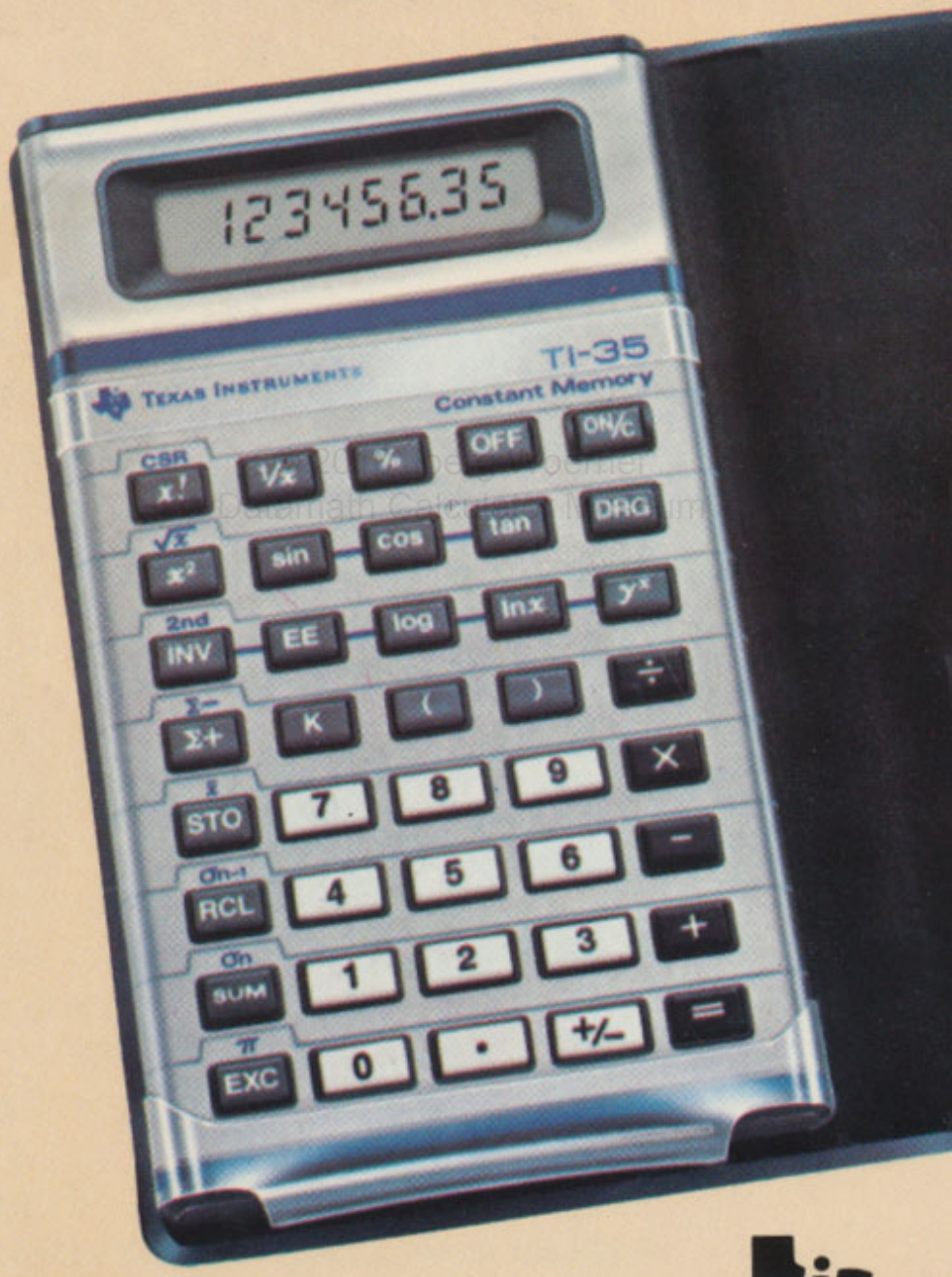
Texas Instruments

Slimline TI 35™

scientific calculator



KEY INDEX

This indexed keyboard provides a quick page reference to the description of each key.

IMPORTANT

Record the serial number from the bottom of the unit and purchase date in the space below. The serial number is identified by the words "SER. NO." on the bottom case. Always reference this information in any correspondence.

TI-35

Model No. Serial No. Purchase Date

Texas Instruments reserves the right to make changes in materials & specifications without notice.

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I. DESCRIPTION

Problem solving is an integral part of every field of study. It is through the solutions of problems that the critical decisions of business and science are tested and verified. Mastery of those mathematical techniques begins early in school and continues throughout life. This slide-rule calculator provides a convenient and accurate electronic means of obtaining answers to a wide range of problems beginning with elementary arithmetic and continuing through the most complicated situations. Use this calculator regularly and it will soon become an inseparable component of your problem-solving system. Years of concentrated research in the calculator industry and the latest electronic advances have combined to produce this extremely versatile, yet reasonably priced calculator. Here are a few of its features.

Features and Functions

- Easy to read Liquid Crystal Display (LCD).
- AOS™ Algebraic Operating System allows you to enter mathematical sequences in the same order that they are algebraically stated.
- Constant Memory™ feature holds numbers in a user memory even while the calculator is turned off.
- APD™ Automatic Power Down provides for special power-saving features. The calculator turns itself off completely after typically 15 to 35 minutes of nonuse. You will never waste a set of batteries by forgetting to turn your calculator off or by having it turned on accidentally. This feature can increase the life of each set of batteries up to 50%.
- Over 1000 hours of operation can normally be achieved from a fresh set of batteries.

• 54 Calculator Functions

Arithmetic	$+, -, \times, \div$	4
Data Entry	$+/-, \pi$	2
Display	Scienfitic notation/ removal	2
Algebraic	x^2, $\sqrt{x}$, $1/x$, y^x, $\sqrt[x]{y}$, $x!$	6
Clearing	Clear,Clear Entry and Clear Statistical Registers	3
Data Grouping	AOS algebraic operating system. Open and close parentheses (up to 15), and full algebraic hierarchy (up to 4 pending operations).	3
Memory	One memory which can store, recall, exchange, and sum	4
Percent	$\%, +\%, -\%, \times\%, \div\%$	5
Trigonometric	Sin, Cos, Tan, Sin^{-1}, Cos^{-1}, Tan^{-1}, and 3 angular modes (Degrees, Radians, Grads)	9
Logarithmic	$\ln x$, log, e^x, 10^x	4
Constant	Operates with $+, -, \times, \div, y^x$ and $\sqrt[x]{y}$	6
Statistical	$\Sigma +, \Sigma -, \bar{x}, \sigma_n, \sigma_{n-1}$	5
Other	APD (automatic power down)	1
		54

• Accuracy — The internal calculating capacity is 11 digits even though only 8 can be displayed. The 8-digit displayed number is generally rounded to within ± 1 in the 8th digit for all functions except where noted.

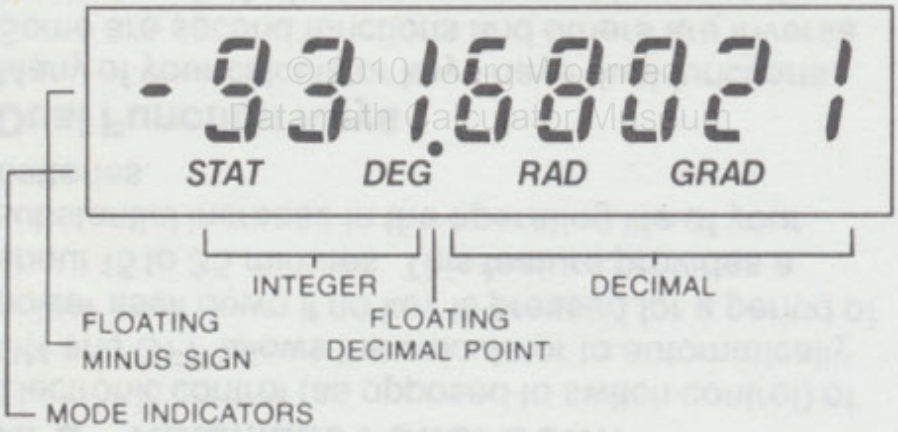
II. BASIC OPERATIONS

Your calculator is easy to operate because of its exclusive AOS™ Algebraic Operating System which allows entry of most problems just as they are stated. Although many operations may be obvious, the following instructions and examples will help you develop skill and confidence in problem solving.

