63/43

UNIVERSITY OF VIRGINIA – CHARLOTTESVILLE

DEPARTMENT OF ENVIRONMENTAL SCIENCES

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ENVIRONMENTAL APPLICATION OF REMOTE SENSING METHODS TO COASTAL ZONE LAND USE AND MARINE RESOURCE MANAGEMENT: APPENDIX F

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APPENDIX F

USER'S GUIDE FOR

ADVECTION, CONVECTION PROTOTYPE

APPENDIX F

INDEX

SECTION 1

MAIN PROGRAM

1.1 NAME = HYPERB

1.2 CONTROL PARAMETERS TO BE SET IN HYPERB:

IVO: This is used as a counter to indicate the particular segment the iteration is in; initially set = 1.

INIT: This function is used as a binary counter to set, non-set the elapsed time and cumulative time counter; initially set = 0.

KST: Set = 1 (do not change) This initializes the program stepping.

SEGMAX: Set equal to the number of geometrical segments over which the model is to run. This function controls the number of program steps to be taken.

DELT: Iteration time internal, Δt.

NCH: Initially set = 0. Tertiary counter used in elapsed, cumulative time counter.

NSET: Initially set = 1. Tertiary counter used in elapsed, cumulative time counter.

XMESH: The number of grid points in the x-direction.

YMESH: The number of grid points in the y-direction.

AI: Initial x-coordinate of the source pollutant. This is written in terms of a decimal such that XMESH * AI = x-coordinate of source pollutant.

BI: Initial y-coordinate of the source pollutant.

NIVO: Control parameter used to select heading print. Initially set = 2.

1.3 INDIRECT CONTROL PARAMETERS

DELX: Iteration Δx

DELY: Iteration Δy

1.4 MAIN PROGRAM USEAGE

The purpose of the main program HYPERB is to serve as the initializing switch. The program controls the stepping and initialization of calculations and heading print out controls. The only control parameters which need to be changed are SEGMAX when the number of segments run is to be changed, DELT for different values of Δt, XMESH for Δx, YMESH for Δy, and AI and BI for the location of the source pollutant. Otherwise, these parameters should not be changed.

SECTION 2

SUBROUTINE SCHEME1

2.1 EXTERNAL FORMAL PARAMETERS

M: number of Δx (grid spacing)

DELX: Δx

DELY: Δy

DELT: Δt

u: u-velocity component

v: v-velocity component

T: data field

XJ: x-coordinate of concentration max.

XK: y-coordinate of concentration max.

XMESH: number of x-direction grid points.

YMESH: number of y-direction grid points.

MM: number of Δy

2.2 EXTERNAL CONTROLS

CUTOFF: Set = .1 This function sets the data field = 0 if T is less than or equal to .1 in order to damp out high frequency oscillations.

MUX: x-coordinate diffusion coefficient

MUY: y-coordinate diffusion coefficient

CUTLIM: Set = .005 so that averaging of the iteration field is accomplished. This is a prefilter prior to final smoothing by CUTOFF.

LIMRUN: Set = 200. This closes the iteration with the max. number of iterations = 200. This is done primarily for economy.

INDEX: Used to control print out of the iterated field for every (iteration) *n* INDEX.

2.3 RUNNING

Only LIMRUN and/or INDEX need be changed. the S/R computes a solution to the heat conduction type problem which includes both advection and diffusion.

SECTION 3

SUBROUTINE TIME

3.1 EXTERNAL FORMAL PARAMETERS

INIT: Binary counter used to set,nonset the elapsed, cumulative time counters.

3.2 PURPOSE

The S/R serves as the elapsed time and cumulative time counter. Elapsed time is reset for each segment once iteration in the particular segment starts. The cumulative counter is initialized but not reset with segment stepping.

SECTION 4

SUBROUTINE POLPROF

4.1 EXTERNAL FORMAL PARAMETERS

Integer number : In call statement this is used to select the particular two dimensional concentration contour type.

Example: The only selection available is a conic projection distribution with the maximum concentration at the concentration center.

T: This is the initial data field.

4.2 PURPOSE

The S/R initially sets the concentration distribution. This S/R is called only at program start.

SECTION 5

SUBROUTINE SETPOL

5.1 EXTERNAL FORMAL PARAMETERS

KK: Segment number

5.2 PURPOSE

The S/R maintains the initial concentration maximum location at program start and the concentration maximum during subsequent segment runs.

SECTION 6

SUBROUTINE VELFLD

6.1 EXTERNAL FORMAL PARAMETERS

Arrays u,v

Array u contains the u-component velocity

Array v contains the v-component velocity

u(I,J), v(I,J) must be dimensioned the same as in the main program.

6.2 PURPOSE

The S/R is used to set the initial velocity component field. The velocity field can be either read-in in component form for each grid point or approximated in functional form. Presently the program only utilizes the functional approximation mode; inclusion of grid point read-in would be a trivial addition.

SECTION 7

SUBROUTINE LITHO

7.1 EXTERNAL FORMAL PARAMETERS

Integer number: Call number, I, can take on the values 1,3, 4,5. The call controls selection of the proper heading label.

7.2 PURPOSE

The S/R selects the heading label for the different field print-outs. Control integer is set in HYPERB and S/R SCHEME1. These controls are preset and need not be altered.

SECTION 8

SUBROUTINE LITHO3

8.1 EXTERNAL FORMAL PARAMETERS

IND: Selects heading label. Heading Label 1 is used for print-out during iteration. Heading Label 2 is used to label initial print-outs at program start and each segment start.

SECTION 9

SUBROUTINES GAIN, SHADE

S/R GAIN and S/R SHADE are a package used to contour the data matrix in a two-dimensional presentation. In order to initiate contouring S/R GAIN is called according to the following format:

CALL GAIN (A, IFACT, SHDITV, NS, LS)

9.1 EXTERNAL CONTROLS

A: is the data array to be shadded.

IFACT: is an integer used in S/R GAIN.

- used as an exponentiate factor to normalize the data.

SHCITV: is the shade interval.

NS: is the number of columns in array A (data array)

LS: is the number rows in array.

9.2 INTERNAL CONTROLS

Internal to GAIN the ICTL(N) array is used as a control function to set the shading format and as communication with S/R SHADE.

ICTL(1) is the call code.

= 0, normal intra-field call (only RFIELD is used), ICTL(2) through ICTL(8) and RCTL are ignored.

= 1, beginning-of-field call (only ICTL and RCTL parameters are used), RFIELD ignored.

The values for ICTL(N) and RCTL(N) are set in GAIN. Examples are:

ICTL(3)= 8, ICTL(3) controls the column in which shading starts For ICTL(3)= 8, shading starts in Column 8 after the margin numbers. Thus if the margin number consists of two digits, shading starts in Column 10.

ICTL(4)= N, where N is the number of lines shaded vertically on the page per row of data from array A.

ICTL(5)= NNS, where NNS is the number of fields or columns in array A to be shaded.

ICTL(6)= 120/NNS, this gives the field width, ie, if NNS = 40 then ICTL(6) = 3, such that a given value at a grid point in A(I,J) will be shaded over a width of three print columns in the shade output.

ICTL(2), output tape number for I/O

ICTL(7), is there interspersed numeric information

= 1, NO

= a, YES

(NOTE: for this model ICTL(7) must = 1)

ICTL(8), edge or fill mode (must = 0)

RCTL(1), cycle point, generally = 0

RCTL(2), shade interval; this is set with the initial call of GAIN from external routines

RFIELD, one-dimensional vector used to shift data from array A into SHADE for contouring. This controls allows only one row of data to be coded for shading at a time.

THe GAIN/SHADE package should be used a "black box". When using GAIN/SHADE array A(I,J) must be dimensioned equal to the data array size in the calling routine.

SECTION 10

SUBROUTINE GRAPH

This subroutine is used to graph the variables requested in S/R SCHEME1. It is not necessary to change any internal statements in GRAPH to use the routine. All variables changes are made through the formal calling parameters. GRAPH has the capability of graphing up to nine different variables.

S/R GRAPH is called according to the following format:

10.1 EXTERNAL CONTROLS

CALL GRAPH (DATA, NUM, PTS, VAR, LOWER, SCALE, TIME)

where,

DATA, is the array DATA (PTS, VAR);the array DATA (,) is used to store the values to be graphed.

NUM, is the number of points to be graphed. NUM must be less than or equal to PTS

PTS, is the number of values for each variable

VAR, the number of different values to be graphed

LOWER, is an array LOWER (VAR) which sets the minimum value for the given variable. This is used to establish the lower limit for the ordinate value. The lower limit for each variable to be graphed need not be the same.

SCALE, is an array SCALE (VAR) which is used as a scale factor for setting the range of values on the graphing ordinate. The effective ordinate graph width is SCALE (VAR) * 120 for each variable. The scale factors need not be the same for each variable.

10.2 EXAMPLE OF USEAGE

The following example will illustrate the calling of GRAPH from S/R SCHEMEL.

Call GRAPH (TADD, LIMRUN, LIMRUN,2, BOTTOM, SCALE, 20)

In SCHEMEL TADD is dimensioned as TADD (200,2)

TADD (N,1) contains the maximum value in the data field during iteration N.

TADD (N,2) contains the total amount of dispersant in the data field during iteration N.

LIMRUN = 200, which is the maximum number of iterations to be run by SCHEMEL. Thus the number of values/variable to be graphed is less than or equal to 200, ie, equal to the number of iterations taken.

2, is the number of variables to be graphed.

BOTTOM (N) = 0 for both variables, thus the minimum ordinate value for both = 0.

SCALE (1) = 1/40, thus SCALE (1)*120= $\frac{1}{40}$ *120=3

The range of ordinate values for variable No. 1 is 0 to 3. Likewise, the range for variable No. 2 is 0 to 120 based on SCALE (2) = 1.

