AURORA OPERATION MANUAL

—Use for AX-595

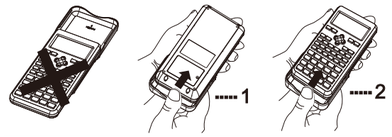
Printed in China
9220260

Removing and Replacing the Calculator's Cover

Always slide the keyboard end of the unit into the cover first. Never slide the display end of the unit into the cover.

Holding the cover as shown in the illustration, slide the unit out of the cover before use. Picture……1

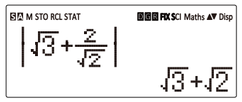
Holding the cover as shown in the illustration, slide the unit out of the cover after use. Picture……2



Precautions

- Don't expose the machine to water, direct sunlight, extremely hot or cold temperatures or dusty environments.
- Don't drop the machine or subject it to heavy impact.
- Use a soft cloth to clean the machine. Do not use detergents.

Display (4-line Dot Matrix Display)



<Status Indicators>

S	: Shift key
A	: Alpha key
M	: Independent memory
STO	: Store memory
RCL	: Recall memory
STAT	: Statistics mode
D	: Degree Mode
R	: Radian Mode
G	: Gradient Mode
FIX	: Fixed-decimal setting
SCI	: Scientific Notation
Maths	: Math Display mode
▲	: Scroll Up
▼	: Scroll Down
◀	: Scroll Left
▶	: Scroll Right
Disp	: Multi-statements Display

Before Using the Calculator

■ **Check the current calculation mode**

Be sure to check the status indicators that indicate the current calculation mode (COMP, STAT, TABLE), display formats setting and angle unit setting (Deg, Rad, Gra).

■ **Return to initial setup**

Pressing [Shift] [CLR] [1] (setup) [=] (Yes) [CA] to return the initial calculator setup.

Calculation mode	: COMP
Input/ Output Format	: Maths
Angle unit	: Deg
Display Digits	: Norm 1
Fraction Display Format	: d/c
Statistical Data Input	: OFF
Decimal Point format	: Dot

This action will not clear the variable memories.

■ **Initialize the calculator**

When you are not sure of the current calculator setting, you are recommended to initialize the calculator (calculation mode "COMP" , angle unit "Degree" , and clear reply and variable memories), and LCD contrast by pressing [Shift] [CLR] [3] (All) [=] (Yes) [CA] .

Getting Started

Power On and Off

■ **First time operation:**

Press [ON] [Shift] [CLR] [3] [=] [CA] to reset the calculator.

Power ON: When [ON] is pressed.

Power OFF: [Shift] [OFF] are pressed.

Display Contrast Adjustment

Press [Shift] [SET-UP] [▼] [5] (5 : ◀ CONT ▶) , enter the Display Contrast Adjustment screen.

CONTRAST	
LIGHT	DARK
[◀]	[▶]

Press [▶] to make the display contrast darken.

Press [◀] to make the display contrast lighten.

Press [CA] or [ON] to confirm and clear the screen.

Auto Power Off Function:

When the calculator is not used for about 7 minutes, it will automatically power off.

■ To initialize the LCD contrast, press [Shift] [CLR] [3] [=] [CA] outside the **Display Contrast Adjustment** screen.

Mode Selection

■ Press [MODE] to enter the Calculation Mode Selection screen.

■ Press [1] , [2] , [3] to select the calculation mode.

■ See " Display Contrast Adjustment " section.

1:COMP	2:STAT
3:TABLE	

Mode		LCD Indicator	Operation
Normal calculation	COMP		MODE 1
Statistical calculation	STAT	STAT	MODE 2
Function Table calculation	TABLE		MODE 3

■ Initial mode is COMP mode.

Calculator Set-up Menu

■ Press [Shift] [SET-UP] to enter the Calculator Set-up Menu; press [▼] / [▲] for next/previous page.

1:Maths	2:Line
3:Deg	4:Rad
5:Gra	6:FiX
7:Sci	8:Norm

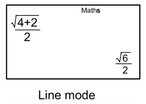
Press [▼] or [▲] key

1:ab/c	2:d/c
3:STAT	4:Disp
5:◀ CONT ▶	

■ **To select the calculator input & output format [1] Maths or [2] Line.**

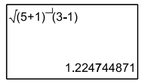
[1] Maths -(Maths mode): The majority of calculation input and output (e.g. Fraction, pi, square root number) are shown in Mathematics textbook format. And "Maths" icon will be shown.

Maths mode



[2] Line-(Line mode): The majority of calculation input and output are Shown in the lines format.

Line mode



■ **To select the angle unit [3] Deg, [4] Rad or [5] Gra**

[3] Deg: Angle unit in Degree

[4] Rad: Angle unit in Radian

[5] Gra: Angle unit in Gradient

$90° = \frac{\pi}{2}$ radians =100 grads

■ **TO select display digit or notation [6] Fix, [7] Sci or [8] Norm**

[6] Fix: Fixed Decimal, [Fix 0~9?] appears, specify the number of decimal places by pressing [0] ~ [9].

Example: 230 ÷ 7 =32.8571 (FIX 4)
=32.86(FIX 2)

[7] Sci: Scientific Notation, [Sci 0~9?] appears, specify the number of significant digits by pressing [0]~[9].

Example: 230 ÷ 7 =32.8571 (FIX 4)
=32.86(FIX 2)

[8] Norm: Exponential Notation, [Norm 1~2?] appears, specify the exponential I notation format by pressing [1] or [2].

Norm 1: Exponential notation is automatically used for

$|x|<10^{-2}, |x|>=10^{10}$

Norm2:Exponential notation is automatically used for

$|x|<10^{-9}, |x|>=10^{10}$

Example: 1 ÷ 1000 = 1 ×10^{-3} (Norm 1)
= 0.001 (Norm 2)

■ **To specify the fraction calculation result display format [1] ■⁄□ or [2] □⁄□ .**

[1] ■⁄□ : specify Mixed fraction display.

[2] □⁄□ : specify Improper fraction display.

