electronic pocket calculator for engineering and science

MR 610

INTRODUCTION

You have purchased a high-quality electronic calculator that requires proper handling in order to ensure trouble-free operation and to allow unlimited use of its many capabilities.

Please read this manual carefully before taking this hand-held calculator into use. It is advisable to observe the cautionary notes given in the following to prevent operational failure.

— Do not store nor operate the calculator in a temperature range other than specified. Note that it should not be exposed to direct sunlight.

— Be sure to prevent impact, shocks or mechanical vibration.
— The calculator should be kept away from water.
— Protect the unit against strong electric or magnetic radiation or X-rays (e. g., in airport check-ups).
— Do not exert pressure to the display as the panel is made of glass.
— A soft, dry cloth or a cloth slightly moistened with a neutral wetting agent (domestic rinsing agent) should be used to clean the surfaces. Do not use quick-volatizing liquids such as spirits, thinners or benzine!
— The battery provides approximately 2000 hours of operation. When the battery is running down, the digits and symbols will

1

become dim and hard to read. Replace the exhausted battery immediately.

We trust that our Model MR 610 will give you full performance satisfaction.

CONTENTS

MR 610

1. SPECIFICATIONS

Arithmetic operations:	Addition Subtraction Multiplication Division Chain calculation Mixed calculation Constant calculation Algebraic logic Two levels of parenthesis
Functions:	sin, cos, tan, arc sin, arc cos, arc tan (three modes of degrees, radians or grads); sinh, cosh, tanh, ln, lg, e^x, 10^x, y^x, $\Delta^0/_0$, X^2, $1/X$,
Conversions:	$\sqrt{}$, $\sqrt[3]{}$, X!, change sign degrees minutes seconds to decimal angles or vice versa; polar coordinates to rectangular coordinates or vice versa
Constant call-up:	the value of π
Register exchange:	X to Y or vice versa
Statistics:	Mean and standard deviation, ΣX, ΣX^2, number of keyed-in values
Memory:	One memory for constants (usable as accumulating

	memory) exchange of memory with display register, memory recall, memory clear
Clearing:	Clear all, Clear entry, Function reset
Numeral display:	8-digit mantissa plus 2-digit exponent and 2-digit sign
Display of special symbols:	Error indication, Level of parenthesis, Display of second function of dual-function
	keys, „Memory-in-use" indication Display of statistical calculations mode
Power consumption:	0.0005 Watts
Power supply:	two silver oxide button cells type SR 44
Dimensions:	144 $\times$ 70 $\times$ 8.5 millimetres
Weight:	90 g approx.
Working temperature:	in a range 0 °C to +40 °C

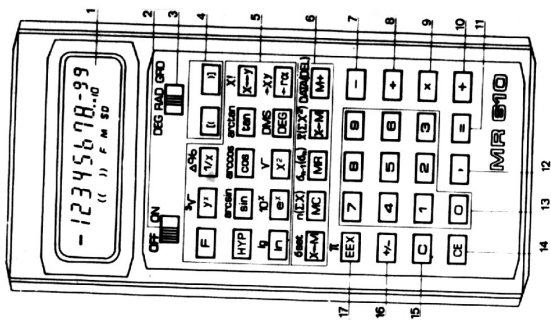| Temperature during transport: | in a range −10 °C to +40 °C |
| Shelf life and transportation in original packing: | one year |

ELECTRONIC POCKET CALCULATOR

for engineering and science

MR 610

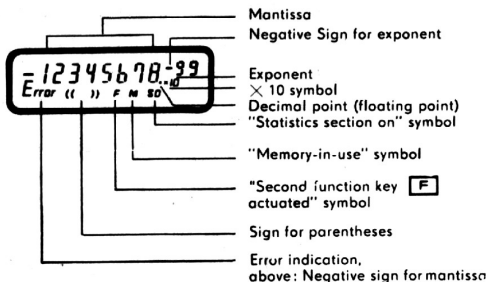## 2. KEYBOARD

1 — Display

2 — ON/OFF power switch

3 — Degree, Radian and Gradian switch

4 — Keys for parentheses

5 — Keys for functions and conversions, register exchange

6 — Keys for memory and statistical calculations

7 — Subtraction key

8 — Division key

9 — Multiplication key

10 — Addition key

11 — Result key

12 — Decimal point key

13 — Numeral keys 0 to 9

14 — Clear entry of last entered number

15 — Clear all except memory contents

16 — Change Sign key

17 — Enter Exponent key and π key

3. DISPLAY

Mantissa

Negative Sign for exponent

Exponent

$\times$ 10 symbol

Decimal point (floating point)

