RATS 9.0: Procedures and Example Programs

The following is a list of the procedures and example programs included with Version 9.0 of RATS. The procedures are stored on files whose names match the procedure names, followed by the extension .SRC (for "source"). The example programs all have the extension .RPF, which we use to denote a RATS program file. All files are plain ASCII text.

Many of the procedures and example programs are discussed in the *User's Guide*—see the Index for page numbers. Also, example programs that are used in the manual will have comment lines at the top of the file indicating the relevant Section of the *Guide*.

Please see Sections 1.4.5 in the *Introduction* and Section 15.2 in the *User's Guide* for information on using procedures. Note that before using the procedure, you should open the .SRC file in RATS and read the comments at the top of the file. These comment lines will tell you what you need to know to use the procedure.

Note that in addition to the files listed here, we also provide worked examples for more than twenty popular econometrics textbooks, and example programs replicating results from several important papers. These are listed in separate PDF files.

You can also find *many* more procedures and example programs—many written by RATS users from around the world—on our web page, at *www.estima.com*.

The procedures are listed first. The list of example programs begins on page 6.

Procedure	Description
ABLAGS	Generates Arellano-Bond set of instruments
ACF	Performs autocorrelation analysis on a series
ACF2PACF	Computes autocorrelations from partial autocorrelations
ADFAUTOSELECT	Selects optimal lag length to be used for an ADF test
ADTEST	Anderson-Darling test for normality
AGFRACTD	Andrews-Guggenberger estimate of fractional difference
APBREAKTEST	Andrews-Ploberger Structural Break Test
APGRADIENTTEST	Andrews-Ploberger Structural Break Test for GARCH/Maximum Likelihood
ARAUTOLAGS	Computes Information Criteria for AR models using Yule-Walker or Burg
ARCHTEST	Tests a series for ARCH effects
ARMADLM	Sets up a DLM based upon an ARMA model
ARMASPECTRUM	Graphs the spectral density for an input ARMA model
BAING	Estimates factors in a factor model using Bai-Ng formulas
BAIPERRON	Bai-Perron Test for Multiple Structural Changes
BAYESTST	Bayesian Unit Root test
BDINDTESTS	Battery of independence tests
BDSTEST	Brock-Decher-Scheinkman test for i.i.d.
BETAPARMS	Computes parameters required for beta distribution
BICORRTEST	Hinich bi-correlations test for autocorrelation
BJAUTOFIT	Automated ARIMA model selection
BJDIFF	Aids in selection of differencing operations
BJEST	Estimates an ARIMA model
BJFORE	Estimates and forecasts an ARIMA model
BJIDENT	Box-Jenkins identification tool
BJTHEIL	Computes Theil U statistics for an ARIMA model
BJTRANS	Aids in selection of preliminary transformation
BKFILTER	Band pass filter using Baxter-King method
BLOCKBOOT	Does block bootstrap draws (not needed with RATS 7.00 or later)
BNDECOMP	Beveridge-Nelson decomposition
BPPANELTESTS	Does Breusch-Pagan (and related) tests for random effects
BQDODRAWS	Does Monte Carlo draws from a VAR with BQ factorization
BREITUNG	Breitung test for unit roots in panel data
BRYBOSCHAN	Bry-Boschan business cycle dating (Pagan-Harding for quarterly data)
BSOPTION	Black-Scholes option pricing proceudre

