

## APPENDIX I

Computer program for calculating probability and sample output

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** IBM 1800 FORTRAN
*LIST ALL
*ONE WORD INTEGER
*IDCS&CARD,1443 PRINTER
*NAME PROBA
C A,B ARE END POINTS OF INTERVAL
C K IS THE NUMBER OF CLASS INTERVALS
  DIMENSION X%400 ,D%40 ,ND%40 ,XMON%12
  IR # 2
  IW # 3
  READ%IR,32 %XMON%I ,I #1,12
31 WRITE%IW,4
  WRITE%IW,5
  WRITE%IW,6
  WRITE%IW,7
  READ%IR,1 A,B,K,N,LC,%X%I ,I#1,6 ,SCAF,ICOM,IPLAC,ITIM1,ITIM2,ITIM
/3,IDAT1,IDAT2,IDAT3
  READ%IR,2 %X%I ,I#7,N
  WRITE%IW,B ICOM,IPLAC,XMON%IDAT2 ,IDAT3,IOAT1,ITIM1,ITIM2,ITIM3,N
  DO 29 I #1,N
29 X%I # X%I *SCAF
  WRITE%IW,9 %X%I ,I #1,N
  XN #N
  C # %B-A /K
  IC # C
  IA # A
  AA # A-IA
  IF%AA - 0.5 62,61,61
61 C # IC
  GO TO 60
62 CC # C-IC
  IF%CC-0.5 65,66,66
65 C # IC
  GO TO 60
66 C # IC & 0.5
60 D%1 # A
  O%2 # A& C
  XMID # %D%1 & D%2 /2.0
  IK # 3
10 D%IK # D%IK-1 GC
  IF%D%IK 40,41,41
40 IK # IK & 1
  GO TO 10
41 K1 # IK
  K2 #K1&1
  DO 43 J # 1,K2
43 ND%J # 0.0
  DO 20 J #1,N
  IF%X%J -A 11,11,12

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11 ND%1 #ND%1 G1
   GO TO 20
12 IF%X%J -D%K1 14,14,13
13 ND%K2 # ND%K2 &1
   GO TO 20
14 XI # %X%J -A /C
   I # XI
   IF%XI-I 15,16,15
15 I # I&2
   GO TO 17
16 I # I&1
17 ND%I # MD%I &1
20 CONTINUE
   WRITE%IW,4
   WRITE%IW,21
   PD # ND%1 /XN
   PERCT # PD*100.0
   WRITE%IW,22 A,ND%1 ,PERCT,PD
   DO 50 I # 2,K1
   PD # ND%I /XN
   PERCT # PD*100.0
   PDF # PD/C
   WRITE%IW,23 D%I-1 ,D%I ,XMID,ND%I ,PERCT,PD,PDF
   XMID # XMID & C
50 CONTINUE
   PD # ND%K2 /XN
   PERCT # PD*100.0
   WRITE%IW,24 D%K1 ,ND%K2 ,PERCT,PD
1  FORMAT%2F9.3,2I4,43X,I3,76F7.2,2X,E10.2,3X,I1,7I2
2  FORMAT%6F7.2
4  FORMAT%1H1
5  FORMAT%5X,@MAGNETOTELLURIC ANALYSIS - PROBABILITY DENSITY OF DIFFE
   /RENT AMPLITUDE'///)
6  FORMAT(10X,'COMPONENT NO. 1 IS HX (MAGNETIC FIELD IN NORTH-SOUTH D
   /IRECTION)'/24X,'2 IS HY (MAGNETIC FIELD IN EAST-WEST DIRECTION)'/2
   /4X,'3 IS HZ (MAGNETIC FIELD IN VERTICAL DIRECTION)'/24X,'4 IS EX (
   /ELECTRIC FIELD IN NORTH-SOUTH DIRECTION)'/24X,'5 IS EY (ELECTRIC F
   /IELD IN EAST-WEST DIRECTION)'/)
7  FORMAT(10X,'PLACE NO.1 IS BANGKOK, THAILAND'//19X,'2 IS SAKAERAT, R
   /AJSIMA, THAILAND'///)
8  FORMAT(10X,'COMPONENT NO. ',I2//10X,'DATA IS TAKEN AT PLACE NO. @,
   /I3, /24X,@ON @,A4,I3,@, 19@,I2/24X,@AT@,I3,@ O CLOCK@,I3,@ MINUTE@,
   /I3,@ SECONDA//10X,@NUMBER OF POINTS IN INPUT@,I6//10X,@DATA@/
9  FORMAT%F22.2,7F12.2
21 FORMAT%10X,@PROBABILITY TABLE@//54X,@NUMBER@,37X,@PROBABILITY@/56X
   /,@OF@,43X,@AT@/15X,@INTERVAL@,17X,@MID-POINT@,4X,@OBSERVATION@,4X,
   /@PERCENTAGE@,4X,@PROBABILITY@,5X,@MID-POINT@/
23 FORMAT%15X,F8.3,2X,@- @,F8.3,6X,F7.2,7X,I5,3F15.2/
22 FORMAT%15X,@LESS THAN @,F8.3,20X,I5,2F15.2/
24 FORMAT%14X,@GREATER THAN @,F8.3,20X,I5,2F15.2/

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32 FORMAT(8X,12A4  
IF(LC-999)31,30,31
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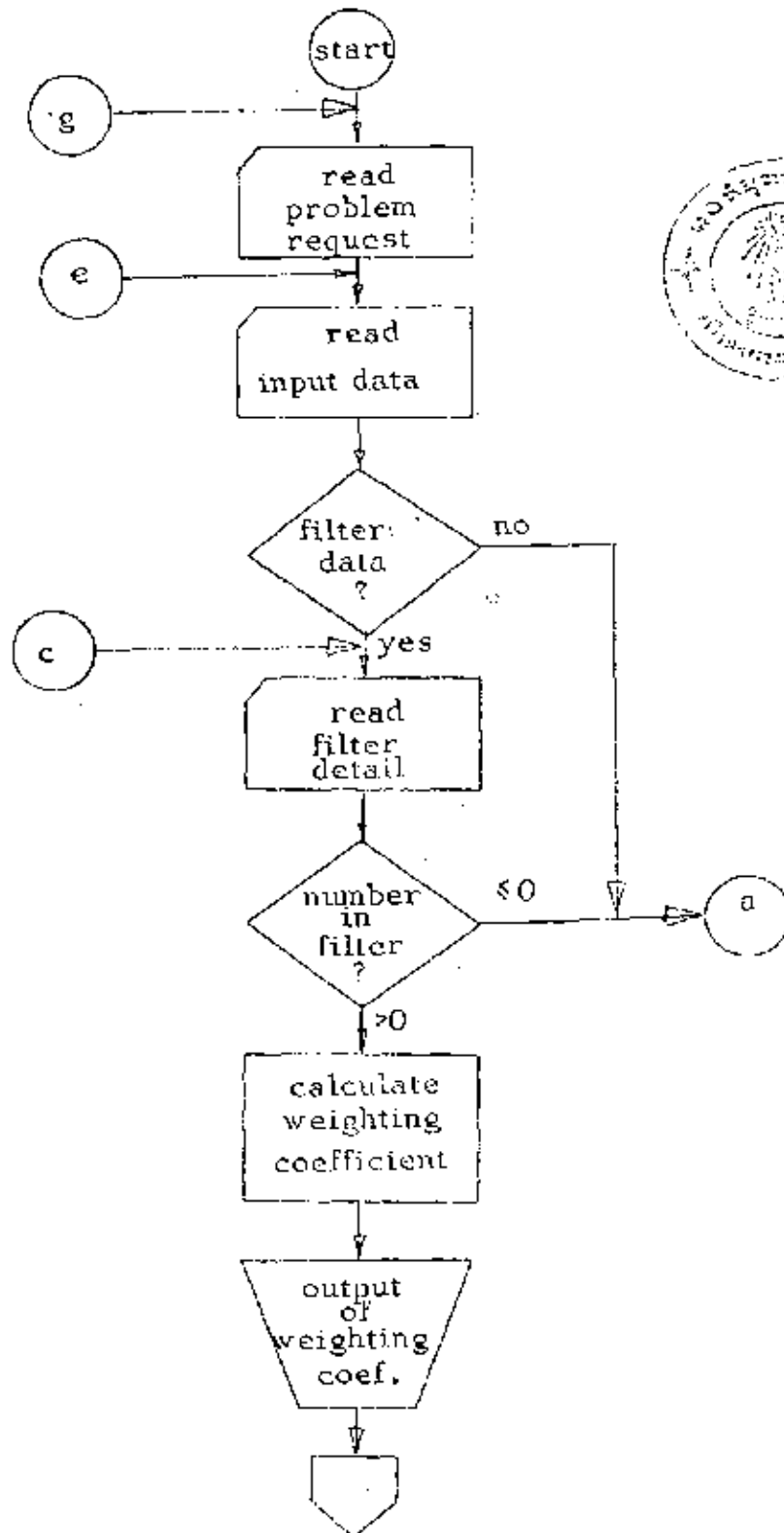
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30 STOP  
END
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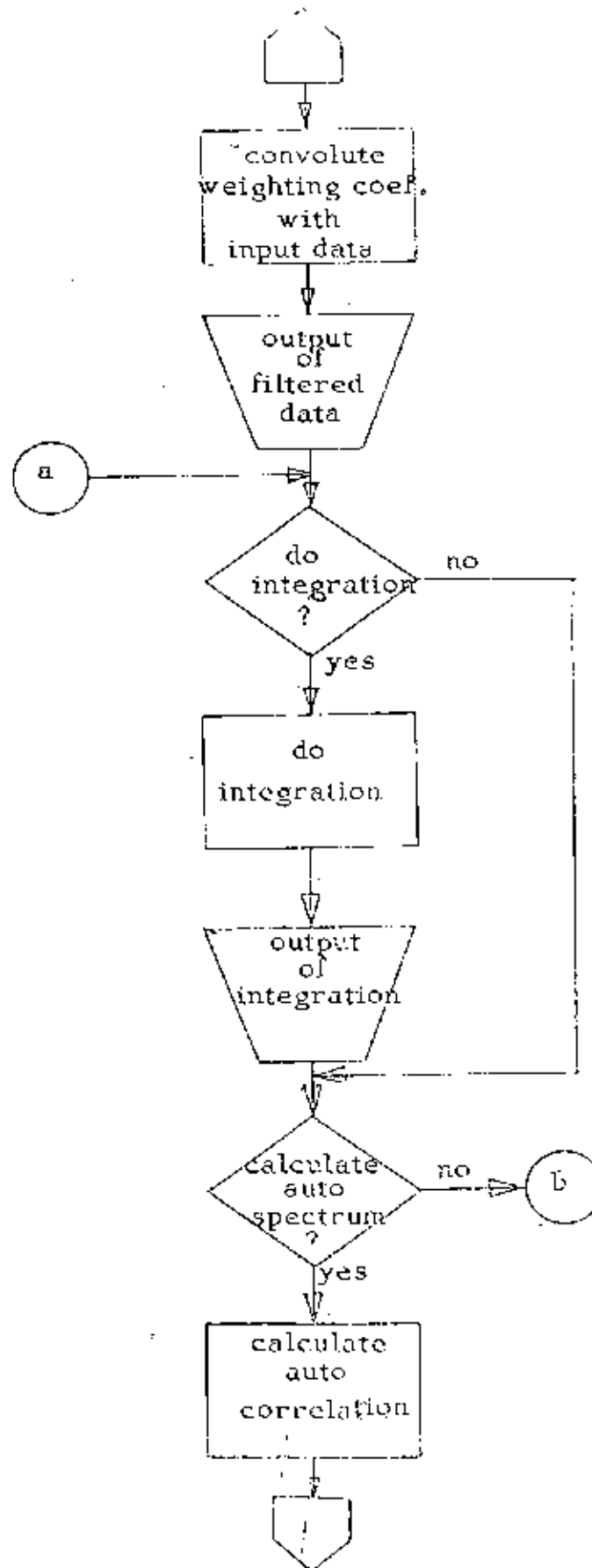
PROBABILITY TABLE

