

Technical information for professionals and students

# TEXAS INSTRUMENTS TI-68 ADVANCED SCIENTIFIC CALCULATOR

An extremely powerful computational tool, the TI-68 is designed to speed you through challenging calculations. It performs 254 functions, yet it's easy-to-use and a great value, too.



The capabilities of the TI-68 go far beyond ordinary calculations. There's power to solve up to five simultaneous equations with real or complex coefficients. Forty complex-number functions — from simple arithmetic to advanced trigonometry. A convenient equation replay feature for checking and editing your work. And versatile formula-programming capabilities.

With the TI-68 you'll find it's easy to concentrate on problem-solving skills. To this end the TI-68 offers helpful prompts that guide you through simultaneous equations and formulas, gives you a straightforward way to enter complex numbers and has an easy-to-read, dot-matrix alphanumeric display.

The result is a calculator that can solve complex problems but is surprisingly easy to learn and to use.

With the TI-68 there's no time wasted learning to operate a complicated calculator. You can start solving problems immediately and spend the rest of your time doing critical thinking and developing problem-solving strategies. Once that important work is done, you can rely on your calculator to provide fast, accurate answers.

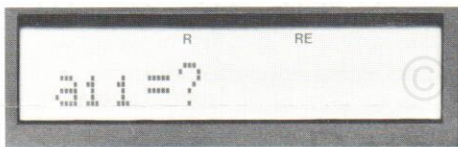
If you're a student, this approach can help you speed through exams and homework. If you're a professional, it can help you stay on schedule. And always with complete confidence in your answers.

# The TI-68 delivers 254 of the most advanced engineering, science and math functions. Yet the calculator is easy-to-use and a great value, too.

The TI-68 sets new standards for advanced scientific calculators:

**Simultaneous equations.** The calculator solves up to five simultaneous equations with real or complex coefficients. You can solve two or three equations relatively easily on paper, but handling more than that is a real challenge. There's a greater chance of error when you try to solve four or five simultaneous equations manually, so a calculator like the TI-68 becomes very useful.

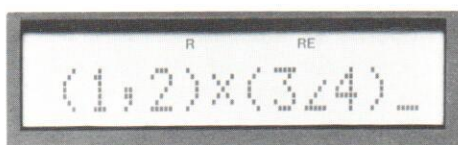
With the TI-68 you can solve simultaneous equations directly. To guide you through each equation a plain-English prompting system asks you to input the coefficients.



**Complex numbers.** Many physical properties, particularly those we encounter in electricity and mechanics, can't be described without using complex numbers. But try to operate on complex numbers using many calculators and all you get is an error message.

The TI-68 evaluates 40 complex-number functions from simple arithmetic to advanced trigonometry. And you don't have to enter a special mode or one with limited capabilities to use these functions.

You can enter complex numbers just as you'd write them on paper — using polar coordinates, rectangular coordinates or a combination. The TI-68 is the first calculator that can handle a combination of polar and rectangular coordinates in the same equation.



The display simultaneously shows both the real and the imaginary part of

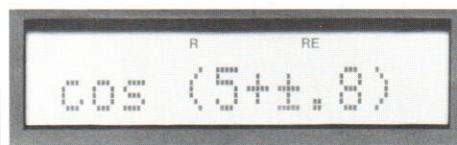
the complex number. You can scroll left and right to read a long number or fix the decimal point to keep the entire number within one screen. You also can select the coordinates in which your results will be displayed — polar or rectangular.

### Last equation replay feature.

Research underscores the value students and technical professionals place on being able to check their entries and verify their answers quickly and easily. With the last equation replay feature you can recall, check and edit the last equation you calculated.

The last equation replay feature eliminates the need to reenter your work, and you can replay one equation even after you've started to enter a second one.

If an error message should appear in the display, you can use the last equation replay feature to help determine the cause. In this case the calculator places the cursor at a point where you might start looking to edit the equation.



**Formula programming.** The TI-68 provides up to 440 steps of formula programming, and you can develop as many as 12 formulas.

Entering and running programs is easy with the TI-68. The calculator's alphanumeric capabilities simplify program-writing and editing. The dot-matrix display shows you the formula exactly as you enter it — there are no operation codes to learn.