Turning the Calculator On

Pressing ON/C the upper rightmost key on the keyboard applies power and clears the calculator. Power-on condition is indicated by the presence of a "0" in the display. The OFF key, of course, removes power from the calculator. When the calculator is turned off and then back on, the display, all pending operations and operands and statistical registers are cleared. However, the user memory is left intact, due to the calculator's Constant Memory™ feature.

Display Indicators



NOTE: Eight digits may be entered into the display. Any digit keys pressed after the eighth are ignored.

NOTE: The display is blank, except for indicators, during the short period of a calculation.

Angular Mode Indicators —
DEG — Indicates degree mode.
RAD — Indicates radian mode.
GRAD — Indicates grad mode.

Statistical Mode Indicator —
STAT — Indicates statistical mode.

Floating Minus Sign — Any negative number is displayed with a minus sign immediately to the left of the number just as negative numbers are normally written.

APD™ Automatic Power Down

Electronic control (as opposed to switch control) of ON and OFF allows the calculator to automatically power itself down if no key is pressed for a period of about 15 to 35 minutes. This feature provides a substantial increase in the operating life of your batteries.

Dual Function Keys

Many of your calculator keys have dual functions. Some are second functions and others are inverse functions, all of which are accessed by using the [INV] / [2nd] key. The dual function keys are described in the appropriate sections of this manual.

Data Entry

For maximum versatility, your calculator operates with a floating decimal point. When entering numbers, the decimal is assumed to the right of the mantissa until [•] is pressed. Then the fractional part of the number is entered and the decimal point floats with the entered number. A maximum of 7 digits may be entered to the right of the decimal.

[0] through [9] **Digit Keys** — Enter numbers 0 through 9.

[•] **Decimal Point Key** — Enters a decimal point. A decimal point is not displayed for integer numbers.

[+/−] **Change Sign Key** — When pressed after number entry or a calculation, changes the sign of the displayed number. The sign of the exponent is changed when this key is pressed after the [EE] key.

[2nd] [π] **PI Key Sequence** — Enters the value of pi correct to 11 digits. This value is rounded to 8 digits (3.1415927) for display.

Numbers up to 8 digits in length can be entered into the calculator directly from the keyboard. The calculator can hold and work with 11 digits. Numbers of this length can be entered as the sum of two numbers.

Example: Enter 389182.70636

Enter	Press	Display
389182	[+]	389182
.70636	[=]	389182.71

Clearing

[ON/C] **Clear Entry/Clear Key** — Removes an incorrect entry from the display when pressed before any function or operation key is pressed. **When pressed after an operation or function key (including [=]), this key clears the display, the constant and all pending operations. Pressing [ON/C] twice always clears the display, the constant and pending operations.** The user memory and statistical registers are not affected by this key.

[2nd] [CSR] **Clear Statistical Registers Key Sequence** —Clears the statistical registers, turns off the STAT display indicator, and sets the calculator for normal calculations. The display and memory are not affected by this key sequence.

Scientific Notation

To enter very large or very small numbers, you must use scientific notation where the number is entered as a mantissa multiplied by 10 raised to some power (exponent) such as -3.6089×10^{-32}.

[EE] **Exponent Entry Key** — When pressed after a keyboard entry or calculation, prepares the calculator to accept the next digits entered as the exponent.

[×] 1 [EE] [=] **Scientific Notation Key Sequence** — Converts a number in normal display format to scientific notation display format. The mantissa is normalized.

IMPORTANT: Pressing [EE] without pressing [×] 1 instructs the calculator to use only the eight displayed digits for subsequent calculations and discards the three internally carried guard digits.

Example: $3.1415927 - 3.1415926536 = 4.64 \times 10^{-8}$

Press	Display	Comments
2nd π	3.1415927	11 digits internally 3.1415926536
EE [−]	3.1416 00	Discards guard digits (536)
2nd π	3.1416 00	11 digits internally 3.1415926536
[=]	4.64 −08	Difference

[INV] [EE] [=] Scientific Notation Removal Key Sequence — Removes displayed numbers from scientific notation if they are between $\pm 1 \times 10^{-7}$ and $\pm 9.9999999 \times 10^{7}$, and displays them in standard display format. If the displayed number is outside the range listed above, the scientific notation removal key sequence will be ignored and the number will remain in scientific notation format until the number is within the standard display range.

The entry procedure is to key in the mantissa (including its sign), then press [EE] and enter the power of ten. Any number smaller than $\pm 1 \times 10^{-7}$ or larger than ± 99999999 must be entered in scientific notation.

The number 320,000,000,000 can be written 3.2×10^{11} and can be entered into the calculator as

Enter	Press	Display
	[ON/C]	
3.2	[EE]	3.2 00
11		3.2 11

The last two digits on the right side of the display are used to indicate the exponent of 10. Additional digits can be entered after pressing [EE], but only the last two numbers pressed are retained as the exponent.

In scientific notation, a positive exponent indicates how many places the decimal point of the mantissa should be shifted to the right. If the exponent is negative, the decimal should be moved to the left.

Regardless of how a mantissa is entered in scientific notation, the calculator normalizes the number, displaying a single digit to the left of the decimal point, when any function or operation key is pressed.

Enter	Press	Display
	[ON/C]	0
6025	[EE]	6025 00
20		6025 20
	[=]	6.025 23

The decimal point of the entered mantissa must not be beyond the 5th digit from the left because the

mantissa for scientific notation is limited to 5 digits in the display. Eight digits can be entered, but only 5 are displayed when [EE] is pressed. The entire eight digit mantissa is used for calculations. The display does not go into scientific notation format if more than 5 numbers are entered to the left of the decimal point.

The change sign key can be used to attach a negative sign to the mantissa and to the power-of-ten exponent.

Example: Enter -4.818×10^{-10}

Enter	Press	Display
	[ON/C]	0
4.818	[+/−] [EE]	−4.818 00
10	[+/−]	−4.818−10

Any displayed value can be easily converted from standard display format to scientific notation. To convert a result in standard display format to scientific notation, press [×] 1 [EE] [=].

Example: $89 \times 987 = 87843 = 8.7843 \times 10^{4}$

Enter	Press	Display
	[ON/C] [ON/C]	0
89	[×]	89
987	[=] [×]	87843
1	[EE] [=]	8.7843 04

Data in scientific notation form may be entered intermixed with data in standard form. The calculator converts the entered data for proper calculation.

Example: $3.2 \times 10^{3} + 12575.321 = 15775.321$

Enter	Press	Display
	[ON/C]	0
3.2	[EE]	3.2 00
3	[+]	3.2 03
12575.321	[=]	1.5775 04
	[INV] [EE] [=]	15775.321

Notice that the complete answer to the problem is 15775.321 and this is the number used for further calculations. Actually, the calculator internally carries all intermediate calculations and final results to 11 places. These numbers are rounded to a maximum of 5 digits for a scientific notation mantissa or to 8 digits for standard display.

Error Indication

The display shows "Error" whenever overflow or underflow occurs or when an improper mathematical operation is requested. When this occurs, no entry from the keyboard (except [OFF]) will be accepted until [ON/C] is pressed. This clears the error condition and all pending operations. You must now return to the first of your problem and begin again. If one of the first ten "Error" conditions occurs during statistical calculations, the statistical registers are not affected. Just press [ON/C] and continue statistical calculations.

"Error" appears for the following reasons.

