

ViewSheet

**An electronic spreadsheet
for the BBC Microcomputer**

ACORNSOFT

Copyright © Acornsoft Limited 1984

All rights reserved

First published in 1984 by Acornsoft Limited

No part of this book may be reproduced by any means without the prior consent of the copyright holder. The only exceptions are as provided for by the Copyright (photocopying) Act or for the purpose of review or in order for the software herein to be entered into a computer for the sole use of the owner of the book

FIRST EDITION

ISBN 0 907876 82 X

Acornsoft Limited, Betjeman House, 104 Hills Road, Cambridge CB2 1LQ
Telephone (0223) 316039

1 What is a spreadsheet?

The spreadsheet is one of those amazingly useful ideas which is so simple in principle that we all wish we had thought of it first.

Imagine a huge chart composed entirely of rectangular pigeon-holes – in ViewSheet there are as many as 255 by 255.

These pigeon-holes (we will call them ‘slots’) may each be filled with any of the following:

- A number.
- A formula (for example, to multiply the value in another slot by 55).
- A ‘label’ (for example: TOTAL).

Any slot may be linked with any other slot, so that slots may interact with each other across the length and breadth of the sheet.

Once a sheet is set up, any new amounts entered in it can automatically be related to what is recorded already. Calculations that would be very repetitive if carried out by conventional means are achieved at no greater effort than that of entering the data on which they are based.

The table below is an example of the kind of calculations for which spreadsheets are used. It shows a list of prices followed by the VAT for each item, and the total price including VAT. The rate of VAT is shown in slot C1. Such is the power of the spreadsheet that you have only to enter another rate of VAT in slot C1 and all the prices in the TOTAL PRICE column and all the amounts of VAT in the sheet will adjust themselves automatically.

Without going into detail of how this particular display is made up, it is clear that facilities of this kind make spreadsheets extremely valuable for forecasting and testing out possibilities in many areas of work. Once a display is set up, you can vary any key quantities – which might for example be interest, or tax rates, prices, sales volume, membership, or growth rate – and see what the effect would be on the system or operation as a whole.

Spreadsheets are widely used, in industry, commerce and research, for recording and comparing data, and for planning and forecasting. At home and in small businesses they are used for basic accounting and records.

ViewSheet is the spreadsheet for the BBC Microcomputer. It allows you to set up displays, vary them at will, save them onto disc or cassette, retrieve them, and print them out in whole or in part. The following pages go into all this in detail

2 Hands on ViewSheet

The point of this chapter is to gain some idea of what you can do with ViewSheet, so that when you come to explore its various facilities you will see where they all fit in.

Before you start you should place the function key card under the clear plastic strip at the top of the keyboard, lining it up so that DELETE CHARACTER is immediately above function key **F9**.

From now on the assumption is made that ViewSheet is installed correctly in your computer. See the leaflet accompanying the ROM for details of how this is done.

According to how it is installed, you may be in ViewSheet immediately you switch on the computer or, more likely, you may have to ask the computer for it. To ask the computer for ViewSheet you should type:

*SHEET and press **RETURN**.

You should now be looking at something like this:

You will probably also find that the screen is flickering slightly. To stop it doing so, and to change to MODE 3, type:

```
*TV0,1 RETURN  
MODE 3 RETURN
```

From this point onwards in the book the assumption will be made that you are working in MODE 3, which means that the screen shows 25 lines of 80 characters each. While other modes are possible, MODE 3 is the most generally useful.

ViewSheet is now in command mode, the mode in which you can tell the computer to SAVE, LOAD and PRINT. The main mode in which ViewSheet operates is sheet mode. To move into sheet mode press **ESCAPE**.

The **ESCAPE** key switches between command and sheet mode and back again. Switching between modes has no effect whatever on anything you have recorded in sheet mode.

