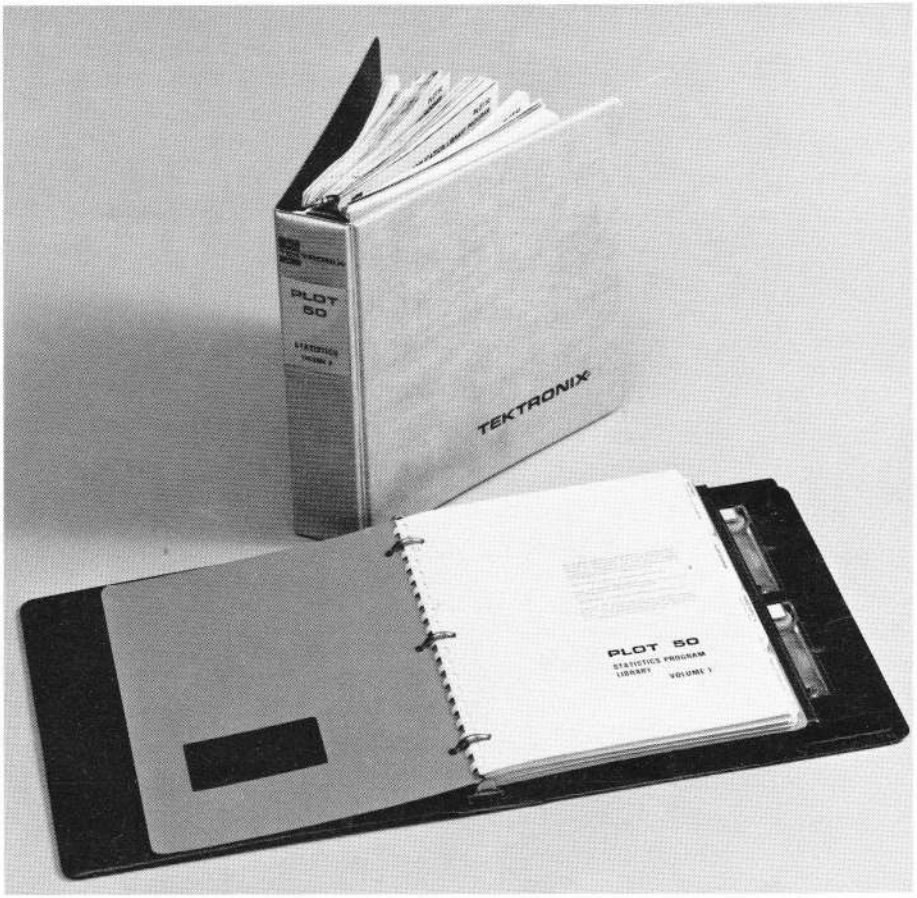
PLOT-50 TEKTRONIX

Software for the 4051 BASIC Graphic Computing System

Statistics Program Library



The shortest route to Graphic solutions. There's always room for error in interpreting results of statistical analysis—that's why quantity and quality of data entry are both vital to the integrity of solutions. That's one reason why Graphics is the ideal medium by which to view the direction data takes and the overall effects of variables.

We designed the 4051 BASIC Graphic Computing System to offer compact local computing power with high-density Graphic capability. We designed our 4051 Statistics Program Library to take full advantage of 4051 flexibility . . . to provide real interactivity in statistical problem-solving, and to make data entry and solutions as easy as pressing a key.

The 4051 Statistics Program Library is a three-volume compilation of wide-ranging programs featuring advanced theoretical approaches to modern statistical theory. Each program offers the greatest possible accuracy and flexibility of data entry to ensure the integrity of final solutions.

There's plenty of elbow room in terms of storage and experimentation. The built-in cartridge tape unit in the 4051 permits management of large data bases, with automatic filing and data retrieval. And because the statistics programs permit total interactivity, you can work through solutions the way you want to, without being tied to a rigid program structure. You can correct or delete data, change parameters, even turn the machine off, with no need to re-enter data from scratch.

Function keys perform major operations. Each statistics volume features its own user-definable overlays, to streamline operations. Where applicable, the 4051 will print significance levels along with results, to eliminate time-consuming reference to tables, with greater accuracy than tables can provide.

