Operator's Manual for

BUSICOM
exec
121-DK

ELECTRONIC DESK-TOP CALCULATOR

BUSICOM **Busicom Corp.**
Business Computer Corporation

CONTENTS

FOREWORD

The BUSICOM-EXEC 121-DK electronic 10 keys desk calculator has been made from the most reliable "MOS-LSI.. (Large Scale Integrated Circuit) which founded by the space electronic technologies, and it has 12 digits capacity, with 1 memory.

This highly versatile BUSICOM-EXEC 121-DK provide extremely high capabilities such as automatically keeping the result before overflow and higher part of result will be guarded when overflows, reciprocal calculations (By using of exchange key), Round-Off, and automatic clear system etc.
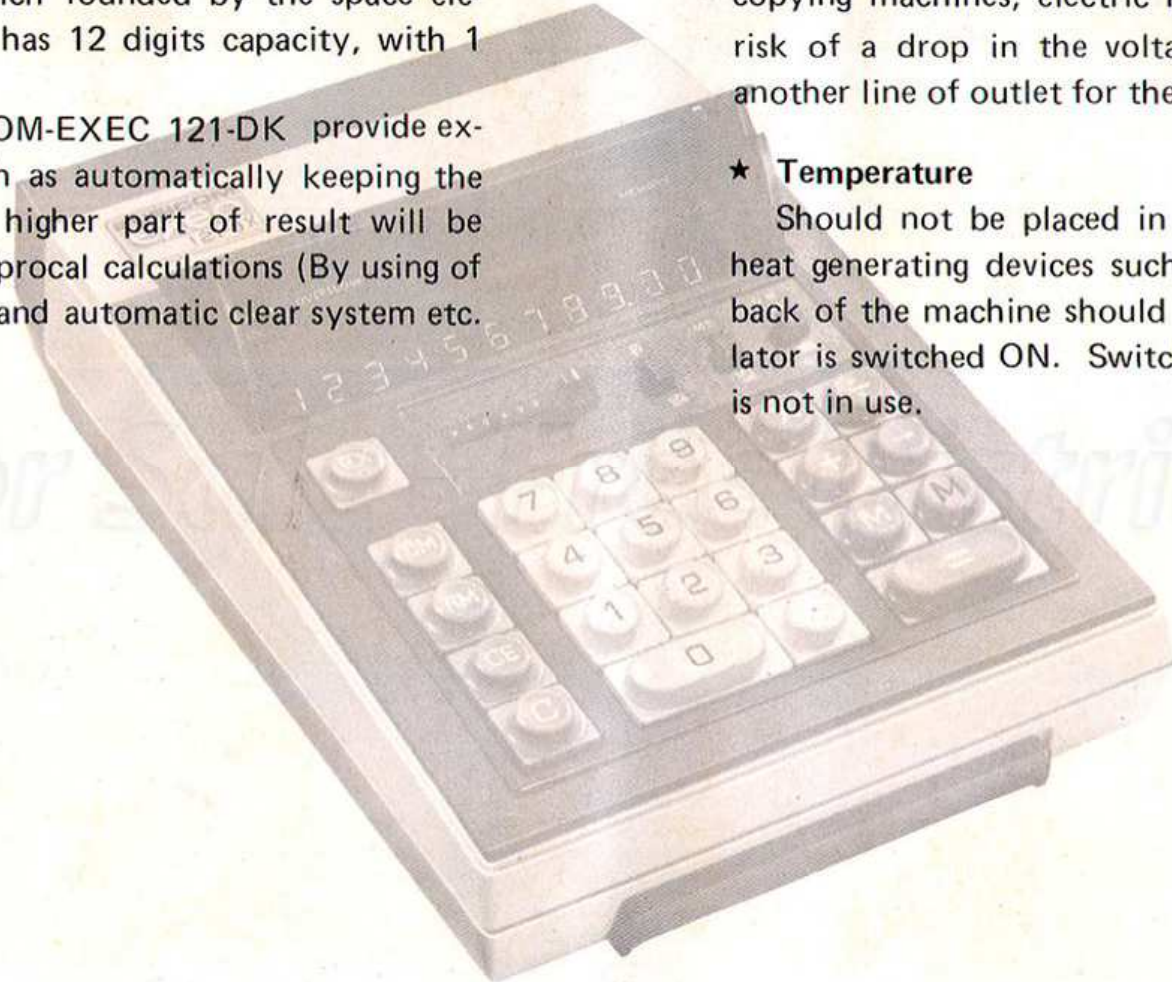
CAUTION

★ **Power Supply**

Where high electrical consumption equipment, such as copying machines, electric heaters, etc. are in use, there is risk of a drop in the voltage. It is recomended to use an another line of outlet for the BUSICOM-EXEC 121-DK.