CANCORR	Computes canonical correlations for two sets of series
CFEAT	Identifying turning points and cyclical phases of a series
CFFILTER	Band pass filter using Christiano-Fitzgerald method
CHOWDENNING	Chow-Denning multiple variance ratio test
CHOWLIN	Distributes a series to a higher frequency using related series
CLASSICALDECOMP	Decomposes a series into trend, seasonal, irregular
CONDITION	Conditional forecasting procedure
CORRADO	Corrado non-parametric event test
CORRINTEGRAL	Computes a correlation integral for a series
CROSSCORR	Computes and graphs cross correlations of two series
CROSSPEC	Computes and graphs phase and coherence
CSERIESSYMM	Complex series symmetrizer
CUMPDGM	Durbin's Cumulated Periodogram for serial correlation
CUSUMTESTS	Computes and displays CUSUM and CUSUMQ tests
CVSTABTEST	Stability tests on a covariance matrix of series
CXLOGDENSITY	Computes Whittle likelihood using complex matrices
CXLOGDENSITYCV	Computes concentrated multivariate Whittle likelihood using complex matrices
DENTON	Distributes a series to a higher frequency using proportional Denton method
DFUNIT	Dickey-Fuller unit root test
DIGAMMA	Computes digamma and trigamma functions
DISAGGREGATE	General disaggregation (interpolation/distribution) procedure
DISTRIB	Distribution from one frequency to a higher frequency
DIVISIA	Computes a Divisia index
DLMGLS	GLS estimation with state-space model for errors
DLMIRF	Impulse Reponse Function from a State-Space model
DMARIANO	Diebold-Mariano Forecast Comparison Test
DSGECONTROL	Computes state space model adjustments for optimal control
DSGETOOL	Computes solution to linear rational expectations model
DURBINLEVINSON	Computes Autoregression Representations using Durbin-Levinson recursion
EBA	Extreme Bounds Analysis, from Granger and Uhlig
EGCRTVAL	Computes 'exact' crit. values for D-F and E-G cointegration tests
EGTEST	Engle-Granger test for Cointegration
EGTESTRESIDS	Engle-Granger test for Cointegration on 1st stage residuals
ELFCALC	Computes empirical likelihood for a set of moment conditions
ENDERSGRANGER	Procedure for Enders/Granger threshold unit root tests
ENDERSSIKLOS	Enders-Siklos test for cointegration with threshold effect
EQNTOACF	Creates an ACF from an ARMA equation
ERSTEST	Elliott-Rothenberg-Stock unit root tests
EXACTINVERSE	Computes exact (limit) inverse with "infinite" components
FLUX	General Nyblom fluctuations test
FM	Estimates cointegrating vectors using Fully Modified Least Squares
FORCEDFACTOR	Factors covariance matrix with specific vector column/row
GAIN	Computes and graphs the gain and phase of a pair of series
GAMMAPARMS	Computes parameters required for gamma distribution
GARCHFORE	Univariate GARCH forecasting procedure
GAUSSHERMITE	Generates weights and grid points for Gauss-Hermite numerical integration
GEDDRAW	Generates draws for a generalized error distribution
GENCOMBOS	Generate all combinations of a set of integers
GLSDETREND	Local to unity GLS detrending routine
GMAUTOFIT	Automated ARIMA model selection (seasonal models)
GNEWBOLD	Granger-Newbold forecast comparison test
GPH	Geweke-Porter-Hudak estimate of fractional differencing
GRAPHMATRIX	Graphs a RECTANGULAR array of series on separate graphs
GREGORYHANSEN	Gregory-Hansen test for Cointegration with breaks
GRIDSERIES	Generates a series with an equally spaced grid
HADRI	Hadri test for unit roots in panel data

