

TI-74 BASICALC™ Software and Accessories

Software Modules

These modules contain easy-to-use programs, chosen to serve a broad range of applications. No programming skill is required; however, a clear understanding of subject matter and tools is needed because the manuals make no attempt to teach these.

The Mathematics and Statistics modules contain useful subprograms which are available to the user when programming in BASIC.

Mathematics Module

Complex Functions — Allows you to perform 19 mathematical operations and functions on complex numbers. This program will calculate $\text{REAL}(Z)$, $\text{IMAG}(Z)$, R , and THETA dependent upon which function or operation you are using.

Gamma Function — Computes the value of the gamma functions for positive integers and positive and negative non-integers, also $\ln(\text{gamma}(x))$.

Polynomial Multiplication — Performs the multiplication of two polynomials.

Prime Factors — Factors an integer into prime numbers.

Cubic Splines — Fits a sequence of cubic polynomials to input data points (a maximum of 100 data points using cubic spline interpolation).

Relative Minimums — Finds a value at which a function is minimum within an interval. The minimum of the interval is not necessarily the absolute minimum.

Root Finder/Bisection — Uses the bisection method to find the roots of a function.

Root Finder/Newton — Uses the Newton-Raphson technique to approximate the roots of a function.

Convolution — Given the impulse response for a linear system, this program uses the convolution integral to find the output for a specified input waveform. The program uses the trapezoidal rule to generate outputs at intervals of Δt .

Differential Equations/Runge-Kutta — Uses a fifth-order, Runge-Kutta method to solve a system of differential equations of the type $y' = f(x, y)$.

Gauss Quadrature — Approximates the integral of a specified function over an interval.

Complex System — Solves a system of n by n simultaneous equations with complex coefficients. Rows and columns are assigned in a traditional matrix.

Matrices — Allows you to perform five different operations using matrices: matrix addition, matrix multiplication, matrix inversion, solution of linear simultaneous equations, and evaluation of the determinant of a matrix.

Tridiagonal Matrix — Solves matrices that are in the tridiagonal form. It is appropriate to use this program when a matrix has non-zero elements only along the main diagonal and the diagonals on either side.

Statistics Module

Histogram — Will determine the number of occurrences per cell, means, and moments of the histogram.

Means and Moments — For a given set of input data with associated frequencies, this program will calculate the means, moments, skewness, and kurtosis of a sample distribution.

t-Test: Paired Observations — Will evaluate the t -statistic with $n-1$ degrees of freedom to test the hypothesis that two normally-distributed populations of paired data with the same unknown variance have the same mean.

t-Test: Unpaired Observations — Will provide the capabilities of the t -TEST: Paired Observations program; however, the two samples do not need to contain the same number of data points.

Contingency Table Analysis — Will evaluate two-way contingency tables.

Mann-Whitney Rank Sum Test — Is used to compare the mean of two populations having the same distribution. It will test:

- That the means of the populations are equal, or
- That the means of the populations differ by an unknown constant.

One-Way Analysis of Variance (Anova) — Is used to compare the mean of various sets of data with different variances and test the hypothesis that a number of populations have the same mean. One-way anova is used to analyze several sample populations where only one factor varies.

Two-Way Anova — Is used in situations which involve two or more varying factors and a possible influence of one factor upon another.

Binomial Distribution — May be used when the variables comply with the following conditions:

- The experiment consists of fixed number of statistically-independent trials,
- Each trial results in either success or failure, and
- Each has a constant probability of success and failure.

Chi-Square Distribution — Calculates the right-tailed area under the chi-square distribution. It is most often used to establish confidence intervals for the standard deviation of a population since its distribution depends on the deviation of a sample.

F-Distribution — The f-statistic is the ratio of two variances. This ratio may be used to compare the variances of two normal populations.

Normal Distribution — May be used on any normally-distributed data with a population of at least 100 elements, and a sample size greater than 30.

