SHARP®

ENGLISH

SCIENTIFIC CALCULATOR **EL-506V**
MODEL **EL-546V**

# OPERATION MANUAL

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## INTRODUCTION

**About operation examples, please refer to the attached sheet.**
**Refer to the number on the right of each title for use.**
After reading this manual, store it in a convenient location for future reference.

Note : One of the models described in this manual may not be available in some countries.

### Operational Notes

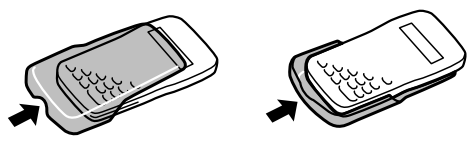
To ensure trouble-free operation, please observe the following points:

1. Do not carry the calculator in the back pocket of slacks or trousers.
2. Do not subject the calculator to extreme temperatures.
3. Do not drop it or apply excessive force.
4. Clean only with a soft, dry cloth.
5. Do not use or store the calculator where fluids can splash onto it.

✦ Press the RESET switch only in the following cases:
- When using for the first time
- After replacing the batteries
- To clear all memory contents
- When an abnormal condition occurs and all keys are inoperative.

If service should be required on this calculator, use only a SHARP servicing dealer, SHARP approved service facility, or SHARP repair service where available.

### Hard Case



## DISPLAY

(During actual use not all symbols are displayed at the same time.)

**←/→** : Appears when the entire equation cannot be displayed. Press [◀]/[▶] to see the remaining (hidden) section.

***xy/rθ*** : Indicates the mode of expression of results in the complex calculation mode.

**2ndF** : Appears when [2ndF] is pressed, indicating that the functions shown in orange are enabled.

**ALPHA** : Indicates that [2ndF] [ALPHA] or [STO] ([RCL]) has been pressed, and entry (recall) of memory contents and recall of statistics can be performed.

**FIX/SCI/ENG:** Indicates the notation used to display a value and changes each time [2ndF] [FSE] are pressed.

**DEG/RAD/GRAD:** Indicates angular units and changes each time [2ndF] [DRG] is pressed.

**ALGB** : Appears when a simulation calculation is executed.

**STAT** : Appears when statistics mode is selected.

**M** : Indicates that a numerical value is stored in the independent memory.

**?** : Indicates that the calculator is waiting for a numerical value to be entered, such as during simulation calculation.

**∠** : Appears when the calculator shows an angle as the result in the complex calculation mode.

***i*** : Indicates an imaginary number is being displayed in the complex calculation mode.

## BEFORE USING THE CALCULATOR

### Key Notation Used in this Manual

In this manual, key operations are described as follows:

[$e^x$ / ln / X E]
To specify $e^x$ : [2ndF] [$e^x$]
To specify E (HEX) : E
To specify ln : [ln]
To specify X : [2ndF] [ALPHA] [X]

Functions that are printed in orange above the key require [2ndF] to be pressed first before the key. Numbers are not shown as keys, but as ordinary numbers.

### Power On and Off

Press [ON/C] to turn the calculator on, and [2ndF] [OFF] to turn it off.

### Clearing Methods

There are three clearing methods as follows:

| Clearing operation | Entry (Display) | M F1, F2 | A-D, X,Y STAT, ANS*1 |
|---|---|---|---|
| [ON/C] | ○ | × | × |
| [2ndF] [CA] | ○ | × | ○ |
| RESET | ○ | ○ | ○ |

○ : Clear × : Retain
*1 Statistical data and last answer memory. Refer to the Memory Calculations section.

### Editing the Equation

- Press [◀] or [▶] to move the cursor. You can also return to the equation after getting an answer by pressing [▶] ([◀]). See below for Multi-line playback function.
- If you need to delete a number, move the cursor to the number you wish to delete then press [DEL]. The number under the cursor will be deleted.
- If you need to insert a number, move the cursor to the place immediately after where you wish to insert the number then enter the number.

### Multi-line Playback function (1)

This calculator is equipped with a function to recall previous equations. Equations also include calculation ending instructions such as "=" and a maximum of 142 characters can be stored in memory. When the memory is full, stored equations are deleted in the order of the oldest first. Pressing [▲] will display the previous equation. Further pressing [▲] will display preceding equations (after returning to the previous equation, press [▼] to view equations in order). In addition, [2ndF] [▲] can be used to jump to the oldest equation.

