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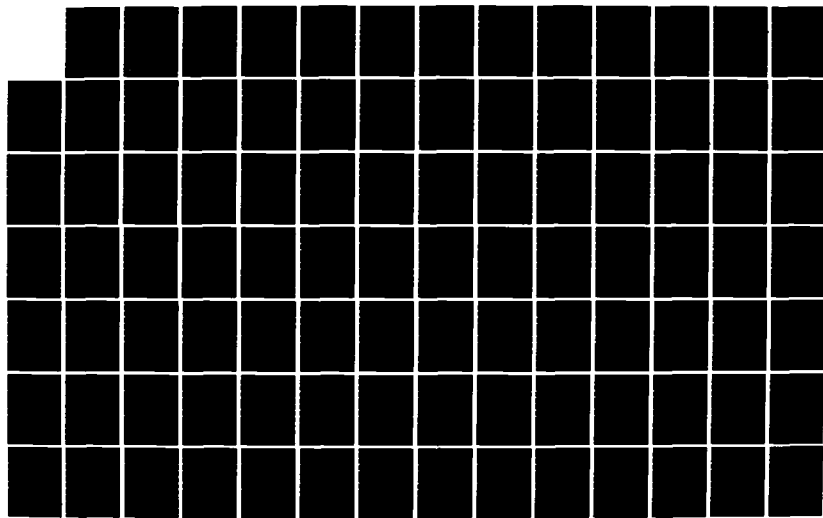
A USER'S GUIDE TO ARSPIQ (AUTOREGRESSIVE SPECTRAL
INFORMATION QUANTILE IDENTIFICATION)<U> TEXAS A AND M
UNIV COLLEGE STATION DEPT OF STATISTICS T J WOODFIELD
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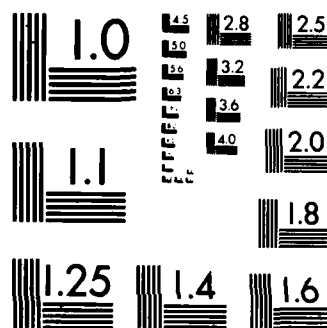
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A USER'S GUIDE TO ARSPIQ: THE UNIVARIATE
TIME SERIES ANALYSIS PROGRAM FOR AUTOREGRESSIVE
SPECTRAL INFORMATION QUANTILE IDENTIFICATION

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Professor Emanuel Parzen, Principal Investigator

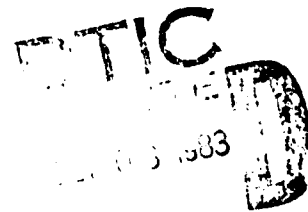
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A User's Guide to ARSPIQ: The Univariate Time Series Analysis Program for Autoregressive Spectral Information Quantile Identification

1. Introduction

The ARSPIQ (AutoRegressive SPectral Information Quantile identification) program is a modified version of ARSPID, a univariate time series program in the TIMESBOARD Computing Library. (Newton, 1983). ARSPIQ provides various diagnostics in the time and frequency domains to help one determine whether a time series is long, short, or no memory.

ARSPIQ is written in FORTRAN and consists of a main program and 58 subprograms, many of which are contained in the TIMESBOARD Computing Library. Many of the subprograms used in the quantile analysis are modified versions of those used by the ONESAM program, (Parzen and Anderson, 1980). The current version of ARSPIQ was developed on an Amdahl 470V/6-II and an Amdahl 470V/8 operated by the Data Processing Center of Texas A&M University. The version of FORTRAN used should be compatible with most FORTRAN IV or FORTRAN 77 compilers.

The basic goal of ARSPIQ is to provide diagnostics to aid in modeling a univariate time series. ARSPIQ is not intended to be a modeling or forecasting program, however. The models produced by ARSPIQ are intended only as guides to formulate more complete, rigorous, or valid models. Our approach is to run ARSPIQ to obtain useful model building diagnostics and then to

employ ARSPID in the more formal model building stage, i.e., estimating parameters and checking residuals. With this goal in mind, ARSPIQ has been made as fully automatic as possible with "logical" defaults provided when input options are specified to be zero.

For a more complete discussion of the statistical functions mentioned in the next section, see Parzen (1981) and Parzen (1983). Also, for a complete discussion of the TIMESBOARD computing package and useful time series results, see Newton (1983).

2. Stages in an Analysis

2.1 Quantile Analysis

The original time series $Y(t)$, the periodogram $f_T(\omega)$, the correlogram $\rho_T(v)$, and the partial autocorrelations $\hat{a}_m(m)$ may be treated as data batches and exposed to a quantile analysis to gain further insight about these quantities. For a data batch $\{X(t), t=1, \dots, T\}$, one defines the informative quantile function $IQ(u)$ by

$$IQ(u) = \frac{X(t) - X_{50}}{2(X_{75} - X_{25})} \quad , \quad u = \frac{2t-1}{2T}, \quad t = 1, \dots, T ;$$

where X_{50} is the median and X_{75} and X_{25} are the upper and lower quartiles respectively. Plots of $IQ(u)$ are useful in describing a data batch and are primarily used in this work to diagnose probability characteristics. In ARSPIQ, the informative quantile function

for the original time series is used in the remaining analyses since it serves to "normalize and detrend" the series analogously to subtracting the mean and dividing by the standard deviation.

For a specified null value for the density-quantile function $fQ(u) \equiv f(Q(u))$ where f is a probability density and Q is the corresponding quantile function, and for a raw estimate of the quantile density q defined to be the derivative of Q , one computes the weighted spacings

$$\tilde{d}(u) = f_0 Q_0(u) \tilde{q}(u) / \tilde{\sigma}_0$$

where

$$\tilde{\sigma}_0 = \int_0^1 f_0 Q_0(u) \tilde{q}(u) du$$

The weighted spacings $\tilde{d}(u)$ hence comprise a probability density and $\tilde{\sigma}_0$ is treated as an estimate of scale (compare to standard deviation). ARPSIQ takes

$$f_0 Q_0(u) = \phi(\phi^{-1}(u))$$

for the normal case where ϕ is the standard normal pdf and ϕ^{-1} is the standard normal quantile function; and

$$f_0 Q_0(u) = 1-u$$

for the exponential case. When a data batch comes from the specified null distribution, $\tilde{d}(u)$ oscillates about a uniform value of 1 and the cumulative weighted spacings

$$\tilde{D}(u) = \int_0^u \tilde{d}(v) dv, \quad 0 \leq u \leq 1$$

oscillates about the identity line. ARSPIQ provides a plot of $\tilde{D}(u)$ as a goodness-of-fit check. For independent normal data, the sample autocorrelations and partial autocorrelations will also be normally distributed while the raw periodogram will have an exponential distribution, hence the normal and exponential cases are automatically checked where appropriate by ARSPIQ.

A quantile analysis also produces some useful descriptive statistics, but discussion of these will be withheld until the appropriate time.

2.2 Frequency Domain Analysis

The raw periodogram $f_T(\omega)$ is computed as a Fourier Transform of the time series and then normalized to integrate to one. Specifically,

$$f_T\left(\frac{k}{Q}\right) = (A_k^2 + B_k^2) \hat{\sigma}^2 / T, \quad k=1, \dots, Q$$

where $\hat{\sigma}^2$ is the sample variance of the informative quantile of the data and A_k and B_k are the Fourier coefficients evaluated

at frequency k/Q . (A_k is the amplitude of the cosine term and B_k is the amplitude of the sine term at frequency k/Q when a sinusoid is fit to the data set. See Newton (1983).) As mentioned previously, white noise data produces a periodogram that has an exponential distribution, and hence a quantile analysis of $f_T(\omega)$ uses $f_0 Q_0(u) = 1-u$.

As discussed in Parzen (1983), the key descriptive statistics for the raw periodogram are the median, variance, and spectral log range (or dynamic range) defined to be

$$\text{SPLR} = \max_{\omega} \log f_T(\omega) - \min_{\omega} \log f_T(\omega) .$$

Large values of periodogram variance or SPLR indicate moderate to long memory, while small values of periodogram median have the same interpretation. For normal white noise, the median is $\log 2 \doteq .693$, the variance is one, and $\text{SPLR} = 0$.

A nonparametric periodogram is also computed and is labeled "Local Quantile Periodogram" on the output. For a neighborhood length NQMP, a batch of periodogram ordinates of length NQMP produces a lower quartile, median, and upper quartile value. These values are labeled G25, G50, and G75 and are associated with the median frequency in the neighborhood. G50 is interpreted as a nonparametric smoothed estimate of the spectral density while G25 and G75 serve as "confidence limits." The log of these values is plotted.

A Parzen window estimator using truncation point $M = \{\text{largest even integer} \leq (T/2)\}$ also provides a smoothed periodogram. This estimate of a spectral density is used in creating the cepstral correlations described later. Parametric spectral estimators are also computed and will be described later. These estimators will have SPLR computed as well as a quantity known as the delta memory function defined by

$$\delta_k = \frac{1}{k} \sum_{j=1}^k \log f\left(\frac{j+m}{Q}\right) - \log f\left(\frac{k+1+m}{Q}\right)$$

where $m = 0$ and $m = Q/XSEAS$ with $Q = NFREQS$ and $XSEAS$ specified by the user. By default, $NFREQS$ is chosen large enough for the FFT routine and $XSEAS = 12$. These two delta sequences are plotted on a scale from -3 to 3 and have apparent memory classification properties as discussed in Parzen (1983).

2.3 Time Domain Analysis

Besides the interpretation provided by Box and Jenkins (1970), the sample autocorrelation function (acf.) and sample partial autocorrelation function (p.acf.) provide added insight when viewed in the quantile domain.

The autocorrelation function (correlogram) $\rho_T(v)$ is computed as the Fourier transform of the raw periodogram. Besides the plot of $\rho_T(v)$ and its quantile function, one also examines the value of

$$\frac{1}{T} \sum_{v=1}^T \rho_T^2(v) \quad (\text{or } \frac{1}{M} \sum_{v=1}^M \rho_T^2(v) \quad , M \leq T/2).$$

Small values of this quantity indicate no memory or short memory, while values larger than say 0.1 typically indicate long memory.

The partial autocorrelation function is given by the value of $\hat{a}_m(m)$ estimated via the Yule-Walker equations for the general AR(m) model denoted by

$$Y(t) + \alpha_m(1) Y(t-1) + \dots + \alpha_m(m) Y(t-m) = \varepsilon(t)$$

where $\varepsilon(t)$ is white noise and $\hat{a}_m(m)$ estimates $\alpha_m(m)$.

A second partial autocorrelation function is computed using the Burg algorithm which appears to provide better estimates than the Yule-Walker equations when roots of the characteristic polynomials are near the unit circle (near nonstationarity).

Only the Yule-Walker estimates are exposed to a quantile analysis with normal $f_0 Q_0$. The Burg estimates are primarily intended to produce an alternate approximating AR model for ARMA select modeling purposes and spectral analysis. Of interest is the number of values of the IQ function for the p.acf. that are greater than one in absolute value. Outliers in both the acf. and p.acf. data batches indicate moderate to long memory.

2.4 Diagnostic Modeling

Five parametric models are provided to give insight into the nature of the time series examined. Spectral densities are computed for four of the models and residual variances are stated for all five. In all cases the parametric models are actually treated as approximating models and hence are really nonparametric in nature. This suggests that ARSPIQ should not be used to provide THE model for a time series although one of the five models examined may be considered appropriate by some criterion.

The first two models considered are approximating autoregressive models with orders given by the first and second relative minima of the CAT function. Values of AIC and log residual variance are also provided in this AR modeling stage. For the best order model, a spectral analysis is carried out with computation of SPLR and δ_k and display of the various spectral quantities. Only the coefficients and residual variance (RVAR) are produced for the second best order model.

A second modeling stage actually produces five models, but only three are examined in detail. This second stage is primarily intended to suggest subset ARMA models to help better understand the nature of the series. In many cases the ARMA models are merely AR models mimicking the previous CAT derived ones, and hence little new information may be provided at this stage.

For subset ARMA modeling, the default strategy is based upon the Burg sample p.acf., but a second strategy based upon cepstral correlations may be requested by the user. The p.acf. obtained via the Burg algorithm is fed to a recursion algorithm which produces AR(p) coefficients where p is chosen to be the larger of the best and second best order as determined by CAT. Inverse autocorrelations are also computed and displayed. A spectral analysis is then performed on this AR model. The model is then inverted to an infinite MA and truncated to order M (NCOVM) corresponding to the number of computed autocorrelations. The residual variance and coefficients of this model are input to a select regression routine to produce an appropriate covariance matrix. Along with cross-correlation values, a value called PVH is also displayed. This is analogous to the prediction variance horizon defined in Parzen (1981) but is actually $1 - \text{PVH}(h)$. For the infinite MA model

$$Y(t) = \varepsilon(t) + \beta_1 (t-1) + \beta_2 \varepsilon(t-2) + \dots$$

we define

$$\text{PVH}(h) = \sigma_{\infty}^2 (1 + \beta_1 + \dots + \beta_h)$$

where σ_{∞}^2 is the normalized mean square prediction error (innovation variance) estimated by RVAR for the Burg AR model.

The horizon HOR is the smallest value of h for which $PVH(h) \geq .95$. As a rule of thumb, $HOR = 0$ implies no memory, $HOR/(AR \text{ order}) \geq 4$ implies long memory, and values in between have specific interpretations as suggested by Parzen (1981). The select regression procedure automatically picks a diagnostic ARMA model displaying various criterion values, RVAR, and spectral density.

A second select strategy is based upon obtaining truncated infinite MA coefficients directly from the cepstral correlations. The cepstral correlations are essentially the Fourier transform values of log spectral density. We define cepstral correlations by

$$\psi(v) = \int_0^1 \log f(\omega) e^{2\pi i \omega v} d\omega$$

where $f(\omega)$ is estimated by the Parzen window estimate of the spectral density mentioned earlier. A recursion algorithm provides the MA coefficients and may be expressed as

$$(n+1) \beta(n+1) = \sum_{k=0}^n (k+1) \psi(k+1) \beta(n-k).$$

Truncating to order M , we proceed as before to the ARMA select stage. In addition, an estimate of σ_∞^2 based upon the formula

$$\log \sigma_\infty^2 = \int_0^1 \log f(\omega) d\omega$$

is provided using the fact that the right hand side is actually $\psi(0)$ and hence

$$\sigma_{\infty}^2 = \exp [\psi(0)] .$$

This value is labeled "SIGMA INFINITY SQUARED" on the output.

Note that the values of RVAR may also be treated as estimates of σ_{∞}^2 . For the cepstral correlation truncated MA model, the residual variance is

$$\text{RVAR} = 1/(1 + \beta_1^2 + \dots + \beta_M^2).$$

The AR residual variances are obtained from the Yule-Walker equations, and the ARMA residual variances are obtained from the suitable element in the covariance matrix after a series of SWEEP operations has been performed.

3. Input Options

One of the primary goals of ARSPIQ is to make a complete memory analysis of a time series as automatic as possible. Hence, when a zero is specified several options will default to "acceptable" values. The input to ARSPIQ is described below. All values should be right justified.

3.1 First card of a run (in I5 Format)

<u>Cols</u>	<u>Quantity</u>	<u>Purpose</u>
1-5	NANS	Number of data sets to be analyzed

3.2 Second card of a run [in (6I5, 2F5.0) Format]

<u>Cols</u>	<u>Quantity</u>	<u>Purpose</u>
1-5	NTAPE	File number where data set to be analyzed resides (e.g., if NTAPE = 11, specify FT11F001 DD card describing data file) Default: NTAPE = 5, data follows card 2 of input options.
6-10	IRWND	1 if NTAPE to be rewound before being read, 0 otherwise. Default: IRWND = 0.
11-15	NCOVN	Number of autocorrelations to compute. $NCOVN \leq 250$. Default: $NCOVN = (\text{sample size})/2$
16-20	NFREQS	Number of equally spaced frequencies at which to compute spectral density. $1152 \geq NFREQS \geq (\text{sample size}) + NCOVN$. Default: Determined by subroutine FNFREQ
21-25	IOPTMX	2 if select ARMA modeling desired, 3 is ARMA modeling using cepstral correlations desired, 4 for both, 1 otherwise. Default: IOPTMX = 2.

<u>Cols</u>	<u>Quantity</u>	<u>Purpose</u>
26-30	NQMP	Length of neighborhood in computation of local quantile periodogram. If no local quantile analysis is desired, specify NQMP = -1. Default: NQMP = (sample size)/XSEAS
31-35	XSEAS	Seasonal period, e.g., 12 for monthly data. Default: XSEAS = 12.
36-40	REXP	Power or log transformation. Y(t) replaced by Y(t)**REXP if 0 REXP>1. If REXP = 0. or 1. on input, no transformation is performed. If REXP 1., a log transformation is produced.

3.3 ARSPIQ data sets

ARSPIQ employs ARSPID data set conventions. All time series data sets must be stored in standard format as described below.

Card 1: A data set title (anywhere in the 80 columns)

Card 2: Columns 1-5: Sample size right justified

Columns 10-29: A FORTRAN format statement describing how the data has been entered on the remaining cards, e.g., (8F10.0).

Card 3,4,...: The data entered in the format specified on Card 2.

3.4 JCL for executing ARSPIQ

```
// Job Card

//* JES3 Control Cards

//PROCLIB DD DSN=USR.R579.TW.PROCLIB,DISP=SHR

// EXEC ARSPIQ

//SYSIN DD *

    --input option cards --

    --//FTnnF001 cards describing input files.
```

4. Sample Output

Following is an abbreviated output from ARSPIQ analyzing the Wolfer Sunspot numbers. The JCL that generated this run is given by:

```
1. //ARSPIQ JOB (R579,006C,S60,10,TW),'WOODFIELD',MSGLEVEL=(1,0)
2. //*FORMAT PR,DDNAME=,DEST=XEROX,JDE=JFMT1,FORMS=D100
3. //*LEVEL 1
4. //PROCLIB DD DSN=USR.R579.TW.PROCLIB,DISP=SHR
5. // EXEC ARSPIQ
6. //SYSIN DD *
7.      1
8.      13  0  0  0  4  0  11.  1.0
9. //FT13F001 DD DSN=USR.R579.TW.TSDATA(WOLFER),DISP=SHR,LABEL=(,,IN)
```

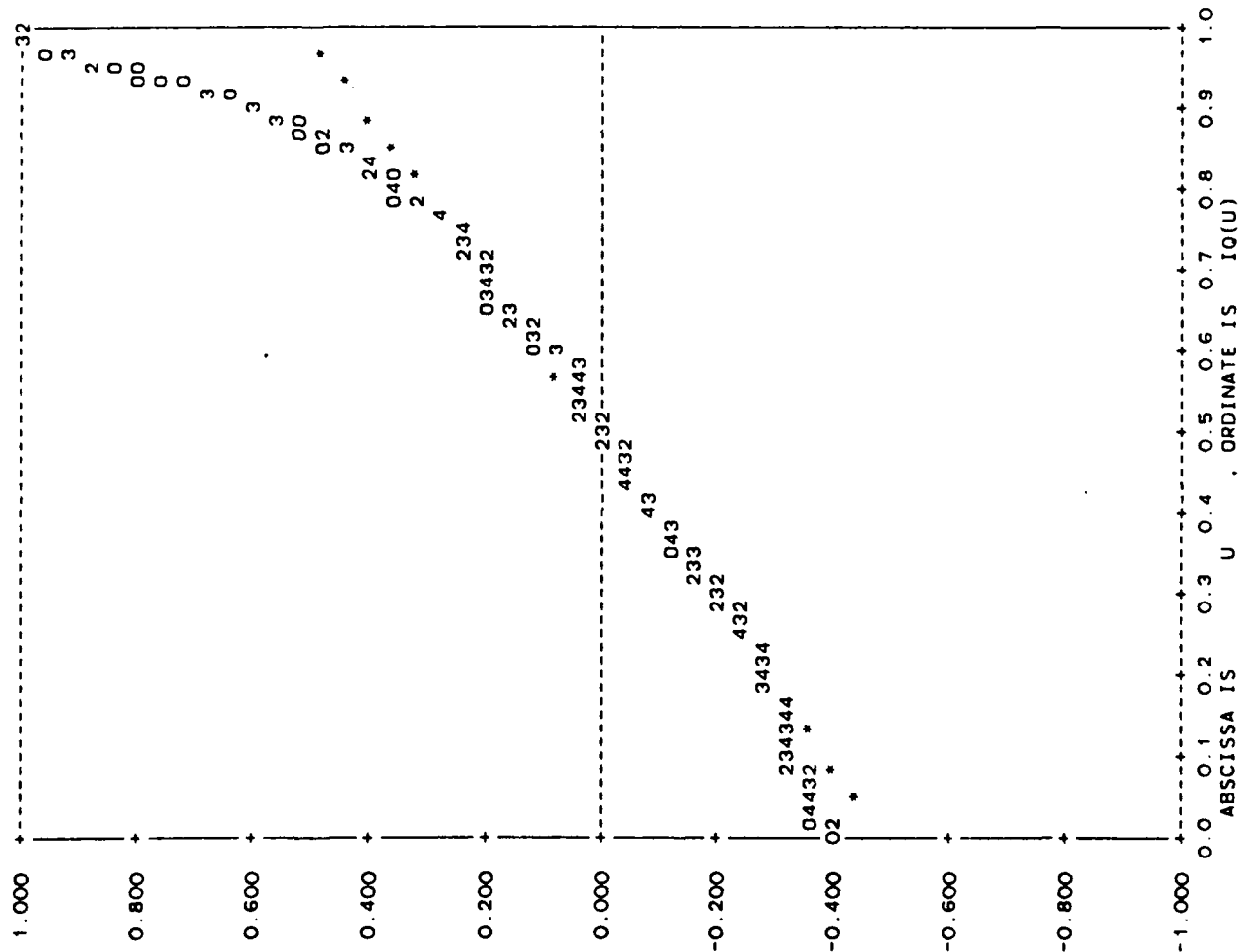
.....
 * ARSPIQ - AUTOREGRESSIVE SPECTRAL INFORMATION QUANTILE IDENTIFICATION *
 *

* EMANUEL PARZEN, TERRY J. WOODFIELD, AND H. JOSEPH NEWTON *
 * DEPARTMENT OF STATISTICS, TEXAS A&M UNIVERSITY, *
 * COLLEGE STATION, TEXAS 77843 *
 * JULY 1983 *
 *

C WOLFERS SUNSPOT NUMBERS, 1749-1963 WOLFER
 INPUT TAPE = 13 IRWIND = 0 LENGTH OF SERIES = 215
 NCDVM = 106 NREQS = 384 XSEAS = 11.00
 NOMP = 19 REXP = 1.000

C WOLFERS SUNSPOT NUMBERS, 1749-1963
INFORMATIVE QUANTILE - ORIGINAL DATA

WOLFER



U	0.01000	0.05000	0.10000	0.25000	0.50000	0.75000	0.90000	0.95000	0.99000
IQ(U)	-0.38550	-0.35821	-0.33531	-0.24905	0.25095	0.75000	0.90000	0.95000	0.99000

0.86584 1.32511

FULLY NON-PARAMETRIC ANALYSIS

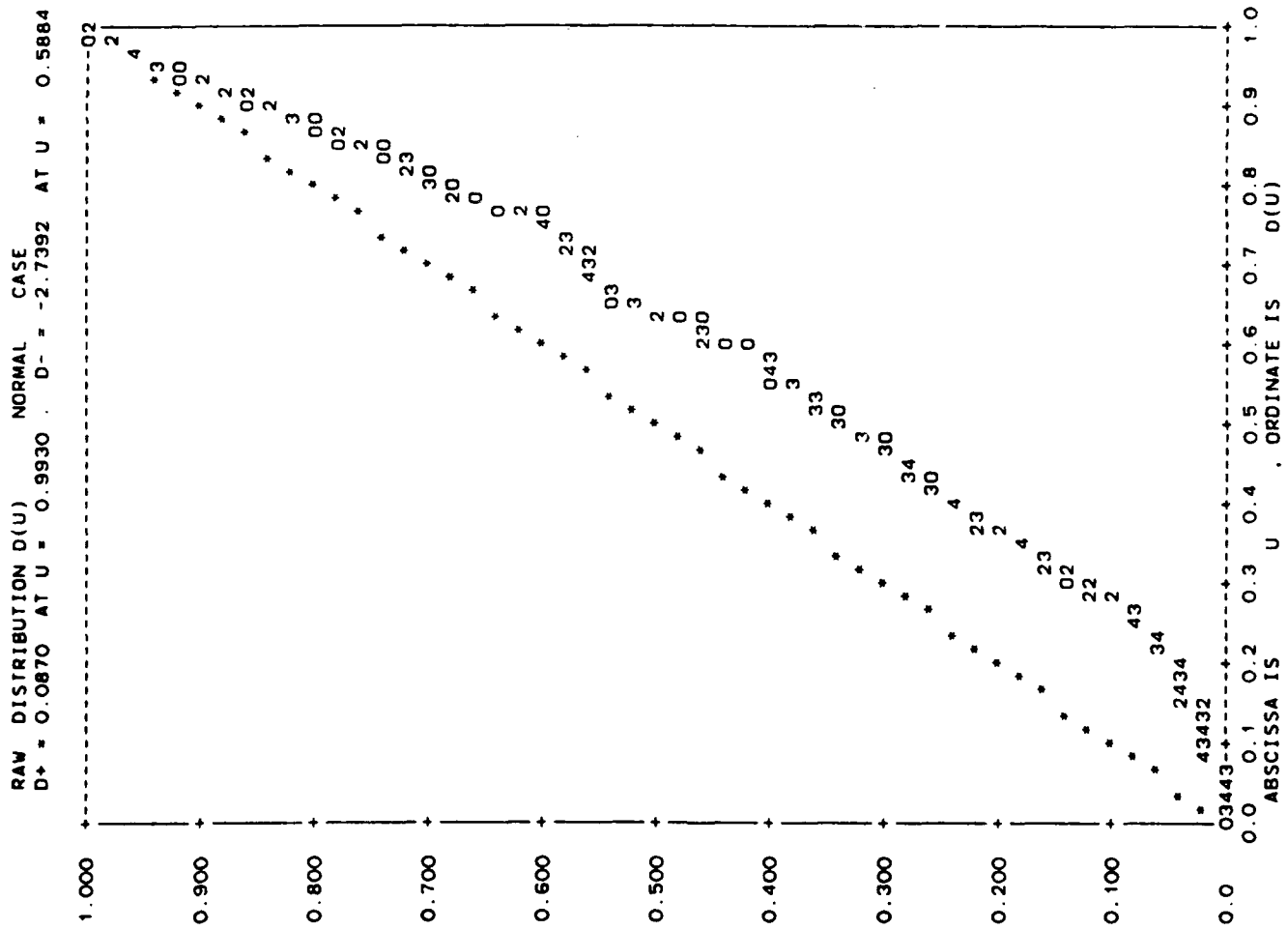
C WOLFERS SUNSPOT NUMBERS. 1749-1963
ORIGINAL DATA
WOLFER

DESCRIPTIVE STATISTICS

SAMPLE SIZE	LOWER QUARTILE	MEDIAN	UPPER QUARTILE	INT QUARTL RANGE
215	15.70	41.80	68.10	52.40

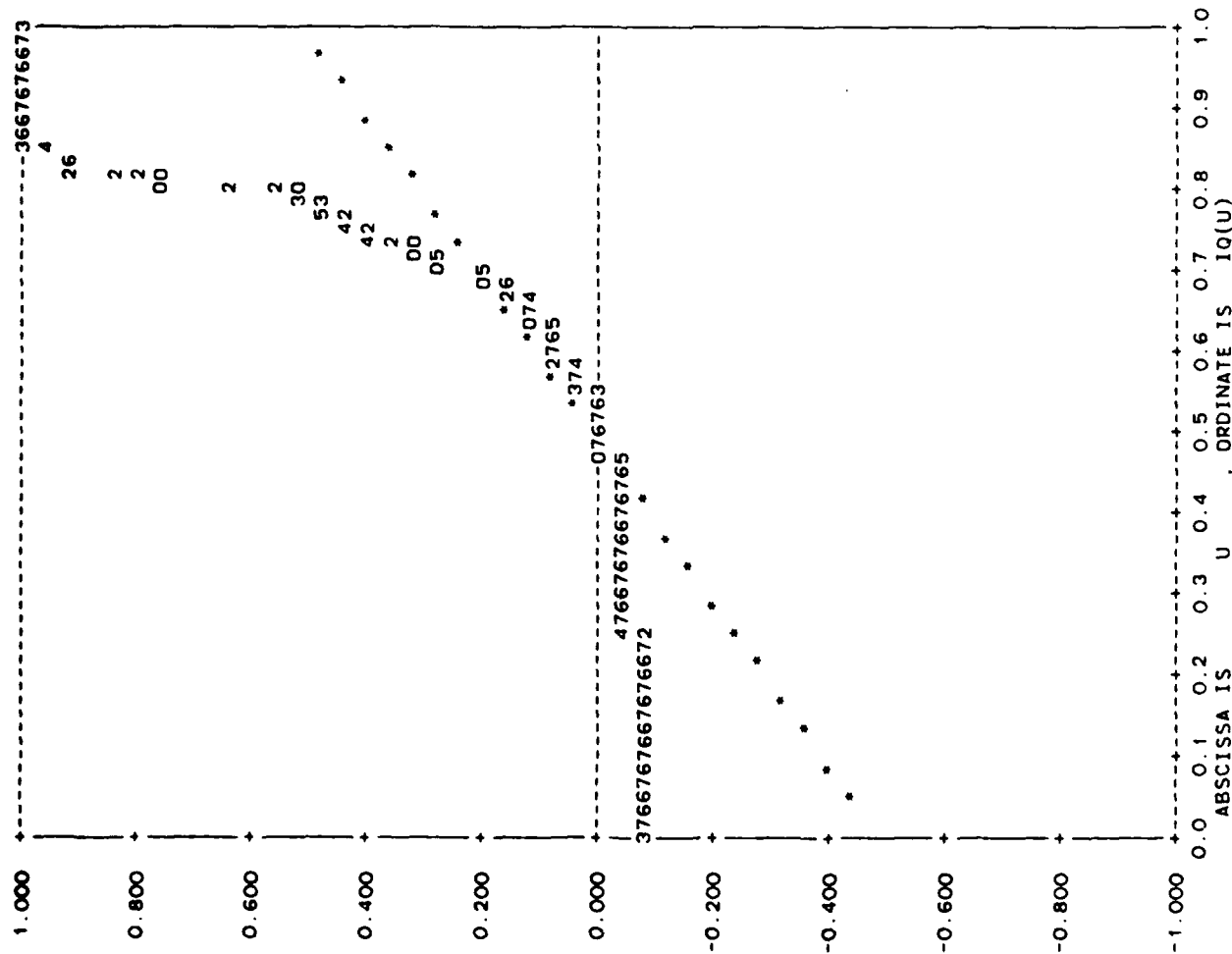
SUNSQ/N	MEAN	VARIANCE	STD DEV	MEAN IQ	STD DEV IQ	LOG STD IQ
3970.	49.20	1556.	39.44	.7065E-01	.3764	-.9772