The sheet mode display is like this:

The slot which appears on the screen as a white block (this is called 'reverse video') is the slot into which you can enter numbers immediately. This reverse video display is known as the 'cursor', and you can move the cursor to any slot you like by pressing the arrow keys at the right of the keyboard

Try this for yourself. Press the right or downward arrow key *briefly* several times. Don't try holding it down yet The cursor jumps from slot to slot each time you press the arrow key.

If you start from the A column and press the right arrow key eight times, the cursor moves to the extreme right position on the screen (ie assuming you are in MODE 3). The next time you press the right arrow key you will find the letters marking the columns changing, so that the left-hand column is no longer 'A'.

What is happening is that the screen is moving across the spreadsheet. The columns along the top are labelled A to Z, followed by AA to AZ and so on through to column IU, which is the 255th column. Rows down go from 1 to 255.

If you now hold one of the arrow keys down for a second or two you will notice that the cursor moves several rows or columns one after the other, even though you have pressed the key only once.

This is a BBC Microcomputer facility known as 'auto-repeat'. If you hold a key down, the effect is as if you had pressed that key several times in quick succession

If you have tried all this you may begin to wonder where exactly you are in the spreadsheet. In order to help you check this ViewSheet gives you a reminder in the top left corner. After SLOT= is the reference of the slot where the cursor rests. The form is always the same: column before row – so that A1 is the top left corner. The CONTENTS= line below this shows what is in the slot.

When you want to return to slot A1, this is also quite easy. Hold down **SHIFT** and press the upward arrow key a few times; then still holding down **SHIFT** press the left arrow key a few times. The effect of **SHIFT** is to magnify the action of the arrow keys - instead of going from one slot to the next, the window moves in jumps across the sheet each time you press them.

Entering values

Move the cursor back to slot A1 and type any number you like into it. To do this just type the number and press **RETURN**.

Notice what happens. The number you type appears first, at the top left of the sheet, and only appears in the slot after you have pressed **RETURN**. At the same time the CONTENTS= line shows the number you have entered as the contents of the slot, and the letter V appears at top left to show that you have entered a value.

Try several numbers for practice.

Slot references and formulae

We mentioned earlier that you can enter a formula in a slot. In ViewSheet formulae can be as simple as an instruction to add 3 to the amount in another slot, or as complex as those used in statistics.

Note: Multiplying and dividing are done with the signs * and /.

Move the cursor to any slot you wish and type:

3.14*123 **RETURN**

The number 386.22 should appear in the slot. Notice that *there is no equals sign*. It is not necessary in ViewSheet since each slot shows the result of whatever value or calculation there may be in it. Try a few more formulae with plus and minus.

By now you will probably have made a few mistakes. If you are typing in a value and find you have typed a wrong digit, you should use the black **DELETE** key at the bottom right of the keyboard. This rubs out the character to its left. If you have already pressed **RETURN**, the simplest way is to place the cursor in the slot that is wrong and overwrite the entry by entering another value.

Move to a blank slot and type:

12345 * 5.5 **RETURN**

and the number 67897.5 should appear in the slot.

Any you can check the entry by typing:

67897.5 / 5.5 **RETURN**

In practice formulae often contain references to other slots. The simplest possible slot reference occurs when you wish to repeat a number in another slot. Move the cursor to a blank slot, and instead of entering a number type:

A1 **RETURN**

Assuming that you have as suggested above, actually entered something in the slot A1 you will see that number reproduced again in the current slot. If you have not the sheet will show zero for the slot with the formula in it until you enter a value in slot A1.

Notice what happens to the CONTENTS= line here. Instead of showing the number in the slot it shows the slot reference you have entered, This is convenient when you are using complex formulae, since by placing the cursor on the slot you can see both the formula (in the CONTENTS= line) and the result (in the slot).

Notice also that the letter V appears at top left when you enter a reference or formula: these too are values.

