Sinclair Executive Instruction Manual

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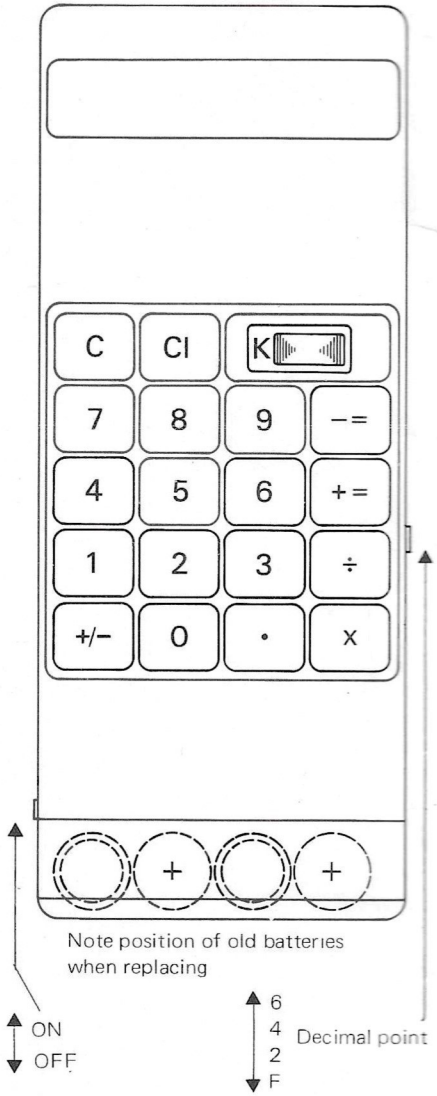


INTRODUCTION

Introduction

Please follow the examples and read the notes; you will soon become familiar with the operation of your Sinclair Executive Calculator.

The diagram shows the controls and other features on the calculator.

There are three 'types' of button.

1 for *number entry,* i.e. digits 0-9 and decimal point, use of these will become obvious.

2 for *instruction:* i.e ± = × ÷ and C and CI

C button: completely clears the calculator ready for a new calculation.

CI button: clears the last entry. Use it if you make a mistake in entering a number, to erase the whole number which may then be re-entered.

Use of the other buttons will become clear in the examples.

3 *Mode* switches, i.e. K and decimal point.

OPERATION

Preliminary

Switch calculator on.

Decide decimal point mode required – in the examples this is floating unless otherwise stated.

Press C button: always do this before starting a new calculation.

1 Number Entry

Example 1. To enter 253.026

Press	*Display*
2	2
5	25
3	253
·	253.
0	253.0
2	253.02
6	253.026
±	253.026

Note, after entering a number an *instruction* button must be pressed to tell the calculator that the complete number has been entered.

If the decimal point switch is pressed twice or more in number entry, the last one is effective.

In the following examples data entry will not be written in full, i.e. if number 260 is to be entered, 'press' column will show 260.

Generally examples will show an arithmetical example for actual calculation (specific problem) and an algebraic example (general problem).

2 ADDITION

Example 2 2.5 + 3.6 + 4.8 = 10.9 (specific)
a + b + c = answer (general)

Specific		*General*	
press	display	press	display
2.5	2.5	a	a
±	2.5	±	a
3.6	3.6	b	b
±	6.1	±	a + b
4.8	4.8	c	c
±	10.9	±	answer

Note The ± button is used for the + sign and for the = sign in the written problem.

3 SUBTRACTION

Example 3 4.9 + 82.1 − 25 = 62
a + b − c = answer

Specific		*General*	
press	display	press	display
4.9	4.9	a	a
±	4.9	±	a
82.1	82.1	b	b
±	87.	±	a + b
25	25	c	c
=	62	=	answer

Note: = is not quite the same as the written − sign. It is an instruction to 'subtract that last number' from the previous total.

4 MULTIPLICATION

Example 4 5.9 x 2.3 = 13.57
a x b = answer

Specific		*General*	
press	display	press	display
5.9	5.9	a	a
×	5.9	×	a
2.3	2.3	b	b
±	13.57	±	answer

5 DIVISION

Example 5 355 ÷ 113 = 3.1415929
a ÷ b = answer

Specific		*General*	
press	display	press	display
355	355	a	a
÷	355	÷	a
113	113	b	b
±	3.1415929	±	a ÷ b

6 MIXED CALCULATIONS

Example 6 (2.6 + 5) x 9.1 or (a + b) c

Specific		*General*	
press	display	press	display
2.6	2.6	a	a
±	2.6	±	a
5	5	b	b
±	7.6	±	(a + b)
×	7.6	×	a + b
9.1	9.1	c	c
±	69.16	±	answer

Note that, in writing the problem, a bracket indicates the part to be done first.