AV. LOG SPACINGS	AV. LOG W. SPACINGS	AV. LOG HYP. FQ	SIGMA ZERO	LOG SIGMA ZERO
-.80315173E-01	-.45842719	-1.3995142	.36008394	-1.0214176



C WOLFERS SUNSPOT NUMBERS, 1749-1863
INFORMATIVE QUANTILE - RAW PERIOOGRAM

WOLFER



U	0.01000	0.05000	0.10000	0.25000	0.75000	0.90000	0.99000
IQ(U)	-0.08192	-0.07895	-0.07583	-0.05973	0.44027	2.85387	6.60207

FULLY NON-PARAMETRIC ANALYSIS

C WOLFERS SUNSPOT NUMBERS, 1749-1963
RAW PERIODOGRAM

WOLFER

DESCRIPTIVE STATISTICS

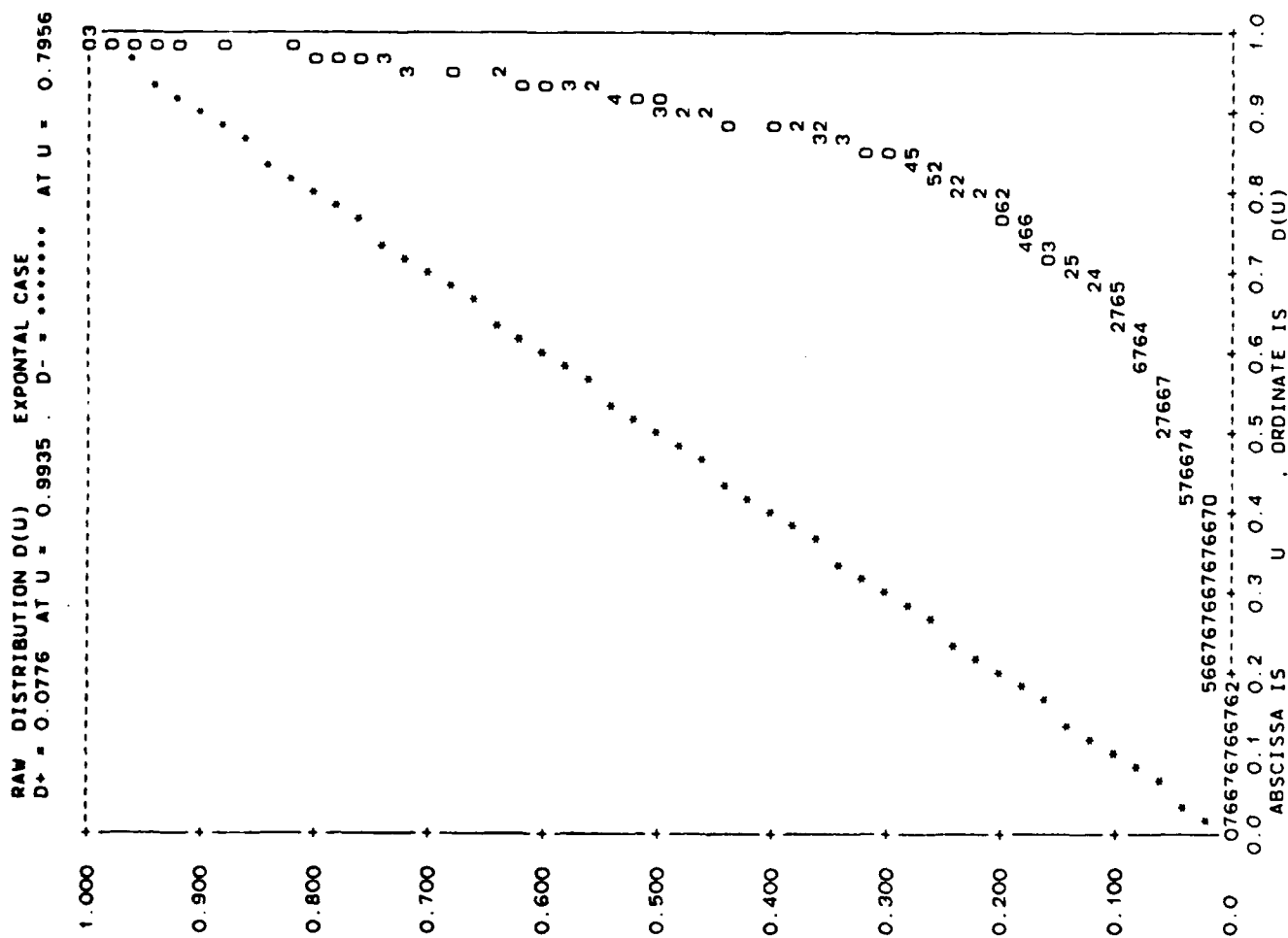
SAMPLE SIZE	LOWER QUANTILE	MEDIAN	UPPER QUANTILE	INT QUANTL RANGE
384	.2133E-01	.7664E-01	.4844	.4630

SUMSQ/N	MEAN	VARIANCE	STD DEV	MEAN IQ	STD DEV IQ	LOG STD IQ
9.867	1.000	8.890	2.982	.9971	3.220	1.169

MAXIMUM JUMP FOR QUANTILE FUNCTION = 921.1580 CORRESPONDING TO Q(U) = 9.96218

I	U	Q
375	0.975	9.96218
376	0.978	9.96220
377	0.980	14.40501
378	0.983	14.40503
379	0.986	16.70163
380	0.988	16.70164
381	0.991	20.58804
382	0.993	20.58804
383	0.996	21.89549
384	0.999	21.89554

AV. LOG SPACINGS	AV. LOG W. SPACINGS	AV. LOG HYP. FQ	SIGMA ZERO	LOG SIGMA ZERO
-.74432033	-1.8252487	-1.0015879	1.0825577	.79326451E-01



LOCAL QUANTILE PERIODOGRAM: K = 19

RAW PERIODOGRAM

U	G25	G50	G75
0.0026	0.4844	1.0109	3.4683
0.0137	0.3255	0.7970	2.5850
0.0248	0.2619	0.5201	1.3799
0.0359	0.4360	0.7326	1.6044
0.0470	0.4850	1.4335	2.9212
0.0582	0.5235	2.5507	7.1950
0.0693	0.8855	3.4208	8.0483
0.0804	1.5137	3.8399	8.0483
0.0915	0.5440	2.6421	7.9348
0.1026	0.2298	0.7373	3.4292
0.1137	0.1473	0.5361	0.9730
0.1248	0.0622	0.2654	0.5915
0.1359	0.0622	0.2204	0.5775
0.1470	0.0689	0.2204	0.4596
0.1582	0.0660	0.2204	0.4019
0.1693	0.0836	0.2716	0.5067
0.1804	0.0508	0.2052	0.3271
0.1915	0.0496	0.1207	0.2609
0.2026	0.0315	0.1003	0.2052
0.2137	0.0315	0.0924	0.1609
0.2248	0.0241	0.0869	0.1506
0.2359	0.0138	0.0812	0.1588
0.2470	0.0219	0.0603	0.1375
0.2582	0.0079	0.0242	0.0774
0.2693	0.0064	0.0319	0.0711
0.2804	0.0064	0.0291	0.0687
0.2915	0.0027	0.0140	0.0687
0.3026	0.0036	0.0172	0.0630
0.3137	0.0095	0.0281	0.0766
0.3248	0.0059	0.0233	0.0811
0.3359	0.0091	0.0205	0.0301
0.3470	0.0084	0.0198	0.0284
0.3582	0.0064	0.0177	0.0237
0.3693	0.0061	0.0175	0.0240
0.3804	0.0057	0.0123	0.0236
0.3915	0.0054	0.0216	0.0266
0.4026	0.0048	0.0236	0.0367
0.4137	0.0064	0.0230	0.0368
0.4248	0.0094	0.0237	0.0379
0.4359	0.0085	0.0247	0.0381
0.4470	0.0086	0.0321	0.0388
0.4582	0.0088	0.0324	0.0388
0.4693	0.0088	0.0345	0.0432
0.4804	0.0082	0.0324	0.0353
0.4915	0.0088	0.0345	0.0443
0.5026	0.0086	0.0324	0.0388

-5 9230

3 6872

FOR PERIODOGRAM, SPLMIN = -6.00000 SPLMAX = 3.08628 R(O) = 0.14599
 SPLR = 9.08628

FREQUENCY	PERIOD	SPEC
0.0	0.0	7.35124
0.00521	192.00005	3.46834
0.01042	96.00002	14.40504
0.01562	64.00002	2.71947
0.02083	48.00000	0.11259
0.02604	38.40001	0.80144
0.03125	32.00000	0.18917
0.03646	27.42857	0.92473
0.04167	24.00000	0.78488
0.04687	21.33333	2.21510
0.05208	19.20000	0.48457
0.05729	17.45454	1.32517
0.06250	16.00000	0.13735
0.06771	14.76923	0.52351
0.07292	13.71429	0.46361
0.07812	12.80001	1.51372
0.08333	12.00000	3.42081
0.08854	11.29412	21.89557
0.09375	10.66667	8.04830
0.09896	10.10526	7.19496
0.10417	9.60000	0.20100
0.10937	9.14286	0.22976
0.11458	8.72727	0.37931
0.11979	8.34783	0.94114
0.12500	8.00000	1.53267
0.13021	7.68000	0.53605
0.13542	7.38462	0.84667
0.14062	7.11111	0.97304
0.14583	6.85715	0.03836
0.15104	6.62069	0.26536
0.15625	6.40000	0.05312
0.16146	6.19355	0.06217
0.16667	6.00000	0.07664
0.17187	5.81819	0.92178
0.17708	5.64706	0.16320
0.18229	5.48572	0.97028
0.18750	5.33334	0.19370
0.19271	5.18919	0.08359
0.19792	5.05263	0.04502
0.20312	4.92308	0.04961
0.20833	4.80000	0.66983
0.21354	4.68293	0.20518
0.21875	4.57143	0.26090
0.22396	4.46512	0.15061
0.22917	4.36364	0.09238
0.23437	4.26667	0.00660
0.23958	4.17392	0.08692
0.24479	4.08511	0.15877
0.25000	4.00000	0.16091
0.25521	3.91837	0.02454
0.26042	3.84000	0.00814
0.26562	3.76471	0.07741
0.27083	3.69231	0.03474
0.27604	3.62264	0.13419
0.28125	3.55556	0.00636
0.28646	3.49091	0.03193

0.29167	3.42857	0.12415
0.29687	3.36842	0.01379
0.30208	3.31035	0.01279
0.30729	3.25424	0.04471
0.31250	3.20000	0.07264
0.31771	3.14754	0.01641
0.32292	3.09678	0.09815
0.32812	3.04762	0.00041
0.33333	3.00000	0.01256
0.33854	2.95385	0.00353
0.34375	2.90909	0.08348
0.34896	2.86567	0.02047
0.35417	2.82353	0.01048
0.35937	2.78261	0.08108
0.36458	2.74286	0.02307
0.36979	2.70423	0.00907
0.37500	2.66667	0.01734
0.38021	2.63014	0.02165
0.38542	2.59459	0.00642
0.39062	2.56000	0.01229
0.39583	2.52632	0.00599
0.40104	2.49351	0.03669
0.40625	2.46154	0.07742
0.41146	2.43038	0.03891
0.41667	2.40000	0.00704
0.42187	2.37037	0.00429
0.42708	2.34146	0.02318
0.43229	2.31325	0.03761
0.43750	2.28571	0.00393
0.44271	2.25882	0.00679
0.44792	2.23256	0.03159
0.45312	2.20690	0.00845
0.45833	2.18182	0.03781
0.46354	2.15730	0.01529
0.46875	2.13333	0.11131
0.47396	2.10989	0.00864
0.47917	2.08696	0.03236
0.48437	2.06452	0.00725
0.48958	2.04255	0.03876
0.49479	2.02105	0.05391
0.50000	2.00000	0.00378

CUMULATIVE PERIODOGRAM :

FREQUENCY	PERIOD	SPEC
0.0	0.0	0.03757
0.00521	192.00005	0.06011
0.01042	96.00002	0.13889
0.01562	64.00002	0.18653
0.02083	48.00000	0.22121
0.02604	38.40001	0.24239
0.03125	32.00000	0.24583
0.03646	27.42857	0.25887
0.04167	24.00000	0.26370
0.04687	21.33333	0.27572
0.05208	19.20000	0.28071
0.05729	17.45454	0.28914
0.06250	16.00000	0.29248
0.06771	14.76923	0.30246

0.07292	13.71428	0.31957
0.07812	12.80001	0.34034
0.08333	12.00000	0.36650
0.08854	11.29412	0.50208
0.09375	10.66667	0.64843
0.09896	10.10526	0.70503
0.10417	9.60000	0.79141
0.10937	9.14286	0.84350
0.11458	8.72727	0.86506
0.11979	8.34783	0.89520
0.12500	8.00000	0.91740
0.13021	7.68000	0.92293
0.13542	7.38462	0.93019
0.14062	7.11111	0.93622
0.14583	6.85715	0.93671
0.15104	6.62069	0.94042
0.15625	6.40000	0.94129
0.16146	6.19355	0.94171
0.16667	6.00000	0.94323
0.17187	5.81819	0.95029
0.17708	5.64706	0.95416
0.18229	5.48572	0.96117
0.18750	5.33334	0.96355
0.19271	5.18919	0.96565
0.19792	5.05263	0.96705
0.20312	4.92308	0.96896
0.20833	4.80000	0.97497
0.21354	4.68293	0.97609
0.21875	4.57143	0.97769
0.22396	4.46512	0.97858
0.22917	4.36364	0.97931
0.23437	4.26667	0.98008
0.23958	4.17392	0.98103
0.24479	4.08511	0.98284
0.25000	4.00000	0.98382
0.25521	3.91837	0.98491
0.26042	3.84000	0.98542
0.26562	3.76471	0.98586
0.27083	3.69231	0.98615
0.27604	3.62264	0.98770
0.28125	3.55556	0.98774
0.28646	3.49091	0.98821
0.29167	3.42857	0.98920
0.29687	3.36842	0.98928
0.30208	3.31035	0.98935
0.30729	3.25424	0.98959
0.31250	3.20000	0.99000
0.31771	3.14754	0.99037
0.32292	3.09678	0.99102
0.32812	3.04762	0.99143
0.33333	3.00000	0.99151
0.33854	2.95385	0.99155
0.34375	2.90909	0.99212
0.34896	2.86567	0.99254
0.35417	2.82353	0.99275
0.35937	2.78261	0.99380
0.36458	2.74286	0.99394
0.36979	2.70423	0.99411
0.37500	2.66667	0.99421
0.38021	2.63014	0.99441
0.38542	2.59459	0.99455

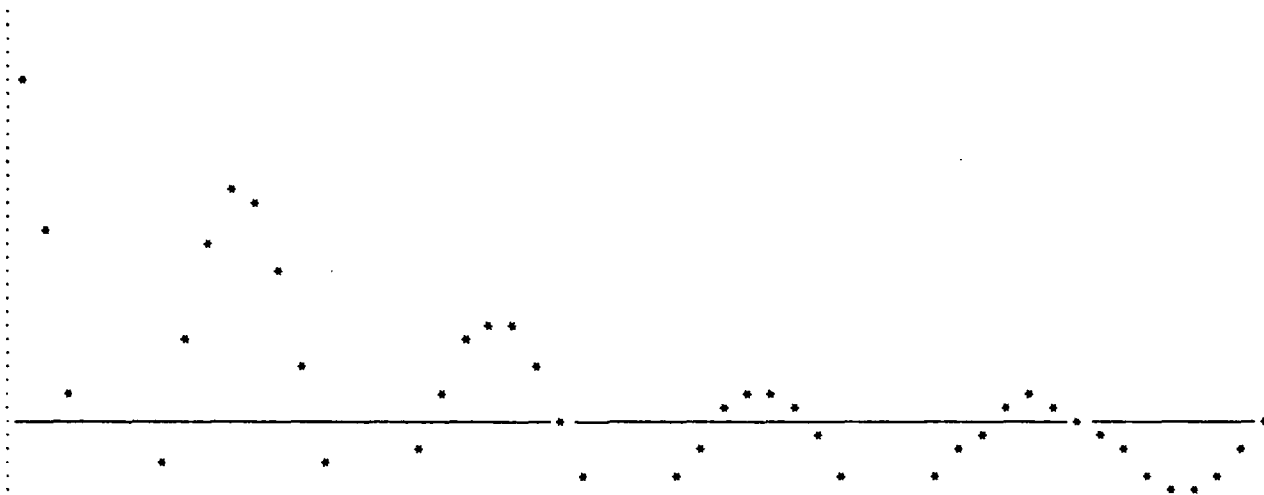
0.39062	2.56000	0.99465
0.39583	2.52632	0.99471
0.40104	2.49351	0.99501
0.40625	2.46154	0.99554
0.41146	2.43038	0.99575
0.41667	2.40000	0.99581
0.42187	2.37037	0.99584
0.42708	2.34146	0.99608
0.43229	2.31325	0.99639
0.43750	2.28571	0.99653
0.44271	2.25882	0.99669
0.44792	2.23256	0.99705
0.45312	2.20690	0.99713
0.45833	2.18182	0.99752
0.46354	2.15730	0.99768
0.46875	2.13333	0.99852
0.47396	2.10989	0.99879
0.47917	2.08696	0.99900
0.48437	2.06452	0.99908
0.48958	2.04255	0.99945
0.49479	2.02105	0.99991
0.50000	2.00000	1.00000

.....

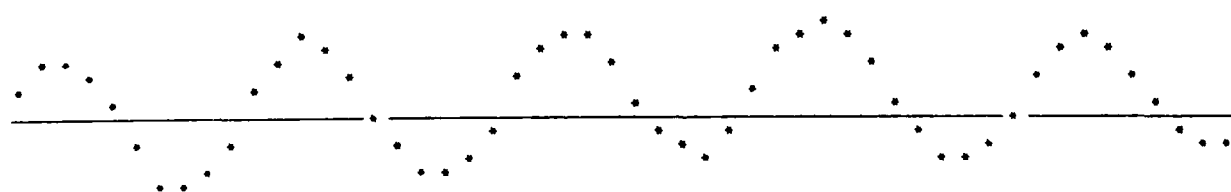
TIME DOMAIN ANALYSIS: CORRELOGRAM

R(O) = 0.1459852E+00

I	CORR
1	0.8221
2	0.4577
3	0.0637
4	-0.2258
5	-0.3531
6	-0.2974
7	-0.0957
8	0.1843
9	0.4354
10	0.5640
11	0.5328
12	0.3582
13	0.1179
14	-0.0972
15	-0.2268
16	-0.2544
17	-0.1873
18	-0.0673
19	0.0719
20	0.1851
21	0.2393
22	0.2246
23	0.1378
24	0.0076
25	-0.1250
26	-0.2223
27	-0.2473
28	-0.2022
29	-0.1331
30	-0.0558
31	0.0170
32	0.0730
33	0.0828
34	0.0451
35	-0.0377
36	-0.1273
37	-0.1886
38	-0.2121
39	-0.1918
40	-0.1428
41	-0.0820
42	-0.0212
43	0.0289
44	0.0544
45	0.0464
46	0.0122
47	-0.0244
48	-0.0748
49	-0.1223
50	-0.1600
51	-0.1623
52	-0.1298
53	-0.0702
54	0.0009



55	0.0728
56	0.1192
57	0.1307
58	0.1018
59	0.0220
60	-0.0816
61	-0.1557
62	-0.1774
63	-0.1416
64	-0.0530
65	0.0542
66	0.1456
67	0.1913
68	0.1761
69	0.1097
70	0.0159
71	-0.0776
72	-0.1373
73	-0.1485
74	-0.1080
75	-0.0193
76	0.0847
77	0.1675
78	0.2005
79	0.1842
80	0.1241
81	0.0495
82	-0.0299
83	-0.0810
84	-0.0918
85	-0.0432
86	0.0554
87	0.1584
88	0.2155
89	0.2259
90	0.1955
91	0.1292
92	0.0498
93	-0.0354
94	-0.0914
95	-0.0999
96	-0.0596
97	0.0132
98	0.1055
99	0.1718
100	0.1894
101	0.1603
102	0.0975
103	0.0244
104	-0.0354
105	-0.0648
106	-0.0626



FULLY NON-PARAMETRIC ANALYSIS

C WOLFERS SUNSPOT NUMBERS, 1749-1963
CORRELOGRAM

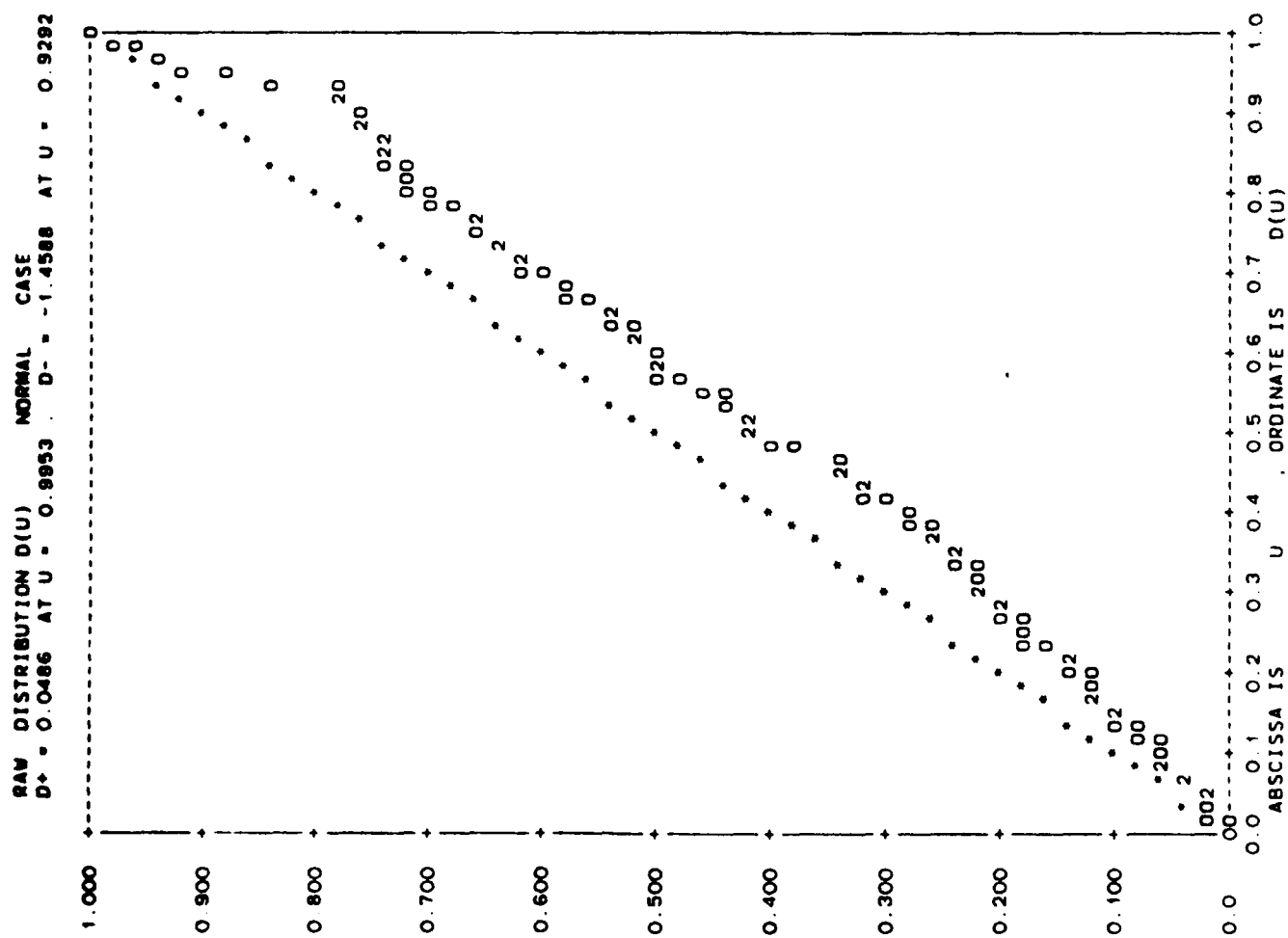
WOLFER

DESCRIPTIVE STATISTICS

SAMPLE SIZE	LOWER QUARTILE	MEDIAN	UPPER QUARTILE	INT_QUARTL RANGE
106	-.1019	.9885E-02	.1254	.2273

SUMSQ/N	MEAN	VARIANCE	STD DEV	MEAN IQ	STD DEV IQ	LOG STD IQ
.3487E-01	.2049E-01	.3478E-01	.1865	.2333E-01	.4103	-.8909

AV. LOG SPACINGS	AV. LOG W. SPACINGS	AV. LOG HYP. FQ	SIGMA ZERO	LOG SIGMA ZERO
.19785833	-.27064902	-1.3855381	.39970297	-.91703361



INFORMATION LAG FUNCTION: $-0.5 \cdot \text{LOG}(1 - \text{RHO}^{**2})$

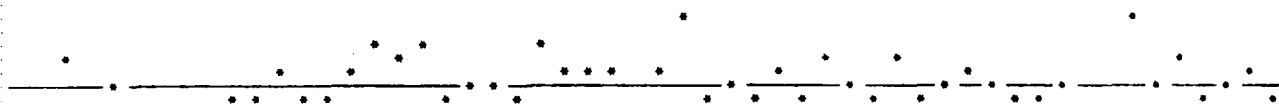
I	INFO
1	0.5634
2	0.1175
3	0.0020
4	0.0262
5	0.0666
6	0.0463
7	0.0046
8	0.0173
9	0.1051
10	0.1915
11	0.1670
12	0.0686
13	0.0070
14	0.0047
15	0.0264
16	0.0335
17	0.0179
18	0.0023
19	0.0026
20	0.0174
21	0.0295
22	0.0259
23	0.0096
24	0.0000
25	0.0079
26	0.0253
27	0.0315
28	0.0209
29	0.0089
30	0.0016
31	0.0001
32	0.0027
33	0.0034
34	0.0010
35	0.0007
36	0.0082
37	0.0181
38	0.0230
39	0.0187
40	0.0103
41	0.0034
42	0.0002
43	0.0004
44	0.0015
45	0.0011
46	0.0001
47	0.0003
48	0.0028
49	0.0075
50	0.0130
51	0.0133
52	0.0085
53	0.0025
54	0.0000

55	0.0027	*
56	0.0072	*
57	0.0086	*
58	0.0052	*
59	0.0002	*
60	0.0033	*
61	0.0123	*
62	0.0160	*
63	0.0101	*
64	0.0014	*
65	0.0015	*
66	0.0107	*
67	0.0186	*
68	0.0158	*
69	0.0060	*
70	0.0001	*
71	0.0030	*
72	0.0095	*
73	0.0112	*
74	0.0059	*
75	0.0002	*
76	0.0036	*
77	0.0142	*
78	0.0205	*
79	0.0173	*
80	0.0078	*
81	0.0012	*
82	0.0004	*
83	0.0033	*
84	0.0042	*
85	0.0009	*
86	0.0015	*
87	0.0127	*
88	0.0238	*
89	0.0262	*
90	0.0195	*
91	0.0084	*
92	0.0012	*
93	0.0006	*
94	0.0042	*
95	0.0050	*
96	0.0018	*
97	0.0001	*
98	0.0056	*
99	0.0150	*
100	0.0183	*
101	0.0130	*
102	0.0048	*
103	0.0003	*
104	0.0006	*
105	0.0021	*
106	0.0020	*

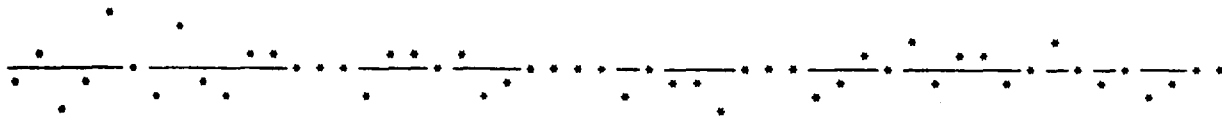
AR DESCRIPTION OF Y TILDA

PARTIAL AUTOCORRELATIONS VIA THE YULE WALKER EQUATIONS

I	PACF
1	-0.8221
2	0.6733
3	0.0698
4	-0.0630
5	-0.0051
6	-0.1761
7	-0.1689
8	-0.2130
9	-0.0832
10	-0.0217
11	-0.0366
12	0.0454
13	-0.0429
14	-0.0335
15	0.0460
16	0.0901
17	0.0545
18	0.1053
19	-0.0209
20	0.0040
21	-0.0134
22	-0.0374
23	0.0977
24	0.0266
25	0.0444
26	0.0418
27	-0.0821
28	0.0368
29	0.1641
30	-0.0201
31	-0.0003
32	-0.0323
33	0.0426
34	-0.0330
35	0.0582
36	0.0145
37	-0.0366
38	0.0547
39	-0.0334
40	0.0122
41	0.0306
42	0.0002
43	-0.0220
44	-0.0310
45	-0.0051
46	-0.0611
47	-0.0650
48	0.1568
49	-0.0077
50	0.0688
51	-0.0335
52	0.0147
53	0.0190
54	-0.0216



55 -0.0170
 56 0.0402
 57 -0.1082
 58 -0.0330
 59 0.1332
 60 -0.0127
 61 -0.0677
 62 0.0884
 63 -0.0392
 64 -0.0547
 65 0.0367
 66 0.0321
 67 -0.0139
 68 0.0000
 69 -0.0013
 70 -0.0659
 71 0.0491
 72 0.0242
 73 0.0089
 74 0.0228
 75 -0.0589
 76 -0.0286
 77 -0.0153
 78 -0.0025
 79 -0.0150
 80 0.0134
 81 -0.0776
 82 0.0041
 83 -0.0330
 84 -0.0178
 85 -0.0877
 86 -0.0048
 87 -0.0071
 88 0.0056
 89 -0.0583
 90 -0.0411
 91 0.0337
 92 0.0000
 93 0.0829
 94 -0.0290
 95 0.0470
 96 0.0229
 97 -0.0457
 98 -0.0115
 99 0.0511
 100 0.0114
 101 -0.0452
 102 0.0010
 103 -0.0634
 104 -0.0449
 105 -0.0104
 106 0.0145