"Statistics section on" symbol

"Memory-in-use" symbol

"Second function key [F] actuated" symbol

Sign for parentheses

Error indication, above: Negative sign for mantissa

4. KEYS AND CONTROLS

ON/OFF power switch
Positioned at ON: Calculator is on
Positioned at OFF:
Calculator is off

Degree, Radian and Gradian switch
This switch is used for the three trigonometric modes, their inverse functions, and for coordinate conversions.
Positioned at DEG: Entry and result

in degrees
Positioned at RAD: Entry and result in radians
Positioned at GRD: Entry and result in grads

Numeral keys

Decimal point key for specifying values with decimal places

Change Sign key
Changes the sign of the displayed number from positive to negative or vice versa.
Changes the sign of the exponent after

depression of the `EEX` key.

`+` `−` `÷` `×`

Keys for addition, subtraction, division, and multiplication

`CE`

Clear entry key. Clears the last entered number. (Used to clear an erroneous entry.)

`C`

Clear all key. Clears the contents of all arithmetic registers. This key does not clear the memory contents.

`F`

Function key. On depression of this key the dual-function keys will then function as indicated by their upper designations. A renewed depression of the F key resets the "Function" mode. Note special features for statistical analysis.

$\frac{\pi}{\text{EEX}}$

"Enter Exponent" key and π key.
Example: $205 \cdot 10^{12}$
Keystroke sequence:
`2` `0` `5` `EEX` `1` `2`
Note: The multiplication key is not depressed.

Only two digits can be entered for the exponent. If you enter more than two digits, only the two last entered digits are effective (correction facility after erroneous entry).
The constant Pi is called up on depression of the `F` and `π` keys.

$\frac{\sqrt[3]{}}{y^x}$

Key for calculating the y^x function and for extracting the cubic root.

$\frac{\Delta\%}{1/x}$

Key for calculating the reciprocal and for percentage calculation

Examples of per cent calculation:

$$a + b \quad \boxed{F} \quad \boxed{\Delta\%} \quad \triangleq \quad \frac{a + b}{b} \cdot 100$$

$$a - b \quad \boxed{F} \quad \boxed{\Delta\%} \quad \triangleq \quad \frac{a - b}{b} \cdot 100$$

$$a \times b \quad \boxed{F} \quad \boxed{\Delta\%} \quad \triangleq \quad \frac{a \cdot b}{100}$$

$$a \div b \quad \boxed{F} \quad \boxed{\Delta\%} \quad \triangleq \quad \frac{a}{b} \cdot 100$$

`(` `)`

Keys for parentheses
The parenthesis symbol is displayed.

arcsin
`sin`
arccos
`cos`
arctan
`tan`

Keys for performing trigonometric functions and their inverse functions.

`HYP`

Key for implementing hyperbolic functions
Example:
`HYP` `sin` $\triangleq$ sinh

$\frac{x!}{x \leftrightarrow y}$

Key for register exchange and for calculating the factorial of a number

$\frac{\lg}{\ln}$

Key for calculating the natural logarithm and common logarithm

$\frac{10^x}{e^x}$

Key for calculating the exponential functions e^x and 10^x

$\sqrt{}$
X^2

Key for calculating the square and
square root of a number

DMS
DEG

Key for converting decimal angles to
degrees, minutes, and seconds or vice
versa Example: 15° 22' 16"
Keystrokes: 15 $\boxed{\cdot}$ 2216 $\boxed{DEG}$
Display: 15.371111
Conversely, the first two places after the
decimal point are interpreted as minutes
and the following as seconds.

$\rightarrow xy$
$\rightarrow r\alpha$

Key for converting rectangular coordinates
to polar coordinates or, after depression
of the function key $\boxed{F}$, from polar
coordinates to rectangular coordinates.