Programs and operations procedures of the 4051 Statistics Library have been culled from customer comments about what they'd like to see in a statistics package. The result is a library of the latest statistical techniques that offer the most compact and comprehensive problem solving available, with Graphics capability only Tektronix can provide.

The power of PLOT-50 software is restricted only by the amount of workspace you have to work with; while most of the following programs can be performed with 8K of core, the more space you allow, the larger the problems you can solve.

Here are just some of the resources our library puts at your disposal:

Volume 1: general purpose programs. Including distributions, tabled values, simple regressions, and one sample analysis, with individualized step-saving overlays.

Distributions: Contains routines to calculate probabilities to five significant figures of accuracy—or to provide normal approximations. Other variable approaches are provided for user convenience—for example, single term hypergeometric distributions encompass both cumulative and point hypergeometric. Programs contain routines for determining either approximate or exact answers.

Tabled values are calculated with a minimum six figures of accuracy for input significance levels between .9999 and .0001. The programs handle any valid values of input parameters, with greater accuracy than published tables.

T-test programs each have 10 different descriptive statistics for each sample, with histograms, tests with one tail or two tail significance levels, and 90-99% confidence intervals for means.

Linearized regressions offer the ability to plot data against eight regression equation models. A SELECT BEST FIT key automatically scans and selects the best-fitting equation according to maximum R-square or minimum absolute residual. A TRIM DATA key lets the operator fit the equation to a specified subset, without re-entering all data.

One-sample analysis, with modular subroutines that include sort routine, histograms, censored and trimmed data, t-tests, confidence intervals, and much more, with unequalled plotting capability.

Volume 2: analysis of variance. Includes most commonly required analytical techniques for pre-analysis, analysis and post-analysis of commonly occurring statistical models. Each program allows graphic multiple comparisons; data transformations; plotting and listing of marginal means; analysis of marginal means with contrasts or orthogonal polynomials; automatic printout of significance levels; complete analysis of variance tables; and easy correction and manipulation of entered data. Among the programs included are:

One-way analysis of variance, with balanced or unbalanced data, using a completely randomized design model.

Two-way analysis of variance— either balanced via standard procedures with Tukeys test for zero interactions; or unbalanced, via least squares analysis or weighted squares of means.

Three-way analysis of variance via least squares analysis, plus a generalization of Tukeys test for testing three factor interactions.

Other programs include one-way analysis of co-variance and latin square designs—with each analysis constructed to permit full plotting capability and graphic multiple comparisons.

Volume 3: regressions. With overlays individualized to polynomial regression and multiple linear regression problems. Almost totally interactive variable selection procedures permit plotting any variable against any other; calculating and plotting residuals; calculating Durbin-Watson statistic; and descriptive statistics that calculate variable means, standard variances, and correlation matrices.

Multiple linear regression. By using the program's ADD VARIABLES and DELETE VARIABLES keys, interactive stepwise regression, forward selection, and backward selection procedures may be utilized without re-entering data. The program will suggest which variables to enter or remove, and permits any option to be exercised during equation fitting without duplicating data entry. The operator may plot any variable against any other variable.

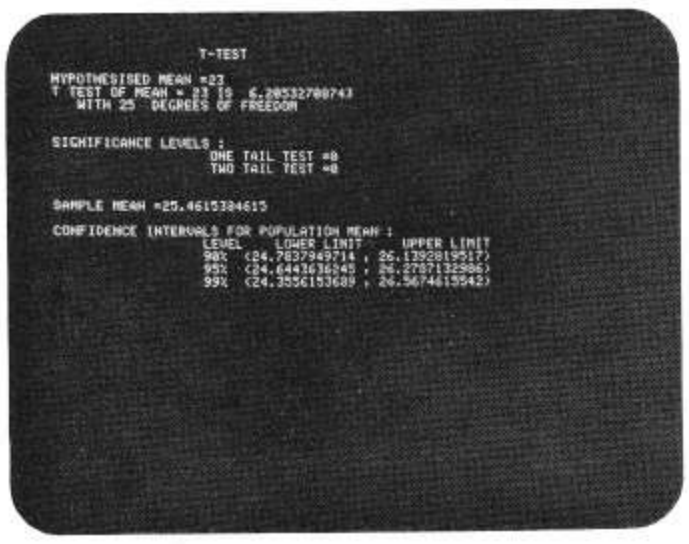
Polynomial regression. Permits degree of fit operations via graphical and objective techniques. In using graphic techniques, the operator simply need select a degree of fit, plot the curve against the data—then continue to select degrees by the press of a key until a satisfactory graph is obtained.