FULLY NON-PARAMETRIC ANALYSIS

C WOLFERS SUNSPOT NUMBERS. 1749-1963
PARTIAL AUTOCORRELATIONS

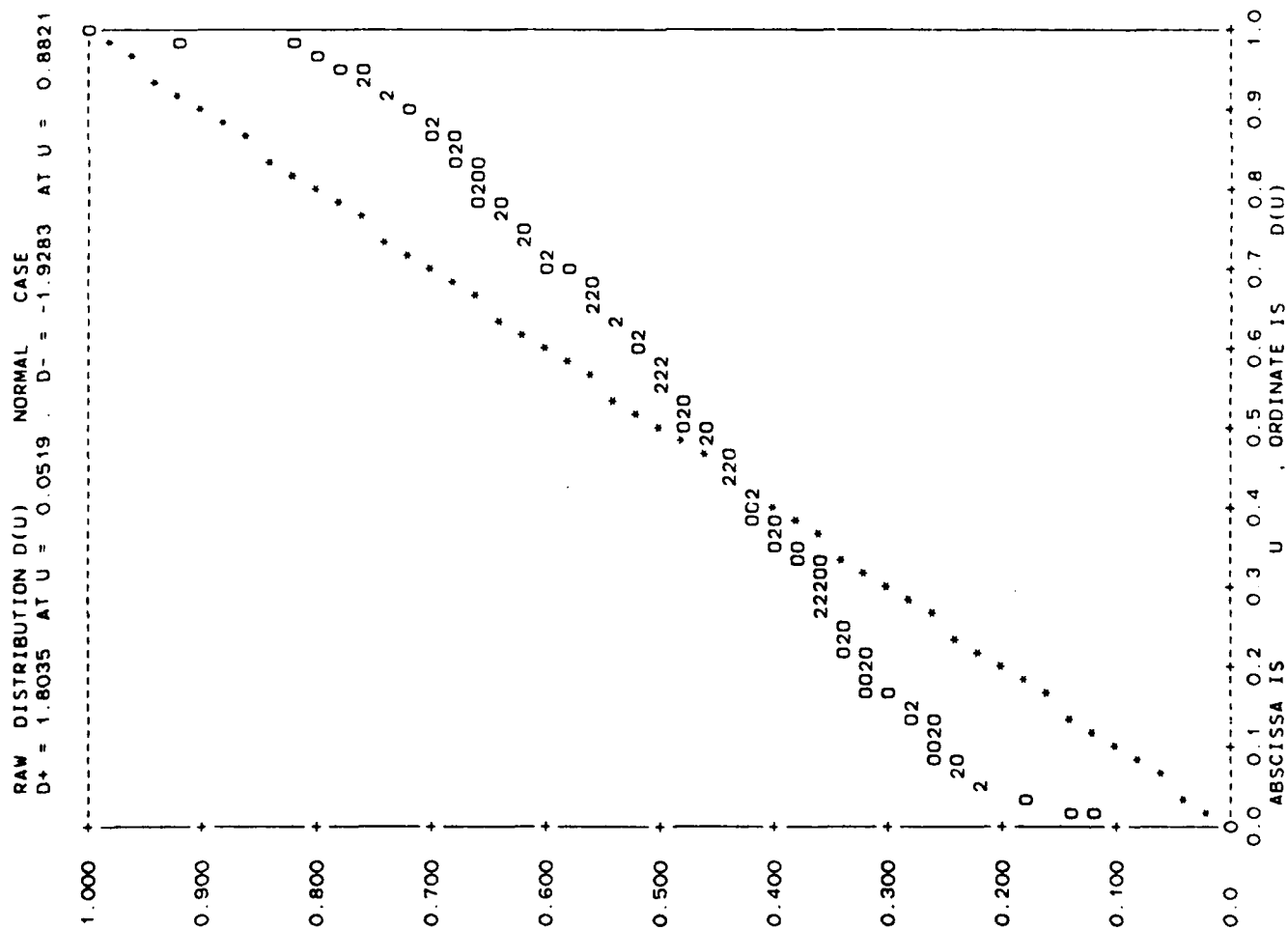
WOLFER

DESCRIPTIVE STATISTICS

SAMPLE SIZE	LOWER QUARTILE	MEDIAN	UPPER QUARTILE	INT QUARTL RANGE
106	-.3658E-01	-.6100E-02	.3252E-01	.6910E-01

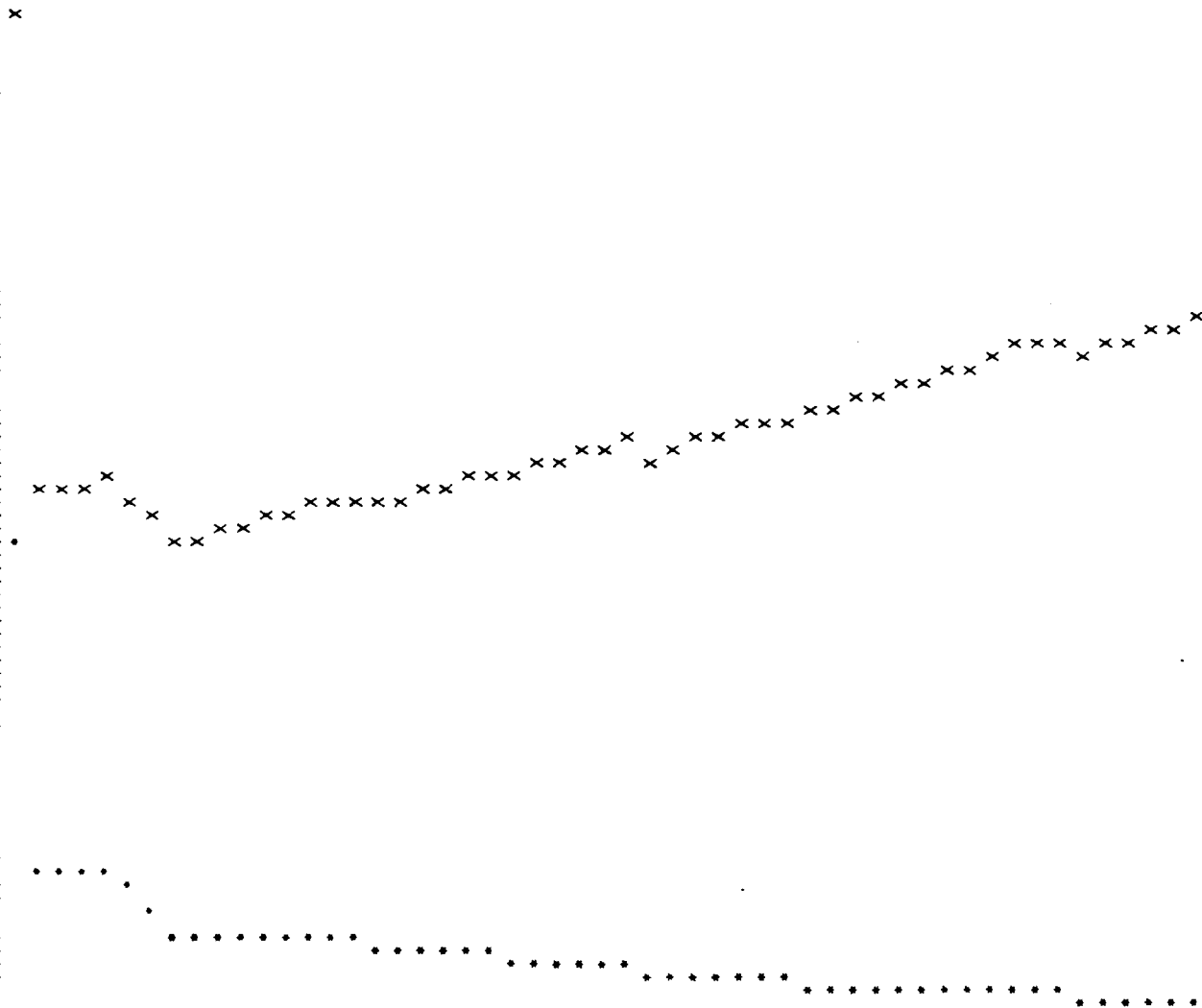
SUMSQ/N	MEAN	VARIANCE	STD DEV	MEAN IQ	STD DEV IQ	LOG STD IQ
.1413E-01	-.6028E-02	.1423E-01	.1193	.5221E-03	.8631	-.1472

AV. LOG SPACINGS	AV. LOG W. SPACINGS	AV. LOG HYP. FQ	SIGMA ZERO	LOG SIGMA ZERO
.33825362	-.62412298	-1.3855381	.65497315	-.42316103



ORDER BY AIC = 8

I	ALRV	AIC
1	-1.1267	-1.1174
2	-1.7306	-1.7120
3	-1.7355	-1.7076
4	-1.7395	-1.7023
5	-1.7395	-1.6930
6	-1.7710	-1.7152
7	-1.8000	-1.7348
8	-1.8464	-1.7719
9	-1.8533	-1.7696
10	-1.8538	-1.7608
11	-1.8551	-1.7528
12	-1.8572	-1.7456
13	-1.8590	-1.7381
14	-1.8602	-1.7299
15	-1.8623	-1.7227
16	-1.8704	-1.7216
17	-1.8734	-1.7152
18	-1.8845	-1.7171
19	-1.8850	-1.7082
20	-1.8850	-1.6989
21	-1.8852	-1.6898
22	-1.8866	-1.6819
23	-1.8962	-1.6822
24	-1.8969	-1.6736
25	-1.8988	-1.6663
26	-1.9006	-1.6587
27	-1.9073	-1.6562
28	-1.9087	-1.6482
29	-1.9360	-1.6662
30	-1.9364	-1.6573
31	-1.9364	-1.6480
32	-1.9374	-1.6398
33	-1.9393	-1.6323
34	-1.9404	-1.6241
35	-1.9437	-1.6182
36	-1.9440	-1.6091
37	-1.9453	-1.6011
38	-1.9483	-1.5948
39	-1.9494	-1.5866
40	-1.9496	-1.5775
41	-1.9505	-1.5691
42	-1.9505	-1.5598
43	-1.9510	-1.5510
44	-1.9519	-1.5426
45	-1.9520	-1.5334
46	-1.9557	-1.5278
47	-1.9600	-1.5227
48	-1.9619	-1.5384
49	-1.9619	-1.5291
50	-1.9897	-1.5245
51	-1.9908	-1.5164
52	-1.9910	-1.5073
53	-1.9914	-1.4983



54	-1	9918	-1	4895	.
55	-1	9921	-1	4805	.
56	-1	9937	-1	4728	.
57	-2	0055	-1	4753	.
58	-2	0066	-1	4671	.
59	-2	0245	-1	4757	.
60	-2	0247	-1	4665	.
61	-2	0293	-1	4618	.
62	-2	0371	-1	4604	.
63	-2	0387	-1	4526	.
64	-2	0417	-1	4463	.
65	-2	0430	-1	4384	.
66	-2	0440	-1	4301	.
67	-2	0442	-1	4210	.
68	-2	0442	-1	4117	.
69	-2	0442	-1	4024	.
70	-2	0486	-1	3974	.
71	-2	0510	-1	3905	.
72	-2	0516	-1	3818	.
73	-2	0517	-1	3726	.
74	-2	0522	-1	3638	.
75	-2	0557	-1	3580	.
76	-2	0565	-1	3495	.
77	-2	0567	-1	3404	.
78	-2	0567	-1	3312	.
79	-2	0570	-1	3221	.
80	-2	0571	-1	3130	.
81	-2	0632	-1	3097	.
82	-2	0632	-1	3004	.
83	-2	0643	-1	2922	.
84	-2	0646	-1	2832	.
85	-2	0723	-1	2816	.
86	-2	0723	-1	2723	.
87	-2	0724	-1	2631	.
88	-2	0724	-1	2538	.
89	-2	0758	-1	2479	.
90	-2	0775	-1	2403	.
91	-2	0786	-1	2321	.
92	-2	0786	-1	2228	.
93	-2	0855	-1	2204	.
94	-2	0864	-1	2120	.
95	-2	0886	-1	2049	.
96	-2	0891	-1	1961	.
97	-2	0912	-1	1889	.
98	-2	0913	-1	1797	.
99	-2	0940	-1	1730	.
100	-2	0941	-1	1638	.
101	-2	0961	-1	1566	.
102	-2	0961	-1	1473	.
103	-2	1002	-1	1420	.
104	-2	1022	-1	1347	.
105	-2	1023	-1	1255	.
106	-2	1025	-1	1164	.

MININ(1) = 2 VALUE -5 5513239
 MININ(2) = 18 VALUE -5 5509377
 MININ(3) = 29 VALUE -5 2114515
 MININ(4) = 48 VALUE -4 3608418

MININ(5) = 59 VALUE -3.9200706
 MIN1 = 8 CAT(MIN1) = -5.9006128
 MIN2 = 2 CAT(MIN2) = -5.5513239
 FOR ORDER 8 AR MODEL, RVAR = 0.1578100

COEFFICIENTS FOR BEST ORDER :

I	ALPH
1	-1.2661
2	0.5007
3	0.1208
4	-0.1356
5	0.1048
6	-0.0600
7	0.1084
8	-0.2130

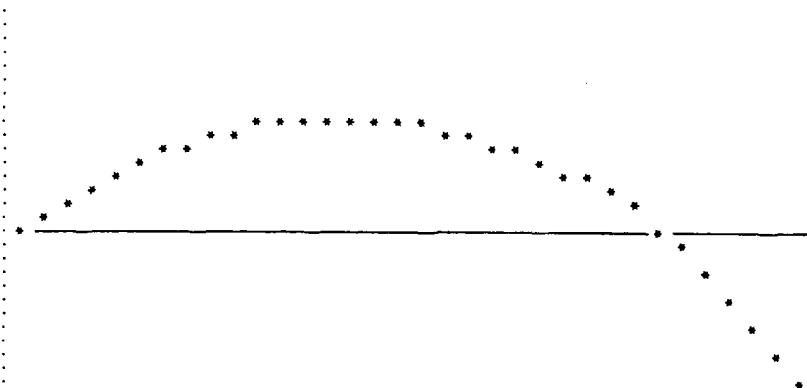
DELTA MEMORY FUNCTION

BEST ORDER AR SPECTRAL DENSITY

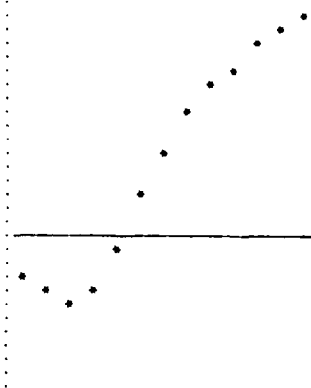
PLOT 1 - LAG 1 IS AT FREQUENCY 0

PLOT 2 - LAG 1 IS AT FREQUENCY 0.09091

I	DELT
1	0.0290
2	0.0960
3	0.1847
4	0.2828
5	0.3805
6	0.4716
7	0.5529
8	0.6230
9	0.6816
10	0.7290
11	0.7657
12	0.7924
13	0.8097
14	0.8180
15	0.8178
16	0.8094
17	0.7930
18	0.7687
19	0.7365
20	0.6963
21	0.6480
22	0.5910
23	0.5250
24	0.4494
25	0.3634
26	0.2658
27	0.1556
28	0.0310
29	-0.1099
30	-0.2694
31	-0.4504
32	-0.6557
33	-0.8876
34	-1.1450



I	DELT
1	-0.3046
2	-0.4414
3	-0.4868
4	-0.3618
5	-0.0775
6	0.2653
7	0.5851
8	0.8536
9	1.0700
10	1.2421
11	1.3785
12	1.4866
13	1.5721



14 1.6394
 15 1.6919
 16 1.7319
 17 1.7615
 18 1.7823
 19 1.7953
 20 1.8015
 21 1.8017
 22 1.7965
 23 1.7863
 24 1.7716
 25 1.7527
 26 1.7300
 27 1.7037
 28 1.6740
 29 1.6414
 30 1.6059
 31 1.5680
 32 1.5279
 33 1.4861
 34 1.4429

SPECTRA, SPLMIN = -4.01750 SPLMAX = 2.65434 SPLR = 6.67184

FREQUENCY	PERIOD	SPEC
0.0	0.0	6.16723
0.00521	192.00005	5.52201
0.01042	96.00002	4.23677
0.01562	64.00002	3.11116
0.02083	48.00000	2.33295
0.02604	38.40001	1.82902
0.03125	32.00000	1.50718
0.03646	27.42857	1.30455
0.04167	24.00000	1.18389
0.04687	21.33333	1.12505
0.05208	19.20000	1.11954
0.05729	17.45454	1.16844
0.06250	16.00000	1.28359
0.06771	14.76923	1.49375
0.07292	13.71429	1.86032
0.07812	12.80001	2.51875
0.08333	12.00000	3.79173
0.08854	11.29412	6.47598
0.09375	10.66667	11.72606
0.09896	10.10526	14.16819
0.10417	9.60000	8.24191
0.10937	9.14286	4.09531
0.11458	8.72727	2.26946
0.11979	8.34783	1.41509
0.12500	8.00000	0.96823
0.13021	7.68000	0.71193
0.13542	7.38462	0.55439
0.14062	7.11111	0.45262
0.14583	6.85715	0.38468
0.15104	6.62069	0.33858
0.15625	6.40000	0.30739
0.16146	6.19355	0.28690
0.16667	6.00000	0.27446
0.17187	5.81819	0.26827

0.17708	5.64706	0.26692
0.18229	5.48572	0.26905
0.18750	5.33334	0.27298
0.19271	5.18919	0.27646
0.19792	5.05263	0.27668
0.20312	4.92308	0.27074
0.20833	4.80000	0.25683
0.21354	4.68293	0.23525
0.21875	4.57143	0.20851
0.22396	4.46512	0.18011
0.22917	4.36364	0.15309
0.23437	4.26667	0.12924
0.23958	4.17392	0.10920
0.24479	4.08511	0.09287
0.25000	4.00000	0.07979
0.25521	3.91837	0.06941
0.26042	3.84000	0.06121
0.26562	3.76471	0.05475
0.27083	3.69231	0.04968
0.27604	3.62264	0.04572
0.28125	3.55556	0.04266
0.28646	3.49091	0.04032
0.29167	3.42857	0.03858
0.29687	3.36842	0.03734
0.30208	3.31035	0.03651
0.30729	3.25424	0.03601
0.31250	3.20000	0.03576
0.31771	3.14754	0.03571
0.32292	3.09678	0.03574
0.32812	3.04762	0.03579
0.33333	3.00000	0.03574
0.33854	2.95385	0.03550
0.34375	2.90909	0.03500
0.34896	2.86567	0.03419
0.35417	2.82353	0.03306
0.35937	2.78261	0.03166
0.36458	2.74286	0.03006
0.36979	2.70423	0.02835
0.37500	2.66667	0.02662
0.38021	2.63014	0.02497
0.38542	2.59459	0.02343
0.39062	2.56000	0.02207
0.39583	2.52632	0.02089
0.40104	2.49351	0.01991
0.40625	2.46154	0.01913
0.41146	2.43038	0.01856
0.41667	2.40000	0.01818
0.42187	2.37037	0.01801
0.42708	2.34146	0.01804
0.43229	2.31325	0.01828
0.43750	2.28571	0.01873
0.44271	2.25882	0.01943
0.44792	2.23256	0.02038
0.45312	2.20690	0.02161
0.45833	2.18182	0.02313
0.46354	2.15730	0.02497
0.46875	2.13333	0.02710
0.47396	2.10989	0.02949
0.47917	2.08696	0.03200
0.48437	2.06452	0.03445
0.48958	2.04255	0.03656

0.49478 2.02105 0.03799
0.50000 2.00000 0.03851

ANALYSIS OF AR SPECTRAL MAXIMA

I	START	FINAL	NUMIT	SPEC(I)	IER
1	10.3783779	10.2431250	3	88.2042999	1
2	5.1200008	5.1105089	3	1.6746912	1

CUMULATIVE BEST ORDER SPECTRA

FREQUENCY	PERIOD	SPEC
0.0	0.0	0.03161
0.00521	192.00005	0.09062
0.01042	96.00002	0.13742
0.01562	64.00002	0.17198
0.02083	48.00000	0.19768
0.02604	38.40001	0.21758
0.03125	32.00000	0.23376
0.03646	27.42857	0.24760
0.04167	24.00000	0.26000
0.04687	21.33333	0.27164
0.05208	19.20000	0.28310
0.05729	17.45454	0.29492
0.06250	16.00000	0.30773
0.06771	14.76923	0.32243
0.07292	13.71429	0.34043
0.07812	12.80001	0.36431
0.08333	12.00000	0.39935
0.08854	11.29412	0.45754
0.09375	10.66667	0.56266
0.09896	10.10526	0.70814
0.10417	9.60000	0.80913
0.10937	9.14286	0.85966
0.11458	8.72727	0.88667
0.11979	8.34783	0.90299
0.12500	8.00000	0.91389
0.13021	7.68000	0.92177
0.13542	7.38462	0.92781
0.14062	7.11111	0.93268
0.14583	6.85715	0.93678
0.15104	6.62069	0.94036
0.15625	6.40000	0.94358
0.16146	6.19355	0.94657
0.16667	6.00000	0.94941
0.17187	5.81819	0.95217
0.17708	5.64706	0.95491
0.18229	5.48572	0.95766
0.18750	5.33334	0.96045
0.19271	5.18919	0.96327
0.19792	5.05263	0.96611
0.20312	4.92308	0.96891
0.20833	4.80000	0.97158
0.21354	4.68293	0.97405
0.21875	4.57143	0.97626
0.22396	4.46512	0.97818
0.22917	4.36364	0.97982
0.23437	4.26667	0.98120

0.23958	4.17392	0.98237
0.24479	4.08511	0.98336
0.25000	4.00000	0.98421
0.25521	3.91837	0.98495
0.26042	3.84000	0.98559
0.26562	3.76471	0.98617
0.27083	3.69231	0.98669
0.27604	3.62264	0.98717
0.28125	3.55556	0.98761
0.28646	3.49091	0.98803
0.29167	3.42857	0.98843
0.29687	3.36842	0.98882
0.30208	3.31035	0.98919
0.30729	3.25424	0.98956
0.31250	3.20000	0.98993
0.31771	3.14754	0.99030
0.32292	3.09678	0.99066
0.32812	3.04762	0.99103
0.33333	3.00000	0.99140
0.33854	2.95385	0.99176
0.34375	2.90909	0.99212
0.34896	2.86567	0.99247
0.35417	2.82353	0.99282
0.35937	2.78261	0.99314
0.36458	2.74286	0.99346
0.36979	2.70423	0.99375
0.37500	2.66667	0.99403
0.38021	2.63014	0.99429
0.38542	2.59459	0.99453
0.39062	2.56000	0.99476
0.39583	2.52632	0.99498
0.40104	2.49351	0.99519
0.40625	2.46154	0.99538
0.41146	2.43038	0.99557
0.41667	2.40000	0.99576
0.42187	2.37037	0.99595
0.42708	2.34146	0.99613
0.43229	2.31325	0.99632
0.43750	2.28571	0.99651
0.44271	2.25882	0.99671
0.44792	2.23256	0.99691
0.45312	2.20690	0.99713
0.45833	2.18182	0.99736
0.46354	2.15730	0.99761
0.46875	2.13333	0.99789
0.47396	2.10989	0.99818
0.47917	2.08696	0.99850
0.48437	2.06452	0.99885
0.48958	2.04255	0.99922
0.49479	2.02105	0.99961
0.50000	2.00000	1.00000

FOR ORDER 2 AR MODEL, RVAR = 0.1771755

COEFFICIENTS FOR 2ND BEST ORDER :

I ALPH

1 -1.3757
2 0.6733

TRUNCATION POINT FOR SMOOTHED PERIODOGRAM = 106

DELTA MEMORY FUNCTION

SMOOTHED PERIOODOGRAM - PARZEN WINDOW

PLOT 1 - LAG 1 IS AT FREQUENCY 0

PLOT 2 - LAG 1 IS AT FREQUENCY 0.09091

I	DELT
1	-0.0646
2	-0.1891
3	-0.2939
4	-0.3258
5	-0.2612
6	-0.1012
7	0.1355
8	0.4183
9	0.7136
10	0.9893
11	1.2060
12	1.3207
13	1.3335
14	1.2931
15	1.2284
16	1.1333
17	1.0212
18	0.9361
19	0.9076
20	0.9236
21	0.9404
22	0.9093
23	0.8034
24	0.6315
25	0.4279
26	0.2311
27	0.0677
28	-0.0641
29	-0.2254
30	-0.5184
31	-0.9424
32	-1.3645
33	-1.6730
34	-1.8278

I	DELT
1	-0.0588
2	0.0279
3	0.1400
4	0.2366
5	0.3146
6	0.4105
7	0.5550
8	0.7358
9	0.8972
10	0.9854
11	1.0113
12	1.0364
13	1.1117



14	1.2528
15	1.4421
16	1.6297
17	1.7569
18	1.8125
19	1.8472
20	1.9112
21	2.0112
22	2.1210
23	2.2209
24	2.3272
25	2.4687
26	2.6194
27	2.6256
28	2.3258
29	1.8447
30	1.3987
31	1.0772
32	0.8867
33	0.7999
34	0.7787

.....
 MIXED SCHEME SELECT PROCEDURE

SIGMA INFINITY SQUARED (VIA SMOOTHED PER.) = 0.14973

I	CEPC
1	1.2584
2	0.2894
3	-0.1040
4	-0.0483
5	-0.1374
6	-0.0620
7	-0.0690
8	0.0891
9	0.2144
10	0.1857
11	0.2058
12	0.0863
13	-0.0399
14	-0.0398
15	0.0035
16	-0.0343
17	0.0359
18	-0.0368
19	-0.0147
20	0.0089
21	-0.0206
22	0.0680
23	0.0184
24	-0.0082
25	0.0230
26	-0.0779
27	-0.0738
28	0.0516
29	-0.0089
30	-0.0329
31	-0.0510
32	0.0151
33	-0.0307
34	0.0280
35	0.0035
36	-0.0383
37	0.0049
38	-0.0281
39	-0.0115
40	0.0020
41	0.0015
42	0.0003
43	-0.0099
44	0.0120
45	0.0038
46	-0.0230
47	0.0266
48	-0.0009
49	0.0095
50	-0.0168

51	-0.0080	*
52	-0.0011	*
53	-0.0027	*
54	-0.0082	*
55	0.0115	*
56	-0.0046	*
57	-0.0098	*
58	0.0143	*
59	0.0067	*
60	-0.0074	*
61	0.0035	*
62	-0.0026	*
63	-0.0040	*
64	-0.0010	*
65	0.0024	*
66	-0.0002	*
67	-0.0003	*
68	0.0007	*
69	-0.0042	*
70	0.0006	*
71	0.0010	*
72	-0.0004	*
73	0.0010	*
74	-0.0001	*
75	-0.0007	*
76	-0.0005	*
77	-0.0006	*
78	0.0005	*
79	0.0003	*
80	-0.0000	*
81	-0.0006	*
82	0.0002	*
83	-0.0001	*
84	-0.0001	*
85	0.0010	*
86	0.0000	*
87	-0.0002	*
88	0.0001	*
89	-0.0002	*
90	-0.0001	*
91	0.0001	*
92	-0.0000	*
93	-0.0001	*
94	0.0000	*
95	-0.0000	*
96	-0.0000	*
97	-0.0000	*
98	-0.0000	*
99	0.0000	*
100	0.0001	*
101	-0.0001	*
102	0.0002	*
103	0.0000	*
104	-0.0002	*
105	0.0001	*
106	0.0001	*

MA MODEL VIA CEPSTRAL CORR., RVAR= 0.15258
 FIRST 10 COEFFICIENTS OF INFINITE MA:

I	BETA
1	1.2584
2	1.0812
3	0.5923
4	0.1964
5	-0.1355
6	-0.2812
7	-0.3289
8	-0.1596
9	0.1857
10	0.5089

LAG	RVY(V)	REY(V)	RYE(V)	REE(V)	PVH(V)
0	1.000000	0.1525801	0.1525801	0.1525801	0.1525801
1	0.8212516	0.1920068	0.0	0.0	0.3942013
2	0.4560588	0.1649727	0.0	0.0	0.5725732
3	0.0633344	0.0903800	0.0	0.0	0.6261092
4	-0.2225544	0.0299657	0.0	0.0	0.6319942
5	-0.3457045	-0.0206712	0.0	0.0	0.6347947
6	-0.2882376	-0.0429078	0.0	0.0	0.6468610
7	-0.0899637	-0.0501892	0.0	0.0	0.6633700
8	0.1800877	-0.0243539	0.0	0.0	0.6672572
9	0.4165128	0.0283414	0.0	0.0	0.6725215
10	0.5313844	0.0776423	0.0	0.0	0.7120307
11	0.4940371	0.1126288	0.0	0.0	0.7951690
12	0.3256853	0.1114869	0.0	0.0	0.8766299
13	0.1032266	0.0720053	0.0	0.0	0.9106105
14	-0.0889249	0.0210675	0.0	0.0	0.9135194
15	-0.1988094	-0.0146934	0.0	0.0	0.9149343
16	-0.2163078	-0.0370177	0.0	0.0	0.9239153
17	-0.1530832	-0.0317362	0.0	0.0	0.9305163
18	-0.0489802	-0.0208281	0.0	0.0	0.9333594
19	0.0654125	-0.0017350	0.0	0.0	0.9333791
20	0.1529310	0.0201087	0.0	0.0	0.9360293
21	0.1894133	0.0318503	0.0	0.0	0.9426778
22	0.1709481	0.0423684	0.0	0.0	0.9544426
23	0.0999367	0.0386368	0.0	0.0	0.9642263
24	0.0023017	0.0219768	0.0	0.0	0.9673917
25	-0.0901654	0.0066035	0.0	0.0	0.9676775
26	-0.1519005	-0.0161352	0.0	0.0	0.9693837
27	-0.1613659	-0.0361856	0.0	0.0	0.9779654
28	-0.1248652	-0.0290928	0.0	0.0	0.9835126
29	-0.0760095	-0.0170519	0.0	0.0	0.9854182
30	-0.0262967	-0.0083312	0.0	0.0	0.9858730
31	0.0163787	-0.0058679	0.0	0.0	0.9860987
32	0.0452819	0.0033431	0.0	0.0	0.9861719
33	0.0462332	0.0050808	0.0	0.0	0.9863411
34	0.0221642	0.0104878	0.0	0.0	0.9870619
35	-0.0221239	0.0061283	0.0	0.0	0.9873080
36	-0.0652053	-0.0069687	0.0	0.0	0.9876263
37	-0.0901687	-0.0146585	0.0	0.0	0.9890345
38	-0.0948357	-0.0216443	0.0	0.0	0.9921048
39	-0.0794292	-0.0214378	0.0	0.0	0.9951168
40	-0.0535882	-0.0157604	0.0	0.0	0.9967447
41	-0.0260918	-0.0093130	0.0	0.0	0.9973131
42	-0.0023169	-0.0038292	0.0	0.0	0.9974092
43	0.0139985	-0.0001726	0.0	0.0	0.9974093
44	0.0193393	0.0038699	0.0	0.0	0.9975075
45	0.0129045	0.0058544	0.0	0.0	0.9977320
46	-0.0007422	-0.0001567	0.0	0.0	0.9977322
47	-0.0128917	-0.0022797	0.0	0.0	0.9977662
48	-0.0252214	-0.0060121	0.0	0.0	0.9980031
49	-0.0333354	-0.0063379	0.0	0.0	0.9982663
50	-0.0367247	-0.0084426	0.0	0.0	0.9987334
51	-0.0319753	-0.0080595	0.0	0.0	0.9991591
52	-0.0215767	-0.0060752	0.0	0.0	0.9994010
53	-0.0086154	-0.0028588	0.0	0.0	0.9994545
54	0.0034824	-0.0013836	0.0	0.0	0.9994670
55	0.0132193	0.0007973	0.0	0.0	0.9994711
56	0.0176550	0.0017502	0.0	0.0	0.9994960
57	0.0165059	0.0015813	0.0	0.0	0.9995124
58	0.0104697	0.0021768	0.0	0.0	0.9995434

59	0.000932	0.0023675	0.0	0.0	0.0	0.9995801
60	-0.0105894	-0.0000931	0.0	0.0	0.0	0.9995801
61	-0.0163468	-0.0024267	0.0	0.0	0.0	0.9996187
62	-0.0159941	-0.0030669	0.0	0.0	0.0	0.9996803
63	-0.0108299	-0.0033139	0.0	0.0	0.0	0.9997523
64	-0.0024386	-0.0021298	0.0	0.0	0.0	0.9997820
65	0.0058578	-0.0005836	0.0	0.0	0.0	0.9997842
66	0.0117297	0.0010471	0.0	0.0	0.0	0.9997913
67	0.0136500	0.0023796	0.0	0.0	0.0	0.9998284
68	0.0115049	0.0026493	0.0	0.0	0.0	0.9998744

REGRESSION ESTIMATION STAGEWISE SUMMARY
 NUMBER OF VARIABLES IN FULL MODEL = 60
 MAXIMUM NUMBER OF COEFFICIENTS = 0

VAR IN MODEL		COEFF	CRIT DEL	AIC	FPE ADD	FPE DEL
19.647263	*****			0.0	145.682007	*****
VAR ADD	VAR DEL	VAR LAST	NO. PREDS	RES VAR	NO. CYC	
1	0	0	0	1.00000	0	

VAR IN MODEL		COEFF	CRIT DEL	AIC	FPE ADD	FPE DEL
1	0.82125					
CRIT ADD	CRIT DEL					
15.020402	133.641968	-1.117599	97.661102	-445.428711		
VAR ADD	VAR DEL	VAR LAST	NO. PREDS	RES VAR	NO. CYC	
2	1	1	1	0.32555	1	

VAR IN MODEL		COEFF	CRIT DEL	AIC	FPE ADD	FPE DEL
2	-0.67086					
1	1.37219					
CRIT ADD	CRIT DEL					
2.923030	52.665573	-1.710878	18.240295	-176.763809		
VAR ADD	VAR DEL	VAR LAST	NO. PREDS	RES VAR	NO. CYC	
9	2	2	2	0.17903	2	

VAR IN MODEL		COEFF	CRIT DEL	AIC	FPE ADD	FPE DEL
9	0.13737					
2	-0.57049					
1	1.26502					
CRIT ADD	CRIT DEL					
0.678282	5.862629	-1.793608	2.087705	-19.814499		
VAR ADD	VAR DEL	VAR LAST	NO. PREDS	RES VAR	NO. CYC	
19	9	9	3	0.16405	3	

TO INTERPRET CRITICAL ADD AND DELETE VALUES, NOTE THAT
 THEY ARE COMPUTED USING TWICE THE SAMPLE SIZE.