1. Number entry or calculation result (including memory sum) outside the range of the calculator, $\pm 1.0 \times 10^{-99}$ to $\pm 9.9999 \times 10^{99}$.
2. Dividing a number by zero.
3. Calculating [log], [lnx] or [1/x] of zero or calculating the 0th root of any number.
4. Calculating [log], [lnx], a power or a root of a negative number.
5. Inverse of sine or cosine (arcsine, arccosine) when the absolute value is greater than 1.
6. Tangent of 90°, 270° $\pi/2$ radians, $3\pi/2$ radians, 100 grads, 300 grads or their rotation multiples like 450°.
7. Having more than 15 open levels of parentheses with each pending operation or more than four pending operations.
8. Factorial of any number except a non-negative integer ≤ 69.

9. Multiplying a number greater than 1×10^{99} by another number (decimal or integer) may cause an Error Condition.
10. Pressing [+], [−], [×], [÷], [y^x], [(], [)], [K] or [=] while in the statistical mode (STAT appears).

The following "Error" conditions cause the statistic register to be cleared and the calculator to reset to normal calculation mode:

11. Calculating standard deviation (n − 1 weighting) with only one data point.
12. Entering a statistical data point x, such that $x \leq \pm 1 \times 10^{-50}$ or $x \geq \pm 1 \times 10^{50}$.
13. Entering a series of statistical data points (x_i) such that $\Sigma (x_i)^2$ exceeds the upper or lower limit of the calculator.
14. Removing last statistical data point (n = 1) using [2nd] [Σ−].

Accuracy and Rounding

Each calculation produces an 11-digit result. These 11 digits are more than can be displayed. The result is, therefore, rounded to an 8-digit standard display or to a 5-digit mantissa and 2-digit exponent for scientific notation. The 5/4 rounding technique built into this calculator adds 1 to the least significant digit of the display if the next, non-displayed digit is five or more. If this digit is less than five, no rounding is applied. In the absence of these extra digits, inaccurate results would frequently be displayed, such as

$$1/3 \times 3 = 0.9999999$$

The example shows $1 \div 3 = 0.3333333$ when multiplied by 3 produces this answer. The internal 11-digit string of nines in your calculator is rounded to 1.

The higher order mathematical functions use iterative calculations. The cumulative error from these calculations in most cases is maintained beyond the eight-digit display so that no inaccuracy is displayed. Most calculations are accurate to ±1 in the last displayed digit. There are a few instances in the solution of high-order functions where display accuracy begins to deteriorate as the function approaches a discontinuous or undefined point. For example, the tangent of 87 degrees is accurate for all displayed digits. However, the tangent of 89.99999 is accurate to only three places. Another example is when the y^x function has a y value that approaches 1 and the x value is very large. The displayed result for 1.05^{-160} is accurate for all displayed digits where 1.0000005^{-16000} is accurate to only five places.

III. ARITHMETIC FUNCTIONS

This calculator is specially equipped with AOS™ (Algebraic Operating System). This advanced system allows key sequences to be interpreted correctly by storing certain quantities and operations until the algebraic principles say they can be completed. A more complete discussion of this system occurs later in this section.

Basic Keys

[+] **Add Key** — Completes any previously entered +, −, ×, ÷, y^x, or $\sqrt[x]{y}$ function when not separated by an open parenthesis and instructs the calculator to add the next entered quantity to the displayed number.

[−] **Subtract Key** — Completes any previously entered +, −, ×, ÷, y^x, or $\sqrt[x]{y}$ function when not separated by an open parenthesis and instructs the calculator to subtract the next entered quantity from the displayed number.

[×] **Multiply Key** — Completes any previously entered divide or multiply, y^x or $\sqrt[x]{y}$ function when not separated by an open parenthesis and instructs the calculator to multiply the displayed number by the next entered quantity. This displayed value must be less than 1×10^{99} or an error condition may result.

[÷] **Divide Key** — Completes any previously entered divide or multiply, y^x or $\sqrt[x]{y}$ function when not separated by an open parenthesis and instructs the calculator to divide the displayed number by the next entered quantity.

[=] **Equals Key** — Combines all previously entered numbers and operations. This key is used to obtain both intermediate and final results.

IMPORTANT: The above basic keys are disabled when the statistical mode is set with [Σ+]. Press [2nd] [CSR] to reset calculator for normal calculations.

Example: 23.79 + 0.54 − 6 = 18.33

Enter	Press	Display
	ON/C ON/C	0
23.79	+	23.79
.54	−	24.33
6	=	18.33

Again note that the numbers and functions are entered in the same order as they are mathematically stated.

Example: −3.7 − (−7.09) + .014 = 3.404

Enter	Press	Display
3.7	+/− −	−3.7
7.09	+/− +	3.39
.014	=	3.404

Example: −4 × 7.3 ÷ 2 = −14.6

Enter	Press	Display
4	+/− ×	−4
7.3	÷	−29.2
2	=	−14.6

Input Error Correction

At any point in a calculation, ON/C can be pressed twice to clear all calculations including any errors and start over. This drastic action is seldom necessary.

If an incorrect number entry is made, pressing the ON/C key before any non-number key clears the incorrect number without affecting any calculation in progress.

Special circuitry has been provided to facilitate the correction of a wrong operation entered while keying in your problem.

When there are no stored operations, as when the first operation is keyed in, and an unwanted operation key is entered, simply press the correct operation and continue. This applies to +, −, ÷, ×, y^x, and INV y^x.

Correction of an incorrect operation entry while there are stored operations in the calculator is dependent on the table below.

INCORRECT ENTRY	DESIRED OPERATION			
	+, −	×, ÷	y^x	$\sqrt[x]{y}$
+, −	CK*	ON/C	ON/C	ON/C
×, ÷	CK	CK	ON/C	ON/C
y^x	CK	CK		ON/C
$\sqrt[x]{y}$	CK	CK	CK	

*CK means to press the correct key and continue.

Locate the incorrect entry you have just made in the column on the left, then follow that row over to the desired operation and apply whatever instruction occurs at that junction.

The [ON/C] key in the table indicates that the incorrect entry cannot safely be corrected to the desired operation for all conditions so the problem must be restarted.

Example: 6 ~~+~~ × 7 ~~+~~ + ~~4~~3 = 45

Enter	Press	Display	Comments
6	[+] [×]	6	First operation wrong
7	[−] [+]	42	6 × 7 Completed
4	[ON/C]	0	Clears 4 (entry)
3	[=]	45	Answer

A full understanding of the calculator hierarchy discussed in the next few pages will make the input error-correction methods obvious.

Combining Operations

After a result is obtained in one calculation, it may be directly used as the first number in a second calculation. There is no need to reenter the number from the keyboard.

Example:
1.84 + 0.39 = 2.23 then (1.84 + 0.39)/365 = 0.0061096

Enter	Press	Display	Comments
1.84	+	1.84	
.39	=	2.23	1.84 + 0.39
	÷	2.23	
365	=	0.0061096	2.23 ÷ 365

Calculator Hierarchy

In order to efficiently combine operations, you need to understand the standard algebraic rules that have been specifically programmed into the calculator. These algebraic rules assign priorities to the various mathematical operations. Without a fixed set of rules, expressions such as $5 \times 4 + 3 \times 2$ could have several meanings:

$$5 \times (4 + 3) \times 2 = 70$$
$$\text{or } (5 \times 4) + (3 \times 2) = 26$$
$$\text{or } ((5 \times 4) + 3) \times 2 = 46$$
$$\text{or } 5 \times (4 + (3 \times 2)) = 50$$

Algebraic rules state that multiplication is to be performed before addition. So, algebraically, the correct answer is $(5 \times 4) + (3 \times 2) = 26$. The complete list of priorities for interpreting expressions is

1) Single-variable Functions
2) Exponentiation (y^x), Roots ($\sqrt[x]{y}$)
3) Multiplication, Division
4) Addition, Subtraction
5) Equals.

1) Single-variable functions (trigonometric, logarithmic, square, square root, factorial, percent and reciprocal) immediately replace the displayed value with their respective functions.