HALTON	Generates Halton sequences
HANNANRISSANEN	Estimates an ARIMA model using the Hannan-Rissanen algorithm
HILLGEV	Estimates tail index for a distribution using Hill's method
HINICHTEST	Hinich test for linearity and Gaussianity
HISTOGRAM	Histogram procedure, using new DENSITY command
HJBOUNDS	Computes Hansen-Jagannathan bounds for a set of returns
HPFILTER	Hodrick-Prescott filter
HTUNIT	Harris-Tzavalis unit root test for panel data
HURST	Computes a Hurst exponent
ICSS	Inclan-Tiao test for breaks in variance
IMHOF	Computes CDF for quadratic form in Normal(0,1) variables
INTERPOL	Interpolation from one frequency to a higher one
INVGAMMAPARMS	Computes parameters required for inverse gamma distribution
IPSHIN	Im, Pesaran and Shin panel unit root test
JOHMLE	Johansen ML Cointegration analysis
KPSS	KPSS (Kwiatowski, Phillips, Schmidt, and Shin) stationarity test
KSCPOSTDRAW	Draws from posterior density needed in stochastic volatility model
LAGPOLYROOTS	Creates table of the roots of a lag polynomial
LEVINLIN	Levin-Lin-Chu test for unit roots in panel data
LIML	Limited information maximum likelihood estimation
LOCALDLM	Creates matrices for local (level or trend) DLM
LOCALDLMINIT	Calculates initial guesses for component variances in a local level/trend
LOCALTREND	Local smoothing regression
LOGMVSKEWT	Function for log density of multivariate skew-t distribution
LOGNORMALPARMS	Computes parameters required for log normal distribution
LOGSKEWTDENSITY	Function for log density of skew-t distribution
LPUNIT	Lumsdaine-Papell unit root test with structural breaks
LSDVC	Estimates a dynamic FE model with correction for bias
LSUNIT	Lee-Strazicich unit root tests with one or more structural breaks
MAAUTOLAGS	Computes Information Criteria for MA models using innovations algorithm
MACKINNONCV	Computes Mackinnon's Critical values for DF and EG tests
MANNWHITNEY	Performs Mann-Whitney test for comparison of samples
MARKOV	Functions supporting Markov Chain Models (use MSSETUP instead)
MATPEEK	Extracting/inserting information from/into rectangular arrays
MCFEVDTABLE	Organizes tables of FEVD's with confidence bands
MCGRAPHIRF	Organizes graphs of IRF's with confidence bands
MCLEODLI	Performs a McLeod-Li test for 2nd order dependence.
MCMCPOSTPROC	Calculates sample statistics from MCMC realizations
MCPROCESSIRF	Organizes error bands for IRF's based upon MC results
MCVARDODRAWS	Does Monte Carlo draws from a VAR to generate IRF's
MEANGROUP	Mean group estimator for panel data
MEPLOT	Does Mean Excess Return plots
MESA	Computes and graphs a spectrum using Maximum Entropy Method
MHEGY	Implements the monthly version of the "HEGY" tests
MIXED	Mixed estimation of a single equation
MIXVAR	Mixed estimation of an equation with a Bayesian prior
MODELCOMPANION	Function returning the companion matrix for a dynamic model
MODELLAGMATRIX	Function returning a lag matrix from a dynamic model
MONTEVAR	Monte Carlo Integration of VAR Impulse Response confidence bands
MSEMSETUPSTD	Markov switching procedures for EM estimation
MSREGRESSION	Markov switching linear regression procedures
MSSETUP	Markov switching general support procedures
MSSYSREGRESSION	Markov switching linear systems regression procedures
MSVARSETUP	Markov switching VAR setup procedures
MULTIPLEBREAKS	Multiple structural change analysis per Bai-Perron
MVARCHTEST	Multivariate test for ARCH
MVBNDECOMP	Multivariate Beveridge-Nelson decomposition via a VAR