TIME = 20, this value is preset and should not be changed.

```
      PROGRAM HYPER3(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)
      DIMENSION T(41,41,2),U(41,41),V(41,41)
      DIMENSION TT(41,41),TTT(41,41)
      EQUIVALENCE (T(1,1,1),TT(1,1)),(T(1,1,2),TTT(1,1))
      COMMON/POL/XCENT,YCENT
      COMMON/POLL/LXCENT,LYCENT,AI,BI
      COMMON/PF/M,DELX,DELY,DELT,XM,XMESH,YMESH,YM,MM
      COMMON/FCTN/PI
      COMMON/ID/ITMAX,TTSUM,LN
      COMMON/COM/TASUM,TN
      COMMON/SEGNO/IVO
      COMMON/NOSEG/SEGMAX
      COMMON/C/INIT
      COMMON/SET/NSET
      COMMON/E/NSET
      REAL LXCENT,LYCENT
      INTEGER XMESH,YMESH
      INTEGER SEGMAX
      IVO=1
      INIT=0
C   INITIALIZE - - - SEGMAX = NO. OF MODEL SEGMENTS
      KST=1
      SEGMAX=3
      DELT=.01
C   SET AI,BI = TO THE INITIAL COORDINATES OF THE SOURCE POLLUTANT
C
      CALL LITHO(1)
      DO 9999 KKK=KST,SEGMAX
      NSH=0
      NSET=1
      XMESH=41
      M=XMESH-1
      YMESH=41
      MM=YMESH-1
      XM=M
      YM=MM
      DELX=1./XM
      DELY=1./YM
      PI=4.*ATAN(1.)
      XCENT=0.
      YCENT=0.
      LXCENT=0.
      LYCENT=0.
      AI=.1
      BI=.5
      CALL SETPOL (KKK)
      IF(KKK.GT.1) GO TO 100
      CALL POLPROF (1,T)
  100 CONTINUE
      NIVO=2
      IF(IVO.GT.1) NIVO=1
      CALL TIME(INIT)
      CALL LITHO3(NIVO)
      CALL LITHO(3)
      CALL VELFLD (U,V)
  150 FORMAT(1X,I2,2X,41F3.1)
      GO 200 K=1,YMESH
```

```
      PRINT 150,K,(U(J,K),J=1,XMESH)
  200 CONTINUE
      CALL TIME(INIT)
      CALL LITHO3(NIVO)
      CALL LITHO(3)
      CALL GAIN(U,0,1.,XMESH,YMESH,1)
      CALL TIME(INIT)
      CALL LITHO3(NIVO)
      CALL LITHO(4)
      DO 205 K=1,YMESH
      PRINT 150,K,(V(J,K),J=1,XMESH)
  205 CONTINUE
      CALL TIME(INIT)
      CALL LITHO3(NIVO)
      CALL LITHO(4)
      CALL GAIN(V,0,1.,XMESH,YMESH,1)
      CALL TIME(INIT)
      CALL LITHO3(NIVO)
      CALL LITHO(5)
      DO 210 K=1,YMESH
      PRINT 150,K,(T(J,K,1),J=1,XMESH)
  210 CONTINUE
C---CALL SHADE ROUTINE FOR INITIAL T-FIELD-
      CALL TIME(INIT)
      CALL LITHO3(NIVO)
      CALL LITHO(5)
      CALL GAIN(T,0,1.,XMESH,YMESH,2)
      INIT=INIT+1
      IF(IVO.GT.  NSET=3
      CALL SCHEME1(M,DELX,DELY,DELT,U,V,T,TT,TIT,LXCENT,LYCENT,XMESH,
     1YMESH,MH)
      IVO=IVO+1
      NSET=2
      NCH=0
 9999 CONTINUE
      STOP
      END
```

```
HYPER3

PROGRAM LENGTH INCLUDING I/O BUFFERS
021500

FUNCTION ASSIGNMENTS

STATEMENT ASSIGNMENTS
130    -  000053    150    -  000304

BLOCK NAMES AND LENGTHS
PBL    -  000002    POLL   -  000004    PF     -  000011    FCTN   -  000031
IJ     -  000003    CUM    -  000002    SEGNO  -  000301    NUSEG  -  000001
D      -  000001    SET    -  000001    E      -  000001

VARIABLE ASSIGNMENTS
AI     -  000002C02 BI     -  000003C02 DELT   -  000003C03 DELX   -  000031C03
DELY   -  000002C03 INIT   -  000000C11 IVO    -  000010C07 J      -  015453
K      -  015432    KKK    -  015430    KST    -  015427    LXCENT -  000030C02
LYCENT -  000C01C02 M      -  000000C03 MM     -  000010C03 NCH    -  000000C12
NIVO   -  015431    NSET   -  000000C13 PI     -  000006C04 SEGMAX -  0000030C10
T      -  000323    TT     -  000323    TTT    -  003544    U      -  006765
V      -  012206    XCENT  -  000002C01 XH     -  000004C03 XMESH  -  000005C03
YCENT  -  000001C01 YM     -  000007C03 YMESH  -  000006C03

START OF CONSTANTS
000255

START OF TEMPORARIES
000317

START OF INDIRECTS
000323

UNUSED COMPILER SPACE
031400
```

```
      SUBROUTINE SCHEME1(M,DELX,DELY,DELT,U,V,T,TT,TTT,XJ,XK,XMESH,YMESH
     1,MM)
      DIMENSION T(41,41,2),U(41,41),V(41,41)
      DIMENSION TMAX(200),TSUM(200)
      DIMENSION TADD(200,2)
      DIMENSION SCALE(2),BOTTOM(2)
      DIMENSION TT(41,41),TTT(41,41)
      EQUIVALENCE (TADD(1,1),TMAX(1)),(TADD(1,2),TSUM(1))
      COMMON/ID/TTMAX,TTSUM,LN
      COMMON/SUM/TNSUM,TN
      COMMON/SECND/IVO
      COMMON/NOSEG/SEGMAX
      COMMON/D/INIT
      COMMON/SET/NCH
      COMMON/LOC/TJ,TK
      INTEGER NEW,OLD,DUMP
      INTEGER XMESH,YMESH
      INTEGER TJ,TK
      INTEGER SEGMAX
      INTEGER XJ,XK
      REAL MUX,MUY
      NEW=2
      OLD=1
      NCH=0
      DO 4 J=1,200
      TSUM(J)=0.
      TMAX(J)=0.
    4 CONTINUE
      MAXIND=0
      TJ=0
      TK=0
      CUTOFF=.1
      CUTLIM=.005
      JMAX=XMESH-1
      KMAX=YMESH-1
      DO 5 K=1,YMESH
      DO 5 J=1,XMESH
      T(J,K,NEW)=T(J,K,OLD)
    5 CONTINUE
  150 FORMAT(1X,I2,2X,41F3.1)
      LIMRUN=200
      INJEX=20
      NN=0
      LN=0
      GRIDX=DELT/DELX
      GRIDY=DELT/DELY
      GRIX=DELT/(2.*DELX)
      GRIY=DELT/(2.*DELY)
      MUX=.1
      MUY=.1
  400 CONTINUE
      NN=NN+1
      LN=LN+1
      TN=DELT*LN
      DO 10 K=2,MM
      DO 9 J=2,M
      APLX=(U(J+1,K)+U(J,K))/2.
```

```
000126          APLY=(V(J,K+1)+V(J,K))/2.
000133          AMNX=(U(J-1,K)+U(J,K))/2.
000140          AMNY=(V(J,K-1)+V(J,K))/2.
000145          T(J,K,NEW)=T(J,K,NEW)-GRIX*(APLX*(T(J+1,K,OLD))-AMNX*(T(J-1,K,OLD)
               1))-GRIY*(APLY*(T(J,K+1,OLD))-AMNY*(T(J,K-1,OLD)))
               2    +MUX*(T(J+1,K,NEW)+T(J-1,K,NEW)-2.*T(J,K,NEW))
               3    +MUY*(T(J,K+1,NEW)+T(J,K-1,NEW)-2.*T(J,K,NEW))
000230          IF(T(J,K,NEW).LE.TMAX(LN)) GO TO 8
000237          TMAX(LN)=T(J,K,NEW)
000243          TJ=J
000244          TK=K
000245        8 CONTINUE
000255          TSUM(LN)=TSUM(LN)+T(J,K,NEW)**2
000256        9 CONTINUE
000258       10 CONTINUE
000263          DO 12 K=1,YMESH
000264          IF(T(J,K,NEW).LT.CUTLIM) T(J,K,NEW)=0.
000303          DO 11 J=1,XMESH
000305       11 CONTINUE
000310       12 CONTINUE
000313          GRIX=GRIDX
000314          GRIY=GRIDY
000316       20 CONTINUE
000316          IF(NN.EQ.INDEX) 450,500
000323      500 CONTINUE
000323          IF(LN.GT.LIMRUN) GO TO 250
000327          IF(TJ.GE.JMAX) GO TO 250
000331          DO 701 K=1,YMESH
000333          IF(T(40,K,NEW).GE.CUTOFF) GO TO 440
                C
                C
000342        701 CONTINUE
000345        401 CONTINUE
                C
                C   NOTE - - - INDICE NOTATION
                C   NEW (RHS) = N-1
                C   OLD = N
                C   NEW (LHS) = N+1
                C   DUMP = TRANSFER INDEX
                C
                C   CENTERED F. D. IS ALWAYS UNCONDITIONALLY UNSTABLE FOR THE
                C   DIFFUSION PROBLEM
                C
000345          DUMP=NEW
000347          NEW=OLD
000350          OLD=DUMP
000351       30 CONTINUE
000351          GO TO 400
000352      440 CONTINUE
000352          MAXIND=MAXIND+1
                C
                C   MAXIND KICKS T OUT OF ITERATION WHEN THE FLOW FRONT REACHES THE FAR
                C   WALL
                C
                C
                C   MAXIND IS .GT.0 WHEN THE FLOW FRONT REACHES THE FAR WALL
                C
000354        450 CONTINUE
```

```
000354          TIMAX=TMAX(LN)
000356          TTSUM=TSUM(LN)
000358          INIT=INIT+1
000361          CALL TIME(INIT)
000363          CALL LITHOJ(1)
000365          PRINT 610
000371      610 FORMAT(20X,*   T-FIELD   *,//)
000371          DO 620 K=1,YMESH
000376          PRINT 150,K,(T(J,K,NEW),J=1,XMESH)
000420      620 CONTINUE
C--- CALL S/R GAIN- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
000427          CALL TIME(INIT)
000430          CALL LITHOJ(1)
000432          CALL GAIN(TTT,0,1.,XMESH,YMESH,2)
000440          NN=0
000441          IF(MAXIND.GT.0) GO TO 250
000447          GO TO 401
000447      250 CONTINUE
000447          NCH=1
000450          TIMAX=TMAX(LN)
000452          TTSUM=TSUM(LN)
000454          CALL TIME(INIT)
000455          CALL LITHOJ(1)
000457          PRINT 610
000463          DO 630 K=1,YMESH
000473          PRINT 150,K,(T(J,K,NEW),J=1,XMESH)
000512      630 CONTINUE
C--- CALL S/R GAIN- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
000521          BOTTOM(1)=0.
000522          BOTTOM(2)=0.
000523          SCALE(1)=1./40.
000524          SCALE(2)=1.
C---CALL S/R GRAPH- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
000526          CALL GRAPH(T400,LIMRUN,LIMRUN,2,BOTTOM,SCALE,20)
000534          IF(MAXIND.EQ.SEGMAX) GO TO 9000
C
C   THIS SECTION PICKS UP THE POLLUTANT IN SEGMENT N AND TRANSFERS THE
C   POLLUTANT DISTRIBUTION AND CONCENTRATION TO SEGMENT N+1
C
000542          DO 700 J=1,XMESH
000543          DO 700 K=1,YMESH
000544          T(J,K,OLD)=0.
000563      700 CONTINUE
000561          IJ=TJ
000562          IIJ=XMESH-IJ+1
000564          DO 710 J=1,IIJ
000566          DO 705 K=1,YMESH
000567          T(J,K,OLD)=T(IJ,K,NEW)
000605      705 CONTINUE
000607          IJ=IJ+1
000610      710 CONTINUE
000613          TJ=1
000614          TK=TK
000615     9000 CONTINUE
000615          RETURN
000616          END
```

```
SCHEME1

SUBPROGRAM LENGTH
001602

FUNCTION ASSIGNMENTS

STATEMENT ASSIGNMENTS
3       -  000245    20      -  000316    30      -  000351    150     -  000623
250     -  000447    430     -  000107    401     -  000345    440     -  000392
450     -  000354    500     -  000323    610     -  000632    9000    -  000615

BLOCK NAMES AND LENGTHS
ID      -  001663    CUM     -  000002    SEGNO   -  000001    NOSEG   -  000001
0       -  000001    SET     -  000001    LOC     -  000002

VARIABLE ASSIGNMENTS
AMAX    -  001576    AMNY    -  001577    APLX    -  001574    APLY    -  001575
BOTTOM  -  001547    CUTLIM  -  001561    CUTOFF  -  001560    DUMP    -  001593
GRIDX   -  001576    GRIDY   -  001571    GRIX    -  001572    GRIY    -  001573
IFJ     -  001601    IJ      -  001600    INDEX   -  001566    INIT    -  000010005
J       -  001556    JMAX    -  001552    K       -  001564    KMAX    -  001503
LIMRUN  -  001565    LN      -  000002C01 MAXIND  -  001557    MM      -  000007
MJX     -  001554    MJY     -  001555    NCH     -  0000000306 NEW     -  001551
NN      -  001567    OLD     -  001552    SCALE   -  001545    SEGMAX  -  00000
T       -  000000    TADD    -  000725    TJ      -  000000C07 TK      -  000011C07
TMAX    -  000725    TN      -  000001C02 TSUM    -  001235    TT      -  000001
TTMAX   -  000000C01 TTSUM   -  000001C01 TTT     -  000002    XJ      -  000003
XK      -  000004    XMESH   -  000005    YMESH   -  000006

START OF CONSTANTS
000020

START OF TEMPORARIES
000543

START OF INDIRECTS
000700

UNUSED COMPILER SPACE
03C103
```

```
      SUBROUTINE TIME(INIT)
      COMMON/COM/TNSUM,TN
      COMMON/SET/NCH
      COMMON/E/NSET
      IF(INIT.EQ.0) 10,20
   10 CONTINUE
      TN=0.
      TNSUM=0.
      GO TO 300
   20 CONTINUE
      IF(NCH.EQ.1) GO TO 40
   30 CONTINUE
      IF(NSET.GT.1) GO TO 35
      TNSUM=TN
      TT=TNSUM
      GO TO 300
   35 CONTINUE
      IF(NSET.GT.2) GO TO 36
      TNSUM=TNSUM
      TN=0.
      GO TO 300
   36 CONTINUE
      TNSUM=TN+TT
      TT=TNSUM
      GO TO 300
   40 CONTINUE
      TNSUM=TNSUM
      TT=TNSUM
      GO TO 300
  300 CONTINUE
      RETURN
      END
```