INTERVAL	MID-POINT	NUMBER OF OBSERVATION	PERCENTAGE	PROBABILITY	PROBABILITY AT MID-POINT
LESS THAN	-5.050	17	14.16	0.14	
-5.050 -	-3.549	8	6.66	0.06	0.04
-3.549 -	-2.049	4	3.33	0.03	0.02
-2.049 -	-0.549	8	6.66	0.06	0.04
-0.549 -	0.950	15	12.50	0.12	0.06
GREATER THAN	0.950	68	56.66	0.56	

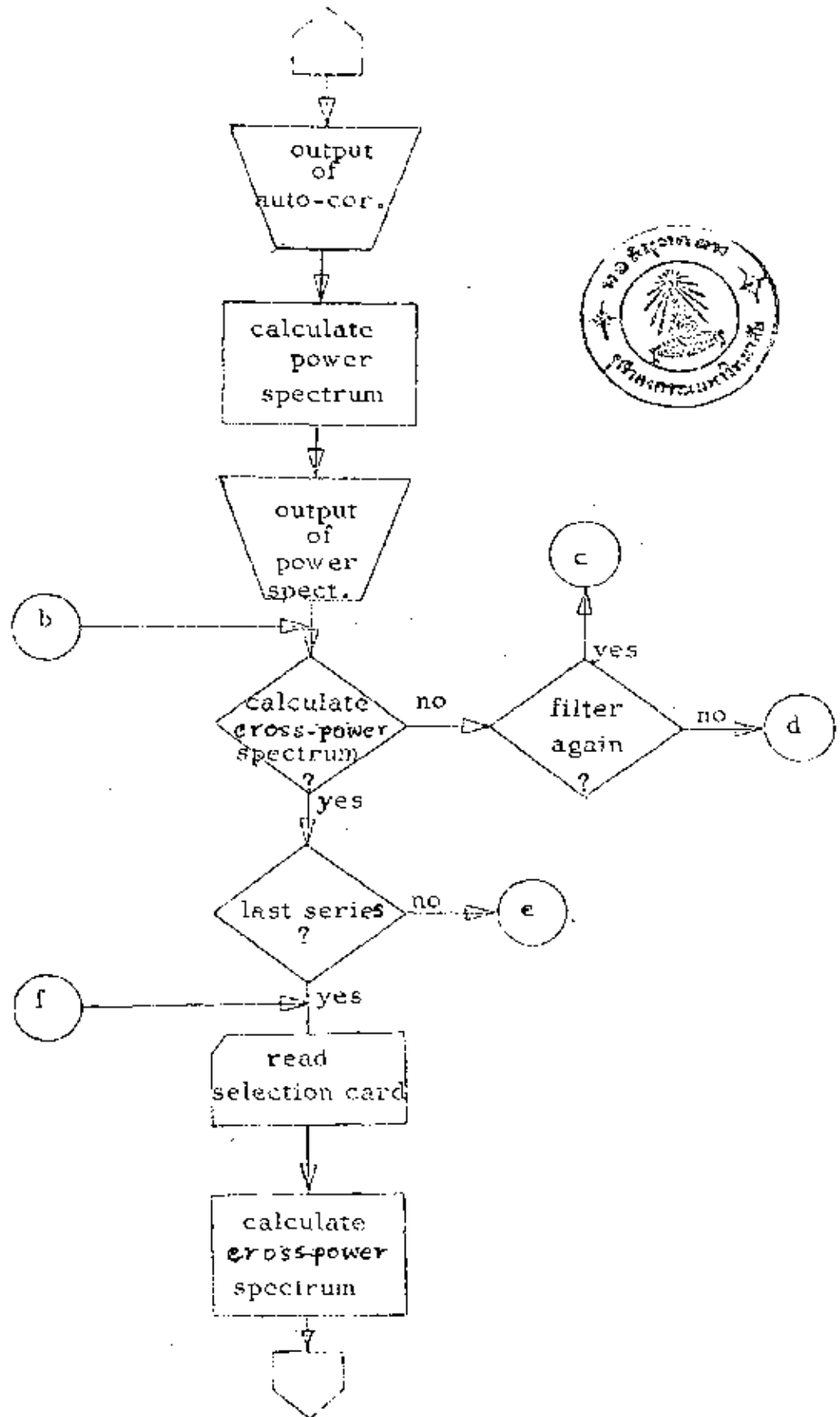
## APPENDIX II

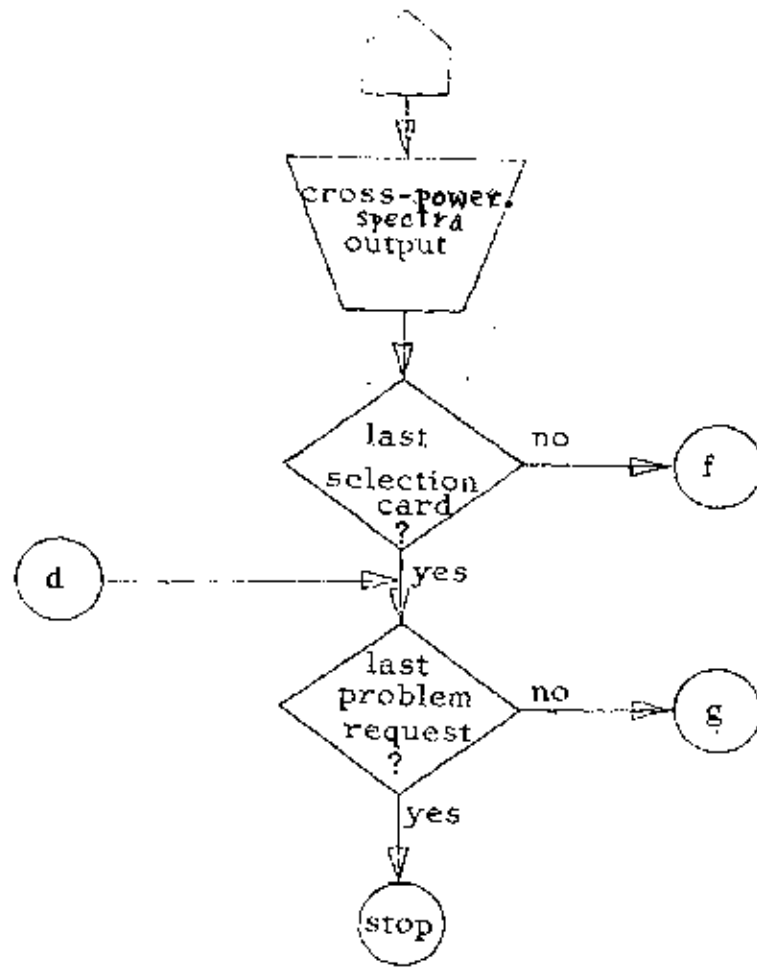
Flow diagram and computer program for calculating spectra











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** IBM 1800 FORTRAN
*LIST ALL
*IOCS%CARD,1443 PRINTER,PLOTTER
*ONE_WORD INTEGER
*NAME MAGTO
  DIMENSION YS(2),XMON(12),NOSC(10),X(400),W(400),A(400),B(400)
  DIMENSION V(400),NC(10),S(10,400)
  COMMON SX,SY,PY,XS,YSY
  IR#2
  IW#3
  IP = 7
  PHI = 3.14159
  READ%IR,1 %YS%I ,I#1,2 ,%XMON%I ,I#1,12
  1 FORMAT%14A4
  WRITE(IW,461)
  WRITE(IW,401)
  WRITE(IW,402)
  WRITE(IW,403)
1000 J #0
  READ(IR,601)XJOB,YJOB,N,DT,IORD,IFT,IINT,IINTO,INOR,IATS,IASS,IATC
/O,IATSO,IASSO,ICRS,ICSS,ICRCD,ICRSD,ICSO,MAXLG,NOSEI,NOSEL,LC
  XMSF =1.0/(2.0#DT)
  WRITE(IW,461)
  WRITE(IW,404)N,DT,XMSF
  WRITE(IW,405)YS(IFT+1),YS(IINT+1)
  IF(IINT)1004,1004,1001
1001 IF(IINTO-1)1002,1002,1003
1002 WRITE(IW,407)YS(IINTO+1),YS(1)
  GO TO 1004
1003 WRITE(IW,407)YS(IINTO-1),YS(2)
1004 IF(INOR)1005,1005,1006
1006 WRITE(IW,473)
1005 WRITE(IW,408)YS(IATS+1)
  IF(IATS)1020,1020,1007
1007 IF(IATCO-1)1009,1009,1011
1009 WRITE(IW,409)YS(IATCO+1),YS(1)
  GO TO 1013
1011 WRITE(IW,409)YS(IATCO-1),YS(2)
1013 IF(IATSO-1)1015,1015,1017
1015 WRITE(IW,411)YS(IATSO+1),YS(1)
  GO TO 2020
1017 WRITE(IW,411)YS(IATSO-1),YS(2)
2020 WRITE%IW,480 YS%IASS%I
  IF(IASS)1020,1020,2021
2021 IF%IASSO-1 2022,2022,2023
2022 WRITE%IW,481 YS%IASSO%I ,YS%1
  GO TO 1020
2023 WRITE%IW,481 YS%IASSO-1 ,YS%2
1020 WRITE(IW,412)YS(ICRS+1)
  IF(ICRS)1031,1031,1021