■ **To select the statistical display format [3] STAT([1] ON or [2] OFF)**

[1] ON: Show FREQ (Frequency) Column in Statistical Data Input Screen.

[2] OFF: Hide FREQ (Frequency) Column in Statistical Data Input Screen.

■ **To select the decimal point display format [4] Disp ([1] Dot or [2] Comma)**

[1] Dot: specify dot format for Decimal point result display.

[2] Comma: specify comma format for Decimal point result display.

■ **To Adjust Display contrast [5] ◀ CONT ▶**

See " Display Contrast Adjustment" section.

Inputting Expressions and Values

Input Capacity

■ This calculator allows you to input a single calculation up to 99 bytes. Normally , one byte is used as each time you press one of the numeric keys, arithmetic keys, scientific function keys or [Ans]. Some functions require 4 - 13bytes.[Shift], [Alpha] , and the direction keys will not use up any bytes.

■ When input capacity is less than 10 bytes, the input cursor will change from " ▌ " to " ■ " that notifying the memory is running now.

Input Editing

■ New Input begins on the left of display. If input data are more than 15 characters, the line will scroll to the right consecutively. You can scroll back to the left by using [◀] and [▶] to review the input. In Line mode, press [▲] to let the cursor jump to the beginning of inputting, while [▼] will jump to the end.

■ In Maths mode, press [▶] to let the cursor jump to the beginning of inputting while it is at end of the input calculation. Or press [◀] to let the cursor jump to the end of inputting while it is at the beginning of the input calculation.

■ Omit the multiplication sign and final close parenthesis.

Example: 2 × log 100 ×(1+3) = 16

Including [×] *1 [)] *2 , [)] *3	Operation 1	Display 1
	[2] [×] [log] [1] [0] [0] [)] [×] [(] [1] [+] [3] [)] [=] (*1, *2, *3)	2×log(100)×(1+3) 16

Omitting [×] *1, Omitting [)] *3	Operation 2	Display 2
	[2] [log] [1] [0] [0] [)] [(] [1] [+] [3] [=]	2log(100)(1+3 16

*1. Omit multiplication sign (x)

- Input before an open parentheses [(] : 1 x (2+3).
- Input before scientific functions that includes parenthesis: 2x sin(30).
- Input before Random number function [Ran#] .
- Input before Variable (A, B, C, D, E, F, X, Y, M) ,π, e.

*2. Scientific functions come with the open parenthesis.

Example: sin(, cos (, Pol(, LCM(… You need to input the argument and the close parenthesis [)].

*3. Omit the last close parenthesis before the [=] , [M+], [Shift] [STO].

■ **Insert and overwrite Input mode**

In Line mode, you can use INSERT [Ins] or overwrite mode for inputting.

In Insert mode (Default input mode), the cursor is a vertical flashing line " ▌" for inserting a new character.

In overwrite mode, press [Shift] [Ins] key to switch the cursor to a flashing horizontal (_) and replace the character at the current cursor position.

In Maths mode, you can only use the insert mode.

Whenever the display format changes from Line mode to Maths mode, it will automatically switch to the insert mode.

■ **Deleting and Correcting an Expression**

In insert mode: Move the cursor to the right of the character or function that needs to be deleted, then press [DEL].

In overwrite mode: Move the cursor under the character or function being deleted, then press [DEL].

Example: 1234567+889912

(1) Replace an entry (1234567→1234560)

Mode Setting	Key in operation	Display(input Line only)
Method 1: Line/Maths mode-Insert mode	1234567 [+] 889912 [◀] 7 times	1234567▌+889912
	[DEL] [0]	1234560▌+889912
Method 2 : Line mode-Overwrite mode	[Shift] [SET-UP] [2] 1234567+889912 [Shift] [Ins]	1234567+889912_
	[◀] 8 times	1234567+889912
	[0]	1234560+889912

(2) Deletion (1234567 → 134567)

Method1: Line/Maths mode– Insert mode	[◀] 12 times	12▌34567+889912
	[DEL]	134567+889912
Method 2: Line mode – Overwrite mode	[Shift] [Ins]	1234567+889912_
	[◀] 13times	1234567+889912
	[DEL]	134567+889912

(3) Insertion (889912→2889912)

Line/Maths mode – Insert mode	[◀] 6times	1234567+▌889912
	[2]	1234567+2▌889912

Inputting and Display Result in Maths Mode

■ In Maths Mode, the Input and display result of fraction or certain functions (log, x^2 ,x^3 $x^{■}$,√■,∛■,$\sqrt[■]{■}$,$\sqrt[■]{□}$,x^{-1},$10^{■}$,$e^{■}$, Abs)are shown in Handwriting/ Mathematics format.

MATHS MODE : [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
	[Abs] [√■] [3] [▶] [+] [2] [a b/c] [√■] [2] [=]	$\left\lvert\sqrt{3}+\frac{2}{\sqrt{2}}\right\rvert$ $\sqrt{3}+\sqrt{2}$

Remark

(1) Some input expressions cause the height of a calculation expression to be greater than one display screen. Maximum input capacity: 2 display screen (31 dots x2).

(2) Calculator memory limits how many functions or parentheses can be input in any single expression. In this case divide the expression into multiple parts and calculate separately.

(3) If part of the expression you input is cut off after calculation and in the result display screen you can press [◀] or [▶] to view the full expression.

Basic Calculations

■ Press [MODE] [1] to enter COMP mode.

■ During the busy calculation, the calculator shows only the indicators (without any calculation result). You can press [CA] key to interrupt the calculating operation.

Arithmetic Calculations

■ To calculate with negative values (exclude the negative exponent) enclose them with parentheses.

■ This calculator supports 99 levels of parenthetical expression.

MATHS MODE: [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
$(2.5)^2$	[(] [2] [•] [5] [)] [x^2] [=]	$(2.5)^2$ $\frac{25}{4}$
$(4\times10^{75})(-2\times10^{-78})$	[4] [EXP] [7] [5] [×] [(-)] [2] [EXP] [(-)] [7] [8] [=]	$4_E75\times-2_E-78$ $-\frac{1}{125}$

Memory Calculations

■ **Memory Variables**

■ There are 9 memory variables (A - F , M, X and Y), which store data, results, or dedicated values.