2) Exponentiation (y^x) and roots ($\sqrt[x]{y}$) are performed as soon as the single-variable functions are completed.

3) Multiplication and division are performed as soon as the special functions, exponentiation, root extraction and other multiplication and division are completed.

4) Addition and subtraction are performed only after all operations through multiplication and division as well as other addition and subtraction are completed.

5) Equals completes all operations.

To illustrate, consider the interpretative order of the following example:

Example: $4 \div 5^2 \times 7 + 3 \times .5^{\cos 60^\circ} = 3.2413203$

Enter	Press	Display	Comments
4	[÷]	4	(4÷) is stored.
5	[x^2]	25	(5^2) single-variable function [x^2] evaluated immediately.
	[×]	0.16	($4 \div 5^2$) evaluated because × is same priority as ÷.
7	[+]	1.12	× higher priority than + so ($4 \div 5^2 \times 7$) evaluated, + stored
3	[×]	3	(3×) stored.
.5	[y^x]	0.5	.5 y^x stored.
60	[cos]	0.5	Cos 60° evaluated immediately.
	[=]	3.2413203	Completes all operations: $.5^{\cos 60^\circ}$ evaluated, then $3 \times .5^{\cos 60^\circ}$ next, then this is added to 1.12.

Thus, by entering the expression just as it is written, the calculator correctly interprets it.

The important thing to remember here is that operations are enacted strictly according to their relative priority as stated in the rules. The calculator remembers all stored operations and recalls each and its associated number for execution at exactly the correct time and place. Once familiar with the order of these operations, you will find most problems are extremely easy to solve because of the straightforward manner in which they can be entered into the calculator.

NOTE: The keys on the right side of your calculator are positioned in such a way as to help you remember the AOS™ hierarchy.

[y^x] — Exponentiation and roots

[÷] [×] — Multiplication and Division

[−] [+] — Addition and Subtraction

[=] — "Equals" which completes all operations. All single variable functions when pressed are performed on the displayed number immediately.

Parentheses

[(] [)] **Parentheses Keys**—Isolates particular numerical expressions for separate mathematical interpretation.

There are sequences of operations for which you must instruct the calculator exactly how to evaluate the problem and produce the correct answer. For example,

$$4 \times (5 + 9) \div (7 - 4)^{(2 + 3)} = ?$$

To evaluate this expression as written using only the calculator hierarchy, many independent steps would be required. Also, intermediate results would have to be stored and the sequence certainly could not be input in the same order in which it is written. Parentheses should be used here and whenever a mathematical sequence cannot be directly entered using the previously mentioned algebraic rules or when there is doubt in your mind as to how the calculator is going to reduce an expression.

To illustrate the benefit of parentheses, try the following experiment: press [(] 5 [+] 9 [)], and you will see the value 14 displayed. The calculator has evaluated 5 + 9 and replaced it with 14 even though the [=] key was not pressed. Because of this function of parentheses, the algebraic rules now apply their hierarchy of operations within each set of parentheses. Use of parentheses insures that your problem can be keyed in just as you have written it down. The calculator remembers each operation and evaluates each part of the expression as soon as all necessary information is available. When a closed parenthesis is encountered, all operations included within the parenthesis pair are completed.

Open parentheses have additional capability of supplying a missing operand, as shown by the following example:

Example: $4 - (4 + 2) = -2$

Enter	Press	Display
4	[−] [(] [+]	4
2	[)]	6
	[=]	−2

If no value is entered after a [(], the calculator uses the value in the display register. In this example 4 was automatically inserted before the +.

Example: $4 \times (5 + 9) \div (7 - 4)^{(2 + 3)} = 0.2304527$

Key in this expression and follow the path to completion.

Enter	Press	Display	Comments
4	[×] [(]	4	(4×) stored pending evaluation of parentheses.
5	[+]	5	(5+) stored.
9	[)]	14	(5 + 9) evaluated.
	[÷]	56	Hierarchy evaluates 4 × 14.
	[(]	56	(56 ÷) stored pending evaluation of parentheses.
7	[−]	7	(7 −) stored.
4	[)]	3	(7 − 4) evaluated.
	[y^x] [(]	3	Prepares for exponent.
2	[+]	2	
3	[)]	5	(2 + 3) evaluated.
	[=]	0.2304527	$(7 - 4)^{(2 + 3)}$ evaluated; then divided into 4 × (5 + 9).

There are limits on how many operations and associated numbers can be stored. Actually, as many as fifteen parentheses can be open at any one time and four operations can be pending, but only in the most complex situations would these limits be approached. If you do attempt to open more than 15 parentheses or if the calculator tries to store more than four operations, "Error" appears in the display.

The following example, requiring the storage of 4 pending operations, shows the order of interpretation provided by the calculator's operating system.

Example: $5 + (8/(9 - (2/3))) = 5.96$

Enter	Press	Display	Comment
5	+ (	5	(5+) stored
8	÷ (	8	(8 ÷) stored
9	− (	9	(9 −) stored
2	÷	2	(2 ÷) stored
3	)	0.6666667	(2/3) evaluated
	)	8.3333333	(9 − (2/3)) evaluated
	)	0.96	(8/(9 − (2/3)))
	=	5.96	5 + (8/(9−(2/3)))

Because the = key has the capability to complete all incomplete operations whenever it is used, it could have been used here instead of the three) keys. Try working this problem again and pressing = instead of the first) .

Each time a closed parenthesis is encountered, the contents are evaluated back to the nearest open parenthesis and are replaced with a single value. Knowing this you can structure the order of interpretation for whatever purpose you may want. Specifically, you can check intermediate results.

Example: $3 \times (4^{(2\ -\ (\sqrt[4]{5}))}) = 4.9053384$

Enter	Press	Display	Comments
	ON/C	0	
3	× (	3	
4	y^x (	4	
2	y^x (	2	
5	INV y^x	5	
4	)	1.4953488	$\sqrt[4]{5}$
	+/−	−1.4953488	$-(\sqrt[4]{5})$
	)	0.3546951	$2^{-(\sqrt[4]{5})}$
	)	1.6351128	$4^{.354...}$
	=	4.9053384	$3 \times 4^{.354...}$

Note that in all these examples the expressions are entered in a straight left-to-right sequence.

Calculations With a Constant

[K] **Constant Key** — Stores a number and its associated operation for repetitive calculations. Enter the number, then the operation, then press [K].

Repetitive calculations have been simplified through use of the constant feature of the calculator. Entry of a recurring sequence such as +3, × (−17.3) or y^7 can be stored and used by the calculator to operate on any displayed number. To use the constant feature, enter the repetitive number, m, then enter the desired operation, then press [K].

m [+] [K]	adds m to each subsequent entry.
m [−] [K]	subtracts m from each subsequent entry.
m [×] [K]	multiplies each subsequent entry by m.
m [÷] [K]	divides each subsequent entry by m.
m [y^x] [K]	raises each subsequent entry to the m power.
m [INV] [y^x] [K]	takes the m^{th} root of each subsequent entry.

After storing the constant, each calculation is completed by entering the new number and pressing [=]. Clearing the calculator or entering any of the above arithmetic functions eliminates the constant that is currently stored.

Example: $31 + 1.8026 = 32.8026$

$745.797 + 1.8026 = 747.5996$

$-8.002 + 1.8026 = -6.1994$

$3.2 \times 10^{-2} + 1.8026 = 1.8346$

Enter	Press	Display
	ON/C	0
1.8026	+ K	1.8026
31	=	32.8026
745.797	=	747.5996
8.002	+/- =	−6.1994
3.2	EE	3.2 00
2	+/- =	1.8346 00

Example: Evaluate $(3.75)^{-3.2}$, $(.1066)^{-3.2}$, $(.0692)^{-3.2}$,

Enter	Press	Display
	ON/C	0
3.2	+/- y^x K	−3.2
3.75	=	0.0145579
.1066	=	1291.7455
.0692	=	5148.2603

IV. SPECIAL FUNCTIONS

The special function keys described in this section are single-variable functions except for y^x and $\sqrt[x]{y}$ which are two-variable functions. The single-variable functions operate only on the displayed value without interfering with calculations in progress. The two-variable functions may be isolated within a calculation by parentheses or used with the calculator hierarchy.

