The TI-25X Solar Calculator

The TI-25X Solar calculator offers you a wide range of mathematical and statistical capabilities. This manual explains these capabilities.

Basic Operations

To turn the calculator on, expose the solar panel to adequate light and press AC ([ON]).

Key	Function
AC ([ON])	If the calculator is off, turns the unit on, clears the display, and resets angle units to degrees.
CE/C	When pressed once during a calculation (but before an operation key), clears the displayed entry and any error condition (**E**). You can make a new entry and continue with your calculation.
	Pressing CE/C does not clear the memory, statistics register, or angle-unit setting.
2nd	Instructs the calculator to perform the second function (written above the key) of the next key pressed.

The Display

You can enter a maximum of eight digits in the display. Any digit key pressed after the eighth is ignored.
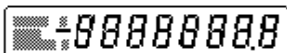
Indicator	Meaning
–	The displayed number is negative.
2nd	The 2nd key has been pressed to access the second function (written above the key) of the next key pressed.
D	Angle units are set to degrees.
R	Angle units are set to radians.
G	Angle units are set to grads.
( )	One or more parentheses are open.
STAT	The calculator is in statistics mode. That is, the statistics register contains data.
K	A number and operation are stored as a constant.
M	A number other than zero is stored in memory.
E	An error has occurred. You must press CE/C or AC to clear the error.

Scientific Notation

In scientific notation, a number is expressed as a mantissa
multiplied by 10 raised to a power (exponent).

Key	Function
EE	**Example:** To enter 1.2345×10^6: 1.2345 EE 6 **1.2345 06**
2nd [EE]	Removes a displayed result from scientific notation and displays it in standard decimal format.

Entering a Number in Scientific Notation

1. Enter the mantissa. If it is negative, press +/−.

2. Press EE. Two zeros appear on the right side of the display.

3. Enter the exponent (one or two digits). If it is negative, press +/−. If you press an incorrect digit key, just reenter the correct digits.

Converting a Number to Scientific Notation

To convert a displayed number from standard display format to scientific notation, press × 1 EE =.

Correcting Entry Errors

At any point in a calculation, you can press [CE/C] twice to clear all calculations, including any errors, and start over.

Clearing an Error Condition

The display shows **E** when an error, overflow, or underflow occurs or when you enter an improper operation. No entry from the keyboard is accepted until you press [CE/C], which clears the error condition and all pending operations.

Order of Calculations

The Algebraic Operating System (AOS™) of the TI−25X Solar completes operations in the order of priority listed below.

1. Single-variable functions (trigonometric, logarithmic, square, square root, factorial, percent, reciprocal, angle conversion, and change sign).

2. Two-variable functions:

    *   Exponential (y^x) and roots ($^x\sqrt{y}$)
    *   Multiplication and division
    *   Addition and subtraction

3. [=] completes all operations.

Basic Functions

Key	Function
⊞, ⊟, ⊠, ⊡	Perform addition, subtraction, multiplication, and division.
	Example: 12 ⊠ 5 ⊞ 60 ⊟ **120.**
⊟	Completes all pending operations.
	Example: 4 ⊠ 5 ⊞ 9 ⊟ **29.**
⊞/⊟	Changes the sign (positive or negative) of the displayed number.
	Example: 8 ⊞/⊟ ⊞ 12 ⊟ **4.**
⊏ ⊐	Operations enclosed in parentheses are given priority over operations outside the parentheses. You can enter up to 15 levels of parentheses. ⊟ closes any open parenthetical expressions.
	Example: 12 ⊠ ⊏ 5 ⊞ 6 ⊟ **132.**
2nd π	Enters the value of π.
x!	Calculates the factorial of the displayed number.
	Example: 5 x! **120.**
%	Converts the displayed number from a percentage to a decimal.
	Example: 25 % **0.25**
⊞ n % ⊟	Adds n% to the displayed number.
⊟ n % ⊟	Subtracts n% from the displayed number.
⊠ n % ⊟	Multiplies the displayed number by n%.
⊡ n % ⊟	Divides the displayed number by n%.

