as a reference manual.

Chapter 1, "Introduction", explains our design goals, lists an overview of the *User's Guide,* and explains how to contact Campion Software.

Chapter 2, "Before You Begin", lists the contents of this package, the equipment that is necessary to run Campion, and explains how to install and load Campion.

Chapter 3, "A Quick Tour", gives you an overview of the features in Campion by building a spreadsheet, making changes in it, printing and saving it for future use. This chapter will also be useful later on if you have not used the program for a while.

Chapter 4, "Spreadsheet Basics", introduces you to some of the basic terms and methods, such as cells, referring to cells, ranges, and explains how the screen is organized in Campion.

Chapter 5, "**Entering and editing data**"**,** explains how to enter data in the spreadsheet and how to perform calculations by using formulas, built-in functions and cell references.

Chapter 6, "Using the menu system", explains how to use the menu system.

Chapter 7, "Using ranges", introduces you to the concept of ranges (rectangular blocks of cells) which makes it much easier to format the spreadsheet and write formulas.

Chapter 8, "Printing", explains how to prepare the spreadsheet before printing; you will learn how to use various fonts, edit headers and footers, insert page numbers and select the quality of the printed output.

Chapter 9, "File Management", covers all the file commands in Campion.

Chapter 10, "Using functions", contains information on how to use the built-in functions.

Chapter 11, "Function Reference", is a complete reference to the functions available in Campion. The functions are organized in alphabetical order for easy reference.

Chapter 12, "Error messages", contains a complete list of the error messages in Campion. It explains how to deal with the situation that caused the error message and how to avoid them in the future.

How to contact Campion

Campion Software can be contacted at this address:

> Campion Software
> Novej 31, No
> DK-6950 Ringkoebing
> Denmark

You can also contact the authorized distributor of our products in your country at the address provided on the last page of this book.

If you ever encounter any problems with this program then please contact us at the above-mentioned address. Before taking any actions please make sure that your hardware is in perfect working condition and look through the *User's Guide* to see if an immediate answer is available. Our response will depend upon the accuracy of the error description you provide.

Your letter should contain the following information:

- Campion version number

- Type of computer and any kind of extra hardware including driver software etc. because it might interfere with Campion.

- A detailed description of the problem; if it is a calculation problem, then please include a printout of the spreadsheet (including formulas, text etc) or preferably a file on a disc.

- Your own address so we can give you an answer or ask for more detailed information if needed.

2: Before You Begin

Before you can begin to work with Campion you need to:

- check the contents of the Campion package
- make sure that you have the necessary equipment to run Campion
- install Campion on your computer
- load Campion into your computer's memory

This chapter will discuss these issues in more details. When you have finished this chapter, you will be ready to use Campion. If you are an experienced user, you do not have to study the rest of this book. It will, however, be a good idea to read it quickly to get an overview of the features in Campion and how to use them. If you are new to spreadsheets, then please read on.

Contents of the package

Before you can begin to work with Campion you need to check if your package contains the following items:

- An User's Guide (this book)
- A program disc (or tape)
- A questionnaire
- 4 additional disc stickers

If your package does not contain the seven items listed above then please return the entire package to the distributor or directly to Campion Software.

The necessary equipment

You need the following equipment to run Campion:

- A Sinclair ZX Spectrum 48 K or a SAM Coupé with a disc drive
- A TV or a monitor

- A tape-recorder (if Campion was supplied on tape)

You do not need the following equipment, but they will without doubt increase your pleasure of working with Campion:

- A printer (ZX Printer or an Epson-compatible printer)
- A +D, DISCiPLE, Betadisc or Opus Discovery disc drive system (Spectrum version only)

If you purchase one of these items at a later date after having installed Campion, you will have to install the program again, if you wish to take advantage of the features the new equipment offers you.

Installing Campion on your computer

You will have to install Campion - The Spreadsheet on your Spectrum before you can use it, but the SAM Coupé version does not require any installation.

We recommend that you make a copy of the disc (or tape), that Campion was supplied on, before you proceed with the installation procedure. It can be disastrous to work with Campion from the original disc (or tape), because you might delete or overwrite the program code by accident. Please refer to the manual that came with your computer for further instructions on how to copy files.

The supplied disc or tape contains an installation program that will help you install Campion on your computer. You will have to answer a few questions about your computer system during the installation process, but the Installation Program should be self-explanatory.

Installation from tape

To run the Installation Program, insert the Program Tape in your tape-recorder and type:

```
LOAD "INSTALL" <ENTER>
```

and press play on the tape-recorder. The Installation Program will load in a moment and guide you through the installation process. If you cannot load the program on your own tape-recorder, then try another one, before adjusting the azimuth on your tape-recorder, because this might prevent you from loading programs from other tapes.

Installation from disc

To run the Installation Program, insert the Program Disc in drive 1 and type:

```
LOAD d1 "INSTALL"
```

or the appropriate command that loads the program named INSTALL (this depends on your disc-drive interface).
The Installation Program will guide you through the installation process.

Loading Campion

When you wish to use Campion, insert the Campion Working Disc in the disc drive and type

```
LOAD d1 "CAMPION" (the command depends on your disc-drive interface)
```

or insert the Campion Working Tape in the tape-recorder and type

```
LOAD "CAMPION"
```

The program will load, and you can begin to work with it. The remaining part of this book will tell you how to take advantage of the features in Campion - The Spreadsheet.

Campion attempts to transfer some printer control codes to your Epson-compatible printer (if one is attached) when it has been loaded. If your printer is off-line it will not accept these printer control codes. Campion will respond with a message that instructs you to set the printer on-line or press a key. The screen will look like the one above when you have done so.

3: A Quick Tour

We will take you on a quick tour of the features provided with Campion - The Spreadsheet. You should, however, keep in mind that our tour is designed to introduce you to the major features of Campion. These features will be covered in depth in the chapters to follow.

If you are new to spreadsheets do not despair, everything will be explained in a tutorial manner later in this *User's Guide.* Read this chapter as an introduction to spreadsheets, and Campion in particular.

This chapter is also helpful if you have not used Campion for a while, because you will learn the ins and outs of the program quickly and you can get on with your analysis in a few minutes.

We will begin our tour by discussing the basic structure of a spreadsheet, and then we will show you a typical spreadsheet. You will learn how to enter and format information in a spreadsheet. Finally, we will show you how to print the spreadsheet and how to enhance the appearance of the spreadsheet by adding various attributes, page numbers etc.

It is assumed that you have installed Campion properly on your computer before proceeding with this chapter.

Getting started

Campion does not differ from other spreadsheets in its basic structure: a spreadsheet in Campion is organized in 128 *columns* and 1000 *rows.* The intersection between a column and a row is called *a cell.* You can enter any kind of information in a cell, such as values, formulas, functions or texts. It is possible to change the appearance of a cell by defining ways to align and format cell contents. It is possible to work with cells in groups, called *ranges.*

Campion provides a large amount of features to ease the work with your spreadsheet. You can copy and move ranges. You can save and load spreadsheets as files and so forth.

All the available commands are organized in an easy-to-use menu system which can be accessed by pressing the EDIT key. You can move around each menu by pressing the up and down cursor keys, and you can access additional menus by pressing EDIT at the appropriate option. When you have learned the menu system, you will appreciate the opportunity to use "short cuts"; that is, you can move around the menu system by pressing the first letter in each option. We have used the shortcut "approach" in this *User's Guide.*

If you are asked to choose the following options:

Print | **C**onfig | **M**argins | **L**eft

You should press the keys EDIT (to access the menu system), P, C, M and L (in that order) to alter the left margin on the printout. You can quit any menu by pressing the DELETE key.

When you want to enter information in a cell, move the widebar (the highlighted rectangle on the screen) to the cell with the cursor keys and enter the information at the bottom of the screen. Press ENTER when you have finished.

The following sections will show you a sample spreadsheet and how to build it. You should be able to build your own spreadsheets when you have read this *User's Guide.* More sample spreadsheets can be found in the "Function Reference" chapter.

A sample expense report

In this lesson, you will learn to set up the expense report for a fictitious company called London Company. You will learn to do the following:

- enter headings to identify the information
- change column widths
- enter the actual numbers
- use built-in functions
- copy cells
- change the layout of cells
- align text
- switch mode
- print the sheet
- enhance the printout
- save the sheet
- quit Campion

The Campion screen

We assume that you have loaded Campion and your screen should look like the figure shown below.

```
SAM(...A...)(...B...)(...C...)(...D...)(...E...)(...F...)
  0
  1
  2
  3
  4
  5
  6
  7
  8
  9
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20
↓:A0    :P:Free 65376:Filename :
L
```

The screen has four main parts:

The working area is made up of the cells but you can only see a small part of the spreadsheet at a time. You can move around the spreadsheet with the cursor keys.

The borders are shown at the top of the screen and to the left. They are used to identify the address of each cell. A cell's address is composed by one or two letters (identifying the column) and a number (identifying the row). For example, the cell in the top left corner is named A0.

The Edit Line is used to enter and edit the cell's contents.

The Status Line displays the number of free bytes, the current filename and error messages among other things.

Entering headings

The first thing you should do, when you are about to create a spreadsheet, is to figure out the basic structure of it. This is done by entering headings to identify the spreadsheet and the data in it. It is recommended that you have planned how you wish to structure the spreadsheet before you begin to enter any information. This might even involve some pencil sketches.

Move the widebar to Cl with the cursor keys and enter:

  $London <ENTER>

The $ character is used to tell Campion that you are entering a text and not a formula.

Move the widebar to Dl (it might already be there) and enter:

  $Company <ENTER>

Move the widebar to A2, press the cursor right key (which will move it to B2) and enter:

```
$Second <ENTER>
$Quarter <ENTER>
$Expenses<ENTER>
```

Notice that the widebar automatically moves a cell to the right each time you press ENTER. The arrow in the Status line shows what direction the widebar will move when you press ENTER in the Edit line.
Move the widebar to A4, press the cursor right key and enter:

```
$April <ENTER>
$May <ENTER>
$June <ENTER>
```

Move the widebar to A4, press the cursor down key and enter:

```
$Salaries <ENTER>
$Building operations <ENTER>
$Travel <ENTER>
$Supplies <ENTER>
$Depreciation <ENTER>
$Maintenance <ENTER>
$Shipping expenses <ENTER>
$Insurance <ENTER>
$other <ENTER>
$Total expenses <ENTER>
```

Changing column width

It is possible to change the width of a column which will make the spreadsheet easier to read. We will now change the width of column A to 20 characters.

1. Choose the Width option from the Main menu
2. Press: EDIT and then W
3. Type: A <ENTER> twice
4. Type: 20 <ENTER>

Entering numbers

Move the widebar to B4, press the cursor down key and enter the following numbers separated by ENTER:

```
10000, 1500, 700, 400, 1400, 600, 300, 800, 1100
```

Move the widebar to C14, press the cursor up key and enter the following numbers as above:

```
1130, 800, 300, 600, 1400, 400, 700, 1500, 10400
```

Move the widebar to D4, press the cursor down key and enter the following numbers as above:

```
10800, 1500, 750, 400, 1400, 650, 275, 800, 1300
```

Using built-in functions

Now we are going to calculate the total expenses for each of the three months. This can be done in a number of ways, but we will use the most powerful; the built-in SUM function.

Move the widebar to B14 and enter:

1. sum(B4,B13) <ENTER>

This function will calculate the sum of the values in the cells in the range B4 to B13, but the result will not be shown until you choose to recalculate the sheet.

Copying cells

We could enter a similar function in C14 and D14, but we will copy the original function to these cells.

First, we will define B14 as a range:
1. Move the widebar to B14.
2. Choose **R**ange | **D**efine (remember to press EDIT first)
3. Type: <ENTER> twice

Then we will copy this range to C14 and D14:
1. Choose Copy
2. Type: C14 <ENTER>
3. Type: D14 <ENTER>
4. Press DELETE twice to leave the menu system.

Changing the layout of cells

Finally we will change the format of the cells containing values so that they appear with a comma for each three digits without decimals.

First, we will define the range of cells we wish to format:
1. Choose **R**ange | **D**efine (remember to press EDIT first)
2. Type: B5 <ENTER>
3. Type: D14 <ENTER>

Then we will format the cells (or define the layout of the cells):
1. Choose **L**ayout
2. Press 6 (to show cells as explained above)
3. Press DELETE twice

Aligning text

It is also possible to left or right align text in cells. We will now right align the labels: April, May and June.

1. Choose **R**ange | **D**efine
2. Type: B4 <ENTER>
3. Type: D4 <ENTER>
4. Choose **A**lign | **T**ext | **R**ight
5. Press DELETE three times

Switching modes

Campion is capable of running in two modes: Programme and Simulate mode. We have been using Campion in Programme mode so far, but now we will switch to Simulate mode to use our spreadsheet.

1. Choose **M**ode | **S**imulate
2. Press DELETE

The spreadsheet will be recalculated and shown on the screen. You can now move around the spreadsheet and change the values as you wish. Notice that the "Total expenses" is updated each time you change a single value. This is due to the use of the SUM function.

The widebar can only move between cells containing numeric constants in Simulate mode to prevent the casual user from overwriting a formula.

Printing the sheet

Finally, we will print the spreadsheet on your printer. We will use default settings for margins, paper length etc to simplify this introduction.

1. Choose Print
2. Press EDIT from the **S**heet option
3. Press EDIT from the No option in the Border menu
4. Type: A0 <ENTER>
5. Type: D14 <ENTER>

Campion will now inform you of the "Estimated number of pages" that is required to print the range you have defined.

1. Press Y <ENTER> to print the sheet.
2. Press DELETE three times

Campion will now format the sheet according to the default settings and print the sheet on the printer without borders, headers/footers or page numbers.

Enhancing the printout

The printout might look a bit boring. We will therefore enhance the printout by inserting a header and a footer.

A header is a line of text that is printed between the top margin and the sheet.

1. Choose **P**rint | **C**onfig | **H**eader
2. Type: London Company ~~Expense Report <ENTER>

The two characters (~ ~) will left align the text "London Company" and right align the text "Expense Report".

1. Choose Footer
2. Type: ~# <ENTER>
3. Press DELETE three times

These characters will center the page number in the footer. The # character is replaced by the actual page number which is calculated by Campion.

Print the spreadsheet again as explained in the section "Printing the sheet".

Saving the sheet

We will now save our spreadsheet for future reference. You must assign a filename to a spreadsheet when you wish to save it. Use a filename that is easy to recognize at a later date.

1. Choose **F**ile | **S**ave
2. Type: quarter2 <ENTER>
3. Press DELETE two times

Quitting Campion

You can quit Campion and return to the normal Spectrum/SAM Coupé editor at any time. It is a good idea to save your spreadsheet before you quit Campion.

1. Choose **Q**uit
2. Type: Y <ENTER>

4: Spreadsheet Basics

We have introduced you to Campion in the first three chapters and briefly discussed what kind of applications it can be used for. Now it is time to define spreadsheet terms and show you how to use Campion with a more tutorial approach. This chapter will introduce you to the most common spreadsheet terms and show you how they are implemented in Campion.

We recommend that you read this chapter even though you might be an experienced user because it contains some useful information about Campion. As a beginner this is the place to start if you wish to learn more about spreadsheets and especially Campion - The Spreadsheet.

What is a spreadsheet ?

