# Scientific Calculator

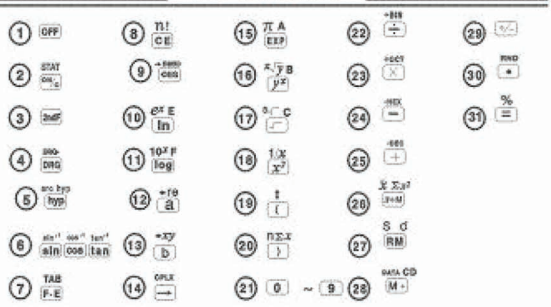
Dear Customer.

- Thank you very much for purchasing our electronic calculator.
- To fully utilize its features no special training is required, but we suggest you study this operation manual to become familiar with its many abilities.
- To help ensure its longevity do not touch the inside of the calculator, avoid hard knocks and unduly strong key pressing. Extreme cold (BELOW 32° or 0°C), heat (above 104°F or 40°C) and humidity may also affect the functions of the calculator. Never use volatile fluid such as lacquer thinner, benzine, etc. when cleaning the unit. FOR servicing, contact your retailer or nearby dealer.

Before starting calculation, be sure to press the ON/C key and to confirm that "0" is shown in the display.

Special care should be taken not to damage the unit by bending or dropping. For example, do not carry it in your hip pocket.

## THE KEYBOARD



## OPERATING CONTROLS

① OFF **Power off key**

When this key is depressed, the calculator is turned off.

**Automatic Power-Off Function.(A.P.O.)**

This calculator is automatically turned off approximately 8 minutes after the last key operation to save the batteries.

② STAT ON/C **Power on and clear/statistical calculation mode key**

ON/C : Push this key to turn the calculator on. It is ready for operation. When pushed during operation it clears the calculator except for the memory.

2ndF STAT : Statistical program will be activated.
When the calculator is set to the statistical calculation mode through these keys the symbol " STAT " appears, and at the same time the numerical values and calculation commands, except for memory contents are cleared. Meanwhile, in the statistical calculation mode the ) , Σ+M , RM and M- keys work as the n , x̄ , S and DATA keys, respectively. And pushing these keys immediately after the 2ndF key they work as the Σx , Σx² , σ and CD keys.

③ 2ndF **2nd function designation key**

④ DRG **Degree/Radian/Grad selector/angular unit conversion key**

DRG : Used for calculation of trigonometric, inverse trigonometric and coordinate conversion. The DRG key changes the angular mode.


(Press DRG )

Ex. DEG → GRAD: Depress the DRG key twice.

"DEG" mode- Entries and answers are in decimal degrees.
"RAD" mode- Entries and answers are in radians.
"GRAD" mode- Entries and answers are in grads.

$(100^g = 90^\circ = \frac{\pi}{2})$

2ndF DRG : It has the function of the DRG key as well as converting the displayed number into a number of the specified angular Mode.

⑤ hyp **Hyperbolic/arc hyperbolic key**

⑥ sin cos tan **Trigonometric/inverse trigonometric function key**

⑦ TAB F-E **Display format exchange/Tabulation key**

F-E : When a calculation result is displayed in the floating decimal point system, depressing the key displays the result in the scientific notation system.

Pushing the key once more displays the result in the floating decimal point system again.

2ndF TAB : To sepcify the number of decimal digits in the calculation result.

⑧ n! CE **Clear entry/Factorial key**

CE : Used to clear an incorrectly entered number.
123 + 455 CE 456 = → 579.

2ndF n! : Calculates the factorial of the displayed number.
Factorial of n(n!) = n · (n-1) · (n-2) ··· 2 · 1

⑨ DEG **Degree/minute/second ⇔ Decimal degrees conversion/hexadecimal number key**

DEG 2ndF DEG : To convert degree/minute/second to decimal degree and vice versa.

D : Hexadecimal number "D" key.
(effective only in hexadecimal number mode- HEX mode)

⑩ $e^x$ E ln **Natural logarithm/antilogarithm and hexadecimal number key**

ln : Used to obtain the logarithm base e (e=2.718281828).

2ndF $e^x$ : Calculates the antilogarithm base e of the displayed numb

E : HEX mode)
Hesadecimal number " E " key.

⑪ $10^x$ F log **Common logarithm/antilogarithm and hexadecimal number key**

log : Used to obtain the logarithm with the base of 10.

2ndF $10^x$ : Calculates the antilogarithm with the base of 10.

