Always refer to Making Tracks into Programming for complete details of calculator operation.

**AOS™ ENTRY METHOD**

Lets you enter problems directly as they’re usually written, left to right. Calculator will execute operations in the following order: 1) single variable functions 2) powers/roots 3) multiplication/division 4) add/subtract. \(=\) (Equals Key) completes all pending operations. This order of operations is also followed inside parentheses.

**CLEARING:**

Turning your calculator OFF and ON clears it completely.

- **CE** — clears last number entered (if not followed by an operation).
- **CLR** — clears machine, except for memories and program steps.
- **2nd** **C.L** — clears the “i” register (memory 7) only.
- **INV** **2nd** **C.L** — clears the display, and all memories, but not program steps.

**POWERS AND ROOTS:**

To raise a number (y) to any power (x)

- Enter the number (y).
- Press \(y^x\).
- Enter the power (x).
- Press \(=\) (or other function key).

To take the \(x^{th}\) root of a number (y). \(\sqrt[y]{y}\)

- Enter the number (y).
- Press \(\text{INV}~y^x\).
- Enter the root (x).
- Press \(=\) (or other function key).
MEMORIES:

8 memories (numbered 0 through 7) are available for your use:

\[ \text{STO} \ n \ (n \text{ from 0 to 7}) \text{ stores the number in the display in the memory you select (0 to 7).} \]

\[ \text{RCL} \ n \text{ recalls the number from memory n into the display.} \]

\[ \text{2nd Exc n} \text{ -- swaps the display value with what's in memory n.} \]

\[ \text{SUM n} \text{ -- sums the number in the display into memory n (the result stays in the memory).} \]

\[ \text{INV SUM n} \text{ -- subtracts the number in the display from what's in memory n (the result stays in memory).} \]

\[ \text{2nd Prd n} \text{ -- multiplies what's in memory n by the number in the display (result stays in memory).} \]

\[ \text{INV 2nd Prd n} \text{ -- divides what's in memory n by the number in the display (result stays in memory).} \]

FIX DECIMAL:

To Set the Number of Decimal Places in the Display, press \[\text{2nd Fix n}\], where n is the desired number of digits to the right of the decimal point (0 to 8).

Pressing \[\text{INV 2nd Fix}\] or \[\text{2nd Fix 9}\] removes the fix on the decimal point.

ANGLE MODE:

Your calculator is equipped to accept angle inputs, and to return angle calculation results, in 3 systems of units: Degrees, Radians, and Grads. When first turned on, the calculator is always in Degree mode.

- Press \[\text{2nd Rad}\] to change to Radian mode.
- Press \[\text{2nd Grad}\] to change to Grad mode.
- Press \[\text{2nd Deg}\] to change to Degree mode.

Be certain that your calculator is in the correct mode for the angular units you desire when performing any calculations involving angles, including:

- Trigonometric functions: \[\text{2nd sin}\], \[\text{2nd cos}\], \[\text{2nd tan}\], and their inverses.
- Polar to Rectangular Conversion: \[\text{2nd P+R}\], and its inverse.
CONVERSIONS:

Polar to Rectangular
- Enter R, Press: $x^{-1}$
- Enter $\theta$
- Press $2\text{nd} \ P+R$ — $y$ is displayed.
- Press $x^{-1}$ to read $x$.

Rectangular to Polar
- Enter $x$ • Press $x^{-1}$
- Enter $y$
- Press $\text{INV} \ 2\text{nd} \ P+R$ —
  $\theta$ is displayed.
- Press $x^{-1}$ to read $R$.

Degrees, Min, sec to Decimal Degrees
- Enter degrees, Press $\cdot$
- Enter minutes (2 digits) and seconds (2 digits).
- Press $2\text{nd} \ D.MS$ for decimal value.

Decimal Degrees to Degrees, Min, Sec
- Enter decimal degrees.
- Press $\text{INV} \ 2\text{nd} \ D.MS$
  (Degrees, minutes, seconds) now displayed.

STATISTICAL KEYS AND FUNCTIONS:

Begin statistical calculations by turning calculator OFF and ON; or by pressing $\text{INV} \ 2\text{nd} \ C.I$

If you have only one set of data to analyze:
- Enter each data point.
- Press $2\text{nd} \Sigma+$
- Repeat for all points.
- Press $2\text{nd} \overline{x}$ to calculate the mean.
- Press $2\text{nd} \sigma^2$ to calculate the variance (with N weighting).
- Press $2\text{nd} \overline{x} \sqrt{x}$ to calculate the standard deviation of the data (with N weighting).

("N weighting" means that the total number of data points is used in the calculation of the variance — this type of variance is called a population variance.)

If you have two sets of data to analyze simultaneously:
Call the two sets of data "x" and "y" arrays.
- Enter an "x" data point.
- Press $x^{-1}$
- Enter a "y" data point.
- Press $2\text{nd} \Sigma+$
- Repeat for all points.
- Press $\text{INV} \ 2\text{nd} \overline{x}$ to calculate the mean of the "x" data points.
- Press $2\text{nd} \overline{x}$ to calculate the mean of the "y" data points.
- Press $\text{INV} \ 2\text{nd} \sigma^2$ to calculate the variance of the "x" data points.
- Press $2\text{nd} \sigma^2$ to calculate the variance of the "y" data points.