6set
$X \leftrightarrow M$

Key for exchange of the displayed number
with the number in the memory, and for
the "Statistical calculations" mode.

n(ΣX)
MC

Key for memory clear, number of the
keyed-in numbers and sum of the keyed-in
numbers in statistical calculations.
In the "Statistics" mode the number n of
the keyed-in values is obtained.
After the keystroke sequence $\boxed{F}$ $\boxed{(\Sigma X)}$
the sum of the keyed-in values is obtained.

$\sigma_{n-1}(\bar{x})$
MR

Key for memory recall and standard
deviation.
Operation of this key causes display of

the memory contents without altering it.
In the "Statistics" mode of operation
the standard deviation σ_{n-1} is obtained.
After the keystroke sequence $\boxed{F}$ $\boxed{\sigma_n}$
the standard deviation σ_n is obtained.

$\bar{x}(\Sigma X^2)$
$X \leftarrow M$

Key for memory entry, arithmetic mean
and sum of the squares of the entered
values.
Writes the displayed number into the
memory, replacing the previous contents
of the memory.
In the "Statistical calculations" mode the

arithmetic mean is obtained as also the
sum of the squares of the entries after the
keystroke sequence $\boxed{F}$ $\boxed{(\Sigma X^2)}$

DATA(DEL)
M+

Key for addition to the memory, entry of
values and deletion of values.
Adds the displayed number to the
memory contents. In the "Statistical
calculations" mode this key serves to
enter values for the calculation of
ΣX; ΣX^2; $\bar{x}$; σ_{n-1} and σ_n.

After the keystroke sequence $\boxed{F}$ $\boxed{(DEL)}$
the displayed value is deleted. In this way
an erroneous entry can be corrected.

Example:

		Display	Counter
a	$\boxed{DATA}$	a	m
b	$\boxed{DATA}$	(erroneous entry)	m + 1
F	$\boxed{DEL}$	b	m
	$\boxed{n}$	m	m

Remarks
When the calculator is in the "Statistical
calculations" mode, all computations can
be performed with the exception of

coordinate conversions, calculations in parentheses and the conversion of decimal angles to degrees, minutes, seconds or vice versa. Neither are memory functions possible in the "Statistics" mode. While in the "Statistics" mode $\bar{x}$; ΣX; ΣX^2; σ_{n-1}; σ_n and n are found out in between, further entries can be made nevertheless.

All registers are cleared by a depression of the $\lfloor\overline{aset}\rfloor$ key. The "Statistical calculations" mode of operation is reset on operation of the $\boxed{C}$ key or by a renewed depression of the $\lfloor\overline{aset}\rfloor$ key.

Definition of the mean value $\bar{x}$ and the standard deviation σ_{n-1} and σ_n

$$\bar{x} = \frac{\Sigma X}{n}$$

$\bar{x}$ = keyed-in values
n = number of values

$$\sigma_{n-1} = \sqrt{\frac{\Sigma X^2 - \frac{(\Sigma X)^2}{n}}{n-1}}$$

$$\sigma_n = \sqrt{\frac{\Sigma X^2 - \frac{(\Sigma X)^2}{n}}{n}}$$

5. GENERAL REMARKS FOR USE OF THE POCKET CALCULATOR

When the ON/OFF slide switch is positioned to ON, a zero (O.) appears on the extreme right in the display. The calculator has been provided with an automatic clearing device and allows immediate operation.

Depress the CE key after an erroneous entry, then key in the correct digits.

When the $+$; $-$; x; $\div$ keys have been operated by mistake, it is only necessary to depress the correct key, and you will obtain the correct result.

The result of a calculation is obtained in exponential notation when the numbers

$\geq 1 . 10^8$ or numbers < 1 are obtained in case they exceed 7 decimal places.

CONDITIONS FOR ERROR INDICATION

● The result or an intermediate result of a calculation exceed the capacity of the calculator.
● Calculation of numbers outside the domain of definitions (cf. par. 6).
● When division by zero is attempted.
● During the "Statistics" mode of operation when calculating σ_{n-1}
    if n = O or 1, when calculating σ_n,
    if n = O and when entering values greater than 9.9 . 10^{61} or
    less than   9.9 . 10^{-61}.