Campion uses a rectangular grid, called *a spreadsheet,* to collect and calculate data. A spreadsheet is an electronic version of an accountant's ledger. It is used to record figures and other information. Campion is much more flexible and advantageous than an old-fashioned ledger, because it is a computer program. Some of the advantages are shown below:

Easy editing It is easy to enter information into a spreadsheet and it is just as easy to alter the information or add additional information. Other figures affected by the alterations will be updated automatically.

Spreadsheet size What you see on the screen is actually only a fraction of the entire spreadsheet. The spreadsheet is much larger than the screen. The spreadsheet consists of 1000 rows by 128 columns. You can move around the spreadsheet as you wish to access the necessary information.

Files You can save your spreadsheet as a file and load it again if you wish to alter some figures or add additional information.

Printing You can improve the appearance of your spreadsheets in various ways and make your figures more appealing and persuasive.

A spreadsheet is a peculiar combination of an ordinary application (such as a word processor) and a programming language because the user enters data, and at the same time he or she specifies how the data should be processed, but the computer does the hard work. This is what makes spreadsheets so exciting and extremely useful.

A grid of cells

A spreadsheet is a rectangular grid made up of *columns* and *rows.* Each of the 128 columns is identified by letters: A to Z, AA to AZ, BA to BZ, up to DA to DX. Each of the 1000 rows is identified by a number: 0 to 999.

The intersection between a column and a row makes up *a cell,* where you enter information. Each cell is named and the name depends on its location in the spreadsheet. The cell in the upper, left corner of the spreadsheet is called A0, the cell below is called Al and the cell to the right is called B0. The cell in the lower, right corner of the spreadsheet is called DX999.

The following figure shows the screen you will see when you load the program.

The horizontal border is a row of letters (A to DX) that identifies each column of cells in the spreadsheet. The letters are (as mentioned above) used to identify each column. It is possible to change the width of each column (measured in characters) individually as explained in the section "Changing column width" below.

The vertical border is a column of numbers (0 to 999) that identifies each row in the spreadsheet. It is not possible to alter the size of a row.

A cell is a box in the spreadsheet where you can enter information. Each cell is identified by an address determined by the column and the row it is placed in. The letter and number that identify each cell is sometimes referred to as the cell's coordinates.

The widebar is the highlighted rectangle shown in reverse. The widebar indicates the current cell, and it can be moved to any cell in various ways.

A cell block is a rectangular group of cells identified by the cell addresses of the cells in two opposite corners of the group - always the upper, left corner and the bottom, right corner. A cell block is often referred to as *a range,* and it can be used in functions and in situations where you wish a command to affect all cells in a range.

The Status line displays many important types of information, such as the filename, the number of free bytes and error messages. See the section The Status line" later in this chapter for more information.

The Edit line is where you enter or edit the contents of a cell before it is placed in the spreadsheet. See the section "The Edit line" later in this chapter for more information.

The Working Area is the part of the spreadsheet you can see on the screen. You can use the cursor keys or the Jump option to move another part of the spreadsheet into the working area.

The widebar cursor

The widebar is the block that completely fills a cell in the working area. The widebar is placed on the current cell and any information you enter in the Edit line will be placed in the current cell when you press ENTER.

The widebar can be moved with the cursor keys automatically as explained below or with the Jump option. The widebar cannot be moved when you are using the menu system. Moving the widebar does not affect the spreadsheet, but it allows you to view another part of it.

Using cursor keys

The widebar can by moved with the cursor keys on your keyboard.

Another part of the spreadsheet will scroll into the working area if you move the widebar out of the working area. If the widebar is placed in the right most column on the screen and you press the cursor right key the next column in the spreadsheet will scroll into the working area and the left most column will scroll out and vice versa. This also applies if you move the widebar out of the working area vertically.

The cursor keys do not always work in the same way, because it depends on which mode Campion is working in, as explained in the section "Two unique modes" later in this chapter.

The widebar moves automatically

There is an arrow in the Status line as you might have noticed on the screen shot above. The arrow, which will be referred to as the Direction Arrow, shows what direction the widebar will move when you press ENTER.

The Direction Arrow is updated each time the widebar moves, and it points in the same direction as the widebar is moved.

This is very useful if you have to enter a large number of figures into a column or a row.

> **Example**
> If you want to enter a number of figures in B3 to B15, move the widebar to B2 and press the Down key because this will make the Direction Arrow point downwards. When you have entered the first figure in B3 and pressed ENTER, the widebar will automatically move down to B4. When you have entered the second figure and pressed ENTER, the widebar will move to B5 and so forth.

This technique can be used in all four directions, and you will appreciate it when you have learned how to use it.

Using the Jump option

If you wish to move the widebar over a large distance it is easier and quicker to use the **J**ump option, because the screen is updated each time the screen scrolls when you use the cursor keys. This is not necessary when you use the **J**ump option because this allows you to (as the name implies) jump directly to a specified cell.

Press the EDIT key and **J** to select the **J**ump option. Enter the cell address and press ENTER in the input menu that appears. The widebar jumps to the specified cell instantly. If you enter an illegal cell reference, an error occurs, and you are asked to enter a new one.

The Status line

The Status line is printed with black characters on a cyan background between the working area and the Edit line at the bottom of the screen. The status line contains various important types of information about the spreadsheet:

The Direction Arrow indicates what direction the widebar will move when you press ENTER, as explained in the section "The widebar moves automatically".

The current cell address is shown beside the direction arrow for reference.

The Mode Indicator shows which mode Campion is running in - either Programme (P) or Simulate (S), as explained in the section "Two unique modes" later in this chapter.

The Free Bytes Counter indicates the number of free bytes and it is updated constantly. You can, for example, see if a copy or fill operation is running smoothly because the free bytes counter is updated each time a cell has been copied or filled. As you might have noticed the number of free bytes is lowered each time you move to a new level in the menu system. This happens because the contents of the working area behind the menus is stored temporarily in your computer's memory along with the spreadsheet and other kinds of information. If the free bytes counter shows less than 1000, you should consider to split your spreadsheet into two or more spreadsheets, or at least save your spreadsheet. Campion will warn you if you run out of memory.
The free bytes counter is updated slightly different in the SAM Coupé version to maximize performance.

The Filename of the current spreadsheet is shown in the Status line as well. The Campion Identification Character, which is used to identify Campion files, is not shown on the screen.

The Error Message Area will show any error message that might occur. Chapter 12, "Error messages", lists all the available error messages and explains how to get around the problem.

The Edit line

The Edit line is the yellow area at the bottom of the screen and all the information you wish to enter into the spreadsheet must be entered here. You can use the cursor keys and the DELETE key like in a word processor in the Edit line, because Campion does not interpret the information until you press ENTER.

The Edit line is also used to edit the contents of cells. If you wish to edit the contents of a cell, move the widebar to the cell and press EDIT and ENTER. The information in the cell will be moved to the Edit line where you can edit it as mentioned above.

If you just wish to examine the contents of the cell then press EDIT once to clear the Edit line and the contents of the cell will be left unchanged.

Campion will examine the contents of the Edit line according to the rules described in the following chapter when you press ENTER in the Edit line.

Two unique modes

Campion can operate in two entirely different modes which really sets it apart from the competition: Programme mode or Simulate mode. This technique has been implemented to emphasize the analytical power of a spreadsheet without using clumsy macros and alike: it is simply just a matter of selecting the right mode in the Mode menu. This mode concept has been introduced for your benefit and because the computer cannot recalculate the spreadsheet each time a cell has been altered and update the screen at a reasonable pace.

The objective of the two modes is that the spreadsheet should be built by entering text and formulas etc in Programme mode and then the analysis should be performed in Simulate mode. This is very valuable if the person that builds the spreadsheet and the person that should use it is not the same person. The "user" person cannot overwrite cells containing formulas and texts and functions by accident because the "user" person can only access cells containing numerical constants in Simulate mode.
It is, however, always possible to switch mode from the Mode menu.

Programme mode

Everything can be done while Campion is running in Programme mode. You can enter information as explained in the previous sections, but the spreadsheet is not recalculated each time a cell has been altered. This will allow you to build the spreadsheet much quicker and you are not interrupted by error messages if you are referring to cells that has not been defined yet.

It is recommended that you switch to Simulate mode when you have built the spreadsheet. It is possible to perform analysis in Programme mode as well, but you will have to choose the Calc option every time a value has been altered.

Simulate mode

The number of features is severely limited when you switch to Simulate mode but there are also some major advantages. You can only move between the cells containing numerical constants in Simulate mode, but the spreadsheet is recalculated each time you enter a new value. If an error occurs, Campion will automatically switch back to Programme mode, so you can analyze and solve the problem.

It is obvious that the widebar will move in another manner in Simulate mode because you can only access cells containing numerical constants. Campion will search for the nearest constant cell if you press one of the four cursor keys in the appropriate direction. This technique requires some practice to master, but you will soon learn to appreciate it.

5: Entering and editing data

Although it is simple and straightforward to enter data in a spreadsheet, there are some terms and methods it is vital to understand if you wish to exploit Campion to its full extent. It is, therefore, highly recommended that you study this chapter carefully.
This chapter will introduce you to the following terms and methods:

- data types
- entering data
- aligning text and values
- operator precedence
- formulas
- built-in functions
- using cell references in formulas

Data types

You can enter any kind of information into a cell, but you must follow some simple rules if you want Campion to process the information correctly. Information in a spreadsheet is generally split into two groups: numbers and text. Text is sometimes referred to as titles, labels or prompts.

Numbers can be values, formulas or functions, because they all end up with being a numeric value. This is the reason why there are only two options (**T**ext and **N**umbers) in the **R**ange | **A**-lign menu, for example. You can format the contents of numeric cells and text cells in various ways, as explained in the "Using ranges" chapter.

It is not possible to enter both text and numbers in one cell. You must enter either text or numbers.

The next sections will clarify the distinction between text and numbers.

Text

If you wish to enter a text in a cell the text must be preceded by a $ character. Campion will not interpret the text you enter. If you enter a numeric expression in a text cell (such as $Expenses 10+20) the expression 10+20 will not be calculated; it will appear as 10+20 on the screen.

Entering text

You can enter up to 254 characters in a cell, and the Edit line will be enlarged to cover additional lines if you enter a long text. The text will be entered in the current cell when you press ENTER. It is important to notice that the text will not "spill over" other cells if the column width is less than the length of the text.

Let's say you enter the text "Budget Report, 1991" into B4 and the width of column B is 9 characters, only the label "Budget Re" will be shown on the screen (and the printer). You can either change the column width or split the text into more cells.

Example

Enter the text "January"" into B2.

1. Move the widebar to B2
2. Type $January <ENTER>

Editing text

If you wish to edit the contents of a text cell, move the widebar to the cell, press EDIT and then ENTER. The contents of the cell will be copied to the Edit line and you can edit the text as you please. Press ENTER when you have edited the label.

If you just wish to examine the contents of the cell then press EDIT once to clear the Edit line and the contents of the cell will be left unchanged.

Aligning text

You can left or right align the text. Define the range of cells where you wish to align the contents, choose **R**ange | **A**lign | **T**ext and either the **L**eft or **R**ight option. See the "Aligning text and numbers" section in the "Using ranges" chapter for more information.

Numbers

When you enter numbers in a spreadsheet you may often want to treat them as numeric values, so you can use them in calculations and formulas.

The term "number" covers several terms in Campion: it can be a value, such as 25.75; a cell reference, such as B7; a formula, such 5+7; a function, such as SUM(C3,C13) and any combination of the above-mentioned expressions. These numeric expressions are treated equally when you format, copy, move and define the layout of a range, because they all turn out to be a number in the end.

Entering numbers

If you want to enter a number in a cell just move the widebar to the cell and enter the number. That's all there is to it! If you want to specify an amount do not enter the currency symbol (£ or $) as well.

> **Example**
> Lets say you want to enter the number 25.85 in A3.
> 1. Move the widebar to A3
> 2. Type 25.85 <ENTER

Entering percentages

It is easy to enter percentages as well. Just enter a percent sign (%) after the number, like 10%. This technique also counts for cell references, such as 100*A3%.

Entering formulas

One of the fundamental and powerful features in a spreadsheet is the ability to enter formulas. A formula is much more powerful than a number or text. A formula is a dynamic object that makes calculations and returns a result based on other entries in the spreadsheet if the formula contains cell references.

One of the simplest formulas is 1+2, but they can also be much more complex. You will not, however, notice the powerful and flexibility of any spreadsheet until you use cell references in the formulas.

Try to enter the following formulas in a number of cells: 6+8, 10-3, 4*5, 20/5 and 10^2, and choose the **C**alc option. The following results will be calculated and shown in the cells: 14, 7, 20, 4 and 100.

Things do, however, get more complicated if a number of operators (+, -, * and /) is combined in a complex expression, such as

$$12-20/5 *3 +6/7$$

25 people might give several answers to the result of this expression and Campion might give yet another result, and everyone will stick to their own result.

Operator precedence

Each operator has been given a priority (or *precedence),* and every formula will be calculated so that the operators with the highest precedence is calculated before operators with a lower precedence. If these rules of precedence are followed everyone will obtain similar answers.

Campion performs all calculations according to the following order of precedence:

Order	Operator	Operation
1	( )	Parentheses
2	%	Percent
3	^	Exponentiation
3	-	Negative value
4	*	Multiplication
4	/	Division
5	+	Addition
5	-	Subtraction
6	=	Equal to test
6	<>	Not equal to test
6	>	Greater than test
6	<	Less than test
6	>=	Greater than or equal to test
6	<=	Less than or equal to test
6	~	Almost equal to test
7	AND	AND Logical AND test
8	OR	Logical OR test

This means that expressions in parentheses are evaluated before any other expression. Unary signs are given a higher precedence than multiplication and division, and then come addition and subtraction. Notice that the comparison operators, such as = and <, are included in this list along with the boolean operators AND and OR. Calculations that have equal precedence are evaluated from left-to-right.

The *almost equal operator (~)* is an unique operator in Campion. It has been included because it is almost impossible to obtain complete equality in numerical expressions on a computer. If you try to test the expression 1/3=0.33333333, the result will be false. That is, the values are not equal. If you use the - operator instead the expression will be true, because the values are *almost* equal.

If an expression does not give the result you expected, think very carefully about these rules of precedence and remember; it is always a good idea to use parentheses in complex expressions.

The following examples illustrate the rules of operator precedence and the use of parentheses:

6+4/2*3 = 12
(6+4)/2*3 = 15
6+4/(2*3) = 6.67
(6+4)/(2*3) = 1.67

One of the ways of preventing errors in complex formulas is to use built-in functions.

Built-in functions

Functions are ready-made formulas that perform advanced calculations and return the result in a single cell. Some of the most commonly used formulas has been implemented in Campion. Functions make it much easier to calculate complex figures, such as the standard deviation of a number of values, because the formula is a part of the program code. Functions can be used in any formula just like a value.

Campion contains more than 70 functions that can be divided into 6 categories:

Mathematical functions are used in more complex formulas; for example to calculate the trigonometric cosine or square root.

Statistical functions perform statistical analysis on a group of values; for example to find the average value or the variance of a group of values.

Financial functions calculate investments and cash flows; for example to determine annuity payments.

Table lookup functions are used to lookup information in parts of the spreadsheet, known as tables.

Logical functions are mostly used in conditional statements where the results are based on the validity of a logical expression, such as A3>B3.