MVGARCHFORE	Multivariate GARCH forecasting
MVGARCHTOVECH	Extracts a VECH representation from GARCH estimates
MVIDENT	Creates a Tiao-Box cross correlation matrix
MVJB	Multivariate Jarque-Bera normality test
MVKFILTR	Multivariate Kalman filtering, superseded by DLM command
MVQSTAT	Hosking's Multivariate Q statistic
NBERCYCLES	Generates dummies based upon NBER cycle dates
OLSHODRICK	Computes Hodrick standard errors
PACF2AR	Generates coefficients for an AR from input covariances
PANCOINT	Panel data unit root/cointegration testing procedure (Pedroni tests)
PANELDOLS	Panel data group mean DOLS
PANELFM	Panel data group mean FMOLS
PANELTHRESH	Does analysis of up to two threshold breaks in a fixed effects panel model
PDL	Polynomial Distributed Lags regression
PDLREG	Polynomial Distributed Lags regression
PERRONBREAKS	Compute various unit root tests with breaks
PERRONNGMTESTS	Compute various Perron-Ng "M" unit root tests
PERRONRODRIGUEZ	Perron-Rodriguez unit root test allowing for break at unknown data
PERSIST	Sum of coefficients of a MA representation for a series
PHILLIPSHANNAN	Phillips-Hannan Efficient estimator for multivariate regressions
POLYMULT	Multiplying lag polynomial coefficients
POTEST	Phillips-Ouliaris-Hansen test for Cointegration
POTESTRESIDS	Phillips-Ouliaris-Hansen test for Cointegration on 1st stage residuals
PPUNIT	Phillips-Perron Unit Root test
PRINFACTORS	Principal components-based factor analysis
PRJCONDITIONAL	Predicted probabilities for conditional logit model
PRJMULTINOMIAL	Predicted probabilities for multinomial logit model
PRJPOISSON	Predictions and marginal effects for Poisson count model
QPLOT	Graphs a Q plot against a hypothesized distribution
QUARTIMAX	Does factor rotation using quartimax criterion
RANGRID	Random draw from a distribution approximated across grid of points
RANMIXTURE	Random draws from a mixture of Normals
RANNORMALTRUNC	Random draws from a truncated Normal (procedure)
REGACTFIT	Regression post-processing, fancy graph of actual/fitted/resids
REGANOVA	Displays an analysis of variance table from most recent regression
REGCONFIDENCE	Displays a table of confidence intervals from most recent regression
REGCORRS	Computes and graphs autocorrelations from residuals
REGCRITS	Computes information criteria for most recent regression
REGEXACTDW	Computes the exact significance level for the Durbin-Watson
REGHBREAK	Performs structural break test with bootstrapped p-values
REGPARTCORR	Computes partial correlations between the regressors and dep var.
REGPCSE	Panel-corrected standard error calculation
REGRECURSIVE	Regression post-processing, computes recursive resids, does tests
REGRESET	Performs Ramsey RESET test on regression
REGTOTEX	Creates a TeX equation from the most recent regression
REGTREE	Performs a CART (Classification and Regression Trees) analysis
REGWHITENNTEST	Performs White neural network test on regression
REGWHITETEST	Performs White heteroscedasticity test on regression
REGWUTEST	Performs Wu (or Durbin-Wu-Hausman) specification test on regression
RGSE	Semiparametric fractional differencing parameter estimation
ROBUSTLMTEST	Robust LM test for orthogonality of residuals and input series
ROLLREG	Computes rolling regressions for least squares
ROOTS	Computes the complex roots of an input polynomial
RRGQTEST	Computes a Goldfeld-Quandt test on recursive residuals
RSSTATISTIC	R/S Statistic (classical or Lo's modified)
RUNTEST	Computes a run test for a two-state series
SEASONALDLM	Creates the matrices for the seasonal component of a DLM

SHORTANDLONG	Factor covariance matrix with short and long run restrictions
SPECFORE	Forecasting using spectral techniques
SPECTRUM	Computes/graphs spectral density
SPLOM	Produces an NxN matrix of SCATTER plots
SPUNIT	Computes various "Schmidt-Phillips" tests (TAU) for a unit roots
SSMSPECTRUM	Multivariate spectral density of a state space model
STABTEST	Perfoms Hansen's stability test for OLS
STAMPDIAGS	Performs a standard battery of specification tests for a state space model
STARTEST	Test for linearity vs. LSTAR or ESTAR
STEPPROBIT	Backwards stepwise reduction of a probit model
STOCKWAT	Stock-Watson and Dickey-Fuller Unit Root Tests
STRUCTRESIDS	Computes structural residuals from standard residuals
SURGIBBSSETUP	Sets up Gibbs sampler for SUR model
SWAMY	Computes a GLS matrix weighted estimator for a panel data set
SWDOLS	Estimates cointegrating vectors using dynamic OLS
SWTRENDS	Tests cointegration rank using common trends analysis
TAR	Estimates a threshold autoregression, tests for threshold effect
THRESHTEST	Hansen's Test for Threshold Break
TLOOKUP	Provides a procedure for doing table lookups
TSAYNLTEST	Tsay test for neglected non-linearities
TSAYTEST	Tsay arranged regression test for threshold autoregression (TAR)
TSECCTEST	Tse test for constant correlation in MV-GARCH model
TVARSET	Time-varying VAR setup routine
UFOREERRORS	Forecast errors for a univariate model
UHLIGFUNCS	Computes criteria for Uhlig sign-restricted shocks
UNIFORMPARMS	Computes required parameters for uniform distribution
UNIQUEVALUES	Extracts unique values from a series
VARBOOTSETUP	Sets up a parallel system for bootstrapping a VAR
VARCALC	Does a direct calculation of a simple OLS VAR
VARFPE	Minimum FPE representation for the equations in a VAR
VARFROMDLM	Computes a state space representation to its implied VAR
VARIMAX	Does factor rotation using varimax criterion
VARIRF	Organizes graphs of Impulse responses for an estimated VAR
VARIRFDELTA	Computes the covariance matrix of an IRF using the delta method
VARLAGMD	Computes the sums of the VAR lag coefficients.
VARLAGSELECT	Selects lag length for a VAR model
VARMADLM	Routines for analyzing a VARMA using DLM
VARSPECTRUM	Multivariate spectral density of a Vector Autoregression
VRATIO	Variance ratio unit root test procedure
WESTCHOTEST	Heteroscedasticity-robust serial correlation test
WFRACTIL	Computes fractiles of a set of sample values with weights
WHITTLETEST	Implements Whittle test for independence of state sequences
YULELAGS	Computes Information Criteria for AR models using Yule-Walker
YULEVAR	Estimates a VAR on stationary data using Yule-Walker Equations
ZIVOT	Zivot-Andrews Unit Root Test