Error indication is reset by a depression of the C key.

6. DOMAIN OF DEFINITION AND ACCURACIES

Function		Domain of definition	Accuracy
sin x	DEG	$0; 4.5 \cdot 10^{-8} \leq |x| \leq 4.4999999 \cdot 10^{9}$	8th digit ± 1
	RAD	$0; 7.8539817 \cdot 10^{-10} \leq |x| \leq 7853980.7$	$0 \leq |x| < \frac{\pi}{2}$; 7th digit ± 1
			$\frac{\pi}{2} \leq |x| \leq 2\pi$; 7th digit ± 5
	GRD	$0; 5 \cdot 10^{-8} \leq |x| \leq 4.9999999 \cdot 10^{9}$	8th digit ± 1

cos x	DEG	$0; 1 \cdot 10^{-8} \leq |x| \leq 4.5000008 \cdot 10^{9}$	8th digit ± 1
	RAD	$0; 7.8539817 \cdot 10^{-10} \leq |x| \leq 7853982.5$	$0 \leq |x| \leq \frac{\pi}{2}$; 7th digit ± 1
			$\frac{\pi}{2} \leq |x| \leq 2\pi$; 7th digit ± 5
	GRD	$0; 1 \cdot 10^{-8} \leq |x| \leq 5.0000009 \cdot 10^{9}$	8th digit ± 1
tan x	DEG	same as sin x; except $|x| = 90° + 180° \cdot n$, for $n = 0, 1, 2, \ldots$	8th digit ± 1

	RAD	same as sin x; except $|x| = \frac{\pi}{2} + \pi \cdot n$, for $n = 0, 1, 2 \ldots$	$0 \leq |x| < \frac{\pi}{2}$; 7th digit ± 1
			$\frac{\pi}{2} \leq |x| \leq 2\pi$; 7th digit ± 5
	GRD	same as sin x; except $|x| = 100\ \text{GRD} + 200\ \text{GRD} \cdot n$, for $n = 0, 1, 2, \ldots$	8th digit ± 1

arcsin x	DEG	$0; 1.5707964 \cdot 10^{-m} \leq |x| \leq 1$,	8th digit ± 1
	RAD	$0; 1 \cdot 10^{-m} \leq |x| \leq 1$	8th digit ± 1
	GRD	$0; 1.5707964 \cdot 10^{-m} \leq |x| \leq 1$	8th digit ± 1
arccos x	DEG	$0; 1 \cdot 10^{-m} \leq |x| \leq 1$	8th digit ± 1
	RAD	$0; 1 \cdot 10^{-m} \leq |x| \leq 1$	8th digit ± 1
	GRD	$0; 1 \cdot 10^{-m} \leq |x| \leq 1$	8th digit ± 1

arctan x	DEG	$0; 1.5707964 \cdot 10^{-m} \leq |x| \leq 9.9999999 \cdot 10^{n}$	8th digit ± 1
	RAD	$0; 1 \cdot 10^{-m} \leq |x| \leq 9.9999999 \cdot 10^{n}$	8th digit ± 1
	GRD	$0; 1.5707964 \cdot 10^{-m} \leq |x| \leq 9.9999999 \cdot 10^{n}$	8th digit ± 1

sinh x	$0; 1 \cdot 10^{-m} \leq |x| \leq 227.95592$	$1 < |x| \leq 227.95592$; 8th digit ± 1
		$0.1 < |x| \leq 1$; 8th digit ± 2
		$1 \cdot 10^{-2} \leq |x| \leq 0.1$; each last but one decimal place ± 0
		$0; 1 \cdot 10^{-m} \leq |x| \leq 9.9999999 \cdot 10^{-3}$ 8th digit ± 0

cosh x	same as sinh x	8th digit ± 1
tanh x	$0; 1 . 10^{-10} \leq |x| \leq 227.95592$	same as sinh x
ln x	$0 < x$	8th digit ± 1
lg x	$0 < x$	8th digit ± 1

Function	Domain of definition	Accuracy
e^x	$-227.95592 \leq x \leq 230.2585$	8th digit ± 1
10^x	$-99 \leq x \leq 99.999999$	$0; 1 . 10^{-99} \leq |x| < 5$ 8th digit ± 2 $5 \leq |x| < 40$ 7th digit ± 1 $40 \leq |x| < 99$ 7th digit ± 2 $99 \leq |x| \leq 99.999999$ 7th digit ± 5

