ACORNSOFT
ATOMCALC MANUAL

```
C8      V    ATOMCALC
B8+.15
+
```

EXPENSE	COST	VAT	TOTAL
FOOD	63.39	0.00	63.39
GAS	12.00	1.80	13.80
ELECT.	33.20	4.98	38.18
PHONE	7.10	1.06	8.16
RENT	95.85	14.37	110.22
PETROL	47.10	7.06	54.16
INSURE.	23.11	3.46	26.57

EXPENSES			314.50
INCOME			325.00
SPENDING			10.49

ATOMCALC MANUAL

CONTENTS

1 Introduction

ATOMCALC will transform your ATOM into an
"electronic sheet" which is capable of storing
data in a logical and consistent format, and
performing complex calculations using stored
data.

ATOMCALC's memory is arranged in rows and
columns like a page of a ledger. The grid
consists of 62 columns and 255 rows: the
columns are lettered A to BK, and the rows are
numbered from 1 to 255. A single entry on the
electronic sheet is referred to by its column
and row address or 'grid reference', for
example, "B20". Entries can be up to 32
characters in length, and can contain numbers,
letters, or mathematical equations.

On the financial and business side ATOMCALC
is well-suited to keeping records, book keeping
on a small or large scale, calculating
end-of-year accounts, and testing hypotheses
relating to data; for example, scheduling and
predicting cash flow.

Where science and engineering projects are
concerned ATOMCALC incorporates a scientific
calculator which features the standard
mathematical and trigonometrical functions and
constants, including SIN, COS, TAN, ASIN, ACOS,
ATAN, ABS, LOG, PI, EXP, SQR, and RND. The
calculator will apply stored formulae to
subsequent entries, and recalculate existing
entries as new data is entered on the sheet.

Knowledge of programming, or a programming
language, is not essential - ATOMCALC's
language consists of a set of simple commands.
A summary of these appears on the back cover
for quick reference.

Data can be saved on cassette, and the
contents of the electronic sheet can be printed
out in tabular form as displayed, or as a
straightforward listing.

> *Examples occurring in the main text of this
> manual are printed within boxes.

Memory requirements

ATOMCALC will make use of as much lower text
space as is available from #2800 upwards; it
also requires the presence of the ATOM
Floating-point ROM.

2 Entering and Re-entering ATOMCALC

To enter ATOMCALC type the word "CALC", and then press RETURN. The white header and cursor will appear at the top of the display as shown in the photograph:
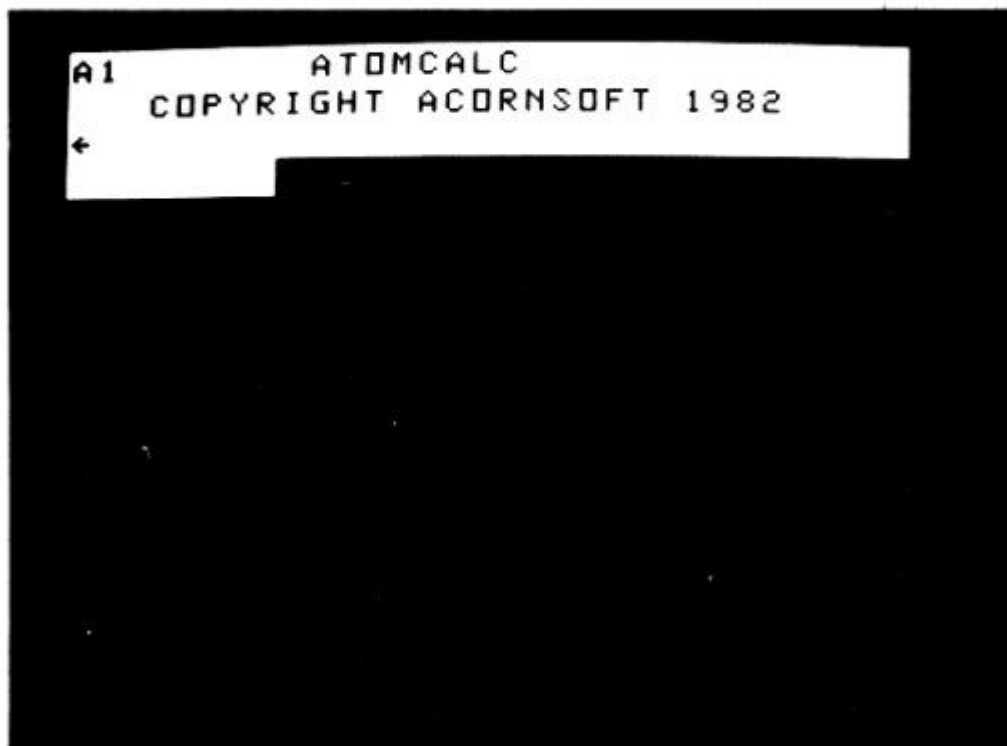
To leave ATOMCALC and return to BASIC press the BREAK key.

Whenever you use the CALC command, ATOMCALC's memory is cleared. To re-enter ATOMCALC preserving all sheet entries enter "CALCR", (and then press RETURN). The data on the sheet is displayed when you press LOCK.

BEWARE OF THE BREAK KEY.....if you hit the BREAK key by mistake and you want to re-enter ATOMCALC at the position you left it, remember to use CALCR and then LOCK, or you could lose your work to date.

The header

The header is three lines deep and 32 characters wide. A grid reference is displayed in the top left hand corner (A1 to start) and the word ATOMCALC in the middle. Initially the second line displays a copyright message which will disappear when you begin using the system. The third line shows the ATOMCALC prompt (←) which follows information as it is typed in.

The display

Data is entered in the area beneath the header.
This area is best thought of as a 'window'
which looks at one section of the electronic
sheet at a time — the sheet itself is far too
big to be displayed all at once. The section
displayed is 13 rows deep and (initially) 4
columns wide.