★ **Temperature**

Should not be placed in intense direct sun light or near heat generating devices such as radiators. Air vents at the back of the machine should not be covered while the calculator is switched ON. Switch off the power when machine is not in use.

KEYBOARD AND DISPLAY CHART

Negative lamp

Overflow lamp

Memory lamp

NEGATIVE   OVERFLOW   MEMORY

1 2 3 4 5 6 7 8 9. 0 0

Exchange Key

Decimal Point Selector

Round-Off Selector

Power Switch

Memory Mode Selector

Clear Memory Key

Division Key

Multiply Key

Recall Memory Key

Minus Key

Plus Key

Clear Entry Key

Memory Minus Key

Memory Plus Key

Clear Key

Equal Key

Numeral Keys

Decimal Point Key

Decimal Point Selector :	⌐or setting of the decimal point position.
Round Off Selector :	Controls the type of rounding to occur.
Memory Mode Selector :	Change Memory Plus/Minus key to M+/M— key or M+/M— key.
⊙ Power Swtich :	Depress the button to switch ON and open the display hood.
:	Close the display hood to switch OFF.

2

KEY FUNCTIONS

(EX)	Exchange key ———————:	For reciprocal calculations.
CM	Clear memory key ———————:	Recalls the contents of memory to display and clears the contents of memory.
RM	Recall memory key ———————:	Recalls the contents of memory to display. (Not clears the contents of memory)
CE	Clear entry key ———————:	Clears the contents of the display.
C	Clear key ———————:	Clears the all contents of the calculator except memory.
×	Multiply key ———————:	For multiplications and storing multiplicand as a constant.
÷	Division key ———————:	For divisions and storing divisor as a constant.
+	Plus key ———————:	Adds the displayed figures to the operating register.
−	Minus key ———————:	Subtracts the displayed figures from the operating register.
M	Memory plus key ———————:	When memory mode selector is M±; Adds the displayed figures to the momory. When memory mode selector is M±; For processing operations individually and automatically adding the results to the memory.
M	Memory minus key ———————:	When memory mode selector is M±; Subtracts the displayed figures from the memory. When memory mode selector is M±; For processing operations indivisually and automatically subtracts the results from the memory.
=	Equal key ———————:	Display the products or quotients.

OPERATING INSTRUCTIONS

1. Addition and Subtraction

In addition or subtraction, the position of the decimal point is set by the D.P. selector (Decimal Point Selector) located on top of the keyboard.

The D.P. selector numbers 0, 1, 2, 3, 4, 5, 6 and 9 indicate the number of digits to the right of the decimal point. Depress the ⓒ key before operating.

Problem 1.

$$12.345 + 234.5 - 0.987 = 245.858$$

Since the decimal point is automatically positioned according to the D.P. selector setting.

To Add, enter the numbers, and depress the ⊞ key. To Subtract, enter the numbers and depress the ⊟ key.

In additions or subtractions, the result will display by the ⊞ or ⊟ key. Therefore, it is not necessary to depress the ⊟ key at all.

Sequence of Keyboard operation	Display
D. P. = 3	
ⓒ	0
12.345	12.345
⊞	12.345
234.5	234.5
⊞	246.845
.987	0.987
⊟	245.858

Problem 2

123.456 + 0.09876543 − 2000 = −1876.445235

When the remainder is negative, the negative lamp is lit and the true credit balance is displayed.

Problem 3

−222.222 + 555555 + 999999 = Overflow

An overflow lamp is lit when the display digit capacity is exceeded then every function key is locked. In this case, the CE key must be pressed to allow further operation, and the result before overflow can be obtained by depressing of the + key.