TIME

SUBPROGRAM LENGTH
000046

FUNCTION ASSIGNMENTS

STATEMENT ASSIGNMENTS
10 - 000007 20 - 000011 30 - 000013 35 - 000022
36 - 000030 40 - 000034 300 - 000037

BLOCK NAMES AND LENGTHS
CJ4 - 000002 SET - 000001 E - 000001

VARIABLE ASSIGNMENTS
NUM - 00000302 NSET - 000000C03 TN - 000001C01 TNSUM - 000000C01
TT - 000045

START OF CONSTANTS
000042

START OF TEMPORARIES
000043

START OF INDIRECTS
000045

UNUSED COMPILER SPACE
032400

```
      SUBROUTINE POLPROF(I,T)
      COMMON/POL/XCENT,YCENT
      COMMON/PF/M,DELX,DELY,DELT,XM,XMESH,YMESH,YM,MM
      DIMENSION T(41,41,2)
      INTEGER XMESH,YMESH
C
C   SUB POLPROF SETS THE INITIAL TWO-DIMENSIONAL (AREAL) PROFILE
C   DISTRIBUTION OF THE SOURCE POLLUTANT
C
C   CASE 1 = CONIC PROJECTION DISTRIBUTION
C
      GO TO (100,200,300,400,500,600,700),I
  100 CONTINUE
      R=.15
      R2=R*R
      AN=1./R2
      DO 3 J=1,XMESH
      X=(J-1)*DELX
      DO 2 K=1,YMESH
      Y=(K-1)*DELY
      T(J,K,1)=AN*(R2-(X-XCENT)**2-(Y-YCENT)**2)
      IF(T(J,K,1).LT.0.) T(J,K,1)=0.
    2 CONTINUE
    3 CONTINUE
      GO TO 1000
  200 CONTINUE
      GO TO 1000
  300 CONTINUE
      GO TO 1000
  400 CONTINUE
      GO TO 1000
  500 CONTINUE
      GO TO 1000
  600 CONTINUE
      GO TO 1000
  700 CONTINUE
      GO TO 1000
 1000 CONTINUE
      RETURN
      END
```

```
POLPROF

SUBPROGRAM LENGTH
000127

FUNCTION ASSIGNMENTS

STATEMENT ASSIGNMENTS
2     - 000057   100   - 000017   200   - 000065   300   - 000066
400   - 000067   500   - 000070   600   - 000071   700   - 000072
1000  - 000073

BLOCK NAMES AND LENGTHS
POL   - 000000   PF    - 000011

VARIABLE ASSIGNMENTS
AN    - 000122   DELX  - 000001C02 DELY  - 000002C02 J     - 000123
K     - 000125   R     - 000120    R2    - 000121    X     - 000124
XCENT - 000000C01 XMESH - 000005C02 Y     - 000126    YCENT - 00000IC01
YMESH - 000006C02

START OF CONSTANTS
000076

START OF TEMPORARIES
000101

START OF INDIRECTS
000115

UNUSED COMPILER SPACE
032200
```

```
                SUBROUTINE SETPOL (KK)
000003          COMMON/POL/XCENT,YCENT
000003          COMMON/POLL/LXCENT,LYCENT,AI,BI
000003          REAL LXCENT,LYCENT
000003          I=1
000004          IF(KK.GT.1) I=2
000007          GO TO (100,200),I
C
C   STMT 100 - - - SETS THE INITIAL SOURCE COORDINATES
C
000015      100 CONTINUE
000016          XCENT=AI
000016          YCENT=BI
000020          GO TO 1000
000021      200 CONTINUE
000021          XCENT=LXCENT
000022          YCENT=LYCENT
000024     1000 CONTINUE
000024          RETURN
000025          END
```

```
SETPOL

SUBPROGRAM LENGTH
000033

FUNCTION ASSIGNMENTS

STATEMENT ASSIGNMENTS
100    -  000015    200    -  000021    1000   -  000024

BLOCK NAMES AND LENGTHS
POL    -  000002    POLL   -  000004

VARIABLE ASSIGNMENTS
AI     -  000002C02 BI     -  000003C02 I      -  000032   LXCENT -  000000C02
LYCENT -  0000010U2 XCENT  -  0J0000CC1 YCENT  -  000001C01

START OF CONSTANTS
000027

START OF TEMPORARIES
000030

START OF INDIRECTS
000032

UNUSED COMPILER SPACE
032400
```

```
      SUBROUTINE VELFLD (U,V)
000005 COMMON/POL/XCENT,YCENT
000005 COMMON/PF/M,DELX,DELY,DELT,XM,XMESH,YMESH,YM,MM
000005 COMMON/FUTN/PI
000005 INTEGER XMESH,YMESH
C
C   S/R VELFLD IS USED TO SET THE INITIAL VELOCITY FIELD
C
      DIMENSION U(41,41),V(41,41)
      DO 3 J=1,XMESH
      X=(J-1)*DELX
      DO 2 K=1,YMESH
      Y=(K-1)*DELY
      ARGX=PI*X
      ARGY=PI*Y
      U(J,K)=SIN(ARGY)
      V(J,K)=0.
    2 CONTINUE
    3 CONTINUE
      RETURN
      END
```

VELFLD

SUBPROGRAM LENGTH
000254

FUNCTION ASSIGNMENTS

STATEMENT ASSIGNMENTS

BLOCK NAMES AND LENGTHS
PBL - 000002 PF - 000011 FCTN - 000001

VARIABLE ASSIGNMENTS
ARGX - 000062 ARGY - 000063 DELX - 000001C02 DELY - 000002C02
J - 000056 K - 000060 PI - 000100C03 X - 000057
XMESH - 0001005002 Y - 000061 YMESH - 0001006C02

START OF CONSTANTS
000045

START OF TEMPORARIES
000046

START OF INDIRECTS
000054

UNUSED COMPILER SPACE
032300

```
      SUBROUTINE LITHO(I)
      GO TO (100,200,300,400,500,600),I
  100 CONTINUE
      PRINT 1
    1 FORMAT(1H1,///,20X,*SOLN. OF THE HEAT CONDUCTION EQUATION*/20X,*ES
     1TUARY PROGRAM NO. 3*/20X,*WRITTEN BY K. L. ECHTERNACHT*,//20X,*CON
     2VECTION AND DIFFUSION OF A SCALAR*,/)
      GO TO 9300
  200 CONTINUE
      GO TO 9300
  300 CONTINUE
      PRINT 3
    3 FORMAT(//,20X,*INITIAL U-VELOCITY FIELD*,///)
      GO TO 9300
  400 CONTINUE
      PRINT 4
    4 FORMAT(//,20X,*INITIAL V-VELOCITY FIELD*,///)
      GO TO 9300
  500 CONTINUE
      PRINT 5
    5 FORMAT(//,20X,*INITIAL T-FIELD*,///)
      GO TO 9300
  600 CONTINUE
      GO TO 9300
 9300 CONTINUE
      RETURN
      END
```

LITHO

SUBPROGRAM LENGTH
000121

FUNCTION ASSIGNMENTS

STATEMENT ASSIGNMENTS

1	-	000054	3	-	000076	4	-	000104	5	-	000112
100	-	000015	200	-	000023	300	-	000024	400	-	000032
500	-	000040	600	-	000046	9300	-	000047			

BLOCK NAMES AND LENGTHS

VARIABLE ASSIGNMENTS

START OF CONSTANTS
000052

START OF TEMPORARIES
000117

START OF INDIRECTS
000121

UNUSED COMPILER SPACE
032300

```
      SUBROUTINE LITHO3(IND)
      COMMON/ID/TTMAX,TTSUM,LN
      COMMON/COM/TNSUM,TN
      COMMON/SEGNO/IVO
      COMMON/LOC/TJ,TK
      GO TO (10,20),IND
   10 CONTINUE
      PRINT 600,TN,TNSUM,TTMAX,TTSUM,IVO,TJ,TK
  600 FORMAT(1H1,9X,*ELAPSED TIME =*F6.3/10X,*CUMULATIVE ELAPSED TIME =*
     1F6.3/10X,*MAXIMUM VALUE OF T =*,E14.6/10X,*SUM OF T-SQUARED OVER T
     2HE REGION =*,E14.6/10X,*SEGMENT NO. = *,I3/10X,*COORDINATES OF CON
     3C. MAXIMUM - - J = *,I3,2X,*, K = *,I3,//)
      GO TO 30
   20 CONTINUE
      PRINT 100, TN,TNSUM,IVO
  100 FORMAT(1H1,9X,*ELAPSED TIME =*F6.3/10X,*CUMULATIVE ELAPSED TIME =*
     1F3.3/10X,*SEGMENT NO. = *,I3,//)
      GO TO 30
   30 CONTINUE
      RETURN
      END
```

```
LITH03

SUBPROGRAM LENGTH
000124

FUNCTION ASSIGNMENTS

STATEMENT ASSIGNMENTS
10     -  000011    20     -  000035    30     -  000051    100    -  000107
500    -  000056

BLOCK NAMES AND LENGTHS
IO     =  000003    COM    =  000002    SEGNO  =  000001    LOC    =  000002

VARIABLE ASSIGNMENTS
IVO    -  000000C03 TJ     -  000000C04 TK     -  000001C04 TN     -  000001C02
TNSU4  =  000000C02 TTMAX  -  000000C01 TTSUM  -  000001C01

START OF CONSTANTS
000054

START OF TEMPORARIES
000122

START OF INDIRECTS
000124

UNUSED COMPILER SPACE
032300
```

```
                SUBROUTINE GAIN(A,IFACT,SHDITV,NS,LS,INDI)
000011          DIMENSION RFIELD(44),ICTL(8),RCTL(2)
000011          DIMENSION A(41,41)
000011          COMMON/SHAD/INDEX(2)
000011          DATA LANK/1H /
                C
                C   NS = LONGITUDINAL COORDINATE
                C   LS = LATERAL COORDINATE
                C
                C.....................................................................
                C   SHADE CODING DESCRIPTION
                C
                C   ICTL(1) = CALL CODE = 1
                C   ICTL(2) = OUTPUT TAPE NUMBER
                C   ICTL(3) = LEFT SHADE MARGIN
                C   ICTL(4) = NUMBER OF SHADING LINES
                C   ICTL(5) = NUMBER OF FIELDS
                C   ICTL(6) = FIELD WIDTH
                C   ICTL(7) = 1
                C   ICTL(8) = EDGE OR FILL MODE
                C - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
                C   RCTL(1) = CYCLE POINT
                C   RCTL(2) = SHADE INTERVAL
                C - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
                C   RFIELD = ONE DIMENSIONAL VECTOR WITH NUMERIC INFORMATION TO BE
                C   SHADED
                C.....................................................................
000011          CALL SHADE(2,0,0,INDI)
000014          NNS=0
000015          ICTL(8)=0
000016          ICTL(1)=1
000017          ICTL(2)=6
000020          ICTL(3)=6
000021          IF(NS.GT.40) 11,12
000031       11 NNS=40
000032          GO TO 13
000033       12 NNS=NS
000034       13 CONTINUE
000034          ICTL(6)=120/NNS
000037          ICTL(5)=NNS
000040          N=ICTL(5)
000041          NK=1
000042          IF(NK.GT.1) ICTL(4)=2
000045          IF(NK.LE.1) ICTL(4)=1
000050          ICTL(7)=1
000051          RCTL(1)=0.
000052          RCTL(2)=SHDITV
000053          K=5
000054          TEN=10.
000055          XFACT=IFACT
000057          TENEIF = TEN ** IFACT                                    45MB023J
000062          DO 10 I=1,44
000064       10 RFIELD(I)=0.
000067          CALL SHADE(ICTL,RCTL,0,INDI)
000072          DO 760 I=1,LS
000077          INDEX(1)=I/10
000102          INDEX(2)=I-10*INDEX(1)
```

```
000105          DO 600 JJ=1,N
000109          RFIELD(JJ)=A(JJ,I)*TENEIF
000117      600 CONTINUE
000121          CALL SHADE(0,0,RFIELD(1),INDI)
000125      700 CONTINUE
000133          RETURN                                          45MBU510
000133          END
```

```
GAIN

SUBPROGRAM LENGTH
000253

FUNCTION ASSIGNMENTS

STATEMENT ASSIGNMENTS
10    - 000064    11    - 000031    12    - 000033    13    - 000034

BLOCK NAMES AND LENGTHS
SHAD  - 000002

VARIABLE ASSIGNMENTS
I     - 000251    ICTL  - 000227    INDEX - 0000000001 JJ    - 000252
K     - 000245    LANK  - 000241    N     - 000243    NK    - 000244
NNS   - 000242    RCTL  - 000237    RFIELD - 000153   TEN   - 000246
TENEIF - 000250   XFACT - 000247

START OF CONSTANTS
000253

START OF TEMPORARIES
000345

START OF INDIRECTS
000350

UNUSED COMPILER SPACE
032503
```

```
      SUBROUTINE SHADE(ICTL,RCTL,BVAL,INDI)
000007      DIMENSION ICTL(8),RCTL(2),BVAL(44),AVAL(44),ALIN(129),CTBL(129),
     *ALIN(129),BLIN(129),CLIN(129)
000007      DIMENSION DTBL(20)
000007      DIMENSION CURTBL(11)
000007      COMMON/SHAD/INDEX(2)
000007      EQUIVALENCE (ALIN,CLIN),(BLANK,LANK)
000007      DATA DTBL / 1H1,1H ,1H2,1H ,1H3,1H ,1H4,1H ,1H5,1H ,
     1     1H6,1H ,1H7,1H ,1H8,1H ,1H9,1H ,1H0,1H  /
000007      DATA CTBL / 1H.,1H*,1H0,1H+ /
000007      DATA BLANK / 1H /
000007      DATA CURTBL / 1H4,1H ,1H6,1H ,1H2,1H3,1H1,1H ,1H5,1H ,1H9 /
      C
      C*****************************************************************
      C     CALL SHADE (ICTL, RCTL, RFIELD)                           *
      C*****************************************************************
      C     ICTL(1)  ...  CALL CODE                                   *
      C           =0  -NORMAL INTRA-FIELD CALL                        *
      C                  (ONLY RFIELD IS USED, ICTL(2) THRU ICTL(8) AN*
      C                  RCTL ARE IGNORED)                            *
      C           =1  -BEGINNING-OF-FIELD CALL                        *
      C                  (ONLY ICTL AND RCTL PARAMETERS ARE USED, RFIELD
      C                  IS IGNORED)                                  *
      C     ICTL(2)  ...  OUTPUT TAPE NUMBER                          *
      C     ICTL(3)  ...  LEFT (SHADE) MARGIN                         *
      C     ICTL(4)  ...  NUMBER OF SHADING LINES                     *
      C     ICTL(5)  ...  NUMBER OF FIELDS                            *
      C     ICTL(6)  ...  FIELD WIDTH                                 *
      C     ICTL(7)  ...  IS THERE INTERSPERSED NUMERIC INFORMATION   *
      C           =1  -NO                                             *
      C           =2  -YES                                            *
      C     ICTL(8)  ...  (EDGE) OR (FIELD) MODE                      *
      C*****************************************************************
      C     RCTL(1)  ...  CYCLE POINT                                 *
      C     RCTL(2)  ...  SHADE INTERVAL                              *
      C*****************************************************************
      C     RFIELD   ...  ONE DIMENSIONAL VECTOR WITH NUMERIC INFORMATION
      C                   TO BE SHADED                                *
      C*****************************************************************
      C
000007      ICT=ICTL(1)
000010      IF(ICT -1)3003,1000,2000
      C
000012  3000 CONTINUE
000012      IF(LINEX1.NE.2) GO TO 3003
000014      DO 3002 I=1,44
000016  3002 AVAL(I)=BVAL(I)
000022  3003 ALIN(LM)=BLIN(LM)
000024      IF(AVAL(1)*BVAL(1).EQ.0.) ALIN(LM)=BLANK
000030      BLIN(LM)=BVAL(1)
000032      K=0
000033      IW=IFW
000034      KSW=0
000035      CLIN(3)=CLIN(4)=BLANK
      C
000040  3001 DO 3009 I=LMA, MR
000042      ALIN(I)=BLIN(I)
```

```
000044          IF(KSW.EQ.1) ALIN(I-1)=BLANK
000050          IF(IW-IFW)3005,3004,3005
000052    3004  CONTINUE
000052          KSW=0
000053          K=K+1
000055          KA=K+1
000056          IF(BVAL(K)*BVAL(KA)*AVAL(K)*AVAL(KA).EQ.0.) KSW=1
000064          IW=0
000065    3005  IW=IW+I
000067          FW=IW
000070    3009  ALIN(I)=( BVAL(K)*(FW-FO) + BVAL(KA)*FO ) / FW
000102          IF(KSW.EQ.1) ALIN(MR)=BLANK
        C
000106          LINE1=LINE1
000107          GO TO (3051,3010), LINE1
000115    3010  CONTINUE
000115          LINE1=1
000116          INUMP=INUMP
000117          GO TO(3021,3020),INUMP
000125    3021  DO 3029 I=LM, MR
000127          IF(CLIN(I).NE.BLANK) ALIN(I)=BLIN(I)
000133    3029  CONTINUE
        C
000136    3051  DO 3059 L=1, NSLX
000140          VO=L
000141          CVO=VOIVS-VO
        C---(L.NE.NSLX)=TO SUPPRESS MARGIN NUMBERING IF VERT. DENS. GT 1 LINE
000143          IF(L.NE.NSLX) GO TO 3061
000145          J=2*INDEX(1)-1
000147          IF(J.LT.1) J=18
000151          CLIN(3)=DTBL(J)
000153          J=2*INDEX(2)-1
000155          IF(J.LT.1) J=19
000161          CLIN(4)=DTBL(J)
        C---CLIN(3),CLIN(4)-ROW NOS.-USE DTBL(J) FOR ROW NOS.
        C
000162    3061  DO 3069 I=LM, MR
000164          IF(CLIN(I).EQ.BLANK) GO TO 3066
000166          VALV=( ALIN(I)*CVO + BLIN(I)*VO ) /VOIVS - CP
000174          IBLC=AMOD(VALV/SINT,TLEN)
000200          IF(INDI.EQ.1) 5000,5001
000204    5001  CONTINUE
000204          IF(IBLC)3066,3068,3066
000206    3066  IT=IBLC
000210          IF(IT.GE.3.AND.IT.LT.6) 4000,4001
000220    4000  CLIN(I)=CTBL(3)
000222          GO TO 3069
000223    4001  CONTINUE
000223          IF(IT.GE.6) 4002,4003
000230    4002  CLIN(I)=CTBL(4)
000232          GO TO 3069
000233    4003  CONTINUE
000233          IF(IT.GE.1.AND.IT.LT.3) 4004,4005
000243    4004  CLIN(I)=CTBL(2)
000245          GO TO 3069
000246    4005  CONTINUE
000246          IF(IBLC.GE.1.AND.IBLC.LT.1.3) 4006,4007
000257    4006  CLIN(I)=CTBL(1)
```

```
000261          GO TO 3049
000262    4007  CONTINUE
000263    3045  CLIN(I)=BLANK
000264          GO TO 6000
000265    5000  CONTINUE
000266          IF(TBLC.GT..6.AND.TBLC.LE.1.0) 5010,5011
000277    5010  CLIN(I)=CURTBL(1)
000331          GO TO 6000
000332    5011  CONTINUE
000333          IF(TBLC.GT..4.AND.TBLC.LE..8) 5015,5016
000314    5015  CLIN(I)=CURTBL(2)
000316          GO TO 6000
000317    5016  CONTINUE
000317          IF(TBLC.GT.+.AND.TBLC.LE..6) 5020,5021
000331    5020  CLIN(I)=CURTBL(3)
000333          GO TO 6000
000334    5021  CONTINUE
000334          IF(TBLC.GT..2.AND.TBLC.LE..4) 5025,5026
000345    5025  CLIN(I)=CURTBL(4)
000350          GO TO 6000
000351    5026  CONTINUE
000351          IF(TBLC.GT.0..AND.TBLC.LE..2) 5030,5031
000352    5030  CLIN(I)=CURTBL(5)
000354          GO TO 6000
000355    5031  CONTINUE
000365          IF(TBLC.LT.0.) 5035,5036
000371    5035  CLIN(I)=CURTBL(6)
000373          GO TO 6000
000374    5036  CONTINUE
000374          IF(TBLC.LT.0..AND.TBLC.GE.-.2) 5040,5041
000404    5040  CLIN(I)=CURTBL(7)
000406          GO TO 6000
000407    5041  CONTINUE
000417          IF(TBLC.LT.-.2.AND.TBLC.GE.-.4) 5045,5046
000420    5045  CLIN(I)=CURTBL(8)
000422          GO TO 6000
000423    5046  CONTINUE
000423          IF(TBLC.LT.-.4.AND.TBLC.GE.-.6) 5050,5051
000434    5050  CLIN(I)=CURTBL(9)
000436          GO TO 6000
000437    5051  CONTINUE
000437          IF(TBLC.LT.-.6.AND.TBLC.GE.-.8) 5055,5056
000450    5055  CLIN(I)=CURTBL(10)
000452          GO TO 6000
000453    5056  CONTINUE
000453          IF(TBLC.LT.-.8.AND.TBLC.GE.-1.0) 5060,5061
000464    5060  CLIN(I)=CURTBL(11)
000466          GO TO 6000
000467    5061  CONTINUE
000467    6000  CONTINUE
000467    3049  CONTINUE
000472          CLIN(1)=BLANK
C
000473          PRINT 3039, CLIN
000501    3059  CONTINUE
C
000536          NSLX=NSL
000537    3020  DO 3060 I=1,44
```

```
000511      3680 AVAL(I)=BVAL(I)
000515           RETURN
             C
             C*****************************************************************
             C
000515      1000 CONTINUE
000515           NIP=ICTL(2)
000517           LM=ICTL(3)
000521           LMA=LM+1
000522           NSL=ICTL(4)
000523           NF=ICTL(5)
000525           IFW=ICTL(6)
000526           FW=IFW
000527           MR=LM+(NF-1)*IFW
000533           IF(MR-LL)1005,1005,1005
000535      1005 MR=LL
000537      1006 CONTINUE
             C
000537           GP=RCTL(1)
000546           SINT=RCTL(2)
             C
000542      1011 DO 1019 I=1, LL
             C
000544      1019 CLIN(I)=BLANK
000550      1023 VDIVS=NSL
000552           INUMP=1
000553           NSLX=1
000554      1050 LINE1=2
000555           RETURN
             C
000560      2000 CONTINUE
000566           TLEN=20.0
000570           DO 2029 I=2,20,2
000571      2029 DTOL(I)=BLANK
000574           LL=129
             C
000565      3099 FORMAT(129A1)
000565           RETURN
000566           END
```