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1021 IF(ICRCO-1)1023,1023,1024
1023 WRITE(IW,413)YS(ICRCO+1),YS(1)
GO TO 1026
1024 WRITE(IW,413)YS(ICRCO-1),YS(2)
1026 IF(ICRSO-1)1027,1027,1029
1027 WRITE(IW,415)YS(ICRSO&1),YS(1)
GO TO 2033
1029 WRITE(IW,415)YS(ICRSO-1),YS(2)
2033 WRITE(IW,483)YS(ICSS+1)
IF(ICSS)1031,1031,2031
2031 IF(ICSO-1)2032,2032,2034
2032 WRITE(IW,484)YS(ICSO+1),YS(1)
GO TO 1033
2034 WRITE(IW,484)YS(ICSO-1),YS(2)
GO TO 1033
1031 IF(IATS)1040,1040,1033
1033 XLGCR=2.0*DT*MAXLG
ER = N
ER = MAXLG/ER
ER = SQRT(ER)
WRITE(IW,417)MAXLG,XLGCR,ER
1040 DO 1041 I = 1,N
1041 X(I)=0.0
READ(IR,602)(X(I),I=1,6),SCAF,ICOM,IPLAC,ITIM1,ITIM2,ITIM3,IDAT1,I
/DAT2, IDAT3
READ(IR,603)(X(I),I=7,N)
J = J+1
WRITE(IW,461)
WRITE(IW,421)ICOM
IF(ICRS)1044,1044,1042
1042 WRITE(IW,423)J
1044 WRITE(IW,425)IPLAC,XMON(IDAT2),IDAT3,IDAT1,ITIM1,ITIM2,ITIM3
CALL AXMIN(X,N,XPMAX,XPMIN,XNMAX,XNMIN,IX)
DO 1043 I = 1,N
X(I)=X(I) + ABS(XNMIN)
1043 X(I) =SCAF*X(I)
ID = IORD+1
GO TO(1050,1045,1047,1045),ID
1045 CALL LPLOT(1.,DT,X,N,X,N,1)
CALL SCALF(SX,SY,XS,YSY)
CALL FCHAR(XS,YSY,.10,.12,0.
WRITE(IP,426)
YSY # YSY -0.40/SY
CALL FCHAR(XS,YSY,.10,.12,0.
WRITE(IP,450)
YSY # YSY-0.50/SY
CALL FCHAR(XS,YSY,.10,.12,0.
WRITE(IP,441)ICOM,IPLAC,XMON(XS-2.0/SX,YSY)
CALL FPLOT(XS-2.0/SX,YSY)
IF(ID-3)1050,1047,1047

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1047 WRITE(IW,427)
      WRITE(IW,428)(X(I),I=1,N)
1050 IF(IFT)1209,1209,1052
1052 N1 =N
1053 READ(IR,605)FD,DF,NF,IPFT,IWTO,IFDD,LFT
      IF(NF)1209,1209,1054
1054 TF=NF*DT
      TT = 2.0*TF
      NTF = NF+NF+1
      WRITE%IP,461
      WRITE(IW,429)FD,DF,TT,NTF
      IF(IWTO-1)1056,1056,1057
1056 WRITE(IW,431)YS(IWTO&1 ,YS%1
      GO TO 1058
1057 WRITE(IW,431)YS(IWTO-1),YS(2)
1058 IF(IFDD-1)1059,1059,1060
1059 WRITE(IW,435)YS(IFDD+1),YS(1)
      GO TO 1065
1060 WRITE(IW,435)YS(IFDD-1),YS(2)
1065 NF1 = NF + 1
      NFOUT= N1-NF
      IF(NFOUT-NTF)1076,1076,1075
1076 WRITE(IW,438)
      PAUSE
C    TAKE OUT DATA CARD, THEN START NEW CONTROL CARD
      GO TO 1000
1075 W(I) = 4.0*DF
      DO 1070 I= 1,NF
      TI = DT*I
      C = PHI*TI
      D = 2.0*C
1070 W(I+1) = SIN(D*DF)*COS(D*FD)*(1.0+COS(C/TF))/C
      IWTO =IWTO+1
      GO TO(1079,1071,1073,1071),IWTO
1071 CALL LPL0T(DT,DT,W,NF1,W,NF1,1)
      CALL SCALF(SX,SY,XS,YSY)
      CALL FCHAR%XS,YSY,.10,.12,0.
      WRITE%IP,426
      YSY # YSY -0.4/SY
      CALL FCHAR%XS,YSY,.10,.12,0.
      WRITE%IP,450
      YSY # YSY-0.50/SY
      CALL FCHAR%XS,YSY,.10,.12,0.
      WRITE%IP,453 FD,DF
      CALL FPLOT%1,XS-2.0/SX,PY)
      IF(IWTO-3)1079,1073,1073
1073 WRITE(IW,437)
      WRITE(IW,428)(W(I),I=1,NF1)
1079 DO 1080 I =1,NF1
1080 A(I) =0.0

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DO 1090 I =NF1,NFOUT
C =0.0
JK =NF+1
JN =1-NF
C =C+W(NF1)*(X(JK)+X(JN))/3.0
IFAC =4
DO 1089 K= 2,NF
JF =NF1-K
JK =I+JF
JN =1-JF
C = C+W(JF+1)*(X(JK)+X(JN))*IFAC/3.0
GO TO (1087,1087,1088,1088),IFAC
1087 IFAC =4
GO TO 1089
1088 IFAC =2
1089 CONTINUE
1090 A(I)=DT*(C+W(I)*X(I))*IFAC/3.0
IFDO=IFDO+1
GO TO(1199,1094,1198,1094),IFDO
1094 CALL LPLT&1,,DT,A,NFOUT,X,N,2
CALL SCALF(SX,SY,XS,YSY)
CALL FCHAR&XS,YSY,.10,.12,0.
WRITE&IP,426
YSY # YSY -0.4/SY
CALL FCHAR&XS,YSY,.10,.12,0.
WRITE&IP,450
YSY # YSY-0.50/SY
CALL FCHAR&XS,YSY,.10,.12,0.
WRITE&IP,465
CALL FPLT(1,XS-2.0/SX,PY)
IF(IFDO-3)1199,1198,1198
1198 WRITE(IW,439)
WRITE(IW,428)(A(I),I=1,NFOUT)
1199 IF(LFT-999)1200,1206,1200
1200 IF(IPFT-1)1206,1206,1203
1203 DO 1205 I =1,NFOUT
1205 X(I)= A(I)
N1= NFOUT
GO TO 1053
1206 DO 1207 I=1,NF1
1207 W(I)=0.0
N1=NFOUT
GO TO 1305
1209 DO 1301 I=1,N
1301 A(I)= X(I)
N1 = N
1305 IF(IINT)1350,1350,1306
1306 B(I)=0
N11 = N1 -1
DO 1310 I = 2,N11

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1310 B(I) = (A(I-1) + 4*A(I) + A(I+1))*DT/3.0
      B(NI) = (A(NI) + A(NI))/2.0
      IO = IINTD+1
      GO TO %1324,1315,1320,1315 ,10
1315 CALL LPL0T(1.,DT,8,NI,8,NI,1)
      CALL SCALF(SX,SY,XS,YSY)
      CALL FCHAR%XS,YSY,.10,.12,0.
      WRITE%IP,426
      YSY # YSY -0.4/SY
      CALL FCHAR%XS,YSY,.10,.12,0.
      WRITE%IP,451
      YSY # YSY-0.50/SY
      CALL FCHAR%XS,YSY,.10,.12,0.
      WRITE%IP,442 ICOM,IPLAC,XMON%IDAT2 ,IDAT3,IDAT1,ITIM1,ITIM2,ITIM3
      CALL FPLOT(1,XS-2.0/SX,PY)
      IF%IO-3 1324,1320,1320
1320 WRITE%IW,461
      WRITE%IW,443 ICOM
      WRITE%IW,428 %B%I ,I#1,NI
1324 DD 1325 I#1,N
1325 A%I #0.0
      NA # NI
      GO TO 1354
1350 DO 1352 I#1,NI
1352 B%I # A%I
      GO TO 1324
1354 CALL XMSTA(B,NI,XMEAN,STD,STDD)
      WRITE%IW,461
      WRITE(IW,475) XMEAN,STD,STDD
      IF(INOR)1360,1360,1355
1355 DO 1356 I = 1,NI
1356 B(I)=(B(I)-XMEAN)
1360 IF%IATS 1402,1402,1362
1362 IF%NA-MAXLG 1409,1373,1373
1373 NAT #MAXLG&1
      DO 1375 I#1,NAT
      NJ #NA-I&1
      SUM#0.0
      DO 1374 K#1,NJ
      IJ #I&K-1
1374 SUM = B(K)*B(IJ) + SUM
1375 A%I #SUM/NJ
      IO #IATCO&1
      GO TO%1386,1377,1385,1377 ,10
1377 CALL LPL0T(0.,1.,A,NAT,A,NAT,1)
      CALL SCALF(SX,SY,XS,YSY)
      CALL FCHAR%XS,YSY,.10,.12,0.
      WRITE%IP,466
      YSY # YSY -0.4/SY
      CALL FCHAR%XS,YSY,.10,.12,0.