NOTE: Except for mode indicators, the display is blank during the short time the calculator is computing a result. Be sure the calculator has completed an operation before pressing the next key.

Roots and Powers

[x²] **Square Key** — Calculates the square of the number x in the display.

Example: $(4.235)^2 = 17.935225$

Enter	Press	Display
4.235	[x²]	17.935225

2nd [√x] **Square Root Key** — Calculates the square root of the number x in the display. The x value cannot be negative.

Example: $\sqrt{6.25} = 2.5$

Enter	Press	Display
6.25	2nd [√x]	2.5

Example: $[\sqrt{3.1452} - 7 + (3.2)^2]^{1/2} = 2.2390782$

Enter	Press	Display
3.1452	2nd [√x] [−]	1.7734712
7	[+]	−5.2265288
3.2	[x²]	10.24
	[=]	5.0134712
	2nd [√x]	2.2390782

[y^x] **y to the xth Power Key** — Raises the displayed value y to the xth power. Order of entry is y [y^x] x. The y value cannot be negative, but both x and y can be fractional.

[INV] [y^x] (= $\sqrt[x]{y}$) xth Root of y Key Sequence — Takes the xth root of the displayed value y. Order of entry is y [INV] [y^x] x. The y value cannot be negative but both x and y can be fractional.

These two universal roots and powers functions are the only special functions that do not act on the displayed value immediately. They require a second value before the function can be realized. Use of these two keys is identical. Enter y, press [y^x] or [INV] [y^x] enter x, and press [=] or an arithmetic function key to yield the answer. A closed parenthesis also completes these functions as well as other stored operations back to the nearest open parenthesis.

Example: $2.86^{-.42} = 0.6431707$

Enter	Press	Display
2.86	[y^x]	2.86
.42	[+/−]	−0.42
	[=]	0.6431707

Example: $\sqrt[3.12]{1460} = 10.332744$

Enter	Press	Display
1460	[INV] [y^x]	1460
3.12	[=]	10.332744

There is a restriction on these functions — the variable y must be non-negative. When y is negative, "Error" appears in the display after x and an operation key are pressed. The y value cannot be negative because logarithms are used to perform these functions. The 0th root of a number is not a natural mathematical operation and consequently results in an error condition. Any non-negative number taken to the zero power is 1.

Accuracy for these roots and powers is within ±1 in the 8th significant digit over all ranges except for values of y very near 1 and very large exponents or very small roots. For example 1.000008^{4367} is accurate to six digits. The error increases as y approaches 1 and the exponent becomes extremely large or when roots become extremely small.

Reciprocal

[1/x] Reciprocal Key — Divides the displayed value x into 1. $x \neq 0$.

Example: $\frac{1}{3.2} = 0.3125$

Enter	Press	Display
3.2	[1/x]	0.3125

Factorial

[x!] Factorial Key—Calculates the factorial (x) (x−1) (x−2)...(2) (1) of the value x in the display for integers $0 \leq x \leq 69$. 0! = 1 by definition.

Example: $36! = 3.7199 \times 10^{41}$

Enter	Press	Display
36	[x!]	3.7199 41

Percent

[%] Percent Key — Converts the displayed number from a percentage to a decimal.

Example; 43.9% = .439

Enter	Press	Display
43.9	[%]	0.439

When [%] is pressed after an arithmetic operation, add on, discount, and percentage can be computed as follows;

[+] n [%] [=] adds n% to the number displayed.

Example: What is the total cost of a $15 item when there is a 5% sales tax?

Enter	Press	Display
15	[+]	15
5	[%] [=]	15.75

[−] n [%] [=] subtracts n% from the number displayed.

Example: How much is paid for a $5 item that has been discounted 2%?

Enter	Press	Display
5	[−]	5
2	[%] [=]	4.9

[×] n [%] [=] multiplies the number in the display by n%.

Example: What is 2.5% of 15?

Enter	Press	Display
15	[×]	15
2.5	[%] [=]	0.375

[÷] n [%] [=] divides the number displayed by n%.

Example: 25 is 15% of what number?

Enter	Press	Display
25	[÷]	25
15	[%] [=]	166.66667

Natural Logarithm and Natural Antilogarithm

[lnx] **Natural Logarithm Key** — Calculates the natural logarithm (base e) of the number x in the display. $x > 0$.

Example: ln 1.2 = 0.1823216

Enter	Press	Display
1.2	[lnx]	0.1823216

[INV] [lnx] **Natural Antilogarithm (e to the xth power) key sequence** —Calculates the natural antilogarithm of the number in the display. This sequence raises the constant e to the displayed power.

Example: $e^{3.81} = 45.150439$

Enter	Press	Display
3.81	[INV] [lnx]	45.150439

Example: $e^{(7.5 + \ln 1.4)} = 2531.2594$

Enter	Press	Display	Comments
	[ON/C] [(]	0	
7.5	[+]	7.5	Enter 7.5
1.4	[lnx]	0.3364722	ln 1.4
	[)]	7.8364722	(7.5 + ln 1.4)
	[INV] [lnx]	2531.2594	Answer

Note that the [=] key is not needed as the special function produces the final result.

Common Logarithm and Common Antilogarithm

[log] **Common Logarithm Key** —Calculates the common logarithm (base 10) of the number x in the display. $x > 0$.

Example: log 32.01 = 1.5052857

Enter	Press	Display
32.01	[log]	1.5052857

[INV] [log] **Common Antilogarithm (10 to the xth Power) Key Sequence** —Calculates the common antilogarithm of the displayed value. This sequence raises 10 to the displayed power.

Example: $10^{-7.12} = 7.5858 \times 10^{-8}$

Enter	Press	Display
7.12	[+/-] [INV] [log]	7.5858−08

Example: $\log (303 + 10^{1.36}) = 2.5130959$

Enter	Press	Display	Comments
	ON/C (	0	
303	+	303	Enter 303
1.36	INV log	22.908677	$10^{1.36}$
	)	325.90868	$303 + 10^{1.36}$
	log	2.5130959	Answer

The results from logarithms (natural and common), when displayed in normal form rather than in scientific notation, are accurate within ±1 in the last displayed digit, allowing for round off.

Trigonometric Functions

DRG **Degree, Radian, Grad Key** —Selects the units for angular measurement. When the calculator is first turned on, it is in the degree mode. Pressing the DRG key once places the calculator in the radian mode. Press this key again and your angles are measured in grads (right angle = 100 grads). The mode changes in a rotary fashion each time the key is pushed. Another key push, for instance, returns the calculator to the degree mode.

The display indicates the current angular mode of the calculator. "DEG" is displayed for degree mode, "RAD" is displayed for radian mode, and "GRAD" is displayed for grad mode.

The angular mode has absolutely no effect on calculations unless the trigonometric functions are being used. Selecting the angular mode is an easy step to perform —*and to forget!* Neglecting this step is responsible for a large portion of errors in operating any calculating machine that offers a choice of angular units.

When the trig functions (sine, cosine, and tangent) are activated, they compute their respective functions of the angle in the display. The inverse trig functions find the smallest angle whose function value is in the display.

[sin] **Sine Key** — Instructs the calculator to find the sine of the displayed value.

[INV] [sin] **Arcsine ($\sin^{-1}$) Key Sequence** — Calculates the smallest angle whose sine is in the display (first or fourth quadrant).

[cos] **Cosine Key** — Instructs the calculator to find the cosine of the displayed value.

[INV] [cos] **Arccosine ($\cos^{-1}$) Key Sequence** — Calculates the smallest angle whose cosine is in the display (first or second quadrant).

[tan] **Tangent Key** — Instructs the calculator to find the tangent of the displayed value.

[INV] [tan] **Arctangent ($\tan^{-1}$) Key Sequence** — Calculates the smallest angle whose tangent is in the display (first or fourth quadrant).