- The multi-line memory is cleared by the following operations: [2ndF] [CA], mode change, RESET, and N-base conversion. For EL-546V, in addition to the above, pressing [2ndF] [OFF] (including the Automatic Power Off feature) will also clear the multi-line memory.

### Priority Levels in Calculation

This calculator performs operations according to the following priority:
① ∠ ② Functions preceded by their argument ($x^{-1}$, $x^2$, n!, etc.) ③ $Y^x$, $\sqrt[x]{\ }$ ④ Implied multiplication of a memory value (2Y, etc.) ⑤ Functions followed by their argument (sin, cos, etc.) ⑥ Implied multiplication of a function (2sin30, etc.) ⑦ $_nC_r$, $_nP_r$ ⑧ ×, ÷ ⑨ +, – ⑩ AND ⑪ OR, XOR, XNOR ⑫ =, M+, M–, ⇒M, ▶DEG, ▶RAD, ▶GRAD, DATA, CD, →rθ, →xy and other calculation ending instruction

- If parentheses are used, parenthesized calculations have precedence over any other calculations.

## INITIAL SETUP

### Mode Selection

Normal mode (NORMAL): [2ndF] [MODE] [0]
Used to perform arithmetic operations and function calculations.

Complex number mode (CPLX): [2ndF] [MODE] [1]
Used to perform arithmetic operations with complex numbers.

3-VLE mode (3-VLE): [2ndF] [MODE] [2]
Used to perform simultaneous linear equations with three unknowns.

Statistic mode (STAT): [2ndF] [MODE] [3]
Used to perform statistical calculations.

When executing mode selection, temporary memories, statistical data and last answer memory will be cleared even when reselecting the same mode.

### Selecting the Display Notation and Decimal Places

The calculator has four display notation systems for displaying calculation results. When FIX, SCI, or ENG symbol is displayed, the number of decimal places can be set to any value between 0 and 9. Displayed values will be reduced to the corresponding number of digits.

100000÷3=

| | | |
|---|---|---|
| [Floating point] | [ON/C] 100000 [÷] 3 [=] | 33333.33333 |
| →[FIXed decimal point] | [2ndF] [FSE] | 33333.33333 |
| [TAB set to 2] | [2ndF] [TAB] 2 | 33333.33 |
| →[SCIentific notation] | [2ndF] [FSE] | $3.33\times10^4$ |
| →[ENGineering notation] | [2ndF] [FSE] | $33.33\times10^3$ |
| →[Floating point] | [2ndF] [FSE] | 33333.33333 |

- If the value for floating point system does not fit in the following range, the calculator will display the result using scientific notation system:
  $0.000000001 \le |x| \le 9999999999$

### Determination of the Angular Unit

This calculator has three angular units: **DEG** (°), **RAD** (Radians) and **GRAD** (g).
Press [2ndF] [DRG] to specify the angular unit.

## SCIENTIFIC CALCULATIONS

- Press [2ndF] [MODE] [0] to select the normal mode.
- In each example, press [ON/C] to clear the display. And if the FIX, SCI, or ENG indicator is displayed, clear the indicator by pressing [2ndF] [FSE].

### Arithmetic Operations (2)

- The closing parenthesis [)] just before [=] or [M+] may be omitted.

### Constant Calculations (3)

- In the constant calculations, the addend becomes a constant. Subtraction and division are performed in the same manner. For multiplications, the multiplicand becomes a constant.
- When performing calculations using constants, constants will be displayed as K.

### Functions (4)

- Refer to operation examples of each function.
- Before starting calculations, specify the angular unit.

### Differential/Integral Functions (5)

Differential and integral calculations are only available in the normal mode. For calculation conditions such as the x value in differential calculation or the initial point in integral calculation, only numerical values can be entered and equations such as $2^2$ cannot be specified. It is possible to reuse the same equation over and over again and to recalculate by only changing the conditions without re-entering the equation.