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WRITE%IP,448
CALL F%PLOT(1,XS-2.0/SX,PY)
IF%IO-3 1386,1385,1385
1385 WRITE%IW,461
WRITE%IW,446
WRITE%IW,428 %A%I ,I#1,NAT
1386 DO 1392 I#1,NAT
SUM #0.0
DO 1390 K#2,MAXLG
1390 SUM #SUM&2*A%K *CDS%PHJ#%K-1 *%I-1 /MAXLG
1392 W%I #2.0*DT*%A%I %SUM&X-1 **%I-1 *A%NAT
IO # IATSO&I
GO TO%2400,1394,1397,1394 ,IO
1394 DEL = XMSF/MAXLG
CALL L%PLOT(0.,DEL,W,NAT,W,NAT,1)
CALL SCALF(SX,SY,XS,YSY)
CALL F%CHAR%XS,YSY,.10,.12,0.
WRITE%IP,456
YSY # YSY -0.4/SY
CALL F%CHAR%XS,YSY,.10,.12,0.
WRITE%IP,449
YSY # YSY-0.50/SY
CALL F%CHAR%XS,YSY,.10,.12,0.
WRITE%IP,454
CALL F%PLOT(1,XS-2.0/SX,PY)
IF%IO-3 2400,1397,1397
1397 IF%IATCO-1)1399,1399,1398
1399 WRITE%IW,461
1398 WRITE%IW,455
WRITE%IW,428 %W%I ,I#1,NAT
2400 IF(IASS)1400,1400,2401
2401 DO 2402 I=1,NI
2402 A(I)=0.0
A(1)=(W(1)+W(2))/2.0
A(NAT)=(W(NAT-1)+W(NAT))/2.0
DO 2403 I=2,MAXLG
2403 A(I)=W(I-1)*0.25+W(I)*0.5+W(I+1)*0.25
IO=IASSO+1
GO TO (1400,2406,2407,2406),IO
2406 DEL=XMSF/MAXLG
CALL L%PLOT(0.,DEL,A,NAT,A,NAT,1)
CALL SCALF(SX,SY,XS,YSY)
CALL F%CHAR(XS,YSY,.10,.12,0.)
WRITE(IP,456)
YSY=YSY-0.4/SY
CALL F%CHAR(XS,YSY,.10,.12,0.)
WRITE(IP,449)
YSY=YSY-0.50/SY
CALL F%CHAR(XS,YSY,.10,.12,0.)
WRITE(IP,490)

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      IF(I0-3)1400,2407,2407
2407 IF(IATSD-1)2409,2409,2412
2409 IF(IATCO-1)2410,2410,2412
2410 WRITE(IW,461)
2412 WRITE(IW,491)
      WRITE(IW,428)(A(I),I =1,NAT)
1400 DO 1401 I#1,NI
      A%I #0.0
1401 W%I #0.0
1402 IF%ICRS 1486,1486,1406
1406 IF%J-1 1407,1407,1408
1407 NAT#MAXLG&1
1408 IF%MAXLG-NI 1404,1404,1409
1409 WRITE%IW,461
      WRITE%IW,444
      DO 1417 I#1,NI
1417 B%I #0.0
      PAUSE
C   TAKE DATA OUT, START THE NEW CONTROL CARU
      GO TO 1000
1404 DO 1405 I#1,NI
1405 S%J,I #B%I
      NC%J # NI
      DO 1411 I#1,NI
1411 B%I #0.0
      IF%J-NOSER 1040,1420,1040
1420 READ%IR,607 NOBS,%NOSC%I ,I#1,10
      NOSEL # NOSEL-1
      DO 1466 M#1,10
      IF%NOSC%M 1480,1480,1422
1422 NCC #NOSC%M
      IF%NC%NOBS -NC%NCC 1423,1423,1424
1423 NCS #NC%NOBS
      GO TO 1426
1424 NCS # NC%NCC
1426 DO 1429 K#1,NAT
      NK #NCS-K&1
      SUMA #0.0
      SUMB #0.0
      DO 1428 L#1,NK
      NL #L&K-1
      SUMA = SUMA + S(NOBS,L)*S(NCC,NL)
1428 SUMB = SUMB + S(NCC,L)*S(NOBS,NL)
      A%K #SUMA/NK
1429 B%K # SUMB/NK
      IO #ICRCD&1
      GO TO%1450,1430,1435,1430 ,10
1430 CALL LPLDT(0.,1.,A,NAT,A,NAT,1)
      CALL SCALF(SX,SY,XS,YSY)
      CALL FCHAR%XS,YSY,.10,.12,0.

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WRITE(IP,466)
YSY # YSY -0.4/SY
CALL FCHAR(XS,YSY,.10,.12,0.)
WRITE(IP,457) NOBS,NCC
CALL FPLDT(1,XS-2.0/SX,PY)
CALL LPLDT(0.,1.,B,NAT,B,NAT,1)
CALL SCALF(SX,SY,XS,YSY)
CALL FCHAR(XS,YSY,-.10,.12,0.)
WRITE(IP,466)
YSY # YSY -0.4/SY
CALL FCHAR(XS,YSY,.10,.12,0.)
WRITE(IP,457) NCC,NOBS
CALL FPLDT(1,XS-2.0/SX,PY)
IF(IO-3) 1450,1435,1435
1435 WRITE(IW,461)
WRITE(IW,460) NOBS,NCC
WRITE(IW,428) %AXI ,I#1,NAT
WRITE(IW,460) NCC,NOBS
WRITE(IW,428) %BXI ,I#1,NAT
1450 DO 1451 I#1,NAT
VXI %%AXI GBXI /2.0
1451 WXI %%AXI -BXI /2.0
DO 1452 I#1,NAT
AXI #0.0
1452 BXI #0.0
DO 1458 I#1,NAT
SUMA#0.0
SUMB#0.0
DO 1456 K#2,MAXLG
SUMA #2.0*V%K *COS%PHI*%K-1 *%I-1 /MAXLG &SUMA
1456 SUMB #4.0*W%K *SIN%PHI*%K-1 *%I-1 /MAXLG &SUMB
AXI # 2.0*(V%I &SUMA&%I-1 **%I-1 *V%NAT *DT
1458 BXI # SUMB*DT
IO = ICRS +1
GO TO (2463,1460,1459,1460),IO
1460 CALL MPOLA(A,B,NAT,II)
CALL SCALF(SY,SY,XS,YSY)
CALL FCHAR(XS,YSY,.10,.10,0.)
WRITE(IP,470) NOBS,NCC
CALL FCHAR(XS,YSY,-.2/SY,.10,.10,0.)
IF(II) 1468,1468,1469
1468 WRITE(IP,471)
GO TO 1470
1469 WRITE(IP,472)
1470 CALL FPLDT(1,XS-2.0/SY,PY)
IF(IO-3) 2463,1459,1459
1459 IF(ICR-1) 1461,1461,1462
1461 WRITE(IW,461)
1462 WRITE(IW,462) NOBS,NCC
WRITE(IW,505)(A(I),I=1,NAT)

```

```

WRITE(IW,506)(B(I),I=1,NAT)
2463 IF(ICSS)1463,1463,2465
2465 DO 2468 I=1,NAT
      V(I)=0.0
2468 W(I)=0.0
      V(1)=(A(1)+A(2))/2.0
      V(NAT)=(V(NAT-1)+V(NAT))/2.0
      W(1)=(B(1)+B(2))/2.0
      W(NAT)=(B(NAT-1)+B(NAT))/2.0
      DO 2470 J=2,MAXLG
2470 V(I)=V(I-1)*0.25+V(I)*0.5+V(I+1)*0.25
      W(I)=W(I-1)*0.25+W(I)*0.5+W(I+1)*0.25
      IO=ICSO+1
      GO TO (1463,2472,2486,2472),IO
2472 CALL MPOLA(V,W,NAT,II)
      CALL SCALF(SY,SX,XS,YSY)
      CALL FCHAR(XS,YSY,0.10,0.10,0.)
      WRITE(IP,500)NOBS,NCC
      CALL FCHAR(XS,YSY-0.2/SY,.10,.10,0.)
      IF(II)2478,2478,2479
2478 WRITE(IP,471)
      GO TO 2480
2479 WRITE(IP,472)
2480 CALL FPLDT(1,XS-2.0/SY,PY)
      IF(IO-3)1463,1463,2486
2486 IF(ICRCO-1)2488,2488,2498
2488 IF(ICRSO-1)2490,2490,2492
2490 WRITE(IW,461)
2492 WRITE(IW,502)NOBS,NCC
      WRITE(IW,505)(V(I),I=1,NAT)
      WRITE(IW,506)(W(I),I=1,NAT)
      GO TO 1463
2498 IF(ICRSO-1)2492,2492,2490
1463 DO 1466 I#1,NAT
      V(I) = 0.0
      W(I) = 0.0
      A%I #0.0
1466 B%I #0.0
1480 IF%NOSEL 1490,1490,1420
1486 DO 1487 I#1,NI
1487 B%I #0.0
      IF(IFT)1490,1490,1488
1488 IF%LFT-999 1052,1490,1052
1490 IF%LC-999 1000,1500,1000
1500 STOP
601 FORMAT%2A4,I5,F10.5,15I2,I3,2I2, 9X,I3
602 FORMAT%6F7.2,2X,E10.2,3X,I1,7I2
603 FORMAT%6F7.2
605 FORMAT%2F10.5,I4,3I2,39X,I3
607 FORMAT%11I2,47X,I3

```