Note: Trigonometric values can be calculated for angles greater than one revolution. As long as the trigonometric function result is displayed in normal form rather than in scientific notation, all display digits are accurate for any angle from −36000° to 36000° and −40,000 to 40,000 grads. The equivalent range in radians ($\pm 200\pi$) is comparable to degrees and grads in accuracy except at rotation multiples of π and $\pi/2$. The rounded value of π limits accuracy at these points. In general, the accuracy decreases one digit for each decade outside this range.

Example: sin 30° = 0.5 = sin 390°

Enter	Press	Display
(Select degree mode)		
30	[sin]	DEG 0.5
390	[sin]	DEG 0.5

Example: $[\sin(.3012\pi)]^{-\tan(16.2^\circ)} = 1.0626654$

Enter	Press	Display		Comments
(Select radian mode "RAD")				
	ON/C (	RAD	0	
.3012	×	RAD	0.3012	
	2nd π	RAD	3.1415927	
	)	RAD	0.9462477	$(.3012\pi)$
	sin	RAD	0.8112271	Sin $(.3012\pi)$
	y^x	RAD	0.8112271	
16.2	DRG DRG tan	DEG	0.2905269	Tan 16.2°
	+/- =	DEG	1.0626654	Answer

The largest angle resulting from an arc function is 180 degrees (π radians or 200 grads). Because certain angles have identical function values within one revolution, i.e. arcsin = .5 for 30° and 150°, the angle returned by each function is restricted as follows:

Arc Function for $x \geq 0$	Quadrant of Resultant Angle
arcsin x ($\sin^{-1}$ x)	First (0 to 90°, $\pi/2$, or 100 G)
arcsin − x ($\sin^{-1}$ − x)	Fourth (0 to −90°, $-\pi/2$, or −100 G)
arccos x ($\cos^{-1}$ x)	First (0 to 90°, $\pi/2$, or 100 G)
arccos − x ($\cos^{-1}$ − x)	Second (90° to 180°, $\pi/2$ to π, or 100 to 200 G)
arctan x ($\tan^{-1}$ x)	First (0 to 90°, $\pi/2$, or 100 G)
arctan − x ($\tan^{-1}$ − x)	Fourth (0 to −90°, $-\pi/2$, or −100 G)

Arcsin .5, for example, always returns 30° as the angle even though sin 150° = .5, sin 390° = .5 as well.

Example:
$\sin^{-1}$ .712 = 45.397875 degrees = 0.7923424 radians = 50.442083 grads

Enter	Press	Display
	(Select degree mode)	
.712	INV sin	DEG 45.397875
	(Select radian mode)	
.712	INV sin	RAD 0.7923424
	(Select grad mode)	
.712	INV sin	GRAD 50.442083

Example:

$$\sqrt{\arctan 9.72^\circ} + \frac{1}{\arcsin .808^\circ} = 9.1905773 \text{ degrees}$$

Enter	Press	Display	Comments
(Select degree mode)			
9.72	INV tan	DEG 84.126039	arctan 9.72
	2nd $\sqrt{x}$ +	DEG 9.1720248	$\sqrt{\arctan 9.72}$
.808	INV sin	DEG 53.900984	arcsin .808
	1/x	DEG 0.0185525	1/arcsin .808
	=	DEG 9.1905773	Answer

Sine and cosine functions are accurate throughout all displayed digits when displayed in standard form. The tangent of $\pm 90^\circ$, $\pm \pi/2$ radians, or $\pm$ 100 grads results in an error condition because the function is undefined at these points. As the tangent approaches these undefined limits the accuracy is restricted. For example, the tangent of 87 degrees is accurate throughout the 8 displayed digits whereas the tangent of 89.99999° is accurate to 3 places.

Degree, Radian, Grad Conversions

It is frequently necessary to convert angular values from one unit system to another. While there are no special conversion keys for this purpose, the key sequences to convert angular units are relatively simple and can be used without affecting the statistical registers, the memory registers or calculations in progress. First, be sure the calculator is in the correct angular mode for entry of the angle to be converted.

Conversion	Key Sequence
Degrees to Radians	sin DRG INV sin
Degrees to Grads	sin DRG DRG INV sin
Grads to Degrees	sin DRG INV sin
Grads to Radians	sin DRG DRG INV sin
Radians to Degrees	sin DRG DRG INV sin
Radians to Grads	sin DRG INV sin

Each calculation should be completed before pressing the next key.

Example: Express 50 degrees in radians, then grads, then back to degrees.

Enter	Press	Display	Comments
(Select degree mode)			
50	sin DRG INV sin	RAD 0.8726646	radians
	sin DRG INV sin	GRAD 55.555556	grads
	sin DRG INV sin	DEG 50	degrees

The angular range of the above conversions must be limited to the first and fourth quadrants:

0 ± 90 degrees
0 ± 100 grads
$0 \pm \pi/2$ radians

Larger angles used in the conversion sequences are returned in the first or fourth quadrants as governed by the calculator arcsine function.

For converting angles in any quadrant from one system to another, the following table of conversion factors can be used.

FROM \ TO	degrees	radians	grads
degrees		$\times \frac{\pi}{180}$	$\div .9$
radians	$\times \frac{180}{\pi}$		$\times \frac{200}{\pi}$
grads	$\times .9$	$\times \frac{\pi}{200}$	

These operations can be performed in any angular mode setting of the calculator.

Example: Convert 120 degrees to radians and grads.

Enter	Press	Display	Comments
120	[×] [2nd] [π] [÷]	376.99112	
180	[=]	2.0943951	radians
	[×]	2.0943951	
200	[÷] [2nd] [π] [=]	133.33333	grads
	[×]	133.33333	
.9	[=]	120	degrees

Because of the independence of these conversions from the angular mode of the calculator, you must be extremely careful when using the results for further calculations. *The angular mode must be adjusted to match the units of the results.*

V. MEMORY USAGE

Your calculator has one constant memory that is able to store data even while the calculator is turned off. This feature allows you to store often used numbers in memory or to keep a running total of figures over a long period of time without having to write them down and re-enter them each time the calculator is turned on.

Use of the memory does not affect any calculations in progress, so memory operations can be used whenever needed.

Memory Store

[STO] **Memory Store Key**—Stores the displayed quantity in the memory without removing it from the display. Any previous value stored in the memory is replaced by the new entry.

Memory Recall

[RCL] **Memory Recall Key**—Recalls the contents of the memory into the display without affecting the content of the memory.

Example: Store and recall 45.68

Enter	Press	Display
45.68	[STO]	45.68
	[OFF] [ON/C]	0
	[RCL]	45.68

Use of these keys allows you to store a long number that is to be used several times. Notice that the calculator can even be turned off without losing the contents of the memory register.

Example:

Evaluate $2.4x^4 - 3x^2 + x - 10.25$ for $x = 3.1478963$

Enter	Press	Display	Comments
2.4	[X]	2.4	
3.1478963	[STO] [y^x]	3.1478963	Store x
4	[−]	235.66382	$2.4x^4$
3	[X]	3	
	[RCL]	3.1478963	Recall x
	[x^2]	9.9092511	x^2
	[+]	205.93607	$2.4x^4 - 3x^2$
	[RCL]	3.1478963	Recall x
	[−]	209.08396	$2.4x^4 - 3x^2 + x$
10.25	[=]	198.83396	Answer

You can see that by storing x the first time it is entered saved you from having to spend 15 more keystrokes to key in x the other two times it is needed. A single press of the [RCL] key brings the eight digit x to the display each time. Notice also that the use of [STO] and [RCL] did not interfere with calculator operations.

Sum to Memory

[SUM] **Sum to Memory Key**— Algebraically adds the display value to the memory content. This key does not affect the displayed number or calculations in progress.

Important: Because of your calculator's Constant Memory™ feature, the memory is not automatically cleared when the calculator is turned off. To prevent adding a new number to the existing contents of the memory, be sure to first clear the memory register by pressing [ON/C] [STO] before pressing [SUM].

