

microlith

four key memory

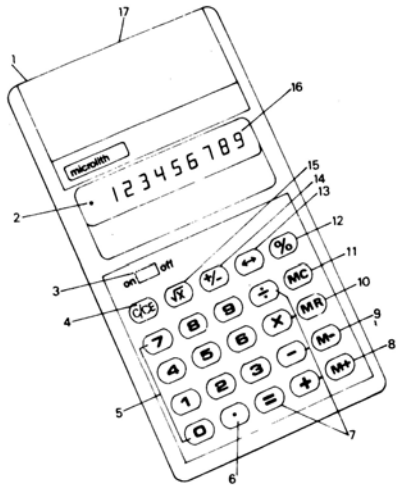
ELECTRONIC CALCULATOR
INSTRUCTION MANUAL

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GENERAL DESCRIPTION

The Microlith 113 memory 4 is a pocket size junior slide rule, designed especially to fulfil the requirements of both the businessmen and the students. It operates on one standard 9V battery or AC using an AC adaptor. It is an eight function (+, -, \times , \div , %, $\sqrt{\quad}$, +/ -, \leftrightarrow) machine with a full access memory (M+, M-, MR, MC) all in algebraic mode with features such as floating or fixed decimal point. The tilted display provides a comfortable viewing angle on desk.



LAYOUT

- 1 A.C. Power Jack
- 2 Indicator Digit
- 3 ON/OFF Power Switch
- 4 Clear and Clear Entry Key
- 5 Numerical Keys
- 6 Decimal Point Key
- 7 Arithmetic Operation Keys
- 8 Memory Add Key
- 9 Memory Minus Key
- 10 Memory Recall Key
- 11 Memory Clear Key
- 12 Percentage Key
- 13 Register Exchange Key
- 14 Change Sign Key
- 15 Square Root Key
- 16 Numerical Display Digits
- 17 Battery Compartment (rear)

FUNCTIONS OF KEYS

NAME	DESCRIPTION
OFF/ON Power Switch	To switch the power of the calculator ON or OFF.
C/CE Clear and Clear Entry Key	Press once clears entries or overflow condition; press twice clears all except memory.
+ / - Change Sign Key	Depression of this key will change the sign of the displayed number.
$\sqrt{\times}$ Square Root Key	Depression of this key will perform the square root of the previously displayed number.
\leftrightarrow Register Exchange Key	Depression of this key will exchange the contents of the display and constants in Y register.
% Percentage Key	For percentage, mark-up and discount calculations.

NAME**DESCRIPTION**

$+$, $-$, \times , \div , $=$ Arithmetic Operation keys

Depression of any of these keys will perform the appropriate function specified by that key.

0~9. Numerical Keys and Decimal Point Key

Depression of any of these keys will perform the appropriate number entry.

M + Memory Add Key

Depression of this key will add the displayed number to the memory.

M - Memory Minus Key

Depression of this key will subtract the displayed number from the memory.

M R Memory Recall Key

Depression of this key will recall the number in the memory.

M C Memory Clear Key

Depression of this key will clear the memory.

CALCULATION EXAMPLES

ADDITION AND SUBTRACTION

Problem: $12.3 + 0.456 = 12.756$

Keyboard Entry	Display
12.3	12.3
+ 0.456	0.456
=	12.756

Problem: $45.6 - 78.9 = -33.3$

Keyboard Entry	Display
45.6	45.6
- 78.9	78.9
=	- 33.3

MULTIPLICATION AND DIVISION

Problem: $12.3 \times 4.5 = 55.35$

Keyboard Entry	Display
12.3	12.3
$\times 4.5$	4.5
=	55.35

MIXED CALCULATION

Problem: $(1.2 \times 3.4 - 6) \div 7.2 = -0.2666666$

Keyboard Entry	Display
1.2	1.2
$\times 3.4$	3.4
-	4.08
6	6
+	- 1.92
7.2	7.2
=	- 0.2666666

CHAIN CALCULATIONS

Problem: $0.1 + 2.3 + 45 - 0.67 - 8.9 = 37.83$

Keyboard Entry	Display	Comments
0.1	0.1	
+ 2.3	2.3	
+	2.4	(0.1 + 2.3) executed
45	45.	
-	47.4	(2.4 + 45) executed
0.67	0.67	
-	46.73	(47.4 - 0.67) executed
8.9	8.9	
=	37.83	(46.73 - 8.9) executed

CONSTANT CALCULATIONS

Constant addition

Problem: $1 + 2 = 3$, $0.2 + 2 = 2.2$, $63 + 2 = 65$

Keyboard Entry	Display	Comments
1	1.	Constant undetermined
+ 2	2.	Constant added = 2
=	3.	
0.2	0.2	
=	2.2	
63	63.	
=	65.0	

Constant subtraction

Problem: $1 - 2 = -1$, $111 - 2 = 109$

Keyboard Entry	Display	Comments
1	1.	Constant undetermined
- 2	2.	Constant = 2
=	- 1.	
111	111.	
=	109.	