RESIDUAL VARIANCE FROM SUBSET ARMA = 0.1640536

I	ALPH
1	-1.2650
2	0.5705
3	0.0
4	0.0

5 0.0
6 0.0
7 0.0
8 0.0
9 -0.1374

SPECTRA, SPLMIN = -3.98663 SPLMAX = 2.63328 SPLR = 6.61990

FREQUENCY	PERIOD	SPEC
0.0	0.0	5.80647
0.00521	192.00005	5.12338
0.01042	96.00002	3.82384
0.01562	64.00002	2.74827
0.02083	48.00000	2.03749
0.02604	38.40001	1.59216
0.03125	32.00000	1.31561
0.03646	27.42857	1.14723
0.04167	24.00000	1.05317
0.04687	21.33333	1.01635
0.05208	19.20000	1.03122
0.05729	17.45454	1.10237
0.06250	16.00000	1.24722
0.06771	14.76923	1.50526
0.07292	13.71429	1.96232
0.07812	12.80001	2.81611
0.08333	12.00000	4.55856
0.08854	11.29412	8.32127
0.09375	10.66667	13.76791
0.09896	10.10526	11.40815
0.10417	9.60000	5.85731
0.10937	9.14286	3.11324
0.11458	8.72727	1.87876
0.11979	8.34783	1.26359
0.12500	8.00000	0.92453
0.13021	7.68000	0.72302
0.13542	7.38462	0.59697
0.14062	7.11111	0.51585
0.14583	6.85715	0.46346
0.15104	6.62069	0.43059
0.15625	6.40000	0.41158
0.16146	6.19355	0.40253
0.16667	6.00000	0.40011
0.17187	5.81819	0.40079
0.17708	5.64706	0.40030
0.18229	5.48572	0.39382
0.18750	5.33334	0.37729
0.19271	5.18919	0.34931
0.19792	5.05263	0.31222
0.20312	4.92308	0.27096
0.20833	4.80000	0.23059
0.21354	4.68293	0.19451
0.21875	4.57143	0.16412
0.22396	4.46512	0.13947
0.22917	4.36364	0.11991
0.23437	4.26667	0.10457
0.23958	4.17392	0.09262
0.24479	4.08511	0.08338
0.25000	4.00000	0.07626
0.25521	3.91837	0.07084

0.26042	3.84000	0.06675
0.26562	3.76471	0.06374
0.27083	3.69231	0.06157
0.27604	3.62264	0.06005
0.28125	3.55556	0.05898
0.28646	3.49091	0.05819
0.29167	3.42857	0.05748
0.29687	3.36842	0.05667
0.30208	3.31035	0.05559
0.30729	3.25424	0.05410
0.31250	3.20000	0.05215
0.31771	3.14754	0.04976
0.32292	3.09678	0.04703
0.32812	3.04762	0.04409
0.33333	3.00000	0.04111
0.33854	2.95385	0.03822
0.34375	2.90909	0.03553
0.34896	2.86567	0.03311
0.35417	2.82353	0.03100
0.35937	2.78261	0.02920
0.36458	2.74286	0.02772
0.36979	2.70423	0.02653
0.37500	2.66667	0.02561
0.38021	2.63014	0.02493
0.38542	2.59459	0.02448
0.39062	2.56000	0.02422
0.39583	2.52632	0.02413
0.40104	2.49351	0.02417
0.40625	2.46154	0.02430
0.41146	2.43038	0.02449
0.41667	2.40000	0.02468
0.42187	2.37037	0.02483
0.42708	2.34146	0.02488
0.43229	2.31325	0.02481
0.43750	2.28571	0.02457
0.44271	2.25882	0.02418
0.44792	2.23256	0.02364
0.45312	2.20690	0.02300
0.45833	2.18182	0.02228
0.46354	2.15730	0.02155
0.46875	2.13333	0.02084
0.47396	2.10989	0.02019
0.47917	2.08696	0.01962
0.48437	2.06452	0.01917
0.48958	2.04255	0.01883
0.49479	2.02105	0.01863
0.50000	2.00000	0.01856

CUMULATIVE SUBSET ARMA SPECTRA :

FREQUENCY	PERIOD	SPEC
0.0	0.0	0.03078
0.00521	192.00005	0.08773
0.01042	96.00002	0.13174
0.01562	64.00002	0.16348
0.02083	48.00000	0.18675
0.02604	38.40001	0.20467
0.03125	32.00000	0.21927
0.03646	27.42857	0.23182

0.04167	24.00000	0.24320
0.04687	21.33333	0.25403
0.05208	19.20000	0.26489
0.05729	17.45454	0.27635
0.06250	16.00000	0.28913
0.06771	14.76923	0.30432
0.07292	13.71429	0.32373
0.07812	12.80001	0.35096
0.08333	12.00000	0.39381
0.08854	11.29412	0.47022
0.09375	10.66667	0.60267
0.09896	10.10526	0.73694
0.10417	9.60000	0.81196
0.10937	9.14286	0.85076
0.11458	8.72727	0.87335
0.11979	8.34783	0.88812
0.12500	8.00000	0.89870
0.13021	7.68000	0.90683
0.13542	7.38462	0.91346
0.14062	7.11111	0.91912
0.14583	6.85715	0.92416
0.15104	6.62069	0.92880
0.15625	6.40000	0.93320
0.16146	6.19355	0.93749
0.16667	6.00000	0.94174
0.17187	5.81819	0.94598
0.17708	5.64706	0.95023
0.18229	5.48572	0.95443
0.18750	5.33334	0.95848
0.19271	5.18919	0.96227
0.19792	5.05263	0.96568
0.20312	4.92308	0.96866
0.20833	4.80000	0.97121
0.21354	4.68293	0.97337
0.21875	4.57143	0.97518
0.22396	4.46512	0.97672
0.22917	4.36364	0.97804
0.23437	4.26667	0.97919
0.23958	4.17392	0.98020
0.24479	4.08511	0.98111
0.25000	4.00000	0.98194
0.25521	3.91837	0.98270
0.26042	3.84000	0.98342
0.26562	3.76471	0.98410
0.27083	3.69231	0.98476
0.27604	3.62264	0.98540
0.28125	3.55556	0.98603
0.28646	3.49091	0.98665
0.29167	3.42857	0.98726
0.29687	3.36842	0.98786
0.30208	3.31035	0.98845
0.30729	3.25424	0.98903
0.31250	3.20000	0.98959
0.31771	3.14754	0.99012
0.32292	3.09678	0.99063
0.32812	3.04762	0.99110
0.33333	3.00000	0.99155
0.33854	2.95385	0.99196
0.34375	2.90909	0.99234
0.34896	2.86567	0.99270
0.35417	2.82353	0.99304

0.35937	2.78261	0.99335
0.36458	2.74286	0.99365
0.36979	2.70423	0.99393
0.37500	2.66667	0.99421
0.38021	2.63014	0.99447
0.38542	2.59459	0.99473
0.39062	2.56000	0.99499
0.39583	2.52632	0.99525
0.40104	2.49351	0.99550
0.40625	2.46154	0.99576
0.41146	2.43038	0.99602
0.41667	2.40000	0.99628
0.42187	2.37037	0.99654
0.42708	2.34146	0.99680
0.43229	2.31325	0.99707
0.43750	2.28571	0.99733
0.44271	2.25882	0.99759
0.44792	2.23256	0.99784
0.45312	2.20690	0.99808
0.45833	2.18182	0.99832
0.46354	2.15730	0.99855
0.46875	2.13333	0.99878
0.47396	2.10989	0.99899
0.47917	2.08696	0.99920
0.48437	2.06452	0.99940
0.48958	2.04255	0.99961
0.49479	2.02105	0.99980
0.50000	2.00000	1.00000

FROM DTARB, RO=

0.14599

PARTIAL AUTOCORRELATIONS VIA BURGS ALGORITHM:

I	PACF
1	-0.8242
2	0.6805
3	0.0780
4	-0.0787
5	0.0115
6	-0.1872
7	-0.1999
8	-0.2494

COEFFICIENTS AND INVERSE CORRELATIONS

SUM OF SQUARES OF COEFFICIENTS = 2.9401

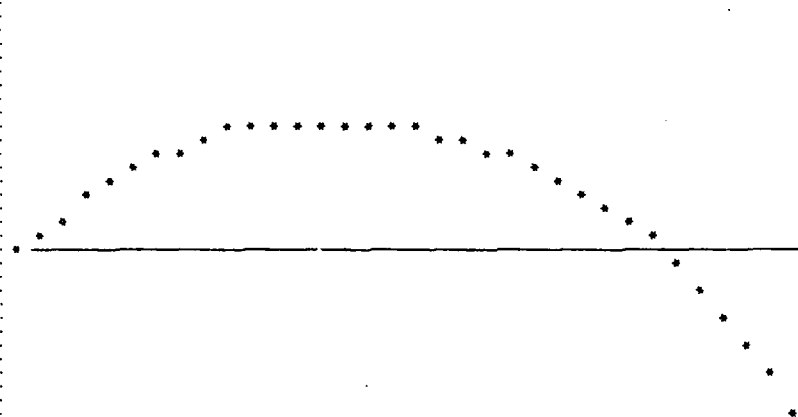
I	ALPH	CORI
1	-1.2539	-0.6327
2	0.4745	0.0845
3	0.1541	0.1227
4	-0.1680	-0.0879
5	0.1048	0.0609
6	-0.0424	-0.1081
7	0.1253	0.1490
8	-0.2494	-0.0848

DELTA MEMORY FUNCTION

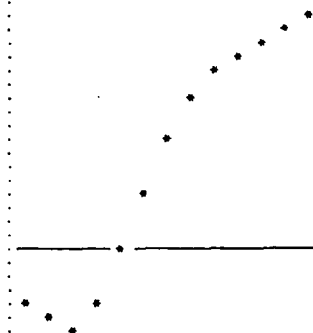
SPECTRAL DENSITY FROM BURG AR MODEL

PLOT 1 - LAG 1 IS AT FREQUENCY 0
 PLOT 2 - LAG 1 IS AT FREQUENCY 0.09091

I	DELT
1	0.0402
2	0.1309
3	0.2459
4	0.3669
5	0.4817
6	0.5842
7	0.6721
8	0.7453
9	0.8045
10	0.8508
11	0.8853
12	0.9090
13	0.9228
14	0.9273
15	0.9231
16	0.9105
17	0.8899
18	0.8612
19	0.8246
20	0.7799
21	0.7268
22	0.6650
23	0.5940
24	0.5129
25	0.4209
26	0.3167
27	0.1989
28	0.0656
29	-0.0859
30	-0.2585
31	-0.4562
32	-0.6837
33	-0.9460
34	-1.2460



I	DELT
1	-0.3651
2	-0.5410
3	-0.5890
4	-0.3849
5	0.0115
6	0.4280
7	0.7787
8	1.0529
9	1.2635
10	1.4251
11	1.5494
12	1.6452
13	1.7188



14 1.7749
 15 1.8168
 16 1.8470
 17 1.8674
 18 1.8794
 19 1.8841
 20 1.8823
 21 1.8747
 22 1.8619
 23 1.8442
 24 1.8219
 25 1.7954
 26 1.7649
 27 1.7306
 28 1.6927
 29 1.6513
 30 1.6068
 31 1.5592
 32 1.5088
 33 1.4561
 34 1.4013

SPECTRA, SPLMIN = -4.07830 SPLMAX = 2.83634 SPLR = 6.91464

FREQUENCY	PERIOD	SPEC
0.0	0.0	7.04114
0.00521	192.00005	6.05410
0.01042	96.00002	4.30453
0.01562	64.00002	2.97043
0.02083	48.00000	2.13851
0.02604	38.40001	1.63452
0.03125	32.00000	1.32580
0.03646	27.42857	1.13644
0.04167	24.00000	1.02550
0.04687	21.33333	0.97188
0.05208	19.20000	0.96680
0.05729	17.45454	1.01098
0.06250	16.00000	1.11562
0.06771	14.76923	1.30849
0.07292	13.71429	1.65071
0.07812	12.80001	2.28379
0.08333	12.00000	3.57398
0.08854	11.29412	6.58283
0.09375	10.66667	13.57119
0.09896	10.10526	16.11069
0.10417	9.60000	7.70292
0.10937	9.14286	3.51911
0.11458	8.72727	1.90166
0.11979	8.34783	1.17818
0.12500	8.00000	0.80647
0.13021	7.68000	0.59507
0.13542	7.38462	0.46587
0.14062	7.11111	0.38293
0.14583	6.85715	0.32814
0.15104	6.62069	0.29167
0.15625	6.40000	0.26792
0.16146	6.19355	0.25359
0.16667	6.00000	0.24672
0.17187	5.81819	0.24607

0.17708 5.64706 0.25078
0.18229 5.48572 0.25993
0.18750 5.33334 0.27208
0.19271 5.18919 0.28465
0.19792 5.05263 0.29348
0.20312 4.92308 0.29336
0.20833 4.80000 0.28030
0.21354 4.68293 0.25441
0.21875 4.57143 0.22036
0.22396 4.46512 0.18453
0.22917 4.36364 0.15173
0.23437 4.26667 0.12416
0.23958 4.17392 0.10210
0.24479 4.08511 0.08489
0.25000 4.00000 0.07161
0.25521 3.91837 0.06139
0.26042 3.84000 0.05353
0.26562 3.76471 0.04747
0.27083 3.69231 0.04280
0.27604 3.62264 0.03922
0.28125 3.55556 0.03650
0.28646 3.49091 0.03448
0.29167 3.42857 0.03302
0.29687 3.36842 0.03203
0.30208 3.31035 0.03144
0.30729 3.25424 0.03119
0.31250 3.20000 0.03121
0.31771 3.14754 0.03145
0.32292 3.09678 0.03182
0.32812 3.04762 0.03225
0.33333 3.00000 0.03262
0.33854 2.95385 0.03284
0.34375 2.90909 0.03280
0.34896 2.86567 0.03241
0.35417 2.82353 0.03164
0.35937 2.78261 0.03050
0.36458 2.74286 0.02908
0.36979 2.70423 0.02746
0.37500 2.66667 0.02577
0.38021 2.63014 0.02410
0.38542 2.59459 0.02254
0.39062 2.56000 0.02114
0.39583 2.52632 0.01993
0.40104 2.49351 0.01892
0.40625 2.46154 0.01811
0.41146 2.43038 0.01752
0.41667 2.40000 0.01713
0.42187 2.37037 0.01695
0.42708 2.34146 0.01698
0.43229 2.31325 0.01722
0.43750 2.28571 0.01770
0.44271 2.25882 0.01843
0.44792 2.23256 0.01944
0.45312 2.20690 0.02077
0.45833 2.18182 0.02245
0.46354 2.15730 0.02453
0.46875 2.13333 0.02701
0.47396 2.10989 0.02986
0.47917 2.08696 0.03299
0.48437 2.06452 0.03614
0.48958 2.04255 0.03893

0.49479 2.02105 0.04089
0.50000 2.00000 0.04160

ANALYSIS OF AR SPECTRAL MAXIMA :

I	START	FINAL	NUMIT	SPEC(I)	IER
1	10.3783779	10.2883120	3	126.337372	1
2	4.9870157	4.9862833	2	2.1484814	1

CUMULATIVE SPECTRA FOR BURG AR:

FREQUENCY	PERIOD	SPEC
0.0	0.0	0.03601
0.00521	192.00005	0.10156
0.01042	96.00002	0.14999
0.01562	64.00002	0.18342
0.02083	48.00000	0.20716
0.02604	38.40001	0.22500
0.03125	32.00000	0.23926
0.03646	27.42857	0.25131
0.04167	24.00000	0.26204
0.04687	21.33333	0.27208
0.05208	19.20000	0.28195
0.05729	17.45454	0.29215
0.06250	16.00000	0.30325
0.06771	14.76923	0.31607
0.07292	13.71429	0.33195
0.07812	12.80001	0.35343
0.08333	12.00000	0.38606
0.08854	11.29412	0.44398
0.09375	10.66667	0.56188
0.09896	10.10526	0.73148
0.10417	9.60000	0.83074
0.10937	9.14286	0.87483
0.11458	8.72727	0.89753
0.11979	8.34783	0.91110
0.12500	8.00000	0.92016
0.13021	7.68000	0.92671
0.13542	7.38462	0.93177
0.14062	7.11111	0.93588
0.14583	6.85715	0.93936
0.15104	6.62069	0.94243
0.15625	6.40000	0.94522
0.16146	6.19355	0.94784
0.16667	6.00000	0.95038
0.17187	5.81819	0.95290
0.17708	5.64706	0.95545
0.18229	5.48572	0.95808
0.18750	5.33334	0.96083
0.19271	5.18919	0.96371
0.19792	5.05263	0.96669
0.20312	4.92308	0.96970
0.20833	4.80000	0.97261
0.21354	4.68293	0.97528
0.21875	4.57143	0.97763
0.22396	4.46512	0.97961
0.22917	4.36364	0.98124
0.23437	4.26667	0.98258

0.23958	4.17392	0.98367
0.24479	4.08511	0.98458
0.25000	4.00000	0.98535
0.25521	3.91837	0.98600
0.26042	3.84000	0.98657
0.26562	3.76471	0.98707
0.27083	3.69231	0.98751
0.27604	3.62264	0.98792
0.28125	3.55556	0.98830
0.28646	3.49091	0.98865
0.29167	3.42857	0.98900
0.29687	3.36842	0.98933
0.30208	3.31035	0.98965
0.30729	3.25424	0.98997
0.31250	3.20000	0.99029
0.31771	3.14754	0.99061
0.32292	3.09678	0.99094
0.32812	3.04762	0.99127
0.33333	3.00000	0.99160
0.33854	2.95385	0.99194
0.34375	2.90909	0.99227
0.34896	2.86567	0.99260
0.35417	2.82353	0.99293
0.35937	2.78261	0.99324
0.36458	2.74286	0.99355
0.36979	2.70423	0.99383
0.37500	2.66667	0.99410
0.38021	2.63014	0.99435
0.38542	2.59459	0.99458
0.39062	2.56000	0.99480
0.39583	2.52632	0.99501
0.40104	2.49351	0.99521
0.40625	2.46154	0.99539
0.41146	2.43038	0.99557
0.41667	2.40000	0.99575
0.42187	2.37037	0.99592
0.42708	2.34146	0.99610
0.43229	2.31325	0.99627
0.43750	2.28571	0.99645
0.44271	2.25882	0.99664
0.44792	2.23256	0.99683
0.45312	2.20690	0.99704
0.45833	2.18182	0.99727
0.46354	2.15730	0.99751
0.46875	2.13333	0.99778
0.47396	2.10989	0.99808
0.47917	2.08696	0.99841
0.48437	2.06452	0.99877
0.48958	2.04255	0.99916
0.49479	2.02105	0.99958
0.50000	2.00000	1.00000

MOVING AVERAGE MODEL VIA SUBR. ARMA. RVAR= 0.14773

FIRST 10 COEFFICIENTS OF INFINITE MA:

I BETA

1	1.2539
2	1.0977
3	0.6273
4	0.2406
5	-0.0592
6	-0.1896
7	-0.3284
8	-0.1990
9	0.1022
10	0.4530

LAG	RYV(V)	REY(V)	RVE(V)	REE(V)	PVH(V)
0	1.000000	0.1477280	0.1477280	0.1477280	0.1477280
1	0.8241955	0.1852343	0.0	0.0	0.3799910
2	0.4610662	0.1621633	0.0	0.0	0.5580000
3	0.0643274	0.0926757	0.0	0.0	0.6161392
4	-0.2290547	0.0355393	0.0	0.0	0.6246889
5	-0.3617923	-0.0087525	0.0	0.0	0.6252075
6	-0.3095543	-0.0280102	0.0	0.0	0.6305184
7	-0.1034002	-0.0485089	0.0	0.0	0.6464470
8	0.1934883	-0.0293971	0.0	0.0	0.6522968
9	0.4531194	0.0151026	0.0	0.0	0.6538408
10	0.5753842	0.0669199	0.0	0.0	0.6841550
11	0.5210851	0.0943505	0.0	0.0	0.7444144
12	0.3289428	0.0931392	0.0	0.0	0.8031365
13	0.0765781	0.0665897	0.0	0.0	0.8331524
14	-0.1471764	0.0322674	0.0	0.0	0.8402004
15	-0.2750675	-0.0044234	0.0	0.0	0.8403328
16	-0.2702639	-0.0317387	0.0	0.0	0.8471517
17	-0.1442332	-0.0418515	0.0	0.0	0.8590083
18	0.0492022	-0.0294647	0.0	0.0	0.8648850
19	0.2329595	-0.0016271	0.0	0.0	0.8649029
20	0.3405738	0.0297803	0.0	0.0	0.8709062
21	0.3388526	0.0513266	0.0	0.0	0.8887391
22	0.2370471	0.0571676	0.0	0.0	0.9108618
23	0.0771126	0.0466486	0.0	0.0	0.9255921
24	-0.0824012	0.0247069	0.0	0.0	0.9297242
25	-0.1873946	-0.0012775	0.0	0.0	0.9297352
26	-0.2058632	-0.0221673	0.0	0.0	0.9330615
27	-0.1385778	-0.0311059	0.0	0.0	0.9396112
28	-0.0165965	-0.0255993	0.0	0.0	0.9440472
29	0.1118597	-0.0091053	0.0	0.0	0.9446084
30	0.2004484	0.0113967	0.0	0.0	0.9454876
31	0.2206798	0.0281378	0.0	0.0	0.9508470
32	0.1702797	0.0356167	0.0	0.0	0.9594340
33	0.0716521	0.0318422	0.0	0.0	0.9662974
34	-0.0376295	0.0188403	0.0	0.0	0.9687002
35	-0.1190166	0.0016216	0.0	0.0	0.9687179
36	-0.1465319	-0.0135378	0.0	0.0	0.9699585
37	-0.1151065	-0.0215335	0.0	0.0	0.9730973
38	-0.0407540	-0.0201678	0.0	0.0	0.9758505
39	0.0467212	-0.0107776	0.0	0.0	0.9766368
40	0.1153275	0.0026240	0.0	0.0	0.9766833
41	0.1422104	0.0149634	0.0	0.0	0.9781989
42	0.1209039	0.0219672	0.0	0.0	0.9814655
43	0.0623043	0.0215286	0.0	0.0	0.9846028
44	-0.0104446	0.0143001	0.0	0.0	0.9859870
45	-0.0709979	0.0032675	0.0	0.0	0.9860592
46	-0.0992993	-0.0074515	0.0	0.0	0.9864351
47	-0.0881484	-0.0141634	0.0	0.0	0.9877930
48	-0.0447187	-0.0148676	0.0	0.0	0.9892892
49	0.0130867	-0.0098285	0.0	0.0	0.9899431
50	0.0637510	-0.0012917	0.0	0.0	0.9899544
51	0.0899499	0.0074532	0.0	0.0	0.9903303
52	0.0842866	0.0133001	0.0	0.0	0.9915277
53	0.0511090	0.0143929	0.0	0.0	0.9929300
54	0.0040742	0.0106851	0.0	0.0	0.9937028
55	-0.0393670	0.0038191	0.0	0.0	0.9938015
56	-0.0643867	-0.0035774	0.0	0.0	0.9938881
57	-0.0637714	-0.0088929	0.0	0.0	0.9944234
58	-0.0398486	-0.0104457	0.0	0.0	0.9951620

59	-0.0029164	-0.0080008	0.0	0.0	0.9955953
60	0.0329950	-0.0027385	0.0	0.0	0.9956460
61	0.0553327	0.0032664	0.0	0.0	0.9957182
62	0.0573010	0.0078396	0.0	0.0	0.9961342
63	0.0397851	0.0094755	0.0	0.0	0.9967419
64	0.0104273	0.0078145	0.0	0.0	0.9971552
65	-0.0195937	0.0036809	0.0	0.0	0.9972469
66	-0.0397664	-0.0012972	0.0	0.0	0.9972583
67	-0.0438760	-0.0053205	0.0	0.0	0.9974499
68	-0.0318346	-0.0070623	0.0	0.0	0.9977875
69	-0.0092135	-0.0060963	0.0	0.0	0.9980390
70	0.0151731	-0.0029766	0.0	0.0	0.9980990
71	0.0326239	0.0010313	0.0	0.0	0.9981061
72	0.0375922	0.0044488	0.0	0.0	0.9982401
73	0.0293675	0.0061181	0.0	0.0	0.9984934
74	0.0119194	0.0055833	0.0	0.0	0.9987044
75	-0.0078895	0.0031963	0.0	0.0	0.9987735
76	-0.0229555	-0.0000690	0.0	0.0	0.9987735
77	-0.0284468	-0.0030056	0.0	0.0	0.9988346
78	-0.0233025	-0.0046142	0.0	0.0	0.9989787
79	-0.0102774	-0.0044372	0.0	0.0	0.9991120
80	0.0053628	-0.0026775	0.0	0.0	0.9991605
81	0.0179151	-0.0000762	0.0	0.0	0.9991605
82	0.0232823	0.0023875	0.0	0.0	0.9991990
83	0.0202608	0.0038587	0.0	0.0	0.9992998
84	0.0106951	0.0038957	0.0	0.0	0.9994025
85	-0.0014568	0.0025937	0.0	0.0	0.9994479
86	-0.0117127	0.0005095	0.0	0.0	0.9994497
87	-0.0166970	-0.0015686	0.0	0.0	0.9994663
88	-0.0152256	-0.0029149	0.0	0.0	0.9995238
89	-0.0085039	-0.0031159	0.0	0.0	0.9995894
90	0.0005594	-0.0021908	0.0	0.0	0.9996219
91	0.0085653	-0.0005517	0.0	0.0	0.9996240
92	0.0128759	0.0011709	0.0	0.0	0.9996332
93	0.0124425	0.0023659	0.0	0.0	0.9996710
94	0.0079964	0.0026543	0.0	0.0	0.9997187
95	0.0015942	0.0020036	0.0	0.0	0.9997458
96	-0.0042568	0.0007131	0.0	0.0	0.9997492
97	-0.0075950	-0.0007169	0.0	0.0	0.9997527
98	-0.0076569	-0.0017756	0.0	0.0	0.9997740
99	-0.0049806	-0.0021214	0.0	0.0	0.9998045
100	-0.0001466	-0.0016888	0.0	0.0	0.9998237
101	0.0028746	-0.0006899	0.0	0.0	0.9998270
102	0.0052827	0.0004813	0.0	0.0	0.9998285
103	0.0056995	0.0014007	0.0	0.0	0.9998417
104	0.0044208	0.0017651	0.0	0.0	0.9998628
105	0.0023895	0.0014890	0.0	0.0	0.9998778
106	0.0007181	0.0007180	0.0	0.0	0.9998812

REGRESSION ESTIMATION STAGEWISE SUMMARY
NUMBER OF VARIABLES IN FULL MODEL = 60
MAXIMUM NUMBER OF COEFFICIENTS = 0

VAR IN MODEL	CRIT DEL	CRIT DEL	AIC	FPE ADD	FPE DEL
23.610504	0.0000000	0.0000000	0.0	146.728394	0.0000000
VAR ADD	VAR DEL	VAR LAST	NO. PREDS	RES VAR	NO. CYC
1	0	0	0	1.00000	0

VAR IN MODEL		COEFF		AIC		FPE ADD		FPE DEL	
1		0.82420							
CRIT ADD		CRIT DEL							
16.240372		136.634933		-1.132591		100.483231		-455.404541	
VAR ADD		VAR DEL		VAR LAST		RES VAR		NO. CYC	
2		1		1		1		1	
						0.32070			

VAR IN MODEL		COEFF		AIC		FPE ADD		FPE DEL	
2		-0.68048							
1		1.38505							
CRIT ADD		CRIT DEL							
3.224512		55.499924		-1.749803		24.167328		-186.276840	
VAR ADD		VAR DEL		VAR LAST		RES VAR		NO. CYC	
8		2		2		2		2	
						0.17220			

VAR IN MODEL		COEFF		AIC		FPE ADD		FPE DEL	
8		0.15144							
2		-0.57455							
1		1.31340							
CRIT ADD		CRIT DEL							
0.699696		8.005162		-1.862652		3.126244		-27.055817	
VAR ADD		VAR DEL		VAR LAST		RES VAR		NO. CYC	
6		8		8		3		3	
						0.15311			

TO INTERPRET CRITICAL ADD AND DELETE VALUES, NOTE THAT THEY ARE COMPUTED USING TWICE THE SAMPLE SIZE.