Key	Function
$\boxed{x^2}$	Calculates the square of the displayed number.
$\boxed{2nd}$ $\boxed{\sqrt{x}}$	Calculates the square root of the displayed number.
$\boxed{1/x}$	Calculates the reciprocal (x^{-1}) of the displayed number.
$\boxed{y^x}$	Raises the displayed number (y) to a specified power (x).
$\boxed{2nd}$ $\boxed{\sqrt[x]{y}}$	Calculates a specified root (x) of the displayed number (y).
$\boxed{LOG}$	Calculates the common logarithm (base 10) of the displayed number.
$\boxed{2nd}$ $\boxed{10^x}$	Calculates the common antilogarithm of the displayed number (10 raised to the power of the number).
$\boxed{LN}$	Calculates the natural logarithm (base e) of the displayed number.
$\boxed{2nd}$ $\boxed{e^x}$	Calculates the natural antilogarithm of the displayed number (e raised to the power of the number).

Using the Memory

The calculator's memory can store data as long as the
calculator is on. You can store a number in memory for
repeated use in a calculation or to keep a running total.

Key	Function
STO	Stores the displayed number in memory, replacing any previously stored number. To clear the memory, press STO when zero is displayed.
	Example: 23 STO + 2 = M **25.**
RCL	Recalls and displays the number stored in memory. Does not change or clear the number in memory.
	Example: RCL + 3 = M **26.**
SUM	Adds the displayed number to the current number in memory. Does not affect the displayed number or any calculation in progress.
	Example: 4 SUM M **4.**
	RCL M **27.**
EXC	Swaps the number in memory with the displayed number. The displayed number is stored, and the previously stored number is displayed.
	Example: 3 × 5 = M **15.**
	EXC M **27.**
	EXC M **15.**

Note: AC clears the memory. CE/C does not clear the
memory.

Constant Calculations

The constant key $\boxed{K}$ simplifies repetitive calculations by storing a number and its associated operation for repeated use.

To enter a constant operation:

1. Key in the repetitive number (m).

2. Press the operation key you want.

3. Press $\boxed{K}$.

Key	Function
m $\boxed{+}$ $\boxed{K}$	Adds m to each subsequent entry.
m $\boxed{-}$ $\boxed{K}$	Subtracts m from each subsequent entry.
m $\boxed{\times}$ $\boxed{K}$	Multiplies each subsequent entry by m.
m $\boxed{\div}$ $\boxed{K}$	Divides each subsequent entry by m.
m $\boxed{y^x}$ $\boxed{K}$	Raises each subsequent entry to the mth power.
m $\boxed{2nd}$ $\boxed{\sqrt[x]{y}}$ $\boxed{K}$	Takes the mth root of each subsequent entry.

After storing the constant, you can complete each repeated calculation by simply entering the new number and pressing $\boxed{=}$. To erase the constant, clear the calculator or enter any of the above arithmetic keys.

Angle-Unit Setting

Before starting a trigonometric calculation, use the DRG key to select the appropriate angle-unit setting (**D—Degree**, **R—Radian**, or **G—Grad**).

Key	Function
DRG	Changes the angle-unit setting without affecting the displayed angle value.
2nd [DRG▸]	Changes the angle-unit setting and converts the displayed angle value to its equivalent for the new setting.

Example: Convert 45°. (If necessary, press DRG until **D** is displayed.)

45	D	45.
2nd [DRG▸]	R	0.7853982
2nd [DRG▸]	G	50.
2nd [DRG▸]	D	45.

Trigonometric Functions

Key	Function
SIN, COS, TAN	Calculates the sine, cosine, or tangent of the displayed angle.

Example:

90 SIN − 30 COS =   0.1339746

Key	Function
2nd [SIN⁻¹], 2nd [COS⁻¹], 2nd [TAN⁻¹]	Calculates arcsine, arccosine, or arctangent of the displayed value.

Example: 1 2nd [SIN⁻¹]   90.

Degree Format Conversions

An angle measured in degrees, minutes, and seconds (**DMS**) must be converted to decimal degrees (**DD**) before you can use it in a calculation.

Degrees, Minutes, and Seconds

DMS angles are entered in **D.MMSSsss** format.

D	Degrees (°)—0 to 8 digits
.	Decimal point separator
MM	Minutes (')—must be 2 digits
SS	Seconds (")—must be 2 digits
sss	Fractional part of a second

For example, enter 48°5'3.5" as **48.05035**.

Decimal Degrees

DD angles are entered in **D.ddddddd** format.

D	Degrees (°)
.	Decimal point separator
ddddddd	Fractional part of a degree

For example, enter 34.047° as **34.047**.

Converting Angle-Measurement Format

The TI-25X Solar can easily convert an angle measurement from one degree format to the other.