- When performing a calculation, the value stored in the X memory will be cleared.
- When performing a differential calculation, enter formula first and then enter $x$ value in differential calculation and minute interval (d$x$). If a numerical value is not specified for minute interval, $x\neq0$ will be $x\times10^{-4}$ and $x=0$ will be $10^{-4}$ from the value of the numeric derivative.
- When performing a integral calculation, enter formula first and then enter a range of integral ($a$, $b$) and subintervals (n). If a numerical value is not specified for subintervals, calculation will be performed using n=100.

Since differential and integral calculations are performed based on the following equations, correct results may not be obtained, in certain rare cases, when performing special calculations which contain discontinuous points.

Integral calculation (Simpson's rule):

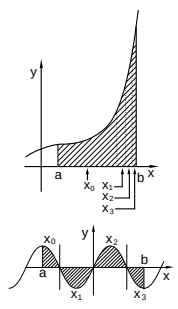
$$S=\frac{1}{3}h\{f(a)+4\{f(a+h)+f(a+3h)+\cdots\cdots+f(a+(N-1)h)\}+2\{f(a+2h)+f(a+4h)+\cdots\cdots+f(a+(N-2)h)\}+f(b)\}$$

$$\left(h=\frac{b-a}{N},\ N=2n,\ a\le x\le b\right)$$

Differential calculation:

$$f'(x)=\frac{f(x+\frac{dx}{2})-f(x-\frac{dx}{2})}{dx}$$

[When performing integral calculations]
Integral calculations, depending on the integrands and subintervals included, require longer calculation time. During calculation, "Calculating!" will be displayed. To cancel calculation, press [ON/C]. In addition, please note that there will be greater integral errors when there are large fluctuations in the integral values during minute shifting of the integral range and for periodic functions, etc., where positive and negative integral values exist depending on the interval.
For the former case, divide integral intervals as small as possible. For the latter case, separate the positive and negative values. Following these tips will allow results of calculations with greater accuracy and will also shorten the calculation time.



### Random Numbers

A pseudo-random number with three significant digits can be generated by pressing [2ndF] [RANDOM] [=]. To generate the next random number, press [=]. You can perform this function in the normal and statistics modes. (You cannot perform this function while you are using the N-Base function.)

- Random numbers use memory Y. Each random number is generated on the basis of the value stored in memory Y (pseudo-random number series).

### Angular Unit Conversions (6)

Each time [2ndF] [DRG▶] are pressed, the angular unit changes in sequence.

### Memory Calculations (7)

The calculator has six temporary memories (A-D, X and Y), one independent memory (M) and one last answer memory (ANS). EL-506V is also equipped with formula memories (F1 and F2) for storing formulas.

| Mode | ANS | M, F1, F2 | A-D, X,Y |
|---|---|---|---|
| Normal | ○ | ○ | ○ |
| Complex | ○ | ○ | × |
| 3-VLE | × | × | × |
| Statistic | ○ | × | × |

○ : Available × : Unavailable

[Temporary memories (A-D, X and Y)]
A stored value can be recalled as a value or variable for the use in equations.

- In case you store an infinite decimal in the memory, recall it as a variable to obtain accurate answers.

Ex.) 1 [÷] 3 [STO] [Y] (0.3333...is stored to Y)
3 [×] [RCL] [Y] [=] ***0.999999999***
3 [×] [2ndF] [ALPHA] [Y] [=] ***1.***

[Independent memory (M)]
In addition to all the features of temporary memories, a value can be added to or subtracted from an existing memory value.

[Last answer memory (ANS)]
The calculation result obtained by pressing [=] or any other calculation ending instruction is automatically stored in the last answer memory.

[Formula memories (F1 and F2)] : available only on EL-506V
Formulas up to 80 characters each can be stored. As with storing numerical values in the memory, storing a new equation will automatically replace any existing equation in memory without notification.

Note:
Calculation results from the functions indicated below are automatically stored in memories X or Y. For this reason, when using these functions, be careful with the use of memories X and Y.

- Random numbers ..... Y memory
- →rθ, →xy ..... X memory (r or x), Y memory (θ or y)

Temporary memories and last answer memory are cleared even when the same mode is reselected.