RESIDUAL VARIANCE FROM SUBSET ARMA = 0.1531089

I	ALPH
1	-1.3134 *
2	0.5746
3	0.0
4	0.0
5	0.0
6	0.0
7	0.0
8	-0.1514 *

SPECTRA, SPLMIN = -4.01966 SPLMAX = 2.58945 SPLR = 6.60911

FREQUENCY	PERIOD	SPEC
0.0	0.0	12.71934
0.00521	192.00005	10.16380
0.01042	96.00002	6.41623
0.01562	64.00002	4.07023
0.02083	48.00000	2.78173
0.02604	38.40001	2.05514
0.03125	32.00000	1.62622
0.03646	27.42857	1.36578
0.04167	24.00000	1.20942
0.04687	21.33333	1.12441
0.05208	19.20000	1.09533
0.05729	17.45454	1.11793
0.06250	16.00000	1.19787

0.06771	14.76923	1.35349
0.07292	13.71429	1.62493
0.07812	12.80001	2.09766
0.08333	12.00000	2.96379
0.08854	11.29412	4.68247
0.09375	10.66667	8.23689
0.09896	10.10526	13.14637
0.10417	9.60000	11.07460
0.10937	9.14286	5.76709
0.11458	8.72727	3.02714
0.11979	8.34783	1.78178
0.12500	8.00000	1.16120
0.13021	7.68000	0.81942
0.13542	7.38462	0.61541
0.14062	7.11111	0.48599
0.14583	6.85715	0.40008
0.15104	6.62069	0.34118
0.15625	6.40000	0.29995
0.16146	6.19355	0.27082
0.16667	6.00000	0.25026
0.17187	5.81819	0.23595
0.17708	5.64706	0.22624
0.18229	5.48572	0.21983
0.18750	5.33334	0.21555
0.19271	5.18919	0.21225
0.19792	5.05263	0.20872
0.20312	4.92308	0.20377
0.20833	4.80000	0.19639
0.21354	4.68293	0.18603
0.21875	4.57143	0.17282
0.22396	4.46512	0.15750
0.22917	4.36364	0.14121
0.23437	4.26667	0.12511
0.23958	4.17392	0.11009
0.24479	4.08511	0.09667
0.25000	4.00000	0.08506
0.25521	3.91837	0.07523
0.26042	3.84000	0.06704
0.26562	3.76471	0.06030
0.27083	3.69231	0.05478
0.27604	3.62264	0.05029
0.28125	3.55556	0.04668
0.28646	3.49091	0.04379
0.29167	3.42857	0.04150
0.29687	3.36842	0.03972
0.30208	3.31035	0.03837
0.30729	3.25424	0.03736
0.31250	3.20000	0.03663
0.31771	3.14754	0.03611
0.32292	3.09678	0.03575
0.32812	3.04762	0.03546
0.33333	3.00000	0.03520
0.33854	2.95385	0.03488
0.34375	2.90909	0.03445
0.34896	2.86567	0.03386
0.35417	2.82353	0.03307
0.35937	2.78261	0.03209
0.36458	2.74286	0.03093
0.36979	2.70423	0.02964
0.37500	2.66667	0.02826
0.38021	2.63014	0.02685

0.38542	2.59459	0.02546
0.39062	2.56000	0.02414
0.39583	2.52632	0.02292
0.40104	2.49351	0.02182
0.40625	2.46154	0.02086
0.41146	2.43038	0.02005
0.41667	2.40000	0.01937
0.42187	2.37037	0.01883
0.42708	2.34146	0.01843
0.43229	2.31325	0.01816
0.43750	2.28571	0.01800
0.44271	2.25882	0.01796
0.44792	2.23256	0.01802
0.45312	2.20690	0.01817
0.45833	2.18182	0.01840
0.46354	2.15730	0.01869
0.46875	2.13333	0.01901
0.47396	2.10989	0.01936
0.47917	2.08696	0.01970
0.48437	2.06452	0.02000
0.48958	2.04255	0.02024
0.49479	2.02105	0.02039
0.50000	2.00000	0.02045

CUMULATIVE SUBSET ARMA SPECTRA :

FREQUENCY	PERIOD	SPEC
0.0	0.0	0.05865
0.00521	192.00005	0.16068
0.01042	96.00002	0.22786
0.01562	64.00002	0.27001
0.02083	48.00000	0.29820
0.02604	38.40001	0.31860
0.03125	32.00000	0.33446
0.03646	27.42857	0.34758
0.04167	24.00000	0.35905
0.04687	21.33333	0.36958
0.05208	19.20000	0.37972
0.05729	17.45454	0.38995
0.06250	16.00000	0.40077
0.06771	14.76923	0.41284
0.07292	13.71429	0.42712
0.07812	12.80001	0.44522
0.08333	12.00000	0.47024
0.08854	11.29412	0.50875
0.09375	10.66667	0.57510
0.09896	10.10526	0.68583
0.10417	9.60000	0.79833
0.10937	9.14286	0.86247
0.11458	8.72727	0.89544
0.11979	8.34783	0.91422
0.12500	8.00000	0.92613
0.13021	7.68000	0.93437
0.13542	7.38462	0.94046
0.14062	7.11111	0.94521
0.14583	6.85715	0.94907
0.15104	6.62069	0.95234
0.15625	6.40000	0.95520
0.16146	6.19355	0.95776

0.16667	6.00000	0.96011
0.17187	5.81819	0.96231
0.17708	5.64706	0.96442
0.18229	5.48572	0.96646
0.18750	5.33334	0.96846
0.19271	5.18919	0.97042
0.19792	5.05263	0.97235
0.20312	4.92308	0.97425
0.20833	4.80000	0.97608
0.21354	4.68293	0.97782
0.21875	4.57143	0.97944
0.22396	4.46512	0.98093
0.22917	4.36364	0.98227
0.23437	4.26667	0.98346
0.23958	4.17392	0.98451
0.24479	4.08511	0.98543
0.25000	4.00000	0.98624
0.25521	3.91837	0.98696
0.26042	3.84000	0.98759
0.26562	3.76471	0.98816
0.27083	3.69231	0.98868
0.27604	3.62264	0.98916
0.28125	3.55556	0.98959
0.28646	3.49091	0.99000
0.29167	3.42857	0.99039
0.29687	3.36842	0.99076
0.30208	3.31035	0.99112
0.30729	3.25424	0.99146
0.31250	3.20000	0.99180
0.31771	3.14754	0.99214
0.32292	3.09678	0.99247
0.32812	3.04762	0.99280
0.33333	3.00000	0.99312
0.33854	2.95385	0.99344
0.34375	2.90909	0.99376
0.34896	2.86567	0.99408
0.35417	2.82353	0.99438
0.35937	2.78261	0.99468
0.36458	2.74286	0.99497
0.36979	2.70423	0.99525
0.37500	2.66667	0.99551
0.38021	2.63014	0.99576
0.38542	2.59459	0.99600
0.39062	2.56000	0.99622
0.39583	2.52632	0.99644
0.40104	2.49351	0.99664
0.40625	2.46154	0.99684
0.41146	2.43038	0.99702
0.41667	2.40000	0.99720
0.42187	2.37037	0.99738
0.42708	2.34146	0.99755
0.43229	2.31325	0.99772
0.43750	2.28571	0.99788
0.44271	2.25882	0.99805
0.44792	2.23256	0.99821
0.45312	2.20690	0.99838
0.45833	2.18182	0.99855
0.46354	2.15730	0.99872
0.46875	2.13333	0.99890
0.47396	2.10989	0.99907
0.47917	2.08696	0.99925

0.48437 2.06452 0.99944
 0.48958 2.04255 0.99962
 0.49479 2.02105 0.99981
 0.50000 2.00000 1.00000

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• ARSPIQ - AUTOREGRESSIVE SPECTRAL INFORMATION QUANTILE IDENTIFICATION •

• EMANUEL PARZEN, TERRY J. WOODFIELD, AND H. JOSEPH NEWTON
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 • JULY 1983
 •

[illegible]


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255 C INPUT NPREOS - NUMBER OF EQUALLY SPACED FREQUENCIES
256 C BETWEEN 0 AND TWOPI
257 C
258 C PT - SPECTRAL DENSITY FUNCTION
259 C NCOVM - NUMBER OF CEPSTRAL CORRELATIONS DESIRED
260 C
261 C OUTPUT: CT - CEPSTRAL CORRELATIONS
262 C SIG - SIGMA INFINITY SQUARED FROM INTEGRAL LOG SPECTRUM
263 C
264 C AUXILIARY BY
265 C
266 C SUBPROGRAMS CALLED: FORIER
267 C
268 C *****
269 C DIMENSION F(NPREOS),CT(NPREOS),ST(NPREOS)
270 C COMPLEX A(1200)
271 C PAC=1./FLOAT(NPREOS)
272 C DO 10 I=1,NPREOS
273 C CT(I)=ALOG(PY(I))
274 C ST(I)=FLOAT(I)*PAC
275 C NCVPI=NCOVM+1
276 C CALL FORIER(CT,ST,NPREOS,A,NCVPI)
277 C DO 20 I=1,NCOVM
278 C CT(I)=REAL(A(I+1))
279 C SIG=EXP(REAL(A(1)))
280 C RETURN
281 C END
282 C SUBROUTINE CHIP(IOPY,CHISO)
283 C DIMENSION CHISO(62),CHI(62)
284 C IF(IOPY EQ 1) GO TO 10
285 C IF(IOPY EQ 2) GO TO 20
286 C IF(IOPY EQ 3) GO TO 30
287 C
288 C 10 CONTINUE
289 C DATA CHI/6 64,9 22,11 32,13 28,
290 C 115 09,16 81,18 47,20 08,
291 C 121 85,23 19,24 75,26 25,27 72,29 17,30 61,32 03,33 44,
292 C 134 83,35 22,37 59,38 96,40 31,41 66,43 00,44 34,45 86,
293 C 146 89,48 20,49 61,50 91,52 21,53 51,54 80,55 08,57 36,
294 C 158 64,59 91,61 19,62 45,63 71,64 97,65 23,67 48,68 73,
295 C 169 88,71 22,72 46,73 70,74 94,76 17,77 40,78 63,79 86,
296 C 181 09,82 31,83 53,84 75,85 97,87 18,88 40,89 61,90 82/
297 C GO TO 99
298 C
299 C 20 CONTINUE
300 C DATA CHI/2 71,
301 C 14 60,6 28,7 78,9 24,10 65,12 02,13 36,14 89,15 99,17 28,
302 C 118 55,19 81,21 07,22 31,23 55,24 77,26 99,27 21,28 42,
303 C 129 82,30 82,32 01,33 20,34 38,35 87,36 74,37 92,39 09,
304 C 140 76,41 43,42 89,43 75,44 91,45 04,47 22,48 37,49 52,
305 C 150 67,51 80,52 94,54 08,55 22,56 36,57 50,58 63,59 77,
306 C 160 90,62 03,63 16,64 29,65 41,66 54,67 67,68 79,69 91,
307 C 171 03,72 15,73 27,74 39,75 51,76 62/
308 C GO TO 99
309 C
310 C 30 CONTINUE
311 C DATA CHI/1 64,
312 C 13 22,4 64,5 99,7 29,8 56,9 80,11 30,12 24,13 44,14 63,
313 C 115 81,16 99,18 15,19 31,20 47,21 62,22 76,23 90,25 04,
314 C 126 17,27 30,28 43,29 56,30 68,31 80,32 91,34 03,35 14,
315 C 136 25,37 36,38 47,39 57,40 68,41 78,42 88,43 98,45 08,
316 C 146 17,47 26,48 36,49 45,50 94,51 93,52 72,53 81,54 90,
317 C 155 99,57 07,58 16,59 24,60 32,61 41,62 49,63 57,64 65,
318 C 165 73,66 81,67 89,68 97,70 04,71 12/
319 C
320 C 99 CONTINUE
321 C DO 40 I=1,62
322 C CHISO(I)=CHI(I)
323 C RETURN
324 C END
325 C SUBROUTINE CLPLTO(X,N,INIT,NAME,XMAX,XMIN)
326 C *****
327 C
328 C SUBROUTINE TO PRINT AND PRINTER PLOT THE N-VECTOR X
329 C THIS ROUTINE IS A MODIFIED VERSION OF CLPLTI DESIGNED TO
330 C PLOT THE DELTA MEMORY FUNCTION
331 C
332 C INPUT :
333 C N,X PRINTED INDEX OF FIRST PRINTED X
334 C NAME - 4 CHARACTER LITERAL CONSTANT GIVING
335 C LABEL FOR X
336 C XMAX,XMIN - MAX AND MIN VALUES FOR SCALING PLOT
337 C
338 C SUBROUTINES CALLED - NONE
339 C *****
340 C
341 C DIMENSION X(N),AL(101)
342 C DATA NOUT/5/
343 C DATA BLANK,DOT,2,SL/1H,1H,1H,1H/
344 C
345 C IOPTR=0
346 C IF(IN CT 1) GO TO 10
347 C WRITE(NOUT,1) NAME,X(1)
348 C 11 FORMAT(10X,A4,1) + ' ',F15.8)
349 C GO TO 99
350 C
351 C 10 CONTINUE
352 C
353 C INITIALIZE AL
354 C
355 C MM=51
356 C ON=(MM-1)/2
357 C DO 20 J=1,MM
358 C AL(J)=DOT
359 C WRITE(NOUT,25) NAME,(AL(J),J=1,MM)
360 C 25 FORMAT(17,14X,1H,6X,A4/10X,15(1H-),2X 101)
361 C DO 30 J=1,MM
362 C AL(J)=BLANK
363 C
364 C FIND SCALING VALUES
365 C
366 C RX=XMAX-XMIN
367 C KZERO=31
368 C IF(RX LT 1.E-20) IOPTR=1
369 C
370 C PLOT
371 C
372 C JJ=INIT
373 C DO 40 J=1,N
374 C IF(IOPTR EQ 1) GO TO 36
375 C C1=(X(J)-XMIN)/RX
376 C C1=2*(C1-.5)
377 C GO TO 37
378 C
379 C 36 C1=0
380 C K=ON+(C1+.1)*.5
381 C AL(KZERO+SL
382 C AL(K)=2
383 C WRITE(NOUT,38) JJ,X(J),(AL(I),I=1,MM)
384 C 38 FORMAT(10X,15,F10.4,2X,101A1)
385 C JJ=JJ+1
386 C AL(K)=BLANK
387 C
388 C 40 CONTINUE
389 C
390 C 99 CONTINUE
391 C RETURN
392 C END

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30 CD TO 39
31 C3= 5
32 39 K1=OM*(C1+1.)+1.5
33 K2=OM*(C2+1.)+1.5
34 AL(K1)=Z1
35 AL(K2)=Z2
36 IF(10PT.E0.1) GO TO 41
37 DO 42 1+1,K1
38 42 AL(I)=Z1
39 DO 43 1+1,K2
40 AL(I)=Z2
41 CONTINUE
42 WRITE(NDUT,40) J,J,K(J),V(J),[AL(I),1+1,MM]
43 40 FORMAT(10X,15,2F10.4,2X,91A1)
44 J=J+1
45 AL(K1)=BLANK
46 AL(K2)=BLANK
47 IF(10PT.E0.1) GO TO 48
48 DO 44 1+1,K1
49 AL(I)=BLANK
50 DO 46 1+1,K2
51 AL(I)=BLANK
52 48 CONTINUE
53 C
54 C
55 99 CONTINUE
56 RETURN
57 END
58 SUBROUTINE CPMA(PT,NFREOS,NCOVM,CT,ST,BETA,RVMA,SIG)
59 .....
60 C
61 C SUBROUTINE TO COMPUTE CEPSTRAL CORRELATIONS FROM SPECTRAL
62 C DENSITY FUNCTION PT VIA CEPSTC AND THEN TO COMPUTE NCOVM
63 C BETAS FOR AN INFINITE MOVING AVERAGE MODEL TRUNCATED TO
64 C ORDER NCOVM.
65 C
66 C INPUT: PT - SPECTRAL DENSITY FUNCTION EVALUATED AT NFREOS
67 C EQUALLY SPACED FREQUENCIES BETWEEN 0 AND TWO PI.
68 C NFREOS - NUMBER OF FREQUENCIES
69 C NCOVM - NUMBER OF CEPSTRAL CORRELATIONS TO COMPUTE AND
70 C ORDER OF TRUNCATED MOVING AVERAGE MODEL
71 C
72 C OUTPUT: CT - CEPSTRAL CORRELATIONS
73 C BETA - VECTOR OF MOVING AVERAGE COEFFICIENTS
74 C RVMA - RESIDUAL VARIANCE FOR MA MODEL
75 C SIG - SIGMA INFINITY SQUARED FROM INTEGRAL LOG SPECTRUM
76 C
77 C AUXILIARY: ST
78 C
79 C SUBPROGRAMS CALLED: CEPSTC,FFT,CLPLY1
80 C
81 .....
82 COMMON /UNIT/ UNIT,MSCKM
83 DIMENSION CT(1),CT(1),ST(1),BETA(1)
84 CALL CEPSTC(PT,NFREOS,NCOVM,CT,ST,SIG)
85 C
86 C CT CONTAINS CEPSTRAL CORRELATIONS
87 C
88 WRITE(UNIT,10) SIG
89 10 FORMAT(//,10X,'SIGMA INFINITY SQUARED (VIA SMOOTHED PER.) = ',
90 +F10.5)
91 CALL CLPLY1(CT,NCOVM,1.4NCEPC,41,1)
92 C
93 C COMPUTE THE BETAS
94 C
95 BETA(1)=CT(1)
96 DO 825 1+2,NCOVM
97 BETA(I)=0.
98 IMI=I-1
99 DO 820 K=1,IMI
820 BETA(I)=BETA(I)+CT(K)*BETA(I-K)+FLOAT(K)
825 BETA(I)=BETA(I)/FLOAT(I) + CT(I)
826 RVMA=1.
827 DO 830 1+1,NCOVM
830 RVMA=RVMA+BETA(I)*BETA(I)
829 RVMA=1./RVMA
830 WRITE(UNIT,832) RVMA
832 FORMAT(//,10X,'MA MODEL VIA CEPSTRAL CORR., RVAR=',
833 +F10.5,//,10X,'FIRST 10 COEFFICIENTS OF INFINITE MA',//)
834 CALL CLPLY1(BETA,10,1.4NBETA,41,1)
835 RETURN
836 END
837 SUBROUTINE CUMSP(SPEC,NFREOS,10PT,WK,N1)
838 .....
839 C
840 C SUBROUTINE TO PRINTER PLOT CUM SPEC DIST FCTN
841 C
842 C INPUT:
843 C NFREOS,SPEC(1).....SPEC(NFREOS)
844 C IF NFREOS.LT.0, CUM SPECTRA IS CALCULATED
845 C BUT NOT PLOTTED.
846 C 10PT: 1 MEANS FREOS ARE 0 TO 2PI
847 C 0 MEANS FREOS ARE 0 TO PI
848 C
849 C OUTPUT:
850 C WK(1).....WK(N1) WHERE N1=(NFREOS/2)+1 IF
851 C 10PT=1 OR NFREOS IF 10PT=0: CUM DIST
852 C
853 .....
854 C
855 DIMENSION SPEC(1),WK(1)
856 C
857 C
858 NFRO=NFREOS
859 NFREOS=ABS(NFREOS)
860 PFREQ=0.0
861 N1=(NFREOS/2)+1
862 DELF=.8*ATAN(1.0)/FLOAT(NFREOS)
863 IF(10PT.E0.1) GO TO 10
864 N1=NFREOS
865 DELF=.8*ATAN(1.0)/FLOAT(2*(NFREOS-1))
866 10 CONTINUE
867 C+SPEC(1)
868 WK(1)=SPEC(1)
869 DO 20 1+2,N1
870 WK(I)=WK(I-1)+SPEC(I)
871 C+SPEC(I)
872 20 CONTINUE
873 DO 30 1+1,N1
874 WK(I)=WK(I)/C
875 30 CONTINUE
876 C
877 C
878 IF(NPRO.LT.0) GO TO 40
879 CALL SPPLT(WK,N1,PFREQ,DELF,0)
880 40 NFREOS=NPRO
881 C
882 C
883 RETURN
884 END
885 SUBROUTINE CVARP(CORR,M,NP,WK1,ALPH)
886 .....

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784      DIMENSION R(NTRUNC),WORK1(NTRUNC),WORK2(NFREQ),SPEC(NFREQ)
785      C
786      C INITIALIZE :
787      C
788      P1=4.*ATAN(1.D)
789      TWOPI=2.*P1
790      DO 1 J=1,NFREQ
791      SPEC(J)=0
792      1 WORK2(J)=0
793      SPEC(J)=RO
794      C1=NTRUNC
795      C2=NFREQ
796      C
797      C CALCULATE SPECIFIED WEIGHTS :
798      C
799      IF(10PT.EQ.1) GO TO 2
800      IF(10PT.EQ.2) GO TO 4
801      IF(10PT.EQ.3) GO TO 6
802      IF(10PT.EQ.4) GO TO 8
803      IF(10PT.EQ.5) GO TO 10
804      IF(10PT.EQ.6) GO TO 12
805      IF(10PT.EQ.7) GO TO 20
806      IF(10PT.EQ.8) GO TO 22
807      GO TO 99
808      C
809      C
810      C BARTLETT :
811      C
812      2 DO 3 J=1,NTRUNC
813      O1=J
814      O2=O1/C1
815      O3=O1/C2
816      3 WORK1(J)=2.*(1.-O2)/(1.-O3)
817      GO TO 14
818      C
819      C MODIFIED BARTLETT :
820      C
821      4 DO 5 J=1,NTRUNC
822      5 WORK1(J)=2.*(1.-[FLOAT(J)/C1])
823      GO TO 14
824      C
825      C HANNING :
826      C
827      6 DO 7 J=1,NTRUNC
828      7 WORK1(J)=1.+COS([PI+FLOAT(J)]/C1)
829      GO TO 14
830      C
831      C HAMMING :
832      C
833      8 DO 9 J=1,NTRUNC
834      9 WORK1(J)=1.08-.92*COS([PI+FLOAT(J)]/C1)
835      GO TO 14
836      C
837      C PARZEN[1] :
838      C
839      10 DO 11 J=1,NTRUNC
840      11 WORK1(J)=2.*(1.-[FLOAT(J)/C1])**2
841      GO TO 14
842      C
843      C PARZEN[J] :
844      C
845      12 M1=NTRUNC/2
846      DO 13 J=1,M1
847      J1=J+M1
848      D1=[FLOAT(J)/C1]
849      O1=O1+2
850      O2=O1+3
851      WORK1(J)=2.*(1.-.5*O2+.5*O3)
852      13 WORK1(J1)=4.*(1.-[FLOAT(J1)/C1])**3
853      GO TO 14
854      20 DO 21 J=1,NTRUNC
855      21 WORK1(J)=2.0/[1.0+[FLOAT(J)/C1]**4]
856      GO TO 14
857      22 DO 23 J=1,NTRUNC
858      23 WORK1(J)=2.0/[1.0+[FLOAT(J)/C1]**8]
859      C
860      C CALL FFT :
861      C
862      14 DO 15 J=1,NTRUNC
863      15 SPEC(J)=WORK1(J)*R(J)
864      CALL FFT(SPEC,WORK2,NFREQ,NFREQ,NFREQ,1)
865      DO 16 J=1,NFREQ
866      16 SPEC(J)=SPEC(J)/TWOPI
867      99 CONTINUE
868      RETURN
869      END
870      SUBROUTINE DATAIN(TAPE,X,N,L,LAB)
871      C-----
872      C SUBROUTINE TO READ A DATA FILE FROM TAPE NTAPE AS FOLLOWS :
873      C
874      C CARD1 : LAB(1),...,LAB(20) (20A4)
875      C CARD2 : SAMPLE SIZE N, FORMAT L(1),...,L(5),[15,4X,5A4]
876      C CARD3,CARD4,... : DATA X(1),...,X(N) IN L FORMAT
877      C-----
878      C
879      C
880      DIMENSION X(1),L(5),LAB(20)
881      C
882      READ(TAPE,1) LAB
883      1 FORMAT(20A4)
884      READ(TAPE,2) N,L
885      2 FORMAT(15,4X,5A4)
886      READ(TAPE,L) (X(I),I=1,N)
887      C
888      RETURN
889      END
890      SUBROUTINE DESTAT(X,N,NAME,IHEAD,L,INIT,IOUT,O25,O50,O75)
891      C-----
892      C SUBROUTINE TO PRINT ORDERED ARRAY BY QUANTILES AND COMPUTE
893      C DESCRIPTIVE STATISTICS.
894      C INPUT :
895      C X : ARRAY OF ORDER STATISTICS
896      C N : DIMENSION OF ARRAY X
897      C NAME : NAME OF DATA SET, MUST BE ARRAY OF DIMENSION 20 IN
898      C CALLING PROGRAM
899      C IUNIT : NUMBER OF UNIT OUTPUT IS DESIRED ON.
900      C INIT : 0 FOR FIRST CALL, 1 THEREAFTER
901      C IOUT : 1 IF QUANTILES TO BE LISTED, 0 OTHERWISE
902      C WK1,WK2 : WORK VECTORS OF LENGTH NN=N*2+3
903      C OUTPUT PRINTED OUTPUT IS ON IUNIT.
904      C NO SUBROUTINES CALLED.
905      C-----
906      COMMON /UNIT/ IUNIT,NSCREEN
907      DIMENSION X(N),NAME(20),SUM(4),SUMSQ(4)
908      DIMENSION L(4)
909      DIMENSION IHEAD(20)
910      NUNIT = IUNIT
911      C COMPUTE L, THE ARRAY OF QUANTILE SIZES
912      IF(INIT.EQ.0) GOTO 5
913      IF(L(4).EQ.N) GOTO 25
914      L1 = N/4
915      L1 = LL

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914      L2 = LL
915      L3 = LL
916      L4 = LL
917      IBRAN = MOD(N,4) + 1
918      GO TO (20,11,12,13),IBRAN
919
920 11 CONTINUE
921      L4 = LL + 1
922      GO TO 20
923
924 12 CONTINUE
925      L1 = LL + 1
926      L4 = LL + 1
927      GO TO 20
928
929 13 CONTINUE
930      L2 = LL + 1
931      L3 = LL + 1
932      L4 = LL + 1
933
934 20 CONTINUE
935      L1=L1+L2
936      L2=L2+L3
937      L3=L3+L4
938      L4=L4+L1
939
940 C PRINT DATA ARRAY - ONE COLUMN FOR EACH QUARTER.
941 25 WRITE(NUNIT,1001) NAME
942 WRITE(NUNIT,1020) INHEAD
943 IF(IOUT.EQ.0) GO TO 35
944 WRITE(NUNIT,1002)
945 WRITE(NUNIT,1003)
946 DO 30 I = 1,LL
947 30 WRITE(NUNIT,1004) I,X(I),X(L(I) + 1),X(L(2)+1),X(L(3) + 1)
948 WRITE(NUNIT,1005)
949 IF(L1.GT.LL) WRITE(NUNIT,1006) X(L(1))
950 IF(L2.GT.LL) WRITE(NUNIT,1007) X(L(2))
951 IF(L3.GT.LL) WRITE(NUNIT,1008) X(L(3))
952 IF(L4.GT.LL) WRITE(NUNIT,1009) L4,X(L(4))
953
954 26 IF(INIT.EQ.1) RETURN
955
956 C COMPUTE AND PRINT DESCRIPTIVE STATISTICS
957 K = 1
958 S = 0
959 SSO = 0
960 DO 50 J = 1,4
961 S1 = 0.0
962 S01 = 0.0
963 KK = L(J)
964 DO 40 J = K,KK
965 S1 = S1 + X(J)
966 S01 = S01 + X(J)*X(J)
967
968 40 CONTINUE
969 K = 1 + L(J)
970 S = S + S1
971 SSO = SSO + S01
972 SUM(J) = S1
973 SUMSO(J) = S01
974
975 50 CONTINUE
976 IF(IOUT.EQ.0) GO TO 55
977 WRITE(NUNIT,1010) (SUM (J),J=1,4)
978 WRITE(NUNIT,1011) (SUMSO (J),J=1,4)
979
980 55 XBAR = S/FL0AT(N)
981 VAR = (SSO - S*XBAR)/FL0AT(N-1)
982 SD = SQRT(VAR)
983
984 C IN THE ORIGINAL VERSION, 025,030,075 ARE COMPUTED HERE.
985 C IN ARSP10, SUB. QUENT COMPUTES THESE VALUES.
986
987
988 O10 = 075 - 025
989 XBAR10 = (XBAR - 050) / (2. + O10)
990 SD10 = SD / (2. + O10)
991 SD10LG = ALOG(SD10)
992 SSON=SSO/FL0AT(N)
993 WRITE(NUNIT,1012)
994 WRITE(NUNIT,1013) N,025,030,075,O10
995 WRITE(NUNIT,1014) SSON,XBAR,VAR,SD,XBAR10,SD10,SD10LG
996
997 CONTINUE
998 RETURN
999
1000 FORMAT(///T20,20A4)
1001 FORMAT(//T40,'ORDER STATISTICS IN QUARTERS'/T40,2B(1H*))
1002 FORMAT(T20,' SEQUENCE'/T20,' WITHIN'/T20,' QUARTILE'
1003 ' FIRST QUARTER SECOND QUARTER THIRD QUARTER FOURTH QUARTER'
1004 '/T21,8(1H*),2(1X),13(1H*),2X,14(1H*))
1005 FORMAT(T20,18,' 4(1X,F15.4)')
1006
1007 FORMAT(1H*,T29,F15.4)
1008 FORMAT(1H*,T45,F15.4)
1009 FORMAT(1H*,T61,F15.4)
1010 FORMAT(1H*,T20,18,T77,F15.4)
1011 FORMAT(1H0,T20,'SUM',5X,4(1X,F15.4))
1012 FORMAT(1H0,T20,'SUM OF',T20,' SQUARES',1X,4(1X,F15.4))
1013 FORMAT(///T45,'DESCRIPTIVE STATISTICS'/T45,23(1H*))
1014
1015 FORMAT(//T20,'SAMPLE',T28,' LOWER',T52,' UPPER'
1016 ' T64,' SIZE'
1017 ' T28,' QUANTILE',T40,' MEDIAN',T62,' QUANTILE',
1018 ' T64,' RANGE',//T20,15,T29,4(G11.4,1X))
1019
1020 FORMAT(//T15,'SUMSO/M',T30,'MEAN',T40,' VARIANCE',T52,
1021 ' STD DEV',T64,'MEAN 10',T76,'STD DEV 10',T88,
1022 ' LOG STD 10',//T16,7(G11.4,1X))
1023
1024 FORMAT(T20,20A4)
1025
1026 END
1027
1028 SUBROUTINE DESYT(NYT,NFREOS,XSEAS,NCOVM,NOMP,
1029 ALL2,10PTMX)
1030
1031 C.....
1032
1033 C SUBROUTINE TO DESCRIBE Y-TILDA VIA PERIODOGRAM, AUTOCORRELATIONS,
1034 C A ONESAM ANALYSIS OF PERIODOGRAM, CORRELOGRAM, AND PARTIAL
1035 C AUTOCORRELATIONS IS PERFORMED TESTING FOR WHITE NOISE.
1036
1037 C INPUT: NYT - NUMBER OF OBSERVATIONS IN Y-TILDA
1038 C NFREOS - NUMBER OF EQUALLY SPACED FREQUENCIES AT
1039 C WHICH TO OBTAIN SPECTRA
1040 C XSEAS - SEASONAL PERIOD OF DATA
1041 C NCOVM - NUMBER OF COVARIANCES TO COMPUTE
1042 C NJMP - SIZE OF NEIGHBORHOOD FOR LOCAL QUANTILE
1043 C ANALYSIS OF PERIODOGRAM
1044 C LL2 - NAMES OF BEST, SECOND BEST AR MODELS
1045 C 10PTMX - SELECT MODELING OPTION:
1046 C 1 - NO ARMA SELECT MODELING
1047 C 2 - ARMA SELECT USING AR FROM BURG ROUTINE,
1048 C AR INVERTED TO LARGE ORDER MA TO PRODUCE
1049 C COVARIANCE MATRIX FOR SELECT
1050 C 3 - ARMA SELECT USING TRUNCATED INFINITE MA
1051 C DERIVED USING CEPSTRAL CORRELATIONS.
1052 C 4 - BOTH 2 AND 3 PERFORMED
1053
1054 C OUTPUT: VARIOUS MODELS AND DIAGNOSTICS.
1055 C MODELS - AR BY BEST CAT ORDER
1056 C AR BY SECOND BEST CAT ORDER
1057 C AR BY BURG ALGORITHM USING LARGER OF BEST AND
1058 C SECOND BEST ORDERS
1059 C MA BY INVERTING BURG AR
1060 C ARMA BY USING COVARIANCES FROM ABOVE MA IN
1061 C SELECT REGRESSION ROUTINE
1062 C MA BY CEPSTRAL CORRELATIONS
1063 C ARMA BY USING COVARIANCES OF CEPSTRAL MA IN
1064 C SELECT REGRESSION ROUTINE
1065
1066
1067