Key	Function
2nd [DMS▶DD]	Converts the displayed value from degrees, minutes, and seconds (**DMS**) to decimal degrees (**DD**). Enter the angle in **D.MMSSsss** format. If necessary, include leading zeros as needed to place the digits in the proper positions. Then press 2nd [DMS▶DD].
2nd [DD▶DMS]	Converts the displayed value from decimal degrees (**DD**) to degrees, minutes, and seconds (**DMS**). Enter the angle in **D.ddddddd** format, and then press 2nd [DD▶DMS].

Example: Convert 33°7'8" in **DMS** format to **DD** format and back to **DMS** format.

Comments	Keystrokes	Display
DMS format	33.0708	**33.0708**
DD format	2nd [DMS▶DD]	**33.118889**
DMS format	2nd [DD▶DMS]	**33.0708**

Rectangular-to-Polar Conversions

Pressing [2nd] [R►P] converts rectangular coordinates (x,y) to polar coordinates (r,Θ).

Example: Convert the rectangular coordinates (10, 8) to polar coordinates.

Comments	Keystrokes	Display
Enter x and y	10 [2nd] [x-y] 8	**8.**
Value of Θ	[2nd] [R►P]	**38.659808**
Value of r	[2nd] [x-y]	**12.806248**
Value of Θ	[2nd] [x-y]	**38.659808**

To alternate between the two converted values (r and Θ), press [2nd] [x-y] repeatedly.

Polar-to-Rectangular Conversions

Pressing [2nd] [P►R] converts polar coordinates (r, Θ) to rectangular coordinates (x, y).

Example: Convert the polar coordinates (5, 30°) to rectangular coordinates.

Comments	Keystrokes	Display
Enter r and Θ	5 [2nd] [x-y] 30	**30.**
Value of y	[2nd] [P►R]	**2.5**
Value of x	[2nd] [x-y]	**4.330127**
Value of y	[2nd] [x-y]	**2.5**

To alternate between the two converted values (x and y), press [2nd] [x-y] repeatedly.

Statistics Functions

The TI–25X Solar can perform statistical analysis on one-variable data.

Key	Function
$\boxed{\Sigma+}$	Enters the displayed number into the statistics register as a data point.
$\boxed{\text{2nd}}$ $[\Sigma-]$	Removes the displayed number from the statistics register.
$\boxed{\text{2nd}}$ $[\bar{x}]$	Calculates the mean of the entered data.
$\boxed{\text{2nd}}$ $[\sigma n]$	Calculates the population standard deviation of the entered data (n weighting).
$\boxed{\text{2nd}}$ $[\sigma n-1]$	Calculates the sample standard deviation of the entered data ($n - 1$ weighting).
$\boxed{\text{2nd}}$ $[\sigma n]$ $\boxed{x^2}$	Calculates variance using n weighting (for population data).
$\boxed{\text{2nd}}$ $[\sigma n-1]$ $\boxed{x^2}$	Calculates variance using $n - 1$ weighting (for sample data).
$\boxed{\text{2nd}}$ $[\Sigma x]$	Calculates the sum of the entered data points.
$\boxed{\text{2nd}}$ $[\Sigma x^2]$	Calculates the sum of the squares of the entered data points.
$\boxed{\text{2nd}}$ $[\text{CSR}]$	Clears all data from the statistics register and the **STAT** indicator.

Example: Analyze the following test scores. Assume that the four students are the entire population: 96, 81, 87, 70.

Comments	Keystrokes	Display
Clear display	CE/C	0.
Clear register	2nd [CSR]	0.
1st entry	96 Σ+	1.
2nd entry	81 Σ+	2.
3rd entry (incorrect)	97 Σ+	3.
3rd entry (removed)	97 2nd [Σ−]	2.
3rd entry (correct)	87 Σ+	3.
4th entry	70 Σ+	4.
Mean (class average)	2nd [$\bar{x}$]	83.5
Standard Deviation	2nd [σ_n]	9.4472218
Variance	x^2	89.25

Important: Remember to press 2nd [CSR] to clear the statistics register and return to arithmetic calculations.

Error Conditions

The display shows **E** when an error occurs or when you attempt certain operations. Press CE/C to clear an error condition.

In Case of Difficulty

1. If the digits fail to appear on the display:

    •   Check to be sure that no part of the solar panel is covered.

    •   Check the intensity of the light source. The light may be too dim to operate the calculator.

2. Press AC and try the calculation again. Review the operating instructions to be certain the calculations were performed properly.

3. Press AC, 2nd CSR, and STO to reset the display and prepare the calculator for use.

TI Product and Services Information

For more information about TI products and services,
contact TI by e-mail or visit the TI calculator home page on
the world-wide web.

| e-mail address: | **ti-cares@ti.com** |
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