### Chain Calculations (8)

This calculator allows the previous calculation result to be used in the following calculation.
The previous calculation result will not be recalled after entering multiple instructions.

### Fraction Calculations (9)

This calculator performs arithmetic operations and memory calculations using a fraction, and conversion between a decimal number and a fraction.

- In all cases, a total of up to 10 digits including integer, numerator, denominator and the symbol (⌈) can be entered.
- If the number of digits to be displayed is greater than 10, the number is converted to and displayed as a decimal number.
- A decimal number, variable, or exponent cannot be used in a fraction.

### Binary, Octal, Decimal, and Hexadecimal Operations (N-Base) (10)

This calculator can perform conversions between numbers expressed in binary, octal, decimal and hexadecimal systems. It can also perform the four basic arithmetic operations, calculations with parentheses and memory calculations using binary, octal, decimal, and hexadecimal numbers. In addition, the calculator can carry out the logical operations AND, OR, NOT, NEG, XOR and XNOR on binary, octal and hexadecimal numbers.
Conversion to each system is performed by the following keys:

[2ndF] [BIN]: Converts to the binary system. "b" appears.

[2ndF] [OCT]: Converts to the octal system. "o" appears.

[2ndF] [HEX]: Converts to the hexadecimal system. "H" appears.

[2ndF] [DEC]: Converts to the decimal system. "b", "o", and "H" disappear from the display.

Conversion is performed on the displayed value when these keys are pressed.

Note: In this calculator, the hexadecimal numbers A – F are entered by pressing [A CNST], [B $y^x$], [C $x^2$], [D log], [E ln], and [F MATH], and displayed as follows:

A → A, B → b, C → C, D → d, E → E, F → F

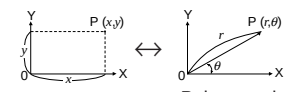
In the binary, octal, and hexadecimal systems, fractional parts cannot be entered. When a decimal number having a fractional part is converted into a binary, octal, or hexadecimal number, the fractional part will be truncated. Likewise, when the result of a binary, octal, or hexadecimal calculation includes a fractional part, the fractional part will be truncated. In the binary, octal, and hexadecimal systems, negative numbers are displayed as a complement.

### Time, Decimal and Sexagesimal Calculations (11)

Conversion between decimal and sexagesimal numbers can be performed. In addition, the four basic arithmetic operations and memory calculations can be carried out using the sexagesimal system.

### Coordinate Conversions (12)

- Before performing a calculation, select the angular unit.




Rectangular coord. Polar coord.

- Refer to the Note of the Memory Calculations section.

### Calculations Using Physical Constants (13)

See the quick reference card and the other side of the "Operation Examples" sheet.
A constant is recalled by pressing [CNST] followed by the number of the physical constant. You have to designate the physical constant using 2-digit numbers. For example, speed of light in vacuum should be designated as "01".

The recalled constant appears in the display mode selected with the designated number of decimal places.

Physical constants can be recalled in the normal mode (when not set to binary, octal, or hexadecimal), 3-VLE mode, or statistics mode.

Note: Physical constants and metric conversions are based either on the 1986 values released by the Committee on Data for Science and Technology (CODATA) of ICSU (International Council of Scientific Unions) or on ISO specifications.

### Metric Conversions (14)

See the quick reference card and the other side of the "Operation Examples" sheet.
Unit conversions can be performed in the normal (when not set to binary, octal, or hexadecimal), 3-VLE and statistics modes.

### Modify Function (15)

In this calculator, all calculation results are internally obtained in scientific notation with up to 12 digits for the mantissa. However, since calculation results are displayed in the form designated by the display notation and the number of decimal places indicated, the internal calculation result may differ from that shown in the display. By using the modify function, the internal value is converted to match that of the display, so that the displayed value can be used without change in subsequent operations.

## SIMULATION CALCULATION (16)

If you have to find a value consecutively using the same formula, such as plotting a curve line for $2x^2 + 1$, or finding the variable for $2x + 2y = 14$, once you enter the equation, all you have to do is to specify the value for the variable in the formula.
Usable variables: A-D, M, X and Y
Unusable functions: RANDOM

- Simulation calculations can only be executed in the normal mode.
- Calculation ending instructions (%, etc.) other than [=] cannot be used.