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1048 C SUBPROGRAMS CALLED: DTCVP, CYCR, QUENT, DESTAT, PPLOT, KSD, FCODEA,
1049 MINMAX, QUICK, FOFNC, QTOPO, WSPACE, OLOCAL,
1050 PPLOT, PTERP, MIN, MAX, PREPSP, CUMSP, SPPLT,
1051 PCORR, CVPART, CLPLT1, PARTRV, AICLS, PAR3,
1052 RELMH, CYVAP, ARSP, QMENVY, MASP, CUSPM, DTARS,
1053 PARTAR, MACV, CLPLT2, ARMA, NAMESL, SELREG, SLMS,
1054 MASP5L
1055 C
1056 C*****
1057 COMMON /DAT/ YT(1000), CT(1200), ST(1200), FT(1200), WKM(61,61),
1058 IERR(500), R(260), CORR(260), INDY(50), COPT(50),
1059 AIC(260), ALRV(260),
1060 SIG(2), MINVC(2), NAMES(260),
1061 LABY(20), IC(10), ALPHY(260)
1062 COMMON /UNIT/ IUNIT, NSCRCH
1063 DIMENSION BETAI(260), LABPA(20), LABAR(20), LABAR1(20), LABW(20)
1064 DIMENSION LL2(2,2), LABP(20), LABC(20), LABAR1(20), LABW(20)
1065 DATA LABP/RAW, PER1, DDDG, RAM, 16, /
1066 DATA LABC/CORR, ELOC, RAM, 17, /
1067 DATA LABPA/PART, IAL, AUTO, CORR, ELAT, IDNS, 14, /
1068 DATA LABAR1/BEST, ORD, ER, A, R, SP, ECTR, AL, D, /
1069 ENSI, TY, 12, /
1070 DATA LABAR2/SPEC, TRAL, DEN, SITY, PRO, M, BU, RG, A, /
1071 R, MD, DEL, 11, /
1072 DATA LABW/SMOD, THED, PER, 1000, GRAM, P, ARZE, /
1073 N, W, NDDW, 11, /
1074 DATA MDIM/61/
1075 TWOP18 0.ATAN(1.0)
1076 C
1077 C COMPUTE PERIODOGRAM CORRELATIONS
1078 C
1079 CALL DTCVP(YT, NYT, NPREOS, NCOVM, CT, ST, FT, R, RO)
1080 DIV=RO/TWOP1
1081 NI=(NPREOS/2)+1
1082 DELP=TWOP1/FLOAT(NPREOS)
1083 CALL CYCR(FT, DIV, NPREOS)
1084 C
1085 C PERFORM QUESAN ANALYSIS ON RAW PERIODOGRAM
1086 C
1087 CALL QUENT(NPREOS, FT, LABY, LABP, 2, 1, NPREOS+4, P25, P50, P75)
1088 C
1089 C LOCAL QUANTILE ANALYSIS OF PERIODOGRAM
1090 C
1091 IF(NOMP.LE.0) GOTO 605
1092 NOL=(NPREOS+NOMP)/2+10
1093 DIVO=1./FLOAT(NPREOS)
1094 CT(1)=DIVO
1095 DO 600 I=2, NOL
1096 CT(I)=CT(I-1)+DIVO
1097 CALL OLOCAL(FT, CT, NOL, NOMP, LABP)
1098 605 CONTINUE
1099 C
1100 C PRINT PERIODOGRAM AND CUMULATIVE PERIODOGRAM
1101 C
1102 CALL PREPSP(FT, NPREOS, 1, 1, 0, CT, SPMIN, SPMAX)
1103 SPLR=SPMAX-SPMIN
1104 WRITE(UNIT, 610) SPMIN, SPMAX, RO, SPLR
1105 610 FORMAT(1H1, 10X, 24HPER PERIODOGRAM, SPLMIN = , F12.5, 2X,
1106 19HSPMAX = , F12.5, 2X, 7HRO = , F12.5, /, 12H, SPLR = , F12.5)
1107 FREQ=0.
1108 CALL SPPLT(FT, NI, FREQ, DELP, 1)
1109 NPRO=NPREOS
1110 WRITE(UNIT, 620)
1111 620 FORMAT(1H1, 10X, 24HCUMULATIVE PERIODOGRAM :)
1112 CALL CUMSP(FT, NPRO, 1, CT, NI)
1113 C
1114 C PRINT CORRELATIONS
1115 C
1116 WRITE(UNIT, 625)
1117 625 FORMAT(1H1, 110, 1TIME DOMAIN ANALYSIS CORRELOGRAM, /)
1118 CALL PCORR(R, RO, NCOVM, CORR)
1119 C
1120 C PERFORM QUANTILE ANALYSIS OF CORRELOGRAM
1121 C
1122 CALL QUENT(NCOVM, CORR, LABY, LABC, 1, 0, NCOVM+4, C25, C50, C75)
1123 C
1124 C CREATE INFORMATION LAG FUNCTION
1125 C
1126 DO 708 I=1, NCOVM
1127 FT(I)=0.5*LOG(1.-CORR(I)+CORR(I))
1128 WRITE(UNIT, 705)
1129 705 FORMAT(1H1, 10X, 1INFORMATION LAG FUNCTION: -0.5*LOG(1-RHO+2))
1130 CALL CLPLT1(FT, NCOVM, 1, 4HINFD, 41, 1)
1131 WRITE(UNIT, 710)
1132 710 FORMAT(1H1, 10X, 27HAR DESCRIPTION OF Y TILDA : /, 10X,
1133 10H PARTIAL AUTOCORRELATIONS VIA THE YULE WALKER EQUATIONS :)
1134 CALL CVPART(R, RO, NCOVM, CT, ST, FT)
1135 C
1136 C FT CONTAINS PARTIAL AUTOCORRELATIONS
1137 C PRINT PARTIAL AUTOCORRELATIONS
1138 C
1139 CALL CLPLT2(FT, NCOVM, 1, 4HPACF, 1, 0, -1, 0)
1140 C
1141 C PERFORM QUANTILE ANALYSIS OF PARTIAL AUTOCORRELATIONS
1142 C
1143 CALL QUENT(NCOVM, FT, LABY, LABPA, 1, 0, NCOVM+4, C25, C50, C75)
1144 C
1145 C COMPUTE PREDICTION VARIANCES AND AIC
1146 C
1147 CALL PARTRV(FT, NCOVM, 1, 0, ST)
1148 CALL AIC(S(ST, NCOVM, NYT, ALRV, AIC, LAIC)
1149 WRITE(UNIT, 961) LAIC
1150 961 FORMAT(1H1, 10X, 15HORDER BY AIC = , 13)
1151 CALL CLPLT2(ALRV, AIC, NCOVM, 1, 4HALRV, 4H AIC, 81, 1)
1152 C
1153 C COMPUTE CAT AR ORDERS
1154 C
1155 DEC=1./FLOAT(NYT)
1156 CALL PAR3(ST, NCOVM, NYT, FT, NORD)
1157 WRITE(UNIT, 970)
1158 970 FORMAT(1H1, 10X, 15HORDER BY CAT = , 13)
1159 CALL RELMH(FT, NCOVM, DEC, MIN1, MIN2)
1160 IF(FT(MIN1).LE.-1.) GOTO 731
1161 WRITE(UNIT, 1401)
1162 1401 FORMAT(1H1, 10X, 15HORDER BY CAT = , 13)
1163 731 CONTINUE
1164 C
1165 C AR SPECTRAL ANALYSIS OF Y
1166 C
1167 NORDTP=MIN1
1168 IF((MIN1+MIN2).EQ.0) GO TO 785
1169 RVTP=ST(MIN1)
1170 IF(MIN2.EQ.0) MIN2=MIN1
1171 SIG(1)=ST(MIN1)
1172 SIG(2)=ST(MIN2)
1173 MINVC(1)=MIN1
1174 MINVC(2)=MIN2
1175 DO 780 IORD=1, 2
1176 IF(IORD.EQ.2) AND (MIN1.EQ.MIN2) GO TO 785
1177 WRITE(UNIT, 725) MINVC(IORD), SIG(IORD)
1178 725 FORMAT(1H1, 10X, 15HORDER = , 12, 10H AR MODEL, RVAR = , F10.7)
1179 WRITE(UNIT, 730) LL2(1, IORD), LL2(2, IORD)

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1312 CALL CLPLT1(ALPHAT, NORDAR, 1, ANALPH, ST, 1)
1313 IF(NORDAR.EQ.0) GO TO 880
1314 CALL CLPLT1(BETA, NORDAR, 1, ANBETA, ST, 1)
1315 CONTINUE
1316 NVAL=NVAL*THOP1
1317 CALL MASPPL(COPT, INDT, RVAR, NPREOS, CT, ST, PT)
1318 CALL PREPSP(PT, NPREOS, 1, 1, 0, ST, SPMA, SPMA)
1319 SPMA=SPMA-SPMIN
1320 WRITE(UNIT, 760) SPMIN, SPMA, SPMA
1321 CALL SPPLT(PT, N1, PPREO, DELP, 1)
1322 NPREO=NPREOS
1323 WRITE(UNIT, 875)
1324 875 FORMAT(//, 10X, 32HCUMULATIVE SUBSET ARMA SPECTRA //)
1325 CALL CUMSP(PT, NPREO, 1, CT, N1)
1326 IF(LCHN.EQ.1 AND IOPTM.NE.3) GO TO 836
1327 CONTINUE
1328 880 RETURN
1329 END
1330 SUBROUTINE DMEMRY(PT, NPREOS, XSEAS, CT, ST, LABEL)
1331 C-----
1332 C
1333 C SUBROUTINE TO COMPUTE DELTA MEMORY SEQUENCE FOR SPECTRAL
1334 C DENSITY FUNCTION FT
1335 C
1336 C INPUT: PT - SPECTRAL DENSITY
1337 C NPREOS - NUMBER OF EQUALLY SPACED FREQUENCIES USED IN
1338 C COMPUTING FT
1339 C XSEAS - SEASONAL LAG, 1 2 ... XSEAS=12 FOR MONTHLY DATA, ETC
1340 C LABEL - LABEL GIVING TYPE OF INPUT SPECTRAL DENSITY
1341 C
1342 C AUXILIARY: CT, ST
1343 C
1344 C OUTPUT: PRINTER PLOT OF DELTA SEQUENCE
1345 C
1346 C SUBPROGRAMS CALLED: CLPLT1
1347 C-----
1348 C
1349 COMMON /UNIT/ UNIT, NSCRCH
1350 DIMENSION FT(1), CT(1), ST(1), LABEL(20)
1351 XSNF=1./XSEAS
1352 WRITE(UNIT, 100) LABEL, XSNF
1353 KPREO=XSNF*FLOAT(NPREOS)
1354 INIT=0
1355 KPREO=KPREO+1
1356 10 CONTINUE
1357 CT(1)=ALOG(PT(INIT+1))
1358 ST(1)=CT(1)
1359 DO 20 I=2, KPREO
1360 CT(I)=ALOG(PT(I+INIT))
1361 ST(I)=ST(I-1)+CT(I)
1362 DO 30 J=1, KPREO
1363 ST(J)=ST(J)/FLOAT(I)-CT(I+1)
1364 IF(ST(J).GT.3.0) ST(J)=3.0
1365 IF(ST(J).LT.-3.0) ST(J)=-3.0
1366 30 CONTINUE
1367 CALL CLPLTDIST, KPREO, 1, ANDELT, 3.0, -3.0)
1368 IF(INIT.NE.0) GO TO 40
1369 INIT=KPREO
1370 GO TO 10
1371 RETURN
1372 100 FORMAT(1H1, 9X, 'DELTA MEMORY FUNCTION', //, 10X, 20A4, //, 10X,
1373 'PLOT 1 - LAG 1 IS AT FREQUENCY 0', //, 10X,
1374 'PLOT 2 - LAG 1 IS AT FREQUENCY ', F7.5, //)
1375 END
1376 FUNCTION DOT(X, Y, N)
1377 C-----
1378 C
1379 C INNER PRODUCT OF TWO VECTORS.
1380 C
1381 C-----
1382 DIMENSION X(1), Y(1)
1383 DOUBLE PRECISION C
1384 C=0.0D0
1385 DO 10 I=1, N
1386 C=C+DBLE(X(I))*DBLE(Y(I))
1387 DOT=C
1388 RETURN
1389 END
1390 SUBROUTINE DTARB(DAT, N, NP, IOPT, Y, X, VP, RO, AJ, RVAR)
1391 C-----
1392 C
1393 C BURG'S ALGORITHM (IOPT=2) OR TOEPLITZ GRAM-SCHMIDT ALGORITHM
1394 C FOR ESTIMATING PARTIAL AUTOCORRELATIONS AJ(1) ... AJ(NP) AND
1395 C RESIDUAL VARIANCES RVAR(1) ... RVAR(NP) FOR AR ORDERS 1 THRU NP.
1396 C
1397 C-----
1398 DIMENSION DAT(1), V(1), X(1), VP(1), AJ(1), RVAR(1)
1399 NPMP=N*NP
1400 DO 1 I=1, NPMP
1401 V(I)=0.0
1402 X(I)=0.0
1403 VP(I)=0.0
1404 DO 2 J=1, N
1405 V(I)=DAT(J)
1406 X(J+1)=DAT(J)
1407 RO=DOT(DAT, DAT, N)/FLOAT(N)
1408 SIG=RO
1409 DO 100 J=1, NP
1410 IF(IOPT.EQ.2) GO TO 10
1411 AJ(J)=2.*DOT(X, V, NPMP)/(DOT(X, X, NPMP)+DOT(Y, Y, NPMP))
1412 GO TO 20
1413 10 TOP=-2.*DOT(X(J+1), V(J+1), N-J)
1414 BOT=DOT(X(J+1), X(J+1), N-J)+DOT(Y(J+1), Y(J+1), N-J)
1415 AJ(J)=TOP/BOT
1416 20 CONTINUE
1417 AJJ=AJ(J)
1418 SIG=SIG*(1.-AJJ*AJJ)
1419 RVAR(J)=SIG
1420 DO 30 K=1, NPMP
1421 VP(K)=V(K)
1422 V(K)=V(K)+AJJ*VP(K)
1423 30 X(K)=X(K)+AJJ*VP(K)
1424 DO 40 K=2, NPMP
1425 KK=NPMP-K+2
1426 X(KK)=X(KK-1)
1427 X(1)=0.0
1428 40 CONTINUE
1429 RETURN
1430 END
1431 SUBROUTINE DTCVP(X, N, NPREOS, M, CT, ST, PER, R, RO)
1432 C-----
1433 C
1434 C SUBROUTINE TO CALCULATE THE FIRST M+1 SAMPLE AUTO-
1435 C COVARIANCES RO, R(1), ... R(M) OF A SAMPLE X(1), ... X(N)
1436 C FROM A TIME SERIES X(.) VIA THE FAST FOURIER TRANSFORM.
1437 C
1438 C INPUT:
1439 C N, X(1), ... X(N), M
1440 C NPREOS: AN INTEGER (>N*M, LARGEST PRIME
1441 C FACTOR (23) SPECIFYING THE NUMBER OF EQUALLY
1442 C SPACED FREQUENCIES BETWEEN 0 AND THOP1 AT
1443 C WHICH THE SAMPLE SPECTRAL DENSITY (PER) IS

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1444 C          TO BE CALCULATED
1445 C
1446 C          OUTPUT
1447 C          PER(1), . . . PER(NFREOS), NO R(1), . . . R(M)
1448 C
1449 C          AUXILIARY
1450 C          CT, ST
1451 C
1452 C          SUBROUTINES CALLED   DTSP SPECV FFT
1453 C
1454 C          .....
1455 C          DIMENSION X(N), CT(NFREOS), ST(NFREOS), PER(NFREOS), R(M)
1456 C
1457 C          CALL DTSP(X, N, NFREOS, CT, ST, PER)
1458 C          CALL SPECV(PER, NFREOS, M, CT, ST, R, RO)
1459 C
1460 C          RETURN
1461 C          END
1462 C          SUBROUTINE DTSP(X, N, NFREOS, CT, ST, PER)
1463 C          .....
1464 C          SUBROUTINE TO CALCULATE THE SAMPLE SPECTRAL DENSITY PER
1465 C          AT THE NFREOS EQUALLY SPACED FREQUENCIES BETWEEN 0
1466 C          AND TWOPI OF THE SAMPLE X(1), . . . , X(N), N < NFREOS, FROM
1467 C          A TIME SERIES X
1468 C
1469 C          INPUT
1470 C          N, X(1), . . . , X(N)
1471 C          NFREOS = LARGEST PRIME FACTOR < 23
1472 C
1473 C          OUTPUT
1474 C          PER(1), . . . PER(NFREOS)
1475 C
1476 C          AUXILIARY
1477 C          CT, ST
1478 C
1479 C          SUBROUTINES CALLED   FFT
1480 C
1481 C          .....
1482 C          DIMENSION X(N), CT(NFREOS), ST(NFREOS), PER(NFREOS)
1483 C
1484 C          TWOPI = 6.283185307179586476925286766559
1485 C
1486 C          DO 1 I=1, NFREOS
1487 C             CT(I) = 0
1488 C             ST(I) = 0
1489 C             DO 2 J=1, N
1490 C                CT(I) = CT(I) + X(J)
1491 C
1492 C          CALL FFT(CT, ST, NFREOS, NFREOS, NFREOS, 1)
1493 C
1494 C          DO 3 I=1, NFREOS
1495 C             PER(I) = (CT(I)*CT(I) + ST(I)*ST(I))/TWOPI
1496 C
1497 C          RETURN
1498 C          END
1499 C          SUBROUTINE FCDEA(X, IFORM, NAME)
1500 C          .....
1501 C          SUBROUTINE TO CONVERT REAL VARIABLE X
1502 C          WHICH HAS 4 CHARACTER F-FORMAT IFORM
1503 C          TO 8 CHARACTER ALPHAMERIC ARRAY NAME WHICH IS
1504 C          IN F-FORMAT NSCRCH = SCRATCH TAPE NUMBER
1505 C          INPUT   X, IFORM
1506 C          OUTPUT  NAME(1), NAME(2) . . . 4 CHARACTERS EACH
1507 C          .....
1508 C          COMMON /UNIT/ IUNIT, NSCRCH
1509 C          DIMENSION NAME(2), IFORM(2)
1510 C          REWIND NSCRCH
1511 C          WRITE(NSCRCH, IFORM) X
1512 C          REWIND NSCRCH
1513 C          READ(NSCRCH, 10) NAME
1514 C          10 FORMAT(2A4)
1515 C          RETURN
1516 C          END
1517 C          SUBROUTINE FFT(A, B, NTOT, N, NSPAN, ISN)
1518 C          MULTIVARIATE COMPLEX FOURIER TRANSFORM, COMPUTED IN PLACE
1519 C          USING MIXED-RADIX FAST FOURIER TRANSFORM ALGORITHM.
1520 C          BY R. C. SINGLETON, STANFORD RESEARCH INSTITUTE, OCT. 1968
1521 C          ARRAYS A AND B ORIGINALLY HOLD THE REAL AND IMAGINARY
1522 C          COMPONENTS OF THE DATA, AND RETURN THE REAL AND
1523 C          IMAGINARY COMPONENTS OF THE RESULTING FOURIER COEFFICIENTS.
1524 C          MULTIVARIATE DATA IS INDEXED ACCORDING TO THE FORTRAN
1525 C          ARRAY ELEMENT SUCCESSOR FUNCTION, WITHOUT LIMIT
1526 C          ON THE NUMBER OF IMPLIED MULTIPLE SUBSCRIPTS.
1527 C          THE SUBROUTINE IS CALLED ONCE FOR EACH VARIATE.
1528 C          THE CALLS FOR A MULTIVARIATE TRANSFORM MAY BE IN ANY ORDER.
1529 C          NTOT IS THE TOTAL NUMBER OF COMPLEX DATA VALUES.
1530 C          N IS THE DIMENSION OF THE CURRENT VARIABLE
1531 C          NSPAN/N IS THE SPACING OF CONSECUTIVE DATA VALUES
1532 C          WHILE INDEXING THE CURRENT VARIABLE.
1533 C          THE SIGN OF ISN DETERMINES THE SIGN OF THE COMPLEX
1534 C          EXPONENTIAL, AND THE MAGNITUDE OF ISN IS NORMALLY ONE.
1535 C          NOTE WHEN TRANSFORMING DATA TO THE FREQUENCY DOMAIN (ISN=+1),
1536 C          FFT YIELDS THE REAL AND IMAGINARY PARTS OF Z(FREQ), WHERE
1537 C          Z(FREQ) = SUM(J=1 TO N) OF X(J) * EXP(I*(J-1)*FREQ), WHERE FREQ
1538 C          REPRESENTS ONE OF THE N FREQUENCIES ON THE GRID 0 TO
1539 C          (2*PI*(N-1)/N).
1540 C          ALSO NOTE WHEN TRANSFORMING FOURIER COEFFICIENTS BACK TO
1541 C          THE TIME DOMAIN (ISN=-1), FFT YIELDS THE REAL AND IMAGINARY
1542 C          PARTS OF X=Z(J), FOR J=1 TO N.
1543 C          A TRI-VARIATE TRANSFORM WITH A(N1,N2,N3), B(N1,N2,N3)
1544 C          IS COMPUTED BY
1545 C          CALL FFT(A, B, N1*N2*N3, N1, N1, 1)
1546 C          CALL FFT(A, B, N1*N2*N3, N2, N1*N2, 1)
1547 C          CALL FFT(A, B, N1*N2*N3, N3, N1*N2*N3, 1)
1548 C          FOR A SINGLE-VARIATE TRANSFORM,
1549 C          NTOT = N * NSPAN * (NUMBER OF COMPLEX DATA VALUES), E.G.
1550 C          CALL FFT(A, B, N, N, N, 1)
1551 C          THE DATA MAY ALTERNATIVELY BE STORED IN A SINGLE COMPLEX
1552 C          ARRAY A, THEN THE MAGNITUDE OF ISN CHANGED TO TWO TO
1553 C          GIVE THE CORRECT INDEXING INCREMENT AND A(2) USED TO
1554 C          PASS THE INITIAL ADDRESS FOR THE SEQUENCE OF IMAGINARY
1555 C          VALUES, E.G.
1556 C          CALL FFT(A, A(2), NTOT, N, NSPAN, 2)
1557 C          ARRAYS AT(MAXP), CK(MAXP), SK(MAXP), AND NP(MAXP)
1558 C          ARE USED FOR TEMPORARY STORAGE. IF THE AVAILABLE STORAGE
1559 C          IS INSUFFICIENT, THE PROGRAM IS TERMINATED BY A STOP.
1560 C          MAXP MUST BE GE. THE MAXIMUM PRIME FACTOR OF N.
1561 C          MAXP MUST BE GT. THE NUMBER OF PRIME FACTORS OF N.
1562 C          IN ADDITION, IF THE SQUARE-FREE PORTION K OF N HAS TWO OR
1563 C          MORE PRIME FACTORS, THEN MAXP MUST BE GE. K-1.
1564 C          DIMENSION A(1), B(1)
1565 C          ARRAY STORAGE IN NPAC FOR A MAXIMUM OF 11 FACTORS OF N.
1566 C          IF N HAS MORE THAN ONE SQUARE-FREE FACTOR, THE PRODUCT OF THE
1567 C          SQUARE-FREE FACTORS MUST BE LE. 210
1568 C          DIMENSION NPAC(11), NP(209)
1569 C          ARRAY STORAGE FOR MAXIMUM PRIME FACTOR OF 23
1570 C          DIMENSION AT(23), CK(23), ST(23), SK(23)
1571 C          EQUIVALENCE (1,1)

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1PIRK .LE. KSPAN) GO TO 320
GO TO 700
C TRANSFORM FOR FACTOR OF 4
400 IF(NFAC[I] .NE. 4) GO TO 600
KSPNN=KSPAN
KSPAN=KSPAN/4
410 C1=1.0
S1=0
420 K1=K1+KSPAN
K2=K1+KSPAN
K3=K2+KSPAN
AKP=A(KK)+A(K2)
AKM=A(KK)+A(K2)
AJP=A(K1)+A(K3)
AJM=A(K1)+A(K3)
A(KK)+AKP+AJP
AJP=AKP+AJP
BKP=B(KK)+B(K2)
BKM=B(KK)+B(K2)
BJP=B(K1)+B(K3)
BJM=B(K1)+B(K3)
B(KK)+BKP+BJP
BJP=BKP+BJP
IF(JSN .LT. 0) GO TO 460
AKP=AKM+BJM
AKM=AKM+BJM
BKP=BKM+AJM
BKM=BKM+AJM
IF(S1 .EQ. 0.0) GO TO 460
430 A(K1)+AKP+C1-BKP=S1
B(K1)+AKP+S1-BKP=C1
A(K2)+AJP+C2-BJP=S2
B(K2)+AJP+S2-BJP=C2
A(K3)+AKM+C3-BKM=S3
B(K3)+AKM+S3-BKM=C3
KK=K3+KSPAN
1PIRK .LE. NT) GO TO 420
440 C2=C1-(C0+C1+S0+S1)
S1=S0+C1-C0+S1+S1
C1=C2.0/(C2+S2+S1+S2)
S1=C1+S1
C1=C1+C2
C2=C1+S2-S1+S2
S2=S2.0+C1+S1
C3=C2+C1-S2+S1
S3=C2+S1+S2+C1
KK=KK+NT+JC
1PIRK .LE. KSPAN) GO TO 420
KK=KK-KSPAN+INC
1PIRK .LE. JC) GO TO 410
1PIKSPAN .EQ. JC) GO TO 600
GO TO 100
450 AKP=AKM+BJM
AKM=AKM+BJM
BKP=BKM+AJM
BKM=BKM+AJM
1F(S1 .NE. 0.0) GO TO 430
460 A(K1)+AKP
B(K1)+BKP
A(K2)+AJP
B(K2)+BJP
A(K3)+AKM
B(K3)+BKM
KK=K3+KSPAN
1PIRK .LE. NT) GO TO 420
GO TO 440
C TRANSFORM FOR FACTOR OF 5 (OPTIONAL CODE)
510 C2=C72+S2-S72+S2
S2=S2.0+C72+S72
520 K1=KK+KSPAN
K2=K1+KSPAN
K3=K2+KSPAN
K4=K3+KSPAN
AKP=A(K1)+A(K4)
AKM=A(K1)+B(K4)
BKP=B(K1)+B(K4)
BKM=B(K1)+B(K4)
AJP=A(K2)+A(K3)
AJM=A(K2)+A(K3)
BJP=B(K2)+B(K3)
BJM=B(K2)+B(K3)
AA=A(KK)
BB=B(KK)
A(KK)+AA+AKP+AJP
B(KK)+BB+BKP+BJP
AK=AKP+C72-AJP+C2+AA
BK=BKP+C72-BJP+C2+BB
AJ=AKM+S72-AJM+S2
BJ=BKM+S72-BJM+S2
A(K1)+AK+BJ
A(K4)+AK+BJ
B(K1)+BK+AJ
B(K4)+BK+AJ
AK=AKP+C2-AJP+C72+AA
BK=BKP+C2-BJP+C72+BB
AJ=AKM+S2-AJM+S72
BJ=BKM+S2-BJM+S72
A(K2)+AK+BJ
A(K3)+AK+BJ
B(K2)+BK+AJ
B(K3)+BK+AJ
KK=K4+KSPAN
1PIRK .LT. NN) GO TO 520
KK=KK+NN
1PIRK .LE. KSPAN) GO TO 520
GO TO 700
C TRANSFORM FOR ODD FACTORS
600 K=NFAC[I]
KSPNN=KSPAN
KSPAN=KSPAN/K
1PIK .EQ. 3) GO TO 320
1PIK .EQ. 5) GO TO 510
1PIK .EQ. 7) GO TO 640
JF=K
S1=RAD/FLOAT(K)
C1=COS(S1)
S1=SIN(S1)
1F(JF .GT. MAXP) GO TO 998
CK(JF)=1.0
SK(JF)=0.0
J=1
630 CK(J)+CK(K)+C1+SK(K)+S1
SK(J)+CK(K)+S1-BK(K)+C1
KK=K
CK(K)+CK(J)
SK(K)+SK(J)
J=J+1
1F(J .LT. K) GO TO 630
640 K1=KK
K2=KK+KSPNN
AA=A(KK)