The cursor

The cursor is the white rectangle initially
displayed at position A1. It highlights one
'cell' on the electronic sheet at a time, and
its current grid reference is displayed at line
1 of the header.

The cursor can be moved to any position on the electronic sheet using the arrow keys in conjunction with the SHIFT key:

|	
←→	cursor right
SHIFT ←→	cursor left
⇕	cursor up
SHIFT ⇕	cursor down

←→ and ⇕ are auto-repeat keys, and so the cursor will continue to step until the key is released. When the cursor reaches the edge of the page a bleep will sound, and will repeat until the key is released.

Notice how the grid reference on the Header changes as you move the cursor around.

3 Writing and Assigning Data

Numeric and alphanumeric entries

ATOMCALC accepts three types of input:

	input	sheet entry
LABELS	FRED ────────→	FRED
VALUES	4 ────────────	4
EXPRESSIONS	(A1 + 2)────────	
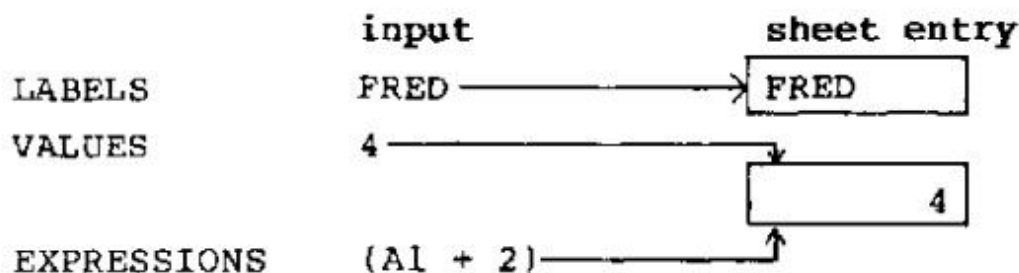
An expression can consist of just one grid reference (in which case the contents of the named cell are displayed) or a calculation involving numbers and functions.

As information is typed in it is displayed at line 3 of the header, immediately preceding the prompt. Press RETURN and the data is assigned to the cell currently highlighted by the cursor.

*Try this out by moving the cursor to A1 and entering "1981", and then pressing RETURN.

The letter "V" is displayed at line 1 of the header to show that this is a VALUE entry, and therefore one which can be used in future calculations.

*Move the cursor to B1, and enter the word "GAS".

An "L" is displayed at line 1 of the header:
if the data is alphanumeric (other than the
alphanumeric grid references) then the letter
"L" is displayed to show that it is a LABEL
entry.

As data is entered on to the sheet a copy of
the entry is displayed at line 2 of the header,
and remains there until the cursor is moved to
a new grid reference. Whenever the cursor is
returned to this position the full entry is
displayed at the header.

*So, for example, if you move the cursor
 to grid reference C1 and enter "ELECTRICITY
 BILL" and only the first 8 letters are
 entered on the sheet, the full entry can
 always be found at line 2 of the header when
 the cursor is returned to this position. (Of
 course you may prefer to use a wider column
 width, and the full definition — see page
 16.)

Calculations

You will find mathematical symbols on your
keyboard as follows:

  +   adds two numbers

  -   subtracts two numbers

  /   divides two numbers

  *   multiplies two numbers

  ^   raises to a power

When faced with a calculation containing
several operands, ATOMCALC will always evaluate
expressions in brackets before proceeding to
evaluate the whole expression. Having evaluated
the expressions in brackets, the precedence
with which ATOMCALC performs calculations is as
follows:

  First   ^

  Second   / *

  Third   + -

*This can be illustrated by comparing the
 answers to the expressions shown below (if
 you would like to try these out, move off to

a blank grid reference, G10 for example):

    10+4/2   Answer: 12

    (10+4)/2   Answer: 7

Note that the formula, not the answer, is
displayed at line 2 of the header, so that
whenever you return to this grid reference
you can see exactly how the value on the
sheet was calculated.

All arithmetic calculations are performed to 31
bit precision, giving better than 9 significant
figures of accuracy to numbers in the range
1E-38 to 1E+38.

To set the format, enter $\boxed{/F}$ followed by the
number of decimal places required: for example,

    /F4

Digits with more decimal places than allowed by
the format control are truncated when
displayed.

*For example,

  using /F1, 9.9 is displayed as 9.9, but

  using /F0, 9.9 is displayed as 9

  However, the stored value, and therefore the
  one used in calculations, is 9.9.

(See also, 'Formatting', page 16.)

Calculations involving sheet entries

ATOMCALC is especially good at doing repetitive
chores using values stored on the sheet. By way
of illustration we shall return to grid
reference A1 and proceed with our original
example. As an alternative to using the cursor
controls you can move the cursor directly to
anywhere on the sheet with the command $\boxed{/G}$
followed by your destination grid reference. So
to go back to A1, the command is

    /G A1

The photograph on the next page shows an
extract from a household accounting system,
part of which you have already entered on your
ATOMCALC sheet. To calculate the average

monthly cost of gas the sum of the bills is
divided by the number of months in a given
period: June to November. The expression

    (B2 + B3)/B4

is entered at B5, and the average is displayed
on the sheet.


```
B5        V    ATOMCALC
(B2+B3)/B4
←

       1981          GAS       ELEC
JUN-AUG               19         27
SEP-NOV               23         39
MONTHS                 6          6
AVERAGE                7         11
```

If any of the values at B2, B3, or B4 are
subsequently changed then the result at B5 is
recalculated automatically.

> *To illustrate this, complete the entries in
> column B, by entering "19" at B2, "23" at B3,
> and "6" at B4. At B5 enter the formula "(B2 +
> B3)/B4" and the average, 7, will be
> calculated and displayed when you press
> RETURN.
>
> Now change B3 to "29" (you can 'write over'
> the old entry). The new average, 8, will be
> displayed at B5.