SHADE

SUBPROGRAM LENGTH
002006

FUNCTION ASSIGNMENTS

STATEMENT ASSIGNMENTS

1000	-	000515	1005	-	000535	1006	-	000537	1011	-	000542
1019	-	000544	1023	-	000553	1050	-	000554	2000	-	000556
2029	-	000561	3000	-	000012	3001	-	000040	3002	-	000016
3003	-	000022	3004	-	000052	3005	-	000105	3010	-	000115
3020	-	000507	3021	-	000125	3023	-	000133	3041	-	000132
3045	-	000[illegible]6	3048	-	000262	3049	-	000467	3051	-	000136
3053	-	000[illegible]11	3099	-	000610	4000	-	000220	4001	-	000223
4002	-	000230	4003	-	000233	4004	-	000243	4005	-	000246
4006	-	000257	4007	-	000262	5000	-	000265	5001	-	000234
5010	-	000277	5011	-	000302	5015	-	000314	5016	-	000317
5020	-	000331	5021	-	000334	5025	-	000346	5026	-	000351
5030	-	000352	5031	-	000365	5035	-	000371	5036	-	000374
5040	-	000404	5041	-	000407	5045	-	000420	5046	-	000423
5050	-	000434	5051	-	000437	5055	-	000450	5056	-	000453
5060	-	000464	5061	-	000467	6000	-	000467			

[illegible] NAMES AND LENGTHS
SHAD - 000002

VARIABLE ASSIGNMENTS

ALIN	-	000630	AVAL	-	001032	BLANK	-	001031	BLIN	-	001317
CLIN	-	001516	CP	-	001775	CTBL	-	001106	CURTBL	-	001735
C73	-	001771	DTBL	-	001711	FD	-	001763	FN	-	001764
I	-	001752	ICT	-	001750	IFH	-	001756	INDEX	-	0000000001
INJMP	-	001765	IT	-	002031	IW	-	001755	J	-	001773
K	-	001754	KA	-	001762	KSW	-	001757	L	-	001766
LANK	-	001631	LIN	-	000630	LINE1	-	001751	LL	-	002035
LM	-	001753	LMA	-	001760	MR	-	001761	NF	-	002034
NSL	-	002002	NSCX	-	001767	NTP	-	002003	SINT	-	001777
TBLC	-	001776	TLEN	-	002000	VALV	-	001774	VD	-	001770
VDIVS	-	001772									

