

# TI PROGRAMMABLE 57 REFERENCE GUIDE



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).

[2nd] [C] — clears the "1" register (memory 7) only.

[CLR] — clears machine, except for memories and program steps.

[INV] [2nd] [C] — 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<sup>x</sup>].
- Enter the power (x).
- Press [=] (or other function key).

**To take the x<sup>th</sup> root of a number (y).** ( $\sqrt[x]{y}$ )

- Enter the number (y).
- Press [INV] [y<sup>x</sup>].
- Enter the root (x).
- Press [=] (or other function key).

## MEMORIES:

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

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

[RCL] n recalls the number from memory n into the display.

[2nd] [↔] n — swaps the display value with what's in memory n.

[SUM] n — sums the number in the display into memory n (the result stays in the memory).

[INV] [SUM] n — subtracts the number in the display from what's in memory n (the result stays in memory).

[2nd] [Prd] n — multiplies what's in memory n by the number in the display (result stays in memory).

[INV] [2nd] [Prd] n — 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 [2nd] [FIX] n, where n is the desired number of digits to the right of the decimal point (0 to 8).

Pressing [INV] [2nd] [FIX] or [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 [2nd] [Rad] to change to Radian mode.
- Press [2nd] [Grad] to change to Grad mode.
- Press [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: [2nd] [sin], [2nd] [cos], [2nd] [tan], and their inverses.
- Polar to Rectangular Conversion: [2nd] [P→R], and its inverse.

## CONVERSIONS:

### Polar to Rectangular

- Enter R, Press:  $\boxed{x\div t}$
- Enter  $\theta$
- Press  $\boxed{2nd}$   $\boxed{P\rightarrow R}$  — y is displayed.
- Press  $\boxed{x\div t}$  to read x.

### Rectangular to Polar

- Enter x • Press  $\boxed{x\div t}$
- Enter y
- Press  $\boxed{INV}$   $\boxed{2nd}$   $\boxed{P\rightarrow R}$  —
- $\theta$  is displayed.
- Press  $\boxed{x\div t}$  to read R.

### Degrees, Min, sec to Decimal Degrees

- Enter degrees, Press  $\boxed{\circ}$
- Enter minutes (2 digits) and seconds (2 digits).
- Press  $\boxed{2nd}$   $\boxed{D.MS}$  for decimal value.

### Decimal Degrees to Degrees, Min, Sec

- Enter decimal degrees
- Press  $\boxed{INV}$   $\boxed{2nd}$   $\boxed{D.MS}$
- (Degrees, minutes, seconds) now displayed.

## STATISTICAL KEYS AND FUNCTIONS:

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

### If you have only one set of data to analyze:

- Enter each data point.
- Press  $\boxed{2nd}$   $\boxed{\Sigma+}$
- Repeat for all points.
- Press  $\boxed{2nd}$   $\boxed{\bar{x}}$  to calculate the *mean*.
- Press  $\boxed{2nd}$   $\boxed{\sigma^2}$  to calculate the *variance* (with N weighting).
- Press  $\boxed{2nd}$   $\boxed{\sigma^2}$   $\boxed{\sqrt{x}}$  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  $\boxed{x\div t}$
  - Enter a "y" data point.
  - Press  $\boxed{2nd}$   $\boxed{\Sigma+}$
  - Repeat for all points.
  - Press  $\boxed{INV}$   $\boxed{2nd}$   $\boxed{\bar{x}}$  to calculate the mean of the "x" data points.
  - Press  $\boxed{2nd}$   $\boxed{\bar{x}}$  to calculate the mean of the "y" data points.
  - Press  $\boxed{INV}$   $\boxed{2nd}$   $\boxed{\sigma^2}$  to calculate the variance of the "x" data points.
  - Press  $\boxed{2nd}$   $\boxed{\sigma^2}$  to calculate the variance of the "y" data points. (use  $\boxed{\sqrt{x}}$  key to calculate standard deviation).