More about LABELS and VALUES

When labelling a column of numerical data you
can put spaces in front of a LABEL so that it
lines up with the figures beneath it, as in
column C in the photograph above, where the
entry was

    ----ELECTRICITY

where "-" represents one space.

Calculations and formulae are taken as VALUEs
so long as the calculation is possible, you
steer clear of unattached letters, and take
care to bracket grid references in all but the
simplest cases.

If you enter an expression whose evaluation is
impossible, it will be entered as a label: for
example, SQR(A1), where the contents of A1 are
negative. To force an expression to be accepted
as a VALUE, so that the entry can be used in
future recalculations, put a plus sign in front
of the expression: "+SQR(A1)". The value of the
cell will be displayed as ERROR until a
positive value is entered at A1.

The following table shows some legal values and
formulae:

```
1
1.500
(1+2) * 3/4
A1
A1 * 6
A1 + B1 - C1
(B3 + C1) / D1^2
(B2 * A4) / 3.3
A2 * 100 + BJ90 / 6
SIN (A1) * 3 + COS (A2) * 3
SQR(A1)
```

Scientific functions in ATOMCALC

ENTRY	FUNCTION	EXPLANATION	EXAMPLES
ABS	ABSOLUTE VALUE	Take positive value	ABS (A1)
ACS	ARC COSINE	Convert value to inverse cosine	ACS (A1) ACS 0.9857
ASN	ARC SINE	Convert value to inverse sine	ASN (A1) ASN 0.9857
ATN	ARC TANGENT	Convert value to inverse tangent	ATN (A1) ATN 0.9857
COS	COSINE	Calculate the cosine of the value	COS (A1) COS 0.9857
DEG	DEGREE	Convert the value to degrees from radians	DEG (A1) DEG (ACS(A1))
EXP	EXPONENT	Return a value expressed in standard form	EXP (A1)
FLT	FLOAT	*Force argument to be taken as as an integer	FLT(2/3)
LOG	LOGARITHM	Calculate and display the natural logarithm	LOG (A1) LOG 0.9857
PI	PI	Present the constant ii	PI * (A1)^2
RAD	RADIAN	Convert the value from degrees to radians	RAD (A1)
RND	RANDOM	*Generate a random number	RND
SGN	SIGN	-1, 0, +1 for negative, zero and positive arguments	SGN (A1) * A2
SIN	SINE	Convert value to sine	SIN (A1) SIN 0.9857
SQR	SQUARE ROOT	Calculate the square root of the value	SQR (A1) SQR 0.9857

Note: All trigonometrical values are displayed in Radians.

(* See the example on the next page.)

> *To illustrate the use of FLT and RND
> enter the following:
>
> "FLT (ABS RND % 10)"
>
> When you press RETURN a random number
> between 0 and 9 is entered in the cell at
> the current cursor position. Press LOCK to
> generate another random number.
>
> Where no limit is set, (for example, "RND")
> ATOMCALC will generate a random number
> between -2000 million and +2000 million.

4 Replicating

One of the most useful and flexible features of
ATOMCALC is its replicating facility, whereby
blocks of data or expressions can be copied
from one area on the sheet to another.

Data

A block of data to be copied is defined by its
top left grid reference and its bottom right
grid reference, and the area that the block of
data is being copied to is defined in the same
way, as illustrated below:
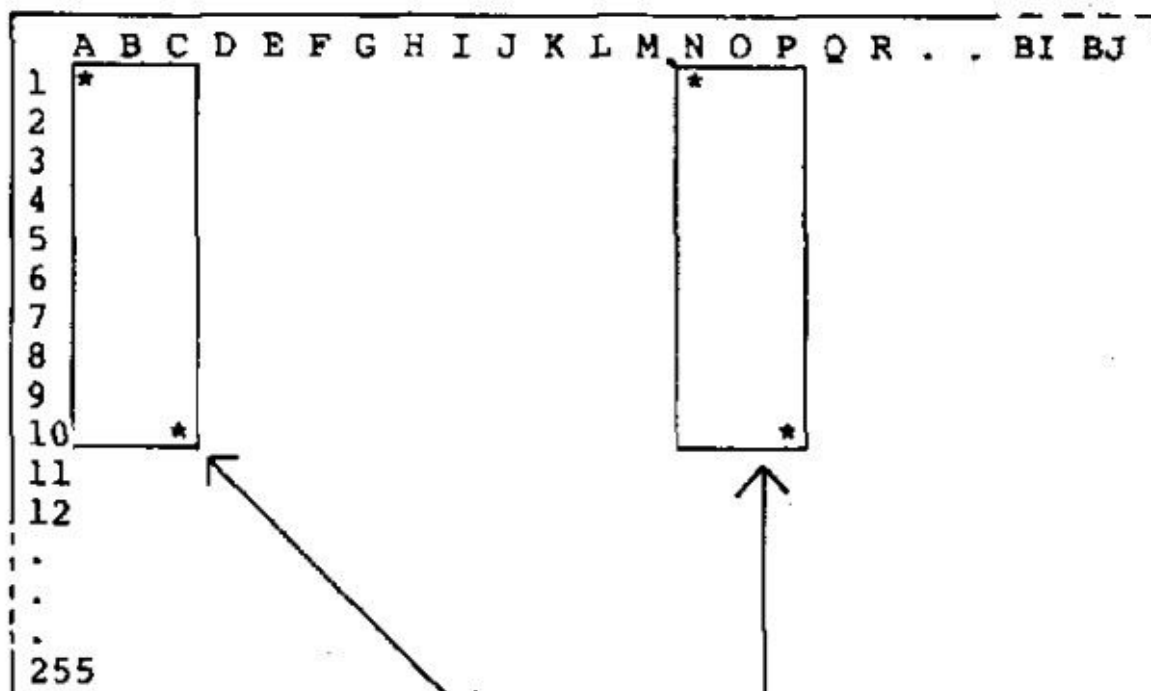
To copy data from here   to   here
enter /R A1 C10 N1 P10

> *To demonstrate the replicating command,
> enter the word "ATOMCALC" at position A1

and then press RETURN. Then enter the
following:

/R	A1 A1	A1 E255
Replicate command	Block to be copied	Block to receive data

The header will display the word "COPYING"
for about one minute after which the word
ATOMCALC will be displayed in columns A to
E, in all 255 rows. The word "MEM" will
appear at the top right hand side of the
header showing that all 4403 bytes of
memory have been allocated.