The TI-68 prompts you to enter each variable in order, and you can nest formulas to simplify long calculations.

Constant Memory™ feature retains formulas even when you turn the calculator off.

**Memory registers.** You can store values in up to 36 memory registers and give each register a meaningful name of up to three characters. The first character of each name must be a letter; subsequent characters can be numbers or letters. Constant Memory feature preserves the contents of every register.

**Integration.** Uses Simpson's rule to perform numerical integration, a function useful in calculus. You can integrate a formula you've previously entered and integrate on any variable in a formula. The TI-68 prompts you to provide the upper and lower integration limits and the number of intervals. You can even specify the level of precision you require by changing the number of intervals.

**Polynomial root finder.** Automatically calculates the real and complex roots of quadratic, cubic and quartic equations (second, third and fourth-order polynomials). The TI-68 prompts you for each coefficient and labels each root.

**Statistics.** Performs one- and two-variable statistical functions including linear regression and trend analysis.

**Number bases.** You can perform arithmetic calculations using decimal, hexadecimal, octal or binary numbers. You also can combine different number bases within a calculation.

You can use the calculator to perform number-base conversions and the Boolean logic operations fundamental to computer programming.

**Conversions.** Performs 18 additional conversions including polar/rectangular, English/metric and angular measurements using degrees, radians and grads.

**Additional functions** include reciprocals. Powers and roots. Logarithms. Hyperbolic functions. Combinations and permutations.

# Designed to speed you through challenging calculations.



grips in the sides of the case promote sure handling.

The calculator is powered by one lithium battery (included) that provides approximately 1,500 hours of operation — that's roughly four years of normal use. TI's APD™ automatic power down feature extends battery life by turning off the calculator after several minutes of non-use.

The TI-68 includes a 180-page guidebook that fully describes each function and presents step-by-step examples. A quick reference card provides a handy summary of functions.

The TI-68 measures 6.0 x 3.0 x 0.6 inches (15.2 x 7.6 x 1.5 centimeters) and weighs 4.5 ounces (128 grams).

TI conducted extensive research among technical professionals, university professors and engineering students during the development of the TI-68. Surveys of 3,000 individuals and personal interviews with 150 more provided an invaluable understanding of the needs and preferences of these power users.

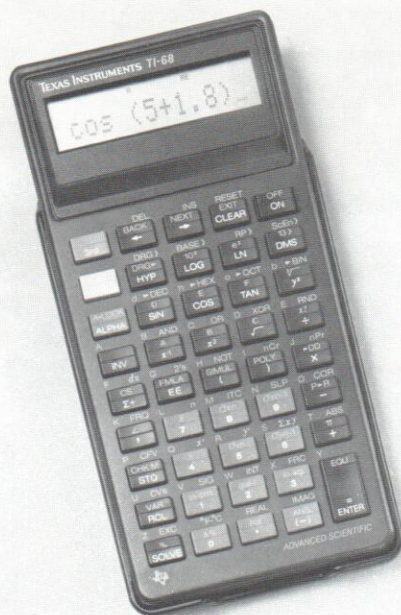
Defining the functions and operating characteristics of an advanced scientific calculator is a lengthy process. In its research TI employed software based on artificial-intelligence principles. This state-of-the-art technique can be used to determine the combination of attributes a product must have to appeal to a specific market segment.

With its sleek, ergonomic design, the TI-68 has the look of a powerful problem-solving tool.

The easy-to-read liquid-crystal display (LCD) is recessed and tilted to reduce glare. Each character is presented in a 5 x 7 dot matrix. The display shows up to 12 alphanumeric characters; you can scroll to show equations up to 80 characters long.

The calculator has 44 keys including 2nd and 3rd function keys, ALPHA, ALPHA LOCK and a large EQUALS key. Keys are color-coded and grouped

by function; designations are easy-to-read. Operations found to be used most frequently are assigned to first-function keys.