### Performing Calculations

① Press [MODE] [0].
② Input a formula with at least one variable.
③ Press [ALGB].
④ Variable input screen will appear. Input the value of the flashing variable, then press [ENT] to confirm. The calculation result will be displayed after entering the value for all used variables.
- Only numerical values are allowed as variables. Input of formulas are not permitted.
- Upon completing the calculation, press [ALGB] to perform calculations using the same formula.
- Variables and numerical values stored in the memories will be displayed in the variable input screen. To change a numerical value, input the new value and press [ENT].

## COMPLEX NUMBER CALCULATIONS (17)

To carry out addition, subtraction, multiplication, and division using complex numbers, press [2ndF] [MODE] [1] to select the complex number mode.

There are two modes of expression of the results of complex number calculations.
① Rectangular coordinate mode. (*xy* appears on the display.) [MATH] [2]
② Polar coordinate mode. (*rθ* appears on the display.) [MATH] [1]

### Complex number entry

① Rectangular coordinates
*x-coordinate* [+] *y-coordinate* [*i*]
or *x-coordinate* [+] [*i*] *y-coordinate*
② Polar coordinates
*r* [∠] *θ*
r: absolute value
θ: argument

- Upon changing to another mode, the imaginary portion of any complex number stored in the independent memory (M) will be cleared.
- A complex number expressed in rectangular coordinates with the y-value equal to zero, or expressed in polar coordinates with the angle equal to zero, is treated as a real number.

## SIMULTANEOUS LINEAR EQUATIONS WITH THREE UNKNOWNS (18)

To solve simultaneous linear equations with three unknowns, press [2ndF] [MODE] [2] to select the 3-VLE mode.

Simultaneous Linear Equations with Three Unknowns:

$$\begin{cases} a_1x + b_1y + c_1z = d_1 \\ a_2x + b_2y + c_2z = d_2 \\ a_3x + b_3y + c_3z = d_3 \end{cases} \qquad |D| = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$$

Notes:
- If the determinant D = 0, an error occurs.
- If the absolute value of an intermediate result or calculation result is $1\times10^{100}$ or more, an error occurs.

### Performing Calculations

① Press [2ndF] [MODE] [2].
② Enter each coefficient from $a_1$ to $d_3$ followed by [ENT], as prompted on the display.
③ Upon pressing [ENT] after entering $d_3$, the solution for $x$ will be displayed. Subsequent pressing will cycle through the values of $y$, $z$ and the determinant D.

- Coefficients can be entered using ordinary arithmetic operations.
- To clear the entered coefficients, press [2ndF] [CA].

Note: Pressing [ENT] when the determinant D is in the display recalls the coefficients. Each time [ENT] is pressed, a coefficient is displayed in the order of input, allowing the entered coefficients to be verified. (by pressing [2ndF] [ENT], coefficients are displayed in reverse order.)

To correct a particular coefficient being displayed, enter the correct value and then press [ENT].

If the coefficients $c_1$, $c_2$ and $c_3$ as well as $a_3$ – $d_3$ are set to zero, the problem is treated as a 2-dimensional simultaneous equation. The $x$ and $y$ values as well as the determinant can be retrieved.

## STATISTICAL CALCULATIONS

Statistical calculations are performed in the statistics mode. Press [2ndF] [MODE] [3] to select the statistics mode. This calculator performs the seven statistical calculations indicated below. After selecting the statistics mode, select the desired sub-mode by pressing the number key corresponding to your choice.
When changing to the statistical sub-mode, press the corresponding number key after performing the operation to select the statistics mode (press [2ndF] [MODE] [3]).