$\frac{1}{x}$	$1 . 10^{-99} < |x| < 1 . 10^{99}$	
x^2	$0; 1 . 10^{-49} \leq |x| \leq 9.9999999 . 10^{49}$	
$\sqrt{x}$	$0; 1 . 10^{-99} \leq x \leq 9.9999999 . 10^{99}$	
$\sqrt[3]{x}$	$0; 1 . 10^{-99} \leq |x| \leq 9.9999999 . 10^{99}$	$0; 1 . 10^{-99} \leq |x| \leq 1 . 10^{99}$ 6th digit ± 1 on other range 7th digit ± 1
DMS → DEG	$0; 1 . 10^{-99} \leq |x| \leq 99999999.$	8th digit ± 0

DEG → DMS	$0; 2.7777778 \cdot 10^{-nn} \leq |x| \leq 99999999.$	8th digit ± 0
y^x	$y > 0;$ $-227.95592 \leq |x| \cdot \ln y \leq 230.2585$	$1 \cdot 10^{99} \leq y^x; y^x \leq 1 \cdot 10^{99}$ 6th digit ± 1 on other range 7th digit ± 2
$x, y \to r, \alpha$	$0; 1 \cdot 10^{-99} \leq x, y \leq 9.9999999 \cdot 10^{99}$ and $\frac{y}{x}$ identical with arctan x	r : 8th digit ± 0 α: same as arctan x
$r, \alpha \to x, y$	$r \geq 0$ α identical with sin x	x: same as cos x y: same as sin x

X!	$0 \leq x \leq 69$; integer	

7. CALCULATION EXAMPLES

The following examples are given to demonstrate the principal calculator functions. Note that they are not comprehensive.

MR 610

Problem	Key operation	Display
$123 + 456 = 579$	123 [+] 456 [=]	579.
$-456 - 789 = -1245$	456 [+/-] [-] 789 [=]	-1245.
$(-3.2 \cdot 10^{-1}) \cdot (2.5 \cdot 10^{5}) = -80000$	3 [.] 2 [+/-] [EEX] 2 [+/-] [×]	
	2 [.] 5 [EEX] 6 [=]	-80000.
$2 \div (3 \cdot 10^{8}) = 6.6666667 \cdot 10^{-9}$	2 [+] 3 [EEX] 8 [=]	-09
		6.6666667
		×10

33

Note:

A depression of the [+/-] key after the entry of the mantissa causes sign change for the mantissa.
The sign for the exponent can be changed in that the [EEX] key is depressed first followed by a depression of the [+/-] key.

MR 610

7.2 CONSTANT CALCULATIONS

In the following practical examples the constant numbers are underlined.

Problem	Key operation	Display
$2 + \underline{3} = 5$	2 [+] 3 [=]	5.
$4 + \underline{3} = 7$	4 [=]	7.
$9 - \underline{4} = 5$	9 [-] 4 [=]	5.
$8 - \underline{4} = 4$	8 [=]	4.
$\underline{5} \cdot 3 = 15$	5 [×] 3 [=]	15.
$\underline{5} \cdot 4 = 20$	4 [=]	20.

6 ÷ 2 = 3 8 ÷ 2 = 4	6 [÷] 2 [=] 8 [=]	3. 4.

7.3. USE OF THE MEMORY

Before you use the memory, first depress the [MC] key and make sure that the "Memory-in-use" symbol has darkened.

Problem	Key operation	Display
3 + 6 + 7 − 8 − 8	3 [M+] 6 [M+] 7 [M+] 8 [−] [M] [MR]	8. M
123 . 45.6 ~ 5608.8	[MC] 123 [×] 45 [.] 6 [M+]	5608.8 M
+) 789 . 12.3 = 9704.7	789 [×] 12 [.] 3 [M+]	9704.7 M
−) 25.8 . 36.9 = 952.02	25 [.] 8 [×] 36 [.] 9 [=] [+/−] [M+]	− 952.02 M
14361.48	[MR]	14361.48 M

789 : 45 ~ 17.533333	[MC] 789 [÷] 45 [M+]	17.533333 M
+) 65.4 : 12.3 = 5.3170732	65 [.] 4 [÷] 12 [.] 3 [M+]	5.3170732 M
−) 147 : 25.8 = 5.6976744	147 [÷] 25 [.] 8 − [+/−] [M+]	5.6976744 M
17.152732	[MR]	17.152732 M

7.4. CALCULATION OF FUNCTIONS

Note:
● The domain of definition of the functions and the accuracies of the functional values are specified in par. 6.