Miscellaneous functions perform a variety of calculations; for example base conversion, and they allow easy spreadsheet programming.

Function syntax

Every function has a unique name and a number of arguments, and they all follow the same basic syntax:

Functionname(Argumentl, Argument2, ...)

The name can be entered in either uppercase or lowercase. Spaces are allowed everywhere except between the functionname and the opening parenthesis. The required arguments must be enclosed in parentheses. When there are multiple arguments, they must be separated by commas. Multiple arguments must be entered in the right order. A function syntax might look like this:

```
AVG(A1,A25) ; calculates the average of the cells A1 to A25.
```

Functions can be "nested" inside other functions. Each function must, however, use separate set of parentheses. For example

```
INT(ABS(C12)) ; returns the integer value of the absolute value of
C12.
```

Further information on the built-in functions can be found in the "Using functions" and "Function Reference" chapters.

Cell references in formulas

You can use cell references in formulas and functions as though they were real numbers. Cell references will be substituted temporarily by the actual numbers in formulas when the spreadsheet is calculated. It is possible to make a spreadsheet without cell references, but you would miss all the fun of using spreadsheets if you do so. Using cell references has one great advantage: You can enter a new value in a cell, and all cells affected by the change will be recalculated and updated instantly (if Campion is operating in Simulate mode).

An example will make you realize the potential of a spreadsheet when cell references are used in formulas.

Example
Enter the figures 4, 5, 6 and 7 in the cells B2 to B5. Let's say we want to add these figures. Try to enter the expression 4+5+6+7 in B6 and choose the Calc option from the Main menu to recalculate the spreadsheet. The result 22 is returned. Try to enter 14 instead of 4 in B2 and choose the **C**alc option again.

B6 still contains the value 22, but it should have been 32. Campion does not do anything wrong, but we have told it to add the actual figures and the contents of the cells they have been entered in.

Example, continued
Enter the expression SUM(B2,B5) in B6. Choose the **C**alc option to recalculate the sheet. The result 32 is returned. Try to enter 4 instead of 14 in B2 and choose the **C**alc option again. Now the right result is returned. Switch to **S**imulate mode (Press EDIT, M and S), enter different figures and watch the result in B6.

Using named ranges in functions

It can be quite a task to analyze a spreadsheet and figure out what it does and how it does it. One way of making a spreadsheet easier to understand is to use named ranges in the statistical and the table lookup functions. It is important that you have named the range before using it in a function, as explained in the "Naming a range" section in the "Using ranges" chapter.

Example
Let's say you have entered a number of test results in the range C2,D12 and that you want to perform a statistical analysis on the results. You could easily enter expressions like AVG(C2,D12) or STD(C2,D12) but these expressions are not easy to understand at a later date. We will now define and name the range:

1. Choose Range Define
2. Type: C2 <ENTER>
3. Type: D12 <ENTER>
4. Choose Name
5. Type: Test_results <ENTER>
6. Press DELETE twice

Now you can enter expressions like SUM(Test_results) and STD(Test_results) in any cell. It is obvious that this kind of expression is the easiest to understand.

Range names can only be used in functions that require a block as an argument. That is, it is illegal to enter expressions like INT(Test_results) or ABS(January_Sales), but expressions like SUM(Sales) or AVG(Temperatures) are legal.

Comments in formulas

It is possible to add comments to the formula in a cell. These comments do not appear in the spreadsheet, and they do not interfere with spreadsheet data in any way. Comments are used to make minor annotations to values or formulas.

Comments can be added to values, formulas and functions. Simply enter a semi-colon (;) after the regular entry and enter the comment. The semi-colon and the comments are stored as a part of the cell, but they will not be shown in the working area or on the printer (unless you choose the **P**rint | **F**ormulas option). The comment is copied to the Edit line as well as the regular entry when you edit the cell.

Example
Some examples of comments are shown below
STD(A1,A25) ; a std of 0 means the values in the range are equal
B12/115; remember to check this value with the sales department

6: Using the menu system

The menu system is one of the major contributions to the ease-of-use that set Campion apart from the competition. The menu system is, however, just a part of the user interface. Screen elements, such as the Status line, the Edit line, and the direction arrow, are also a part of the user interface.

Accessing the Menu system

All the commands in Campion has been organized in a selection of menus that is accessible from the Main menu. The Main menu is invoked by pressing the EDIT key when the Edit line is empty. The Main menu will pop-up in the upper left corner of the working area when the EDIT key has been pressed. Some of the options will invoke other menus so that you can make more selections or enter additional information. The Print and Range options, for example, open a new world of menus.

The following section briefly discusses the options in the Main menu:

Edit. This option allows you to edit the contents of the cells that you have already entered. See the "Spreadsheet Basics" chapter for more information.

Mode. Use this option to switch between Program and Simulate mode. See the "Spreadsheet Basics" chapter for more information.

File. This option allows you to manipulate files in various ways. See the "File Management" chapter for more information.

Width. This option allows you to change the width of one or several columns at once. See the "Spreadsheet Basics" chapter for more information.

Range. This option allows you to manipulate blocks of cells in various ways. See the "Using ranges" chapter for more information.

Jump. This option allows you to jump to another cell in the spreadsheet. See the "Spreadsheet Basics" chapter for more information.

Print. This option allows you to enhance the printout of your sheet with fonts, headers/footers etc. See the "Printing" chapter for more information.

Calc. This option recalculates the spreadsheet. See the "Spreadsheet Basics" chapter for more information.

New. This option allows you to make a new spreadsheet.

Quit. This option allows you to exit Campion and use other programs. See the "Quitting Camp[i]on" section later in this chapter for more information.

Quitting the Menu system

When you have made your selections, you can quit the Menu system by pressing the DELETE key a number of times. You will return to the working area if you press DELETE from the Main Menu.

Pressing DELETE from any other menu will send you back to the previous level of the menu system. Pressing DELETE from the **P**rint menu, for example, will send you back to the Main menu.

Some of the options quit the Menu system automatically after execution, such as the **J**ump option.

You can leave any kind of menu by pressing the DELETE key.

Selecting an option from a menu

There are two different ways to select an option from a menu: You can either move the menubar with the cursor keys and press ENTER or EDIT, or you can make shortcuts to the appropriate option.

Using cursor keys to select an option

You can move the menubar (the black line that reverses the text so that it appears white on a black background) with the cursor keys to the option you wish to select. The menubar uses the well-known wrap-around technique which makes it much faster to get to the right option. If you press the Down key from the bottom line of a menu, the menubar will jump to the top line of the menu. If you press the Up key from the top line of a menu, the menubar will jump to the bottom line of the menu. When you have moved the menubar to the appropriate option, you can press either the EDIT or the ENTER key.

Press the EDIT key if the option you wish to select, will access additional menus. If the option takes immediate action and does not access additional menus, press ENTER.

You will soon learn when to press the ENTER key and when to press the EDIT key. This technique may seem awkward at first, but it is consistent and logical, and it makes it easier to print the same range several times due to a trick which will be explained later in the "Printing" chapter.

Using shortcuts to select an option

When you have learned the ins and outs of the Menu system it will be easier to use the following technique. You can make a shortcut to the option you wish to select by pressing the first letter in the option. If the option you have selected accesses additional menus, the first one will automatically appear (It acts as if the EDIT key has been pressed).

If the option you have selected does not access additional menus, it will take immediate action (It acts as if the ENTER key has been pressed).
We will use the shortcut approach in this manual, and it will be displayed as follows:

Choose **P**rint | **C**onfig | **Q**uality

This means that you should press EDIT and type P, C and Q in that order to access the **Q**uality menu. You can, of course, move the menubar to the **P**rint entry in the Main menu and press EDIT, and so forth, but it is much easier to use the shortcuts.

If you are asked to choose **P**rint | **C**onfig | **Q**uality and you are already in the Print menu then you should only choose **C**onfig | **Q**uality. If you are in the **C**onfig menu then you should only select the **Q**uality option.

The options in *a chain of commands* are separated by a "|" character, and you should always just type the character after the "|" characters when you have pressed EDIT to access the Main menu and the first character in the chain of commands. We have printed the entire option names in the chain of commands for clarity in this *User's Guide.*

Using input menus

When you have reached the end of a chain of commands, an input menu might appear where you should enter additional information. If you, for example, have selected the **P**rint | **C**onfig | **M**argins | **T**op option, you should enter the number of lines in the top margin.
There are different kinds of input menus even though they may look alike.

You can only enter numbers in some input menus, such as the **R**ange | **F**ill menu. It is not possible to enter anything but numbers in these menus.

You can only enter cell references in some input menus, such as the **D**efine range menu or the Copy to menu. If anything but a cell reference has been entered, an error message will occur.

In other menus, such as the "Are you sure Y/N ?" menu, you are asked to answer a question by typing either Y for Yes of N for No in either upper case or lower case.

You can use the cursor keys to edit the input, but you should always press ENTER when you have finished no matter what kind of input menu it might be. You can also leave any menu by pressing DELETE E without entering any information.

7: Using ranges

The ability to work with ranges is one of the really exciting features of Campion - The Spreadsheet. It allows you to manipulate blocks of cells and to use descriptive names in functions which makes your spreadsheet much easier to understand. The main part of the commands dealing with ranges are located in the Range option from the Main menu. Before you can use any of the commands from the Range menu, you must define the range you wish to manipulate.

With the range commands you can:

- align the contents of a block of cells

- specify the numeric format

- move, copy and delete blocks of cells

- name blocks of cells

- convert formulas in a block of cells to their values

- fill a block of cells with values of your choice

Possible ranges

A range is basically just a block of cells. A range is described by the cell in the top left corner of the range and the cell in the bottom right corner of the range as follows:

top left corner, bottom right corner

Ranges can consist of any number of cells from one cell to the entire sheet, but the cells must form a rectangle.

Some possible ranges are listed below:

Multiple cells in a row: A1,G1

An entire row: A1,DX1

Multiple cells in a column: A3,A10

An entire column: D0,D999

A square range: A1,E5

The entire sheet: A0,DX999

Defining a range

Choose **R**ange | **D**efine if you wish to define a range.

Type in the cell in the upper left corner of the range followed by ENTER. Type in the cell in the bottom right corner of the range followed by ENTER. You cannot provide a cell address larger than DX999, because that is the bottom right cell in the entire sheet. The range you have defined will apply until you leave the **R**ange menu or an error occurs. You can exit this menu by pressing DELETE.

> **Example:**
> Let's say you want to define the range D10, F14 from the working area.
> 1. Choose Range | Define to access the Define Range menu.
> 2. Type: D10 <ENTER>
> 3. Type: F14 <ENTER>

If the widebar has been placed in one of the cells you are asked to enter, you do not have to enter the cell address. You can just press ENTER, because Campion will use the location of the widebar as the cell address.

> **Example:**
> Let's say you want to define the range P14, Q18 and that you have placed the widebar in P14.
> 1. Choose **R**ange | **D**efine from the working area to access the Define Range menu.
> 2. Press <ENTER>
> 3. Type: Q18 <ENTER>

> **Example:**
> Let's say you want to define the entire sheet as a range from the Range menu.
> 1. Press D to access the Define Range menu.
> 2. Type: A0 <ENTER>
> 3. Type: DX999 <ENTER>

Aligning labels and numbers

Campion allows you to left or right align the labels and the numbers individually which will make your spreadsheet easier to read and more appealing. It is recommended to left align text and right align numbers consistently.

Choose **R**ange | **A**lign to access the Align menu.

Press **T** to align text or press N to align numbers.

Press **L** to left align or **R** to right align the type of cell contents you have just selected.

The alignment settings will apply on the screen and the printer even if you change the column widths or the layout of the numbers.

Specifying the format of numbers

Choose **R**ange | **L**ayout to specify the layout of the numbers in a range. The term layout in Campion covers the number of decimals and the use of the signs , and ..

Enter a number between 1 and 8 or move the menubar with the cursor keys until you reach the format you wish to use. Make your selection by pressing ENTER. The options in the menu are examples of how the values will look when you select the appropriate option. Option 1 shows values with the maximum number of decimals available and the other options are self-explanatory.

It is important to remember that the values shown on the screen or the printer are not necessarily equal to the actual values, because the values are stored with a much higher accuracy than you normally need to display.

Changing column width

The default column width is 9 characters. If you enter information that is longer than 9 characters you will have to change the column width. Choose the **W**idth option from the Main menu by pressing W. The Width menu appears, and you are to enter three arguments, be-cause you can change the column width of a number of columns at once. Enter the left and right column that should be affected by the new column width, which you are asked to enter at the end. Each entry should be followed by ENTER (You can learn more about using the menu system in the "Using the menu system" chapter). The column width can be any number between 4 and 48 characters.

Example

Let's say you want to change the column width of the columns A to N to 6 characters.

1. Press EDIT and W to access the Width menu
2. Type A <ENTER> (at the Left : prompt)
3. Type N <ENTER> (at the Right: prompt)
4. Type 6 <ENTER> (at the Width: prompt)

Example

You can also change the column width of a single column at a time. Let's say you want to change the column width of column C to 12 characters.

1. Move the widebar to the column of which you wish to change the width
2. Press EDIT and W to access the Width menu
3. Press ENTER twice to skip the Left: and Right: prompts (The current column is used)
4. Type 12 <ENTER> to change the column width

Campion automatically calculates the number of columns that can be shown on the screen (and on the printer) at a time. Only an integer number of columns will appear at a time.

Copying formulas

Copying formulas is a very easy way to build a part of a spreadsheet if you have to use almost identical formulas in a block of cells, such as summarizing the monthly sales figures (with every month's figures shown in a separate column) for an entire year.

Whenever you want to copy a block of cells containing formulas to another part of the spreadsheet you need to be aware of the two different kinds of cell references that can be used in Campion.

Relative cell references

Cell references in a formula are normally considered to be *relative*. This means that Campion keeps track of each cell reference in the formula by remembering its position in relation to the formula cell, and not its address. If, for example, E3 contains the formula E1+E2 and you copy it to F6, the cell references in the formula will be changed so that the formula in F6 looks as follows: F4+F5, because the formula in E3 is interpreted as "add the values of the two cells above". The same interpretation will apply in F6 when you have copied the formula, so that it reads F4+F5. If you wish the formula to remain E1+E2 no matter what you do, you will have to use *absolute* cell references as described in the following section.

Absolute cell references

If you copy a block of cells containing both a formula and any cells referenced to by that formula, Campion will automatically update the formula to reference the new cell positions.

Absolute cell references can be used in formulas just like relative cell references, but they are references to the actual cell address and not its location relative to the formula. The ' character is used to make a reference absolute. There are 4 different kinds of cell references:

Cell reference	Reference type	Column	Row
A1	Relative	Changes	Changes
'Al	Mixed	Fixed	Changes
A'l	Mixed	Changes	Fixed
'A'l	Absolute	Fixed	Fixed

Let's look at the previous example again. If you copy the formula E1+E2 in E3 to F6, Campion will make the following adjustments to the formula under these given circumstances:

E'l+E'2 becomes F'1+F'2
'E1+'E2 becomes 'E4+'E5
'E'1+'E'2 becomes 'E'l+'E'2

An example will clarify the disctinction between absolute and relative cell references.