[SUM] is used to accumulate the results from a series of independent calculations. [SUM] replaces the arithmetic sequence [+] [EXC] [=] [EXC].

Example:

$$28.3 \times 7 = 198.1$$
$$173 + 16 = 189$$
$$312 - 42 + 7.8 = 277.8$$
$$\text{Total} \quad 664.9$$

Enter	Press	Display	Memory
28.3	[X]	28.3	0
7	[=] [STO]	198.1	198.1
173	[+]	173	198.1
16	[=] [SUM]	189	387.1
312	[−]	312	387.1
42	[+]	270	387.1
7.8	[=] [SUM]	277.8	664.9
	[RCL]	664.9	664.9

This example could have been performed simply by linking each expression together with a [+] and not using the memory. But if each of the three expressions had been far more complicated, then solving the entire problem sequentially could be

risky. An uncorrectable mistake during calculations would mean starting over from the first. Summing to memory saves each completed expression making the calculation of each new series of terms independent of the previous calculations.

Memory Exchange

[EXC] **Exchange Key**—Swaps the content of the memory with the display value. The display value is stored and the previously stored value is displayed.

This key combines the store and recall operations into a single key. Use of this key, like the other memory keys, does not disturb a sequence of calculations and can consequently be used anywhere in the solution of a problem.

The [EXC] key permits you to solve problem 1 and store the result. Then solve problem 2 and compare the results of the two problems while retaining both answers. Also, numbers can be temporarily stored and used as needed.

Example: Evaluate $A^2 + 2AB + B^2 =$ for A = .258963 and B = 1.25632

Enter	Press	Display	Comments
.258963	[STO] [x^2] [+]	0.0670618	Store A, A^2 displayed
1.25632	[X]	1.25632	Enter B
	[EXC]	0.258963	Store B, recall A
	[X]	0.3253404	A × B displayed
2	[+]	0.7177426	$A^2 + 2AB$ displayed
	[RCL]	1.25632	Recall B
	[x^2]	1.5783399	B^2
	[=]	2.2960826	Answer

When A is recalled from memory for the last time it is needed, B is instantly stored in its place by the single keystroke [EXC].

VI. STATISTICAL FUNCTIONS

In many situations in your business (and everyday) life, you may find yourself making decisions based on a set of data points. This data could be test scores, sales figures, weights of an incoming shipment, etc. An effective way to evaluate this data is to use statistical methods. The most commonly used statistical calculations are the mean ($\bar{x}$), standard deviation (σ_n or σ_{n-1}), and variance (σ^2_n or σ^2_{n-1}).

The mean (or average value) is the most common "central" tendency in your data. The standard deviation and variance give you a feel for how variable the data is — a feel for how far the data differs from the mean.

Statistical Data Entry and Removal

[Σ+] Sum Plus Key—Enters data points x_i for calculation of mean, variance, and standard deviation. After x_i is entered, the current number of data points, n is displayed. The first entry with this key sets the calculator in the statistical mode and "STAT" appears.

IMPORTANT: Using [Σ+] sets the calculator in the statistical mode. The arithmetic functions, [+], [−], [×] and [÷], powers and roots with [y^x], parenthesis [(] [)], constant [K] and [=] are all invalid in the statistical mode and will cause an "Error" indication. Pressing [2nd] [CSR] clears the statistical registers, the "STAT" indicator, and resets the calculator for normal calculations.

[2nd] [Σ−] Sum Minus Key Sequence — Removes unwanted data points x_i. After x_i is removed, the current number of data points, n is displayed.

Mean

2nd $\bar{x}$ Mean Key Sequence — Calculates the mean of the data entered.

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}, \; i = 1, 2, 3 \ldots n$$

Standard Deviation

2nd σn Population Standard Deviation Key Sequence — Calculates standard deviation using n weighting (for population data).

$$\sigma_n = \sqrt{\frac{\Sigma(x_i - \bar{x})^2}{n}}$$

2nd $\sigma n{-}1$ Sample Standard Deviation Key Sequence — Calculates standard deviation using n-1 weighting (for sample data).

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

NOTE: A population is usually a large set of items, and a sample is a smaller portion selected from the population. The difference between the Sample Standard Deviation and the Population Standard Deviation calculations becomes very small for over 30 data points.

Variance

2nd σn x^2 Population Variance Key Sequence — Calculates variance using n weighting (for population data)

$$\text{Var}_{(n)} = \frac{\Sigma(x_i - \bar{x})^2}{n}$$

2nd $\sigma n{-}1$ x^2 Sample Variance Key Sequence — Calculates variance using n-1 weighting (for sample data)

$$\text{Var}_{(n-1)} = \frac{\Sigma(x_i - \bar{x})^2}{n-1}$$

Data points are entered by pressing [Σ+] after each data-point entry and removed by pressing [2nd] [Σ−] after reentry of an incorrect point. The entry number N is displayed after each entry, N = 0, 1, 2 ... Removing last data point using [2nd] [Σ−] will cause "Error" to be displayed and the statistical registers to be cleared. Clear calculator and enter new data.

Once entered, the data can be used to calculate the mean, variance and standard deviation by simply pressing the necessary keys.

Example: Analyze the following test scores: 96, 81, 87, 70, 93, 77, assuming that the six students are the entire population.

Enter	Press		Display	Comments
	[ON/C]			
	[2nd] [CSR]		0	Clear
96	[Σ+]	STAT	1	1st Entry
81	[Σ+]	STAT	2	2nd Entry
97	[Σ+]	STAT	3	3rd Entry (Incorrect)
97	[2nd] [Σ−]	STAT	2	Remove 3rd Entry
87	[Σ+]	STAT	3	Correct 3rd Entry
70	[Σ+]	STAT	4	4th Entry
93	[Σ+]	STAT	5	5th Entry
77	[Σ+]	STAT	6	6th Entry
	[2nd] [$\bar{x}$]	STAT	84	Mean (class average)
	[2nd] [σn]	STAT	9.0184995	Standard Deviation
	[x^2]	STAT	81.333333	Variance

IMPORTANT: Remember to press [2nd] [CSR] to perform arithmetic calculations.

APPENDIX A
HYPERBOLIC FUNCTIONS

Hyperbolic Functions

Solving problems involving hyperbolic functions uses the exponential (INV lnx) capability of your calculator.

$$\text{Hyperbolic Sine (sinh) } x = \frac{1}{2}(e^x - e^{-x}) = \frac{e^{2x} - 1}{2e^x}$$

$$\text{Hyperbolic Cosine (cosh) } x = \frac{1}{2}(e^x + e^{-x}) = \frac{e^{2x} + 1}{2e^x}$$

$$\text{Hyperbolic Tangent (tanh) } x = \frac{e^x - e^{-x}}{e^x + e^{-x}} = \frac{e^{2x} - 1}{e^{2x} + 1}$$

Example: tanh 2.99 = 0.9949551

Enter	Press	Display
2.99	X	2.99
2	=	5.98
	INV lnx STO −	395.44037
1	= ÷	394.44037
	(RCL +	395.44037
1	=	0.9949551

Inverse Hyperbolic Functions

$$\sinh^{-1}x = \ln(x + \sqrt{x^2 + 1})$$

$$\cosh^{-1}x = \ln(x + \sqrt{x^2 - 1}) \text{ for } x \geq 1$$

$$\tanh^{-1}x = \frac{1}{2}\ln\left(\frac{1 + x}{1 - x}\right) \text{ for } -1 < x < 1$$

Example: $\sinh^{-1}$ 86.213 = 5.1500018

Enter	Press	Display
86.213	+ (	86.213
	x² +	7432.6814
1	)	7433.6814
	2nd √x	86.218799
	=	172.4318
	lnx	5.1500018

APPENDIX B
CONVERSION FACTORS

English to Metric

To Find	Multiply	By
microns	mils	**25.4**
centimetres	inches	**2.54**
metres	feet	**0.3048**
metres	yards	**0.9144**
kilometres	miles	**1.609344**
gramme	ounces	28.349523
kilogramme	pounds	**4.5359237×10^{-1}**
litres	gallons (U.S.)	3.7854118
litres	gallons (Imp.)	4.546090
millilitres (cc)	fl. ounces	29.573530
sq. centimetres	sq. inches	**6.4516**
sq. metres	sq. feet	**9.290304×10^{-2}**
sq. metres	sq. yards	**8.3612736×10^{-1}**
millilitres (cc)	cu. inches	**16.387064**
cu. metres	cu. feet	2.8316847×10^{-2}
cu. metres	cu. yards	7.6455486×10^{-1}

Temperature Conversions

$$°F = \frac{9}{5}(°C) + 32$$

$$°C = \frac{5}{9}(°F - 32)$$

Boldface numbers are exact; others are rounded.