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1972      KK=KK-N1+JC
1973      IF(K2 .LT. K5) GO TO 850
1974      K2=K2-NP(J)
1975      J=J+1
1976      K2=NP(J+1)+K2
1977      IF(K2 .GT. NP(J)) GO TO 870
1978      J=1
1979      840 IF(KK .LT. K2) GO TO 850
1980      KK=KK+JC
1981      K2=KSPAN+K2
1982      IF(K2 .LT. K5) GO TO 880
1983      IF(KK .LT. K5) GO TO 870
1984      JC=K2
1985      890 IF(I=KT+1 .GE. M) RETURN
1986      KSPNN=NP(KT+1)
1987      C PERMUTATION FOR SQUARE-FREE FACTORS OF N
1988      J=M-KT
1989      NPAC(J+1)=1
1990      900 NPAC(J)=NPAC(J)+NPAC(J+1)
1991      J=J-1
1992      IF(J .NE. KT) GO TO 900
1993      KT=KT+1
1994      NN=NPAC(KT)-1
1995      IF(NN .GT. MAXP) GO TO 998
1996      JJ=0
1997      J=0
1998      GO TO 905
1999      902 JJ=JJ-K2
2000      K2=KK
2001      K=K+1
2002      KK=NPAC(K)
2003      904 JJ=KK+JJ
2004      IF(JJ .GE. K2) GO TO 902
2005      NP(J)=JJ
2006      906 K2=NPAC(KT)
2007      K=KT+1
2008      KK=NPAC(K)
2009      J=J+1
2010      IF(J .LE. NN) GO TO 904
2011      C DETERMINE THE PERMUTATION CYCLES OF LENGTH GREATER THAN 1
2012      J=0
2013      GO TO 914
2014      910 K=KK
2015      KK=NP(K)
2016      NP(K)=K
2017      IF(KK .NE. J) GO TO 910
2018      KJ=KK
2019      914 J=J+1
2020      KK=NP(J)
2021      IF(KK .LT. 0) GO TO 914
2022      IF(KK .NE. J) GO TO 910
2023      NP(J)=J
2024      IF(J .NE. NN) GO TO 914
2025      MAXP=INC+MAXP
2026      C REORDER A AND B, FOLLOWING THE PERMUTATION CYCLES
2027      GO TO 950
2028      924 J=J-1
2029      IF(NP(J) .LT. 0) GO TO 924
2030      JJ=JC
2031      926 KSPAN=JJ
2032      IF(JJ .GT. MAXP) KSPAN=MAXP
2033      JJ=JJ-KSPAN
2034      K=NP(J)
2035      KK=JC+K+1+JJ
2036      K1=K+KSPAN
2037      K2=0
2038      928 K2=K2+1
2039      A(K2)=A(K1)
2040      B(K2)=B(K1)
2041      K1=K1-INC
2042      IF(K1 .NE. KK) GO TO 928
2043      932 K1=KK+KSPAN
2044      K2=K1-JC+K+NP(K)
2045      K1=NP(K)
2046      936 A(K1)=A(K2)
2047      B(K1)=B(K2)
2048      K1=K1-INC
2049      K2=K2-INC
2050      IF(K1 .NE. KK) GO TO 932
2051      KK=K2
2052      IF(K .NE. J) GO TO 932
2053      K1=KK+KSPAN
2054      K2=0
2055      940 K2=K2+1
2056      A(K1)=A(K2)
2057      B(K1)=B(K2)
2058      K1=K1-INC
2059      IF(K1 .NE. KK) GO TO 940
2060      IF(JJ .NE. 0) GO TO 926
2061      IF(J .NE. 1) GO TO 924
2062      950 J=K2+1
2063      NT=N-KSPNN
2064      I=NT-INC+1
2065      IF(NT .GE. 0) GO TO 924
2066      RETURN
2067      C ERROR FINISH, INSUFFICIENT ARRAY STORAGE
2068      998 ISNO
2069      PRINT 998
2070      STOP
2071      999 FORMAT(44H0ARRAY BOUNDS EXCEEDED WITHIN SUBROUTINE PPT)
2072      END
2073      FUNCTION F1(R,NP,W)
2074      C .....
2075      C
2076      C FUNCTION TO DETERMINE THE NUMERATOR FUNCTION IN NEWTAR
2077      C RADIAL FREQUENCY W.
2078      C
2079      C INPUT :
2080      C      NP,R(1),...,R(NP)
2081      C      W
2082      C .....
2083      C
2084      C
2085      C DIMENSION R(NP)
2086      C
2087      C C=0.
2088      DO 1 I=1,NP
2089      D1=FLOAT(I)
2090      1 C=C-D1*R(I)*SIN(D1*W)
2091      F1=C
2092      C
2093      RETURN
2094      END
2095      FUNCTION FIP(R,NP,W)
2096      C .....
2097      C
2098      C FUNCTION TO DETERMINE DERIVATIVE OF F1 AT RADIAL
2099      C FREQUENCY W
2100      C
2101      C INPUT :
2102      C      NP,R(1),...,R(NP)
2103      C      W

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2236 C COMPUTE THE HALP LOGISTIC
2237 11 CONTINUE
2238 POPNC=1-N*2
2239 99 RETURN
2240 END
2241 SUBROUTINE PTERP(U,V,X,F,N,M)
2242 C-----
2243 C
2244 C SUBROUTINE TO PERFORM LINEAR INTERPOLATION ON V TO OBTAIN F AT
2245 C THE M X VALUES.
2246 C
2247 C INPUT: U = VECTOR OF VALUES AT WHICH V IS EVALUATED
2248 C V = FUNCTION VALUES TO INTERPOLATE
2249 C X = VALUES AT WHICH INTERPOLATED FUNCTION TO BE
2250 C EVALUATED
2251 C N = DIMENSION OF VECTORS U AND V
2252 C M = DIMENSION OF VECTORS X AND F
2253 C
2254 C NOTE: ALL ABSCISSA VECTORS MUST BE ORDERED
2255 C
2256 C OUTPUT: F = INTERPOLATED FUNCTION VALUES
2257 C-----
2258 C
2259 C DIMENSION U(N),V(N),X(M),F(M)
2260 IF(N.EQ.M) GO TO 100
2261 11=1
2262 DO 60 I=1,M
2263 10 IF(X(I)-U(1))20,40,50
2264 20 IF(11.EQ.1) GO TO 30
2265 F(I)=V(1)*(V(2)-V(1))/(X(1)-U(1))/(U(2)-U(1))
2266 GO TO 60
2267 30 F(I)=V(11-1)*(V(11)-V(11-1))/(X(1)-U(11-1))/(U(11)-U(11-1))
2268 GO TO 60
2269 40 F(I)=V(11)
2270 GO TO 60
2271 50 11=11+1
2272 IF(11.LT.N) GO TO 10
2273 11=M
2274 GO TO 30
2275 60 CONTINUE
2276 100 RETURN
2277 END
2278 SUBROUTINE ICODEA(K,IFORM,NAME)
2279 C-----
2280 C SUBROUTINE TO CONVERT INTEGER VARIABLE K
2281 C WHICH HAS 8 CHARACTER 1-FORMAT IFORM
2282 C TO 8 CHARACTER ALPHAMERIC ARRAY NAME WHICH IS
2283 C IN 8-FORMAT
2284 C INPUT : NSCRCH : SCRATCH TAPE NUMBER
2285 C K : IFORM
2286 C OUTPUT : NAME(1),NAME(2) : 4 CHARACTERS EACH
2287 C-----
2288 COMMON /UNIT/ IUNIT,NSCRCH
2289 DIMENSION NAME(2),IFORM(2)
2290 REWIND NSCRCH
2291 WRITE(NSCRCH,IFORM)K
2292 REWIND NSCRCH
2293 READ(NSCRCH,10)NAME
2294 10 FORMAT(2A4)
2295 RETURN
2296 END
2297 SUBROUTINE KSD(D,U,N,DM,UM,DP,UP)
2298 C-----
2299 C SUBROUTINE TO COMPUTE KENDALLCORV-SMIRNOFF STATISTIC FOR
2300 C THE DEVIATIONS D(U)-U. UPPER AND LOWER BOUNDS ARE GIVEN.
2301 C INPUT : D,U,N
2302 C OUTPUT :
2303 C DP,UP : MAX (+) DEVIATION, DP, WHICH IS AT U=UP
2304 C DM,UM : MAX (-) DEVIATION, DM, WHICH IS AT U=UM
2305 C SUBROUTINES CALLED : NONE
2306 C-----
2307 C DIMENSION D(N),U(N)
2308 SON = SORT(FLOAT(N))
2309 DP = (D(1) - U(1))
2310 UP = U(1)
2311 DM = DP
2312 UM = UP
2313 DO 10 I = 2,N
2314 DT = (D(I) - U(I))
2315 IF(DT .LE. DP) GO TO 1
2316 UP = U(I)
2317 DP = DT
2318 GO TO 10
2319 1 IF(DT .GE. DM) GO TO 10
2320 UM = U(I)
2321 DM = DT
2322 10 CONTINUE
2323 DP = SON*DP
2324 DM = SON*DM
2325 RETURN
2326 END
2327 SUBROUTINE MACV(BETA,SIG,NO,R,NO)
2328 C-----
2329 C
2330 C SUBROUTINE TO CALCULATE THE AUTOCOVARIANCES NO,R(1),
2331 C R(NO) FOR A MOVING AVERAGE PROCESS OF ORDER NO
2332 C WITH PARAMETERS BETA(1),...,BETA(NO), AND SIG (RES VAR)
2333 C
2334 C INPUT : NO,BETA(1),...,BETA(NO),SIG
2335 C
2336 C OUTPUT :
2337 C NO,R(1),...,R(NO)
2338 C
2339 C SUBROUTINES CALLED : NONE
2340 C-----
2341 C
2342 C DIMENSION BETA(NO),R(NO)
2343 C
2344 C C=1
2345 DO 1 I=1,NO
2346 C=C*BETA(I)+BETA(I)
2347 RO=C*SIG
2348 C
2349 DO 2 I=1,NO
2350 C=BETA(1)
2351 IF(I.EQ.NO) GO TO 2
2352 NOH=NO-I
2353 DO 3 J=1,NOH
2354 C=C*BETA(J)+BETA(J+1)
2355 2 R(I)=C*SIG
2356 C
2357 RETURN
2358 END
2359 SUBROUTINE NAMESL(RV,RVO,BETA,MR,NDIM,K1,K2,KTOP,
2360 IL,ALP,NAME,CDF,IND,RVAR,IER)
2361 C-----
2362 C SUBROUTINE TO PERFORM SUBSET MIXED SCHEME ESTIMATION
2363 C (C(L)V(T)+H(L)E(T))

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2800      18 DD 18 1+1,K1
2801      16 NAME[1]=K1-1+1
2802      C
2803      C K2 :
2804      C
2805      20 IF(K2.GT.O) GO TO 30
2806      C
2807      C K2 LE O
2808      C
2809      K2=ABS(K2)
2810      GO TO 40
2811      30 IF(K2.EQ.M1) GO TO 38
2812      C
2813      C O LT K2.LT M1 :
2814      C
2815      DD 31 1+1,M1
2816      WK[1]=ABS(REV[1])
2817      31 NWK[1]=O
2818      DO 32 1+1,K2
2819      CALL MAX(WK,M1,WKMAX,MIND)
2820      NWK[MIND]=1
2821      32 WK[MIND]=O
2822      1+1
2823      DO 33 1+1,M1
2824      IF(NWK[1] EQ O) GO TO 33
2825      NAME(K1+K2-1+1)=1
2826      1+1+1
2827      33 CONTINUE
2828      GO TO 40
2829      C
2830      C K2 EQ M1 :
2831      C
2832      36 DO 36 1+1,K2
2833      36 NAME(K1+1)=1-K2-1
2834      C
2835      C
2836      C FORM MATRIX A :
2837      C
2838      C
2839      40 IF([(K1.NE.O).AND.(K2.NE.O)]) GO TO 50
2840      IF(K2 EQ O) GO TO 45
2841      C
2842      C PURE MOVING AVERAGE :
2843      C
2844      DD 41 1+1,K2
2845      1+1=NAME[1]
2846      DO 41 J=1,I
2847      12=ABS(1+1-NAME[J])
2848      IF(12 EQ O) GO TO 42
2849      A[1,J]=REV(12)
2850      GO TO 41
2851      42 A[1,J]=REO
2852      41 A[J,1]=A[1,J]
2853      GO TO 50
2854      C
2855      C PURE AUTOREGRESSION :
2856      C
2857      45 DD 46 1+1,K1
2858      1+1=NAME[1]
2859      DO 46 J=1,I
2860      12=ABS(1+1-NAME[J])
2861      IF(12 EQ O) GO TO 47
2862      A[1,J]=RY(12)
2863      GO TO 46
2864      47 A[J,1]=RYO
2865      46 A[J,1]=A[1,J]
2866      GO TO 50
2867      C
2868      C MIXED :
2869      C
2870      50 DD 54 1+1,KK
2871      1+1=NAME[1]
2872      DO 54 J=1,I
2873      J1=NAME[J]
2874      12=1+1-J1
2875      13=ABS(1+1)
2876      14=ABS(J1)
2877      13=ABS(13-14)
2878      IF(12 GT O) GO TO 56
2879      C
2880      C REV :
2881      IF(13 EQ O) GO TO 55
2882      A[1,J]=REV(13)
2883      IF(1+1-J1).GT.O) A[1,J]=RYE(13)
2884      GO TO 54
2885      55 A[1,J]=REYO
2886      GO TO 54
2887      56 IF(1+1 GT O) GO TO 58
2888      C
2889      C REE :
2890      IF(13 EQ O) GO TO 57
2891      A[1,J]=REE(13)
2892      GO TO 54
2893      57 A[1,J]=REEO
2894      GO TO 54
2895      C
2896      C RYV :
2897      IF(13 EQ O) GO TO 59
2898      A[1,J]=RY(13)
2899      GO TO 54
2900      59 A[1,J]=RYO
2901      C
2902      C
2903      54 A[J,1]=A[1,J]
2904      C
2905      C
2906      60 N=KK+1
2907      A[N,N]=RYO
2908      DO 61 1+1,KK
2909      1+1=NAME[1]
2910      IF(1+1 GT O) GO TO 63
2911      12=1+1
2912      A[1,N]=REV(12)
2913      GO TO 61
2914      63 A[1,N]=RY(1+1)
2915      61 A[N,1]=A[1,N]
2916      C
2917      C CALL SELREG :
2918      C
2919      C INPUT TWICE SAMPLE SIZE FOR ARGUMENT 5 TO PERMIT MORE
2920      C VARIABLES TO BE SIGNIFICANT.
2921      C
2922      L2=L+2
2923      CALL SELREG(A,NDIM,KK,NAME,KTOP,L2,KP,COP,IND,IER)
2924      IF(KP LE O) GO TO 99
2925      DO 70 1+1,KP
2926      IF(IND[1].GT.O) COP[1]=COP[1]
2927      70 CONTINUE
2928      99 CONTINUE
2929      WR=MDPT
2930      C
2931      C
2932      C
2933      C
2934      C
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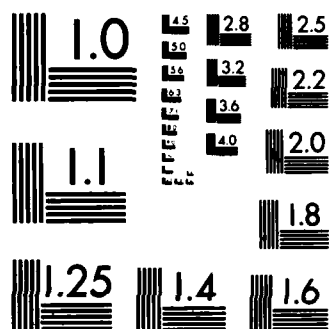
A USER'S GUIDE TO ARSPIQ (AUTOREGRESSIVE SPECTRAL
INFORMATION QUANTILE IDENTIFICATION)(U) TEXAS A AND M
UNIV COLLEGE STATION DEPT OF STATISTICS T J WOODFIELD
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NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A


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3160 RETURN
3161 END
3162 SUBROUTINE PLINE(NR,NC,NL,STRT,END,CHARL,PARRAY,VMIN,VMAX,VINC)
3163 DIMENSION STRT(NL),END(NL),CHARL(NL),PARRAY(NR,NC)
3164 NCM1 = NC - 1
3165 FNC = 1. / FLOAT(NCM1)
3166 NRP1 = NR + 1
3167 C
3168 DO 10 IL = 1,NL
3169 IF ( STRT(IL) .EQ. END(IL) ) GO TO 20,30,40
3170 20 STRT(IL) = AMAX1(STRT(IL),VMIN)
3171 END(IL) = AMIN1(END(IL),VMAX)
3172 GO TO 50
3173 40 STRT(IL) = AMIN1(STRT(IL),VMAX)
3174 END(IL) = AMAX1(END(IL),VMIN)
3175 50 DS = (END(IL) - STRT(IL)) * FNC * VINC
3176 S = (STRT(IL) - VMIN) * VINC + 1.5
3177 IND = INT(S)
3178 DO 60 I = 2,NCM1
3179 S = S + DS
3180 IF ( INT(S) .EQ. IND ) GO TO 60
3181 IND = INT(S)
3182 PARRAY(NRP1-IND,I) = CHARL(IL)
3183 CONTINUE
3184 GO TO 10
3185 30 IF ( STRT(IL) .LE. VMIN .OR. STRT(IL) .GE. VMAX ) GO TO 10
3186 IND = (STRT(IL) - VMIN) * VINC + 1.5
3187 DO 70 I = 2,NCM1
3188 PARRAY(NRP1-IND,I) = CHARL(IL)
3189 CONTINUE
3190 10 CONTINUE
3191 RETURN
3192 END
3193 SUBROUTINE PPLLOT(X,Y,NY,XCHAR,XZ,Z,NZ,LZ,ZCHAR,IORD,VMN,VMX,
3194 ..... LINE,STRT,END,CHARL,LX,LV,LC,L1)
3195 .....
3196 C ROUTINE TO DISPLAY PRINTER QUANTILE-BOX PLOT
3197 C INPUT
3198 C X - VECTOR CONTAINING THE VALUES J/(NY+1) WHERE
3199 C J=1,2,3,...,NY
3200 C Y - VECTOR OF SIZE NY TO BE PLOTTED
3201 C XCHAR - CHARACTER FOR Y IN PLOT
3202 C LX,LV - VECTORS OF SIZE 2 CONTAINING THE LABELS
3203 C FOR X AND Y RESPECTIVELY
3204 C LC - VECTOR OF SIZE 20 CONTAINING THE CAPTION FOR
3205 C THE PLOT
3206 C Z - OPTIONAL VECTOR OF SIZE NZ TO BE PLOTTED
3207 C XZ - ABSCESSA FOR Z
3208 C NLIN,STRT,END - VALUES FOR SUB. PLINE WHEN Z IS A LINE
3209 C VMN,VMX - MIN AND MAX VALUES FOR ORDINATE OF PLOT
3210 C IBOX - EQUAL ZERO IF BOX PLOTS ARE NOT WANTED
3211 C IZ - EQUAL 1 IF VECTOR Z IS TO BE PLOTTED
3212 C ZCHAR - PLOTTING CHARACTER TO BE USED FOR THE
3213 C Z VECTOR. MUST BE DIFFERENT FROM O.
3214 C L1 - OPTIONAL LABEL TO FOLLOW CAPTION
3215 C IORD = 1 IF Y IS ORDERED FROM MIN TO MAX
3216 C = 0 IF Y IS NOT ORDERED
3217 C = 2 FOR HORIZONTAL ZERO-LINE (FOR 10 PLOT)
3218 .....
3219 COMMON /UNIT/ IUNIT,NSCREEN
3220 DIMENSION PARRAY(51,51),CHAR(10),X(NY),Y(NY),LX(2),LV(2),
3221 ..... LC(20),XJ(11),Z(NZ),LI(20),XZ(NZ),STRT(1),END(1),CHARL(1)
3222 DATA BLANK,DASH,PLUS,CAP1,ZERO / ..... 'O' /
3223 DATA CHAR1,CHAR/'O','D','2','3','4','5','6','7','8','9','M' /
3224 DATA EPS / 1.E-10 /
3225 JINC = 5
3226 KINC = 5
3227 NR = 1 + 10 * JINC
3228 NC = 1 + 10 * KINC
3229 NRP1 = NR + 1
3230 NRM1 = NR - 1
3231 NCM1 = NC - 1
3232 FC = FLOAT(NCM1)
3233 NUNIT = IUNIT
3234 CHAR(1) = XCHAR
3235 IF ( CHAR(1) .EQ. BLANK ) CHAR(1) = CHAR1
3236 IF (IORD-1) 2,3,4
3237 2 CALL MIN(Y,VMN,IER)
3238 CALL MAX(Y,NY,VMAX,IER)
3239 IF (IZ .EQ. 0 ) GO TO 1
3240 CALL MIN(Z,NZ,ZMIN,IER)
3241 CALL MAX(Z,NZ,ZMAX,IER)
3242 IF (ZMIN .LT. VMIN) VMIN = ZMIN
3243 IF (ZMAX .GT. VMAX) VMAX = ZMAX
3244 GO TO 1
3245 3 VMIN = Y(1)
3246 VMAX = Y(NY)
3247 IF (IZ .EQ. 0) GO TO 1
3248 ZMIN = Z(1)
3249 ZMAX = Z(NZ)
3250 IF (ZMIN .LT. VMIN) VMIN = ZMIN
3251 IF (ZMAX .GT. VMAX) VMAX = ZMAX
3252 GO TO 1
3253 4 VMIN = VMN
3254 VMAX = VMX
3255 1 CONTINUE
3256 RANGE = VMAX - VMIN
3257 IF ( RANGE .LT. EPS ) GO TO 99
3258 VINC = FLOAT(NRM1) / RANGE
3259 DO 10 I = 2,NRM1
3260 PARRAY(I,1) = CAP1
3261 PARRAY(I,NC) = CAP1
3262 DO 5 J = 2,NCM1
3263 PARRAY(I,J) = BLANK
3264 CONTINUE
3265 5 CONTINUE
3266 10 DO 20 J = 1,NC
3267 PARRAY(1,J) = DASH
3268 PARRAY(NR,J) = DASH
3269 CONTINUE
3270 20 J = 0
3271 S = 0.0
3272 DO 25 I = 1,NC,KINC
3273 J = J + 1
3274 XJ(J) = S
3275 S = S + 1
3276 PARRAY(NR,I) = PLUS
3277 CONTINUE
3278 DO 30 I = 1,NR,JINC
3279 PARRAY(NRP1-1,I) = PLUS
3280 CONTINUE
3281 IF ( NLIN .GE. 1 ) CALL PLINE(NR,NC,NLINE,STRT,END,CHARL,
3282 ..... PARRAY,VMIN,VMAX,VINC)
3283 60 CONTINUE
3284 DO 45 K = 1,NY
3285 INDY = (Y(K) - VMIN) * VINC + 1.5
3286 IF (IZ .NE. 1) GO TO 70
3287 INDZ = (Z(K) - VMIN) * VINC + 1.5
3288 PARRAY(NRP1-INDY,INDZ) = CHAR(1)
3289 PARRAY(NRP1-INDZ,INDX) = ZCHAR
3290 IF (INDZ .EQ. INDY) PARRAY(NRP1-INDY,INDX) = CHAR(10)
3291

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3292      GO TO 45
3293      CONTINUE
3294      IF ( CHAR(1) .EQ. NCHAR ) GO TO 44
3295      DO 42 I=1,10
3296      IF(PARRAY(NRPI-INDY,INDX).EQ.CHAR(1))GO TO 43
3297      CONTINUE
3298      42 PARRAY(NRPI-INDY,INDX)=CHAR(1)
3299      GO TO 45
3300      43 IF(1.EQ.10)I=I-1
3301      PARRAY(NRPI-INDY,INDX)=CHAR(1+1)
3302      45 CONTINUE
3303      IF ( 12 NE. 2 ) GO TO 49
3304      DO 47 I = 1,N2
3305      INDZ = IZ(I) + FC + 1.5
3306      INDZ = IZ(I) - VMIN + VINC + 1.5
3307      IF ( PARRAY(NRPI-INDZ,INDEX2) .EQ. CHAR(1) ) GO TO 48
3308      PARRAY(NRPI-INDZ,INDEX2) = ICHAR
3309      GO TO 47
3310      48 PARRAY(NRPI-INDZ,INDEX2) = CHAR(10)
3311      47 CONTINUE
3312      WRITE(UNIT,100)LC,L1
3313      DYS = (FLOAT(JINC) / FLOAT(NRM1)) * RANGE
3314      YVALUE = YMAX + DYS
3315      DO 300 I=1,NR,JINC
3316      IF(PARRAY(NRPI-1,I) NE.PLUS) PARRAY(NRPI-1,I)=ZERO
3317      CONTINUE
3318      DO 55 I=1,NRM1
3319      IF((PARRAY(1,I).EQ.PLUS).OR.(PARRAY(1,I).EQ.ZERO)) GO TO 50
3320      WRITE(UNIT,105)(PARRAY(1,I),J=1,NC)
3321      GO TO 55
3322      50 YVALUE = YVALUE + DYS
3323      WRITE(UNIT,110)YVALUE,(PARRAY(1,I),J=1,NC)
3324      CONTINUE
3325      WRITE(UNIT,110)VMIN,(PARRAY(NR,J),J=1,NC)
3326      WRITE(UNIT,115)KJ
3327      WRITE(UNIT,120)LK,LV
3328      GO TO 999
3329      99 CONTINUE
3330      WRITE(UNIT,199)LC
3331      WRITE(UNIT,200)
3332      FORMAT(' X VALUES')
3333      WRITE(UNIT,205)(X(I),I=1,NY)
3334      205 FORMAT(1X,10F10.5)
3335      WRITE(UNIT,210)
3336      FORMAT(' Y VALUES')
3337      WRITE(UNIT,205)(Y(I),I=1,NY)
3338      199 FORMAT(' ERROR IN PLOT FOR THE PLOT OF ',20A4)
3339      RETURN
3340      100 FORMAT(1H1,1X,20A4,/,16X,20A4,/)
3341      105 FORMAT(13X,61A1)
3342      110 FORMAT(1X,F10.3,2X,61A1)
3343      115 FORMAT(12X,51F3.1,3X)
3344      120 FORMAT(16X,'ABSCISSA IS ',2A4,4X,' , ORDINATE IS ',2A4)
3345      END
3346      SUBROUTINE PPLDTC(W,X,Y,Z,N,ICAPT,NAMW,NAMX,NAMY,NAMZ,MM,SMIN,
3347      +SMAX)
3348      C-----
3349      C
3350      C SUBROUTINE TO PLOT LOCAL QUANTILES OF PERIODDOGRAM FROM
3351      C SUBROUTINE LOCAL. QUANTILES ARE PRINTED, LOG(QUANTILES)
3352      C ARE PLOTTED
3353      C
3354      C INPUT: W,X,Y,Z - W IS ORDERED ON INPUT AND X(1)=X(W(1)),ETC.
3355      C ICAPT - LITERAL CONSTANT FOR CAPTION OF PLOT
3356      C NAMW,NAMX,NAMY,NAMZ - 4 CHAR. LABELS FOR W,X,Y,Z
3357      C MM - WIDTH OF PLOT (<101)
3358      C SMIN,SMAX - MIN OF {X,Y,Z} AND MAX OF {X,Y,Z}
3359      C
3360      C SUBROUTINES CALLED: PTERP, MAX, MIN
3361      C
3362      C-----
3363      C
3364      COMMON /UNIT/ UNIT,NSCREEN
3365      DIMENSION W(46),X(46),Y(46),Z(46),ICAPT(20)
3366      DIMENSION W1(46),X1(46),Y1(46),Z1(46),AL(101)
3367      DATA BLANK,DOT,STAR,SL,PLUS,SM/1H,1H,1H,1H,1H,1H/
3368      10PTX=0
3369      IF(N.CT.23) GO TO 20
3370      WRITE(UNIT,10) N
3371      10 FORMAT(10X,'SAMPLE SIZE OF ',12,' IS TOO SMALL IN PPLDTC.')
3372      GO TO 999
3373      20 CONTINUE
3374      AMIN=ALOG(SMIN)
3375      AMAX=ALOG(SMAX)
3376      C
3377      C CREATE W1 VECTOR OF EQUALLY SPACED W AND INTERPOLATE TO OBTAIN
3378      C CORRESPONDING X,Y, AND Z VALUES
3379      C
3380      DEC=(W(N)-W(1))/45.0
3381      DO 30 I=1,45
3382      W1(I)=W(1)+FLOAT(I-1)*DEC
3383      CALL PTERP(W,X,W1,X1,N,46)
3384      CALL PTERP(W,Y,W1,Y1,N,46)
3385      CALL PTERP(W,Z,W1,Z1,N,46)
3386      C
3387      C INITIALIZE AL
3388      C
3389      ON=(MM-1)/2
3390      DO 40 J=1,MM
3391      AL(J)=DOT
3392      WRITE(UNIT,45) ICAPT
3393      45 FORMAT(/,T10,20A4,/)
3394      WRITE(UNIT,50) NAMW,NAMX,NAMY,NAMZ,(AL(J),J=1,MM)
3395      50 FORMAT(/,16X,A4,6X,A4,6X,A4,6X,A4/10X,40(1H,1H),2X,10(1A1))
3396      DO 60 J=1,MM
3397      AL(J)=BLANK
3398      60 AL(J)=BLANK
3399      AL(1)=SL
3400      AL(MM)=SL
3401      C
3402      RY=1.2*(AMAX-AMIN)
3403      IF(RY.LT.1.E-20) 10PTX=1
3404      C
3405      C PLOT
3406      C
3407      DO 100 J=1,45
3408      IF(10PTX.EQ.1) GO TO 70
3409      C1=2*(ALOG(X1(J))-AMIN)/RY + 1.
3410      C2=2*(ALOG(Y1(J))-AMIN)/RY + 1.
3411      C3=2*(ALOG(Z1(J))-AMIN)/RY + 1.
3412      GO TO 80
3413      70 C1=0.
3414      C2=0.
3415      C3=0.
3416      80 RX=ON+(C1+1)*2.5
3417      RY=ON+(C2+1)*2.5
3418      RZ=ON+(C3+1)*2.5
3419      AL(KX)=DOT
3420      AL(KY)=STAR
3421      AL(KZ)=DOT
3422      100 IF(KX.EQ.KY) AL(KX)=SM
3423      IF(KX.EQ.KZ) AL(KX)=SM
3424      IF(KY.EQ.KZ) AL(KY)=SM