Calculations by objective techniques will display the residual error, orthogonal polynomial sum of squares, F test of significance and R-square. Regression coefficients with t-tests, residuals, plots, the Durbin-Watson test and others may all be printed for any degree selected, without re-entering data.

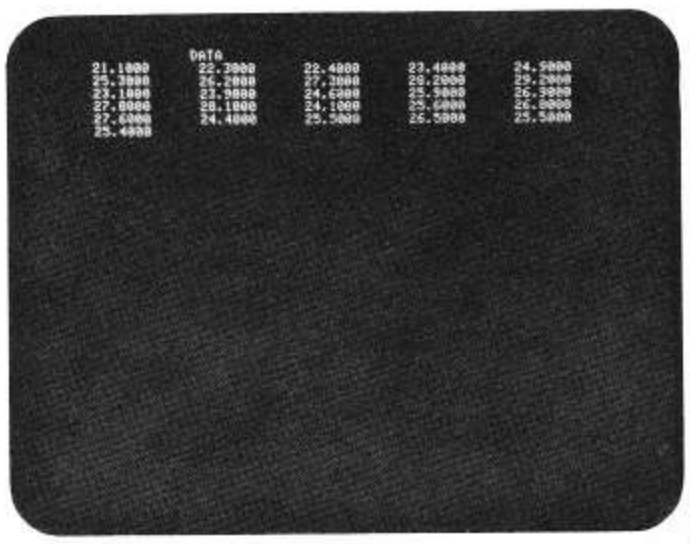
Each 4051 Statistics Program manual is fully documented with examples and suggested program execution. Each program contains function key overlays that make problem-solving routines as rapid and routine as possible—with tape storage that makes even data base collection from instrumentation systems comprehensive and thoroughly manageable. Your Tektronix Sales Engineer can show you how to put it all together . . . very inexpensively.

Statistics Program Library

Volume 1

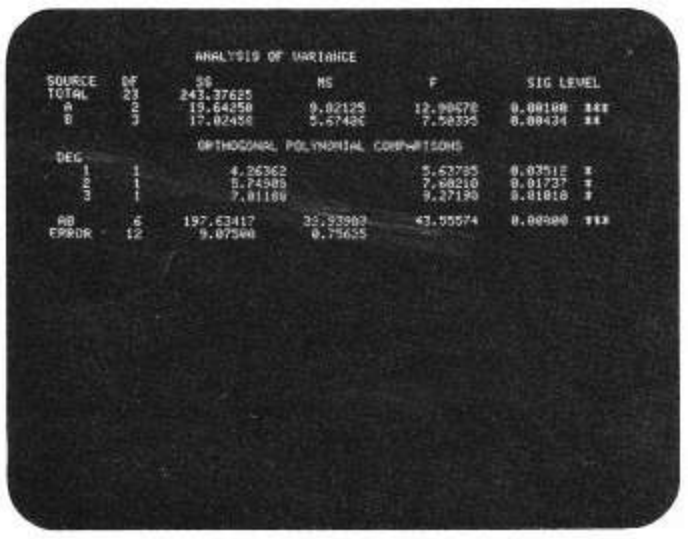


The T test of the mean of a sample equal to 1 with significance levels and confidence intervals for the mean.