APPENDIX C
SERVICE INFORMATION

In Case Of Difficulty

1. If digits fail to appear on the display, check for improperly inserted or discharged batteries. See Battery Replacement on the following page.
2. Press [OFF] then [ON/C] and try calculation again. Review operating instructions to be certain that calculations were performed correctly.
3. When batteries are inserted into the calculator and the display does not reset, pressing [OFF] then [ON/C] should reset the display and prepare the calculator for use.

If none of the above procedures corrects the difficulty, return the calculator PREPAID to the applicable SERVICE FACILITY listed on the back cover.

NOTE: The P.O. box number listed for the Lubbock Service Facility is for United States parcel post shipments only. If you desire to use another carrier, the street address is:

Texas Instruments Incorporated
2305 University Ave.
Lubbock, Texas 79415

For your protection, the calculator should be sent insured; Texas Instruments cannot assume any responsibility for loss of or damage to uninsured shipments.

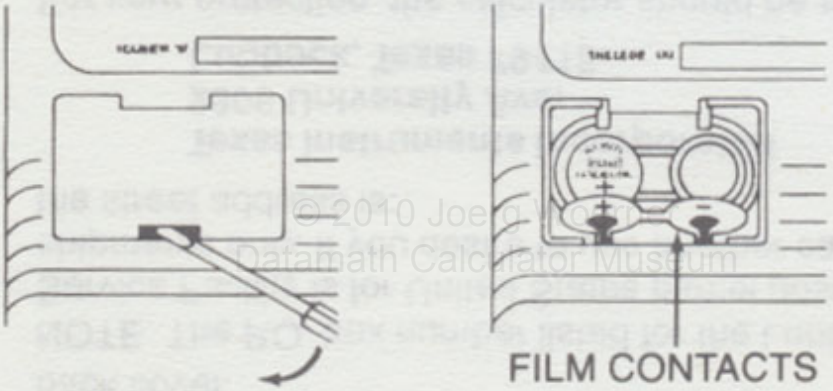
Please include information on the difficulty experienced with the calculator, as well as return address information including name, address, city, state and zip code. The shipment should be carefully packaged and adequately protected against shock and rough handling.

Battery Replacement

NOTE: Your calculator cannot hold data if the batteries are removed or become discharged.

There are two types of batteries that can be used with your calculator. For up to 1000 hours operation, you can use two Panasonic LR-44, Union Carbide (Eveready) A-76, or Ray-O-Vac RW-82 alkaline batteries (equivalent supplied with calculator). You can also use two Mallory 10L14, Union Carbide (Eveready) 357, Panasonic WL-14, Ray-O-Vac RW-42, or Toshiba G-13 silver-oxide batteries for up to 2500 hours operation.

1. Turn the calculator off. Place a small screwdriver, paper clip, or other similar instrument into the slot and gently lift the battery cover.



2. Remove the discharged batteries and install new ones as shown. Be careful not to crease the film contacts while installing the new batteries. Be sure the film contacts are positioned to lay on top of the batteries after the batteries are installed.
3. Replace the cover top edge first, then gently press until the bottom of the cover snaps into place.

Caution: Do not incinerate old batteries.

Out-of-Warranty Service.

Because our service facility serves the entire United States, it is not feasible to hold units while providing repair estimates. For simplicity of operation, we have established flat-rate charges for all out-of-warranty repairs. To obtain the correct charges for a particular model, write to Consumer Relations at the address provided on the following page.

Calculator Exchange Centers

If your calculator requires service, instead of returning the unit to your dealer or to a service facility for repair, you may elect to exchange the calculator for a factory-reconditioned calculator of the SAME MODEL (or equivalent model specified by TI) by bringing the calculator in person to one of the exchange centers which have been established across the United States. No charge will be made for the exchange with proof-of-purchase during the first 90 days. The exchanged unit will be in warranty for the remainder of the original warranty period or for 6 months, whichever is longer. A HANDLING FEE WILL BE CHARGED FOR EXCHANGE AFTER 90 DAYS FROM THE DATE OF PURCHASE. Out-of-warranty exchanges will be charged at the rates in effect at the time of the exchange.

To determine if there is an exchange center in your locality, look for Texas Instruments Incorporated Exchange Center in the white pages of your telephone directory or look under the Calculator and Adding Machine heading in the yellow pages. Please call the exchange center for availability of your model. Write the Consumer Relations Department for further details and the location of the nearest exchange center.

If You Need Service Information

If you need service information for your calculator, write Consumer Relations at:

Texas Instruments Incorporated
P.O. Box 53
Lubbock, Texas 79408

Notes

ONE-YEAR LIMITED WARRANTY

THIS TEXAS INSTRUMENTS CONSUMER WARRANTY EXTENDS TO THE ORIGINAL CONSUMER PURCHASER OF THE PRODUCT.

WARRANTY DURATION: This Texas Instruments consumer product is warranted to the original consumer purchaser for a period of one year from the original purchase date.

WARRANTY COVERAGE: This Texas Instruments consumer product is warranted against defective materials or workmanship. **THIS WARRANTY DOES NOT COVER THE BATTERY AND IS VOID IF THE PRODUCT HAS BEEN DAMAGED BY ACCIDENT, UNREASONABLE USE, NEGLECT, IMPROPER SERVICE OR OTHER CAUSES NOT ARISING OUT OF DEFECTS IN MATERIAL OR WORKMANSHIP.**

WARRANTY DISCLAIMERS: ANY IMPLIED WARRANTIES ARISING OUT OF THIS SALE, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE ABOVE ONE YEAR PERIOD. TEXAS INSTRUMENTS SHALL NOT BE LIABLE FOR LOSS OF USE OF THE PRODUCT OR OTHER INCIDENTAL OR CONSEQUENTIAL COSTS, EXPENSES, OR DAMAGES INCURRED BY THE CONSUMER OR ANY OTHER USER.

Some states do not allow the exclusion or limitation of implied warranties or consequential damages, so the above limitations or exclusions may not apply to you.

LEGAL REMEDIES: This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

WARRANTY PERFORMANCE: During the above one year warranty period, your TI Electronic Calculator will either be repaired or replaced with a reconditioned comparable model (at TI's option) when the Electronic Calculator is returned postage prepaid to a Texas Instruments Service Facility.

The repaired or replacement calculator will continue the warranty of the original unit or six months, whichever is longer. Other than the postage requirement, no charge will be made for such repair or replacement of in-warranty calculators.

TI strongly recommends that you insure the product for value, prior to mailing.

TEXAS INSTRUMENTS CONSUMER SERVICE FACILITIES

U.S. Residents:

Texas Instruments Service Facility
P.O. Box 2500
Lubbock, Texas 79408

Canadian Residents Only:

Geophysical Services Incorporated
41 Shelley Road
Richmond Hill, Ontario, Canada L4C5G4

Consumers in California and Oregon may contact the following Texas Instruments offices for additional assistance or information.

Texas Instruments Consumer Service
831 South Douglas Street
El Segundo, California 90245
(213) 973-1803

Texas Instruments Consumer Service
6700 Southwest 105th
Kristin Square, Suite 110
Beaverton, Oregon 97005
(503) 643-6758

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