F : HEX mode)
Hesadecimal number " F " key.

⑫ →rθ a **Real number enter/coordinate conversion key**

a : • This is used when the real parts of complex numbers are to be input and when identifying the real parts of calculation results.
• This is used during coordinate conversions when the X coordinate of the Rectangular coordinates (X, Y) is input or when the r of the polar coordinates (r, θ) is input. It is also used for identifying the calculated values of X or r.

2ndF →rθ : Converts rectangular coordinate into polar coordinate.

⑬ →xy b **Imaginary number enter/coordinate conversion key**

b : • This is used when the imaginary parts of complex numbers are to be input and when identifying the imaginary parts of the calculation results.
• This is used during coordinate conversions when the Y coordinate of the Rectangular coordinates (X, Y) is input or when the θ of the polar coordinates (r, θ) is input. It is also used for identifying the calculated values of Y or θ.

2ndF →xy : **Converts polar coordinate into rectangular coordinate.**

⑭ CPLX → **Right shift/complex number mode key**

→ : Example

| Key In | | Display |
|---|---|---|
| ① 12356 → → | → | 123. |
| 45 | → | 12346. |
| ② 5 EXP 24 → → | → | 5. 00 |
| 35 | → | 5. 35 |

2ndF CPLX : Used to set the complex number mode.

⑮ π A EXP **Enter exponent/pi and hexadecimal number key**

EXP : To enter number in scientific notation.

2ndF π : The constant π ( π =3.141592654) is entered.

A : HEX mode
Hexadecimal number "A" key.

⑯ $\overset{x\sqrt{y}\ B}{y^x}$ **Yx / $\sqrt[x]{y}$ and hexadecimal number key**

$y^x$ : Raises a number to a power.

2ndF $\sqrt[x]{y}$ : Calculates the X th root of Y.

B : HEX mode
Hexadecimal number "B" key.

⑰ $\overset{3\sqrt{}\ C}{\sqrt{}}$ **Square root/cube root and hexadecimal number key**

$\sqrt{}$ : Calculates the square root of the number displayed.

2ndF $\sqrt[3]{}$ : Calculates the cube root of the number displayed.

C : HEX mode
Hexadecimal number "C" key.

⑱ $\overset{1/x}{x^2}$ **Square/reciprocal key**

$x^2$ : Calculates a square of the number displayed.

2ndF $1/x$ : Calculates the reciprocal of the number displayed.

⑲ $\overset{x\rightleftarrows y}{(}$ **Open parenthesis/exchange key**

( : Used to open parenthesis.

2ndF $x\rightleftarrows y$ : Used to exchange the number being displayed with the number stored in the working register ($x \rightleftarrows y$)

⑳ $\overset{n\ \Sigma\ x}{)}$ **Close parenthesis/statistical calculation key**

) : Used to close parenthesis.

- When the statistical mode is set.

n : Displays the number of samples entered. (n)

2ndF $\Sigma x$ : Used to obtain the sum of the data ($\Sigma x$)

㉑ 0 – 9 **Numeral keys**
Used to enter numbers.

㉒ $\overset{\text{BIN}}{\div}$ **Division/binary number mode key**

÷ : Depressed for division.

2ndF BIN : Used to set the binary system mode.
Converts the number displayed into a number in base 2.

㉓ $\overset{\text{OCT}}{\times}$ **Multiplication/octal number mode key**

× : Depressed for multiplication.

2ndF OCT : Used to set the octal system mode.
Converts the number displayed into a number in base 8.

㉔ $\overset{\text{HEX}}{-}$ **Minus/hexadecimal number mode key**

− : Depressed for subtraction.

2ndF HEX : Used to set the hexadecimal system mode.
Converts the number displayed into a number in base 16.

㉕ $\overset{\text{DEC}}{+}$ **Plus/decimal number mode key**

+ : Depressed for addition.

2ndF DEC : Used to set the decimal system mode (normal mode).
Converts the number displayed into a number in base 10.

㉖ $\overset{\Sigma x^2}{\text{M-}}$ **Memory-in/statistical calculation key**

M- : Clears the number in the memory then stores the number being displayed in the memory.
To clear the memory depress the ON/C key followed by the M- key.

- When the statistical mode is set.

$\bar{x}$ : Used to obtain the mean value of the data. ($\bar{x}$)

2ndF $\Sigma x^2$ : Used to obtain the sum of squares of data. ($\Sigma x^2$)

㉗ $\overset{\$\ \sigma}{\text{RM}}$ **Recall memory/statistical calculation key**

RM : Displays the contents of the memory. The contents of the memory remain unchanged after this key operation

- When the statistical mode is set.