If only one entry is to be copied, the top
left, and bottom right grid references will
consist of only the one reference number:

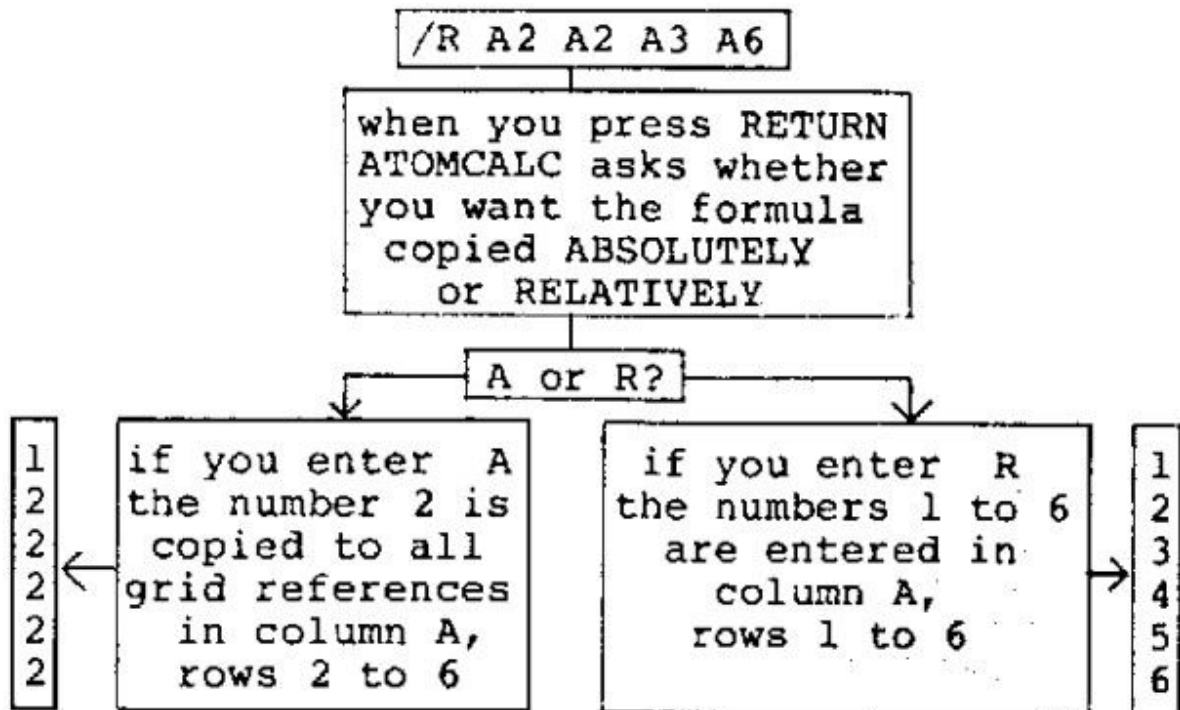| *For example,			
to copy	A1	to	C1
enter	/R	A1A1	C1C1

If you enter the command /R on its own,
ATOMCALC will bleep, and ask you for the
information it needs. Note that if you press
RETURN after any command ATOMCALC will prompt
you for the appropriate grid references or
information.

To speed things up a little when entering
replicate commands, \ will write the grid
reference of the cell currently occupied by the
cursor.

Expressions

ATOMCALC is capable of replicating a formula or
a calculation exactly, or it can adjust each
grid reference according to its relative
position on the sheet.

*For example, consider the formula A1 + 1
being copied to 4 other positions. To do
this, enter the number "1" at A1, move the
cursor to A2 and enter the formula "A1 + 1":
the resultant, 2, is displayed here. Enter
the replicating command:

```
/R A2 A2 A3 A6
```

when you press RETURN
ATOMCALC asks whether
you want the formula
copied ABSOLUTELY
or RELATIVELY

A or R?

1	if you enter A	if you enter R	1
2	the number 2 is	the numbers 1 to 6	2
2	copied to all	are entered in	3
2	grid references	column A,	4
2	in column A,	rows 1 to 6	5
2	rows 2 to 6		6

If the formula involves more than one sheet
entry then the computer will repeat the
question at each relevant stage of the formula,
so that you can replicate one part of a formula
absolutely, and another part relatively.

Manual control

Whenever new data is entered on the sheet,
everything is recalculated automatically. When
entering a large number of entries it is
sometimes inconvenient to wait for ATOMCALC to
recalculate the whole sheet as each entry is
made. In this case, enter the command `/M`, and
you are in manual mode.

The ATOMCALC header displays an "M" on the
first line. Once all entries have been made,
press the LOCK key to recalculate everything on
the sheet.

The following examples show how the replicating
system works in practice.