> **Example:**
> Let's say you want to build a 10 by 10 product table like the one shown below. We will enter a formula in B2 and copy that formula to the entire table. It is obvious that the formula A2*B1 will provide the correct result in B2. If we copy this formula to the entire range wrong results will be provided. The formula in D3 would become C3*D2, but it should have been A3*Dl, so we will have to use mixed cell references. Column A and row 1 in the formula A2*B1 should be made absolute to obtain the correct results. The formula in B2 must be 'A2*B'1, and this formula can be copied to the entire table.

```
SAM (.A) (.B) (.C) (.D) (.E) (.F) (.G) (.H) (.I) (.J) (.K) (...L...)
 0█
 1       1    2    3    4    5    6    7    8    9   10
 2   1   1    2    3    4    5    6    7    8    9   10
 3   2   2    4    6    8   10   12   14   16   18   20
 4   3   3    6    9   12   15   18   21   24   27   30
 5   4   4    8   12   16   20   24   28   32   36   40
 6   5   5   10   15   20   25   30   35   40   45   50
 7   6   6   12   18   24   30   36   42   48   54   60
 8   7   7   14   21   28   35   42   49   56   63   70
 9   8   8   16   24   32   40   48   56   64   72   80
10   9   9   18   27   36   45   54   63   72   81   90
11  10  10   20   30   40   50   60   70   80   90  100
12
13
14
15
16
17
18
19
20
↑:A0    :P:Free 63176:Filename :
█
```

Building the spreadsheet

1. Save the current spreadsheet (if any) as described in the "File Management" chapter and return to the working area.
2. Choose New and type Y followed by ENTER to obtain an empty spreadsheet.
3. Move the widebar to A2
4. Choose **R**ange | **D**efine
5. Type: <ENTER>
6. Type: A11 <ENTER>
7. Choose Fill
8. Enter the Start value: 1 <ENTER>
9. Enter the Step value: 1 <ENTER>
10. Choose Define
11. Type: B1 <ENTER>
12. Type: K1 <ENTER>
13. Choose Fill
14. Enter the Start value: 1 <ENTER>
15. Enter the Step value: 1 <ENTER>
16. Press DELETE twice to leave the menu system
17. Move the widebar to B2
18. Type the formula: 'A2*B'1 <ENTER>
19. Choose **R**ange | **D**efine to define a range
20. Type: B2 <ENTER> twice
21. Choose Copy to copy the range
22. Type: B3 <ENTER>
23. Type: B11 <ENTER>
24. Choose Define
25. Type: B2 <ENTER>

26. Choose Copy
27. Type: C2 <ENTER>
28. Type: K11 <ENTER>
29. Choose Define
30. Type: A0 <ENTER>
31. Type: K11 <ENTER>
32. Choose **L**ayout
33. Choose 2
34. Press DELETE
35. Choose Width
36. Type: A <ENTER>
37. Type: K <ENTER>
38. Type: 4 <ENTER>
39. Choose **C**alc to calculate the spreadsheet

Your spreadsheet should now look like the one shown above.

Moving a range

Choose Range j Move to move a previously defined range to a new location. Enter the cell address you wish to move the defined range to followed by ENTER. The cell in the top left corner of the defined range will be moved to the cell you just entered, and the remaining cells in the range will be moved accordingly.

It is important that you have defined a range before you choose to move it. All the cell references in the entire spreadsheet will be adjusted as follows: *All references to cells outside the range are considered to he absolute and all references to cells inside the range are considered to be relative.*

Copying a range

Choose **R**ange | **C**opy to copy a previously defined range to a new range. Enter the cell in the top left corner (followed by ENTER) and the cell in the bottom right corner (followed by ENTER) of the range you wish the defined range to be copied to.

Campion allows you to copy a cell to another cell, a cell to a row of cells, a cell to a column of cells, a column of cells to several columns or a row of cells to several rows.

It is important that you have defined a range before you choose to copy it.

Example
Let's say you want to copy the cell A15 to the range B15,M15.
1. Choose **R**ange | **D**efine to define a range
2. Type A15 <ENTER> twice in the Define range menu
3. Choose Copy to access the Copy to menu
4. Type B15 <ENTER> and M15 <ENTER>
5. Press DELETE twice to leave the menu system.

Erasing a range

Choose **R**ange | **E**rase if you wish to delete the defined range.

Type **Y** followed by ENTER if you are sure or type **N** followed by ENTER if you do not wish to delete the defined range.

You must be absolutely sure before deleting a range because the range cannot be retrieved again unless you load the spreadsheet file again.

Naming a range

Choose **R**ange | **N**ame to name the defined range. Enter the name you wish to give the defined range followed by ENTER. You can use any name you like (up to 15 characters long) as long as it does not resemble cell references or the name of any of the built-in functions. Ranges cannot be named All or PI, but names like INCOME, EXPENSES or ANIMALS are al-lowed. You can use the underscore character (_) to separate words in range names, like SALES JANUARY.

Naming ranges can make your spreadsheet much easier to read and understand at a later date as the examples below will show. It is not possible to use a range name that contains a part of a previously defined range name. That is, if you have named a range WIN do not name another range WINTER afterwards. It is, however, possible to name a range WINTER and name another range WIN afterwards.

If you wish to use range names in formulas, the ranges must have been named before they are used in the formulas.

Note: There is a disadvantage to using named ranges: If you copy an expression with a named range, the name will not be changed and the cell references that defines the range are there-fore considered to be absolute. If you enter the formula SUM(January_Sales) in A15 and copy it to the range B15,L15, the formula will remain the same and provide the same results in the entire range A15,L15.

Example:

Let's say you have entered some experimental data showing the temperature during a two-weeks period in the range B3 to C9 and that you want to show the average temperature in Cll.

1. Choose **R**ange | **D**efine
2. Type: B3 <ENTER>
3. Type: C9 <ENTER>
4. Press N
5. Enter the name: TEMPERATURES <ENTER>
6. Press DELETE twice to leave the menu system
7. Move the widebar to C11
8. Enter the formula: AVG(TEMPERATURES) <ENTER>.

```
SAM(......A.....)(...B...)(...C...)(...D...)(...E...)(...F...)
 0
 1                 Week 1   Week2
 2              ----------------
 3Monday             12.20    13.60
 4Tuesday            10.60    11.00
 5Wednesday           8.60    13.80
 6Thursday           15.70    11.00
 7Friday             11.70    10.50
 8Saturday           10.40     9.70
 9Sunday             12.50    10.00
10-----------------------------
11Average                     11.52
12                        ████████
13
14
15
16
17
18
19
20
↓:C12   :P:Free 64955:Filename :
C
```

Convert formulas to their values

Choose **R**ange | **V**alues to convert the formulas in the defined range to their values.

Type Y followed by ENTER if you are sure or type N followed by ENTER (or just press DELETE) if you do not wish to convert the defined range.

You must be absolutely sure before converting the range because the formulas cannot be retrieved again unless you load the spreadsheet file again.

This feature is very valuable if you have placed some values in a table you only wish to use for reference in the future, and they will not need to be changed. There is therefore no need to recalculate the table each time the spreadsheet is recalculated. You will save time, and the spreadsheet file will be smaller if you convert the formulas to their values.

Filling a range with values

Choose **R**ange | **F**ill if you wish to fill the defined range with values of your choice. Enter the start value followed by ENTER and the step value followed by ENTER. You can quit this menu with DELETE.

The first cell in the range will contain the start value, and the second cell will contain the start value plus the step value, and the third cell will contain the start value plus twice the step value, and so forth.

Example:

Let's say you wish to fill the range A3 to A32 with the values from 1 to 30.

1. Choose Range I Define to define the range
2. Type: A3 <ENTER>
3. Type: A32 <ENTER>
4. Choose Fill to access the Fill menu
5. Type: 1 (as the Start value) <ENTER>
6. Type: 1 (as the Step value) <ENTER>
7. Press DELETE twice to leave the menu system

8: Printing

When you have completed your spreadsheet, you can print out the entire spreadsheet or just a part of it on any printer by using the commands in the **P**rint menu. Campion allows you to improve the appearance of the spreadsheet in many ways, and this chapter will show you how to:

- define the part of the spreadsheet to print

- choose the kind of cells to print

- print floating headers and footers on each page

- print page numbers on each page

- improve the appearance of the headers and footers

- change margins

- change page parameters

- select the quality of the output

- print the spreadsheet on any printer - even a ZX Printer

You can use these options whether you want to print a single-sheet list of sales figures or a multipage financial analysis with headers and footers including page numbers etc.

The header, footer and fonts you use in your spreadsheet are saved with the spreadsheet file, so the sheet will look the same whether you print it today or at a later date. If you change any of the settings and save the spreadsheet again, the new settings will apply. The margins and the page settings are not saved with the spreadsheet.

The appearance and the numbers of enhancements you can add to the printed spreadsheet depend upon your printer, but Campion will always try to take advantage of your printer's capabilities and produce the best output possible.

Selecting the active printer

Campion allows you to print the spreadsheet on a ZX Printer or an EPSON compatible printer. You will have to select the printer you wish to use (we will call this printer the *active* printer) in the supplied Installation program, but you can always install the program again and

select another printer. The number of improvements that can be made to the printed spreadsheets depends on the active printer. There are, for example, limitations to what can be done with the ZX Printer, even though Campion can print 51 characters per line, but you can always print the spreadsheet with floating headers and footers including page numbers, change margins etc.

Using printer control codes

A printer is controlled by using *control codes.* If you have a ZX Printer or an EPSON compatible printer, these control codes will be inserted automatically into Campion. If you have a printer that does not follow the standard for printer control codes (set by Epson), then please contact Campion Software for details on how to enter the special control codes required by your printer.

Accessing the Print menu

Choose **P**rint from the Main menu if you wish to print something.

You can press DELETE if you wish to quit this menu. All selections in connection with printing can be made from this menu.

Configuring the printout

Choose **P**rint | **C**onfig to configure the printer. This menu is just a menu where you can gain access to other menus where the actual selections can be made.

You can quit this menu by pressing DELETE. Otherwise you can gain access to other menus where the following parameters can be altered:

- the four margins
- enter the header and footer
- specify the number of lines per page
- specify the pitch
- specify the numbers of characters per line
- select the quality of the output

Specifying the margins

Choose **P**rint | **C**onfig | **M**argins to specify the margins. The left and right margins are measured in characters, and the top and bottom margins are measured in lines.

Choose **T**op, **B**ottom, **L**eft or **R**ight to set the respective margins in a menu (You can quit this menu by pressing DELETE and the old margin setting will be left unchanged.). The number you type should be followed by ENTER.

Choose **D**efault if you wish to use the values specified in the following table.

Margin	Default value	Unit
Top	0	lines
Bottom	5	lines
Left	0	characters
Right	0	characters

Note: The right margin is measured in characters from the righthand side of the paper. This means that you do not need to change the specified right margin if you change the pitch setting (using **P**rint | **C**onfig | **P**itch) or the number of characters per line (using **P**rint | **C**onfig | **L**ayout | **C**har/line).

Press DELETE to quit this menu. If you have changed any margins they will apply, or if you have not, the old ones will apply when you quit this menu.

Entering the header

Choose **P**rint | **C**onfig | **H**eader to enter the header. The header will appear below the top margin followed by two empty lines and the spreadsheet.

When you select the header/footer option the old header/footer will appear in the Edit line, so you can edit it. If you wish to change the header/footer completely, you can press EDIT once to delete the old header/footer.

The header must be entered in the Edit line, where you can use the usual editing keys. The header can be left aligned, centered or right aligned or all of the three at one time. The character is used to separate the 3 blocks.

See the following section for examples.

Entering the footer

Choose **P**rint | **C**onfig | **F**ooter to enter the footer. The footer will appear above the bottom margin. Two empty lines will be inserted between the spreadsheet and the footer.

The footer should be entered in the Edit line, where you can use the usual editing keys. The footer can be left aligned, centered or right aligned or all of the three at one time. The ~ character is used to separate the 3 blocks.

The footer works in exactly the same way as the header regarding to alignment and centering.

Example:
Lets say you want the company name to be centered. Enter the following text in the Edit line:

```
~Campion Software
```

Example:

Let's say you want to right align the date. Enter the following text in the Edit line:

```
~ ~December 12, 1991
```

Example:

Let's say you want to left align the company name and right align the department. Enter the following text in the Edit line:

```
Campion Software ~ ~ Budget Department
```

Example:

Let's say you want the company name to be left aligned, the department to be centered and the date to be right aligned. You should enter the following text:

```
Campion Software ~ Budget Department ~ December 12, 1991
```

Page numbers in the header/footer

Campion can insert page numbers in the header and the footer. Just type the # character in the header/footer, where you want the page number to appear. Campion will align the text according to the page number, so that the text will always be aligned or centered no matter how large the page number is. The page number can be mixed with text in various ways.

Example:

Let's say you want to print the page number centered. Enter the following text in the Edit line:

```
~ #
```

Example:

Let's say you want to left align the company name, center the text Page *page number* and right align the department name. Enter the following text:

```
Campion Software ~ Page #~ Budget Department
```

Using attributes in the header/footer

Campion can improve the appearance of the header/footer if you insert # codes in the text you want to appear in the header/footer. The number of improvements depend upon your printer, and the function of the codes depend upon the selections you made during installation. These codes do not affect the ZX Printer. You can use 10 different (numbered 0 to 9) codes, and they will be saved with the spreadsheet.

The following table shows the function of the 10 codes if you have selected an EPSON compatible printer:

Code	Function	Corresponding printer Control codes
0	Underline On	27,45,1
1	Underline Off	27,45,0
2	Italics On	27,52
3	Italics Off	27,53
4	Bold On	27,71
5	Bold Off	27,72
6	Emphasized On	27,69
7	Emphasized Off	27,70
8	Subscript On	27,83,1
9	Subscript Off	27,84

Example:
Let's say you want the department name to be printed right aligned and underlined. The #0 code turns underlined printing on and the #1 code turns it off again. Enter the following text after having selected the **H**eader option or **F**ooter option from the **C**onfig menu:

```
~ ~#0Budget Department#1
```

Example:
Let's say you want the text "- *page number* -" to appear centered in bold. The #4 code turns bold mode on. The # code between the two - (minus signs) is replaced by the page number during printing. The #5 code turns bold mode off.

```
~#4- # -#5
```

Example:
Let's say you wish to print the company name left aligned in italics and the page number right aligned in bold. The #2 code turns italics mode on and #3 turns it off. The #4 code turns bold mode on and #5 turns it off. The # character between the last two codes is replaced by the page number during printing. Enter the following text and codes after having selected either the Header option or the **F**ooter option from the **C**onfig menu:

```
#2Campion Software#3~~#4##5
```

The codes can be mixed as you wish, but you must always remember to turn each selection off again when the text has been printed. If the printout does not look as you had expected it to do, it might be because the printer cannot mix the codes you have entered. Some printers cannot, for example, mix emphasized and underlined printing.

Changing attributes and fonts in cells

Campion allows you to change attributes and fonts in every text cell of the printout which greatly improves the visual impact of the printed sheet. The number of improvements de pends upon your printer's capability and ability to use and mix attributes, such as bold, italics and underlining.

The attributes are selected by inserting # codes in the cells you wish to emphasize. Campion allows you to use 10 different codes. The table above lists the function of these codes if you have selected an EPSON compatible printer.