[0] (STAT 0) : Single-variable statistics
[1] (STAT 1) : Linear regression calculation
[2] (STAT 2) : Quadratic regression calculation
[3] (STAT 3) : Exponential regression calculation
[4] (STAT 4) : Logarithmic regression calculation
[5] (STAT 5) : Power regression calculation
[6] (STAT 6) : Inverse regression calculation

The following statistics can be obtained for each statistical calculation (refer to the table below):

### Single-variable statistical calculation (19)

Statistics of ① and value of the normal probability function

### Linear regression calculation (20)

Statistics of ① and ② and, in addition, estimate of $y$ for a given $x$ (estimate $y'$) and estimate of $x$ for a given $y$ (estimate $x'$)

### Exponential regression, Logarithmic regression, Power regression, and Inverse regression calculation

Statistics of ① and ②. In addition, estimate of $y$ for a given $x$ and estimate of $x$ for a given $y$. (Since the calculator converts each formula into a linear regression formula before actual calculation takes place, it obtains all statistics, except coefficients $a$ and $b$, from converted data rather than entered data.)

### Quadratic regression calculation (21)

Statistics of ① and ② and coefficients $a$, $b$, $c$ in the quadratic regression formula ($y = a + bx + cx^2$). (For quadratic regression calculations, no correlation coefficient ($r$) can be obtained.) When there are two $x'$ values, press [2ndF] [←·→].

When performing calculations using a, b and c, only one numeric value can be held.

| | | |
|---|---|---|
| ① | $\bar{x}$ | Mean of samples ($x$ data) |
| | $sx$ | Sample standard deviation ($x$ data) |
| | $\sigma x$ | Population standard deviation ($x$ data) |
| | $n$ | Number of samples |
| | $\Sigma x$ | Sum of samples ($x$ data) |
| | $\Sigma x^2$ | Sum of squares of samples ($x$ data) |
| ② | $\bar{y}$ | Means of samples ($y$ data) |
| | $sy$ | Sample standard deviation ($y$ data) |
| | $\sigma y$ | Population standard deviation ($y$ data) |
| | $\Sigma y$ | Sum of samples ($y$ data) |
| | $\Sigma y^2$ | Sum of squares of samples ($y$ data) |
| | $\Sigma xy$ | Sum of products of samples ($x$, $y$) |
| | $r$ | Correlation coefficient |
| | $a$ | Coefficient of regression equation |
| | $b$ | Coefficient of regression equation |
| | $c$ | Coefficient of quadratic regression equation |

Entered data are kept in memory until [2ndF] [CA] or [2ndF] [MODE] [3] are pressed. Before entering new data, clear the memory contents.

[Data Entry]
Single-variable data
*Data* [DATA]
*Data* [(x,y)] *frequency* [DATA] (To enter multiples of the same data)
Two-variable data
*Data x* [(x,y)] *Data y* [DATA]
*Data x* [(x,y)] *Data y* [(x,y)] *frequency* [DATA] (To enter multiples of the same data $x$ and $y$.)

[Data Correction]
Correction prior to pressing [DATA]:
Delete incorrect data with [ON/C].
Correction after pressing [DATA]:
The inputted statistical data can be traced back by pressing [▲]. Display the data to correct, press [2ndF] [CD] to delete, then input the correct value.

### Statistical Calculation Formulas (22)

Refer also to the operation examples sheets.

| Type | Regression formula |
|---|---|
| Linear | $y = a + bx$ |
| Exponential | $y = a \bullet e^{bx}$ |
| Logarithmic | $y = a + b \bullet \ln x$ |
| Power | $y = a \bullet x^b$ |
| Inverse | $y = a + b\frac{1}{x}$ |
| Quadratic | $y = a + bx + cx^2$ |

In the statistical calculation formulas, an error will occur when:

- the absolute value of the intermediate result or calculation result is equal to or greater than $1 \times 10^{100}$.
- the denominator is zero.
- an attempt is made to take the square root of a negative number.
- no solution exists in the quadratic regression calculation.

### Normal Probability Calculations (19) (23)

Refer also to the operation examples sheet.

- P($t$), Q($t$), and R($t$) will always take positive values, even when $t$<0, because these functions follow the same principle used when solving for an area.
  Values for P($t$), Q($t$), and R($t$) are given to six decimal places.

## ERROR AND CALCULATION RANGES

### Errors

An error will occur if an operation exceeds the calculation ranges, or if a mathematically illegal operation is attempted. When an error occurs, pressing [◀] (or [▶]) automatically moves the cursor back to the place in the equation where the error occurred. Edit the equation or press [ON/C] to clear the equation.