START OF CONSTANTS
000570

START OF TEMPORARIES
000612

START OF INDIRECTS
000621

UNUSED COMPILER SPACE
027600

```
      SUBROUTINE GRAPH(DATA,NUM,PTS,VAR,LOWER,SCALE,TIME)                GRAPH  1
C                                                                        GRAPH  2
C     FORTRAN EXTENDED SUBROUTINE                                        GRAPH  3
C                                                                        GRAPH  4
C     LENGTHWISE GRAPH OF *VAR* VARIABLES.                               GRAPH  5
C                                                                        GRAPH  6
C     *VAR* IS THE NUMBER OF VARIABLES TO BE GRAPHED.   (INTEGER)        GRAPH  7
C                                                                        GRAPH  8
C     *DATA*  THE VALUES WHICH ARE TO BE GRAPHED ARE STORED              GRAPH  9
C       IN AN ARRAY *DATA(PTS,VAR)*.                                     GRAPH 10
C                                                                        GRAPH 11
C     *PTS* IS THE NUMBER OF VALUES OF EACH VARIABLE.   (INTEGER)        GRAPH 12
C     *PTS* NATURALLY IS THE SAME FOR EACH VARIABLE.                     GRAPH 13
C                                                                        GRAPH 14
C     *NUM* IS THE NUMBER OF POINTS TO BE GRAPHED.                       GRAPH 15
C     *NUM* MUST BE LESS THAN OR EQUAL TO *PTS*.                         GRAPH 16
C                                                                        GRAPH 17
C     *LOWER* IS AN ARRAY *LOWER(VAR)* OF THE MINIMUM VALUE              GRAPH 18
C       OF EACH VARIABLE WHICH IS TO BE GRAPHED.                         GRAPH 19
C       THESE MINIMUMS NEED NOT BE THE SAME FOR EACH VARIABLE.           GRAPH 20
C                                                                        GRAPH 21
C     *SCALE* IS AN ARRAY *SCALE(VAR)* OF THE SCALE FACTOR WHICH         GRAPH 22
C       IS TO BE APPLIED TO EACH VARIABLE.  THESE NUMBERS                GRAPH 23
C       ARE THE RANGE REPRESENTED BY ONE SPACE ON EACH LINE.             GRAPH 24
C       THE EFFECTIVE WIDTH OF THE GRAPH IS  SCALE(VAR)*120  FOR         GRAPH 25
C       EACH VARIABLE.  THESE SCALE FACTORS NEED NOT BE THE SAME         GRAPH 26
C       FOR EACH VARIABLE.                                               GRAPH 27
C                                                                        GRAPH 28
C----------------------------------------------------------------------  GRAPH 29
      INTEGER PTS                                                        GRAPH 30
      INTEGER VAR,TIME,CODE,BAR                                          GRAPH 31
      DIMENSION SCL(7),DATA(PTS,VAR)                                     GRAPH 32
      DIMENSION LINE(122),LOWER(1),SCALE(1),CODE(9)                      GRAPH 33
      REAL LOWER                                                         GRAPH 34
                                                                         GRAPH 35
C     INITIALIZE ALL THE NECESSARY THINGS                                GRAPH 36
                                                                         GRAPH 37
      IBLANK=1H                                                          GRAPH 38
      IVERT=1HI                                                          GRAPH 39
      IHORIZ=1H-                                                         GRAPH 40
      IRANGE=1HR                                                         GRAPH 41
      IEQUAL=1H=                                                         GRAPH 42
      BAR=0                                                              GRAPH 43
      CODE(1)=1H*                                                        GRAPH 44
      CODE(2)=1H+                                                        GRAPH 45
      CODE(3)=1HO                                                        GRAPH 46
      CODE(4)=1HX                                                        GRAPH 47
      CODE(5)=1H.                                                        GRAPH 48
      CODE(6)=1HH                                                        GRAPH 49
      CODE(7)=1HG                                                        GRAPH 50
      CODE(8)=1HE                                                        GRAPH 51
      CODE(9)=1HK                                                        GRAPH 52
C     END OF INITIALIZATION ------------------------------               GRAPH 53
                                                                         GRAPH 54
C     PRINT OUT THE PERTAINENT INFORMATION                               GRAPH 55
      PRINT 9101                                                         GRAPH 56
      PRINT 9000,VAR,TIME
```

```
      C     CHECK THE NUMBER OF VARIABLES FOR ERRORS                  GRAPH 57
000036      IF(VAR.GE.1.OR.VAR.LE.9) GO TO 5                          GRAPH 58
000373      PRINT 8999                                                GRAPH 59
000376      RETURN                                                    GRAPH 60
000377    5 CONTINUE                                                  GRAPH 61
000377      DO 10 J=1,VAR                                             GRAPH 62
000104   10 PRINT 9001,J,LOWER(J),SCALE(J),CODE(J)                    GRAPH 63
000141      PRINT 9002                                                GRAPH 64
000146      PRINT 9003                                                GRAPH 65
000150      DO 20 J=1,VAR                                             GRAPH 66
000156      SAM=LOWER(J)                                              GRAPH 67
000157      DO 15 K=1,7                                               GRAPH 68
000161      SCL(K)=SAM                                                GRAPH 69
000163   15 SAM=SAM+20.*SCALE(J)                                      GRAPH 70
000176      PRINT 9003,CODE(J),(SCL(K),K=1,7)                         GRAPH 71
000213   20 CONTINUE                                                  GRAPH 72
      C     MAKE UP THE FIRST LINE----------                          GRAPH 73
000221      DO 50K=1,122                                              GRAPH 74
000222   50 LINE(K)=IHORIZ                                            GRAPH 75
000225      LINE(1)=IVERT                                             GRAPH 76
000227      LINE(21)=IVERT                                            GRAPH 77
000230      LINE(41)=IVERT                                            GRAPH 78
000231      LINE(61)=IVERT                                            GRAPH 79
000232      LINE(81)=IVERT                                            GRAPH 80
000233      LINE(101)=IVERT                                           GRAPH 81
000234      LINE(121)=IVERT                                           GRAPH 82
000235      PRINT 9006,(LINE(K),K=1,122)                              GRAPH 83
000291   60 CONTINUE                                                  GRAPH 84
000251  100 CONTINUE                                                  GRAPH 85
      C     START THE GRAPHING ************************************** GRAPH 86
000251      DO 200 I=1,NUM                                            GRAPH 87
      C     COMMY OUT THE LINE  ------------------------------------- GRAPH 88
000256      IF(NOD(I,TIME).EQ.0) GO TO 105                            GRAPH 89
000262      DO 101 K=1,122                                            GRAPH 90
000264  101 LINE(K)=ISLANK
000267      IFLAG=0
000270      GO TO 110
000271  105 DO 106 K=1,122
000273  106 LINE(K)=IHORIZ
000276      IFLAG=1
000277  110 CONTINUE
000277      LINE(1)=IVERT
000301      LINE(21)=IVERT                                            GRAPH 93
000302      LINE(41)=IVERT                                            GRAPH100
000313      LINE(61)=IVERT                                            GRAPH101
000314      LINE(81)=IVERT                                            GRAPH102
000315      LINE(101)=IVERT                                           GRAPH103
000316      LINE(121)=IVERT                                           GRAPH104
      C     FILL THE LINE WITH THE DATA ---------------------------------GRAPH105
000317      DO 150 J=1,VAR                                            GRAPH106
000310      AIN=(DATA(I,J)-LOWER(J))/SCALE(J)                         GRAPH107
000317      IN=IFIX(AIN)+1                                            GRAPH108
000323      IF(IN.GT.1) GO TO 120                                     GRAPH109
000325      LINE(1)=IRANGE                                            GRAPH110
000326      GO TO 150                                                 GRAPH111
000326  120 IF(IN.LT.122) GO TO 130                                   GRAPH112
000331      LINE(122)=IRANGE                                          GRAPH113
000332      GO TO 150                                                 GRAPH114
```

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000333      130 IF(LINE(IN).EQ.IBLANK)  GO TO 140                          GRAPH115
000336          IF(LINE(IN).EQ.IHORIZ)  GO TO 140                          GRAPH116
000341          IF(LINE(IN).EQ.IVERT )  GO TO 140                          GRAPH117
000342          LINE(IN)=IEQUAL                                            GRAPH118
000343          GO TO 150                                                  GRAPH119
000344      140 LINE(IN)=LOOUL(J)                                          GRAPH120
000347      150 CONTINUE                                                   GRAPH121
            C   PRINT OUT THE LINE ACCORDING TO THE CORRECT FORMAT*********GRAPH122
000352          IF(IFLAG.GT.0) GO TO 160                                   GRAPH123
000354      170 PRINT 9151,I,(LINE(K),K=1,122)                             GRAPH124
000373          GO TO 200                                                  GRAPH125
000377      180 RAN=RAN+1                                                  GRAPH126
000401          PRINT 9161,RAN,(LINE(K),K=1,122)                           GRAPH127
000417      200 CONTINUE                                                   GRAPH128
            C   END THE GRAPHING ********************************************GRAPH129
            C                                                              GRAPH130
            C   MAKE UP THE LAST LINE ------------                         GRAPH131
000425          DO 250 K=1,122                                             GRAPH132
000425      250 LINE(K)=IHORIZ                                             GRAPH133
000431          LINE(1)=IVERT                                              GRAPH134
000433          LINE(21)=IVERT                                             GRAPH135
000434          LINE(41)=IVERT                                             GRAPH136
000436          LINE(61)=IVERT                                             GRAPH137
000440          LINE(81)=IVERT                                             GRAPH138
000443          LINE(101)=IVERT                                            GRAPH139
000446          LINE(121)=IVERT                                            GRAPH140
000451          PRINT 9005,(LINE(K),K=1,122)                               GRAPH141
            C    PUT ON END UP INFO                                        GRAPH142
000465          PRINT 9005 ,NUM,VAR                                        GRAPH143
000471          RETURN                                                     GRAPH144
            C                                                              GRAPH145
            C   PRINTER FORMATS-------------------------------------------GRAPH146
            C                                                              GRAPH147
000472     8999 FORMAT(* THE NUMBER OF VARIABLES PASSED TO SUBROUTINE GRAPH WAS NUGRAPH148
           8999*T BETWEEN 1 AND 9.*)                                       GRAPH149
000472     9000 FORMAT(1X*GRAPH OF *I3* VARIABLES WITH EVERY *I5* LINES MARKED*/9X
           9001*VARIABLE*7X*LOWER LIMIT*4X*,CALL FACTOR*3X*SYMBOL*)
000472     9101 FORMAT(10XI5    ,5XE10.3,5XE10.3,10XA1)                   GRAPH152
000472     9002 FORMAT(/* EXCEEDING LIMITS RESULTS IN .X. IN FIRST OR LAST COLUMN.GRAPH153
           9021*/* DUPLICATION OF POINTS IS INDICATED BY .=..*///)        GRAPH154
000472     9003 FORMAT(* THE FOLLOWING ARE THE VALUES OF THE VERTICAL REFERENCE LIGRAPH155
           9031NES FOR EACH VARIABLE.*/)                                   GRAPH156
000472     9005 FORMAT(1HA1,7XE10.2,9(10XE10.2),5XE10.2)                  GRAPH157
000472     9006 FORMAT(11X* +*122A1*+*)                                   GRAPH158
000472     9009 FORMAT(//I6* POINTS OF *I4* VARIABLES GRAPHED*)           GRAPH159
000472     9150 FORMAT(1XI10* +*122A1*+*)                                 GRAPH160
000472     9160 FORMAT(1XI10* +*122A1*+*)                                 GRAPH161
000472     9161 FORMAT(1H1)                                               GRAPH162
            C                                                              GRAPH163
000472          END                                                        GRAPH163
```

```
GRAPH

SUBPROGRAM LENGTH
001187

FUNCTION ASSIGNMENTS

STATEMENT ASSIGNMENTS
5     - 000077   50    - 000222   66    - 000291   100   - 000291
131   - 000364   135   - 000271   166   - 000273   110   - 000277
121   - 000326   130   - 000353   140   - 000344   153   - 000347
170   - 000394   160   - 000377   200   - 000417   253   - 000426
9999  - 000553   9000  - 000545   9001  - 000562   9002  - 000567
9003  - 000534   9005  - 000616   9006  - 000523   9009  - 000626
9153  - 000654   9180  - 000640   9181  - 000644

BLOCK NAMES AND LENGTHS

VARIABLE ASSIGNMENTS
AIN   - 001155   CODE  - 000660   I     - 001103   IBLANK - 001073
IBUFL - 001077   IFLAG - 001104   IHORIZ - 001075   IN    - 001136
IRANGE - 001076  IVERT - 001074   J     - 001100   K     - 001102
LINE  - 000741   RAN   - 000671   SAM   - 001151   SCL   - 000672
TIME  - 000000

START OF CONSTANTS
000474

START OF TEMPORARIES
000646

START OF INDIRECTS
000654

UNUSED COMPILER SPACE
030233
```

```
CORE MAP  17.55.12.  NORMAL              CONTROL                                                  000100    034155    000000    000000
     ---TIME---LOAD MODE --L1--L2-----TYPE---------------USER----++---CALL-------------FWA LOAD--LWA LOAD--BLNK COMN--LENGTH--
     FWA LOADER  062771  FWA TABLES  060542
     -PROGRAM----ADDRESS-                    --LABELED---COMMON--
     HYPERB      000132                              POL         000103
                                                     POLL        000102
                                                     PF          000106
                                                     FCTN        000117
                                                     ID          000120
                                                     CUM         000123
                                                     SEGNO       000125
                                                     NOSEG       000126
                                                     D           000127
                                                     SET         000130
                                                     E           000131
     SCHEME1     021634                              ID          000120
                                                     CUM         000123
                                                     SEGNO       000125
                                                     NOSEG       000126
                                                     D           000127
                                                     SET         000130
                                                     LOC         021632
     TIME        023436                              CUM         000123
                                                     SET         000130
                                                     E           000131
     POLPROF     023504                              POL         000100
                                                     PF          000106
     SETPOL      023533                              POL         000100
                                                     POLL        000102
     VELFLD      023666                              POL         000100
                                                     PF          000106
                                                     FCTN        000117
     LITHO       023752
     LITHO3      024373                              ID          000120
                                                     CUM         000123
                                                     SEGNO       000125
                                                     LOC         021632
     GAIN        024221                              SHAD        024217
     SHADE       024474                              SHAD        024217
     GRAPH       025502
     ACGOER      027511
     SINCOS      027623
     SYSTEM      027722                              SCOPE2      027722
     ATAN        031034
     RSAIEX      031133
     GETBA       031171
     KODER       031213
     OUTPTC      032455
     SIGI        032547
     ----UNSATISFIED EXTERNALS-----                          REFERENCES
```