● All functions can be chained. An exception to this are statistical calculations and coordinate conversions.

7.4.1 TRIGONOMETRIC FUNCTIONS AND INVERSE TRIGONOMETRIC FUNCTIONS (sin, cos, tan, arc sin, arc cos, arc tan)

Problem	Key operation	Switch in position	Display
sin 15° 15' 15" = 2.6310136 . 10⁻¹	15 $\boxed{.}$ 15 15 $\boxed{DEG}$ $\boxed{sin}$	DEG	2.6310136 $^{-01}$ x 10
$\cos \frac{\pi}{3}$ = 0.5	$\boxed{F}$ π $\boxed{\div}$ 3 $\boxed{=}$ cos	RAD	0.5
tan (− 35 GRD) = − 6.1280079 . 10⁻¹	35 $\boxed{+/-}$ $\boxed{tan}$	GRD	− 6.1280079 $^{-01}$ x 10

arcsin 0.5 = 30°	$\boxed{.}$ 5 $\boxed{F}$ $\boxed{arcsin}$	DEG	30.
arccos 0.5 = 60°	$\boxed{.}$ 5 $\boxed{F}$ $\boxed{arccos}$	DEG	60.
arctan 1 = 45°	1 $\boxed{F}$ $\boxed{arctan}$	DEG	45.
2 . sin 30° . cos 60° = 0.5	2 $\boxed{\times}$ 30 $\boxed{sin}$ $\boxed{\times}$ 60 $\boxed{cos}$ $\boxed{=}$	DEG	0.5
arcsin 0.5 − arccos 0.5 = − 30	$\boxed{.}$ 5 $\boxed{F}$ $\boxed{arcsin}$ $\boxed{-}$ $\boxed{.}$ 5 $\boxed{F}$ $\boxed{arccos}$ $\boxed{=}$		−30.

7.4.2 HYPERBOLIC FUNCTIONS (sinh, cosh, tanh)

Problem	Key operation	Display
sinh 2 = 3.6268604	2 $\boxed{HYP}$ $\boxed{sin}$	3.6268604
cosh (− 0.5) = 1.127626	$\boxed{.}$ 5 $\boxed{+/-}$ $\boxed{HYP}$ $\boxed{cos}$	1.127626
tanh 25 = 1	25 $\boxed{HYP}$ $\boxed{tan}$	1.
sinh 1 + cosh 2 = 4.9373969	1 $\boxed{HYP}$ $\boxed{sin}$ $\boxed{+}$ 2 $\boxed{HYP}$ $\boxed{cos}$ $\boxed{=}$	4.9373969

Definitions:

$$\sinh x = \frac{e^x - e^{-x}}{2}$$

$$\cosh x = \frac{e^x + e^{-x}}{2}$$

$$\tanh x = \frac{e^x - e^{-x}}{e^x + e^{-x}} = \frac{\sinh x}{\cosh x}$$

MR 610

7.4.3 LOGARITHMIC FUNCTIONS AND INVERSES (ln, lg, e^x, 10^x, y^x)

Problem	Key operation	Display
ln 2 = 0.69314718	2 [ln]	6.9314718 $\times 10^{-01}$
lg 12 = 1.0791812	12 [F] [lg]	1.0791812
lg 26 : ln 13 = 0.55165742	26 [F] [lg] [÷] 13 [ln] [=]	5.5165742 $\times 10^{-01}$
$e^{2.3}$ = 9.9741824	2 [.] 3 [e^x]	9.9741824
$10^{1.4}$ = 25.118864	1 [.] 4 [F] [10^x]	25.118864
$2.4^{1.6}$ = 4.058242	2 [.] 4 [y^x] 1 [.] 6 [=]	4.058242