You can use as many # codes as you like, but you must always remember to turn off every option that has been turned on in each cell. (This might not be necessary with your printer but printers respond differently to printer control codes, so you might have to experiment a little.)

The inserted codes will only apply on the printer (the codes will not affect the ZX Printer). The codes will appear on the screen as they appear in the Edit line.

Example:
Lets say you have built a spreadsheet showing sales figures month by month and that you wish to emphasize the names of the months. (We will use the bold attribute which uses the codes #4 and #5, but other attributes can be used.) It is assumed that the text January is entered in Al, the text February in B1 and so forth.

1. Move the widebar to A1
2. Press EDIT and ENTER to move the contents of the cell to the Edit line
3. Insert the #4 code in the beginning of the line
4. Insert the #5 code in the end of the line
5. Press ENTER
6. Move the widebar to B1 and repeat the steps above for inserting codes
7. Choose Print Sheet when you have emphasized all the names
8. Specify whether you want to include the borders by moving the menubar to the Yes or No option and press EDIT.

Specifying the page layout

Choose **P**rint | **C**onfig | **L**ayout to change the number of lines the printer uses per page and the characters per line or select the default values. This is used if you use paper of different sizes.

Choose **L**ines/page to set the number of lines per page. Enter the number followed by ENTER. The number you type is the total number of lines per page.

Example:
If you have specified 72 lines per page and set the top and bottom margin to 3 lines and entered a header, the actual number of lines is 72-3-3-1-2 = 63 lines.

Choose **C**har/line to set the number of characters per line. Enter the number followed by ENTER. The number you type is the total number of characters per line. The actual number of characters per line can be calculated as follows:

The actual number of characters per line = the total number of characters per line - left margin - right margin

Example:
If you have specified 80 characters per line and set the left and right margins to 8 char acter, the actual number of characters per line is 80-8-8 = 64.

Note: If you alter the pitch, the number of characters per line might not be correct.

Choose **D**efault if you wish to use the values specified in the following table.

Option	Default value
Lines per page	72
Characters per line	80

Press DELETE to quit this menu. If you have made any changes they will apply, or if you have not the old values will apply.

Selecting the print quality

Choose **P**rint | **C**onfig | **Q**uality to select the print quality. The quality depends on your printer.

Choose **D**raft if you want to print the spreadsheet in draft mode, which produces a fast but low quality output.

Choose **NLQ** if you want to print the spreadsheet in Near Letter Quality (**NLQ**) mode, which produces a slow but high quality output.

Selecting the pitch

Choose **P**rint | **C**onfig | **P**itch to set the print pitch (the number of characters per inch on the printer). You can choose either **P**ica or **E**lite by pressing **P** or **E.** This selection can by expanded by choosing either **N**ormal or **C**ondensed by pressing **N** or **C**. The **N**ormal/**C**ondensed should be considered as an additional attribute to the **P**ica/**E**lite selection, because **N**ormal or **C**ondensed can be combined with either **P**ica or **E**lite, but you cannot use **P**ica and **E**lite (or **N**ormal and **C**ondensed) at the same time.

This setting sends some control codes to the printer immediately (as shown in the table below) and affects the **P**rint | **C**onfig | **L**ayout | **C**har/line option.

The following table lists the **P**itch settings and the appropriate printer control codes:

Type	Characters/line	Corresponding printer Control codes
Pica	10	27,80
Elite	12	27,77
Normal	10/12	18
Con-	17/20	27,15

This option gives you unlimited possibilities when combined with the **C**har/line setting and the **M**argins settings, and some experimentation might be needed before the optimal layout quality can be achieved.

Printing the spreadsheet

Choose **P**rint | **S**heet to print the spreadsheet. This option will print the spreadsheet as it appears on the screen (but with a larger variety of fonts if your printer is capable of using various fonts).

Press EDIT if you want to alter the range of cells to print. Enter the cell in the top left and the bottom right corner of the range followed by ENTER. Remember that if you press ENTER without having entered a cell the current cell in the working area will be used.

Move the bar to the **Y**es/**N**o entry you want and press ENTER if you want to use the same range. The range settings will apply until you leave the **P**rint menu or a printer error occurs.

The "Estimated number of pages" menu appears as described in the section "Confirm before printing" below.

Printing the text

Choose **P**rint | **T**ext to print only the text in the spreadsheet in a special format. This option will print the cell reference followed by a colon (:) and the text from the cells in the spreadsheet that contains text.

Press EDIT if you want to enter the range of cells to print. Enter the cell in the top left and the bottom right corner of the range followed by ENTER. Remember that if you press ENTER without having entered a cell, the current cell in the working area will be used.
Press ENTER if you want use the same range as the last time you printed.

Printing the formulas

Choose **P**rint | **F**ormulas to print only the formulas in the spreadsheet in a special format. This option will print the cell reference followed by a colon (:) and the formulas from the cells in the spreadsheet that contains formulas.

Press EDIT if you want to enter the range of cells to print. Enter the cell in the top left and the bottom right corner of the range followed by ENTER. Remember that if you press ENTER without having entered a cell, the current cell in the working area will be used. You can quit this menu by pressing DELETE.
Press ENTER if you want use the same range as the last time you printed.

Printing the ranges

Choose **P**rint | **R**anges to print the names and the adjacent cell references of the ranges that has been named previously.

Confirm before printing

When you have made your selections a menu appears, which informs you about the estimated numbers of pages required to print the spreadsheet with the selections you have made. If the number of pages equals 65535 the actual number of pages required might be higher, but it is hardly likely that this will ever happen.

You can choose to continue by pressing **Y** followed by ENTER and the printing process will begin, or you can choose to quit the printing by pressing N followed by ENTER.

9: File Management

Campion stores the information you enter in a part of your computer's memory, called Random Access Memory (RAM). Contrary to another part of your computer's memory, called Read Only Memory (ROM), the contents of the RAM is deleted if you quit Campion, if the power disappears for just a fraction of a second or if you accidentally turn off your computer.

If you wish to use your spreadsheet at a later date you can save it on discs or tapes. Each spreadsheet is saved as *a file* with a unique name. The spreadsheet can be loaded back into your computer by referring to its *filename*.

The Campion File Manager allows you to work with spreadsheet files you have created in Campion. It contains many of the commands that is also found in DOS, but it is much easier to use the File Manager than to switch between DOS and Campion every time you wish to do some basic file operations.
 With the File Manager you can:

- load and save files
- verify saved files for maximum security
- rename and erase files
- • display a list of Campion files
- access files from a disc drive or a tape recorder

The File Manager will only work with spreadsheet files that have been created in Campion. This is due to the fact that the filename of every file created in Campion is preceded by a *Campion Identification Character*. This implies that it is not possible to manipulate files that have been created by other programs than Campion in the File Manager. You will learn to appreciate this later on, and this chapter will explain why.

Storage medias

You can use a disc drive or a tape recorder with Campion. Only one of these two options can be selected at a time, and all file operations will refer to the disc drive or the tape that you have selected. Even though it is possible to use a tape recorder, we highly recommend the use of a disc drive.

You will have to select the storage media you wish to use during installation, but you can always change your mind and reinstall the program.

The implementation of the file management options on the Spectrum version might differ slightly from this discussion, because they depend on the disc drive system you have installed.

Note: The SAM Coupé version does not support the use of a tape recorder as a storage media.

Accessing the File Manager

The file management features are accessed through the File option in the Main menu. Press EDIT to access the Main Menu. The File option can be accessed in two ways from here: Press F for **F**ile or move the bar to the **F**ile option and press EDIT. Whatever method you choose the File menu will appear.

You can quit the **F**ile menu by pressing DELETE if you have selected the wrong menu or if you do not want to manipulate files after all.

Loading a file

Choose **F**ile | **L**oad if you wish to load a spreadsheet file that has been saved previously. The selected file will replace the current spreadsheet.

You can enter the filename followed by ENTER in this menu. The filename can contain up to 9 characters (the 10th character is the Campion Identification Character). Only letters, numbers and the underscore character (_) can be used in a filename. If you enter an illegal filename or if the requested file cannot be found, an error message will appear in the right side of the status line.

Note: If the storage media is the tape recorder you can enter the filename "?" and the first file on the tape will be loaded.

The filename will appear in the middle of the status line when the file header has been loaded and the spreadsheet will appear in the working area when you close the menus.

Saving a file

Choose **F**ile | **S**ave if you wish to save the current spreadsheet. You can quit this option and return to the File menu by pressing DELETE.

You can enter the filename followed by ENTER in this menu. The filename can contain up to 9 characters (the 10th character is the Campion Identification Character) and the same characters as with LOAD can be used. If you enter an illegal filename, an error message will appear in the right side of the status line. If you press ENTER without entering a filename, the current filename (which is shown in the Status line) will be used and the old file with this name will be overwritten, unless you have not named the current spreadsheet.

Verifying a saved file

Choose **F**ile | **V**erify to examine if the latest save operation has been successful. This selection does not require any additional information because the current filename will be used, so the Filename menu will not appear.

If you are using a disc drive, the verification process will start immediately and if any errors occur, an appropriate error message will appear in the right side of the status line.

If you are using the tape recorder, you should exchange the wires, rewind the tape and press play before the verification process can begin. If any errors occur, an appropriate error message will appear in the right side of the status line.

A list of files

Choose **F**ile | **I**ndex if you wish to see a list of Campion files. The list consists of the spreadsheet files that have been saved from Campion on the current drive.

The list contains the file names and the length of the files in bytes. The names scrolls slowly through the window. You can pause the scrolling list by pressing BREAK once. Press any key to make the list continue to scroll.
Press DELETE to exit the menu.

Erasing a file

Choose **F**ile | **E**rase to erase a file. Campion will erase the file in the same way as DOS, so any utility program that can *recover* an erased file will also be able to recover a file that has been erased by Campion.

If you want to erase other Campion files than the current file you will have load them first (this also allows to examine whether you really want to delete the file).

Renaming a file

Choose **F**ile | **R**ename to rename a spreadsheet file. The file you wish to rename will not be loaded into Campion because the rename operation is done through DOS.

Enter the name of the file you wish to rename followed by ENTER and enter the file's new name followed by ENTER.

If the old file cannot be found or if there already is a file with the new name, an appropriate error message will appear in the right side of the status line.

Note: You cannot rename files on a tape recorder.

Copying a file

There is no Copy option on the File menu, but it is, of course, possible to copy files anyway. Load the file you wish to copy and save it with the same name or another name if you wish.

10: Using functions

This part of the *User's Guide* will provide you with comprehensive and concise information about the built-in functions. These functions are ready-made formulas for a large variety of specialized calculations. Since these functions are already implemented in the program and tested, you can easily make use of them and rely on the results they provide.

The ability to insert functions in cells is a very powerful feature of Campion. It does without question increase your productivity once you learn to use them properly. Even though we expect you to be reasonably familiar with the theory behind the functions you wish to use, you might provide a number as an argument or refer to a cell that is not allowed in a specific function by accident. We have made extensive use of error handling routines, which will give you comprehensive error messages, when an error occurs.

The objective of the next two chapters is to provide you with hands-on information when you want to check which arguments a given function requires.

Formulas, algorithms and constants

The main part of the built-in functions are based on an explicit formula, which you could have typed into a cell and referred to in other cells by yourself. It is easier, though, to use the built-in functions. We have printed the formulas whenever possible in each entry in this reference section.

Other built-in functions cannot be expressed as a formula. We have used well-known *algorithms* to calculate approximate results of these functions. It will take more time to recalculate the spreadsheet if these functions are used extensively, but you will soon realize that the presence of these algorithms are extremely beneficial. It will be very time-consuming to make repeated calculations using an ordinary calculator, sketchpad and a pencil. (The **IRATE** function, for example, is calculated by using the Newton-Raphson Iteration Method because an explicit formula cannot be derived.)

Functions like **MEDIAN**, **TABLE**, **VLOOKUP**, **HLOOKUP** and **RND** are treated in an entirely different way due to their nature. This is explained in details in each entry.

In practice, you will not notice the difference between using a function based on an explicit formula or an algorithm. This distinction does, however, explain why some of the entries in this reference section does not include a formula.

Naming conventions

There are some simple rules you must be aware of when using the built-in functions. These functions follow the same basic format. Each function has a special keyword or name that tells Campion which function you wish to use. The name should not be preceded by a @-sign, which is often used in other spreadsheets. This is not necessary in Campion, but the name must be spelled correctly, of course. Both upper or lower case letters can be used, although Campion will convert all keywords to uppercase for the sake of clarity. It is therefore a good idea to write all cell references and function names in lowercase.

Spaces can be inserted as you wish to make expressions easier to read, but Campion will remove them when the expression has been entered to save memory. Spaces are not allowed between the keyword and the opening parenthesis which must be used if the function requires any arguments. The opening parenthesis should be considered as a part of the keyword.

Arguments

If the function requires any arguments that specifies the values you want to insert in the formula, these must be included in paired parentheses with commas between each argument. Each of these arguments can be expressed as a number, a reference to another cell that does not contain text or is undefined, a formula or another function. This ability is due to the recursive manner in which the expression is evaluated, which allows an argument to a function to be another function, and so forth. You must always remember to include all the necessary arguments in paired parentheses in each of these functions and in the right order.

Functions by category

The built-in functions can be divided into several groups depending on their purpose. The following sections will discuss some of these functions in more detail. You can find more in-depth information about each function in the "Function Reference" chapter. We do, however, recommend that you buy a textbook if you wish to study the theory behind the built-in functions thoroughly.

Depreciation functions

Campion contains three functions DDB, SLN and SYD to calculate the depreciation allowance of an asset.

DDB uses the double-declining balance method.

SLN uses the straight line depreciation method where the depreciation is the same every year during the asset's life.

SYD uses an accelerated deprecation method which allows higher depreciation in the earlier years of an asset's life.

Compounding functions

The four functions RATE, TERM, PV and FV can be used to determine the fourth parameter when the other three are given. These functions can only be used if there are not any payment involved in the financial transaction. If any payments are involved, then you should use the annuity functions discussed in the following section.

The interest rate is calculated at the end of each period. It is important that you use the actual interest rate, that is, whether you use the annual or the monthly interest rate.

Annuity functions

The five functions IRATE, NPER, PMT, PVAL and FVAL can be used to determine the fifth parameter when the other four parameters are given.

It is important that you use positive values when you are receiving money and negative values when you are paying money. If you, for example, should pay £100 each month, the payment parameter should be -100. If you, on the contrary, should receive £100 each month, the payment parameter should be 100. These considerations count for the present value and future value parameters as well.

The interest rate is calculated, and the payments are made at the end of each period. It is important that you use the actual interest rate, that is, whether you use the annual or the monthly interest rate.

Logical functions

The logical functions, such as AND, NEG and POS, can be used in conditional statements, where the result is based upon the validity of a logical expression, such as IF(Al> 10 AND A1<25,100,250). The logical functions are mostly used in combination with the logical operators, such as > or <=.

A conditional statement returns either the logical value 1 (true), if the expression is true, or the logical value 0 (false), if the expression is false. A conditional statement can be used in calculations where you can take advantage of the logical value it returns. An expression like 100000*(A25> =25000) would return 0, if A25 contains a value less than 25000, or it would return 100000, if A25 contains a value greater than or equal to 25000.

We strongly recommend that you try the built-in functions (especially the financial functions) on well-known data to make sure that they provide the results you expect them to provide. A close examination of the formulas that the financial and statistical functions have been based upon might also be in order.