Calculation

Now to set up an actual calculation. By now you will have a good many unwanted entries all over the screen. To clear the screen completely, press **ESCAPE** to switch to command mode type:

NEW **RETURN**

Press **ESCAPE** again to get back to the sheet (which will now be blank) and enter a value in slot A1. Enter another number in slot B2. Now move to slot C3 and type:

A1 + B2 **RETURN**

When you press **RETURN** the number that appears in C3 will be the sum of the other two numbers. To prove the working of the spreadsheet, change the numbers in A1 and B2 a few times, and watch the number in C3 change accordingly.

$$A1 + B2$$

Experiment with a few other numbers. For example:

$A1/0.125*D3$ Divides the contents of A1 by 0.125 and multiplies the result by the contents of D3.

$((A6+A7)*D4)+15$ Adds the contents of A6 to the contents of A7, multiplies the result by the contents of D4 and adds 15 to the result.

Notice the use of parentheses here. You will find other mathematical symbols and operators in Part Two.

Recalculation

Every time you change a value, ViewSheet automatically ‘recalculates’, but it is important to realise the direction in which it does this. Recalculation is from left to right along each succeeding row from top to bottom.

To recalculate a sheet hold down **SHIFT** and press function key **F7** – which you will see on the function key card is ‘RECALCULATE’. Alternatively press **TAB** – which also causes the sheet to recalculate.

What is a slot?

Before we go on to entering more complex things in slots, we need to be quite clear as to what a slot is. When you look at the sheet mode display, as it is at the moment, it is clear that seven characters will fit into each slot. The first character space is always blank so as to divide columns from each other.

Formulae can of course be much longer than seven characters, but then they do not appear in the slots. However the values themselves can be longer too. You can prove this by typing

1.23456789 **RETURN**

The number that appears in the slot is: 1.23457. ViewSheet has rounded the number to fit the slot, but the number which appears on the CONTENTS= line is the full number you entered, and this is the number which will be used in calculations.

As we shall see later, many adjustments can be made both to slots and their contents. Column widths can be increased, values can be ranged left to right, the number of decimal places can be specified, and so on.

Entering labels.

So far we have dealt only with entering values in slots, but ViewSheet allows you to enter characters in slots which do not make up any value at all. This is useful for headings and explanations. Such entries are known as ‘labels’.

As you know, when you enter a value into a slot the letter V for ‘value’ appears at top left. Similarly when you enter a label the letter L appears.

Try entering a word such as ‘TOTAL’ or ‘BUDGET’ in a slot. Type the word and press **RETURN** – and the word itself appears in the slot. In contrast to values labels are normally ranged left.

When you press **RETURN**, ViewSheet examines whatever you have placed on the editing line. If it makes sense as a value ViewSheet will place it in the slot, ranged right. Otherwise ViewSheet will assume it is a label, range it left, and not use it in any calculation.

Occasionally this causes a problem. Suppose you want to use the date '1984' as a heading: the simplest way to make sure this is read as a label, not as a value, is to place it in single quotes or between some kind of markers.

Another situation in which this ViewSheet facility may produce puzzling results is when you make a mistake in entering a formula. ViewSheet will then examine your formula, which does not make sense as a value, conclude that it must be a label, and enter it in the slot as such

Editing slot contents

When this happens, the best way is to *edit* the contents of the slot. We have in fact been using the *editing line* for some time – this is the line on which you type when you place values in slots.

The most radical way of editing the slot contents is simply to replace what is in the slot completely, ie place the cursor on the slot, type new contents and press **RETURN**.

However, if the slot contains a complex formula you may prefer to modify it rather than retype it all. The first step is to *copy* the contents of the slot back into the editing line at the top. To do this, place the cursor in the slot and press **COPY**.

Once the slot contents are in the editing line, a flashing white block is positioned over the first character. This is the line cursor and it is an indication that you can now use ViewSheet's editing facilities to modify the entry. The following are the most important. For the rest see Part Two.

Moving the line cursor

All editing takes place at the cursor position, so you need to be able to move the cursor along the line. To do this hold down **CTRL** and press a right or left arrow key.