A sturdy sliding cover protects the display and keyboard from dirt and scratches. The cover, which stores securely on the back of the calculator during use, has non-skid feet. A thumb notch on the cover and recessed finger

# Advanced, single-chip architecture provides high performance, long battery life.

The heart of the TI-68 is a single, advanced calculator integrated circuit. Fabricated in a high-performance silicon-gate CMOS technology that dissipates very little power, this four-bit microcomputer is designed specifically for calculator applications. The highly integrated chip contains the TI-68's CPU and memory as well as its 540-pixel display-driver and keyboard-interface circuitry.

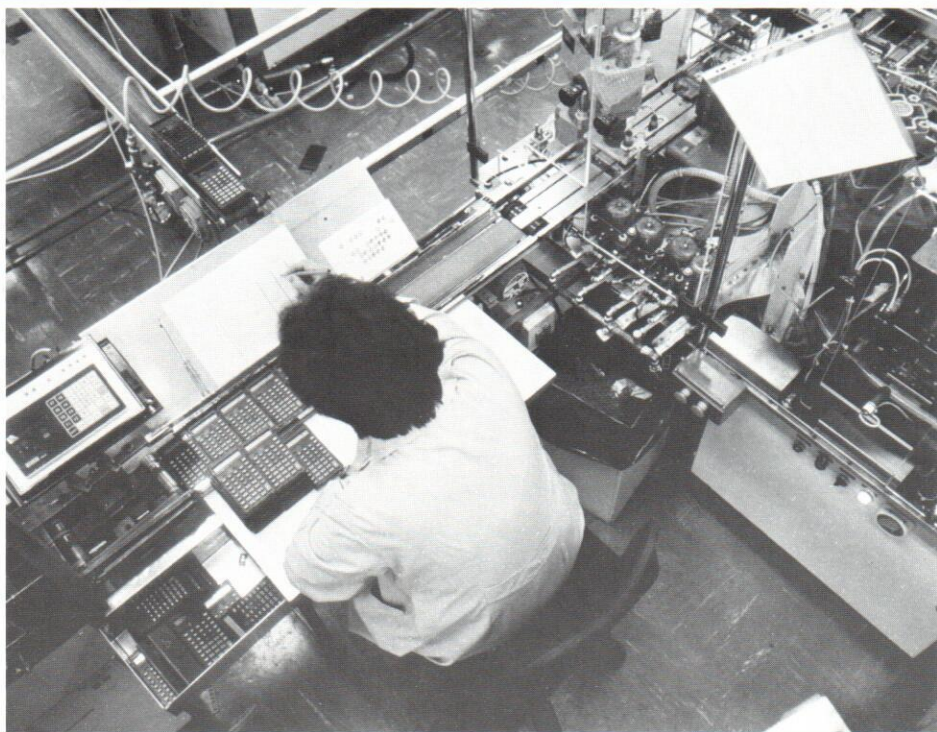
To prolong battery life without compromising high-performance operation, the TI-68 chip operates in multiple modes. In its high-speed calculating mode the chip consumes 220 microamps; in its power-saving idle mode the chip drives the display and reads the keyboard for inputs but consumes just 23 microamps. The calculator maintains the high contrast and wide viewing angle of its liquid crystal display over the life of the battery.

## Carefully engineered and thoroughly tested to provide years of reliable service.

Texas Instruments manufactures the TI-68 under rigid quality standards. We test the calculator and its components to assure reliable service that extends far beyond the calculator's one-year limited warranty.

In rigorous qualification and production tests the TI-68 has survived conditions that simulate reasonably expected use and reasonably expected abuse:

- Extended-storage temperatures that range from -40 to 70 degrees Celsius (-40 to 158 degrees Fahrenheit).
- Operating temperatures that range from zero to 40 degrees Celsius (32 to 104 degrees Fahrenheit).
- Steam-bath conditions (a temperature of 50 degrees Celsius — 122 degrees Fahrenheit — with 95 percent relative humidity).
- Drop tests conducted from desktop height to cause an impact on each surface of the calculator.
- Keystroke actuation tests (500,000 actuations per key) and more.



# An introduction to the TI-68 advanced scientific calculator.

## To begin . . .

Press **ON**. To set the calculator, press **3rd** **[RESET]**.