11: Function Reference

The ability to use functions is one of the features that sets Campion apart from the competition. The functions can be used to perform a large variety of calculations as explained in the previous chapters. The plus 70 built-in functions will be explained thoroughly on the following pages. The functions are organized in alphabetical order.
Each entry contains all or some of the following items:

Purpose. A brief description of the purpose of the function. This description is very short because it should only be a quick overview of the function.

Format. This lists the function including its parameters.

Arguments. Each of the function's parameters are described. The description explains what values are allowed as parameters. If you enter an illegal parameter, an error message will appear.

Formula. The formula the function has been based upon is listed if it is possible.

Examples. The examples illustrate the use of the function and some examples of how to enter parameters.

Notes. Selected entries will also include notes about advanced usage of the function, a sample spreadsheet and further explanation for experienced users of spreadsheets.

ABS

ABS returns the absolute or positive value of the argument. The absolute value of a number is its value without its sign, which means this function will always return a positive value or zero.

Format	**ABS(number)**
number	a numeric value
Examples	ABS(-0,125) = 0,125
	ABS(10-20/10) = 8

ACOS

ACOS returns the angle expressed in radians when you provide the cosine of the angle. The arcus cosinus function is sometimes referred to as the inverse cosine.

Format	**ACOS (number)**
number	a numeric value between -1 to 1. If you provide a number outside the allowable limits, an error will occur.
Examples	ACOS(D24) = 1,3694, if D24 contains the value 0.2

AND

AND returns the boolean value of a comparison between two expressions. The result will be true if both *expr1* and *expr2* are true. Otherwise the result will be false. AND returns *expr1* if *expr2* does not equal zero.

Format	**expr1 AND expr2**
exprl	A numeric value or a conditional statement. If a string of text or a reference to a cell containing text is used for exprl , an error will occur.
expr2	A numeric value or a conditional statement. If a string of text or a reference to a cell containing text is used for expr2, an error will occur.

The AND function may be used if you want to determine whether a value lies within a given range or not. It is not possible to simply type a<b<c (in mathematical terms), if you want to determine whether b lies between a and c. You will have to type a<b AND b<c instead.

Examples	1 AND 1 = 1
	1 AND 0=0
	1000 AND 1 = 1000
	2500 AND A10> 100 = 2500, if A10 contains a value larger than 100, otherwise 0 is returned.

ASIN

ASIN returns the angle expressed in radians when you provide the sine of the angle. The arcus cosinus function is sometimes referred to as the inverse sine.

Format	**ASIN(number)**

A numeric value between -1 to 1. If you provide a number outside the
allowable limits, an error will occur.

Examples   ASIN(D24) = 0.9273, if D24 contains the value 0.8

ATAN

ATAN returns an angle between PI/2 and -PI/2 in quadrant 1 or 4. The arcus tangent is
sometimes referred to as the inverse tangent.

Format   **ATAN (number)4**

number   A numeric value

Examples   ATAN(0.5) = 0.4636 ATAN(1) = 0.7854

ATAN2

ATAN2 returns a 4 quadrant angle or an angle of a coordinate in radians. ATAN2 is some-
times displayed as TAN-1(y/x). This functions differs from the ATAN function because it
returns values from all 4 quadrants.

Format   **ATAN2(x coord, y coord)**

x coord   The arc cosine component of the coordinate.

y coord   The arc sine component of the coordinate.
                  If both x coord and y coord is 0, an error will occur.

The ATAN2 function returns the arc tangent of the angle represented by the point (x,y) with
coordinates *(x coord, y coord)*. The result is between pi/2 and -pi/2 with the quadrant chosen
appropriately.

Examples   ATAN2(1,1) = ATAN(1) = 0.7854
                  ATAN2(-1,2) = 2.0344439
                  ATAN2(1,-2) = -1.1071487

AVG

AVG calculates the average of a block of values. The average is calculated as the sum of the
values in the block divided by the numbers of cells in the block that contains numbers.

Format   **AVG(block)**

block   A group of cells, expressed as two cell references or a range name

Example   Turn to the SUM entry for an example.

BIN

BIN exchanges a binary value for a decimal value.

Format   **BIN(number)**

number	a string of 1's and 0's, maximum 16. The number of digits is counted from the first and left-most "1".
Examples	BIN(11)=3 BIN(1010101)=85

CELSIUS

CELSIUS converts a temperature given in Fahrenheit to its equivalent in degrees Celsius.

Format	**CELSIUS (temperature)**
temperature	*A* numeric value.
Examples	CELSIUS(212) =200 CELSIUS(B2)=0, if B2 contains the temperature 32 F.

Note: This function does not examine whether you have specified a temperature below the absolute zero (which is -459.67 degrees Fahrenheit) or not.

CHOOSE

CHOOSE selects and enters a value from the supplied list of values. The chosen value depends on the value of *number,* which makes it more powerful than the similar IF function.

Format	**CHOOSE(number, V1, V2, ...)**
number	An integer value < = the number of items in list. This number (usually a cell reference) determines which of the values in list that will be entered in the cell. *V1* is entered if *number=2; V2* is entered if *number=2* and so forth. If a non-integer value is entered only the integer part of the value will be used. If *number is* negative or if it exceeds the number of values in list, an error occurs.
V1, V2, V3, ...	A list of numeric values (numbers, formulas or functions) separated by commas.

Let's say you run a small business, Pink Bikes Ltd, that manufactures only three different bike models for children, men and women. The bikes cost (with the product number shown in parentheses) £125 (1), £219 (2) and £169 (3), respectively. You have built a simple spreadsheet (like the one shown below) where you should only enter the product number in C11 and the final price will be shown in C24. C24 contains the expression: CHOOSE(C22, 125, 149, 269). (It is highly recommended to use the HLOOKUP function if you plan to use a spreadsheet like this one more than once.)

Note: The table lookup functions (TABLE, HLOOKUP and VLOOKUP) perform similar tasks, if the data has been organized in the spreadsheet, but the CHOOSE function is easier to setup and use, though more limited in scope.

```
SAM(.....A....)(.....B....)(...C...)(...D...)(...E...)(...F...)
 0
 1            Pink-Bikes    Ltd
 2
 3         Bike types          Price
 4
 5            1 Children       125.00
 6            2 Men            149.00
 7            3 Women          169.00
 8
 9
10
11         Enter bike type  :1
12
13
14            To pay          125.00
15            ====================
16
17
18
19
20
↓:C14   :P:Free 65117:Filename :
CHOOSE(C11,C5,C6,C7█)
```

COM

COM determines the number of possible combinations of n objects using k objects at a time when the order of the selection is not important.

Format	COM(n, k)
n	A positive, integer numerical value representing the number of objects in the group, maximum 33 (See the FAC entry)
k	A positive, integer numerical value less than *n.* This number representents the number of objects that should be taken out of the group, where $k<=n$.

Formula
$$COM\ (n,k) = \frac{n!}{(n-k)!\,k!}$$

Let's say a company must select five employees from a group of 30 people to attend a business conference. The COM function can be used to determine the number of possible delegations. The order of selection is not of any importance in this problem, so this is a combinational problem rather than a permutational problem. The answer is COM(30,5) which equals 142506.

Examples   COM(10,11) will generate an error message because it is not possible to select 11 objects when there are only 10 to choose from
COM(44,3) will generate an error message because 44 > 33 as mentioned above.

COS

COS returns the cosine of an angle in radians.

Format   **COS (number)**

number   A numerical value, representing an angle in radians.

COUNT

COUNT counts the number of cells in block that contains values, formulas, functions or references to other cells. Undefined cells or cells containing text do not count as a cell in the COUNT function.

Format   **COUNT(block)**

block   A group of cells, expressed as two cell references or a range name.

COUNTA

COUNTA counts the total number of cells in a specified block.

Format   **COUNTA(block)**

block   A group of cells, expressed as two cell references or a range name.

DDB

DDB calculates the depreciation allowance by using the double-declining balance method, where the depreciation is high in the early years of the asset's life and gets lower as the asset reaches the end of its useful life.

Format   **DDB(cost, salvage, life, period)**

cost   A numeric value representing the amount paid for the asset, where *cost > =salvage.*

salvage   A numeric value representing the worth of the asset at the end of its useful life, where *salvage> =0* and at least 10 percent of *cost* if *life is* at least 3 years.

life   An integer, numeric value representing the expected useful life of the asset, where *life> =1*

period   An integer, numeric value representing the time period for which you need to determine the depreciation expense, where *period < =life*

Formula   The depreciation value (DDB) and the book value (BV) are calculated as follows:
BV=Cost
DDB=2*BV/Life
BV=BV-DDB
The DDB function examines the calculated results and makes sure that

DDB> =0 and that BV> =*Salvage* in the subsequent calculation. These calculations are performed *period* times.

Suppose you have bought a new £1500 computer and that the dealer told you it will be worth £150 in 5 years. In other words, the cost is £1500, the salvage value is £150 and its life is 5 years. If you wish to determine the depreciation by the second year enter the formula: DDB(1500,150,5,2)
The result is £360.

Examples
DDB(100000,15000,5,1)=40000
DDB(100000,15000,5,2)=24000
DDB(100000,15000,5,3)=14400
DDB(100000,15000,5,4) = 6600
DDB(100000,15000,5,5) = 0

DEGREES

DEGREES converts a given number of radians to its equivalent in degrees.

Format   **DEGREES(angle)**

angle   A numeric value, representing an angle in radians

Examples   DEGREES(PI/2)=90
                    DEGREES(0.5)=28.65

DIV

DIV returns the number of times *number]* can be divided by *number2*.

Format   **number1 DIV number2**

number1   An integer, numeric value

number2   An integer, numeric value (except 0)

Examples   11 DIV 4 = 2

                    A2 DIV 2 = 4, if A2 contains the value 8 (or any other value up

                    to 9.999).

EXP

EXP raises the constant e to the power of the specified number. EXP is the inverse function of the LN function.
Format   **EXP(number)**

number   a numeric value

Examples   EXP(1)=2,7182818
                    EXP(LN(A4))=A4, if A4 contains a positive value, otherwise an error
                    occurs.#

FAC

FAC calculates the factorial value of a given number.

Format   **FAC(number)**

number   An integer, numeric value, maximum 33.

Examples   FAC(0) = 1
FAC(10)=3628800
FAC(D12)= 120, if D12 contains the value 5

FAHRENHEIT

FAHRENHEIT converts a temperature given in degrees Celsius to its equivalent in Fahrenheit.

Format   **FAHRENHEIT(temperature)**

temperature   A numeric value

Examples   FAHRENHEIT(100)=212
FAHRENHEIT(0)=32

Note: This function does not examine whether you have specified a temperature below the absolute zero (which is -273,15 degrees Celsius) or not.

FALSE

FALSE returns the logical value 0 in Campion. It is the opposite of the TRUE function.

Format   **FALSE**

This constant can make conditional statements easier to read and understand for those that are not familiar with logical operators, like > and <.

FRAC

FRAC returns the fractional part of a number (contrary to the INT function which returns the integer part of the number).

Format   **FRAC(number)**

number   A numeric value

Examples   FRAC(12.25)=0.25
FRAC(PI) = 0.14159265

FV

FV returns the future value of an investment where only one initial payment is made. It is assumed that the interest is calculated and added at the end of each term.

Format   **FV(rate, term, present value)**

rate	A numeric value, representing the interest rate. If you enter a negative interest rate the function can be used to discount values as well.
term	A numeric value, representing the number of periods
present value	A numeric value, representing the initial payment

Formula $$FV = PV * (1 + RATE)^{TERM}$$

Suppose you deposit £500 on an account with an annual interest rate of 10%. To determine what the account will be worth in 10 years, enter this formula: FV(0.10,10,500)=1296.87 Your account will be £1297 worth in 10 years.

Note: It is essential that the interest rate and the number of terms are expressed in the same type of time period. If one of them is expressed in months the other must not be expressed in years, otherwise wrong results will be returned.

FVAL

FVAL calculates the future value of an annuity when the periodic interest rate, the number of time periods, the periodic payment and an initial payment is provided.

Format	**FVAL(nper, payment, present value, rate)**
nper	A numeric value, representing the number of time periods
payment	A numeric value, representing the periodic payment
present value	A numeric value, representing an initial payment or an amount which might have been on the account when the investment was made
rate	A numeric value, representing the periodic interest rate, which is assumed to be constant

Formula $$FVAL = -PVAL * (1 + IRATE)^{NPER} - PMT * \left(\frac{(1+IRATE)^{NPER}-1}{IRATE} \right)$$

Let's assume you want to set aside £150 at the start of every month for five years on a savings account that earns 15 Rio annually and that you have made an initial payment of £1000. The FVAL function can be used to determine what the account will be worth at the end of five years: FVAL(5*12,-150,-1000,0.15) = 15,393.36

GRATIO

GRATIO returns the value of the golden ratio, which is approximately 1.6180339887.5.

Format	**GRATIO**

HEX

HEX converts a base 16 or hexadecimal number to a decimal value.

Format	**HEX(number)**
number	A hexadecimal value, maximum 4 digits. It is not possible to insert a cell reference or a formula.
Examples	HEX(FFFF) = 655535
	HEX(0400) = 1024

HLOOKUP

HLOOKUP searches horizontally through the first row in the specified block for the given value. If the value is found, the value in row number of rows beneath it is returned.

Format	**HLOOKUP(value, row, block)**
value	An integer, numeric value or a cell reference. If an exact match is not found in block, an error message is returned.
row	A numeric value larger than or equal to 0, representing the row in the block you wish to access information from. This value is relative to the block. If row exceeds the number of rows in the block, an error message will occur.
block	A range name or two cell references, representing the block of cells containing the table used for the lookup.

The HLOOKUP provides an efficient way to access information stored in a table, which is basically just a block of cells. The table must have index values in the first row. Campion will search for an exact match of *value in* the first row of the block. If the value is found, the value in *row* number of rows beneath it is returned (the value itself will be returned if *row* = 0*)*.

The following examples refer to the spreadsheet shown below. The examples illustrate the use of the HLOOKUP functions. Notice that the block has previously been named Discount Rates which makes the function easier to understand. Cell B4 contains the formula HLOOKUP(B1,B2, DISCOUNT_RATES).

> Examples HLOOKUP(8,3,Discount_Rates) = 0.15
> HLOOKUP(3,2,Discount_Rates) = 0.07
> HLOOKUP(11,2,Discount_Rates) = (an error message is returned,
> because an exact match is not found)
> HLOOKUP(2,6,Discount_Rates) = (an error message will occur,
> because *row* exceeds the number of rows in the given block).

```
SAM(...A...)(.....B....)(...C...)(...D...)(...E...)(...F...)
 0
 1value         8.00
 2term          3.00
 3
 4rate          0.15
 5
 6
 7
 8
 9
10         D i s c o u n t _ R  a t e s
11
12Values         1.00    3.00    5.00    8.00
13rates          0.05    0.09    0.11    0.13
14rates          0.03    0.07    0.08    0.10
15rates          0.08    0.10    0.12    0.15
16rates          0.12    0.15    0.17    0.20
17
18
19
20
+:B4    :P:Free 65025:Filename :
HLOOKUP(B1,B2,DISCOUNT_RATES)▮
```

IF

IF allows you to insert one of two possible numbers based on the result of a test.