$(26 - 13)^{3.2}$ = 3669.6	26 [−] 13 [y^x] 3 [.] 2 [=]	3669.6
$(35 \cdot 15)^{-1.6}$ = 0.0004143068	35 [−] 15 [y^x] 2 [.] 6 [+/−] [=]	4.143068 $\times 10^{-04}$
$4^{2.5}$ = 32	4 [y^x] 2 [.] 5 [=]	32
$0.16^{2.5}$ = 0.01024	[.] 16 [=]	0.01024
$5.76^{2.5}$ = 79.62624	5 [.] 76 [=]	79.62624
$5^6 + e^2$ = 15632.389	5 [y^x] 6 [+] 2 [e^x] [=]	15632.389
$(3^7)^3$ = 14348910	3 [y^x] 3 [y^x] 5 [=]	14348910.

7.4.4 SQUARE ROOT, SQUARE, RECIPROCAL, CUBIC ROOT ($\sqrt{}$, X^2, $\frac{1}{x}$, $\sqrt[3]{}$)

Problem	Key operation	Display
$\sqrt{2} + \sqrt{3} = 3.1462644$	2 $\boxed{F}$ $\boxed{\sqrt{}}$ $\boxed{+}$ 3 $\boxed{F}$ $\boxed{\sqrt{}}$ $\boxed{=}$	3.1462644
$3^2 + 4^2 = 25$	3 $\boxed{x^2}$ $\boxed{+}$ 4 $\boxed{x^2}$ $\boxed{=}$	25.
$1 : 4 . 10^{-4} = 2500$	4 $\boxed{EEX}$ 4 $\boxed{+/-}$ $\boxed{1/x}$	2500.
$\sqrt[3]{253} + \sqrt[3]{166} = 11.820568$	253 $\boxed{F}$ $\boxed{\sqrt[3]{}}$ $\boxed{+}$ 166 $\boxed{F}$ $\boxed{\sqrt[3]{}}$ $\boxed{=}$	11.820568
$\sqrt[n]{A} = B$ is obtained from $B = A^{\frac{1}{n}}$ $\sqrt[5]{40} =$	Entry A $\boxed{y^x}$ Entry n $\boxed{1/x}$ $\boxed{=}$ 40 $\boxed{y^x}$ 5 $\boxed{1/x}$ $\boxed{=}$	2.091279

7.4.5 THE CONSTANT PI and X FACTORIAL (π, X!)

Problem	Key operation	Display
$\pi . 2^2 = 12.566371$	$\boxed{F}$ $\boxed{\pi}$ $\boxed{x}$ 2 $\boxed{x^2}$ $\boxed{=}$	12.566371
$13! = 6.2270208 . 10^9$	13 $\boxed{F}$ $\boxed{X!}$	6.2270208 $_{\times 10}^{09}$

7.4.6 CONVERSION OF DECIMAL ANGLES TO DEGREES, MINUTES AND SECONDS OR VICE VERSA

Problem	Key operation	Display
$62.124228° = 62°7'27.22''$ $\approx 62°7'27''$	62 $\boxed{.}$ 124228 $\boxed{F}$ $\boxed{DMS}$	62.072722
$52°43'25'' = 52.723611$	52 $\boxed{.}$ 4325 $\boxed{DEG}$	52.723611
$12°34'56'' + 46°8'29''$ $58°43'24.99''$ $\approx 58°43'25''$	12 $\boxed{.}$ 3456 $\boxed{DEG}$ $\boxed{+}$ 46 $\boxed{.}$ 0829 $\boxed{DEG}$ $\boxed{=}$ $\boxed{F}$ $\boxed{DMS}$	58.432499

7.4.7 CALCULATIONS IN PARENTHESES

Problem	Key operation	Display
$3(32-18)+83.6=540$	3 $\boxed{\times}$ $\boxed{((}$ 32 $\boxed{-}$ 18 $\boxed{))}$ $\boxed{+}$ $\boxed{((}$ 83 $\boxed{\times}$ 6 $\boxed{))}$ $\boxed{=}$	540.
$5(6(25-6)^2-0.6:4^2)=10829.813$	5 $\boxed{\times}$ $\boxed{((}$ 6 $\boxed{\times}$ $\boxed{((}$ 25 $\boxed{-}$ 6 $\boxed{))}$ $\boxed{x^2}$ $\boxed{-}$ $\boxed{((}$ $\boxed{.}$ 6 $\boxed{+}$ 4 $\boxed{x^2}$ $\boxed{))}$ $\boxed{))}$ $\boxed{=}$	10829.813
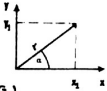
Note:

● The two levels of parenthesis can be used for all computations with the exception of statistical calculations and coordinate conversions.