Sequence of Keyboard operation	Display
2 D. P. = 6 [C]	0
123.456	123.456
[+]	123.456000
.09876543	0.09876543
[+]	123.554765
2000	2000
[−]	— 1876.445235
([−])	1876.445235)
3 D. P. = 6 [C]	0
222.222	222.222
[−]	— 222.222000
555555	555555
[+]	555332.778000
999999	999999
[+]	◀ 999999.000000
[CE]	0
[+]	555332.778000

2. MULTIPLICATION

In the case of multiplication (also division) all the displayed figures of the preceding operations are cleared automatically by the entry of new figures. There is no need to depress the C key after each operation. The decimal point in the product is set by D.P. selector.

Problem 4
$$12.34 \times 0.456 = 5.62704$$

Problem 5
$$0.123456789 \times 63 = 7.777777707$$

	Sequence of Keyboard operation	Display
4	D. P. = 6 ⬜	
	12.34	12.34
	⨯	12.34
	.456	0.456
	＝	5.627040
5	D. P. = 6 ⬜	
	.123456789	0.123456789
	⨯	0.123456789
	63	63
	＝	7.777778

3. Chain Multiplication

Problem 6

$$4.13 \times 2.718 \times 1.0086 = 11.321877924$$

In chain multiplication, the first product is obtained by the second depression of the ⊠ key. The first product is then used as the second multiplicand. Thus, multiplication can be continued as many times as required without pressing the ⊟ key to obtain each successive product.

Problem 7

$$-0.99999 \times 44444 \times 66666 = -2962874074.96$$

At this problem the overflow lamp is lit, but the displayed product of figures is correct. This means the decimal point position in the product differs from setting decimal point. It is able to obtain the result before overflow by depression of the CE key, and the EX key.

Sequence of Key-board operation	Display
D. P. = 6 ▣	
4.13	4.13
⊠	4.13
2.718	2.718
⊠	11.2253400000
1.0086	1.0086
⊟	11.321878
D. P. = 6 ▣	
.99999	0.99999
⊟	— 0.999990
⊠	— 0.999990
44444	44444
⊠	— 44443.5555600
66666	66666
⊟	— ◀ 2962874074.96
CE	0
EX	— 44443.5555600

6

7

4. Multiplication by Constant

Problem 8

(a)	123.4 x 45	= 5553
(b)	123.4 x 8.1	= 999.54
(c)	123.4 x 0.000789	= 0.0973626
(d)	123.4 x 456789	= 56367762.6
(e)	123.4 x 50	= 6170

The multiplicand is retained in the operating register. Multiplication by a constant can be processed by merely entering the necessary figures and depressing the ☐ key.

8

Sequence of Key-board operation	Display
D. P. = 6 🔲	
123.4	123.4
☒	123.4
45	45
☐	5553.000000
8.1	8.1
☐	999.540000
.000789	0.000789
☐	0.097363
456789	456789
☐	◀ 56367762.6000
CE	0
50	50
☐	6170.000000

5. Raising to a Power   6. Division   7. Chain Division

Problem 9

$$(-10.01)^5 = -100501.001$$

Following the entry of the figures, depress the ⊠ key. Then depress the ⊟ key once and second power is displayed. Depressing the ⊟ key again displays the third power, and so forth.

Problem 10

$$50 \div 9 = 5.555555$$

As in multiplication, the quotient can be obtained by the same method used in normal mathematical calculations.

Problem 11

$$1000 \div 0.072 \div 258 = 53.832902669$$

In continuous division, there is no need to depress the ⊟ key in the procedure.

	Sequence of Keyboard operation	Display
9	D. P. = 6 ▦	
	10.01	10.01
	⊟	— 10.010000
	⊠	— 10.010000
	⊟	100.200100
	⊟	— 1003.003001
	⊟	10040.060040
	⊟	— 100501.001000
10	D. P. = 6 ▦	
	50	50
	÷	50.
	9	9
	⊟	5.555556
11	D. P. = 6 ▦	
	1000	1000
	÷	1000.
	.072	0.072
	÷	13888.8888888
	258	258
	⊟	53.832903

8. Division by Constant

Problem 12

(a) $20 \div 0.3 = 66.66666$

(b) $960 \div 0.3 = 3200$

(c) $500000000000 \div 0.3 = 1666666666666.6$

(d) $240 \div 0.3 = 800$

The constant number "0.3" and ÷ function are memo-
lized by depressing of the ÷ key automatically. Thus,
division by a constant is performed without requiring entry
of the divisor for each operation.