Format   **IF(condition to be tested, value if true, value if false)**

condition   A conditional statement

values   Numeric values, representing the value to insert in the cell based on the
                           result of the conditional statement.

Let's say, a company manufactures pencils and wants to examine the consequences of a major increase in production. If the number of pencils manufactured exceeds 1000000 pieces, the company will have to build a new storage building, which will cost £150000. If the company does not manufacture more than 1000000 pencils the £150000 expense can be saved. If A17 contains the number of pencils manufactured and C10 contains the costs of the storage building, the contents of C10 should be: IF(A17> =1000000, 150000, 0)

The cell C10 will contain the value 150000, if A17 contains a value more than or equal to 1000000 and the value 0, if not.

INT

INT rounds off the specified number. The returned value will therefore be an integer value.

Format   **INT(number)**

number   A numeric value

The INT rounds off towards the nearest integer value. The INT function is closely related to the ROUND and TRUNC functions, and it must be considered carefully which one to use. The following table will clarify the difference between these functions:

Value	INT	ROUND	TRUNC	FRAC
1,5	1	1,5	1	0,5
1,55	1	1,6	1	0,55
1,75	1	1,8	1	0,75
-1,75	-2	-1.8	-1	-0,75
-1,55	-2	-1,6	-1	-0,55

IRATE

IRATE calculates the interest rate when the initial payment, the future value, the periodic payment and the number of periods are provided.

Format   **IRATE(nper, payment, present value, future value)**

nper   A numeric value, representing the number of periods

payment   A numeric value, representing the periodic payment

present value   A numeric value, representing the initial payment or the amount deposited on the account when this investment was made

future value   A numeric value, representing the future value of the investment

Assume you are about to buy a new £12000 car and you are able to pay £400 every month for the next five year. The monthly percentage rate can be determined as follows:
IRATE(5*12, -400, 12000,0) = 0.026

LN

LN calculates the natural logarithm of a number.

Format   **LN (number)**

number   A positive, numeric value.

Examples   LN(2) = 0.6931
LN(EXP(3)) = 3
LN(-100), an error message will occur because number is negative.

LOG

LOG calculates the base 10 logarithm of a number.

Format   **LOG(number)**

number   A positive, numeric value.

Examples   LOG(2) = 0.3010
                    LOG(10^6) = 6
                    LOG(-100), an error message will occur because number is negative.

MAX

MAX returns the largest number in a specified block of cells.

Format   **MAX(block)**

  block   A range name or two cell references representing a block of cells.

Example   Turn to the SUM entry for an example.

MEDIAN

MEDIAN returns the value in the middle of the block (if the number of values in the block is odd) or the average of the two values in the middle (if the number of values is even) once the values have been sorted in ascending order.

Format   **MEDIAN(block)**

  block   A range name or two cell references representing a block of cells.

Example   Turn to the SUM entry for an example.

Note: The MEDIAN function does not alter the contents of the cells in the block because the values are only sorted temporarily "behind the scenes".

MIN

MIN returns the smallest number in a specified block of cells.

Format   **MIN (block)**

  block   A range name or two cell references representing a block of cells.

Example   Turn to the SUM entry for an example.

MOD

MOD returns the remainder when an integer number is divided by another integer number.

Format   **number1 MOD number2**

  number1   An integer number, known as the *numerato*r

  number2   An integer number, known as the denominator. An error message will occur, if the denominator equals 0.

Let's say you own a company that manufactures loudspeakers and you want to examine the number of pallets used to ship the loudspeakers. The following spreadsheet illustrates the use of the MOD and DIV functions:

```
SAM(............A............)(...B...)(...C...)(...D...)
  0 Loudspeaker pr pallet              69
  1 Loudspeakers produced          3,870
  2
  3 Nr of full pallets               56
  4 Loudspeakers leftover             6
  5
  6
  7
  8
  9
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20
↓:B4    :P:Free 65231:Filename :
B1 MOD B0█
```

Examples   8 MOD 3 = 2
                      A12 MOD A10 = 3, if Al2 contains the value 15 and A10 contains the
                      value 4.

NEG

NEG returns a boolean value depending upon the sign of its parameter. It returns true if the parameter is negative; otherwise it returns false.

Format   **NEG(number)**

  number   A numeric value

This function can, for instance, be used in the IF function. You can write IF(NEG(A17),0,100) instead of IF(A17<0,0,100). It is primarily used to simplify expressions, especially if you prefer to use functions instead of operators.

NOT

NOT returns the opposite boolean value of a number.

Format   **NOT(number)**

  number   A numeric value or a logical expression

This function can be used in situations where you want to evaluate the opposite of an expression. You can, for example, write the formula IF(A17> 100,0,25) like this IF(NOT(A17> 100),25,0) if you find that the latter is easier to understand.

NPER

NPER returns the number of payment periods for an investment when the periodic payment, the past value, the future value and the interest rate are given.

Format	NPER(payment, present value, future value, rate)
payment	A numeric value, representing the periodic payment
present value	A numeric value, representing an initial payment or an amount which might have been on the account when the investment was made
future value	A numeric value, representing the future value of the investment
rate	A numeric value, representing the periodic interest rate, which is assumed to be constant

Formula

$$NPER = \frac{LOG\left(FVAL + \frac{PMT}{IRATE}\right) - LOG\left(PVAL + \frac{PMT}{IRATE}\right)}{LOG\ (1 + IRATE\ )}$$

Assume that you have an account that earns 12% interest paid at the start of the year, and that you deposit £500 into the account at the end of each year. The present account balance is £778. You can use the NPER function to determine how many payment periods it will take to reach a balance of £15000: NPER(-500,-778,15000,12%) = 11.96

NPV

NPV calculates the current value of a set of estimated cash flow values, discounted at the given interest rate which is assumed to be constant.

Format	NPV(rate,block)
rate	A numeric value, representing the estimated interest rate
block	A range of cells, expressed as two cell references or a range name, representing the cash flow values

Formula

$$NPV = \sum_{i=1}^{n} \frac{V_i}{(1 + RATE)^i}$$

Let's say you are considering to invest £10000, and you expect a return of £3000 in each of the next five year. Put the values -10000, 3000, 3000, 3000, 3000, 3000 into the block A1,A6. Enter the value 11 in A8. The net present value, using a discount rate of 11%, is NPV(A8%,A1,A6) = 979.90

Examples   The following spreadsheet shows an example of the NPV function:

```
SAM(.....A.....)(.............B.............)(...C...)(...D...)
 0   -10,000.00 Initial investment
 1     3,000.00 1.  Years profit
 2     3,000.00 2.  Years profit
 3     3,000.00 3.  Years profit
 4     3,000.00 4.  Years profit
 5     3,000.00 Last years profit
 6
 7        11.00 Annual inflation in pct.
 8
 9       979.90 Final profit
10
11
12
13
14
15
16
17
18
19
20
↓:A9    :P:Free 65113:Filename :
NPY(A8%,A1,A6)L
```

OR

OR returns the boolean value of a comparison between two expressions. The result will be true if just one of the two expressions does not equal zero.

Format	**expr1 OR expr2**
exprl	A numeric value or a conditional statement. If a string of text or a reference to a cell containing text is used for exprl , an error will occur.
expr2	A numeric value or a conditional statement. If a string of text or a reference to a cell containing text is used for expr2, an error will occur.
Examples	1 OR 1 = 1
	1000 OR 1 = 1
	2500 OR Al0> 100 = 2500 if A10 contains a value less than or equal to 100, otherwise 1.

PER

PER can be used to determine the number of possible combinations of n objects using k objects at a time when the order of the selection is of importance.

Format	**PER(n, k)**
n	A positive, integer numerical value representing the number of objects in the group, maximum 33 (See the FAC entry)
k	A positive, integer numerical value less than n. This number representents the number of objects that should be taken out of the group, where k< =n

Formula

$$PER(n,k) = \frac{n!}{(n-k)!}$$

Let's say you want to determine how many two-digit numbers that can be constructed with the digits 1,2,3 and 4 without repeating any digits. The answer is: PER(4,2) = 12.

Examples   PER(10,11) will generate an error message because it is not possible to select 11 objects when there are only 10 to choose from
PER(50,3) will generate an error message because 50 > 33 as mentioned above.

PI

PI returns the value of the constant pi, which is approximately 3.141592654.

Format   **PI**

PMT

PMT returns the payment of an annuity when the number of time periods, the present value, the future value and the interest rate is given.

Format   **PMT(term, present value, future value, rate)**

term	A positive, integer numeric value, representing the number of time periods
present value	A numeric value, representing the initial payment or the amount that might be deposited on the account when the investment was made
future value	A numeric value, representing the future value of the investment
rate	A numeric value, representing the periodic interest rate, which is assumed to be constant during the entire investment period

Formula

$$PMT = \frac{\left(FVAL + PVAL * (1 + IRATE)^{NPER}\right) * IRATE}{1 - (1 + IRATE)^{NPER}}$$

Assume you want to borrow £10000 and the percentage rate is 12% annually. If the loan should be paid back in 10 years the periodic payment is: PMT(10,10000,0,12%) =-1,769.84

POS

POS returns a boolean value depending upon the sign of its parameter. It returns true if the parameter is positive; otherwise it returns false.

Format   **POS(number)**

number	A numeric value

This function can, for instance, be used in the IF function. You can write IF(POS(A17),0,100) instead of IF(A17>0,0,100). It is primarily used to simplify expressions, especially if you prefer to use functions instead of operators.

PRODUCT

PRODUCT returns the product of the cells in the block.

Format	**PRODUCT(block)**
block	A group of cells, expressed as two cell references or a range name
Examples	PRODUCT(A3,A6)= 0.0084, if the cells A3 to A6 contains the values 0.1. 0.4, 0.7 and 0.3 in any order.
	PRODUCT(PROBABILITIES)=0.0084, if the range A3, A6 from the previous example have been named PROBABILITIES.

PV

PV calculates the present value of an investment assuming that the interest rate is constant over the entire investment period, and that the interest is compounded at the end of each time period.

Format	**PV(rate, term, future value)**
rate	A numeric value representing the interest rate, which is assumed to be constant during the entire investment period. For a further discussion of the interest rate turn to the "Compounding functions" in the previous chapter.
term	A positive, integer value, representing the number of time periods
future value	A numeric value, representing the future value of the investment
Formula	$$PV = \frac{FV}{(1 + RATE)^{TERM}}$$

Let's say you want £10000 in 10 years and your bank offers you an account with an annual interest rate of 10%. The PV function can be used to determine the amount you will have to deposit in the bank today to obtain the £10000 in 10 years: PV(0.1, 10, 10000) = 3855.43

Note: The PV function can also be used to perform calculations dealing with discounted values.

PVAL

PVAL returns the present value of an investment where the payment is paid for a number of time periods and is discounted at a given rate per time period when the future value of the investment is also given.

Format	**PVAL(nper, payment, future value, rate)**

nper	A positive, integer numeric value, representing the number of time periods
payment	A numeric value, representing the amount of the periodic payment
future value	A numeric value, representing the future value of the investment
rate	A numeric value, representing the periodic interest rate, which is assumed to be constant during the entire investment period

Format

$$PVAL = \frac{-FAVL - PMT * \left(\dfrac{(1 + IRATE)^{NPER} - 1}{IRATE} \right)}{(1 + IRATE)^{NPER}}$$

Examples   PVAL(15, -2000, 0, 0.10) = 15,212.16
                  PVAL(20, 0, -40000, 0.10) = PV(0.1, 20, 40000) = 5,945.75

RADIANS

RADIANS converts an angle in degrees to its equivalent in radians.

Format	**RADIANS(angle)**
angle	A numeric value, representing an angle in degrees
Examples	RADIANS(90) = PI / 2
	RADIANS(28.65) = 0.5

RANGE

RANGE returns the difference between the maximum value and the minimum value of the cells in the specified block.

Format	**RANGE(block)**
block	A group of cells, expressed as two cell references or a range name
Examples	RANGE(A3,A5) = 10, if the range A3,A5 contain the values 1, 3, 11

RATE

RATE returns the interest rate of an investment when the present value, the future value and the number of periods are given.

Format	**RATE(term, present value, future value)**
term	A numeric value, representing the number of periods
present value	A numeric value, representing the present value or the initial (and only) payment
future value	A numeric value, representing the future value of the investment under the given circumstances

Formula

$$RATE = \sqrt[TERM]{\dfrac{FV}{PV}} - 1$$

Let's say you want to deposit £1000 in a savings account and you want to obtain £2500 in 10 years. The RATE function returns the interest rate necessary to fulfil your wish: RATE(10,1000,2500) = 9.6%

Examples   RATE(10,1000,5000) = 17.5%
RATE(2,1200,1000) = -8.7% (This example shows that the function can also be used to discount figures)

RND

RND returns a randomly chosen value between 0 and 1.

Format   **RND**

RND(

RND(returns a randomly chosen integer value between numbed and number2.

Format   **RND(number1, number2)**

  number1   A numeric value

  number2   A numeric value larger than or equal to number1

The RND() function can be used to get random values in a spreadsheet. It is more powerful than the RND function because you specify the range you wish the random value to be in. It can be used if you want to add an uncertainty factor to a forecast.

ROOT

ROOT determines any root of a number which makes it more powerful than the SQR function.

Format   **ROOT(number1, number2)**

  numberl   A numeric value, representing the root you wish to determine of number2

  number2   A numeric value. The specified value must be positive if number1 is even.

Formula

$$ROOT = \sqrt[number1]{number2}$$

Examples   ROOT(2, 9) = 3
ROOT(3, 27) = 3
ROOT(A9, A10) = 10, if A10 contains the value 1000 and A9 contains the value 3

ROUND

ROUND rounds off values to a specified number of decimals.

Format   **ROUND(number, decimals)**

  number   A numeric value, representing the value you wish to round off

  decimals   An integer numeric value, representing the number of decimals

Examples   ROUND(PI,2) = 3.14
ROUND(PI,7) = 3.1415926
ROUND(1/7,A3) = 0.14286, if A3 contains the value 5
ROUND(1510,-3) = 2000

Tip: You can also use ROUND to round off a value by any power of 10. If you wish to round off a value to the nearest 100, then use -2 as the number of decimals. You can also use -3 as the numbers of decimals if you wish to round off a value to the nearest 1000, and so forth. Examples are provided above.

SGN

SGN can be used to perform conditional statements based on the sign of the specified number.

Format   **SGN (number)**

  number   A numeric value

The SGN function returns 1 if number is positive or -1 if number is negative.

Examples   SGN(-10) = -1 SGN(100) = 1
SGN(A4) = -1, if A4 contains a negative number

SIN

SIN returns the sine of an angle in radians.

Format   **SIN (number)**

  number   A numeric value, representing an angle in radians

Examples   SIN(PI/2) = 1
SIN(PI) = 0

SLN

SLN returns the straight-line depreciation allowance for an asset over one period of its life.

Format   **SLN(cost, salvage, life)**

  cost   A numeric value, representing the amount paid for an asset

salvage	A numeric value, representing the value of an asset at the end of its useful life
life	A positive numeric value, representing the number of years of useful life for an asset

Formula

$$SLN = \frac{COST - SALVAGE}{LIFE}$$

Assume you have just bought a new £1200 computer. The dealer promises you that you can sell it back to the store for £200 in 5 years. That means, the salvage value is £200 and the asset's life is 5 years. The depreciation allowance of the computer for each year of its useful life is: SLN(1200,200,5) = 200.