```

401 FORMAT(/////5X,'MAGNETOTELLURIC ANALYSIS'///)
402 FORMAT%10X,@COMPONENT NO. 1 IS HX %MAGNETIC FIELD IN NORTH-SOUTH D
/IRECTION @/24X,@2 IS HY %MAGNETIC FIELD IN EAST-WEST DIRECTION @/2
/4X,@3 IS HZ %MAGNETIC FIELD IN VERTICAL DIRECTION @/24X,@4 IS EX %
/ELECTRIC FIELD IN NORTH-SOUTH DIRECTION @/24X,@5 IS EY %ELECTRIC F
/IELD IN EAST-WEST DIRECTION @/
403 FORMAT%10X,@PLACE NO. 1 IS BANGKOK, THAILAND@/20X,@2 IS SAKAERAT,
/RAJSIMA, THAILAND@//
404 FORMAT%10X,@NUMBER OF POINTS IN EACH INPUT SERIES@,2X,I6//10X,@TIME
/ INTERVAL OF SAMPLING@,2X,F11.5,1X,@SECONUS@//10X,@MAXIMUM SAMPLIN
/G FREQUENCY@,3X ,F8.3,@ CYCLES/SECOND'//)
405 FORMAT%10X,@FILTERING DATA @,A4//10X,'INTEGRATING DATA ',A4)
407 FORMAT%15X,@INTEGRATING DATA IS TO BE PLOTTED @,A4/41X,@PRINTED
/@,A4/
408 FORMAT%//10X,'POWER SPECTRAL ANALYSIS ',A4)
409 FORMAT%15X,@AUTO-CORRELATION IS TO BE PLOTTED @,A4/41X,@PRINTED
/@,A4
411 FORMAT(15X,'POWER SPECTRAL IS TO BE PLOTTED ',A4/39X,'PRINTED ',
/A4/)
412 FORMAT(//10X,'CROSS-SPECTRAL ANALYSIS ',A4)
413 FORMAT%15X,@CROSS-CORRELATION IS TO BE PLOTTED @,A4/42X,@PRINTED
/ @,A4
415 FORMAT%15X,@CROSS SPECTRAL IS TO BE PLOTTED @,A4/39X,@PRINTED @,
/A4/
417 FORMAT(//10X,'MAXIMUM LAG ',I4//10X,'LENGTH OF CORRELATION ',F8.
/3,2X,'SECONDS'//10X,'ERRDR ',F6.3/)
421 FORMAT% 10X,@COMPONENT NO. @,I2
423 FORMAT%1H&,37X,@SERIES NO. @,I3
425 FORMAT(//10X,'DATA IS TAKEN AT PLACE NO. ',I3/24X,'ON ',A4,1X,I3,'
/, 19',I2/24X,'AT',I3,' O-CLOCK ',I3,' MINUTES',I3,' SECONDS'//)
426 FORMAT%@X AXIS IS TIME SCALE)
427 FORMAT%10X,@ORIGINAL DATA@/
428 FORMAT(F25.5,5F15.5)
429 FORMAT% 10X,@FILTER DETAIL@//15X,@CENTRAL FREQUENCY @,F10.3,2X
/,@CYCLES/SECONDA@//15X,@HALF WIDTH OF BAND PASS @,F10.5,2X,@CYCLES/
/SECONDA@//15X,@LENGTH OF FILTER @,F10.5,2X,@SECONDA@//15X,@NUMBER
/OF POINTS IN FILTER @,I5//)
431 FORMAT%10X,@FILTER WEIGHTING COEFFICIENTS IS TO BE PLOTTED @,A4/4
/9X,@PRINTED @,A4/
435 FORMAT%10X,@FILTER DATA IS TO BE PLOTTED @,A4/31X,@PRINTED @,A4/
///)
437 FORMAT%10X,@FILTER WEIGHTING COEFFICIENTS@/
438 FORMAT(///5X,'FILTER LENGTH IS GREATER THAN SAMPLING LENGTH'//)
439 FORMAT(///10X,'FILTERED DATA'//)
441 FORMAT%@ORIGINAL DATA OF COMPONENT NO. @,I2,@, TAKEN AT PLACE NO.
/@,I3,@, ON @,A4,I3,@, 19@,I2,@, AT@,I3,@ O CLOCK@,I3,@ MINUTE@,I3,
/@ SECONDA
442 FORMAT%@MAGNETIC FIELD OF COMPONENT NO. @,I2,@, TAKEN AT PLACE NO.
/ @,I3,@ ON @,A4,I3@ 19@,I2,@ AT@,I3,@ O-CLDCK@,I3,@ MINUTE@,I3,@ S
/ECONDA

```

```

443 FORMAT(10X,'MAGNETIC FIELD, COMPONENT NO. ',I3)
444 FORMAT(5X,'MAXIMUM LAG IS GREATER THAN NUMBER OF DATA POINTS' /)
446 FORMAT(10X,'AUTO-CORRELATION' /)
448 FORMAT(20Y AXIS IS AUTO-CORRELATION')
449 FORMAT(20Y AXIS IS AMPLITUDE@
454 FORMAT(20POWER SPECTRAL')
455 FORMAT(////10X,'POWER SPECTRAL ' /)
456 FORMAT(20X AXIS IS FREQUENCY@
466 FORMAT(20X AXIS IS LAG NUMBER@
457 FORMAT('Y AXIS IS CROSS-CORRELATION OF SERIES NO. ',I3,' AND SERIES
/ NO. ',I3)
450 FORMAT(20Y AXIS IS AMPLITUDE %MICRO-VOLT @
451 FORMAT(20Y AXIS IS AMPLITUDE %GAMMA @
453 FORMAT(20FILTER OF CENTRAL FREQUENCY@,F10.3,@ CYCLES/SECOND, HALF W
/IDTH OF BAND @,F10.5,@ CYCLES/SECOND@
460 FORMAT( // 10X,'CROSS-CORRELATION OF SERIES NO. ',I3,' AND SERIES N
/O. ',I3//
461 FORMAT(1H1
462 FORMAT(////10X,'CROSS-SPECTRAL OF SERIES NO. ',I3,' AND SERIES NO. '
/,I3//)
465 FORMAT(20ORIGINAL DATA AND FILTERED DATA@
470 FORMAT('CROSS-SPECTRAL OF SERIES NO. ',I3,' AND SERIES NO. ',I3)
471 FORMAT('X-AXIS IS QUADRATURE SPECTRAL, Y-AXIS IS CO-SPECTRAL')
472 FORMAT('X-AXIS IS CO-SPECTRAL, Y-AXIS IS QUADRATURE SPECTRAL')
473 FORMAT(//10X,'THE DATA IS TO BE TRANSFORMED BEFORE ANALYSIS@/
505 FORMAT(10X,'CO-SPECTRAL'//(F25.5,5F15.5))
506 FORMAT(//10X,'QUADRATURE-SPECTRAL'//(F25.5,5F15.5))
502 FORMAT(////10X,'SMOOTH CROSS-SPECTRAL OF SERIES NO. ',I3,' AND SER
IES NO. ',I3//)
480 FORMAT(12X,'SMOOTH POWER SPECTRAL ',A4)
481 FORMAT(15X,'SMOOTH POWER SPECTRAL IS TO BE PLOTTED ',A4/46X,'PRIN
ITED ',A4/)
483 FORMAT(12X,'SMOOTH CROSS- SPECTRAL ',A4)
484 FORMAT(15X,'SMOOTH CROSS-SPECTRAL IS TO BE PLOTTED ',A4/46X,'PRIN
ITED ',A4/)
490 FORMAT('SMOOTH POWER SPECTRAL')
491 FORMAT(////10X,'SMOOTH POWER SPECTRAL ' /)
500 FORMAT('SMOOTH CROSS SPECTRAL OF SERIES NO. ',I3,' AND SERIES NO. '
I,I3)
475 FORMAT( //10X,'THE MEAN IS ',F10.5//10X,'THE MEAN S
QUARE IS ',F10.5//10X,'THE STANDARD DEVIATION IS ',F10.5//)
END

```

```
** IBM 1800 FORTRAN SUBROUTINE
```

```
*LIST ALL
```

```
  SUBROUTINE I_PLOT(X,DEL,S,M,Y,N,K
```

```
  DIMENSION Y%400 ,S%400
```

```
  COMMON SX,SY,PY,XSD,YSD
```

```
  IP # 7
```

```
  PHI # 3.14159
```

```
C X IS THE MINIMUM OF X-AXIS WHICH IS CORRESPONDING WITH Y%1 , DR/
```

```
C AND S%1
```

```
C DEL IS THE INCREMENT OF X
```

```
C M MUST BE EQUAL OR LESS THAN N
```

```
  XRAN # DEL*N
```

```
  XPMAX # X%XRAN
```

```
  IF%XPMAX 10,10,15
```

```
10 IX # -1
```

```
  XNMAX = XPMAX
```

```
  XPMAX = 0.0
```

```
  XPMIN = 0.0
```

```
  XNMIN = X
```

```
  GO TO 26
```

```
15 IF(X) 25,20,20
```

```
20 IX = 1
```

```
  XPMIN = X
```

```
  XNMAX = 0.0
```

```
  XNMIN = 0.0
```

```
  GO TO 26
```

```
25 IX#2
```

```
  XPMIN#0.0
```

```
  XNMAX#0.0
```

```
  XNMIN#X
```

```
26 CALL AXMIN%Y,N,YPMAX,YPMIN,YNMAX,YNMIN,IY
```

```
C K#1,PLOT ONE SERIES
```

```
C K#2,PLOT TWO SERIES ON THE SAME SCALE
```

```
  GO TO %36,27 ,K
```

```
27 CALL AXMIN%S,M,SPMAX,SPMIN,SNMAX,SNMIN,IS
```

```
  IF%YPMAX-SPMAX 28,29,29
```

```
28 YPMAX#SPMAX
```

```
29 IF%YNMIN-SNMIN 31,31,30
```

```
30 YNMIN #SNMIN
```

```
31 IF%YPMAX 32,32,34
```

```
32 IY#-1
```

```
  YPMIN#0
```

```
  IF%YNMAX-SNMAX 33,36,36
```

```
33 YNMAX#SNMAX
```

```
  GO TO 36
```

```
34 IF%YNMIN 48,44,35
```

```
35 IF%YPMIN-SPMIN 44,44,43
```

```
43 YPMIN#SPMIN
```

```
44 IY#1
```

```

YNMAX#0.0
GO TO 36
48 IY#2
YPMIN#0.0
YNMAX#0.0
36 IF IY-1 37,38,39
37 YPRAN#0.0
YNRAN#YNMAX-YNMIN
GO TO 40
38 YPRAN#YPMAX-YPMIN
YNRAN#0.0
GO TO 40
39 YPRAN #YPMAX
YNRAN#ABS YNMIN
40 YRAN#YPRAN&YNRAN
KI = 1
GO TO (215,210),K
210 CALL COUNT(S,M,IPM,INM)
GO TO 220
215 IPM = 0
INM = 0
220 CALL COUNT(Y,N,IPN,INN)
MNP = IPM+IPN
MNN = INM + INN
IF (MNP) 241,241,221
221 IF (MNP - MNN) 281,241,241
281 IF (YRAN - 5 ) 241,241,224
224 IYRAN = YRAN
YRAN = YRAN - IYRAN
IYRAN = YPMAX
YPMAX = YPMAX - IYRAN
IYRAN = YPMIN
YPMIN = YPMIN - IYRAN
IYRAN = YNMAX
YNMAX = YNMAX - IYRAN
IYRAN = YNMIN
YNMIN = YNMIN - IYRAN
KI = 2
241 FAC = 1.0
IF IYRAN-1 45,65,55
45 YRAN#YRAN*10.0
FAC = FAC*10.0
IF IYRAN-1 45,50,50
50 FAC#1.0/FAC
GO TO 60
55 IF IYRAN-20. 65,65,58
58 FAC#YRAN/20.
YRAN#YRAN/20.
60 YPMAX#YPMAX/FAC
YPMIN#YPMIN/FAC

```