Defaults YN?

Press these keys to respond to the displayed prompts:

Press **ALPHA** **Y**.

Clr Mem YN?

Press **ALPHA** **Y**.

Confirm YN?

Press **ALPHA** **Y**.

Cleared

## Entering and solving equations is straightforward.

Calculate  $8^2 \times \log(25^{2.5} / .03125)$ .

To enter the expression, press

8 **x<sup>2</sup>** **×** **LOG** **(** 25 **y<sup>x</sup>** 2.5 **÷** .03125

As you fill the display, notice how it scrolls to show the most recent keystrokes.

Evaluate the entry by pressing **ENTER**.

320

Use the Last Equation Replay feature to retrieve the last equation, edit it and find the new result. Change .03125 to .3125.

Retrieve the expression by pressing **2nd** **[EQU]**.

$8^2 \times \log(25y$

To edit the expression, press **→** to position the cursor at the 0.

$(25y^x 2.5 \div .0$

Delete the 0 by pressing **3rd** **[DEL]**.

$(25y^x 2.5 \div .3$

Evaluate the entry by pressing **ENTER**.

256

## The TI-68 evaluates 40 complex-number functions from simple arithmetic to advanced trigonometry.

Find the product of two rectangular complex numbers.

$(5.18, 5.7) \times (6.24, 6) = ?$

To enter the expression, press

**(** 5.18 **,** 5.7 **)** **×** **(** 6.24 **,** 6 **)**

Evaluate the entry by pressing **ENTER**.

$(-1.8768, 66.648)$

Find the sum of two polar complex numbers.

$(13 \angle 22.62) + (5 \angle 53.13) = ?$

Set the calculator to display four places after the decimal.

To set the fixed decimal, press **CLEAR** **2nd** **[FIX]** 4.

To enter the expression, press

**(** 13 **2nd** **∠** 22.62 **)** **+** **(** 5 **2nd** **∠** 53.13 **)**

Evaluate the entry by pressing **ENTER**.

$(15.0000, 9.0000)$

To return the calculator to floating decimal operation, press **2nd** **[fix]** **.**

Combine complex and real numbers.

$(3, -4)^{-1} \times 10 + (6 \angle -90) = ?$

To enter the expression, press **(** 3 **,** **(-)** 4 **)** **x<sup>-1</sup>**

**×** 10 **+** **(** 6 **2nd** **∠** **(-)** 90 **)**

Evaluate the entry by pressing **ENTER**.

$(1.2, -4.4)$

## Finding polynomial roots.

Find the roots of  $25x^2 + 12x + 1.69 = 0$ .

To find second-order polynomial roots, press **2nd** **[POLY]**.

Press **2**.

Respond to the displayed prompts to enter the coefficients.

Press **25** **[ENTER]**.

Press **12** **[ENTER]**.

Press **1.69** **[ENTER]**.

To view the results without reviewing the coefficients, press **ALPHA** **N**.

To view the next result, press **[ENTER]**.

Order 2-4?

A2=?

A1=?

A0=?

Review YN?

x1= (-0.24, 0.1)

x2= (-0.24, -0.1)

## Solving a real system of simultaneous equations.

The TI-68 can rapidly determine the solutions to a system of simultaneous equations up to fifth order. This short demonstration solves a second-order system of simultaneous equations for  $x_1$  and  $x_2$ .

$$6x_1 + 5x_2 = 1$$

$$2x_1 + 3x_2 = 4$$

To begin solving a system of simultaneous equations, press **2nd** **[SIMUL]**.

To specify second order, press **2**.

To specify a real system, press **ALPHA** **N**. Then enter the coefficients equation-by-equation.

Press **6** **[ENTER]**.

Press **5** **[ENTER]**.

Press **1** **[ENTER]**.

Press **2** **[ENTER]**.

Press **3** **[ENTER]**.

Press **4** **[ENTER]**.

To view the results without reviewing the coefficients, press **ALPHA** **N**.

To view the next result, press **[ENTER]**.

Equa 2-5?

Complex YN?

a 11 = ?

a 12 = ?

b 1 = ?

a 21 = ?

a 22 = ?

b 2 = ?