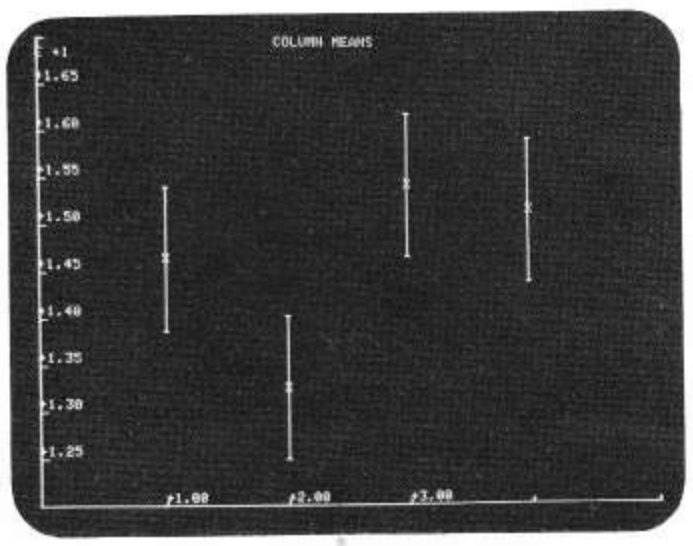


The data for a one sample T test.

Volume 2



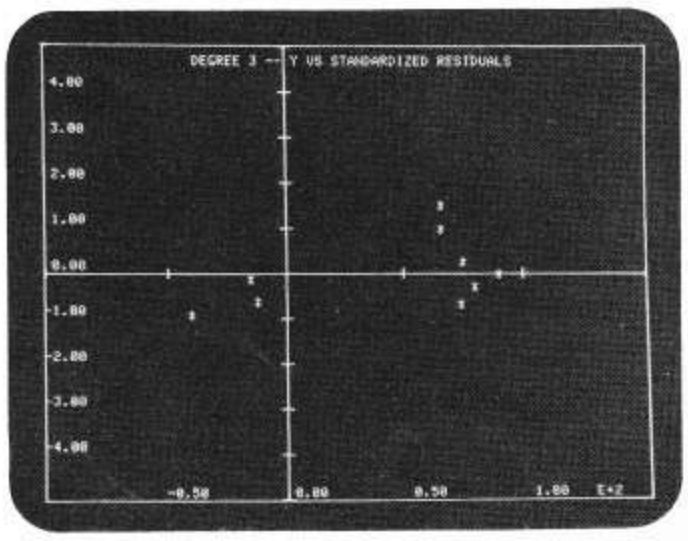
Analysis of variance table for a two-way analysis of variance showing orthogonal polynomial comparison when columns are a quantitative variable.



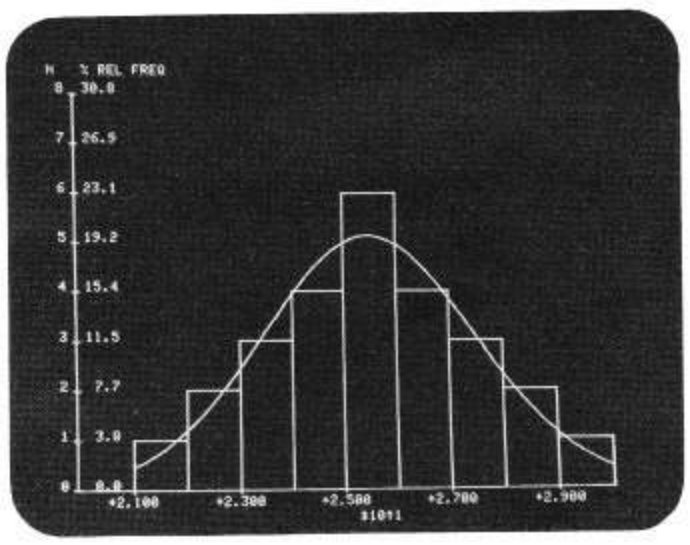
A graph of the column means for the two-way analysis of variance with 95% confidence limits for individual means.