Therefore, a problem such as [a + b (c + d)] e must be done working from the inside outwards – start with c + d. Then multiply by b. The problem becomes clearer if written [[c + d]b + a] e, in which order it is done.

A problem such as (a + b) c + (d + e)f cannot be done as a simple calculation, it must be split into two parts.

Example 6.2 $\frac{(a + b)}{c} - d$ can be written

(a + b) ÷ c – d

e.g. (2.1 + 13.2) ÷ 2 – 4.4 = 3.25

Specific		*General*	
press	display	press	display
2.1	2.1	a	a
[±]	2.1	[±]	a
13.2	13.2	b	b
[+]	15.3	[+]	a + b
[÷]	15.3	[÷]	a + b
2	2	c	c
[=]	7.65	[=]	$\frac{a + b}{c}$
4.4	4.4	d	d
[−]	3.25	[−]	answer

7 USE OF DECIMAL POINT SWITCH

The decimal point switch (shown in fig. 1) has four positions to give:

1 Floating point (in which the decimal point is automatically positioned to make best use of the display)
2 Two decimal places.
3 Four decimal places.
4 Six decimal places

Floating point is usually used.

Problem work out π to 2, 4 and 6 decimal places. π, the ratio of the circumference of a circle to its diameter, is 3.14159265.....
A way of obtaining it, approximately, is
355 ÷ 113 = 3.1415929

(a) Decimal point floating

press	*display*
355	355
[÷]	355
113	113
[=]	3 1415929

(b) Decimal point 6 places: repeat calculation (a): answer is 3.141593
(c) Decimal point 4 places: answer is 3.1416
(d) Decimal point 2 places: answer is 3.14

Note: Automatic rounding off occurs when the decimal point is fixed. In (b) 3.141592 (9) was rounded up to 3.141593, similarly (c) was rounded up. (d) was rounded down. If the figure after the last decimal place is 5 or higher the last decimal place is rounded up.

8 USE OF K SWITCH

In the example, when the symbol ↓K appears the constant switch should be operated (switch to the left). ↑K means switch back to chain operation (switch to right).

8.1 Multiplication by a constant

Example 8.1

multiply 3.8 x 4.2 = 15.96 a x b =
and 3.8 x 5.19 = 19.722 a x c =
and 3.8 x 2.67 = 10.146 a x d =
and 3.8 x 51.09 = 194.142 a x e =

Specific		*General*	
press	display	press	display
↓K	0	↓K	0
3.8	3.8	a	a
×	3.8	×	a

The calculator now remembers the instruction 3.8 x or a x

Subsequent numerical entries will, on operation of the ± button, be multiplied by this number.

Continue			
4.2	4.2	b	b
±	15.96	±	a x b
then			
5.19	5.19	c	c
±	19.722	±	a x c
and			
2.67	2.67	d	d
±	10.146	±	a x d
and			
51.09	51.09	e	e
±	194.142	±	a x e

8.2 Division by a constant

Example 8.2

9.05 ÷ 3.14 a ÷ b
and 19.106 ÷ 3.14 c ÷ b
and 72.5 ÷ 3.14 d ÷ b

press	*display*	*press*	*display*
↓K	0	↓K	0
9.05	9.05	a	a
÷	9.05	÷	a
3.14	3.14	b	b
±	2.8821656	±	a ÷ b

The calculator now remembers the command ÷ b and on entering a number and ± will display that number ÷ b.

Thus			
19.106	19.106	c	c
±	6.0847133	±	c ÷ b
and			
72.5	72.5	d	d
±	23.089171	±	d ÷ b

8.3 Currency conversions

The feature of constant multiplication and division is particularly useful for conversions from one currency to another, or back again, in the same operation. Assume there are 2.65 $ to £1, to convert £ to $ we multiply by $\frac{2.65\$}{£1}$

This constant is to be set up in the calculator: set the decimal switch to 2 places, or as required.

press	*display*
↓K	0
2.65	2.65
×	2.65

The calculator is now ready to convert £ to $.

Example 8.3.1

Convert (a) £1.90
(b) £3.25
(c) £0.65
(d) £102.90 to $

press	*display*
(a) 1.90	1.90
±	*5.04*
(b) 3.25	3.25
±	*8.61*
(c) 0.65	0.65
±	*1.72*
(d) 102.90	102.90
±	*272.69*

And, to convert $ to £1, without any change in the calculation, simply press ÷ and proceed thus:

Example 8.3.2

Convert (a) $1
(b) $1049.80
(c) $25.85 to £

press	*display*
÷	272.69 (answer to last calculation in 8.3.1)
(a) 1	1
±	*0.38*
(b) 1049.80	1049.80
±	*396.15*
(c) 25.85	25.85
±	*9.75*

9 USE AS A TALLY COUNTER

Set decimal point switch to 6. Select ↓K. Enter 1.000001 × ± Display now registers 1.000002, and by pressing ± button counts upwards one count for each operation.