- Store values into memory by pressing [Shift] [STO] + Memory variable.
- Recall memory values by pressing [RCL] + Memory variable.
- Memory content can be cleared by pressing [0] [Shift] [STO] +Memory variable.

Example: 24+6→A (30 store into A), calculate 2 sin A and clear memory A.

MATHS MODE: [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
24+6→A	[2] [4] [+] [6] [Shift] [STO] [A]	24+6→A 30
2×sin A =1	[2] [sin] [Alpha] [A] [=]	2sin(A 1
Clear memory A	[0] [Shift] [STO] [A]	0→A 0

■ **Independent Memory**

- Independent memory [M] uses the same memory area as variable M. It is convenient for calculating cumulative total by just pressing [M+] (add to memory) or [M-] (subtract from memory).
- Memory contents are retained even when the calculator is powered off.
- Clear independent memory (M) by pressing [0] [Shift] [STO] [M]
- Clear all memory values by pressing [Shift] [CLR] [2] (Memory) [=] [CA].

■ **Answer Memory**

- The input values or the most recent calculation result will be automatically stored into Answer memory whenever you press [=], [Shift] [=] , [M+] , [Shift] [M-] , [Shift] [STO] memory, [RCL] memory. Answer memory can hold up to 18 digits.
- Recall and use the latest stored Answer memory by pressing [Ans].
- Answer memory is not updated as an error operation had been performed.
- Answer memory contents can be maintained even if pressing [CA], changing the calculation mode, or turning off the calculator.

Example in Maths mode	Key in operation	Display
123+456→M+, Ans^2 =335,241	[1] [2] [3] [+] [4] [5] [6] [M+] [x^2] [=]	Ans^2 335241
789012- Ans = 453,771	[7] [8] [9] [0] [1] [2] [•] [Ans] [=]	789012-Ans 453771

Fraction Calculations

The calculator supports fraction calculations and the conversions between Fraction, Decimal point, Mixed fraction and Improper fraction.

- Specify the fraction calculation result display format by either mixed fraction (■⁄□) or improper fraction (□⁄□) in set-up menu.
- At the default setting, fractions are displayed as improper fractions (□⁄□).
- Mixed Fraction display result only available after set the (■⁄□) in the setup menu.

	Improper Fraction (□⁄□)	Mixed Fraction (■⁄□)
Maths Mode	$\frac{13}{3}$	$4\frac{1}{3}$
Line Mode	13⌋3	4⌋1⌋3

■ Press [F↔D] to switch a calculation result between fraction and decimal format.

■ Press [Shift] [a b/c↔d/c] to switch a calculation result between improper fraction and mixed fraction format.

■ Result will be displayed in decimal format automatically whenever the total digit of a fractional value (integer + numerator + denominator + separator marks) exceeds 10.

■ As a fraction calculation is mixed with decimal value, the result will be displayed by decimal format.

Fraction ↔ Decimal point conversion

MATHS MODE: [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
$1\frac{1}{3}+\frac{5}{6}=\frac{13}{6}$ In Maths mode	[1] [Shift] [□⁄□] [1] [▶] [3] [▶] [+] [5] [□⁄□] [6] [=]	$1\frac{1}{3}+\frac{5}{6}$ $\frac{13}{6}$
$\frac{13}{6}$↔2.166666667 (Fraction↔Decimal)	[F↔D]	$1\frac{1}{3}+\frac{5}{6}$ 2. 166666667
2.166666667 ↔ $2\frac{1}{6}$ (Decimal↔Mixed Fraction)	[Shift] [a b/c↔d/c]	$1\frac{1}{3}+\frac{5}{6}$ $2\frac{1}{6}$

Percentage Calculations

MATHS MODE : [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
To calculate 30% of 820 (Maths mode)	[8] [2] [0] [×] [3] [0] [Shift] [%] [=]	820×30% 246
The percentage of 75 against 12 (Maths mode)	[7] [5] [÷] [1] [2] [Shift] [%] [=]	75÷12% 625

Degree-Minutes-Seconds Calculations

Use degrees (hours), minutes and seconds key to perform a sexagesimal (base-60 notational system) calculation or convert the sexagesimal value into decimal value.

Degree-Minutes-Seconds ↔ Decimal points

MATHS MODE : [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
99°0'4.8"÷0.8= 123°45'6"(Mathsmode)	[9] [9] [°'"] [0] [°'"] [4] [•] [8] [°'"] [÷] [0] [•] [8] [=]	99°0'4.8"÷0.8 123°45'6"
123°45'6"*123.7516667 (Maths mode)	[°'"]	99°0'4.8"÷0.8 123.7516667
2.345→2°20'44.16" (Maths mode)	[2] [•] [3] [4] [5] [6] [=] [°'"]	2.3456 2°20'44.16"

Replay & Multi -statements

■ **Replay Memory Function**

- Replay memory is only available in COMP mode.
- After the calculation is executed，the calculation input and result will be stored in the replay memory automatically.
- Pressing [▼] (or [▲]) can replay the performed calculation input and result history.
- After obtaining the calculation result on the display，press [◀] or [▶] to edit the input expression of that result.
- If the ▶ indicator is on the right side of a calculation result display，you need to press [CA] and then [◀] or [▶] to scroll the calculation.
- Replay memory is cleared when you press
  (1). Initialize calculator setting by [Shift] [CLR] [3] [=] [CA].
  (2). Change from one calculation mode or display mode to other
  (3). Press [ON] key.
  (4). Press [Shift] [OFF] to power off machine.

■ **Multi-statements Function**

- Use a colon [:] to put two or more calculations input together.
- The first executed statement will have "Disp" indicator，and the "Disp" icon will disappeared after the last statement is being executed.