Inserting and deleting characters

The INSERT CHARACTER and DELETE CHARACTER keys are **F8** and **F9** – see the function key card. To insert, place the line cursor on the character

after the point where you wish the new character to appear. Then press **F8**; the text opens up and you have only to type in the character. For example:

Place the cursor on 'L': TOTLS
Press function key **F8**: TOT_LS
Type 'A': TOTALS

Deleting is even simpler: place the line cursor on the character you want deleted and press the DELETE CHARACTER key.

Deleting to the end of a line

For this you use function key **F3**. What it does is to delete the character which the line cursor is on, and everything to the right of it on the editing line.

Rubbing out – part of entry

We have mentioned this before. If you have just typed a character which you realise is wrong, press **DELETE** at bottom right on the keyboard, and the character to the left of the cursor will be deleted.

Rubbing out – whole entry

If at any time you change your mind about the entry you are making and want to rub it out completely and go out of editing mode, you have only to press **ESCAPE**. This can be used to discontinue any operation on the spreadsheet.

Deleting slots

Another kind of deleting is also available in ViewSheet. This is for deleting the whole contents of a slot. To do this, place the sheet cursor on the slot to be deleted, hold down **SHIFT** and press function key **F9**.

Exercise

Try to construct a 'magic square' just like the one below. Enter the figures in the square simply as numbers. The equals signs and the title will be labels. Use formulae for the totals of the rows and columns.

Magic square

Remember that slot references are entered in formulae like this:

$$A1+A2+A3$$

Did you have trouble placing the labels in line with the numbers? Normally numbers range right and labels left, but you can use spaces to even them up.

A neater way of aligning labels is to make use of ViewSheet's facility for right-justifying labels. Enter your label in the usual way; then leaving the cursor in the same slot press **SHIFT F8** (JUSTIFY LABEL) and the slot will change

m	

Additional facilities for entering

With a sheet as small as the magic square it is easy enough to type in all the slot references for the additions. However, there are times when you need to make up a formula containing references from all over the sheet. ViewSheet has two facilities which are particularly useful for this.

Moving the sheet cursor while editing

Once you have started typing the contents of a slot, you can move the sheet cursor where you like - which can be very useful when you want to check up on a slot reference you are thinking of giving in a formula. When you press **RETURN** the entry appears in the slot you started with, no matter where the sheet cursor may actually be.

Automatic copying of slot references

Position the cursor on a slot. Then hold down **SHIFT** and press **COPY**. The slot reference appears in the editing line. This is a quick and accurate method which can be very useful when making up complex formulae.

For example suppose your magic square is set up like this . . .

. . . and you want to add the totals for the left-right and right-left diagonals at the bottom. Using the two facilities just described the method would be to place the sheet cursor on slot E13 and press the Space Bar once – this gets you into the editing process and ensures that when you eventually press **RETURN** the entry will appear in this slot.

Then move to slot B3, hold down **SHIFT** and press **COPY** - the reference B3 will appear in the editing line. Type the plus sign and move on to slot C5. Hold down **SHIFT** and press **COPY** again and C5 will appear in the editing line - and so on.

The whole process is as follows:

Slot	Action	Result in editing line
D13	Space Bar	Editing begins
B3	SHIFT COPY	B3
	+	B3+
C5	SHIFT COPY	B3+C5
	+	B3+C5+
D7	SHIFT COPY	B3+C5+D7

Then press **RETURN** and the job is done. Use the same method for slot E14.

3 Ranges and replication

It is easy to get the impression, when looking at a finished spreadsheet, that although it is remarkably useful, it must have been very boring to set up. Column after column of figures, differing perhaps only slightly in their makeup; row upon row of statistics, progressing in regular formation across the sheet – surely there ought to be some easier way of setting them up than painstakingly entering every variation of every formula for every slot.

ViewSheet has several labour-saving devices of this kind for entering data, grouping items together, and copying too.

Ranges

Suppose you want to add a whole column of figures together. Rather than specify all the slots in a formula, ViewSheet allows you to specify a ‘range’, either vertically or horizontally, and add together everything within that range.

To try it out, clear the sheet by pressing **ESCAPE** (and so returning to command mode), typing NEW and pressing **RETURN**. Now press **ESCAPE** again and enter a column of figures in column A.