```
YNMAX#YNMAX/FAC
YNMIN#YNMIN/FAC
YPRAN = YPRAN/FAC
YNRAN = YNRAN/FAC
65 SY#7.5/YRAM
   ISY#SY
   ESY#SY-ISY
   IF%ESY-0.25 66,70,67
66 SY#ISY
   IF(SY) 61,61,70
61 SY = 0.10
   GO TO 70
67 IF%ESY-0.50 68,70,69
68 SY#ISY&0.25
   GO TO 70
69 SY #ISY&0.50
70 SX#0.25/DEL
   IF(SX) 71,71,73
71 SX = 0.25
73 PX#2.0/SX&XPMAX&XNMAX
   PY#7.5*YPRAN/YRAN-4.0 /SY&YPMIN&YNMAX
   YDEL#0.5/SY
   IF(YDEL) 75,75,79
75 YDEL = 0.10
79 CALL SCALF%SX,SY,PX,PY
   IF%IX-1 72,74,76
72 NXP#0
   NXN#N/2+1
   CALL FGRID%2,XNMAX,YPMIN &YNMAX,2*DEL,NXN)
   XYS#0.05/SX +XPMIN+XNMAX
   GO TO 80
74 NXP#N/2+1
   NXN#0
   CALL FGRID%0,XPMIN,YPMIN &YNMAX,2*DEL,NXP)
   GO TO 78
76 NXP#XPMAX/(2*DEL) +1.0
   NXN#-XNMIN/(2*DEL) + 1.0
   CALL FGRID%0,XPMIN,YPMIN&YNMAX,2*DEL,NXP)
   CALL FGRID%2,XNMAX,YPMIN&YNMAX,2*DEL,NXN)
78 XYS = - 0.9/SX +XPMIN+XNMAX
80 IF%IY-1 82,84,86
82 NYP#0
   NYN#YNRAN/YDEL + 1.0
   CALL FGRID%3,XPMIN&XNMAX,YNMAX,YDEL,NYN)
   YXS = 0.9/SY + YPMIN + YNMAX
   T#PHI/2.0
   GO TO 90
84 NYN#0
   NYP#YPRAN/YDEL + 1.0
   CALL FGRID%1,XPMIN&XNMAX,YPMIN,YDEL,NYP)
```



```

GO TO 88
86 NYP#YPRAN/YDEL + 1.0
   NYN#YNRAN/YDEL + 1.0
   CALL FGRID%1,XPMIN&XNMIN,YDEL,NYP
   CALL FGRID%3,XPMIN&XNMIN,YDEL,NYN
88 YXS#-0.05/SY+YPMIN+YNMAX
   T#3.0*PHI/2.0
90 XD#0.04/SX
   XS#-NXN*DEL&XNMAX&XPMIN
   XSD#XS
   EP#0.001
   NX#NXPGNXN&1
   DO 102 I#1,NX
   IF%ABS%XS -EP 100,100,98
98 CALL FCHAR%XS,XD,YXS,.08,.08,T
   WRITE%IP,200 XS
100 XS#XS&2*DEL
102 CONTINUE
   T#0.0
   XD#0.04/SY
   YS#-NYN*YDEL&YNMAX&YPMIN
   YSP#YS*FAC
   YSD#YS-1.1/SY
   NY#NYPGNYN&1
   DO 112 I#1,NY
   IF%ABS%YS -EP 110,110,109
109 CALL FCHAR%YS,YS,XD,.08,.08,T
   WRITE%IP,200 YSP
110 YS#YS&YDEL
   YSP#YS*FAC
112 CONTINUE
   GO TO (114,250),KI
114 XS#X
   CALL FPLDT%-2,XS,Y%1 /FAC
   DO 116 I = 2,N
   XS#XS&DEL
   CALL FPLDT%0,XS,Y%I /FAC
116 CONTINUE
   GO TO %124,118,124 ,K
118 N#M
   DO 120 I#1,N
120 Y%I #S%I
   K#3
   CALL FPLDT(1,X,Y(I)/FAC)
   GO TO 114
250 YCM = YPMAX + YNMAX
   YCN = YPMIN + YNMIN
   IPT = 0
254 XS = X
   DO 260 I = 1,N

```

```
Y(I) = Y(I)/FAC
IF (YCM - Y(I)) 256,255,255
255 IF(YCM - Y(I))257,257,256
257 CALL FPLLOT(1,XS,Y(I))
CALL FPLLOT(-2,XS,Y(I))
CALL POINT(IPT)
256 XS = XS + DEL
260 CONTINUE
GO TO (124,262,124),K
262 N = M
DO 266 I = 1,N
266 Y(I) = S(I)
IPT = 1
K = 3
GO TO 254
124 CALL FPLLOT(1,XSD,YSD)
CALL FPLLOT(-2,XSD,YSD)
200 FORMAT(F10.5)
RETURN
END
```

```
**IBM 1800 FORTRAN SUBROUTINE
```

```
* LIST ALL
```

```

SUBROUTINE MPOLA(X,Y,N,II)
DIMENSION X(400),Y(400)
COMMON SX,SY,PY,XSD,YSD
IP=7
PHI=3.14159
CALL AXMIN(Y,N,YPMAX,YPMIN,YNMAX,YNMIN,IY)
CALL AXMIN(X,N,XPMAX,XPMIN,XNMAX,XNMIN,IX)
YRAN=YPMAX-YNMIN
XRAN=XPMAX-XNMIN
II # 1
IF(YRAN-XRAN) 20,20,8
8 II = -1
DO 10 I=1,N
A=X(II)
X(II)=Y(II)
10 Y(II)=A
A=XPMAX
XPMAX=YPMAX
YPMAX=A
A=XNMIN
XNMIN=YNMIN
YNMIN=A
A=IX
IX=IY
IY=A
A=XRAN
XRAN=YRAN
YRAN=A
20 FAC=1.0
IF(YRAN-1) 30,50,40
30 YRAN=YRAN*10.0
FAC=FAC*10.0
IF(YRAN-1) 30,35,35
35 FAC =1.0/FAC
GO TO 47
40 IF(YRAN-20.0) 50,50,45
45 FAC=YRAN/20.0
YRAN=YRAN/FAC
47 XRAN=XRAN/FAC
XPMAX = XPMAX/FAC
XNMIN = XNMIN/FAC
YPMAX = YPMAX/FAC
YNMIN = YNMIN/FAC
50 SY=8.0/YRAN
ISY=SY
ESY=SY-ISY
IF(ESY-0.25) 54,60,55

```

```
54 SY=ISY
  IF(SY)53,53,60
53 SY = 0.25
  GO TO 60
55 IF(ESY-0.50) 56,60,57
56 SY=ISY+0.25
  GO TO 60
57 SY=ISY+0.50
60 PX=2.0/SY+XPMAX
  PY=(8.0*YPMAX/YRAN-4.0)/SY
  DEL=0.50/SY
  IF(DEL)61,61,63
61 DEL = 0.25
63 IF(IX-1) 62,64,66
62 NXP=0
  NXN=ABS(XNMIN)/DEL+2.0
  XYS=0.05/SY
  GO TO 70
64 NXP=XPMAX/DEL+2.0
  NXN=0
  GO TO 69
66 NXP=XPMAX/DEL+2.0
  NXN=ABS(XNMIN)/DEL+2.0
69 XYS=-0.85/SY
70 IF(IY-1) 72,74,76
72 NYP=0
  NYN=ABS(YNMINI)/DEL+2.0
  YXS=0.85/SY
  T=PHI/2.0
  GO TO 80
74 NYP=YPMAX/DEL+2.0
  NYN=0
  GO TO 79
76 NYP=YPMAX/DEL+2.0
  NYN=ABS(YNMINI)/DEL+2.0
79 XYS=-0.05/SY
  T=3.0*PHI/2.0
  CALL SCALF(SY,SY,PX,PY)
  CALL FGRID(0,0,0,DEL,NXP)
  CALL FGRID(1,0,0,DEL,NYP)
  CALL FGRID(2,0,0,DEL,NXN)
  CALL FGRID(3,0,0,DEL,NYN)
80 XD=0.04/SY
  XS=-NXN*DEL
  XSD # XS
  EP=0.0
  NX=NXP+NXN+1
  DO 90I=1,NX
  IF(ABS(XS)-EP) 88,88,87
87 CALL FCHAR(XS-XD,YXS,.08,.08,T)
```