Example A

In the interests of economy a telephone
monitoring system has been installed in Mr J's
office. A general overview of his monthly
expenditure on telephone calls (pre-VAT) is
shown in the photograph:

```
D6        V   ATOMCALC
B6*C2
←
                UNITS UNITCOST      COST
        JAN  221.00      0.05     11.05
        FEB  197.00               9.85
        MAR  257.00              12.85
        APR  236.00              11.80
        MAY  248.00              12.40
        JUN  251.00              12.55
        JUL  264.00              13.20
        AUG  269.00              13.45
        SEP  236.00              11.80
        OCT  274.00              13.70
        NOV  256.00              12.80
        DEC  237.00              11.85
```

The formula (B2 * C2) at D2 calculates the cost
of X units at 5 pence per unit. The formula is
replicated down the sheet with the command

   /R D2 D2 D3 D13

When the replicate command is given, and the
RETURN key pressed, ATOMCALC asks the question
"A or R?" twice, referring to each grid
reference in the formula in turn with a "?":

(B2 * C2)   enter Ⓡ since this varies
   ?   from month to month

(B2 * C2)   enter Ⓐ since the unit
       ?   cost is fixed

Example B

Set the format to 5 decimal places with the
command "/F5":

   enter "16" at A1, and "SQR (A1)" at B1
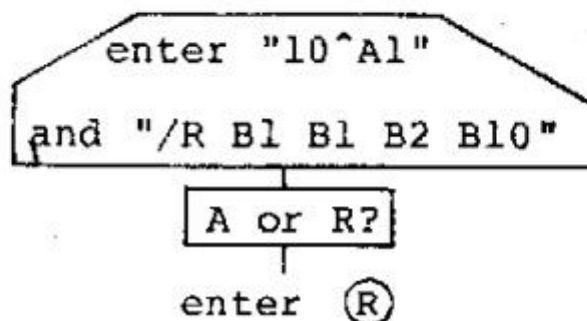
        and /R B1 B1 C1 Z1

              A or R?

   enter Ⓐ , and   enter Ⓡ , and
   the square root of   the square roots of
   16 is entered in the   16, 4, 2, etc. are
   first row, columns   entered in the first
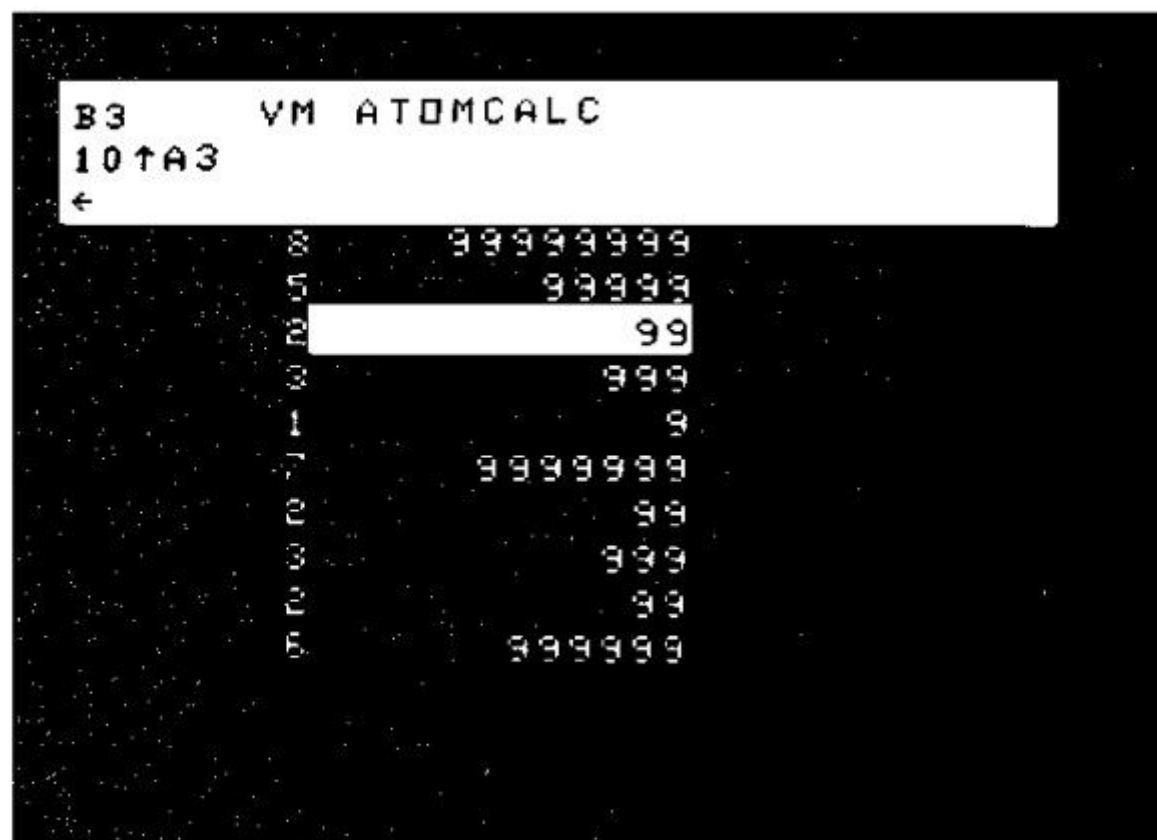   A to Z   row, columns A to Z

Example C

This is how you can draw a simple bar chart composed of digits:

1 Set the format to 0 with the command "/F0".

2 Enter some sample figures in column A as shown below. (For the purposes of this example you can assume that the figures represent the turnout, in thousands of people, to a series of ten football matches.)

   Enter in column A, rows 1 to 10, the numbers 8, 5, 2, 3, 1, 7, 2, 3, 2, 6.

3 Move the cursor to B1 and set the column width to 12 characters wide with the command /W12.

enter "10^A1"

and "/R B1 B1 B2 B10"

A or R?

enter Ⓡ

The photograph shows the resulting display:


```
B3        VM ATOMCALC
10↑A3
←
     8        99999999
     5           99999
     2              99
     3             999
     1               9
     7          999999
     2              99
     3             999
     2              99
     6          999999
```

5 Deleting and Changing Entries

`DELETE` The DELETE key is used when correcting
entries before they are written on to the
sheet. DELETE will remove the character(s)
immediately preceding the prompt. The bleep
will sound when the cursor hits the left hand
end of the header.