Constant Multiplication

Problem: $2 \times 2 = 4$, $0.34 \times 2 = 0.68$

Keyboard Entry	Display	Comments
2	2.	Constant undetermined
$\times 2$	2.	Constant = 2
=	4.	
0.34	0.34	
=	0.68	

Constant Division

Problem: $3 \div 2 = 1.5$, $123 \div 2 = 61.5$

Keyboard Entry	Display	Comments
3	3.	Constant undetermined
$\div 2$	2.	Constant = 2
=	1.5	
123	123.	
=	61.5	

Percentage calculation with a constant factor.

a) Different percentages of a fixed quantity.

Problem: $123 \times 5\% = 6.15$, $123 \times 6\% = 7.38$

Keyboard Entry	Display	Comments
123	123.	Constant 123
+ 5	5.	
%	6.15	
6	6.	
%	7.38	

b) Same percentage of different quantities

Problem: $250 \times 8\% = 20$, $400 \times 8\% = 32$

Keyboard Entry	Display	Comments
8	8.	Constant 8
+ 250	250.	
%	20.	
400	400.	
%	32.	

PERCENTAGE CALCULATIONS EVALUATION

Problem: $123 \times 12.3\% = 15.129$

Keyboard Entry	Display
123	123.
$\times 12.3$	12.3
%	15.129

MARK-UP

Problem: cost \$200

Profit: 10% Selling Price = ?

Keyboard Entry	Display
200	200.
$+ 10$	10.
%	20.
=	220.

DISCOUNT

Problem: Nominal price = \$200

Discount 10% Net price = ?

Keyboard Entry	Display
200	200.
$- 10$	10.
%	20.
=	180.

SQUARE ROOT CALCULATION

Problem: $\sqrt{(\sqrt{16} + 5)} = 3$

Keyboard Entry	Display
$16 \sqrt{X}$	4.
$+ 5$	5.
=	9.
\sqrt{X}	3.

CHANGE SIGN CALCULATION

Problem: $(-35) \times 3 \div 5 = -21$

Keyboard Entry	Indicator	Display	Comments
35		35.	
+/-	-	35.	
$\times 3$		3.	$(-35) \times 3$ executed
$\div 5$		5.	
=	-	21.	

EXCHANGE OPERAND CALCULATION

Problem: $\frac{124}{(9 \times 6) + 8} = 2$

Keyboard Entry	Display	Comments
9	9.	
$\times 6$	6.	(9×6) executed
+ 8	8.	$(9 \times 6) + 8$ executed
$\div 124$	124.	
\leftrightarrow	62.	
=	2.	

MEMORY CALCULATIONS

Problem: $\frac{(3 \times 4) + 111}{(4 \times 5) + (3 \times 8) - (6 + 2)} = 3$

Keyboard Entry	Indicator	Display	Memory
MC		0.	0
4		4.	0
× 5		5.	0
=		20.	0
M+	.	20.	20
3	.	3.	20
× 8	.	8.	20
=	.	24.	20
M+	.	24.	44
6	.	6.	44
+ 2	.	2.	44
=	.	3.	44
M-	.	3.	41

Keyboard Entry	Indicator	Display	Memory
3	.	3.	41
× 4	.	4.	41
+	.	12.	41
111	.	111.	41
÷	.	123.	41
MR	.	41.	41
=	.	3.	41

Problem: Arithmetic Progression

Find the sum from the 1st to 8th terms of the following arithmetic progression (3, 1, -1)

$$\begin{aligned}
 S_8 &= \frac{n(2a + (n - 1)d)}{2} \\
 &= \frac{8(2 \times 3 - 7 \times 2)}{2} \\
 &= -32
 \end{aligned}$$

Keyboard Entry	Indicator	Display	Memory
MC		0.	0
2		2.	0
× 3		3.	0
=		6.	0
M+	.	6.	6
C	.	0.	6
7	.	7.	6
× 2	.	2.	6
=	.	14.	6
M-	.	14.	-8
C	.	0.	-8
8	.	8	-8
× MR	—.	8.	-8
+ 2	.	2.	-8
=	—.	32.	-8