This will work until the display shows 1.500,000. Above this the count will become irregular. The same method may be used with four decimals or two decimals, in which case numbers entered must be 1.0001 or 1.01 respectively. Maximum count will be 1.5000 and 1.50 respectively.

10 SQUARES AND OTHER POWERS

10.1 'In-calculation' squaring

At any time during calculation the answer can be squared. Having pressed ± to obtain the answer, press × then ±

press	*display*
±	a
×	a
±	a^2
×	a^2
±	a^4
×	a^4
±	a^8

Note that by successive × ± operations the series a, a^2, a^4, a^8, a^{16}, a^{32} etc. is displayed.

10.2 Displaying powers

It is very simple to display a, a^2, a^3, a^4 etc., e.g.

Problem: work out 7^n, in successive powers (general problem a^n)

press	display	press	display
↓K	–	↓K	–
7	7	a	a
×	7	×	a
1	1	1	1
=	49	=	a^2
=	343	=	a^3
=	2401	=	a^4
=	16807	=	a^5
=	117649	=	a^6
=	823543	=	a^7
=	5764801	=	a^8
=	40353607	=	a^9

Note in keying a x 1, the 2nd operation of = gives the square, the 3rd the cube etc. The 1 can be omitted in which case the first = gives the square, the second the cube etc.

If a number such as $2^5 \times 6$ is to be calculated the 1 in the above calculation is replaced by 6.

11 'IN-CALCULATION' RECIPROCALS

In the process of calculation the intermediate result 0.1369863 has occurred: problem to find its reciprocal.

Specific		*General*	
–	0.1369863	–	a
↓K	0.1369863	↓K	a
÷	0.1369863	÷	a
=	1	=	$1\left(=\frac{a}{a}\right)$
↑K	1	↑K	1
=	7.3	=	$1 \div a$

Note on releasing ↑K the calculator still remembers the command ÷ a which is not lost until the next operation(=)after releasing K.

If $\frac{b}{a}$ is to be found, b can be entered after releasing K and before operating =.

Problem 11.1 Specific $\frac{12 \times 6}{12 + 6}$

General $\frac{a \times b}{a + b}$

If we do not need an answer to more than 2 decimals: set decimal switch at 2 places.

Specific		*General*	
press	display	press	display
12	12	a	a
=	12.00	=	a
6	6	b	b
=	18.00	=	a + b
↓K	18.00	↓K	a + b
÷	18.00	÷	a + b
=	1.00	=	$\frac{a+b}{a+b} = 1$
↑K	1.00	↑K	1
12	12	a	a
×	0.6666666	×	$\frac{a}{a+b}$
6	6	b	b
=	4.00	=	$\frac{a \times b}{a+b}$

Note the calculator does not round-up after ×,but only after = or =.

If the decimal point is left floating the answer does not come to exactly 4, since some error is introduced because $18 \div 12$ is a recurring number. The error is however very tiny.

12 ITERATIVE SQUARE ROOT PROCESS

To find $\sqrt{133}$ or, generally, $\sqrt{A}$, take a rough guess, 11 or, generally, n. Write this on paper.

Specific

paper	press	display
11	11	11
	±	11
repeat cycle	↓K	11
	÷	11
	±	1
	↑K	1
	133	133
	±	12.090909
	11	11
	±	23.090909
	÷	23.090909
	2	2
11.545454	±	11.545454

General

paper	press	display
n	n	n
	±	n
repeat cycle	↓K	n
	÷	n
	±	1
	↑K	1
	A	A
	±	$\frac{A}{n}$
	n	n
	±	$\frac{A}{n} + n$
	÷	
	2	2
½ $(\frac{A}{n} + n)$	±	½ $(\frac{A}{n} + n)$

Write the answer on paper, then repeat the cycle as indicated, but using the new number instead of the first rough guess.

The cycle is to be repeated until the desired accuracy is obtained, or the number repeats itself. Thus, in the example, successive approximations are:

11
11.545454
11.532569
11.532562
11.532562

Example 12.1

find $\sqrt{3^2 + 4^2}$ this is best written as $4\sqrt{1 + (\frac{3}{4})^2}$

$\sqrt{a^2 + b^2}$ $\quad a\sqrt{1 + (\frac{b}{a})^2}$

which can much better be calculated.

press	*display*	*press*	*display*
3	3	b	b
÷	3	÷	b
4	4	a	a
×	0.75	×	$\frac{a}{b}$
±	0.5625	±	$(\frac{a}{b})^2$
1	1	1	1
±	1.5625	±	$1+(\frac{a}{b})^2$

Write this number down then perform the square root calculation to give $\sqrt{1 + (\frac{a}{b})^2}$

multiply by a to give the answer, thus

Rough guess 1
second 1.28125
third 1.250381
fourth 1.25

press	*display*	*press*	*display*
–	1.25	–	$\sqrt{1 + (\frac{a}{b})^2}$
×	1.25	×	$\sqrt{1 + (\frac{a}{b})^2}$
4	4	a	a
±	5	±	answer

This is of course the solution to the right angled triangle with sides 3, 4 and 5.