(use $\sqrt{x}$ key to calculate standard deviation).
**Basic Programming Keys**

**LRN** — “Learn” Key
- Pressing this key once, puts calculator in “learn” mode — ready to remember up to 50 program steps (numbered 00 to 49). Display switches to special format: 00 00.
- Pressing this key once again takes calculator out of learn mode, calculator retains program steps. (Display reverts to the standard format).

**RST** — Reset Key
Resets program pointer to first step (step 00), whether entered from the keyboard or encountered as part of a program. (Also, clears Subroutine Return register.)

**R/S** — Run/Stop Key
When out of learn mode, this is the start/stop key for your program. If the program is stopped, pressing **R/S** starts it; if it’s running, pressing **R/S** stops it. When **R/S** is inserted as part of a program (in learn mode) it will stop the program at that point.

While a program is running, encountering a **2nd Pause** instruction causes the program to halt and display contents of the display register for about ¾ of a second.

**2nd Lbl n** — Label Key Sequence
Allows you to label up to 10 points in a program — n is from 0 to 9. (Labels cannot be used more than once within the same program.)

**GTO n** — Go to Label n Key Sequence
Causes program pointer to immediately go to label n (n from 0 to 9), whether encountered as part of a program, or used from the keyboard.

**GTO 2nd nn** — Go to Step Number nn Key Sequence
(nn from 00 to 49) — May be used when out of learn mode only. Positions program pointer at step number nn.
PROGRAM DECISION-MAKING

2nd Dsz — Decrement and Skip on Zero Key Sequence
Works together with memory zero. When 2nd Dsz is encountered in a program:
- First, the contents of memory zero are decreased by one (increased by one if the contents are negative),
- If the result is NOT ZERO, the calculator proceeds to the step following 2nd Dsz.
- If the result IS ZERO, the calculator SKIPS the step following 2nd Dsz, and continues.

INV 2nd Dsz — Decrement and Skip if not Zero Key Sequence
When encountered in a program:
- First, the contents of memory zero are decreased by one (increased if the contents are negative).
- If the result is NOT ZERO, the calculator SKIPS the step following INV 2nd Dsz and continues.
- If the result IS ZERO, the calculator proceeds to the step following 2nd Dsz.

x:t — x exchange with t Key
Swaps what’s in the display register with what’s in the “t” or “test” register. (The t register is memory 7.)

The Conditional Transfer Test Key Sequences —
cause the calculator to compare the contents of display (or “x”) register with what’s in the test (or “t”) register, and ask one of the 4 questions below:

2nd x=1 — Is x equal to t?
INV 2nd x=1 Is x not equal to t? (x ≠ t?)
2nd x=1 Is x greater than or equal to t?
INV 2nd x=1 Is x less than t? (x < t?)

If the answer is YES, program goes directly to step that follows key sequence.
If the answer is NO, program SKIPS step that follows key sequence, and continues.
SUBROUTINES:

\[ \text{SBR}\ n\ \text{and}\ \text{INV}\ SBR\ Key\ Sequences}\]

To Create a Subroutine – just begin any series of program steps you need to use repetitively with a label. End the series of steps with an \text{INV}\ SBR key sequence.

To Use a Subroutine – Insert an \text{SBR}\ n\ Key sequence in your program where \( n \) is the label number of the subroutine.

EDITING KEYS:

\[ \text{SST} \quad \text{– Single Step Key} \]
Steps through program steps one at a time. When used in “learn” mode, displays program key codes sequentially. When used out of “learn” mode, executes program one step at a time.

\[ \text{BST} \quad \text{– Back Step Key} \]
When used in “learn” mode, steps backwards through a program one step at a time.

To Write Over a Program Step:
Just get to the exact step number of a step you need to change, and (while in “learn” mode) key in the new instruction. It will replace the old one.

\[ \text{2nd}\ \text{Nop} \quad \text{– No Operation Key} \]
Can be used while in learn mode to blank out any program step with a null step.

\[ \text{2nd}\ \text{Ins} \quad \text{– Insert Key Sequence} \]
To insert program steps, just get to the location at which you’d like to add steps and press \text{2nd}\ Ins (while in “learn” mode). That instruction, and all that follow it, will be moved down one step.

\[ \text{2nd}\ \text{Del} \quad \text{– Delete Key Sequence} \]
To delete program steps, just get to the location of any step you’d like to delete, and (while in “learn” mode) press \text{2nd}\ Del. The instruction at that location will be deleted, and all those after it will be “brought up” one location to fill the gap it leaves.
# Calculator Key Program Codes

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## Display in "Learn" Mode

46 | –39 | 6

- **Program Location**
- **Inverse Operation**
- **Address or Label**