An easy way of doing this is to make use of the AUTO ENTRY mode.

Press function key **CTRL F0**

The letter R appears at top left on the screen.

Press it again and the R changes to D.

Press it again and the D disappears.

R means right and D means down. What AUTO ENTRY does is to save you the trouble of pressing the arrow keys every time you want to move to the next slot. Just type the number in and press **RETURN** - and the system moves you on to the next slot automatically.

For present purposes we need the D (down) operation. Use it to enter ten figures in A1 to A10. Then move the cursor to slot A15 and type

A1A14 **RETURN**

Placing the two slot references together in this way is a signal to ViewSheet that you are telling it about a *range* of slots, bounded by and including the two slots named.

The result should be the sum of the whole range in slot A15. Ranges work equally well if all the slots are filled or if some are empty, so you can set a total for a row or column in the form of a range statement, and fill the column in later if you wish.

Replication

Another extremely useful feature of ViewSheet is the way in which it allows you to copy whole ranges of slots either unchanged or with regular variations.

The simplest form of replication is to copy the contents of one slot into another. For example, clear the sheet (with NEW) and enter a number into slot A1. Now press the function key for REPLICATE (key **F0**).

The system replies with a prompt:

From – To?

Type: A1-C1 **RETURN**

This tells the system to copy the number in slot A1 into slot C1.

Replication works equally well with slots or ranges. Press REPLICATE (**F0**) again.

Reply. F r o m – T o?

Type: A 1 - B1B19 **RETURN**

This replicates the contents of slot A1 into rows 1 to 19 of column B.

In the examples above, the contents of the slot are copied just as they are with no change whatsoever. This is known as *absolute* replication. An even more useful facility is *relative* replication. For example, consider again the example we looked at in the first chapter.

Obviously the formulae in the VAT column must all involve multiplying by the VAT rate, and the formulae in the TOTAL PRICE column must all involve adding the net price to the VAT amount. So in each of these columns the individual items are very similar to each other, differing only in the slots they refer to. To type them all individually would be a great waste of time.

To show how ViewSheet overcomes this problem we can construct a simplified version of this sheet. You can omit most of the titles, and use just the three columns for NET PRICE, VAT and TOTAL PRICE.

Clear the sheet again, and type the numbers from B6 to B10 – you can use AUTO ENTRY again for practice. You will notice that the amounts will appear without decimal places, eg ‘85’ not ‘85.00’. We shall deal with ways of lining up the decimal points later.

We now need to type the first item in the VAT column. To make things simpler we will assume a fixed rate of 15 per cent for VAT.

Move the cursor to slot C6 and type:

B6*0.15 **RETURN**

18

By now your sheet should look something like this:

We now need to replicate this formula in slots C7 to C10, changing only the slot referred to in the formula in each case.

Press: REPLICATE (F0)

Reply: From - To?

Type: C6–C7C10 RETURN

Reply: R)elative, N)o change?
B6*0.15

The reference B6 appears in black on a white background and the rest of the expression follows, so that you can easily locate the reference.

Whenever ViewSheet is asked to replicate a slot reference it always gives you the choice of replicating it *absolutely*, ie exactly as it is, or replicating it *relatively*. In this case ViewSheet is asking if you wish to multiply slot B6 by 0.15 in every slot from C7 to C10, or whether you want to change the B6 to B7, B8, B9 and B10. Of course this is what we need to do.

Press: R

Immediately the column is filled with figures and if you pass the cursor down you will see in the CONTENTS= line at the top of the screen how the formula has been copied with the slot reference updated each time, so that the 15 per cent is applied to the relevant slot in the B column.

To finish the job enter the formula:

B6+C6

in slot D6 and replicate that column too, like this.

Press: REPLICATE (F0)

Reply: From – To?

Type: D6-D7D10 RETURN

Reply: R)elative, N)o change?

B6+ C6

Press: R

Reply: R)elative, N)o change?

C6

Press: R

20