## CALCULATOR KEY CODES IN NUMERICAL ORDER

00	$\boxed{0}$	42	$\boxed{EE}$
01	$\boxed{1}$	-42	$\boxed{INV}$ $\boxed{EE}$
09	$\boxed{9}$	43	$\boxed{(-)}$
13	$\boxed{1/nx}$	44	$\boxed{)}$
-13	$\boxed{INV}$ $\boxed{1/nx}$	45	$\boxed{\div}$
14	$\boxed{CE}$	46	$\boxed{2nd}$ $\boxed{N}$
15	$\boxed{CLR}$	48	$\boxed{2nd}$ $\boxed{FIX}$
18	$\boxed{2nd}$ $\boxed{\log}$	-48	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{FIX}$
-18	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{\log}$	49	$\boxed{2nd}$ $\boxed{int}$
19	$\boxed{2nd}$ $\boxed{C.t}$	-49	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{int}$
-19	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{C.t}$	50	$\boxed{2nd}$ $\boxed{Deg}$
20	$\boxed{2nd}$ $\boxed{\tan}$	51	$\boxed{GTO}$
-20	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{\tan}$	55	$\boxed{X}$
22	$\boxed{x\div t}$	56	$\boxed{2nd}$ $\boxed{DSZ}$
23	$\boxed{x^2}$	-56	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{DSZ}$
24	$\boxed{\sqrt{x}}$	60	$\boxed{2nd}$ $\boxed{Rad}$
25	$\boxed{1/x}$	61	$\boxed{SBR}$
26	$\boxed{2nd}$ $\boxed{D.MS}$	-61	$\boxed{INV}$ $\boxed{SBR}$
-26	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{D.MS}$	65	$\boxed{-}$
27	$\boxed{2nd}$ $\boxed{P\rightarrow R}$	66	$\boxed{2nd}$ $\boxed{x\div t}$
-27	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{P\rightarrow R}$	-66	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{x\div t}$
28	$\boxed{2nd}$ $\boxed{\sin}$	70	$\boxed{2nd}$ $\boxed{Grad}$
-28	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{\sin}$	71	$\boxed{RST}$
29	$\boxed{2nd}$ $\boxed{\cos}$	75	$\boxed{+}$
-29	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{\cos}$	76	$\boxed{2nd}$ $\boxed{x\div t}$
30	$\boxed{2nd}$ $\boxed{\pi}$	-76	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{x\div t}$
32	$\boxed{STO}$	80	$\boxed{2nd}$ $\boxed{\sigma^2}$
33	$\boxed{RCL}$	-80	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{\sigma^2}$
34	$\boxed{SUM}$	81	$\boxed{R/S}$
-34	$\boxed{INV}$ $\boxed{SUM}$	83	$\boxed{\cdot}$
35	$\boxed{y^x}$	84	$\boxed{+/-}$
-35	$\boxed{INV}$ $\boxed{y^x}$	85	$\boxed{=}$
36	$\boxed{2nd}$ $\boxed{Pause}$	86	$\boxed{2nd}$ $\boxed{Lbl}$
38	$\boxed{2nd}$ $\boxed{Exc}$	88	$\boxed{2nd}$ $\boxed{\Sigma+}$
39	$\boxed{2nd}$ $\boxed{Prd}$	-88	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{\Sigma+}$
-39	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{Prd}$	89	$\boxed{2nd}$ $\boxed{\bar{x}}$
40	$\boxed{2nd}$ $\boxed{1/x}$	-89	$\boxed{INV}$ $\boxed{2nd}$ $\boxed{\bar{x}}$

## 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.

### **2nd** **PAUSE**

While a program is running, encountering a **2nd** **PAUSE** instruction causes the program to halt and display contents of the display register for about  $\frac{3}{4}$  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** **DS** – Decrement and Skip on Zero Key

#### Sequence

Works together with memory zero. When **2nd** **DS** 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** **DS**.
- If the result *IS ZERO*, the calculator *SKIPS* the step following **2nd** **DS**, 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 $\leftrightarrow$ 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 $\equiv$ t** –  
Is x equal to t?

**INV** **2nd** **x $\neq$ t** Is x not  
equal to t? ( $x \neq t$ )

**2nd** **x $>$ t** Is x greater  
than or equal to t?

**INV** **2nd** **x $<$ t** 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:

### **SBR** n and **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 **INV** **SBR** key sequence.

**To Use a Subroutine** – Insert an **SBR** n Key sequence in your program where n is the label number of the subroutine.

## EDITING KEYS:

### **SST** – 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.

### **BST** – 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.

### **2nd** **NOG** – No Operation Key

Can be used while in learn mode to blank out any program step with a null step.

### **2nd** **INS** – Insert Key Sequence

To insert program steps, just get to the location at which you'd like to add steps and press **2nd** **INS** (while in "learn" mode). That instruction, and all that follow it, will be moved down one step.

### **2nd** **DEL** – 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 **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

Rows	No	Minus	<b>NOG</b> 18	<b>CL</b> 19
1	<b>2nd</b> Code	<b>INV</b> Sign	<b>INX</b> 13	<b>CE</b> 14 <b>CLR</b> 15
2	<b>MS</b> 26 (No Code)	<b>P-R</b> 27 <b>x&lt;1</b> 22	<b>SQ</b> 28 <b>x²</b> 23	<b>COS</b> 29 <b>√x</b> 24 <b>1/x</b> 25
3	<b>PAUSE</b> 36 (No Code)	<b>INS</b> Code)	<b>EXC</b> 38 <b>RCL</b> 33	<b>P/rt</b> 39 <b>SUM</b> 34 <b>π</b> 30 <b>Y*</b> 35
4	<b>NO</b> 46 (No Code)	<b>DEL</b> Code)	<b>FIX</b> 48 <b>(</b> 43	<b>INT</b> 49 <b>)</b> 44 <b>1/x</b> 40 <b>+</b> 45
5	<b>DS</b> 56 <b>GTO</b> 51	<b>7</b> 07	<b>8</b> 08	<b>9</b> 09 <b>X</b> 55 <b>DEG</b> 50
6	<b>x=1</b> 66 <b>SBR</b> 61	<b>4</b> 04	<b>5</b> 05	<b>6</b> 06 <b>-</b> 65 <b>RAD</b> 60
7	<b>x=1</b> 76 <b>RST</b> 71	<b>1</b> 01	<b>2</b> 02	<b>3</b> 03 <b>GRD</b> 70 <b>+</b> 75
8	<b>LBL</b> 86 <b>R/S</b> 81	<b>0</b> 00	<b>+</b> 88 <b>•</b> 83	<b>x</b> 89 <b>+/-</b> 84 <b>σ2</b> 80 <b>≡</b> 85

### Columns

1	2	3	4	5
(for second functions)				
6	7	8	9	0

## Display in "Learn" Mode