```
XSP=XS*FAC
WRITE(IP,400) XSP
88 XS=XS+DEL
90 CONTINUE
T=0.0
YS=-NYN*DEL
YSD = YS - 1.0/SY
NY=NYP+NYN+1
DO 100 I=1,NY
IF(ABS(YS)-EP) 98,98,97
97 CALL FCHAR(XYS,YS-XD,.08,.08,T)
YSP=YS*FAC
WRITE(IP,400) YSP
98 YS = YS + DEL
100 CONTINUE
I=1
CALL FCHAR(X(I)/FAC ,Y(I)/FAC ,0.10,0.10,0.)
WRITE(IP,401)I
CALL FPL0T(-2,X(I)/FAC ,Y(I)/FAC )
DO 102 I=2,N,2
CALL FPL0T(0, X(I)/FAC ,Y(I)/FAC )
CALL POINT(0)
CALL FPL0T(0,X(I+1)/FAC ,Y(I+1)/FAC )
102 CALL POINT(1)
CALL FPL0T(0,X(N)/FAC ,Y(N)/FAC )
CALL FCHAR(X(N)/FAC ,Y(N)/FAC ,.10,.10,0.)
WRITE(IP,402)
CALL FPL0T(-2,XSD,YSD)
400 FORMAT(F10.5)
401 FORMAT(I1)
402 FORMAT('L')
RETURN
END
```

## APPENDIX III

Sample output of spectra calculation



MAGNETOTELLURIC ANALYSIS

- 1 IS HX (MAGNETIC FIELD IN NORTH-SOUTH DIRECTION)
- 2 IS HY (MAGNETIC FIELD IN EAST-WEST DIRECTION)
- 3 IS HZ (MAGNETIC FIELD IN VERTICAL DIRECTION)
- 4 IS EX (ELECTRIC FIELD IN NORTH-SOUTH DIRECTION)
- 5 IS EY (ELECTRIC FIELD IN EAST-WEST DIRECTION)

- 1 IS BANGKOK, THAILAND
- 2 IS SAKAERAT, RAJISMA, THAILAND

```

NUMBER OF POINTS IN EACH INPUT SERIES -----299-----
TIME INTERVAL OF SAMPLING -----0.1000 SECONDS-----
MAXIMUM SAMPLING FREQUENCY -----5.000 CYCLES/SECOND-----

FILTERING DATA  YES

INTEGRATING DATA --YES--
INTEGRATING DATA IS TO BE PLOTTED  NO
PRINTED --YES--

THE DATA IS TO BE TRANSFORMED BEFORE ANALYST

POWER SPECTRAL ANALYSIS --YES--
AUTO-CORRELATION IS TO BE PLOTTED  NO
PRINTED --YES--
POWER SPECTRAL IS TO BE PLOTTED  NO
PRINTED --YES--