`ESC` The ESCape key is safe to use for
escaping from any command, or clearing the
input line, if you make a mistake while
entering data.

To edit data which has already been entered on
the sheet you can use the COPY key.

First, move the cursor to the grid reference in
question.

`COPY` If only one character in a long word or
equation is to be changed then use the COPY
key to duplicate one character at a time until
the change is required, when the new character
is typed in. Press the COPY key to duplicate
the rest of the entry and then press RETURN.

`/B` blanks an entry – enter `/B` and the space
is freed when you press RETURN.

6 Presenting Data

Column width control

The column width is, by default 8 characters,
but can be adjusted to anywhere between 0 and
32 characters by entering `/W` followed by your
preferred width. For example,

   /W20

Formatting

To set the format the command is

   /F[n]

where n is an integer between 0 and 255. Where
n lies between 0 and 31 ATOMCALC will attempt
to display that number of decimal places. Once
the format has been set it will apply to all
subsequent entries until it is reset by another
`/F` command.

For example, to set the format to 4 decimal places, enter

    /F 4

It is a good idea to set the number of decimal places required right at the start of an ATOMCALC session since if you change the format later on entries made prior to that point will not be altered.

If the column width is set too small to accommodate the result of a calculation in the specified format then the result is displayed in exponent form (e.g. 1.75E-8). However, exponent form requires a column width of at least 8 characters, and if the column width is set at less than 8, then a series of ?????? is displayed instead.

If the calculation is impossible (e.g. the square root of a negative number) then an ERROR message is displayed.

Fixing titles

The command /T fixes all rows and columns above and to the left of the cursor. Once titles have been assigned to any or all of the first row, and to any or all of the first column, they can be fixed by moving the cursor to cell B2 and entering /T . It is now impossible to move the cursor into row 1 and column A, and when the rest of the screen scrolls away to the right, or down, the titles stay put so that you can always refer to them.

To remove the restriction on titles, enter the command /U .

Negative quantities

The standard accountancy convention is to display negative quantities in brackets rather than prefixed with a minus sign. ATOMCALC can display negative quantities in either style: to change all negative quantities on the sheet from the prefixed to the bracketted style, enter /- . The same command (/-) is used to revert to scientific style.

Planning a print format

An A4, portrait, page will take 10 columns, each 8 characters wide, and approximately 54 rows. Printed out in this way the entire sheet would measure 7 pages across and 5 pages lengthways, which is 35 pages in all. However, it is much more likely that you will need to print out sections of the sheet, so if you bear the "80 characters by 54 rows" page format in mind when planning the layout of the ATOMCALC sheet, you can arrange the contents in a format which suits you, but which is also convenient for printing.

7 Saving, Loading, and Printing

Saving data

The sheet entries in columns A to BG can be saved on cassette. The procedure is described below:

1   Enter /S - ATOMCALC responds with a request for "FILE?".

2   Enter a "FILENAME". When you press RETURN, ATOMCALC asks you to "RECORD TAPE".

3   Press the RECORD button on the cassette recorder, and then press the space bar to confirm that you have started recording. Two asterisks are displayed next to the "RECORD TAPE" message. When recording is complete the asterisks will disappear, so you know when you can switch off the cassette recorder.

Loading data

To load a file back from cassette:

1   Rewind the tape.

2   Enter /L - ATOMCALC asks you for a "FILE?".

3   Enter the "FILENAME". When you press RETURN, ATOMCALC responds with an instruction to "PLAY TAPE".

4   Press PLAY on the cassette recorder and then press the space bar to confirm that you have done so. Two asterisks are displayed next to the "PLAY TAPE" message, and remain until loading is complete.

Listing the contents of a cassette

Just in case you've forgotten the name of your program, here's how to list the filenames on a cassette:

1   Rewind the tape.

2   Press BREAK to get into BASIC.

3   Enter "*CAT" and then press PLAY on the cassette recorder. As the tape is played the filenames on the cassette will be written on the screen.

If it doesn't work....

If all does not go smoothly with saving and loading data, use the checklist below:

*   Try a different volume setting on the cassette recorder.

*   Check that you are using the correct filename.

*   If you are using a tape that is slightly suspect, then exchange it for a newer, or better, one.

*   Try listing the filenames on cassette, and see whether there are any irregularities in the coding. For example, if the first part of a file is missing, then it may be something to do with the quality of the cassette.

Printing

Alternative print-outs are obtained using the /O and /P commands. Entering /O causes the full definitions of all sheet entries to be printed in a straight up-and-down format. /P prints the data on the sheet in tabular form, omitting any remarks or full definitions.

Output /O

The computer will print out all data and calculations within a defined block. The block is defined in the same way as for replicating, i.e. by the top left and the bottom right grid references.

*A typical command would be:

    /O A1 D13

and would result in a 'hard copy' of the
sheet entries in the defined area. Shown
below is an extract from the output following
this command, of some data from an experiment
to compare the weight/height ratio of groups
of seedlings grown under different
conditions:

```
A1      L      GROUP
        GROUP

B1      L      HT(CMS)
       HT(CMS)

C1      L      WT(G)
       WT(G)

D1      L      WT/HT(G/CM)
      WT/HT(G/CM)

A2      V          1
1

B2      V       13.85
13.05

C2      V       48.90
48.9

D2      V        3.53
```

Print /P

The contents of the sheet can be printed out in
tabular form (as seen on the screen) using /P
and the grid references defining the block to
be printed. Similarly, any part of the sheet
can be printed using /P and the block grid
references.