Poisson Distribution — Is useful when the probability of a specific event occurring is very small. The inspection and quality control of manufactured goods often yield data which exhibit a Poisson distribution since the number of defective articles in a large lot of goods should be small.

Students' t-Distribution — Is very similar to the normal distribution, but will allow for small samples. The t-curve is most commonly used when the sample size is less than 30.

Finance Module

Finance Program — This program performs time-value-of-money, rate conversion, bond, depreciation, cash-flow, and date calculations.

Time-value-of-money: Helps you make decisions related to mortgage, lease, loan, and savings problems.

Interest rate: Lets you convert between two different methods of expressing interest rates: annual percentage rate (APR) and annual effective rate (AER).

Bond: Lets you calculate the annual yield of a bond sold prior to maturity, the yield-to-maturity, the price at which you must purchase a bond to achieve a particular annual yield, the number of coupon payments paid during the time period in which the bond is owned, and the amount of interest accrued by the bond when it is purchased.

Depreciation: Lets you calculate using the straight line, declining balance, and sum-of-year's-digits depreciation methods.

Cash-Flow: Lets you enter up to 50 different cash-flow groups, with as many as 999 cash flows in each group.

Date: Lets you calculate the number of days between any two dates, using either the actual days or the 360-day method. Also calculates the date and day of the week that is a given number of days and/or months from a specified date. The date functions correctly account for leap years and leap centuries.

Data Forecasting Program — This program lets you project future sales, expenses, asset usage, and other important information based upon the historical data you enter and the forecasting model — level, trend or seasonal — you select.

Learning Curve Program — This program has many applications in modern business, such as scheduling production, projecting unit costs and hours, and setting cost and labor standards.

Rent or Buy Program — This program helps you decide whether it is better to buy or to rent a residence. To make this calculation, you must be able to estimate how long you will occupy the residence; the tax advantages of owning a house are included in the calculation.

True Cost of Insurance Program — This program helps you decide if you should keep an existing whole life insurance policy or purchase term life insurance. Many financial advisors consider term insurance the most cost-effective type of life insurance.

Chemical Engineering Module

Gas Viscosity — Estimates the gas viscosity of nonpolar and polar gases at different pressures. The program provides separate treatment of hydrogen-bonding and nonhydrogen-bonding polar gases.

Gas Thermal Conductivity — Estimates the thermal conductivity of pure gases at low and high pressures (Misic-Thodos and Stiel-Thodos methods) and of mixtures (Wassiljewa-Lindsay-Bromley correlation.)

Liquid Viscosity — Estimates liquid viscosity for hydrocarbons and nonhydrocarbons at various temperatures. Also estimates viscosity for binary mixtures at moderate temperatures.

Liquid Density — Predicts saturated liquid density for pure liquids and mixtures using a generalization of the Rackett equation.

Liquid Thermal Conductivity — Estimates the thermal conductivity of pure liquids using the Robbins-Kingree method and of mixtures using the power law rule.

Vapor Pressure and Raoult's Law K-Value — Estimates vapor pressure using the Frost-Kalkwarf-Thodos method. Also estimates Raoult's Law K-values.

Latent Heat of Vaporization — Estimates the heat of vaporization at a compound's normal boiling point and at a given temperature.

Critical Properties — Estimates critical temperature, pressure, and volume using Lydersen's method.

Specific Heat — Estimates ideal heat capacity for hydrocarbons and non-hydrocarbons in gas and liquid phases.

Soave-Redlich-Kwong Thermodynamics — Estimates compressibility factor, fugacity coefficients, and vapor density for nonideal gases.

Peng-Robinson Thermodynamics — Estimates compressibility factor, vapor density, vapor enthalpy, and the fugacity coefficient of each component of a mixture.

Activity Coefficients — Estimates liquid-phase activity coefficients according to the Wilson equation from the binary interaction coefficients entered.