13 PERCENTAGES

Example. A certain product has a list price of £19.95. Discount to the dealer is 20% plus 3¾% for cash settlement. What is the net price.

A discount of 20% means the price reduces to 80% of the list: generally a discount of a% means a reduction to (100 – a)%. This transformation can be done in the head. Similarly 3¾% discount means a reduction to 96.25%.

80% means $\frac{80}{100}$ times the original – or 0.8 times. 96.25% is the same as 0.9625 times, or generally a discount of –a% means multiply by $\frac{100 - a'}{100}$

The answer is required to the nearest 1p – set decimal switch to 2 places.

Specific

press	display
19.95	19.95
×	19.95
0.8	0.8
×	15.96
0.9625	.9625
±	15.36

14 COMPOUND INTEREST

Example. The sum of £4,580 is invested at an interest rate of 5¾%, the interest to be re-invested every year. What is the accumulated sum after seven years?

At the end of 1 year the sum of £100 will become £105.75: the sum of £1 will become £1.0575. Each year the principal is multiplied by £1.0575.

press	*display*	
↓K		
1.0575	1.0575	
×	1.0575	
4,580	4,580	
=	4,843.35	1st year
=	5,121.84	2nd year
=	5,416.35	3rd year etc.

It is thus possible to work out the principle of any invested sum, provided the term invested is in a whole number of periods (e.g. half years) over which the interest is known.

Additional Instructions

+/− *button:* this merely changes the sign of the display.

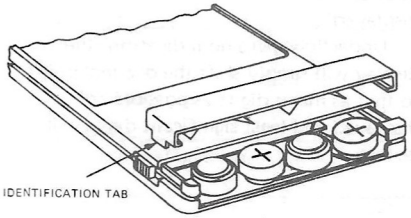
Batteries

The Sinclair calculator uses four deaf-aid type batteries number MP675H. They are available from most chemists and radio shops. Although it is the same size, RM675 will not work satisfactorily and should not be used. Take care that you obtain the correct cells – they look identical but MP type has stamped on the cell 'MP675'. The RM type only has '675' stamped on it. Some other cells are available. Most of these are however similar to the RM and we cannot guarantee their operation.

The batteries are available also from Sinclair Radionics Ltd. or from A. & M. Hearing Aids Ltd., 7 Kelvin Way, Crawley, Sussex. They are sold in packs of six cells and, as they last a very long time in storage, it is a good idea to keep spares.

The batteries will last 4-6 hours of continual use, which means several weeks in normal use. Indication of failing batteries is given by a weakening brightness of the display, which will eventually fade completely. This will happen before calculation accuracy is affected.

The batteries may be replaced after removing the panel as shown on the inside front cover.



To remove battery cover, lift tab outwards and upwards with thumb nail.

As this is a battery operated machine, switch off between calculations.

Overflow

If, in data entry, the number being entered is too long (9 digits or more) for the calculator, once the display is filled no further digits can be entered. Any further digits entered will not be displayed, but E or ⊏ will appear in the extreme left-hand display to indicate overflow.

Entry overflow can be cleared. However, calculations are still possible even if entry has overflowed, although the E display will remain illuminated.

If the answer to a calculation exceeds the calculator's capacity then □, ⊔, ⊏, or ⊔ will appear. This will 'lock' the calculation and no further operation is possible until the calculator is cleared.

In the overflow condition the display shows the proper answer, but multiplied by 10^{-8}. Thus to determine the answer, the overflow is to be considered as $X10^{8}$: to determine the correct figure, move the decimal point eight places to the right.

Thus, 5.9065202 ***304*** – is to be read as 590652023.04 (the figures in italics are not displayed).

Underflow gives no indication: the display will simply shift the decimal point so that as many digits as possible are displayed and least significant digits will be last.

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Guarantee

The Sinclair Calculator is guaranteed against defects arising in normal use, for a period of 5 years from the date of purchase, subject to the following condition:

The fault has not been caused by misuse.

Please return the Calculator direct to Sinclair Radionics Ltd., Calculator Service Department, London Road, St Ives, Huntingdon PE17 4HJ, carefully packed, postage prepaid.

Please enclose a letter with the Calculator, stating clearly your name and address and the place of purchase. Also the nature of the fault.

Guarantee Registration is not required but please use the space below to record the relevant details for your reference.

Calculator Serial Number

Date of purchase

Place of purchase

Owners name and address

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