Review YN?

x1 = -2.125

x2 = 2.75

## Solving a complex system of simultaneous equations.

Solve this second-order set of complex simultaneous equations to find  $x_1$  and  $x_2$ .

Set the calculator to show answers to three places after the decimal so the entire result can be seen without scrolling the display.

$$(6.8, 4.7)x_1 + (9.3, 8.7)x_2 = (1.1, 6.9)$$

$$(9.7, 2.3)x_1 + (8.7, 5.5)x_2 = (9.3, 8.8)$$

To set the fixed decimal, press **2nd** **[FIX]** **3**.

To begin solving a system of simultaneous equations, press **2nd** **[SIMUL]**.

To specify second order, press **2**.

To specify a complex system, press **ALPHA** **Y**. Then enter the coefficients equation-by-equation.

Press **(** **6.8** **,** **4.7** **)** **[ENTER]**.

Press **(** **9.3** **,** **8.7** **)** **[ENTER]**.

Press **(** **1.1** **,** **6.9** **)** **[ENTER]**.

Press **(** **9.7** **,** **2.3** **)** **[ENTER]**.

Press **(** **8.7** **,** **5.5** **)** **[ENTER]**.

Press **(** **9.3** **,** **8.8** **)** **[ENTER]**.

To view the results without reviewing the coefficients, press **ALPHA** **N**.

To view the next result, press **[ENTER]**.

Equa 2-5?

Complex YN?

a 11 = ?

a 12 = ?

b 1 = ?

a 21 = ?

a 22 = ?

b 2 = ?

Review YN?

x1 = (1.923, 1.187)

x2 = (-0.915, -0.242)

= (-0.915, -0.242)

-

**→** **→**

To return the calculator to floating decimal operation, press **2nd** **[FIX]** **.**

© 2024 Joerg Woerner  
Datamath Calculator Museum

## Formula programming capabilities.

Evaluate  $Y = 10e^{-X/T}$  for several values of X when  $T = .5$ .

Let X be: 0, .2, .4

To begin the formula routine, press **2nd** **[FMLA]**.

To enter the formula, press

**ALPHA** Y **ENTER** 10 **x** **2nd** **e<sup>x</sup>** **(** **(-)** **ALPHA** X **÷**  
**ALPHA** T **)**

To store the formula, press **ENTER**.

To evaluate the formula, press **ALPHA** Y.

To enter the first value for X, press 0 **ENTER**.

To enter the value for T, press .5 **ENTER**.

To view the result without reviewing the variables, press **ALPHA** N.

To evaluate the formula again, press **SOLVE**.

To enter the next X, press .2 **SOLVE**.

To evaluate the formula again, press **SOLVE**.

To enter the next X, press .4 **SOLVE**.

Name?

$0 \times e^{(-X \div T)}$

Solve YN?

X = ?

T = ?

Review YN?

Y = 10

X = 0

Y = 6.70320046

X = .2

Y = 4.493289641

## Integration

Integrate the previous formula with respect to X. Use a lower limit of 0, an upper limit of .6, and three intervals.

To begin the formula routine, press **2nd** **[FMLA]**.

To specify the formula and begin evaluation, press **ALPHA** Y **ENTER**.

To use the formula, press **ENTER** **ALPHA** Y.

To declare X as the independent variable, press **CLEAR** **3rd** **[dx]** **ENTER**.

To enter the lower limit, press 0 **ENTER**.

To enter the upper limit, press .6 **ENTER**.

To specify the number of intervals, press 3 **ENTER**.

To accept T, press **ENTER**.

To proceed with the result without reviewing the variables, press **ALPHA** N.

When you finish, you can turn off the calculator by pressing **2nd** **[OFF]**.

Name?

$Y = 10 \times e^{(-X \div T)}$

X = .4

low = ?

up = ?

intrv = ?

T = .5

Review YN?

Y = 3.494059851

For more information on the TI-68  
advanced scientific calculator — or for  
information about TI calculator  
dealers, call 806/747-1882.

© 2024 Joerg Woerner  
Datamath Calculator Museum



**TEXAS  
INSTRUMENTS**