Reaction Order — Uses the chemical reaction kinetics data of concentration or partial pressure versus time and determines the order of the reaction. As an alternative procedure, after the program selects an appropriate reaction mechanism, it computes the reaction rate constants.

Heat Transfer Coefficient — Estimates heat transfer coefficients for four configurations of heat transfer:

- internal fluid-to-wall for turbulent flow in a pipe
- external fluid-to-wall in a heat exchanger bundle
- external condensing on vertical tubes
- external condensing on horizontal tubes.

Equilibrium Flash — Determines the equilibrium concentrations of the product streams for a single-stage flashing of a feed liquid.

Pipe Analysis for Liquid Flow — Calculates pressure drop for flowing liquids in a pipe given liquid flow rate, physical properties, and a definition of the pipe geometry. It also calculates the liquid flow rate, given the pressure drop.

Absorber Analysis — Solves for the separation in a multicomponent absorption system, using the Edmister method.

Distillation Design — Calculates design for a multicomponent distillation process using the Fenske-Underwood-Gilliland short-cut distillation method.

Heat Exchanger Design — Determines sizing of double-pipe or shell and tube heat exchangers.

Learn PASCAL Module

PASCAL is a programming language that was defined by Niklaus Wirth in the late '60s. It is characterized by a highly-disciplined, relatively formal syntax and structure. The Learn PASCAL Solid State Software™ is an interpreted subset of UCSD Pascal with more than 110 reserved words including access to files and procedures. Includes the Learn PASCAL User's Guide, a Learn PASCAL Reference Guide, a keyboard overlay, and a Quick Reference Card.

TI-74 Hardware/Accessories

8K Constant Memory™ Cartridge

This cartridge is designed to expand memory space and can be used to store contents of the calculator's memory. It has a Constant Memory™ feature to maintain the contents of the cartridge even when it is removed from the calculator. An internal battery given the cartridge a typical service life of three years or more. This cartridge may also be used with the TI-95 PROCALC™.

CI-7 Cassette Interface Cable

The **CI-7 cassette interface cable** connects the TI-74 calculator to a cassette recorder, which you provide. This equipment enables you to store and retrieve information from cassette tape.

PC-324

This printer is a dot-matrix thermal printer designed for use with the TI-74 and the TI-95 calculators. It prints up to 24 characters per line at a speed of 48 lines per minute. It will print the contents of the calculator's display under keyboard or program control and can provide a print record of calculations at any time. The advance key can advance the paper at any time. Four AAA batteries and two rolls of thermal paper are packaged with the unit.

Documentation

The TI-74 is packaged with two manuals, the TI-74 User's Guide and the TI-74 Programming Reference Guide. Also included is a comprehensive Quick Reference Card.

Accessories

The **optional AC9201 adapter (sold separately)** is available for use with the PC-324 printer. When connected to the printer, the adapter provides power for both the printer and the calculator.

The **thermal paper for the PC324** is available in a three-roll package.

The **TI-74 Learn BASIC Guidebook** is designed to help you master the built-in BASIC programming language of the TI-74.

THE **PA201 adapter connector (optional)** allows the AC9201 to directly power the TI-74 without the PC-324 printer.

TI-74 BASICALC™ ACCESSORY ORDER FORM

	Unit Price	Quantity	Total Price
TI-74 STATISTICS	\$50.00		
TI-74 MATHEMATICS	50.00		
TI-74 FINANCE	50.00		
TI-74 CHEMICAL ENGINEERING	50.00		
TI-74 LEARN PASCAL	50.00		
8K CONSTANT MEMORY	50.00		
CI-7	35.00		
Cassette Interface Cable			
PC324	98.00		
Battery-operated thermal printer			
TP324	5.95		
3 Roll/Pkg. of thermal paper			
AC9201	18.95		
Optional adapter for use with the PC324 or the PA201			
PA201	7.95		
Calculator connector for the AC9201			
Learn BASIC Guidebook	9.99		
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