```
      SOLN. OF THE HEAT CONDUCTION EQUATION
      ESTUARY PROGRAM NO. 3
      WRITTEN BY K. L. ECHTERNACHT

      CONVECTION AND DIFFUSION OF A SCALAR
```

ELAPSED TIME = 0.000
CUMULATIVE ELAPSED TIME = 0.000
SEGMENT NO. = 1

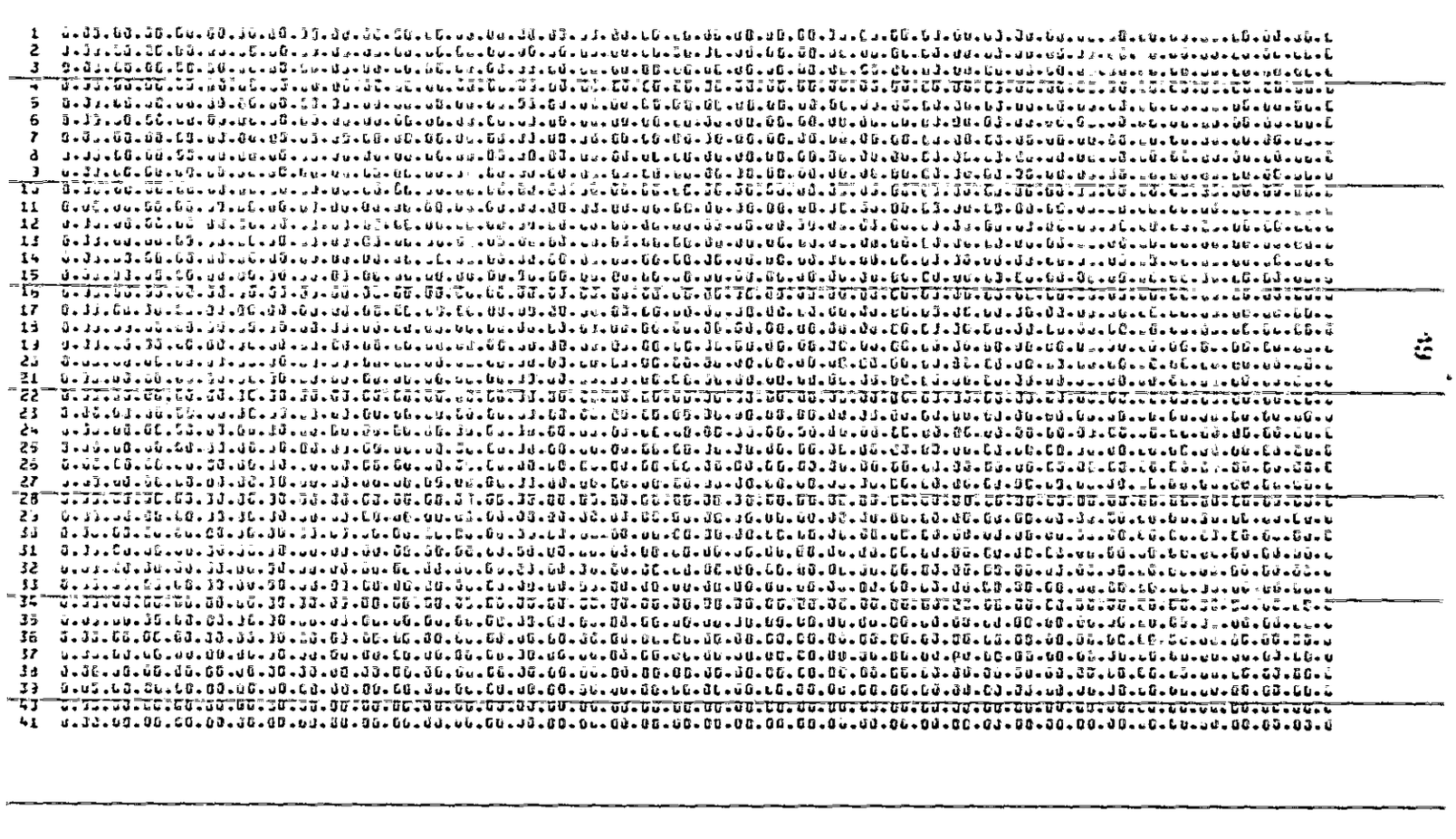
INITIAL U-VELOCITY FIELD

ELAPSED TIME = 0.000
CUMULATIVE ELAPSED TIME = 0.000
SEGMENT NO. = 1

INITIAL U-VELOCITY FIELD

ELAPSED TIME = 0.000
CUMULATIVE ELAPSED TIME = 0.000
SEGMENT NO. = 1

INITIAL V-VELOCITY FIELD

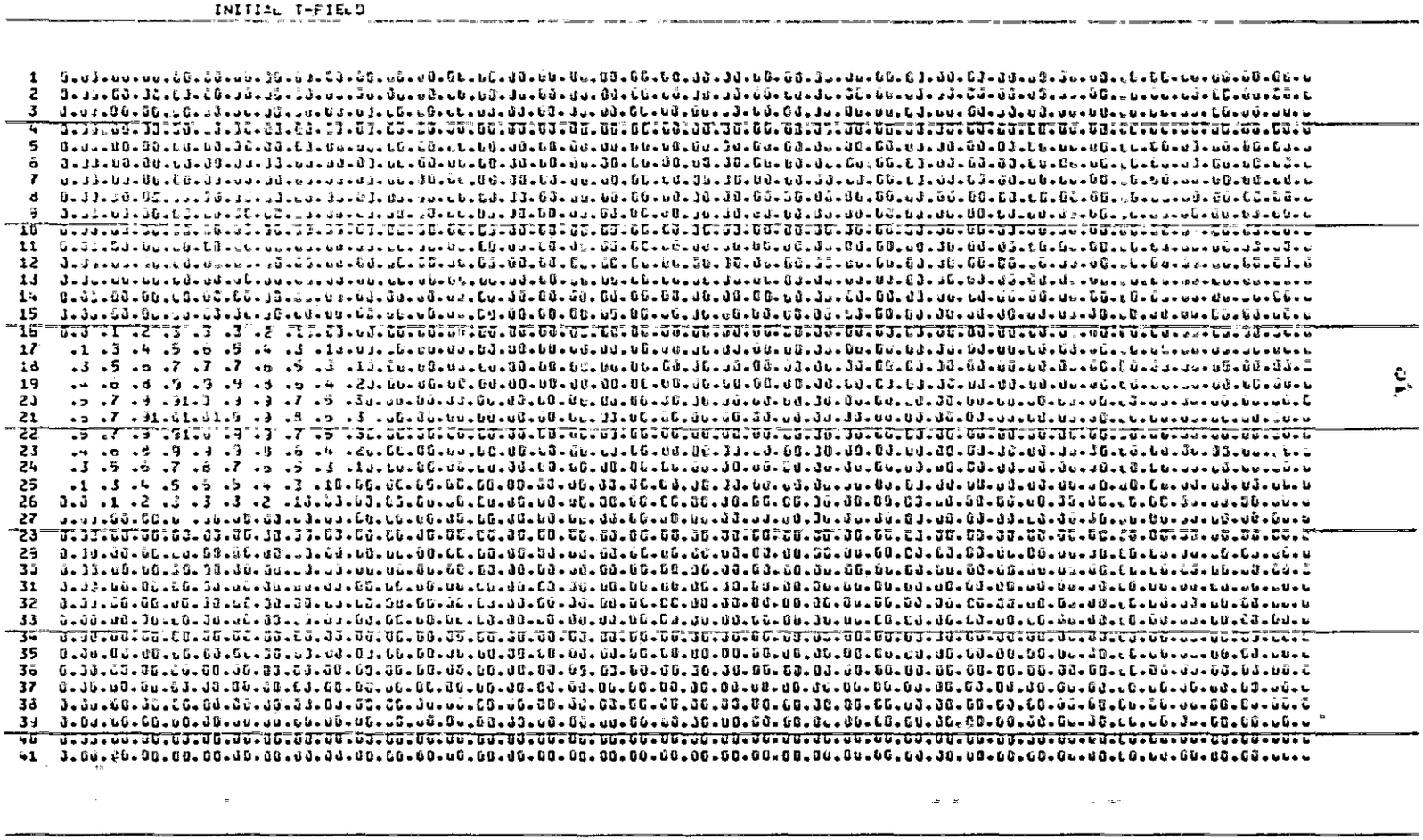


ELAPSED TIME = 3.333
CUMULATIVE ELAPSED TIME = 6.000
SEGMENT NO. = 1

INITIAL V-VELOCITY FIELD

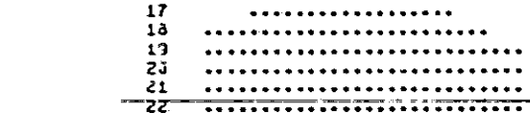
ELAPSED TIME = 3.000
CUMULATIVE ELAPSED TIME = 0.000
SEGMENT NO. = 1

INITIAL T-FIELD



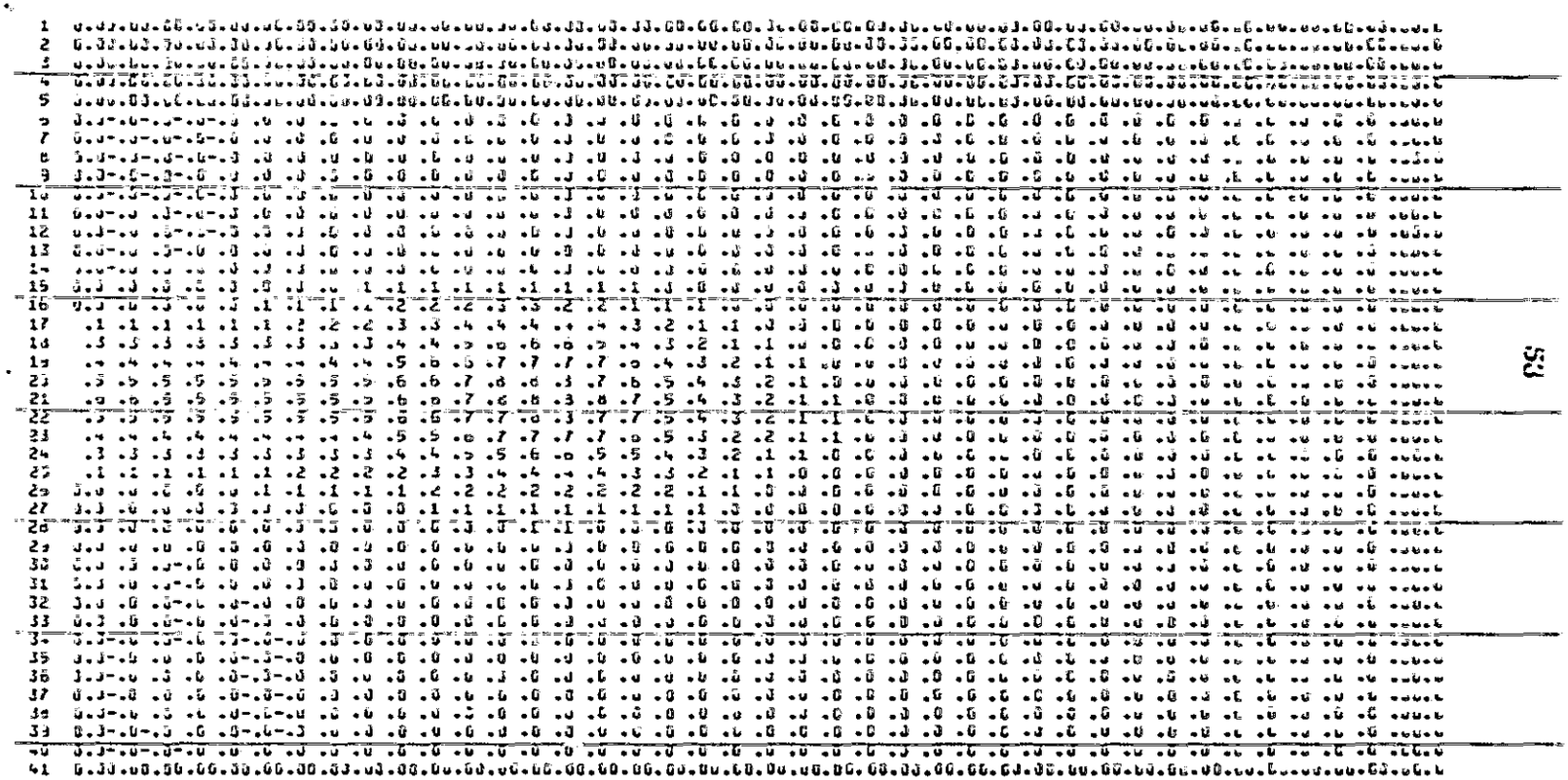
```
 ELAPSED TIME = 0.000
 CUMULATIVE ELAPSED TIME =    0.000
 SEGMENT NO. =   1


                INITIAL T-FIELD
```

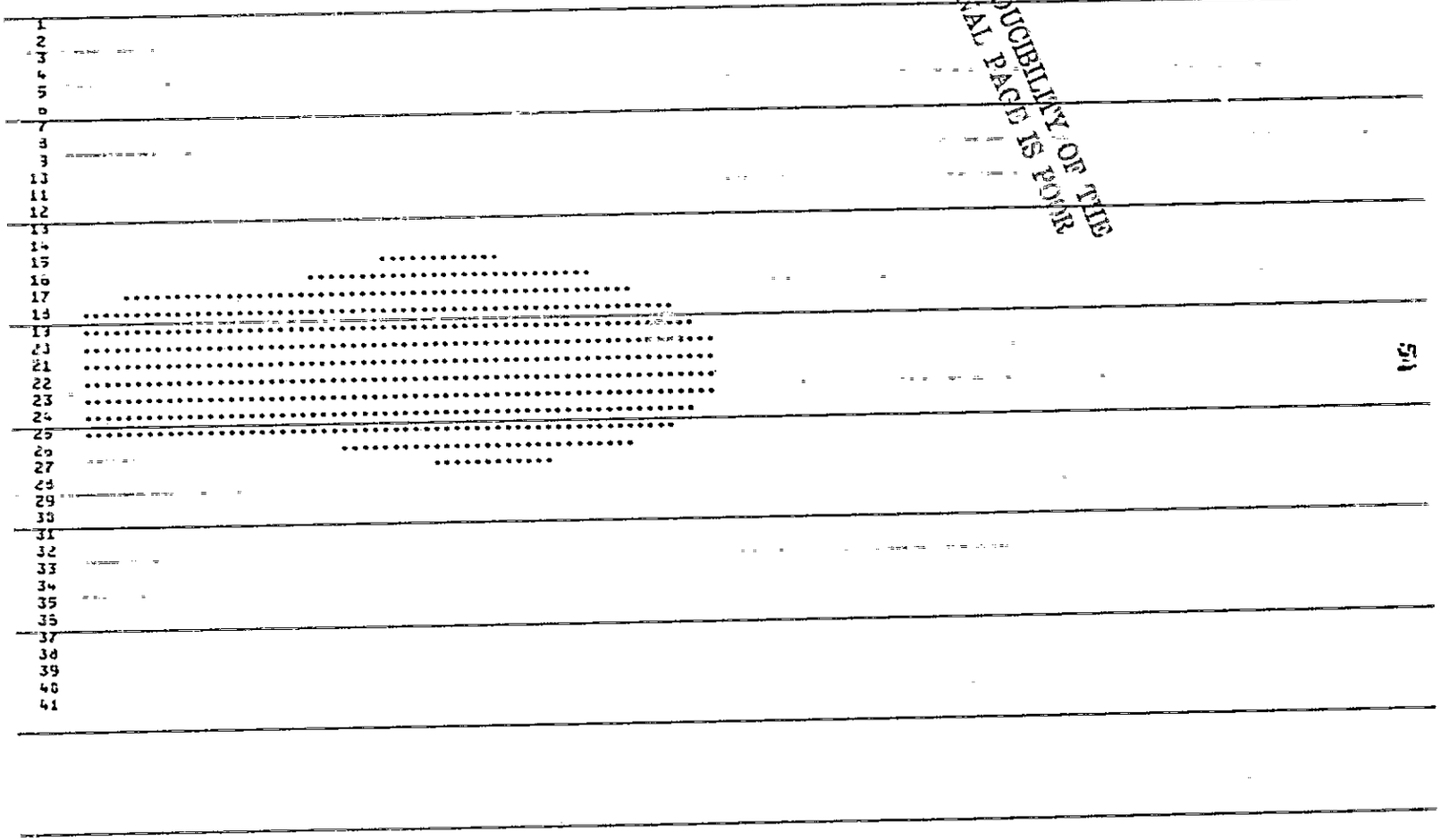



ELAPSED TIME = .000
CUMULATIVE ELAPSED TIME = .200
MAXIMUM VALUE OF T = 5.215737E-01
SUM OF T-SQUARED OVER THE REGION = 3.941226E+01
SEGMENT NO. = 1
COORDINATES OF CONS. MAXIMUM - - J = 15 , K = 21

T-FIELD