● Only the first level of parenthesis can be used for the conversion of decimal angles to degrees, minutes, and seconds.

7.4.8 COORDINATE CONVERSIONS ($\rightarrow r\alpha$, $\rightarrow xy$)

Problem	Key operation	Display
Conversion of rectangular coordinates to polar coordinates $y=y_1; x=x_1$ Find: r, α $x_1=3; y_1=4$ (DEG) $r=5$ $\alpha=53.130102°$	x_1 $\boxed{+}$ y_1 $\boxed{\rightarrow r\alpha}$ $\qquad$ $\boxed{x \leftrightarrow y}$ 3 $\boxed{+}$ 4 $\boxed{\rightarrow r\alpha}$ $\qquad$ $\boxed{x \leftrightarrow y}$	r α 5. 53.130102

Conversion of polar coordinates to rectangular coordinates		
$r = r_1; \alpha = \alpha_1$	r_1 [+] α_1 [F] [→xy]	x
Find x and y	[x↔y]	y
$r_1 = 4; \alpha_1 = 45°$ (DEG)	4 [+] 45 [F] [→xy]	2.8284271
$x = y = 2.8284271$	[x↔y]	2.8284271

Note:

- The input or output of the angles α depends on the position of the slide switch (DEG, RAD, or GRD)

- Coordinate conversions can also be performed by means of the [−] [×] [+] keys instead of the [+] key.

7.4.9 STATISTICAL CALCULATIONS

Problem	Key operation	Display
Calculate		
$\Sigma X, \bar{x}, \sigma_{n-1}, \sigma_n, \Sigma X^2$		
from	[F] [nset]	
12.52	12 [.] 52 [DATA]	
12.63	12 [.] 63 [DATA]	
12.77	12 [.] 77 [DATA]	

13.00	13 [DATA]	
12.76	12 [.] 76 [DATA]	
12.44	12 [.] 44 [DATA]	
12.33	12 [.] 33 [DATA]	
12.66	12 [.] 66 [DATA]	
12.67	12 [.] 67 [DATA]	
12.70 (error)	12 [.] 7 [DATA]	

(correction)	12 ⬜ 7 F DEL	
12.68	12 ⬜ 68 DATA	
$\Sigma X = 126.46$	F ΣX	126.46 SD
$\bar{x} = 12.646$	$\bar{x}$	12.646 SD
$\sigma_{n-1} = 0.18679757$	σ_{n-1}	1.8679757 − 01 SD x 10
$\sigma_n = 0.17721174$	F σ_n	1.7721174 − 01 SD x 10
$\Sigma X^2 = 1599.5272$	F ΣX^2	1599.5272 SD
$n = 10$	n	10. SD

For definitions of $\bar{x}$, σ_{n-1}, σ_n
see par. 4
Note:
To change to the "Statistical calculations"
mode, depress the keys F and σset
This chauses clearing of all registers and
display of O. and the SD symbol.

MR 610

8.   BATTERY REPLACEMENT

The back cover of the calculator is attached
to its narrow edge by means of two claws
and secured through two screws. For battery
replacement, untighten these screws by
means of a screwdriver, slightly lift the back
cover near the screw-connection and
unhook the claws of the back cover at the
edge opposite the screw-connection.
Remove the used button cells from their
compartments and replace them with new
ones.

Take care to prevent mistake of the battery's
polarity for fear of damage to the
calculator and the cells. When you look
into the opened unit the positive pole (+)

of each cell should be up pointing to you.
A label inside the calculator also indicates
correct polarity.
Close the unit by first repositioning the
rear side with its claws and securing it
again by means of the two screws.