Problem: Geometric Progression

Find the sum from the 1st to 8th terms of the following geometric progression: (3, 9, 27)

$$S_8 = \frac{a(1 - r^n)}{1 - r} = \frac{3(1 - 3^8)}{1 - 3} = 9840$$

Keyboard Entry	Indicator	Display	Memory
1		1.	
- 3		3.	
=	-	2.	
M+	-.	2.	-2
C	.	0.	-2
3	.	3.	-2
x =	.	9.	-2
x =	.	81.	-2
x =	.	6561.	-2
+/-	-.	6561.	-2

Keyboard Entry	Indicator	Display	Memory
+ 1	.	1.	-2
× 3	.	3.	-2
- MR	-.	2.	-2
=	.	9840.	-2

OVERFLOW CONDITIONS

The following operations result in an overflow condition which causes the Overflow Indicator, x.x.x.x.x.x.x.x., to light and all keys except the clear key to become inoperative.

1. Any answer or subtotal exceeding 8 digits (greater than 99,999,999.) to the left of the decimal point, regardless of the arithmetic sign. Calculations can be continued, if desired (see

Wrap-Around Decimal). The 8 most significant digits are displayed.

2. Memory accumulation exceeding 8 whole digits to the left of the decimal point, regardless of the arithmetic sign. Calculations can be continued, if desired (see Wrap-Around Decimal). The number used in the last memory operation remains in the display.
3. Division by zero.

WRAP-AROUND DECIMAL

The wrap-around decimal feature lets you proceed when the answer obtained in the display or memory exceeds the capacity of the calculator (99,999,999.). The calculator automatically retains the 8 most significant (important) digits, places the decimal point 8 positions to the left of its true position, and lights the display x.x.x.x.x.x.x.x. You can proceed with the calculation after depressing the clear key once to clear the over-

Key Board Entry	Indicator	Display
98765432		98765432
+ 12345678		12345678
=		1.1.1.1.1.1.1.1.

flow condition, but you must multiply the final answer by 10^8 (100,000,000) or move the decimal point 8 places to the right. Any numbers subsequently added or subtracted must be divided by 10^8 before entering. If two overflows occur in the same problem, the final answer must be multiplied by $10^8 \times 10^8 = 10^{16}$, and so on. This same feature applies to the numbers in memory. For example, solve $(98765432 + 12345678)$ $(12345678 + 99999999)$:

Memory	Comments
	Overflow condition. Multiply by 10^8 to correct

Keyboard Entry	Indicator	Display .	Memory	Comments
C		1.1111111		Suppression of overflow condition, Number displayed retained for further calculations.
M+	.	1.1111111	1.1111111	The memory indicator lights.
C	.	0.	1.1111111	
12345678	.	12345678	1.1111111	Suppression of overflow condition, Number displayed retained for further calculations.
+ 99999999 x	. .	12345678 1.1.2.3.4.5.6.7.	1.1111111 1.1111111	overflow condition. Multiply by 10^8 to correct
C	.	1.1234567	1.1111111	
MR	.	1.1111111	1.1111111	The number in memory becomes multiplier.
=	.	1.2482852	1.1111111	The answer is 1.2482852×10^{16}

CLEAR OPERATION

There are two clear keys which perform the following functions: C/CE clear calculator/clear entry and MC clear memory.

1. Clear entry (Enter correction): A single depression of the C/CE key after entry of a number clears the displayed number but does not affect the stored constants or the operations in progress.
2. Clear calculator (except memory): A double depression of the C/CE key clears any operation in progress and clears the calculator except the memory.
3. Clear overflow: Depressing the C/CE key during an overflow condition (see overflow/underflow conditions)

clears that condition. The number displayed and any number in the memory can be used in further operations when corrected under wrap-around decimal.

4. Pressing the MC key clears the memory.

RECOVERY TECHNIQUES

Should you unintentionally press one of the arithmetic function keys, the following techniques allow easy correction without loss of the displayed number.

Unintentional + or - : Depress 0, then =
If constant addition or subtraction is being performed, the constant is replaced by 0.

Unintentional \times or \div : Depress 1, then =.
If constant multiplication or division is being performed, the constant is replaced by 1.

POWER SOURCE

Battery: Installation — Remove the battery compartment cover from the back of the calculator by sliding as shown by the arrow on the cover. Insert the 9-volt battery into the compartment snapping the battery terminals onto the clips provided within the compartment. Replace the battery compartment cover. The calculator is now ready for use.

Type: Standard ordinary Zinc-Carbon 9V cells (size 6F216 "216")

AC adaptor: Optional AC adapter (part No. 80027) lets you operate the calculator on A.C. mains. Plug the Adapter into a mains socket before turning ON the calculator. The battery is automatically cut off from the calculator and the Adapter.

NOTE: ONLY APPROVED ADAPTER SHOULD BE USED.

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