MATHS MODE: [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
1×23=23 2+25=27 usingamulti-statement in Maths mode	[1] [×] [2] [3] [Alpha] [:] [2] [+] [2] [5]	1×23:2+25▌
	[=]	▲ Disp 1×23 23
	[=]	▲ 2+25 27
Replay the previous Calculation history 1 × 23=23	[▲]	▼ 1×23 23

Functional Scientfic Calculations

■ Press [MODE] [1] to enter COMP mode.

■ π =3.1415926535897932324

■ e=2.7182818284590452324

Square、Root、Cube、Cube Root、Power、Power Root、Reciprocal and Pi.

MATHS MODE: [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
$\left(\sqrt[3]{3^2+5^3}\right)^{-1}\times\pi$ =0.6139244642	[(] [Shift] [∛■] [3] [x^3] [+] [5] [x^3] [▶] [)] [x^{-1}] [×] [Shift] [π] [=]	$\left(\sqrt[3]{3^2+5^3}\right)^{-1}\times\pi$ 0.6139244642
$(\sqrt{2^6}+\sqrt[5]{243})$ =7	[(] [Shift] [√■] [2] [$x^{■}$] [6] [▶] [▶] [+] [Shift] [$\sqrt[■]{□}$] [5] [▶] [2] [4] [3] [▶] [)] [=]	$(\sqrt{2^6}+\sqrt[5]{243})$ 7

Logarithm、Natural logarithm、Antilogarithm and logab.

MATHS MODE: [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
$e^{-3}+10^{1.2}+\ln3$= 16.99733128	[Shift] [$e^{■}$] [(-)] [3] [▶] [+] [Shift] [$10^{■}$] [1] [•] [2] [▶] [+] [ln] [3] [=]	$e^{-3}+10^{1.2}+\ln(3$ 16.99733128
$\log_2 8$ - log1=3	[$\log_{■}$□] [2] [▶] [8] [▶] [-] [log] [1] [=]	$\log_2(8)$ - log(1 3

Angle Unit Conversion

The calculator angle unit setting is "Degree" , pressing [Shift] [SET-UP] enter the setup menu to change the unit to "Radian "or "Gradient" :

1:Maths	2:Line
3:Deg	4:Rad
5:Gra	6:Fix
7:Sci	8:Norm

Press the corresponding number key [3] , [4] or [5] for the angle unit you need, then the display will show the D , R , G indicator accordingly.

Convert an angle unit between"Degree","Radian"and"Gradient" by pressing [Shift] [DRG▶] .

1: ◦	2: r
3: g	

Then, pressing [1] , [2] or [3] will convert the displayed value into the selected Angle unit.

MATHS MODE: [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
Convert 180 Degree into radian and gradient ($180°=\pi^{Rad}=200^{Grad}$)	[Shift] [SET-UP] [4] [1] [8] [0] [Shift] [DRG▶] [1] [=]	D Maths ▲ 180° π
	[Shift] [SET-UP] [5] [=]	G Maths ▲ 180° 200

Trigonometry Calculations

■ Before using the trigonometric functions(except hyperbolic calculations),select the appropriate angle unit(Deg/Rad/Gra) by pressing [Shift] [SET-UP] .

■ $90° = \frac{\pi}{2}$ Radians=100 Gradients.

Example in Maths mode	Key in operation	Display
Degree Mode	[Shift] [SET-UP] [3]	D
$\sin30=\frac{1}{2}$	[sin] [3] [0] [=]	sin(30 $\frac{1}{2}$
$\frac{1}{\sin45°}$= Cosec 45° = √2	[sin] [4] [5] [)] [x^{-1}] [=]	$\sin(45)^{-1}$ $\sqrt{2}$

■ Hyperbolic (sinh /cosh/tanh), Inverse Hyperbolic($\sinh^{-1}$/$\cosh^{-1}$/ $\tanh^{-1}$) Funtions.

■ Pressing [hyp] enter sub-hyperbolic menu.

1:sinh	2:cosh
3:tanh	4:$\sinh^{-1}$
5:$\cosh^{-1}$	6:$\tanh^{-1}$

MATHS MODE: [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
sinh2.4 - cosh2.4 =-0.09071795329	[hyp] [1] [2] [•] [4] [)] [−] [hyp] [2] [2] [•] [4] [)] [=]	sinh(2.4 - cosh(▷ -0.09071795329
$\cosh^{-1}45$ =4.499686191	[hyp] [5] [4] [5] [=]	$\cosh^{-1}(45$ 4.499686191

Permutation，Combination，Factorials and Random Number Generation

■ Permutation: $nPr=\frac{n!}{(n-r)!}$

■ Combination: $nCr=\frac{n!}{r!(n-r)!}$

■ Factorial: x!=x(x-1)(x-2)···(2)(1)

MATHS MODE: [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
$_{10}P_4$=5040	[1] [0] [Shift] [nPr] [4] [=]	10P4 5040
$_4C_2$=6	[4] [Shift] [nCr] [2] [=]	4C2 6
10!=3628800	[1] [0] [Shift] [x!] [=]	10! 3628800

■ **Random Number Generation**

[Shift] [Rand] :Generate a random number between 0.000 and 0,999. And the display result will be fraction format in Maths mode status.

[Alpha] [I-Rand]:Generate a random number between two specified positive integers.The entry is divided by " , " .

MATHS MODE: [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
Generate a random number between 0.000 & 0,999	[Shift] [Rand] [=]	Rand $\frac{739}{1000}$
Generate an integer from range of 1 to 100	[Alpha] [I-Rand] [1] [Shift] [,] [1] [0] [0] [=]	I-Rand(1,100 43

*The value is only a sample，results will differ each time.

Least Common Multiple and Greatest Common Divisor

■ LCM：Calculate the least common multiple among three positive integers.

■ GCD：Calculate the greatest common divisor among three positive integers.

MATHS MODE: [Shift] [SET-UP] [1]

Example	Key in operation	Display
LCM(15,27 39,) =1755	[Shift] [LCM] [1] [5] [Shift] [,] [2] [7] [Shift] [,] [3] [9] [=]	LCM(15,27 39 1755

LINE MODE: [Shift] [SET-UP] [2]

Example	Key in operation	Display
GCD(12,24,60) =12	[Alpha] [GCD] [1] [2] [Shift] [,] [2] [4] [Shift] [,] [6] [0] [=]	GCD(12,24,60 12

Integer Division Calculations(I-Div)

■ "Q" is quotient of an integer division. "R" is remainder of an integer division.