```
 ELAPSED TIME =  .203
 CUMULATIVE ELAPSED TIME =     .208
 MAXIMUM VALUE OF T =  8.161737E-01
 SUM OF T-SQUARED OVER THE REGION =  3.9432268+01
 SEGMENT NO. =  1
 COORDINATES OF CONC. MAXIMUM - - J =  15  , K =  21
```

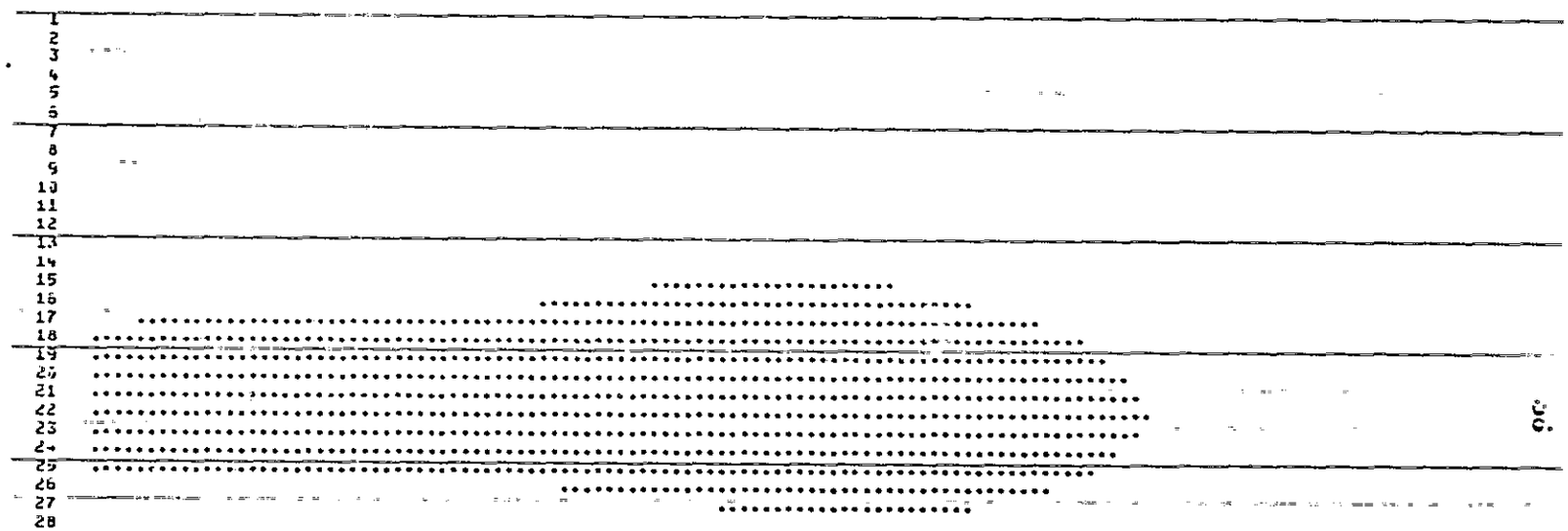


```
ELAPSED TIME =  .400
CUMULATIVE ELAPSED TIME =    .400
MAXIMUM VALUE OF T =  6.8271996E-01
SUM OF T-SQUARED OVER THE REGION =  4.5363430E+01
SEGMENT NO. =   1
COORDINATES OF CONC. MAXIMUM - - J =  24  , K =  21

            T-FIELD

 1  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0000
 2  0.0-.0-.0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
 3  0.0-.0-.0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
 4  0.0-.0 .0 .0 .0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
 5  0.0-.0 .0 .0 .0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
 6  0.0-.0 .0-.0 .0-.0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
 7  0.0 .0 .0-.0 .0-.0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
 8  0.0 .0-.0-.0 .0 .0 .0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
 9  0.0 .0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
10  0.0 .0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
11  0.0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
12  0.0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
13  0.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
14  0.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .1 .1 .1 .1 .1 .1 .1 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
15  0.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .1 .1 .1 .1 .1 .1 .2 .2 .1 .1 .1 .1 .1 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
16  0.0 .0 .0 .0 .0 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .2 .2 .2 .3 .3 .3 .2 .2 .2 .1 .1 .1 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
17   .1 .1 .1 .1 .1 .1 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .3 .3 .4 .4 .4 .4 .3 .3 .2 .2 .1 .1 .1 .0 .0 .0 .0 .0 .0 .0 .0 .0000
18   .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .4 .4 .5 .5 .5 .5 .5 .4 .3 .3 .2 .1 .1 .1 .0 .0 .0 .0 .0 .0 .0 .0000
19   .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .5 .5 .6 .6 .6 .6 .5 .4 .4 .3 .2 .1 .1 .1 .0 .0 .0 .0 .0 .0 .0000
20   .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .4 .4 .4 .4 .4 .5 .5 .5 .6 .6 .7 .7 .6 .6 .5 .4 .3 .2 .2 .1 .1 .0 .0 .0 .0 .0 .0 .0000
21   .6 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .6 .6 .6 .7 .7 .7 .6 .5 .5 .4 .3 .2 .1 .1 .1 .0 .0 .0 .0 .0 .0000
22   .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .4 .4 .4 .4 .4 .5 .5 .5 .6 .6 .6 .7 .6 .6 .5 .4 .4 .3 .2 .1 .1 .1 .0 .0 .0 .0 .0 .0000
23   .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .5 .5 .6 .6 .6 .6 .5 .5 .4 .3 .2 .2 .1 .1 .1 .0 .0 .0 .0 .0 .0000
24   .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .4 .4 .5 .5 .5 .5 .4 .4 .3 .3 .2 .1 .1 .1 .0 .0 .0 .0 .0 .0 .0000
25   .1 .1 .1 .1 .1 .1 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .3 .3 .3 .4 .4 .3 .3 .3 .2 .2 .1 .1 .1 .1 .0 .0 .0 .0 .0 .0 .0000
26  0.0 .0 .0 .0 .0 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .1 .1 .1 .1 .0 .0 .0 .0 .0 .0 .0 .0000
27  0.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
28  0.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
29  0.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
30  0.0 .0 .0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
31  0.0 .0 .0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
32  0.0 .0 .0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
33  0.0 .0 .0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
34  0.0 .0 .0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
35  0.0-.0 .0 .0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
36  0.0-.0 .0 .0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
37  0.0-.0 .0 .0-.0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
38  0.0-.0-.0 .0 .0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
39  0.0-.0-.0 .0 .0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
40  0.0 .0-.0-.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0000
41  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0000
```

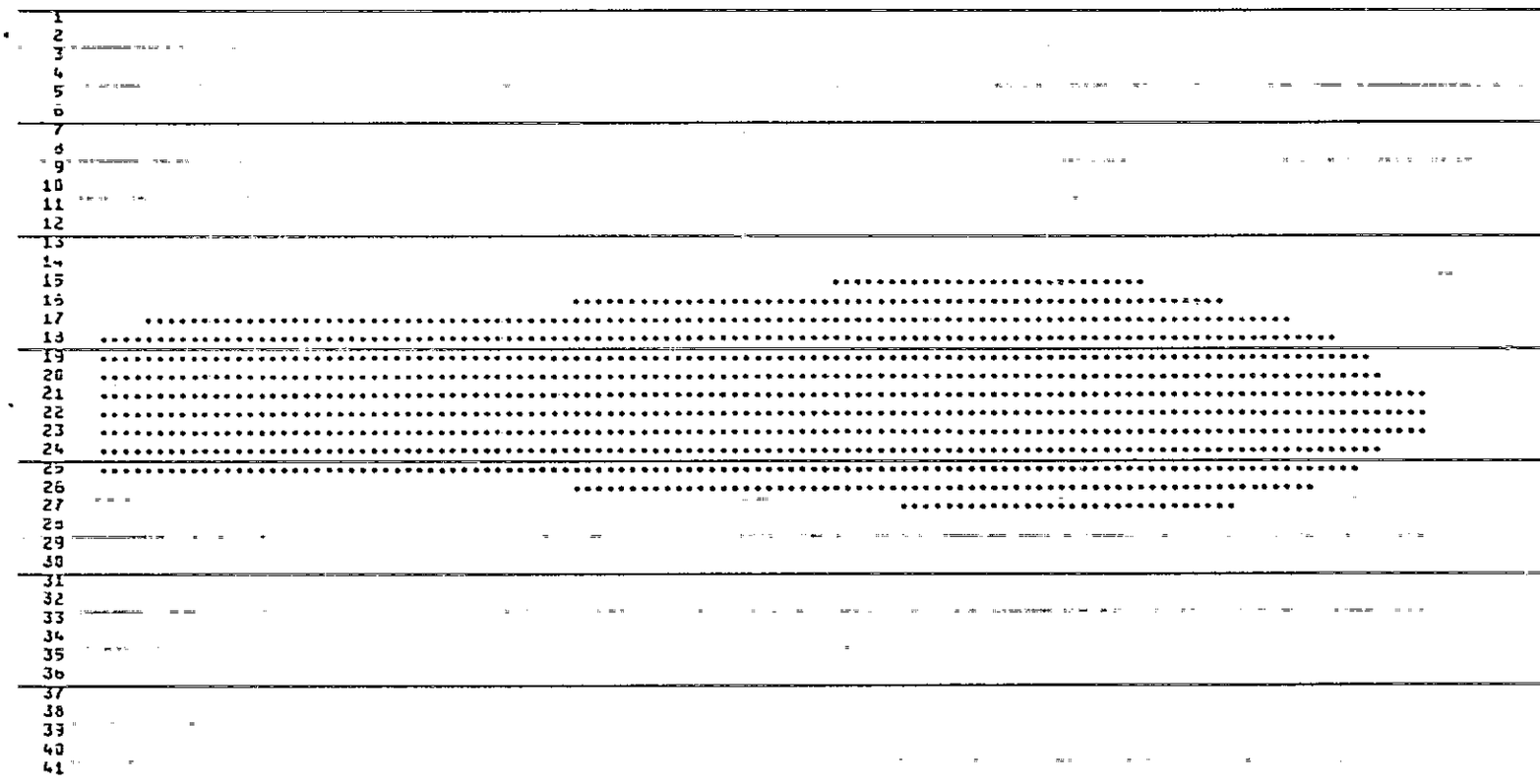
```
ELAPSED TIME =   .400
CUMULATIVE ELAPSED TIME =     .400
MAXIMUM VALUE OF T =  6.827199E-01
SUM OF T-SQUARED OVER THE REGION =  4.536340E+01
SEGMENT NO. =   1
COORDINATES OF CONC. MAXIMUM - - J =  24  , K =  21
```



ELAPSED TIME = .990
CUMULATIVE ELAPSED TIME = .530
MAXIMUM VALUE OF T = 6.162316E-01
SUM OF T-SQUARED OVER THE REGION = 4.950435E+01
SEGMENT NO. = 1
COORDINATES OF CONC. MAXIMUM - - J = 30 , K = 21

T-FIELD

```
 ELAPSED TIME =   .533
 CUMULATIVE ELAPSED TIME =     .536
 MAXIMUM VALUE OF T =  6.162312E-01
 SUM OF T-SQUARED OVER THE REGION =  4.950435E+01
 SEGMENT NO. =   1
 COORDINATES OF CONC. MAXIMUM - - J =  30  , K =  21
```



```
 ELAPSED TIME =  .530
 CUMULATIVE ELAPSED TIME =    .530
 MAXIMUM VALUE OF T =  6.102312E-01
 SUM OF T-SQUARED OVER THE REGION =  4.950435E+01
 SEGMENT NO. =  1
 COORDINATES OF COND. MAXIMUM - - J =  30  , K =  21