Example Program	Description
ADAPTIVE	Estimates a linear regression using an adaptive kernel estimator
AKAIKE	Demonstrates use of information criteria
AR1	Demonstrates AR1 instruction
ARELLANO	Demonstrates Arellano-Bond estimator for dynamic panel model
ARIMA	Demonstrates BOXJENK instruction, various procedures
ARMAGIBBS	Demonstrates Gibbs Sampling applied to an ARMA model
BASICS	Introductory example - demonstrates many techniques
BETAS	Computes betas for large number of stocks
BONDS	Estimates term structure using non-linear methods
BONDSPLINE	Estimates term structure with cubic splines
BOOTARMA	Demonstrates bootstrapping with an ARMA model
BOOTCOINTEGRATION	Example of bootstrapping with cointegration
BOOTSIMPLE	Demonstrates basic bootstrapping techniques
BOOTSPECTRUM	Demonstrates bootstrapping spectral density estimates
BOOTVAR	Demonstrates bootstrapping with a VAR
BOOTVECM	Demonstrates bootstrapping with a VECM
BOXCOX	Demonstrates maximum likelihood estimation for a Box-Cox model
CAGAN	Demonstrates estimation of a dynamic model using DSGE and DLM
CANMODEL	Demonstrates Bayesian VAR estimation
CASSKOOPMANS	Solves Cass-Koopmans growth model
CAUSAL	Demonstrates (bivariate) causality tests
CHOW1	Demonstrates Chow test with known break (separate regression form)
CHOW2	Demonstrates Chow test with known break (dummy variable form)
COINTTST	Demonstrates cointegration tests
CONDITION	Demonstrates conditional forecasting
CONSTANT	Demonstrates various stability tests
CONSUMER	Demonstrates non-linear systems estimation (NLSYSTEM)
CUMPDGM	Demonstrates Durbin's Cumulated Periodogram test for serial correlation
CVMODEL	Demonstrates estimation of structural VAR's
DISTRIBLAG	Demonstrates estimation of distributed lags
DLMEST	Demonstrates estimation of a state-space model
ECT	Demonstrates estimation of an vector error correction model
EGARCHBOOTSTRAP	Demonstrates bootstrapping with an E-GARCH model
EGARCHSIMULATE	Demonstrates forecasting an E-GARCH model using random simulations
EHLJME2000	Model specification for Erceg-Henderson-Levin model
EXPSMOOTH1	Demonstrates exponential smoothing
EXPSMOOTH2	Demonstrates exponential smoothing
FRACTINT	Demonstrates estimation of a model with fractional differencing
FREQDESEASON	Demonstrates frequency domain deseasonalization
GARCHBOOT	Demonstrates bootstrapping with a GARCH model
GARCHGIBBS	Demonstrates Gibbs sampling with GARCH model
GARCHIMPORT	Demonstrates importance sampling with GARCH model
GARCHMV	Demonstrates multivariate GARCH
GARCHMVBOOTSTRAP	Demonstrates bootstrapping on a multivariate GARCH model
GARCHMVDCCGIBBS	Demonstrates Gibbs sampling applied to a DCC GARCH model
GARCHMVDCC2	Demonstrates 2-step DCC estimates
GARCHSEMIPARAM	Demonstrates univariate GARCH with nonparametric density
GARCHUV	Demonstrates univariate GARCH
GCONTOUR	Demonstrates contour graph
GIBBS	Demonstrates Gibbs sampling with a linear regression
GIBBSPROBITDYNAMIC	Demonstrates Gibbs sampling on dynamic probit model
GIBBSVAR	Demonstrates Gibbs Sampling applied to a Bayesian VAR
GIV	Demonstrates generalized instrumental variables
GRANGERBOOTSTRAP	Demonstrates bootstrapping applied to Granger causality test
GRAPHBOXPLOT	Demonstrates creation of a box plot
GRAPHFORECAST	Demonstrates graphing forecasts