■ The calculated quotient value(Q) and remainder(R) will be stored into memory variables " C " and "D "automatically assigned.

■ In Maths mode，press [◀] or [▶] to scroll a long calculation result.

■ In Line mode，the quotient value (Q) and remainder (R) will be shown over 2 line.

■ Only Quotient Value (Q) can continue to be used for the next

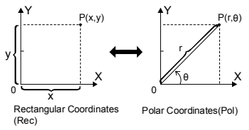
calculation or be stored into memory variables.

LINE MODE: [Shift] [SET-UP] [2]

Example in Line mode	Key in operation	Display
35 ÷ 10=3 × 10+5 Q=3 R=5 (Line mode)	[Shift] [I-Div] [3] [5] [Shift] [·] [1] [0] [=]	I-Div(35,10 Q= 3 R= 5
Quotient value(Q)+3 =6	[+] [3] [=]	Ans+3 6
Recall Quotient Value(Q)	[RCL] [C]	C 3
Recall Remainder Value(R)	[RCL] [D]	D 5

Coordinate Conversion

- With polar coordinates, you can calculate and Display θ within –180° ＜θ≦180° range,(Same as Radian and Gradient).
- In Maths mode, press [◀] or [▶] to scroll the calculation result.
- In Line mode,(x, y) or (r, θ) will be shown over 2 line.
- After conversion, the results will automatically be assigned to memory variables X and Y. Press [RCL] [X] or [Y] to show the results.



Rectangular Coordinates (Rec) ⟷ Polar Coordinates(Pol)

[Shift] [Pol( ]:Convert rectangular coordinates (x, y) to polar coordinates (r, θ); Press [RCL] [X] for r , or [RCL] [Y] for θ.

Example in Maths mode	Key in operation	Display
With rectangular coordinate (x=1,y=√3). Find Polar coordinate (r,θ) at degree mode.	[Shift] [Pol( ] [1] [Shift] [,] [√■] [3] [=]	Pol(1, √3 r=2, θ=60
	[RCL] [X]	X 2
	[RCL] [Y]	Y 60

[Shift] [Rec( ]:Convert polar coordinates (r, θ) to rectangular coordinates (x, y); Press [RCL] [X] for x, or [RCL] [Y] for y.

Example in Line mode	Key in operation	Display
With Polar coordinate (r=2, θ=60°) Find Rectangular Coordinate (x, y) at Degree mode	[Shift] [Rec( ] [2] [Shift] [,] [6] [0] [=]	Rec(2,60 X= 1 Y= 1.732050808
	[RCL] [X]	X 1
	[RCL] [Y]	Y 1.732050808

Absolute Value Calculation

Example in Maths mode	Key in operation	Display
|sin(30-5)x(-π)| =1.327694426	[Abs] [sin] [3] [0] [-] [5] [)] [×] [(] [(-)] [Shift] [π] [)] [=]	|sin(30-5)x(-π)| 1.327694426

Engineering Notation

Example in Line mode	Key in operation	Display
1÷200=5×10^{-3} (In Line Mode)	[1] [÷] [2] [0] [0] [=]	1 ÷ 200 5×10^{-3}
	[ENG] [ENG]	1 ÷ 200 5000×10^{-3}
	[Shift] [◀ENG]	1 ÷ 200 5×10^{-3}

Display Values Exchange

- In Maths mode pressing [F↔D] to change the calculation result value between fraction form ↔ Decimal form, π form ↔ Decimal form, √■ form ↔ Decimal form.
- In Line mode, pressing [F↔D] to **ONLY** change the calculation result value between fraction form ↔ Decimal form, the other π and √■ calculation will display the decimal value only.

LINE MODE: [Shift] [SET-UP] [2]

Example in Line mode	Key in operation	Display
$\frac{2}{3}+2=\frac{8}{3}$ =2.666666667 (In Line Mode)	[2] [a b/c] [3] [+] [2] [=]	2⌋3+2 8⌋3
	[F↔D]	2⌋3+2 2.666666667

MATHS MODE: [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
$\frac{1}{2}+2=\frac{5}{2}=2.5$ (In Maths Mode)	[1] [a b/c] [2] [▶] [+] [2] [=]	$\frac{1}{2}$+2 $\frac{5}{2}$
	[F↔D]	$\frac{1}{2}$+2 2.5

MATHS MODE: [Shift] [SET-UP] [1]

Example in Maths mode	Key in operation	Display
tan 60＝√3 =1.732050808	[tan] [6] [0] [=]	tan(60 √3
	[F↔D]	tan(60 1.732050808
π ÷ 6＝$\frac{1}{6}$π =0.5235987756	[Shift] [π] [÷] [6] [=]	π ÷ 6 $\frac{1}{6}$π
	[F↔D]	π ÷ 6 0.5235987756

Remark

- Some Calculation results pressing [F↔D] key will not convert the display value.
- Some display result conversion may take a long time.

Statistical Calculations

- Press [MODE] [2] to enter Statistical Type Selection screen and select 1~8.Then enter Statistical calculation mode and "STAT" indicator lights up.
- In Statistical calculation mode , press [Shift] [STAT] [1] (Type) to select the calculation type.

Statistical Type Selection

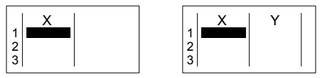
There are 8 types of Statistical Calculation after entered the Statistical Type Selection screen then press the number to select the type of Statistic Calculation.