SQR

SQR returns the square root of a positive number.

Format	**SQR(number)**
number	A positive, numeric value
Examples	SQR(100) = 10 SQR(A10) = 9, if A10 contains the value 81 SQR(-10), an error message occurs because -10 is not a positive number.

STD

STD calculates the population standard deviation of a block of cells. This statistical function is useful when examining a large amount of numbers. This function is the square root of the population variance.

Format	**STD (block)**
block	A group of cells, expressed as two cell references or a range name
Example	Turn to the SUM entry for an example.

STDS

STDS calculates the sample standard deviation of a block of cells. This function is preferable if only a sample of the entire population is available, although it is very similar to the STD function. This is the square root of the sample variance.

Format	**STDS(block)**
block	A group of cells, expressed as two cell references or a range name
Example	Turn to the following SUM entry for an example.

SUM

SUM returns the sum of the cells in a specified block of cells.

Format	SUM(block)
block	A range of cells, expressed as two cell references or a range name
Example	The following sample spreadsheet illustrates the use of the statistical functions STD, STDS, SUM, MIN, MAX, RANGE, VAR and VARS.

```
SAM(...A...)(...B...)(...C...)(...D...)(...E...)(...F...)
  0    37.00    57.00    91.00    42.00    40.00
  1    37.00    70.00    58.00    97.00    70.00
  2    64.00    61.00    97.00    62.00    15.00
  3    39.00    43.00    75.00    52.00    21.00
  4    52.00    57.00    17.00    77.00    19.00
  5    72.00    19.00    35.00    56.00    27.00
  6    28.00    78.00    16.00    60.00    80.00
  7    34.00     8.00    79.00    95.00    44.00
  8    66.00    26.00     3.00    67.00     9.00
  9   100.00    88.00    69.00     8.00     1.00
 10
 11sum          2,518.00
 12Min              1.00
 13Max            100.00
 14Range           99.00
 15Avg             50.36
 16Median          54.00
 17Var            754.55
 18Std             27.47
 19Vars           769.95
 20Stds            27.75
↓:B11   :P:Free 64689:Filename :
SUM(BLOCK)█
```

Note: The range A0,E9 has previously been named BLOCK.

SYD

SYD calculates the depreciation allowance of an asset using an accelerated depreciation method which allows higher depreciation allowances in the early years of the asset's useful life

Format	SYD(cost, salvage, life, period)
cost	A numeric value, representing the amount paid for an asset
salvage	A numeric value, representing the value of an asset at the end of its useful life. The following must be true: cost> =salvage> =0
life	A positive, numeric value, representing the number of years of useful life for an asset
period	A positive, numeric value, representing the period for which you want to determine the depreciation allowance. The following must be true: life> =period> =1

Formula

$$SYD = \frac{(COST - SALVAGE)(LIFE - PERIOD + 1)}{LIFE \frac{(LIFE + 1)}{2}}$$

Assume you have just bought a new £1200 computer. The dealer promises you that you can sell it back to the store for £200 in 5 years. That means, the salvage value is £200 and the asset's life is 5 years. The depreciation allowances of the computer for each of the 5 years of its useful life is:

SYD(1200,200,5,1) = 333.33
SYD(1200,200,5,2) = 266.67
SYD(1200,200,5,3) = 200.00
SYD(1200,200,5,4) = 133.33
SYD(1200,200,5,5) = 66.67.

TABLE

TABLE returns a specified number from a previously defined table, which is just a part of the spreadsheet.

Format	TABLE(row,column,block)
row	A positive, integer value, representing the row in block from which the value should be taken
column	A positive, integer value, representing the column in block from which the value should be taken
block	A range of cells, expressed as two cell references or a range name

The TABLE returns the value in row *row* and column *column* in block, where *row* and *column* are measured relative to the upper, left corner of block.

Assume you have built the following spreadsheet which might contain the provision figures for your sales representatives. The following figures will be provided by the TABLE function if you have named the range B13,E16 PROVISION. Cell B7 contains the formula B5*TABLE(B4-1,B3-1,PROVISION)%.

```
SAM(........A........)(....B....)(....C....)(....D....)(...E...)
  1
  2
  3 Sales man       3
  4 Department      3
  5 Sales amount      100,000.00 £
  6
  7 Provision         ▐ 7,000.00▌ £
  8
  9 Provision pct.    1:Johnson   2:Smith    3:Doyle
 10 1:Lawn tools         10.00      22.00     15.00
 11 2:Chainsaw           12.00      20.00     10.00
 12 3:Kitchen stuff      20.00      10.00      7.00
 13 4:Furniture          18.00      10.00      7.00
 14 5:Carpets            15.00      10.00      7.00
 15 6:Fertilizers         7.00       7.00     20.00
 16 7:Pesticides          7.00       7.00     20.00
 17 8:Nails & screws      7.00      15.00     10.00
 18 9:Small tools         7.00      10.00     12.00
 19
 20
 21
↓:B7    :P:Free 64645:table    :
B5*TABLE(B4-1,B3-1,PROVISION)%▐
```

TAN

TAN returns the tangent of an angle in radians.

Format	**TAN (angle)**
angle	A numeric value, representing an angle in radians
Examples	TAN(0) = 0 TAN(PI/4) = 1
	TAN(C13) = 0.9316, if C13 contains the value 0.75.

TERM

TERM returns the number of periods it takes an initial payment to reach a given future value when the interest rate is given.

Format	**TERM (rate, present value, future value)**
rate	A numeric value > -1, representing the periodic interest rate which is assumed to be constant during the entire investment period
present value	A numeric value, representing the past value (the initial payment) of an investment
future value	A numeric value, representing the future value of an investment

Formula

$$TERM = \frac{LOG(FV) - LOG(PV)}{LOG(1 + RATE)}$$

Assume you want to find out how many years it will take an investment of £10000 to reach a future value of £15000 when the expected annual rate of return is 15%: TERM(0.15,10000,15000) = 2.9 years.

TRUE

TRUE returns the logical value 1 in Campion. It is the opposite of the FALSE function.

Format	**TRUE**

This constant can make conditional statements easier to read and understand for those that are not familiar with logical operators, like > and <.

TRUNC

TRUNC returns the integer number of its argument. It differs from the INT function because it truncates the argument towards zero, which is illustrated in the table under the INT entry.

Format	**TRUNC(number)**
number	A numeric value

VAR

VAR calculates the population variance of a specified block of cells. It equals the population standard deviation (STD) raised to the power of 2.

Format   **VAR(block)**

block   A range of cells, expressed as two cell references or a range name

Formula

$$VAR = \frac{\sum (X - AVERAGE)^2}{N}$$

Example   A sample spreadsheet illustrating this can be found under the SUM entry. This sheet also shows the difference between the VAR and VARS functions.

VARS

VARS calculates the sample variance of a specified block of cells. It equals the sample standard deviation (STDS) raised to the power of 2.

FormatVARS (block)

block   A range of cells, expressed as two cell references or a range name

Formula

$$VAR = \frac{\sum (X - AVERAGE)^2}{N-1}$$

Example   A sample spreadsheet illustrating this can be found under the SUM entry.

VERSION

VERSION returns the version number of Campion.

Format   **VERSION**

VLOOKUP

VLOOKUP searches vertically through the first column in the specified block for the given value. If value is found, the value in column number of columns to the right of it, is returned.

Format   **VLOOKUP(value,column,block)**

value   An integer, numeric value or a cell reference. If an exact match is not found in block, an error occurs.

column   A numeric value larger than or equal to 0, representing the column in the block you wish to access information from. This value is relative to the block and if column exceeds the number of columns in the block, an error message will occur.

Block　　　　　　　　　A group of cells, expressed as two cell references or a range name, repre
senting the block of cells containing the table used for the lookup.

The VLOOKUP provides an efficient way to access information stored in a table, which is basically just a block of cells. The table must have index values in the first column. Campion will search for an exact match of *value* in the first column of *block*. If *value* is found, the value in *column* number of columns to the right of it is returned (*value* itself will be returned if *column* = 0).

　Example　　　　　　Turn to the HLOOKUP entry for an example. The only difference
between the HLOOKUP and VLOOKUP functions is that the columns
and the rows in the table have been transposed.

12: Error messages

This chapter lists the entire range of the error messages you might see while working with Campion. The error messages can be divided into two categories: software and hardware errors.

Whenever an error occurs, the appropriate error message is shown in the right side of the Status line. The error message is written in plain English and not just a cryptic error code.

This chapter will be of use if you do not understand the message or if you do not know how to correct the problem that caused the error message.

Software error messages

One of our four design goals was "Comprehensive error handling" as mentioned in the Introduction. This means that whenever you make a mistake while entering formulas in the spreadsheet, Campion will provide you with an error message that is easy to understand so that you can easily correct the problem.

There are some simple rules that must be followed while entering data in the spreadsheet as explained earlier in this *User's Guide*. If you by accident do not follow these rules one of the following error messages will appear in the right side of the Status line.

The widebar will be moved to the cell where the error is detected. This does not, however, mean that the error is located in this cell. It might as well be located in a cell referenced to by the current cell or in a cell that is referring to the current cell.

Some of the error messages can be avoided by using the IF-function and the logical operators extensively throughout the spreadsheet.

Syntax error

This message is displayed if you have made an error while entering an expression. This message may appear for many reasons, usually due to a spelling error.

Examine the expression and check to see; if the right number of arguments has been provided when using a built-in function; if you have used operators (like + or /) correctly and so forth.

Line too long

This message is displayed if you have entered a formula that uses more than 255 bytes when it has been interpreted by Campion.

You should consider to split the formula into several simpler formulas.

Invalid argument

This message is displayed if you have entered an illegal value in a function. It is, for example, not possible to calculate the value SQR(-1) or LOG(-15).

Examine the cell that caused this error. It might be necessary to use an IF statement to avoid this message.

Number too big

This message is displayed if a value is larger than 1E+39 or smaller than 1E-39.

Try to split the calculation that gives this message into several calculations. If this does not help the value is simple too high or too low for the Spectrum.

Integer out of range

This message is displayed if you enter an integer value that is out of the allowable limits (in the CHOOSE function, for example).

It is necessary to alter the contents of the spreadsheet or use an IF statement so that this message will not occur again.

Missing a ")"

This message is displayed if you have missed a ")" or entered a "(" too many.

Examine the formula by counting the number of "("'s and ")"'s which should be equal. If that is not the case, enter the number of parentheses that is required.

Missing a ","

This message is displayed if a comma is missing in an expression. This will happen, for example, if you enter an expression like ATAN2(l) because you have just entered one argument and Campion cannot locate the second argument due to the missing comma, or if you have forgotten a comma between two arguments.

Examine where the comma should be inserted and insert it.

Invalid cell reference

This message is displayed if a cell reference larger than DX999 has been entered in the Jump option, for example.

Enter a new cell reference.

Infinite loop

This error message is displayed if Campion has entered an infinite loop of cell references during recalculation. This might happen if Al contains the cell reference A2, and A2 contains

a cell reference to A1. Campion cannot return any results due to this circular reference and will therefore provide this message instead. A circular reference might also occur if the number of references is larger than two (as in the example above).

Check the spreadsheet for circular references.

Not numeric

This message is displayed if a reference is made to a cell containing text when a numeric argument is required.

You will have to edit the contents of the cell because it is not possible to mix numbers and text in a single cell in Campion.

Cell not found

This message is displayed if a reference is made to a cell that has not been defined.

Define the cell by entering a value or check to see if the cell that references the cell in question is erroneous.

Invalid range ref.

This message is displayed if you have entered the two cell references that are necessary to define a range in the wrong order.

The cell in the upper, left corner should always be entered as the first reference and the cell in the bottom, right corner as the last.

Out of sheet

This message is displayed if you try to copy or move a range out of the sheet. It is, for example, not possible to copy the range A1,A15 to DX999 because DX999 is placed in the bottom. right corner of the spreadsheet.

Examine the copy or the move operation that returned this message because you have probably entered a wrong cell address somewhere.

Out of memory

This message is displayed if your computer has run out of memory.

Save your spreadsheet immediately. It might also be a good idea to split the spreadsheet into several spreadsheets if you do not wish to see this message again. (It might not be possible to save your spreadsheet as it is because Campion requires a small amount of memory to open the main menu and the file menu.)

Column too narrow

This message is displayed if a number has more digits than there is room for in the current column. (This will not happen for text entries as they are cut off.)

Change the column width by selecting the Width option from the Main menu or change the layout of the number by choosing the **R**ange | **L**ayout option.

Margin too wide

This message is displayed if the printout has been configured so that there is not enough room between the margins for the data.

Change the margin settings (Choose **P**rint | **C**onfig | **M**argins) or the number of characters per line (Choose **P**rint | **L**ayout | **C**har/line)

Invalid name

This message is displayed if you have specified an illegal filename or an illegal range name.

Type another filename. Remember that a range name or a filename can only consist of the characters: a to z, 0 to 9, _ (the underscore character) and A to Z.

File not found

This message is displayed if you have tried to load a file which can not be found on the cur-rent disc.

Examine whether you have spelled the filename correctly.

Filename used

This message is displayed if you have named a file with a name that has already been used on the current disc.

Use another filename or save it on another disc.

Hardware error messages

The following five error messages will occur if there is some kind of problem with your computer system.

There are a couple of things you might try before contacting your dealer:

- Examine the entire computer system for bad connections between each unit and wires that are not connected properly.
- Try to make an operation in another program similar to the one that forced the error message to appear.
- Consult the manuals that came with your computer hardware (computer, printer, disc drive interface etc) and check if they contain a troubleshooting chapter.

If the problem has not been located at this moment it is recommended that you contact your dealer as soon as possible.

Verify failed

This message is displayed if an error has occurred while Campion was verifying the file you had previously saved. It is recommended to save the file on another tape or disc.

This is an error caused by your computer hardware. It might be a good idea to clean and adjust your tape recorder.

Examine the wires between the computer and the tape recorder.

Refer to your computer manual for further instructions.

Tape error

This message is displayed if an error occurs while the tape recorder is active and the error is not one of the previously discussed errors.

Examine the entire computer system for bad connections and wires that are not connected properly.

Try to save the file again or load the file by using another tape recorder before consulting your hardware dealer.

Disc full

This message is displayed if the current disc has been filled with files.

Note for +D/DISCiPLE owners: This does not necessarily mean that the disc is full but the catalogue cannot contain more than 80 filenames and if you try to save file number 81, this error occurs.

Disc error

This message is displayed if an error occurs while the disc drive is active and the error is not one of the previously discussed errors.

Try to use the disc drive with other programs: if a similar error message is given in these programs, consult your hardware dealer because this might be a serious hardware error that requires the aid of professional technicians.

No disc interface

This message is displayed if you try to perform a command that is related to the disc interface and Campion fails to gain access to the interface.

This is a serious problem, so please turn off the computer system.

Make sure that the interface is correctly attached to the Spectrum and that all the wires are connected as they should be.

Try to wriggle a little with the interface because there might be a bad connection between the interface and the Spectrum.

Load another program and check if this program is having trouble with accessing the disc interface as well. If this program runs without any problems, contact Campion Software. Otherwise contact your dealer immediately before your computer is severely damaged by hardware problems.