SMOOTH POWER SPECTRAL --YES--
SMOOTH POWER SPECTRAL IS TO BE PLOTTED  NO
PRINTED --YES--

CROSS-SPECTRAL ANALYSIS --NO--

MAXIMUM LAG  60

LENGTH OF CORRELATION  12.000  SECONDS

ERROR  0.447

```



COMPONENT NO. 2

DATA IS TAKEN AT PLACE NO. 2

ON FEB. 2, 1970

AT 6 O'CLOCK 2 MINUTES AFTER

ORIGINAL DATA

0.0094	0.01518	0.01409	0.03181	0.03865	0.04449
0.03772	0.02909	0.02510	0.01550	0.01227	0.01634
0.02134	0.02863	0.03727	0.02909	0.02409	0.02318
0.02545	0.01181	0.03330	0.03400	0.03050	0.02479
0.01700	0.01712	0.01854	0.01525	0.02630	0.02799
0.03181	0.02554	0.02510	0.01721	0.00621	0.01363
0.01909	0.01116	0.02550	0.02909	0.01909	0.01363
0.02545	0.03048	0.03727	0.03772	0.03727	0.02927
0.01019	0.01499	0.01499	0.02367	0.01136	0.05407
0.04363	0.03548	0.02999	0.02317	0.01909	0.02134
0.02227	0.02999	0.02010	0.02510	0.01772	0.03409
0.01499	0.02272	0.02510	0.0366	0.03909	0.02299
0.02134	0.01155	0.00914	0.01363	0.01540	0.02096
0.02636	0.02136	0.02318	0.02030	0.02909	0.03353
0.03409	0.03499	0.03454	0.02583	0.02318	0.02136
0.00727	0.00818	0.01316	0.02545	0.03454	0.03272
0.02772	0.01772	0.01009	0.01540	0.01540	0.02409
0.02954	0.02727	0.02409	0.01611	0.01745	0.01545
0.01310	0.03772	0.04227	0.02550	0.00154	0.01999
0.01454	0.01999	0.02045	0.02772	0.03636	0.03954
0.03583	0.02272	0.01772	0.02090	0.02099	0.03772
0.03272	0.02999	0.02600	0.01227	0.00621	0.01227
0.01227	0.01772	0.02045	0.03409	0.03540	0.01363
0.02500	0.02863	0.02954	0.03409	0.03636	0.03636
0.02636	0.01063	0.01063	0.01363	0.01363	0.01363



0.02318	0.01827	0.03181	0.02045	0.00945	0.00900
0.01136	0.01899	0.02727	0.03227	0.03364	0.03271
0.02499	0.02181	0.02727	0.02954	0.02727	0.02590
0.02318	0.01272	0.01695	0.00590	0.00549	0.01954
0.02954	0.03590	0.04040	0.03636	0.02681	0.02497
0.01954	0.02136	0.02136	0.02636	0.03045	0.02469
0.01772	0.01495	0.01383	0.02727	0.03227	0.03590
0.03499	0.02727	0.02499	0.01863	0.01161	0.01909
0.02136	0.02727	0.01534	0.02954	0.02364	0.02090
0.02136	0.02136	0.02469	0.03090	0.03227	0.02227
0.01272	0.00727	0.00227	0.01136	0.02409	0.03636
0.00318	0.00227	0.01590	0.02727	0.02136	0.01954
0.02499	0.03227	0.03045	0.03136	0.02136	0.01590
0.01681	0.00636	0.03045	0.01227	0.03863	0.03136
0.02681	0.00636	0.00000	0.02136	0.02172	0.02772
0.03499	0.03045	0.03045	0.02318	0.01454	0.01954
0.02545	0.01536	0.04136	0.03499	0.03045	0.02409
0.01681	0.01818	0.00045	0.03409	0.03818	0.04136
0.04318	0.03590	0.02727	0.01999	0.01590	0.02045
0.02499	0.02499	0.02499	0.02045	0.01499	0.01727
0.02227	0.04136	0.05045	0.04136	0.03227	0.02318
0.01181	0.00863	0.00863	0.01227	0.02318	0.02909
0.03045	0.02364	0.02136	0.02090	0.02045	0.02545
0.02999	0.03045	0.02172	0.02318	0.01461	0.01909
0.02363	0.02954	0.03499	0.04136	0.04136	

FILTER DATA

CENTRAL FREQUENCY 2.450 CYCLES/SECOND

HALF WIDTH OF BAND PASS 2.45000 CYCLES/SECOND

LENGTH OF FILTER 4.00000 SECONDS

NUMBER OF POINTS IN FILTER 41

FILTER WEIGHTING COEFFICIENTS IS TO BE PRINTED NO  
PRINTED YES

FILTER DATA IS TO BE PLOTTED NO  
PRINTED YES

FILTER WEIGHTING COEFFICIENTS

0.80000	0.19865	-0.19450	0.00709	-0.17901	0.16707
-0.15505	0.14076	-0.12545	0.00919	-0.09355	0.07780
-0.00273	0.04875	-0.03510	0.00514	-0.01608	0.00898
-0.00391	0.00095	-0.00000			

FILTER DATA

0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.02000	0.00000	0.02734	0.02589	0.02383	0.01974
0.01235	0.00814	0.00743	0.01383	0.02040	0.02288
0.02400	0.02196	0.01823	0.04106	0.00700	0.01202
0.01556	0.01725	0.02018	0.01704	0.01604	0.01197

0.01040	0.02362	0.01308	0.02898	0.02917	0.01704
0.01150	0.01351	0.01342	0.01927	0.02425	0.01370
0.01250	0.02738	0.02337	0.01882	0.01805	0.01753
0.01811	0.01983	0.02199	0.01652	0.01496	0.01237
0.01308	0.01805	0.02037	0.02740	0.02998	0.02824
0.01726	0.01044	0.00605	0.01159	0.01363	0.01007
0.02060	0.01721	0.01896	0.02957	0.02741	0.02541
0.02572	0.02634	0.02600	0.02037	0.01840	0.01023
0.00444	0.00836	0.01169	0.01987	0.02544	0.01140
0.02140	0.01455	0.01234	0.01381	0.01483	0.01876
0.02779	0.02091	0.01925	0.01859	0.01076	0.01517
0.01217	0.02807	0.01161	0.02593	0.02442	0.01601
0.01324	0.01848	0.01714	0.02158	0.02175	0.01707
0.02588	0.01808	0.01511	0.01717	0.02334	0.02820
0.02514	0.02322	0.01966	0.01110	0.00783	0.01161
0.01137	0.01505	0.02301	0.02500	0.02728	0.02508
0.02063	0.02727	0.02365	0.02568	0.01757	0.01036
0.01238	0.01536	0.01132	0.01196	0.01197	0.01441
0.01856	0.01420	0.02427	0.01628	0.01231	0.01262
0.01055	0.01535	0.02113	0.02416	0.01127	0.01421
0.01962	0.01729	0.01782	0.02280	0.01111	0.02107
0.01849	0.01134	0.01009	0.00681	0.00670	0.01592
0.02284	0.02683	0.03016	0.02715	0.02111	0.01950
0.01631	0.01720	0.01756	0.02076	0.02165	0.01900
0.01517	0.01240	0.01244	0.02119	0.02485	0.02898
0.02665	0.02120	0.01997	0.01896	0.01116	0.01075
0.01750	0.02119	0.02538	0.02767	0.01899	0.01689
0.01748	0.02155	0.02206	0.02363	0.02472	0.01761
0.01187	0.00758	0.00497	0.01071	0.01957	0.02892
0.03257	0.03094	0.01423	0.02107	0.01750	0.01600
0.02033	0.02459	0.02911	0.02407	0.01716	0.01384
0.01477	0.02092	0.01479	0.02500	0.02917	0.02633
0.02122	0.01981	0.01132	0.01110	0.01747	0.02194
0.02559	0.02134	0.01483	0.01859	0.02108	0.01850
0.02032	0.02112	0.01052	0.02619	0.02310	0.01967
0.01672	0.01568	0.01717	0.02027	0.02502	0.03113
0.05257	0.02743	0.02108	0.01118	0.01118	0.01702
0.02017	0.01989	0.02611	0.01881	0.01246	0.01777
0.01013	0.01076	0.03685	0.03011	0.01660	0.01850
0.01398	0.01884	0.00765			

MAGNETIC FIELD COMPONENT NO. 3

0.00000	0.00113	0.00000	0.00113	0.00000	0.00113
0.00000	0.00113	0.00000	0.00113	0.00000	0.00113
0.00000	0.00113	0.00000	0.00113	0.00000	0.00113
0.00000	0.00113	0.00091	0.00564	0.00606	0.01031
0.00989	0.01289	0.01164	0.01462	0.01441	0.01856
0.01894	0.02326	0.02328	0.02679	0.02561	0.02854
0.02797	0.03159	0.03147	0.03542	0.03495	0.03876
0.03868	0.04286	0.04344	0.04835	0.04912	0.05378
0.05347	0.05702	0.05623	0.05990	0.06006	0.06477
0.06590	0.07101	0.07141	0.07566	0.07523	0.07902
0.07871	0.08268	0.08269	0.08689	0.08639	0.09041
0.08898	0.09267	0.09250	0.09690	0.09780	0.10245
0.10239	0.10586	0.10456	0.10742	0.10662	0.11070
0.11021	0.11408	0.11381	0.11781	0.11791	0.12233
0.12291	0.12748	0.12815	0.13253	0.13241	0.13603
0.13458	0.13725	0.13623	0.13975	0.14013	0.14469
0.14499	0.14885	0.14805	0.15144	0.15081	0.15491
0.15457	0.15887	0.15876	0.16260	0.16161	0.16608
0.16411	0.16787	0.16931	0.17393	0.17477	0.17863
0.17822	0.18149	0.18143	0.18505	0.18582	0.19086
0.19155	0.19550	0.19534	0.19871	0.19891	0.20354
0.20431	0.20841	0.20894	0.21235	0.21142	0.21635
0.21358	0.21656	0.21675	0.22106	0.22198	0.22677
0.22671	0.23064	0.23114	0.23532	0.23627	0.24076
0.24145	0.24512	0.24466	0.24767	0.24711	0.25067
0.25061	0.25436	0.25526	0.25895	0.25835	0.26302
0.25917	0.26203	0.26227	0.26616	0.26704	0.27116





ALTO-CORRELATION

0.02353	0.02338	0.02323	0.02307	0.02292	0.02275
0.02259	0.02243	0.02226	0.02210	0.02193	0.02175
0.02157	0.02139	0.02121	0.02102	0.02084	0.02064
0.02045	0.02025	0.02005	0.01985	0.01965	0.01944
0.01925	0.01904	0.01884	0.01863	0.01842	0.01821
0.01800	0.01779	0.01758	0.01736	0.01715	0.01693
0.01671	0.01649	0.01627	0.01605	0.01582	0.01560
0.01537	0.01514	0.01491	0.01468	0.01445	0.01422
0.01399	0.01376	0.01353	0.01330	0.01307	0.01283
0.01259	0.01236	0.01212	0.01189	0.01165	0.01141
0.01117					

POWER SPECTRAL

0.42713	0.06095	-0.00312	0.00633	-0.00087	0.00214
-0.00037	-0.00118	-0.00019	0.00073	-0.00017	0.00044
-0.00009	0.00034	-0.00005	0.00026	-0.00006	0.00021
-0.00004	-0.00017	-0.00003	0.00014	-0.00003	0.00011
-0.00002	0.00010	-0.00002	0.00009	-0.00002	0.00006
-0.00001	0.00007	-0.00001	0.00006	-0.00001	0.00004
-0.00001	0.00005	-0.00001	0.00005	-0.00001	0.00003
-0.00001	-0.00004	-0.00001	-0.00004	-0.00001	0.00003
-0.00001	0.00004	-0.00000	0.00004	-0.00000	0.00003
-0.00000	-0.00003	-0.00000	-0.00003	-0.00000	0.00003
0.00001					

SMOOTH POWER SPECTRAL

0.24404	0.13648	0.01526	0.00216	0.00169	0.00074
0.00065	0.00044	0.00038	0.00028	0.00023	0.00017
0.00015	0.00013	0.00012	0.00010	0.00008	0.00007
0.00007	0.00006	0.00005	0.00005	0.00004	0.00004
0.00004	0.00003	0.00003	0.00003	0.00003	0.00003
0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
0.00002	0.00002	0.00002	0.00002	0.00001	0.00001
0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
0.00002					

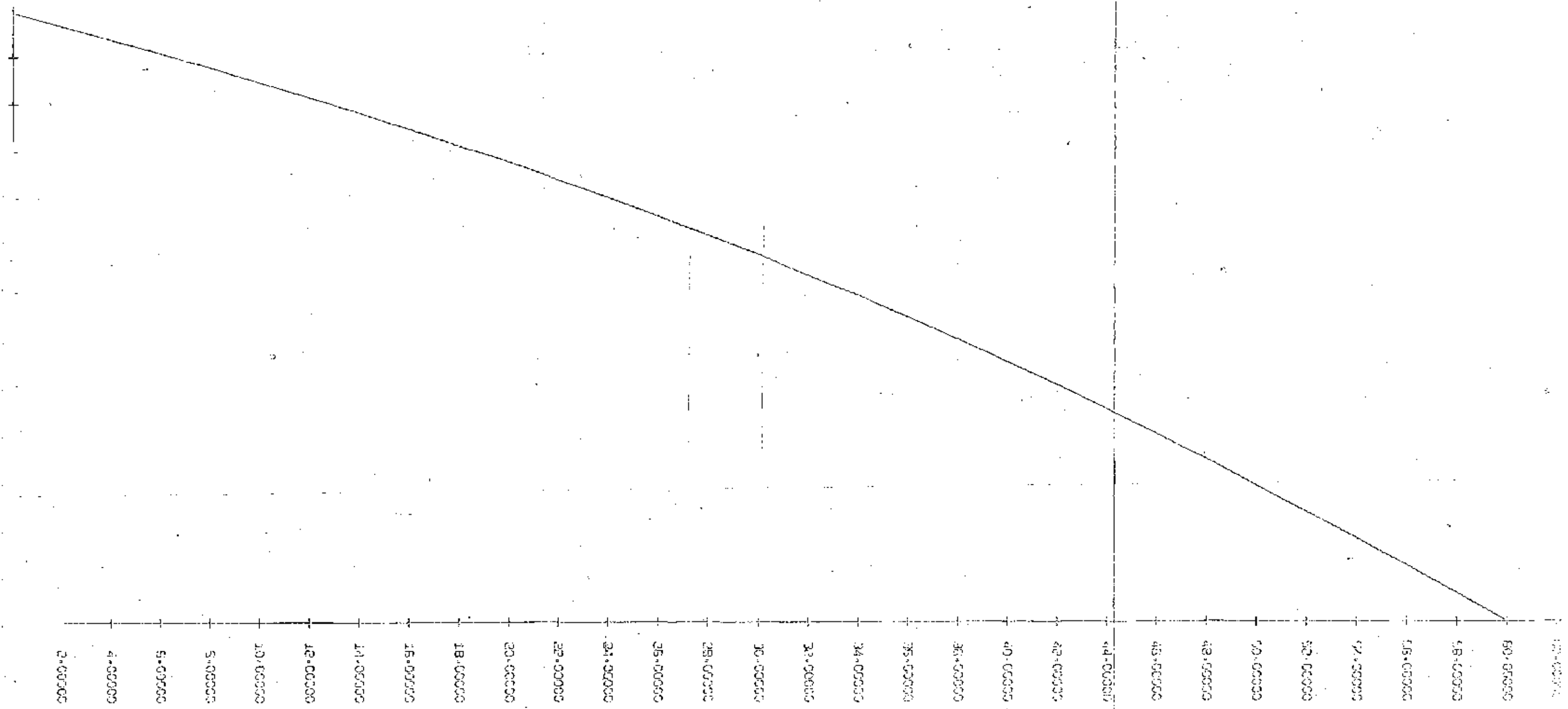
CROSS-CORRELATION OF SERIES NO. 1 AND SERIES NO. 2

0.30252	0.30063	0.29870	0.29677	0.29479	0.29250
0.29078	0.28873	0.28665	0.28456	0.28243	0.28027
0.27812	0.27595	0.27375	0.27155	0.26932	0.26707
0.26484	0.26261	0.26035	0.25809	0.25579	0.25350
0.25118	0.24887	0.24653	0.24418	0.24178	0.23935
0.23598	0.23358	0.23214	0.22969	0.22720	0.22470
0.22217	0.21953	0.21705	0.21446	0.21183	0.20927
0.20559	0.20397	0.20132	0.19869	0.19604	0.19341
0.19077	0.18816	0.18552	0.18289	0.18024	0.17759
0.17493	0.17226	0.16956	0.16684	0.16407	0.16129
0.15846					

CROSS-CORRELATION OF SERIES NO. 2 AND SERIES NO. 1

0.30252	0.30053	0.29852	0.29647	0.29439	0.29230
0.29021	0.28810	0.28596	0.28379	0.28161	0.27942
0.27722	0.27500	0.27276	0.27051	0.26826	0.26600
0.26374	0.26145	0.25916	0.25684	0.25453	0.25221
0.24985	0.24749	0.24512	0.24274	0.24035	0.23795
0.23551	0.23309	0.23065	0.22818	0.22569	0.22319
0.22070	0.21818	0.21565	0.21309	0.21052	0.20795
0.20538	0.20279	0.20018	0.19756	0.19493	0.19230
0.18966	0.18702	0.18437	0.18172	0.17907	0.17640
0.17372	0.17102	0.16831	0.16558	0.16284	0.16009
0.15727					





X AXIS IS LAG NUMBER  
Y AXIS IS AUTO-CORRELATION

## REFERENCES

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## VITA

Name	La-or Chonviriya
Birthplace	Bangkok, Thailand
Birthdate	24 April, 1942
Degree	B. Sc. (Hons.), in Mathematics, April, 1965 B. Ed. in Secondary Education, April, 1968 Chulalongkorn University Bangkok, Thailand
Professional Positions	Demonstration school of Chulalongkorn University Bangkok, Thailand 1965-1968
Graduate scholarship	Applied Scientific Research Cooperation of Thailand Bangkok, Thailand 1968-1970