1:SD	2:Lin
3:Quad	4:Log
5:e EXP	6:ab EXP
7:Pwr	8:Inv

Pressing Key	Statistical Calculation
1(SD)	One-variable statistics (X)
2(Lin)	Two-variable, Linear regression (y=A+Bx)
3(Quad)	Two-variable, Quadratic regression (y=A+Bx+Cx^2)
4(Log)	Two-variable, Logarithmic regression (y=A×BInx)
5(e EXP)	Two-variable, E exponential regression (y=Ae^{Bx})
6(ab EXP)	Two-variable, ab Exponential regression (y=AB^x)
7(Pwr)	Two-variable, Power regression (y=Ax^B)
8(Inv)	Two-variable, Inverse regression (y=A+B/x)

Statistical Data Input

After confirmed the calculation type of the above Statistical Type Selection screen or by pressing [Shift] [STAT] [2] 〈Data〉 in the STAT mode, the following Statistical Data input screen will be shown.



1-variable STAT 2-variable STAT

- After turned on Data Frequency "FREQ" in calculator's setup menu, the FREQ column will be added into the above screen.
- The followings are the maximum number of line for data input.

Statistic type	FREQ On	FREQ Off
Single Variable (only x input)	40	80
2 Variable (x & y input)	26	40

- Input expression and display result value in Statistical Data Input screen are in line mode (same as Comp mode with Line mode status).
- After inputted the data, then press [=] to store the value into statistical registers and display the value (max, 6 digits) in the cell, and you can press cursor key to move the cursor between each cell.

Editing Statistical Sample Data

- Replacing the Data in a cell.
  (1) In Statistical Data Input screen, move the cursor to cell you want to edit.
  (2) Input the new data value or expression, and then press [=] .
- Deleting a line
  (1) In Statistical Data input screen move the cursor to line you want to delete.
  (2) Press [DEL] .
- Inserting a line
  (1) In Statistical Data input screen, move the cursor to the line that will be under the line being inserted.
  (2) Press [Shift] [STAT] [3] (Edit).
  (3) Press [1] (Ins).
- Deleting All STAT Data input.
  (1) Press [Shift] [STAT] [3] (Edit).
  (2) Press [2] (Del-A).

Statistical Calculation Screen

- After inputting the STAT Data, press [CA] to enter Statistical Calculation screen.
- Statistical Calculation screen is in Line mode for input & output Display.
- Use Statistical Menu to calculate the Statistical result, (S-SUM, S-VAR, S-PTS, Reg).

Statistical Menu

In **Statistical Data Input** screen or **Statistical Calculation** screen, you can press [Shift] [STAT] to display the **Statistical Menu** screen.

1:Type	2:Data
3:Edit	4:S-SUM
5:S-VAR	6:S-PTS

1-variable STAT

1:Type	2:Data
3:Edit	4:S-SUM
5:S-VAR	6:S-PTS
7:Reg	

2-variable STAT

STAT items	Description
(1) Type	To enter the statistical calculation type screen
(2) Data	To enter the statistical Data input screen
(3) Edit	To enter Edit sub-menu for editing STAT editor screen contents
(4) S-SUM	To enter S-Sum sub-menu (calculating sum)
(5) S-VAR	To enter S-Var sub-menu (calculating variable)
(6) S-PTS	To enter S-PTS sub-menu (calculating points)
(7) Reg	To enter Reg sub-menu (Regression calculation)

Statistical calculation result in [4] S-SUM, [5] S-VAR, [6] S-PTS, [7] Reg

STAT Sub-menu	STAT Type	Value	Symbol	Operation
S-SUM	1&2 variable STAT	Summation of all x^2 value	$\sum x^2$	[Shift] [STAT] [4] [1]
		Summation of all x value	$\sum x$	[Shift] [STAT] [4] [2]
	2-variable STAT only	Summation of all y^2 value	$\sum y^2$	[Shift] [STAT] [4] [3]
		Summation of all y value	$\sum y$	[Shift] [STAT] [4] [4]
		Summation of xy pairs	$\sum xy$	[Shift] [STAT] [4] [5]
		Summation of all x^3 value	$\sum x^3$	[Shift] [STAT] [4] [6]
		Summation of all x^{2}y pairs	$\sum x^2y$	[Shift] [STAT] [4] [7]
		Summation of all x^4 pairs	$\sum x^4$	[Shift] [STAT] [4] [8]
S-VAR	1 & 2 Variable STAT	Number of data sample	n	[Shift] [STAT] [5] [1]
		Mean of the x values	$\bar{x}$	[Shift] [STAT] [5] [2]
		Population standard deviation of x	σ_n	[Shift] [STAT] [5] [3]
		Sample Standard! Deviation of x	$x\sigma_{n-1}$	[Shift] [STAT] [5] [4]
	2-variable STAT only	Mean of the y values	$\bar{y}$	[Shift] [STAT] [5] [5]
		Population standard deviation of y	$y\sigma_n$	[Shift] [STAT] [5] [6]
		Sample standard Deviation of y	$y\sigma_{n-1}$	[Shift] [STAT] [5] [7]
S-PTS	1&2 variable STAT	Minimum value of x	min X	[Shift] [STAT] [6] [1]
		Maximum value of x	max X	[Shift] [STAT] [6] [2]
	2-variable STAT only	Minimum value of y	min Y	[Shift] [STAT] [6] [3]
		Maximum value of y	max Y	[Shift] [STAT] [6] [4]
Reg	For non-Quad Reg	Regression coefficient A	A	[Shift] [STAT] [7] [1]
		Regression coefficient B	B	[Shift] [STAT] [7] [2]
		Correlation coefficient r	r	[Shift] [STAT] [7] [3]
		Estimated value of x	$\hat{x}$	[Shift] [STAT] [7] [4]
		Estimated value of y	$\hat{y}$	[Shift] [STAT] [7] [5]
Reg	For Quad Reg only	Regression coefficient A	A	[Shift] [STAT] [7] [1]
		Regression coefficient B	B	[Shift] [STAT] [7] [2]
		Regression coefficient C	C	[Shift] [STAT] [7] [3]
		Estimated value of x1	$\hat{x}1$	[Shift] [STAT] [7] [4]
		Estimated value of x2	$\hat{x}2$	[Shift] [STAT] [7] [5]
		Estimated value of y	$\hat{y}$	[Shift] [STAT] [7] [6]

Statistical Calculation Example.