GRAPHFUNCTION	Demonstrates graphing a general function
GRAPHHIGHLOW	Demonstrates high-low-close graphs
GRAPHLABELS	Demonstrates positioning of labels on graphs
GRAPHOVERLAY	Demonstrates overlay graphs
HAMILTON	Hamilton switching model example
HANNAN	Demonstrates Hannan efficient estimation
HANSEN	Demonstrates GMM (IV) in linear model
HAUSMAN	Demonstrates Hausman test (2SLS vs 3SLS)
HETERO	Demonstrates various forms of weighted least squares
HETEROTEST	Demonstrates heteroscedastity tests
HISTORY	Demonstrates historical decomposition
HPFILTER	Demonstrates use of Hodrick-Prescott filter
IMPULSES	Demonstrates computing and graphing impulse response functions
INFLUNEM	Demonstrates looping over graph instructions
INSTRUMENT	Demonstrates instrumental variables estimation
INTERVENTION	Demonstrates intervention model
KLEIN	Estimates Klein's Model I
LOWESS	Demonstrates use of lowess non-parametric fit
MISCPROB	Demonstrates logit and probit models (use DDV instruction instead)
MONTEARCH	Demonstrates Monte Carlo analysis of a test statistic
MONTEEXOGVAR	Demonstrates Monte Carlo Impulse Response to exogenous variable
MONTENEARSVAR	Demonstrates Monte Carlo Impulse Response for a structural near-VAR
MONTESUR	Demonstrates Monte Carlo Impulse Responses for a Near-VAR
MONTESVAR	Demonstrates Monte Carlo Impulse Responses for overidentified SVARs
MONTEVAR	Demonstrates Monte Carlo Impulse Responses for a standard VAR
NEURAL	Demonstrates use of neural networks
NLLS	Demonstrates non-linear least squares
NONLINEAR	Demonstrates various techniques for maximum likelihood
NPREG	Demonstrates non-parametric regression
OLSMENU	Demonstrates user-defined menus
PANEL	Demonstrates basic panel data techniques
PANELCAUSE	Demonstrates Granger causality test with heterogeneous panel
PDL	Demonstrates estimation of polynomial distributed lags
PORTFOLIO	Demonstrates calculation of optimal portfolios
PROBIT	Demonstrates logit and probit models
QPROG	Demonstrates quadratic programming
QQPLOT	Simple example of Q, QQ, and P Plots
RANDOMIZE	Demonstrates sample randomization techniques
REPROBIT	Panel data probit model with random effects
RLS	Demonstrates calculation of an arranged autoregression
ROBUST	demonstrates robust estimation techniques in a linear model
SHILLER	Demonstrates Shiller smoothness prior for polynomial DL
SIMULADD	Demonstrates add-factoring in a simultaneous equations model
SIMULEST	Demonstrates estimation techniques in a simultaneous equations model
SIMULFORE	Demonstrates forecasts for a simultaneous equations model
SIMULMULT	Demonstrates calculation of multipliers in a simultaneous equations model
SIMULTHEIL	Demonstrates forecast statistics in a simultaneous equations model
SPECFORE	Demonstrates forecasting using spectral techniques
SPGRAPH	Demonstrates multiple graphs per page
SUR	Demonstrates estimation of a SUR model
SV	Demonstrates estimation of a stochastic volatility model
SWAMY	Demonstrates GLS matrix weighted estimator for a panel data set
SWARCH	Demonstrates Markov Switching ARCH
TOBIT	Demonstrates tobit and other limited dependent variable techniques
TVARYING	Demonstrates time-varying coefficient estimation in a VAR
UNION	Demonstrates probit/logit models
VARCAUSE	Demonstrates block causality tests in a VAR

VARLAG	Demonstrates lag length selection techniques in a VAR