### Error Codes and Error Types

Syntax error (Error 1):
- An attempt was made to perform an invalid operation.
  Ex. 2 [+] [–] 5 [=]

Calculation error (Error 2):
- The absolute value of an intermediate or final calculation result equals or exceeds $10^{100}$.
- An attempt was made to divide by 0.
- The calculation ranges were exceeded while performing calculations.

Depth error (Error 3):
- The available number of buffers was exceeded. (There are 8 buffers* for numeric values and 16 buffers for calculation instructions). *4 buffers in STAT and the complex number mode.

Equation too long (Error 4):
- The equation exceeded its maximum input buffer (142 characters). An equation must be shorter than 142 characters.

Equation recall error (Error 5):
- The stored equation contains a function not available in the mode used to recall the equation. For example, if a numerical value with numbers other than 0 and 1 is stored as a decimal, etc., it cannot be recalled when the calculator is set to binary.

### Calculation Ranges (24)

Refer also to the operation examples sheet.

- Within the ranges specified, this calculator is accurate to ±1 in the least significant digit of the mantissa. When performing continuous calculations (including chain calculations), errors accumulate leading to reduced accuracy.
- Calculation ranges
  $\pm10^{-99} - \pm9.999999999\times10^{99}$ and 0.

If the absolute value of an entry or a final or intermediate result of a calculation is less than $10^{-99}$, the value is considered to be 0 in calculations and in the display.

## BATTERY REPLACEMENT

### Notes on Battery Replacement

Improper handling of batteries can cause electrolyte leakage or explosion. Be sure to observe the following handling rules:

- Replace both batteries at the same time.
- Do not mix new and old batteries.
- Make sure the new batteries are the correct type.
- When installing, orient each battery properly as indicated in the calculator.

### When to Replace the Batteries

If the display has poor contrast or nothing appears on the display even when [ON/C] is pressed in dim lighting, it is time to replace the batteries.

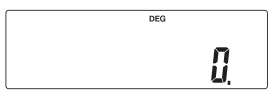
### Caution

- Keep batteries out of the reach of children.
- Exhausted batteries left in the calculator may leak and damage the calculator.
- Explosion risk may be caused by incorrect handling.
- Batteries must be replaced only with others of the same type.
- Do not throw batteries into a fire as they may explode.

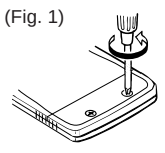
### Replacement Procedure

1. Turn the power off by pressing [2ndF] [OFF].
2. Remove two screws. (Fig. 1)
3. Slide the battery cover slightly and lift it to remove.
4. Remove the used batteries by prying them with a ball-point pen or other similar pointed device. (Fig. 2)
5. Install two new batteries. Make sure the "+" side facing up.
6. Replace the cover and screws.
7. Press the RESET switch (on the back).

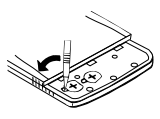
- Make sure that the display appears as shown below. If the display does not appear as shown, remove the batteries reinstall them and check the display once again.




(Fig. 1)



(Fig. 2)



### Automatic Power Off Function

This calculator will turn itself off to save battery power if no key is pressed for approximately 10 minutes.

## SPECIFICATIONS

| | |
|---|---|
| Calculations: | Scientific calculations, complex number calculations, simultaneous linear equations with three unknowns, statistical calculations, etc. |
| Internal calculations: | Mantissas of up to 12 digits |
| Pending operations: | 16 calculations 8 numeric values (4 numeric values in STAT and complex number mode) |
| Power source: | Built-in solar cells<br>3V ⎓ (DC):<br>Backup batteries (Alkaline batteries (LR44) × 2) |
| Operating temperature: | 0°C – 40°C (32°F – 104°F) |
| External dimensions: | 78.6 mm (W) × 152 mm (D) × 10.5 mm (H)<br>3-3/32" (W) × 5-31/32" (D) × 13/32" (H) |
| Weight: | Approx. 78 g ( 0.172 lb)<br>(Including batteries) |
| Accessories: | Batteries × 2 (installed), operation manual, operation examples sheet, quick reference card (Physical Constants and Metric Conversions) and hard case |

## FOR MORE INFORMATION ABOUT THIS CALCULATOR

Visit our Web site.
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