- **SD type Statistical calculation Example:**
  To calculate $\sum x^2$, $\sum x_1$, n, $\bar{x}$, x σ_n, x σ_{n-1} , minX , maxX , of data: 75,85,90 77,79 in SD mode (Freq: OFF).

Key in operation	Display
[MODE] [2]	1:SD 2:Lin 3:Quad 4:Log 5:e EXP 6:ab EXP 7:Pwr 8:Inv
[1] (SD)	X 1 2 3
[7] [5] [=] [8] [5] [=] [9] [0] [=] [7] [7] [=] [7] [9] [=]	X 4 77 5 79 6
[CA] [Shift] [STAT] [4] [1] [=]	$\sum x^2$ 33120
[CA] [Shift] [STAT] [4] [2] [=]	$\sum x$ 406
[CA] [Shift] [STAT] [5] [1] [=]	n 5
[CA] [Shift] [STAT] [5] [2] [=]	$\bar{x}$ 81.2
[CA] [Shift] [STAT] [5] [3] [=]	$x\sigma_n$ 5.528109984
[CA] [Shift] [STAT] [5] [4] [=]	$x\sigma_{n-1}$ 6.180614856

Quadratic Regression type Statistical Calculation Example:

ABC Company investigate the effectiveness of the advertisement expense in coded units, the following data were obtained:

Advertisement expenses: X	18	35	40	21	19
Effectiveness: y (%)	38	54	59	40	38

Please use the regression to estimate the effectiveness(estimate the value of y) if the advertisement expenses X=30, and estimate the advertisement expenses level (estimate the value of x_1, x_2) for effectiveness y = 50.

Key in operation	Display
[MODE] [2]	1:SD 2:Lin 3:Quad 4:Log 5:e EXP 6:ab EXP 7:Pwr 8:Inv
[3] (Quad)	X Y 1 2 3
[1] [8] [=] [3] [5] [=] [4] [0] [=] [2] [1] [=] [1] [9] [=] [▼] [▶] [3] [8] [=] [5] [4] [=] [5] [9] [=] [4] [0] [=] [3] [8] [=]	X Y 4 21 40 5 19 38 6
[CA] [3] [0] [Shift] [STAT] [7] [6] [=]	30$\hat{y}$ 48.69615715
[CA] [5] [0] [Shift] [STAT] [7] [4] [=]	50$\hat{x}_1$ 31.30538226
[CA] [5] [0] [Shift] [STAT] [7] [5] [=]	50$\hat{x}_2$ -167.1096731

Function (X, Y) Table Calculation

- Input f(x) function to generate the function table for x & f(x),
- Steps to generate a Number Table

1. Enter TABLE Mode
- Press [MODE] [3] to enter the Table function calculation,

2. Function Input screen
- Input function with X variable ([Alpha] [X]) to generate Function Table Result.
- All other variables (A,B,C,D, E, F, Y) and independent memory (M) act as the value.
- Pol, Rec, I-Div function not able to used in Function Input screen.
- The Function Table Calculation will change X-variable.

3. Input the start, end & step information
- Input the value press [=] to confirm on the following screens
- Input expression and display result value in following screens are in Line mode status
- There are maximum of 30 x-values for generate function table, The "insufficient Error" Will be shown if you input the start, end, step value combination is more than 30 x-values.

Display screen	You should input:·
Start?	Input the lower limit of X (Default =1).
End?	Input the upper limit of X (Default =5). *End value must be greater than the start value.
Step?	Input the increment step (Default =1).

- In Function Table Result screen, you cannot edit the content, and press [CA] return to Function input screen.

Example: $f(x)=x^3+3x^2-2x$ to generate the function table for the range 1≦x≦5 incremented in steps of 1.

Key in operation	Display
[MODE] [3]	f(x)=
[Alpha] [X] [X^3] [+] [3] [Alpha] [X] [X^2] [−] [2] [Alpha] [X]	f(x)=X^3+3X^2-2X
[=] [1] [=] [5] [=] [1] [=]	X F(X) 1 1 2 2 2 16 3 3 48 1
[▼] [▼] [▼] [▼]	X F(X) 3 3 48 4 4 104 5 5 190 5

Input Range and Error Message

Calculation Precision, Input Range

Number of Digits for Internal Calculation	Up to 18 digits
Precision *	± at the 10th digit for a single calculation. ± at the least significant for exponential display
Calculation Range	±×10^{-99} to ±9.999999999×10^{99} or 0

- **Function Calculation Input Ranges**

Functions		Input Range
Sin x	DEG	0≦|x|<9×10^9
	RAD	0≦|x|<157 079 632.7
	GRA	0≦|x|<1×10^{10}
Cos x	DEG	0≦|x|<9×10^9
	RAD	0≦|x|<157 079 632.7
	GRA	0≦|x|<1×10^{10}
Tan x	DEG	Same as sinx , except when |x|=(2n-1) ×90
	RAD	Same as sinx , except when |x|=(2n-1) ×π/2
	GRA	Same as sinx , except when |x|=(2n-1) ×100
Sin^{-1} x	0≦|x|≦1	
Cos^{-1} x		
tan^{-1} x	0≦|x|≦9.999 999 999×10^{99}	
Sinh x	0≦|x|≦230 258 509 2	
cosh x		
Sinh^{-1} x	0≦|x|≦4.999 999 999×10^{99}	
cosh^{-1} x	1≦x≦4.999 999 999×10^{99}	
tanh x	0≦|x|≦9.999 999 999×10^{99}	
tanh^{-1} x	0≦|x|≦9.999 999 999×10^{-1}	
Log x/lnx	0<x≦9.999 999 999×10^{99}	
10^x	-9.999 999 999×10^{99}≦x≦99.999 999 99	
e^x	-9.999 999 999×10^{99}≦x≦230.258 509 2	
√x	0≦x<1×10^{100}	
X^2	|x|<1×10^{50}	
X^3	|x|2.154 434 69×10^{33}	
x^{-1}	|x|<1×10^{100} ,x≠0	
$^3\sqrt{x}$	|x|<1×10^{100}	
X!	0≦x≦69(x is an integer)	
nPr	0≦n<1×10^{10} , 0≦r≦n(n, r are integers)	
	1≦ {n!/ (n-r)!}<1×10^{100}	
nCr	0≦n<1×10^{10} , 0≦r≦n(n, r are integers)	
	1≦n!/ r!<1×10^{100} or 1≦n!/(n-r)!<1×10^{100}	