$s$ : Used to obtain the standard deviation of the sample of data.

2ndF $\sigma$ : Used to obtain the standard deviation of the population of data.

㉘ $\overset{\text{DATA CD}}{\text{M+}}$ **Memory plus/DATA CD key**

M+ : Used to add the number being displayed or a calculated result to the contents of the memory.
When subtracting a number from the memory, depress the +/− and M+ keys in this order.

- When the statistical mode is set.

DATA : Used to enter the data (numbers).

2ndF CD : Used to correct the mis-entry, (delete function)

㉙ +/− **Change sign key**
Changes the sign of the number displayed from a positive to a negative or vice versa
Example 5 +/− → −5.

㉚ $\overset{\text{RND}}{\cdot}$ **Decimal point/random number key**

. : Example: 12.3 1 2 . 3
0.7 → . 7

2ndF RND : These keys are used to generate uniform random numbers from 0.000 to 0.999.

**Note:** Random number generation is not possible when binary/octal/hexadecimal system mode is set.

㉛ $\overset{\%}{=}$ **Equals/percent key**

= : Completes four arithmetic calculations (+, −, ×, ÷), $\sqrt[x]{y}$, $y^x$, and complex number calculations.

2ndF % : Used for the percentage calculation and add-on/discount Calculation.

## DISPLAY

### (1) Display format


(Floating decimal system, notmal display)


(Scientific notation system)

Mantissa Exponent

### (2) Symbols

**− :** **Minus symbol**
Indicates that the number in the display following the "−" is a negative

**M :** **Memory symbol**
Appears when a number is stored in the memory.

**E :** **Error symbol**
Appears when an overflow of an error is detected.

**2ndF:** **2nd function designation symbol**
Appears when the 2nd function is designated.

**HYP:** **Hyperbolic function designation symbol**
Appears when hyperbolic function is designated.

**DEG:** **Degree mode symbol**
Appears when the degree mode is designated or shows that the angular mode of the converted result is in degree.

**RAD:** **Radian mode symbol**
Appears when the radian mode is designated or shows that the angular mode of the converted result is in radian.

**GRAD:** **Grad mode symbol**
Appears when the grad mode is designated, or shows that the angular mode of the converted result is in grad.

**( ):** **Parenthesis symbol**
Appears when a calculation with parenthesis is performed by depressing the ( Key.

**BIN :** Appears when the binary system mode is set or shows the displayed number is a binary number.

**OCT :** Appears when the octal system mode is set or shows the displayed number is an octal number

**HEX :** Appears when the hexadecimal system mode is set or shows the displayed number is a hexadecimal number.

**CPLX :** Appears when the complex number mode is set.

**STAT:** Appears when the statistical calculation mode is set.

### (3) Display system

This machine displays a calculation result ($x$), if it is within the following range. In the floating decimal point system.

$$0.000000001 \leq |x| < 9999999999$$

And otherwise the machine displays $|x|$ in the scientific notation system. However a calculation result within the above range is also capable of being displayed in the scientific notation system by pressing the F-E key

Example: 2ndF TAB 9
. 5 ÷ 9 = → 0.055555556
(The 10th decimal place is rounded.)

F-E → 5.5555555 - 02
(The 10th decimal place of the mantissa is rounded.)

F-E → 0.055555556

2ndF TAB . → 0.055555556
This is determined by the calculator in the form of $5.55555555556 \times 10^{-2}$
Rounding the 11th digit of the mantissa results in $5.555555556 \times 10^{-2}$
When changed to the floating decimal display,the rounded parts may not be displayed asin this example.

## BATTERY REPLACEMENT

If the display becomes dark or dim..replace the batteries with new ones according to the following procedure.

Battery: Function on
2pcs "AA" in 1.5V

1. Turn off the calculator.
2. Remove the back cover.
3. Replaces the batteries(see * for)correct battery replacement).
4. Push in the back cover.
5. After the replacement, press the OFF and ON/C keys in this order to clear the calculator.

When the batteries are correctly installed "DEG0." will be displayed. (If the display shows nothing or a meaningless symbol, or the keys become inoperative, remove the batteries and install them again.Press OFF and ON/C Keys in this order and check the display again.)

Note: - wipe off the surface of the new batteries with dry cloth and then install the batteries.
Always replace both of the batteries at the same time.