Volume 3

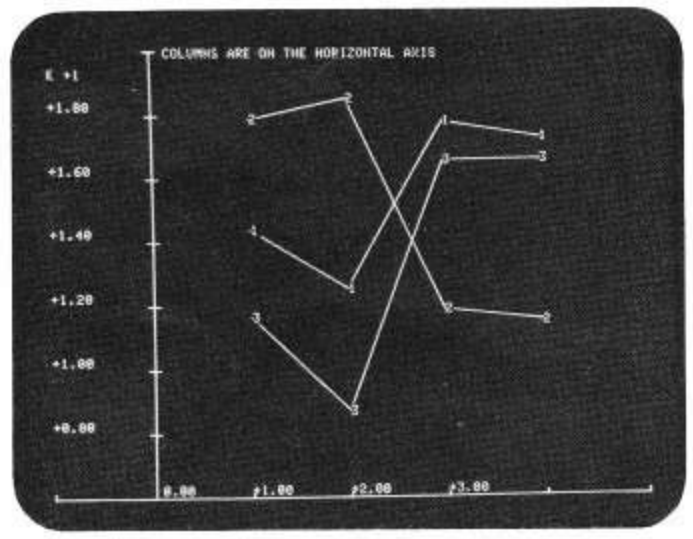
Coefficients for a 3rd degree polynomial regression with standard error and T test of significances.



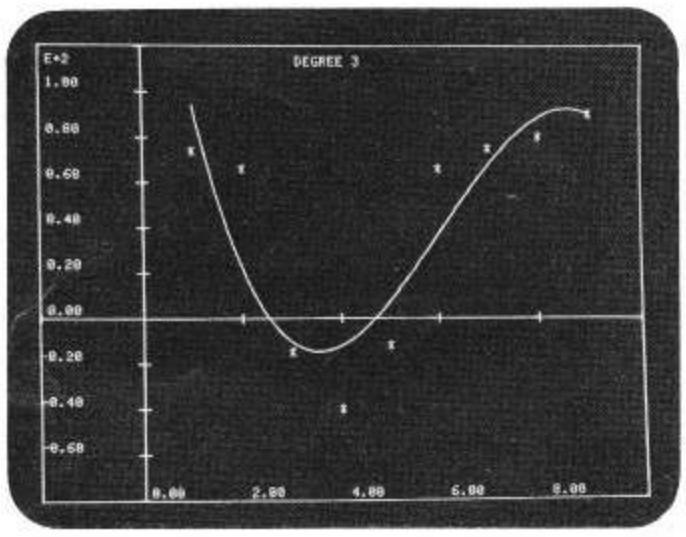
Plot of standardized residuals for a degree 3 polynomial regression. The residuals are plotted against Y.



A histogram of data from the one sample. T test with a normal curve overlay.



A graph of the two-way means from the two-way analysis of variance showing the interaction.



Graph of degree 3 polynomial regression curve and data.

Specifications
Each program package includes:
Manual and binder
Labeled user-definable overlays
Tape cartridge

Volume 1
Distributions: Includes F, t, chi-square, gamma, normal (approximate), beta, point binomial, single term binomial, cumulative binomial, point hypergeometric, single term hypergeometric, cumulative hypergeometric, and high accuracy normal.

Tabled values: F-tabled, t-tabled, chi-square, gamma, normal, and beta tabled.

Tests: RxC contingency tables, 2x2 contingency tables (Fisher's test), one and two sample t-tests, paired t-test, linearized regressions. Requires 8K workspace.

Volume 2. Analysis of Variance.
One-way analysis of variance.
Two-way analysis of variance (balanced).
Two-way analysis of variance (unbalanced).
Three-way analysis of variance.
One-way analysis of co-variance.
Latin squares. Requires 16K workspace.

Volume 3. Regressions.

Multiple linear regression. Includes the following for any equation fit: print coefficients with t-test; print analysis of variance table; estimate Y for input variables; list residuals for all data; plot residuals; Durbin-Watson calculations.

Polynomial regression. Fit to model $Y = A_0 + A_1 X + \ldots A_p X^p$; plot data; print means, variances, simple correlation; correct data; print preliminary analysis of variance table. For each selected degree regression, the following steps are available: print coefficients with t-tests; plot regression curve vs. data; print analysis of variance table; calculate residuals; calculate Durbin-Watson test; estimate Y for input X. Requires 16K workspace.

Since the efficiency of all PLOT-50 Statistics software is restricted only by your system's workspace, the larger the workspace, the faster you can solve large problems.

Package components include tape cartridges for program storage and storage of data, analysis and results of analysis; labeled user-definable overlays, manual and binder.

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