*For example, columns A to D, and rows 1
 to 13 of the same data shown in the /O
 extract above, would be printed out following
 the command

 /P A1 D13

 and would look like this:

```
GROUP   HT(CMS)    WT(G)   WT/HT(G/CM)
  1      13.85     48.90      3.53
  2      15.00     52.30      3.48
  3      13.70     47.50      3.46
  4      14.80     50.23      3.39
  5      14.65     49.39      3.37
  6      13.54     48.67      3.59
  7      14.26     50.17      3.51
  8      13.97     51.12      3.65
  9      13.67     50.54      3.69
 10      14.17     50.47      3.56
 11      15.21     52.31      3.30
 12      14.87     49.76      3.34
```

Example: A Cash Flow Forecast

A typical application involving financial data is the formulation of a cash flow forecast chart, which uses expectations based on past experience to predict the future cash requirements of a business. So, a cash flow prediction is a function of many factors, some fixed and some variable. In this example a small supermarket is predicting its cash requirements over the next 10 years.

Setting up a system

1 Assuming that the computer is switched on and ready to go press BREAK and then enter the command CALC.

   The first column will contain headings for the breakdown of the company's finances, and the first row will have headings for the ten year progression.

2 First, set the width of the first column to 14 using the command "/W14".

   The forecast is for 10 years, so we will label columns B to K from 1 to 10 as follows:

   With the cursor at position B1 enter the value 1, and then move the cursor to position C1 and enter the formula "B1 + 1". Now enter "/R C1 C1 D1 K1" and to the question "A or R?", enter "R". The first row will now have 1 to 10 in columns B to K.

   Move the cursor to position A2 and enter "SALES TURNOVER". Move the cursor down one position to A3 and enter "COST OF GOODS SOLD". The first three words appear at the cursor position and the full definition can be seen at line 2 of the header.

   With the cursor at A4 enter "GROSS PROFIT". At position A5 enter 14 "=" symbols. Give the command "/R A5 A5 B5 K5" and the = = = = signs will be reproduced across the table - these will help separate items on the sheet.

To complete the labelling of the rows enter
labels, and execute commands as listed in the
table below:

Label	Grid Reference	Command
STAFF COSTS	A6	
STOCK COSTS	A7	
MAINTENANCE	A8	
RENTAL	A9	
===================	A10	/R A10 A10 B10 K10
NET PROFIT	A11	
===================	A12	/R A12 A12 B12 K12
INTEREST @ 10%	A13	
TAXATION @ 52%	A14	
DEPRECIATION	A15	
TAX DUE	A16	
===================	A17	/R A17 A17 B17 K17
CASH FLOW	A18	
===================	A19	/R A19 A19 B19 K19
SALES TURNOVER	A20	
YEAR	A21	
-------------------	A22	/R A22 A22 B22 K22

3 Rows and columns are now labelled. Move the
  cursor to position B2 and your display should
  resemble the photograph on the next page. It
  will be as well to fix the titles in place -
  they can always be un-fixed later - so with
  the cursor at B2 enter /T .

Setting the style

4 For dealings in pounds and pence two decimal
  places are required, so set the format with
  /F2.

  Columns B to K may have to accommodate
  substantial sums of money and so we will set

the column widths to 10 with /W10 (you have to do this for each column).

Finally, we will instruct ATOMCALC to display negative quantities in brackets in true commercial style, so enter `/-`.

```
 B2            ATOMCALC

 ←
                              1
 SALES TURNOVER[          ]
 COST OF GOODS
 GROSS PROFIT
 ===========================
 STAFF COSTS
 STOCK COSTS
 MAINTENANCE
 RENTAL
 ===========================
 NET PROFIT
 ===========================
 INTEREST @10%
```

Entering data

Our shop is a new, medium-sized supermarket. The yearly sales turnover is expected to increase by a compound rate of 10% for the first ten years of the project. Compensation for inflation accounts for an annual increase of 9%.

5 We'll take an arbitrary figure of £10000 for the Sales Turnover for year 1, so enter "10000" at B2. Move the cursor to C2 and enter the formula "(B2*1.1) * 1.09". (From now on, for each stage, we will briefly describe the entries before listing them as they should be typed in, e.g.

at B2 enter "10000"

at C2 enter "(B2 * 1.1) * 1.09")

The rate of growth is constant, and so the

formula will be the same for the calculation
of sales turnover each year. Replicate the
formula across columns 2 to 10 as shown
below, and when the calculation is complete
the value 11990.00 should be displayed at C2.

    /R C2 C2 D2 K2   ®

6 The cost of the goods sold is 2/3rds of the
value of Sales Turnover. With the cursor at
position B3 enter the formula "B2/1.5". The
value 6666.66 will be computed and displayed.

    at B3 enter "B2/1.5"

    /R B3 B3 C3 K3   ®

7 Gross profit is calculated as the Sales
Turnover minus the Cost of Goods Sold: the
formula "B2 - B3" should be entered at
position B4, and replicated relatively across
the sheet.

    at B4 enter "B2 - B3"

    /R B4 B4 C4 K4   ®

8 Staffing costs vary with Turnover and
inflation. In order to calculate these costs
a fixed cost of 12000 is entered in year 1
(position B6) and the formula "B6 * 1.1"
applied to the second and each subsequent
year.

    at B6 enter "12000"

    at C6 enter "B6 * 1.1"

    /R C6 C6 D6 K6   ®

9 The cost of holding the stocks that the
supermarket will sell is calculated as being
2% of the value of Sales Turnover. The
formula "B2 * 0.02" is entered at cursor
position B7 and the value 200.00 should be
displayed.

    at B2 enter "B2 * 0.02"

    /R B7 B7 C7 K7   ®

10 Maintenance costs are expected to be £500.00
in the first year increasing by 10% p.a.
thereafter. Enter 500 at position B8 and move
the cursor to position C8 and enter the
formula "B8 * 1.1". The formula is then
copied relatively across the sheet.