Sequence of Key-board operation	Display
D. P. = 6 🔢	
20	20
÷	20.
.3	0.3
=	66.666667
960	960
=	3200.000000
500000000000	500000000000
=	◀ 166666666666
CE	0
240	240
=	800.000000

12

9. Division by Raising to a Power

Problem 13

$$\frac{1000}{(0.03)^4} = 1234567900$$

At this problem, the overflow lamp will be lit, but the displayed figures is correct answer. In this case, the decimal point position displayed differs from setting of decimal point.

13

Sequence of Keyboard operation	Display
D. P. =4 ⌷⌷	
1000	1000
÷	1000.
.03	0.03
=	33333.3333
=	1111111.1100
=	37037037.0000
=	◀ 1234567900.00

10. Round-Off

Turn the Round-Off selector to the ⊡, to make Round-Off calculations by depressing of the ⊟ key or Ⓜ, Ⓜ keys (when memory mode selector is set to M±).

The digit to be rounded is determined by the setting of the D.P. selector. For example, if the D.P. selector is set at 6, the seventh digit to the right of the decimal point is rounded. When Round-Off selector is set at √N̄, Round-Off will not be made. (cut off).

Problem 14

⊡　0.1234567 → 0.123457

Problem 15

√N̄　0.1234567 → 0.123456

	Sequence of Keyboard operation	Display
14	D. P. = 6 ⊡、ⒸΙ	0
	.1234567	0.1234567
	⊟	0.123457
15	D. P. = 6 √N̄、ⒸΙ	0
	.1234567	0.1234567
	⊟	0.123456

11. Accumulation

By addition or subtraction into memory, it is possible to accumulate the sum or difference of products, accumulative products, quotients, etc., as well as their individual results. Decimal point positioning in addition and subtraction into memory is determined by the D.P. selector. There are two ways to accumulate into memory. When the memory mode selector is set to M±, the displayed figures will accumulate by $\boxed{M}$ or $\boxed{M}$. If the selector is set to M± individual result will accumulate automatically by $\boxed{M}$ or $\boxed{M}$. The memory lamp will light if there are some numbers in memory.

Problem 16

a.	123 × 4.5	=	553.5
b.	−123 × 258	=	−31734
c.	369 ÷ 0.9	=	410
d.	−456 ÷ 0.9	=	−506.66666
			−31277.1667

16

Sequence of Key-board operation	Display
D. P. = 4 $\boxed{M±}$、$\boxed{ }$	
$\boxed{CM}$、$\boxed{C}$	0
123	123
$\boxed{×}$	123.
4.5	4.5
$\boxed{M}$	553.5000
258	258
$\boxed{M}$	31734.0000
369	369
$\boxed{÷}$	369.
.9	0.9
$\boxed{M}$	410.0000
456	456
$\boxed{M}$	506.6667
$\boxed{RM}$	— 31277.1667

Problem 17

a. (4.23×15) − 38   = 25.45
b. (3.2 − 38) ÷ 0.83 = −41.9277
                        ─────────
                        −16.4777

17

Sequence of Key-board operation		Display
D. P. = 4 [M±] , [%&]		
[CM] 、 [C]		0
4. 23		4.23
[×]		4.23
15		15
[=]		63.4500
[+]		63.4500
38		38
[−]		25.4500
[M]		25.4500
[C] 3.2		3.2
[+]		3.2000
38		38
[−]	−	34.8000
[÷]	−	34.8000
.83		0.83
[=]	−	41.9277
[M]	−	41.9277
[RM]	−	16.4777

Problem 18

	price		amount		total
a.	3.21	x	15	=	48.15
b.	4.56	x	35	=	159.6
c.	28	x	345	=	9660

total of amount 395

Sequence of Key-board operation	Display
D. P. = 4 [M±], [⅝]	
[CM] 3.21	3.21
[×]	3.21
15	15
[M]	15.0000
[=]	48.1500
4.56	4.56
[×]	4.56
35	35
[M]	35.0000
[=]	159.6000
28	28
[×]	28.
345	345
[M]	345.0000
[=]	9660.0000
[RM]	395.0000

18

12. Square Root

Problem 19

$\sqrt{45.6} = 6.752777206$

It is possible to calculate the square root by using approximations

$$X \fallingdotseq \frac{1}{2}\left(\frac{a}{X_0} + X_0\right)$$

X_0 = approximation of a.