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3424 WRITE(IUNIT,90) W1(J),V1(J),V1(J),Z1(J),AL(1),1+1,MM)
3425 90 FORMAT(10X,F10.4,1X,F9.4,1X,F9.6,1X,F9.6,2X,101A1)
3426 AL(K1)=BLANK
3427 AL(KY)=BLANK
3428 AL(KZ)=BLANK
3429 100 CONTINUE
3430 DO 110 1+1,MM
3431 110 AL(1)=DOT
3432 AL(1)=PLUS
3433 AL(MM)=PLUS
3434 WRITE(IUNIT,120) AL(1),1+1,MM)
3435 120 FORMAT(10X,40(1X) 2X,101A1)
3436 PHAX=RY+AMIN
3437 WRITE(IUNIT,130) AMIN,PHAX
3438 130 FORMAT(47X,F10.4,60X,F10.4)
3439 999 CONTINUE
3440 RETURN
3441 END
3442 SUBROUTINE PREPSP(SPEC,NFREOS,IOPY,DIV,WK,SPMIN,SPMAX)
C .....
3443 C
3444 C SUBROUTINE TO DIVIDE SPEC BY DIV, TAKE LOG, AND CLIP
3445 C TO -6.6 ALSO MAX AND MIN OF RESULT IS FOUND.
3446 C
3447 C INPUT
3448 C NFREOS,SPEC(1),...SPEC(NFREOS),DIV
3449 C IOPY = 1 MEANS FREOS ARE 0 TO 3PI
3450 C 0 MEANS FREOS ARE 0 TO PI
3451 C
3452 C OUTPUT
3453 C WK(1),...WK(N1) WHERE N1 IS (NFREOS/2)+1 OR NFREOS
3454 C SPMIN,SPMAX
3455 C
3456 C .....
3457 C
3458 C DIMENSION SPEC(NFREOS),WK(NFREOS)
3459 C
3460 C INITIALIZE
3461 C
3462 C SPMIN=6.
3463 C SPMAX=-6
3464 C DD=ALOG(DIV)
3465 C EMIN=DIV*EXP(-6.6)
3466 C EMAX=DIV*EXP(6.6)
3467 C N1=(NFREOS/2)+1
3468 C IF(IOPY EQ 0) N1=NFREOS
3469 C
3470 C TAKE LOG AND CLIP
3471 C
3472 C DO 30 1+1,N1
3473 1F(SPEC(1) GT EMAX) GO TO 10
3474 1F(SPEC(1) LT EMIN) GO TO 20
3475 WK(1)=ALOG(SPEC(1))-DD
3476 IF(WK(1) LT SPMIN) SPMIN=WK(1)
3477 IF(WK(1) GT SPMAX) SPMAX=WK(1)
3478 GO TO 30
3479 10 CONTINUE
3480 WK(1)=6.
3481 SPMAX=6
3482 GO TO 30
3483 20 CONTINUE
3484 WK(1)=-6
3485 SPMIN=-6
3486 30 CONTINUE
3487 C
3488 C
3489 C RETURN
3490 C
3491 C FUNCTION OFIND(O,N,QUANT)
3492 C .....
3493 C PURPOSE TO FIND THE PERCENTILE VALUE OF O
3494 C AT QUANT.
3495 C
3496 C INPUT:
3497 C O - VECTOR OF SIZE N
3498 C N - NUMBER OF VALUES IN V
3499 C QUANT - QUANTILE VALUE
3500 C .....
3501 C COMMON /PARM1/ IMIN
3502 C DIMENSION O(N)
3503 C P = FLOAT(N+1) * QUANT
3504 C I = INT(P)
3505 C P = P-I
3506 1F(I NE 0) GOTO 1
3507 OFIND = (1-P) * XMIN + P * O(1)
3508 RETURN
3509 1 IF(I LT N) GOTO 2
3510 OFIND = O(N)
3511 RETURN
3512 2 OFIND = (1-P) * O(I) + P * O(I+1)
3513 RETURN
3514 END
3515 SUBROUTINE OLOCAL(X,U,N,K,NAME)
C .....
3516 C
3517 C SUBROUTINE TO COMPUTE AND DISPLAY LOCAL QUANTILES
3518 C
3519 C INPUT: X - DATA SET FOR WHICH LOCAL QUANTILES ARE DESIRED
3520 C U - ABSCISSA FOR ORDINATE X (X IS A FUNCTION OF U)
3521 C N - DIMENSION OF VECTORS X AND U
3522 C K - SIZE OF LOCAL DATA BATCHES TAKEN FROM DATA BATCH X
3523 C NAME - HEADING FOR PLOTS
3524 C IPLTV = 1 IF VERSETEC PLOTS DESIRED, 0 OTHERWISE
3525 C
3526 C OUTPUT: PRINTER AND VERSETEC PLOTS OF LOCAL QUANTILES C25,C50,
3527 C AND G75 - GP(1), P=25,50,75, IS THE P-TH PERCENTILE
3528 C VALUE FOR THE DATA BATCH X(1),X(1+1),...X(1+K-1).
3529 C THE ABSCISSA VALUE UC(1) IS TAKEN TO BE U(1+K/2)
3530 C IF K IS ODD AND THE AVERAGE OF U(1+K/2-1) AND
3531 C U(1+K/2) IF K IS EVEN.
3532 C
3533 C SUBPROGRAMS CALLED: QUICK,OFIND,ICODEA,MIN,MAX,PPLTQ
3534 C
3535 C .....
3536 C COMMON /UNIT/ IUNIT,NSCRCH
3537 C DIMENSION R(N),U(N),NAME(20)
3538 C DIMENSION V(100),C25(550),C50(550),C75(550),UC(550)
3539 C DIMENSION LAB(20),LABEL(20,2)
3540 C DATA LAB/'LOCAL','L OUT','ANTT','LE P','ERIG','DOGR','AM: ',
3541 C + 'R ','12'/'
3542 C DATA NAMU,NAMC25,NAMC50,NAMC75/' U ',' C25 ',' C50 ',' C75 '/
3543 C
3544 C IS K ODD OR EVEN?
3545 C
3546 C 1000*MOD(K,2)
3547 K02=K/2
3548 KST=N-K+1
3549 C
3550 C COMPUTE LOCAL QUANTILES
3551 C
3552 C DO 20 1+1,KST
3553 KL=1+1
3554 DO 10 J+1,K
3555

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3688      MIN=ON(1)
3689      DO 80 I=1,8
3690      EXIO(1) = OFIND(ON,NOP1,EXU(1))
3691      90 CONTINUE
3692      WRITE(NUNIT,92) EXU,EXIO
3693      92 FORMAT('TIO',I,U,'.3E,8(P8.8,1E),',
3694      * 'TIO',I,10I,U,'.3E,8(P8.8,1E),',)
3695      WRITE(NUNIT,900)
3696      CALL DESTAT(Y,M,NAME,LAB,LOUANT,O.O,X25,X50,X75)
3697      KASE=INUL*2
3698      ICASE(1)=LCASE(KASE-1)
3699      ICASE(2)=LCASE(KASE)
3700      C COMPUTE RAW SPACINGS (WK1=LITTLE O)
3701      CALL OTOP(ON,U,NOP1,WK1,SPECFAC,AVLX)
3702      C
3703      C FOR PERIODODOGRAM, CHECK FOR SINUSOIDAL BEHAVIOUR
3704      C
3705      IF(IOPY 80 0) GO TO 98
3706      CALL MAX(WK1,NO,OMAKJ,INDO)
3707      OP=ON(INDO)/TIO*X50
3708      WRITE(NUNIT,903) OMAKJ,OP
3709      DO 84 I=INDO,N
3710      OP=ON(I)/TIO*X50
3711      UOP=(FLOAT(I)-O.5)/FLOAT(N)
3712      WRITE(NUNIT,904) I,UOP,OP
3713      94 CONTINUE
3714      98 CONTINUE
3715      C COMPUTE AND PLOT WEIGHTED SPACINGS FOR CASE ICASE
3716      AVLGFO = 0
3717      DO 100 I = 1,NO
3718      WK2(1) = FOFNC(U(I+1),INUL)
3719      AVLGFO = AVLGFO + ALOG(WK2(1))
3720      100 CONTINUE
3721      AVLGFO = AVLGFO / FLOAT(NO)
3722      CALL WSPACE(WKS,D,NOP1,WK1,WK2,U,SW,AVLWX)
3723      SWLG = ALOG(SW)
3724      WRITE(NUNIT,902) AVLX,AVLWX,AVLGFO,SW,SWLG
3725      C PLOT CUMULATIVE WEIGHTED SPACINGS WITH D+ AND D-
3726      CALL KSID(U,NOP1,DM,UM,OP,UP)
3727      CALL PCODEA(DP,SHIFT,4) ,LAB9(2)
3728      CALL PCODEA(UP,SHIFT,4) ,LAB9(4)
3729      CALL PCODEA(DM,SHIFT,4) ,LAB9(10)
3730      CALL PCODEA(UM,SHIFT,4) ,LAB9(14)
3731      LAB10(8)=ICASE(1)
3732      LAB10(9)=ICASE(2)
3733      CALL PLOT(U,D,NOP1,BLK,O.O,O.O,1.O,1.O,1.O,1.O,ASTER,
3734      * NAMU,NAMCWS,LAB10,LAB9)
3735      WRITE(NUNIT,200)
3736      200 FORMAT('////////')
3737      900 FORMAT('////T50, FULLY NON-PARAMETRIC ANALYSIS//T50,3(1H*)')
3738      901 FORMAT('T50, SUMMARY OF AN PARAMETRIC SELECT ANALYSIS//
3739      * T55,40(1H*)//')
3740      902 FORMAT('T20,AV, LOG SPACINGS, T40,
3741      * AV, LOG W SPACINGS, T63,AV, LOG HYP. FO,
3742      * T85,SIGMA ZERO, T103, LOG SIGMA ZERO//
3743      * T20,8(5X,G15.6)')
3744      903 FORMAT('T10X, MAXIMUM JUMP FOR QUANTILE FUNCTION = F12.6,
3745      * CORRESPONDING TO Q(U) = F12.5,///,14X,1 U,19X,0')
3746      *//,10X,3(1H*)')
3747      904 FORMAT('10X,15,1X,F8.3,2X,F15.6')
3748      RETURN
3749      END
3750      SUBROUTINE QUICK(M,T)
3751      C *****
3752      C QUICK SORT THIS ALGORITHM IS ALSO REFERRED TO AS A PARTITIONED
3753      C EXCHANGE SORT EXPECTED RUNTIME IS PROPORTIONAL TO N*LOG2(N)
3754      C ALTHOUGH THE WORST CASE IS PROPORTIONAL TO N**2.
3755      C REFERENCE: DONALD E. KNUTH- THE ART OF COMPUTER PROGRAMMING VOL 3.
3756      C INPUT :
3757      C X,N - VECTOR TO BE SORTED OF LENGTH N
3758      C OUTPUT :
3759      C X - SORTED VECTOR
3760      C SUBROUTINES CALLED: NONE
3761      C *****
3762      REAL T(N),Y
3763      INTEGER IP,LV(16),IV(16),LP,IUP
3764      LV(1)=1
3765      IV(1)=N
3766      IP=1
3767      10 IF(IP.LT.1) GO TO 75
3768      15 IF((IV(IP)-LV(IP)).LT.1) GO TO 20
3769      GO TO 25
3770      20 IP=IP+1
3771      GO TO 10
3772      25 LP=LV(IP)+1
3773      IUP=IV(IP)
3774      Y=T(IUP)
3775      30 IF((IUP-LP).LT.2) GO TO 45
3776      LP=LP+1
3777      IF(T(LP).LE.Y) GO TO 30
3778      T(IUP)=T(LP)
3779      35 IF((IUP-LP).LT.2) GO TO 40
3780      IUP=IUP-1
3781      IF(T(IUP)GE.Y) GO TO 35
3782      T(LP)=T(IUP)
3783      GO TO 30
3784      40 IUP=IUP-1
3785      45 T(IUP)=Y
3786      IF((IUP-LV(IP)).LT.(IV(IP)-IUP)) GO TO 55
3787      GO TO 60
3788      55 LV(IP+1)=LV(IP)
3789      IV(IP+1)=IUP-1
3790      LV(IP)=IUP+1
3791      GO TO 70
3792      60 LV(IP+1)=IUP+1
3793      IV(IP+1)=IV(IP)
3794      IV(IP)=IUP-1
3795      70 IP=IP+1
3796      GO TO 15
3797      75 RETURN
3798      END
3799      SUBROUTINE RELMN(CAT,M,DEC,MIN1,MIN2)
3800      C *****
3801      C
3802      C SUBROUTINE TO PRINT SIGNIFICANT RELATIVE MINIMA (AND THEIR
3803      C INDICES) OF CAT(1),...CAT(M). A SIGNIFICANT RELATIVE
3804      C MINIMUM IS DEFINED TO BE A RELATIVE MINIMUM WHICH IS AT
3805      C LEAST DEC (USUALLY 1/SAMPLE SIZE) LESS THAN THE PREVIOUS
3806      C VALUE.
3807      C
3808      C INPUT :
3809      C M,CAT(1),...CAT(M),DEC
3810      C
3811      C OUTPUT :
3812      C MIN1 - INDEX OF OVERALL MINIMUM OF CAT
3813      C MIN2 - INDEX (OTHER THAN MIN1) OF SMALLEST
3814      C SIGNIFICANT RELATIVE MINIMUM (IF THERE ARE
3815      C ANY) OR INDEX OF 2ND SMALLEST CAT VALUE.
3816      C
3817      C SUBROUTINES CALLED : MIN
3818      C *****

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3688      MIN=ON(1)
3689      DD 90 1+1,8
3690      EXIO(1) = OFIND(ON,NOP1,EXU(1))
3691      90 CONTINUE
3692      WRITE(NUNIT,92) EXU,EXIO
3693      92 FORMAT(//TIO, ' U ',2X,8(F8.5,1X),
3694      ' //TIO, '10(U)',2X,8(F8.5,1X),//)
3695      WRITE(NUNIT,900)
3696      CALL DESTAY(Y,N,NAME,LAB,LOUARY,O,O,X25,X50,X75)
3697      KASE=INUL*2
3698      ICASE(1)=ICASE(KASE-1)
3699      ICASE(2)=ICASE(KASE)
3700      C COMPUTE RAW SPACINGS (WK1=LITTLE O)
3701      CALL OTOP(ON,U,NOP1,WK1,SPCFAC,AVLK)
3702      C
3703      C FOR PERIODOGRAM, CHECK FOR SINUSOIDAL BEHAVIOUR
3704      C
3705      IF(DOPT EQ 0) GO TO 98
3706      CALL MAX(WK1,NO,OMARJ,INDQ)
3707      OP=ON(INDQ)/TIO*X50
3708      WRITE(NUNIT,903) OMARJ,OP
3709      DO 94 1=INDQ,N
3710      OP=ON(1)/TIO*X50
3711      UOP=(FLODAT(1)-O,5)/FLODAT(N)
3712      WRITE(NUNIT,904) 1,UOP,OP
3713      94 CONTINUE
3714      98 CONTINUE
3715      C COMPUTE AND PLOT WEIGHTED SPACINGS FOR CASE ICASE
3716      AVLGFO = 0
3717      DD 100 1 = 1,NO
3718      WK2(1) = POFNC(U(1-1),INUL)
3719      AVLGFO = AVLGFO + ALOG(WK2(1))
3720      100 CONTINUE
3721      AVLGFO = AVLGFO / FLOSTINO
3722      CALL WSPACE(WKS,D,NOP1,WK1,WK2,U,SW,AVLWX)
3723      SWLG = ALOG(SW)
3724      WRITE(NUNIT,902) AVLX,AVLWX,AVLGFO,SW,SWLG
3725      C PLOT CUMULATIVE WEIGHTED SPACINGS WITH D* AND D-
3726      CALL KSD(D,U,NOP1,DM,UM,OP,UP)
3727      CALL FCODEA(OP,SH(F7.4),LAB9(2))
3728      CALL FCODEA(UP,SH(F7.4),LAB9(3))
3729      CALL FCODEA(DM,SH(F7.4),LAB9(10))
3730      CALL FCODEA(UM,SH(F7.4),LAB9(14))
3731      LAB10(8)=ICASE(1)
3732      LAB10(9)=ICASE(2)
3733      CALL PLOT(U,D,NOP1,BLK,O,O,1,0,BLK,2,O,1,1,0,1,1,ASTER,
3734      NAMU,NAMCWS,LAB10,LAB9)
3735      WRITE(NUNIT,200)
3736      200 FORMAT(////)
3737      900 FORMAT(//T50, 'FULLY NON-PARAMETRIC ANALYSIS'//T50,3(1H=))
3738      901 FORMAT(//T35, 'SUMMARY OF AR PARAMETRIC SELECT ANALYSIS'//
3739      ' T35,40(1H=)////)
3740      902 FORMAT(//T20, 'AV, LOG SPACINGS',T40,
3741      ' T20, 'AV, LOG N, SPACINGS',T65, 'AV, LOG HYP, PO',
3742      ' T85, 'SIGMA ZERO',T103, 'LOG SIGMA ZERO'//
3743      ' T20,51X,615,8))
3744      903 FORMAT(//T0X, 'MAXIMUM JUMP FOR QUANTILE FUNCTION = ',F12.4,
3745      ' CORRESPONDING TO Q(U) = ',F12.5,///,14X, ' U',19X,'O',
3746      //,10X,3(1H=))
3747      904 FORMAT(10X,15,1X,F5.3,2X,F18.5)
3748      RETURN
3749      END
3750      SUBROUTINE QUICK(N,T)
3751      C-----
3752      C QUICK SORT THIS ALGORITHM IS ALSO REFERRED TO AS A PARTITIONED
3753      C EXCHANGE SORT EXPECTED RUNTIME IS PROPORTIONAL TO N*LOG2(N)
3754      C ALTHOUGH THE WORST CASE IS PROPORTIONAL TO N**2
3755      C REFERENCE: DONALD E. KNUTH- THE ART OF COMPUTER PROGRAMMING VOL 3.
3756      C INPUT :
3757      C X,N : VECTOR TO BE SORTED OF LENGTH N
3758      C OUTPUT :
3759      C X : SORTED VECTOR
3760      C SUBROUTINES CALLED : NONE
3761      C-----
3762      REAL T(N),V
3763      INTEGER IP,LV(16),IV(16),LP,IUP
3764      IV(1)=1
3765      IV(16)=N
3766      IP=1
3767      10 IF(IP.LT.1) GO TO 75
3768      15 IF([IV(IP)-LV(IP)].LT.1) GO TO 20
3769      GO TO 25
3770      20 IP=IP-1
3771      GO TO 10
3772      25 LP=LV(IP)-1
3773      IUP=IV(IP)
3774      V=V(IUP)
3775      30 IF([IUP-LP].LT.2) GO TO 45
3776      LP=LP+1
3777      IF(T(LP).LE.V) GO TO 30
3778      T(IUP)=T(LP)
3779      35 IF([IUP-LP].LT.2) GO TO 40
3780      IUP=IUP-1
3781      IF(T(IUP)GE.V) GO TO 35
3782      T(LP)=T(IUP)
3783      GO TO 30
3784      40 IUP=IUP-1
3785      45 T(IUP)=V
3786      IF([IUP-LV(IP)].LT. [IV(IP)-IUP]) GO TO 55
3787      GO TO 60
3788      55 LV(IP+1)=LV(IP)
3789      IV(IP+1)=IUP-1
3790      LV(IP)=IUP+1
3791      GO TO 70
3792      60 LV(IP+1)=IUP+1
3793      IV(IP+1)=IV(IP)
3794      IV(IP)=IUP-1
3795      70 IP=IP+1
3796      GO TO 15
3797      75 RETURN
3798      END
3799      SUBROUTINE RELMH(CAT,M,DEC,MIN1,MIN2)
3800      C-----
3801      C
3802      C SUBROUTINE TO PRINT SIGNIFICANT RELATIVE MINIMA (AND THEIR
3803      C INDICES) OF CAT(1),...,CAT(M). A SIGNIFICANT RELATIVE
3804      C MINIMUM IS DEFINED TO BE A RELATIVE MINIMUM WHICH IS AT
3805      C LEAST DEC (USUALLY 1/SAMPLE SIZE) LESS THAN THE PREVIOUS
3806      C VALUE.
3807      C
3808      C INPUT :
3809      C M,CAT(1),...,CAT(M),DEC
3810      C
3811      C OUTPUT :
3812      C MIN1 : INDEX OF OVERALL MINIMUM OF CAT
3813      C MIN2 : INDEX (OTHER THAN MIN1) OF SMALLEST
3814      C SIGNIFICANT RELATIVE MINIMUM (IF THERE ARE
3815      C ANY) OR INDEX OF 2ND SMALLEST CAT VALUE.
3816      C
3817      C SUBROUTINES CALLED : MIN
3818      C-----

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3020 C      DIMENSION CAT(M),REL(20),MINIM(20)
3021 C      DATA NOUT/6/
3022 C
3023 C      FIND FIRST TWO MINIMA :
3024 C
3025 C      CALL MIN(CAT,M,CMIN1,MIN1)
3026 C      CALL MIN(CAT,M,CMIN2,MIN2)
3027 C      CAT(MIN1)+0.0
3028 C      CAT(MIN2)+CMIN1
3029 C
3030 C      FIND SIGNIFICANT RELATIVE MINIMA :
3031 C
3032 C      IF (M.LE.2) GO TO 50
3033 C      L=0
3034 C      MM1=M-1
3035 C      DO 20 I=2,MM1
3036 C      CC=CAT(I)
3037 C      IF ((CC GE CAT(I-1)-DEC) OR (CC GE CAT(I+1))) GO TO 20
3038 C      IF (I EQ MIN1) GO TO 20
3039 C      L=L+1
3040 C      REL(L)=CC
3041 C      MINIM(L)=I
3042 C      WRITE(NDOUT,10) L,L,CC
3043 C      10 FORMAT(10X,6HMINIM(12,4H) = ,13,2X,7HVALUE : ,F15.7)
3044 C      20 CONTINUE
3045 C
3046 C      FIND MIN2 :
3047 C
3048 C      IF (L EQ 0) GO TO 50
3049 C      CALL MIN(REL,L,CMIN2,MIN2)
3050 C      MIN2=MINIM(MIN2)
3051 C
3052 C
3053 C
3054 C      50 CONTINUE
3055 C      WRITE(NDOUT,50) MIN1,CMIN1,MIN2,CMIN2
3056 C      50 FORMAT(//,10X,7HMIN1 = ,13,2X,12HCAT(MIN1) = ,F15.7/10X,
3057 C      17HMIN2 = ,13,2X,12HCAT(MIN2) = ,F15.7)
3058 C
3059 C
3060 C      RETURN
3061 C      END
3062 C      SUBROUTINE SELREC(A,NDIM,K,NAME,KTOP,L,KP,COP,IND,IER)
3063 C-----
3064 C      SUBROUTINE TO PERFORM SUBSET REGRESSION
3065 C
3066 C      INPUT :
3067 C      A : COVARIANCE MATRIX TO BE ANALYZED
3068 C      NDIM : DIMENSION OF A IN CALLING PROGRAM
3069 C      K : NUMBER OF INDEPENDENT VARIABLES IN FULL
3070 C      MODEL
3071 C      NAME : NAME(I)=VARIABLE NUMBER OF VARIABLE ON
3072 C      ITH DIAGONAL OF A
3073 C      KTOP : INDICATOR (0 MEANS SELREC AUTOMATICALLY
3074 C      CHOOSES BEST MODEL, KTOP = M FORCES BEST M
3075 C      VARIABLES INTO MODEL)
3076 C      KTOP = -1 MEANS TERMINATE AFTER FIRST DELETION
3077 C      IF RES VAR .LT. 0.100 OR TERMINATE IF RES VAR
3078 C      .LT. 0.001
3079 C      IF KTOP GE 99, CHISO VALUES FOR P=.90 ARE USED AND
3080 C      KTOP=100 IS USED TO DETERMINE OTHER OPTIONS.
3081 C      IF KTOP GE 199, THEN CHISO VALUES FOR P=.50 ARE USED,
3082 C      AS IS THE VALUE OF KTOP=200
3083 C      L : SAMPLE SIZE (IF L IS NEGATIVE, NO PRINTING
3084 C      IS DONE)
3085 C
3086 C      OUTPUT :
3087 C      KP : NUMBER OF PREDICTOR VARIABLES IN CHOSEN
3088 C      MODEL
3089 C      IND : VECTOR TELLING WHICH VARIABLES (ACCORDING
3090 C      TO NAME) HAVE BEEN CHOSEN
3091 C      COP : VECTOR OF COEFFICIENTS FOR CHOSEN MODEL
3092 C      IER : ERROR INDICATOR (1 MEANS ALL DIAGONAL
3093 C      ELEMENTS OF A .LT. 1.E-5 AT A CYCLE, 0 IS
3094 C      NORMAL RETURN)
3095 C
3096 C      SUBROUTINES CALLED : NONE
3097 C-----
3098 C
3099 C      DIMENSION A(NDIM,NDIM),NAME(K),COP(K),IND(K),
3100 C      1CHISO(62),CB(100),IND1(100)
3101 C      DATA NOUT/6/
3102 C
3103 C      IOPTP=1
3104 C      LLOPT=L
3105 C      IF (L GT 0) GO TO 50
3106 C      L=-L
3107 C      IOPTP=0
3108 C      50 CONTINUE
3109 C      KTOP=KTOP
3110 C      IF (KTOP GE 99) GO TO 2
3111 C      CALL CHIP(1,CHISO)
3112 C      GO TO 4
3113 C      2 IF (KTOP GE 199) GO TO 3
3114 C      CALL CHIP(2,CHISO)
3115 C      KTOP=KTOP-100
3116 C      GO TO 4
3117 C      3 CALL CHIP(3,CHISO)
3118 C      KTOP=KTOP-200
3119 C      4 CONTINUE
3120 C
3121 C      DO 10 I=1,K
3122 C      CB(I)=0
3123 C      IND1(I)=0
3124 C      IER=0
3125 C      IF (IOPTP.EQ.0) GO TO 51
3126 C      WRITE(NDOUT,61) K,KTOP
3127 C      41 FORMAT(//,10X,'REGRESSION ESTIMATION STAGEWISE SUMMARY'/10X,
3128 C      1'NUMBER OF VARIABLES IN FULL MODEL = ',13/10X,
3129 C      1'MAXIMUM NUMBER OF COEFFICIENTS = ',13//)
3130 C      WRITE(NDOUT,1)
3131 C      1 FORMAT(10X,7H(1H-))
3132 C      51 CONTINUE
3133 C      N=K+1
3134 C      44 FORMAT(10X,6(E10.3,2X))
3135 C
3136 C
3137 C
3138 C
3139 C
3140 C      P2=.638
3141 C      R1=0
3142 C      TOL=1.E-5
3143 C      KC=0
3144 C      100 KP=0
3145 C
3146 C
3147 C      STAGE 1 ANALYZE MATRIX A
3148 C
3149 C
3150 C      RTDY=0.
3151 C      VMIN=2**30

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[illegible]

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4084      IF((KP.LT.KC).AND.(A(N,N).LT.0.1)) GO TO 260
4085      IF(A(N,N).LT.0.001) GO TO 225
4086      C
4087      C CHECK DELETE CONDITIONS FOR KTOP.NE.-1 :
4088      C
4089      224 IF((ABS(VMIN).GE.P2*A(N,N)/PHI).OR.(K1.EQ.NMIN)) GO TO 230
4090      C
4091      C YES
4092      C
4093      225 K1=NMIN
4094      GO TO 240
4095      C
4096      C NO
4097      C
4098      C
4099      C CHECK ADD :
4100      C
4101      230 IF(RTOT.LE.P1*(A(N,N)/PHI)) GO TO 280
4102      C
4103      C YES
4104      C
4105      300 K1=NMAX
4106      240 CONTINUE
4107      C
4108      C
4109      C STAGE 3 : PIVOT
4110      C
4111      C
4112      PIVOT=1./A(K1,K1)
4113      DO 350 JKT=1,N
4114      350 A(K1,JKT)*A(K1,JKT)=PIVOT
4115      DO 370 IKY=1,N
4116      IF(IKY.EQ.K1) GO TO 370
4117      TEMP=A(IKY,K1)
4118      DO 360 JKT=1,N
4119      360 A(IKY,JKT)=A(IKY,JKT)-TEMP*A(K1,JKT)
4120      A(IKY,K1)=TEMP*PIVOT
4121      370 CONTINUE
4122      A(K1,K1)=PIVOT
4123      C
4124      C RETURN TO STAGE 1
4125      C
4126      KC=KC+1
4127      IF(KC.LT.100) GO TO 100
4128      C
4129      C TERMINATIONS :
4130      C
4131      913 WRITE(NOUT,913)
4132      913 FORMAT(/,10X,'TERMINATION OF SELREG SINCE KC.GE.100')
4133      GO TO 280
4134      C
4135      C
4136      919 WRITE(NOUT,920)
4137      920 FORMAT(/,10X,'TERMINATION SINCE ALL REMAINING VARIABLES HAVE 0 PAR
4138      TIAL VARIANCE')
4139      GO TO 280
4140      C
4141      C
4142      999 WRITE(NOUT,1000)
4143      1000 FORMAT(/,10X,'TERMINATION SINCE ALL DIAGONALS.LT.TOL')
4144      IERR=1
4145      280 KTOP=KTOP1
4146      LVL=LDPT
4147      RETURN
4148      C
4149      C
4150      C
4151      C END
4152      C
4153      SUBROUTINE SLMX(KP,IND,COF,ALPHA,BETA,NORDAR,NORDMA)
4154      C
4155      C SUBROUTINE TO TRANSFORM MIXED SELECT SCHEME PARAMETERS
4156      C KP,IND,COF TO FULL MIXED SCHEME PARAMETERS NORDAR,NORDMA,
4157      C ALPHA,BETA
4158      C
4159      C INPUT :
4160      C KP : NUMBER OF LAGS IN SELECT SCHEME
4161      C IND(1),...,IND(KP) : LAGS (AR LAGS +, MA LAGS -)
4162      C COF(1),...,COF(KP) : COEFFS CORRESPONDING TO LAGS
4163      C
4164      C OUTPUT :
4165      C NORDAR,NORDMA : AR AND MA PART ORDERS
4166      C ALPHA(1),...,ALPHA(NORDAR) : AR COEFFS
4167      C BETA(1),...,BETA(NORDMA) : MA COEFFS
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