at B8 enter "500"

at C8 enter "B8 * 1.1"

/R C8 C8 D8 K8   (R)

11 The rental is fixed and an annual charge of
   £4000.00 covers both the rental and the
   rates. Enter 4000 at position B9, and copy
   the value absolutely since the value at B9 is
   constant for the duration of the project.

at B9 enter "4000"

/R B9 B9 C9 K9   (A)

12 The Net Profit is calculated as the Gross
   Profit with other costs deducted, so at
   position B11 enter the formula "B4 - (B6 + B7
   + B8 + B9)". The value (13366.66) will appear
   as the Net Profit for year 1 of the project.
   This formula is applied to each subsequent
   year of the project.

at B11 enter "B4 - (B6 + B7 + B8 + B9)"

/R B11 B11 C11 K11   (R) (R) (R) (R) (R)

13 Interest is accumulated over the period of
   one year on profits: but if the business
   makes a loss then interest must be paid. No
   interest is accumulated or paid in year 1,
   and therefore the value "0" is entered at
   position B13. In subsequent years interest
   accumulated or paid will amount to 10% of the
   profit or loss made by the business, so the
   formula B11 * 0.1 is replicated across the
   sheet in row 13.

at B13 enter "0"

at C13 enter "B11 * 0.1"

/R C13 C13 D13 K13   (R)

14 This stage requires the calculation of the
   taxation, at a rate of 52%, on the profits
   generated by the business. First, the
   Depreciation values must be entered on the
   sheet - these are set at £200 per year.

at B15 enter "200"

/R B15 B15 C15 K15   (A)

The Taxation row shows how much tax will be
due, in the following year, and is calculated
as Net Profit plus Interest minus

Depreciation times 52%.

   at C14 enter "(B11 + B13 - B15) * 0.52"

   /R B14 B14 C14 K14   Ⓡ Ⓡ Ⓡ

15 Move the cursor to position B16 (the Tax Due
   row) and enter the value 0, because there is
   no tax due in the first year of the project.
   The Tax Due in subsequent years is shown in
   brackets so move the cursor to position C16
   and enter "-B14" this will have the effect
   of transferring the value at position B14 and
   displaying it in brackets.

   at B16 enter "0"

   at C16 enter "-B14"

   /R C16 C16 D16 K16   Ⓡ

16 The final item - the Cash Flow figure - is
   calculated by adding the Net Profit to the
   Interest, and subtracting the Tax due.

   The Tax Due has already been calculated as a
   negative quantity, so in the formula, B16
   will be added rather than subtracted.

   at B18 enter "B11 + B13 + B16"

   /R B18 B18 C18 K18   Ⓡ Ⓡ Ⓡ

```
A18    L    ATOMCALC
CASH FLOW
←
STOCK COSTS          200.00
MAINTENANCE          500.00
RENTAL              4000.00
=========================
NET PROFIT        (13366.66)
=========================
INTEREST 010%         0.00
TAXATION @ 52%   (7054.66)
DEPRECIATION        200.00
TAX DUE               0.00
=========================
CASH FLOW         13366.66
=========================
```

17 The remaining two rows are copies of rows 1
   and 2, displaying the annual turnover so that
   it may be seen in relation to the final Cash
   Flow figure.

    at B20 enter "B2"

    /R B20 B20 C20 K20   ⓡ

    at B21 enter "B1"

    /R B21 B21 C21 K21   ⓡ

In conclusion

The Cash Flow Forecast chart is now finished,
and you can see from the photograph that a
turnover of £10,000.00 in the first year will
result in a negative cash flow of £13366.66:
this means that the business will be spending
more than it takes.

Looking at the chart it can be seen that
negative cash flows are generated every year.
By increasing the figure at B2, you can
speculate as to the size of turnover required
to break even. Enter the value "52659.6" at B2
and this will result in the cash flow forecast
equalling the break even point. Any increase in
revenue will increase the profitability of the
business. (NB This assumption is based upon
strict accounting theory: economic theory is
slightly different!)

Now that data and expressions have been entered
on to the sheet questions can be asked and
solved quickly and accurately, for example;

    What happens if the rent goes up to
    £6000.00?

    What if the Government changes the Tax rate?

    What Turnover is needed to make the shop
    break even in year 4?

    What happens if the staff threaten to strike
    unless they get a 20% pay rise?

    What happens if Maintenance or Stock costs
    change?

    What if the Sales Forecast is wrong?

By simply moving the cursor to appropriate
positions and changing raw data entries these
and many other hypotheses can be tested, proved
or disproved.

Subject index

SUMMARY OF COMMANDS

Command	Meaning	Page
CALC	Enter ATOMCALC from BASIC	3
CALCR	Return to ATOMCALC at position of exit retaining all data	3
LOCK	Recalculate all sheet entries	3
BREAK	Revert to BASIC	3
RETURN	Terminate user input	3
COPY	Duplicate entry at header	16
DELETE	Remove character immediately preceeding '← ' prompt	16
↔ & ↑	Cursor movement controls	5
SHIFT	Reverse cursor movement	5
\	Enter grid reference of cell currently occupied by cursor	12
/G [#]	Move cursor directly	7
/B [#]	Blank sheet entry	16
/F [n]	Control decimal place format	7,16
/L [FILE]	Load from cassette	18
/M	Put ATOMCALC into, and out of, manual mode	13
/O [##]	Output full definition of sheet entries	19
/P [##]	Print out sheet	20
/R [####]	Replicate a block	11
/S [FILE]	Save the contents of the sheet	18
/T	Fix title	17
/U	Remove /T restrictions	17
/W [n]	Set column width	16
TOP	Display memory available in bytes	-
/-	Adopt commercial style i.e. negative items in brackets, and revert to scientific style	17

Note: for the purposes of this summary, the # character denotes one grid reference.