For example, if $a = 8 \rightarrow X_0 = 3$, $a = 38 \rightarrow X_0 = 6$,
$a = 246 \rightarrow X_0 = 16$

The operation procedure shown in the right is the first approximation obtained as initial X_0 number being fixed 7(X_0=7). It is possible to obtain 2nd approximation if you would carry out calculation by setting X_0=6.757142857 As such, carry out repeat calculation. And then if the approximation does not change, its number will be square root.

19

Sequence of Keyboard operation	Display
D. P. = 9 [M±] [√N]	
[CM] 、 [C]	0
7	7
[M]	7.000000000
45.6	45.6
[÷]	45.6
[RM]	7.000000000
[M]	6.514285714
[CM]	13.514285714
[÷]	13.514285714
2	2
[M]	6.757142857

13. Reciprocal Calculation

Problem 20

$$\frac{5}{(1+2-1.3)\times4} = 0.735294117$$

Sequence of Keyboard operation	Display
20 D. P. = 9 Ⓜ	
Ⓒ	0
1	1
⊞	1.000000000
2	2
⊞	3.000000000
1.3	1.3
⊟	1.700000000
⊠	1.70000000
4	4
⊡	6.80000000000
5	5
EX	6.80000000000
⊟	0.735294117

14. Combination Problems

$$\frac{(37-74.6)\times3.08}{236} + 0.22 = 0.270711$$

21

Sequence of Key-board operation	Display
D. P. = 6 🔳,🔳	
🅒	0
37	37
➕	37.000000
74.6	74.6
➖	− 37.600000
✖	− 37.600000
3.08	3.0 8
➗	− 115.808000000
236	236
➖	− 0.490711
➕	− 0.490711
.22	0.22
➕	− 0.270711

Problem 22

$$\frac{7 \times 5}{6} - \frac{29}{(3.5+10.5)} + 3 - 5 = 1.7619$$

22

Sequence of Key-board operation	Display
D. P. = 4	
M⁺	
🔅	
CM、 C	0
7	7
×	7.
5	5
÷	35.0000000000
6	6
=	5.8333
M	5.8333
3.5	3.5
+	3.5000
10.5	10.5
+	14.0000
÷	14.0000
29	29
EX	14.0000
=	2.0714
M	2.0714
3	3
M	3.0000
5	5
M	5.0000
RM	1.7619

15. Operating Cautions

15-1 Correction of functions are basically only as follows.

$\boxed{\times} \xleftarrow{\rightarrow} \boxed{\div}$ $\boxed{\times} \rightarrow \boxed{-}$

$\boxed{\times} \xleftarrow{\rightarrow} \boxed{+}$ $\boxed{\div} \rightarrow \boxed{-}$

$\boxed{\div} \xleftarrow{\rightarrow} \boxed{+}$ $\boxed{+} \rightarrow \boxed{-}$

15-2 Changing of D.P. selector in the middle of operations are basically only available in multiplication or division.

15-3 Do not depress the $\boxed{C}$ and $\boxed{CE}$ key at the same time. The $\boxed{CE}$ key clears only the contents of display register and releasing of overflows. It means the other functions are safely stored, such as result etc.

15-4 By depressing of the $\boxed{-}$ key continuously, the negative lamp will goes "ON" and "OFF". It is only changing of the "Sign" for the displayed contents.

15-5 By depressing of the $\boxed{M}$, $\boxed{M}$ key continuously, may results addition or subtraction to memory as the number of depression of the $\boxed{M}$, $\boxed{M}$ key.

15-6 In case of the dividend or divisor is "0" in division, result will be as follows.

(1) $a \div 0 = \ldots$ overflows
Depress the $\boxed{CE}$ key to make further operations.

(2) $0 \div a = 0.0000 \ldots$ correct result
In case of D.P. = 4

(3) $0 \div 0 = \ldots$ overflows
Depress the $\boxed{CE}$ key to make further operations.

Busicom Corp.
Business Computer Corporation

BUSICOM