- Errors are cumulative in the case of consecutive calculations, this is also true as internal consecutive calculation are performed in the case of x▪(x^y), $\sqrt{■}$, $\sqrt[3]{■}$, x!, nPr , nCr , etc . And may become large .
- **Display of results using √ ¯**

Calculation results may be displayed using √ ¯ when all of the following cases:

When intermediate and final calculation results are displayed in the following form:

$$\pm\frac{a\sqrt{b}}{c}\pm\frac{d\sqrt{e}}{f}$$

0≦a<100, 1≦d<100
0≦b<1000, 1≦e<1000
1≦c<100, 1≦f<100

When the number of terms in the intermediate and final calculation result is one or two.

Order of Operations

This calculator will automatically determine the operation priority of each individual command as follows:

1st Priority	Recall memory (A, B, C, D, E, F,0~9), Rand
2nd	Calculation within parentheses () .
3rd	Function with parenthesis that request the input argument to the right Pol(, Rec(, sin(, cos(, tan(, sin^{-1}(, cos^{-1}(, tan^{-1}(, sinh(, cosh(, tanh(, sinh^{-1}(, cosh^{-1}(, tanh^{-1}(, log(, ln(, e^x (, 10^x (, √(, ^{3}√(, Abs(, ROUND(,I-Rand(,
4th	Functions that come after the input value preceded by values, powers, power roots: x^2 ,x^3 ,x^{-1} ,x!, ° ′ ″, ° , r , g ,x^y(, ^{x} √(, Percent %, log▪▯ , EXP
5th	Fractions: ▪▯/▪▯ , ▪▯/▪▯
6th	Prefix symbol: (-)(negative sign)
7th	Statistical estimated value calculation: $\hat{x}$,$\hat{y}$,$\hat{x}$1, $\hat{x}$2
8th	Multiplication where sign is omitted: Multiplication sign omitted immediately before πe, variables (2 π , 5 A, π A , etc.), functions with parentheses(2√(3), A sin (30), etc.)
9th	Permutations, combinations: nPr, nCr
10th	Multiplication and division:× , ÷
11th	Addition and subtraction: +, -
12th	Calculation ending instruction: =, M+, M- STO (store memory)

- In the same precedence level, calculations are performed from left to right.
- Operation enclosed within parentheses is performed first. When a calculation contains an argument that is a negative number, the negative number must be enclosed within parentheses.

Example:

[(-)] [3] [x^2] [=] -3^2=-9

[(] [(-)] [3] [)] [x^2] [=] (-3)^2=9

- When same priority commands are mixed into one calculation.

Example 1:

[1] [÷] [2] [Shift] [π] [=] 1÷2π=0.1591549431

Example 2:

[2] [Shift] [STO] [(-)] 2→ A

[1] [÷] [2] [Alpha] [A] [=] 1÷2A=$\frac{1}{4}$

Calculation Stacks

- This calculator uses memory areas, called "stacks", to temporarily store numeric value (numbers) and commands (+, -, ×.....) according to their precedence during calculations.
- The numeric stack has 10 levels and command stack has 128 levels. A stack error [Stack ERROR] occurs whenever you try to perform a calculation that exceeds the capacity of stacks.
- Calculations are performed in sequence according to "Order of Operations". After the calculation is performed, the stored stack values will be released.

Error Messages and Error Locator

The calculator is locked up while an error message is shown on the display to indicate the cause of the error.

- Press [CA] to clear the error message, then return to the initial display of latest mode.
- Press [◀] or [▶] to display input expression with the cursor positioned next to the error.
- Press [ON] to clear the error message, clear the replay memory history and return to the initial display of the latest mode.

Error Message	Cause	Action
Math ERROR	• The intermediate or final result is outside the allowable calculation range. • An attempt to perform a calculation using a value that exceeds the allowable input range. • An attempt to perform an illogical operation (division by zero, etc.).	Check the input values and make sure they are all within the allowable ranges, Pay special attention to values in any using memory areas.
Stack ERROR	• The capacity of the numeric stack or operator stack is exceeded.	• Simplify the calculation. • Divide the calculation into two or more separate parts.
Syntax ERROR	An attempt to perform an illegal mathematical operation.	Press [◀] or [▶] to display the cursor at the location of the error, make appropriate corrections.
Insufficient MEM	The calculation result of Function Table mode parameters caused more than 30 x-values to be generated for a table.	Narrow the table calculation range by changing the start, end, and step values, and try again.

Battery Replacement

When the display characters are dim, turn the calculator off and replace the battery immediately. Please replace the battery using the following procedures.

1. Press [Shift] [OFF] to power off the calculator.
2. Remove the screw that securely fixes the battery cover in place.
3. Remove battery cover.
4. Remove the old battery with ball pen or similar sharp object.
5. Load the new battery with positive "+"side facing up.
6. Replace the battery cover, screw, and press [ON] , [Shift] [CLR] [3] [=] [CA] to initialize the calculator.

Caution: Risk of explosion if battery is replaced by an incorrect type. Dispose of used battery at your local collection point.

- Electromagnetic interference or electrostatic discharge may cause the display to malfunction or the contents of the memory to be lost or altered. When this occur ,press [ON] , [Shift] [CLR] [3] [=] [CA] to restart the calculator.

Specifications

Power Supply:	LR44*1 (1.5V)
Power Consumption:	0.0015 W
Battery Life:	3 years
Auto power off:	5-9 minutes
Usable Temperature:	0-40℃
Size:	L153*W80*H14 mm
Weight:	86 g(hard cover is not included)

Producer

Aurora Electronics (UK) LTD.
Unit 1 & 2 Shires Industrial Estate
Lichfield, Staffordshire, WS14 9AZ, U.K.