                        T-FIELD
```

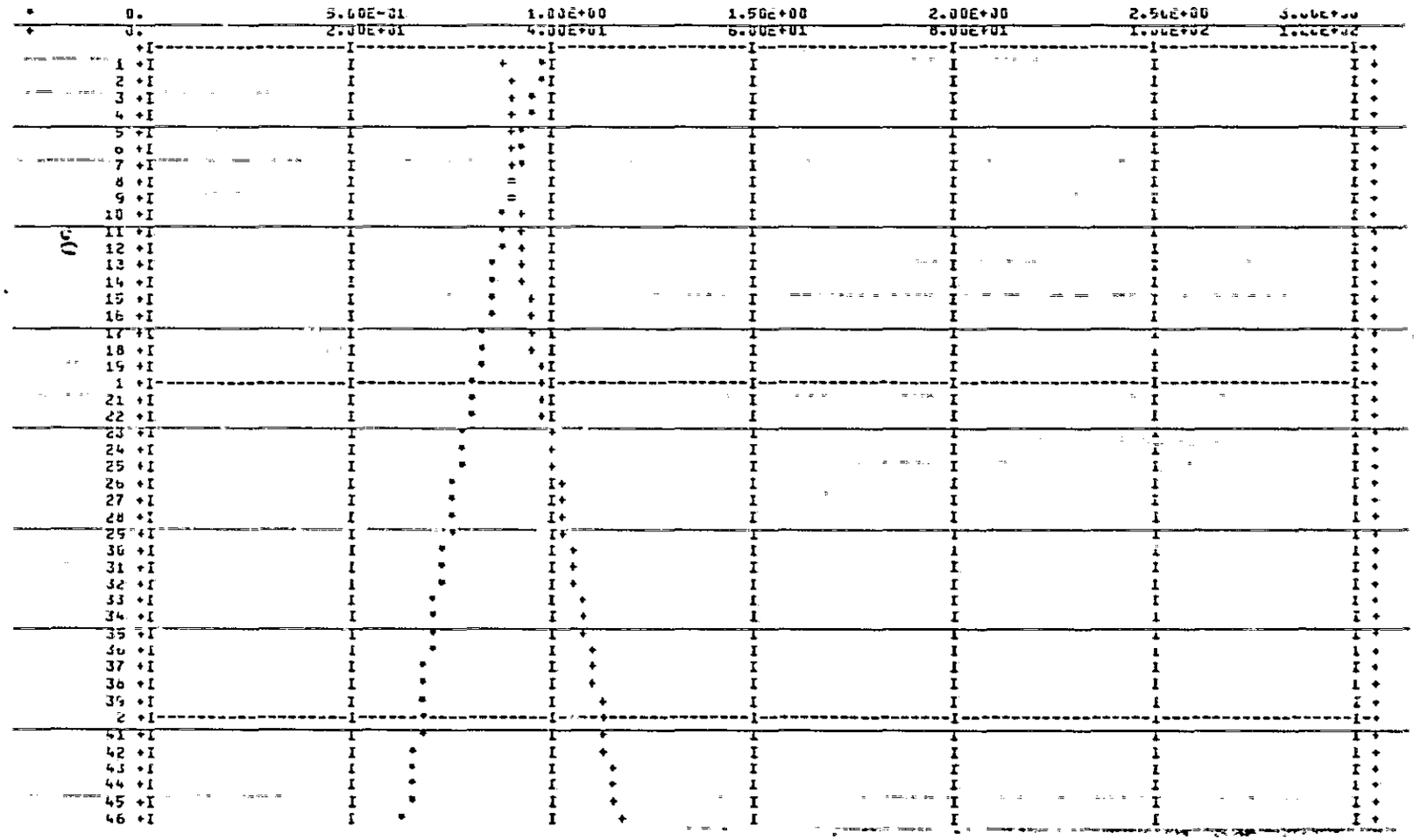
GRAPH OF 2 VARIABLES WITH EVERY 20 LINES MARKED

VARIABLE	LOWER LIMIT	SCALE FACTOR	SYMBOL
1	0.	2.500E-02	*
2	0.	1.000E+00	+

EXCEEDING LIMITS RESULTS IN .X. IN FIRST OR LAST COLUMN.
DUPLICATION OF POINTS IS INDICATED BY .=..

THE FOLLOWING ARE THE VALUES OF THE VERTICAL REFERENCE LINES FOR EACH VARIABLE.

*	0.	5.00E-01	1.00E+00	1.50E+00	2.00E+00	2.50E+00	3.00E+00
+	0.	2.00E+01	4.00E+01	6.00E+01	8.00E+01	1.00E+02	1.20E+02



ELAPSED TIME = .533
CUMULATIVE ELAPSED TIME = .936
MAXIMUM VALUE OF T = 6.1633126-01
SUM OF T-SQUARED OVER THE REGION = 4.550435E+01
SEGMENT NO. = 2
COORDINATES OF CONC. MAXIMUM - - J = 1 , K = 21

INITIAL U-VELOCITY FIELD

```
 ELAPSED TIME =   .530
 CUMULATIVE ELAPSED TIME =     .530
 MAXIMUM VALUE OF T =  0.162312E-01
 SUM OF T-SQUARED OVER THE REGION =  4.950435E+01
 SEGMENT NO. =   2
 COORDINATES OF CONG. MAXIMUM - - J =   1  , K =  21
```

INITIAL U-VELOCITY FIELD

ELAPSED TIME = .538
CUMULATIVE ELAPSED TIME = .538
MAXIMUM VALUE OF T = 5.162312E-01
SUM OF T-SQUARED OVER THE REGION = 4.950435E+01
SEGMENT NO. = 2
COORDINATES OF CONC. MAXIMUM - - J = 1 , K = 21

INITIAL V-VELOCITY FIELD

ELAPSED TIME = .530
CUMULATIVE ELAPSED TIME = .530
MAXIMUM VALUE OF T = 8.162312E-01
SUM OF T-SQUARED OVER THE REGION = 4.950435E+01
SEGMENT NO. = 2
COORDINATES OF CONC. MAXIMUM - - J = 1 , K = 21

INITIAL V-VELOCITY FIELD

ELAPSED TIME = .533
CUMULATIVE ELAPSED TIME = .538
MAXIMUM VALUE OF T = 8.1023122E-01
SUM OF T-SQUARED OVER THE REGION = 4.950435E+01
SEGMENT NO. = 2
COORDINATES OF CONC. MAXIMUM - - J = 1 , K = 21

INITIAL T-FIELD

```
 ELAPSED TIME =  .033
 CUMULATIVE ELAPSED TIME =    .038
 MAXIMUM VALUE OF T =  5.162312E-01
 SUM OF T-SQUARED OVER THE REGION =  4.950435E+01
 SEGMENT NO. =   2
 COORDINATES OF COND. MAXIMUM - - J =   1  , K =  21
```

INITIAL T-FIELD

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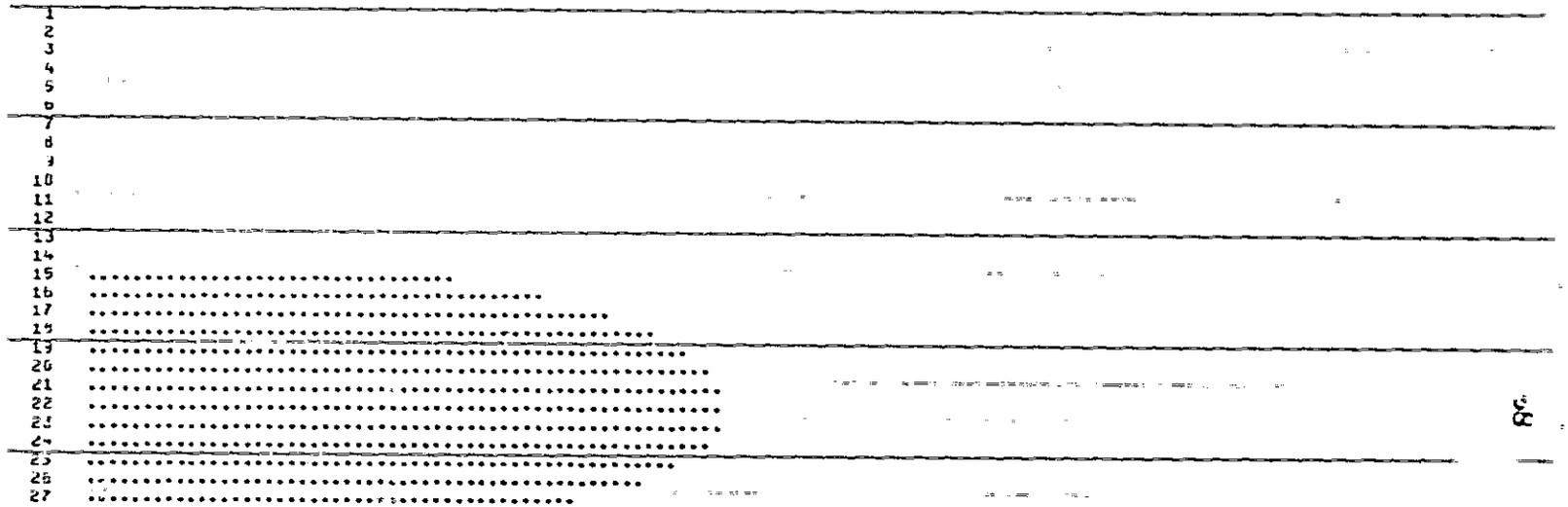
ELAPSED TIME = .263
CUMULATIVE ELAPSED TIME = .730
MAXIMUM VALUE OF T = 3.11616E-01
SUM OF T-SQUARED OVER THE REGION = 3.025956E+01
SEGMENT NO. = 2
COORDINATES OF CONC. MAXIMUM - - J = 2 , K = 21

T-FIELD

ELAPSED TIME = .283
CUMULATIVE ELAPSED TIME = .730
MAXIMUM VALUE OF Y = 6.115168E-01
SUM OF Y-SQUARED OVER THE REGION = 3.025956E+01
SEGMENT NO. = 2
COORDINATES OF CONC. MAXIMUM - - J = 2 , K = 21



ELAPSED TIME = .403
CUMULATIVE ELAPSED TIME = .930
MAXIMUM VALUE OF T = 5.110559E-01
SUM OF T-SQUARED OVER THE REGION = 5.012687E+01
SEGMENT NO. = 2
COORDINATES OF COND. MAXIMUM - - J = 2 , K = 21

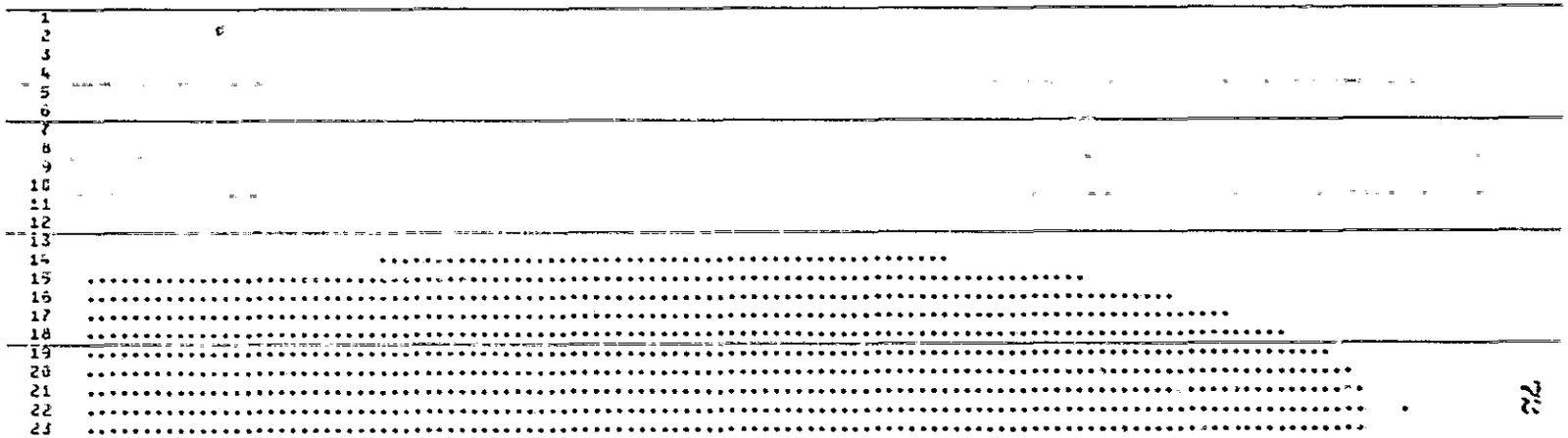
T-FIELD

```
 ELAPSED TIME =    .440
 CUMULATIVE ELAPSED TIME =     .930
  MAXIMUM VALUE OF I = 6.110559E-01
  SUM OF I-SQUARED OVER THE REGION =  5.012607E+01
  SEGMENT NO. =  2
  COORDINATES OF COND. MAXIMUM - - J =  2 , K =  21
```

ELAPSED TIME = .973
CUMULATIVE ELAPSED TIME = 1.100
MAXIMUM VALUE OF T = 8.119726E-01
SUM OF T-SQUARED OVER THE REGION = 6.695229E+01
SEGMENT NO. = 2
COORDINATES OF CONC. MAXIMUM - - J = 2 , K = 21

T-FIELD

```
 ELAPSED TIME =   .970
 CUMULATIVE ELAPSED TIME =    1.100
 MAXIMUM VALUE OF T =  5.110729E-01
 SUM OF T-SQUARED OVER THE REGION =  6.6D9229E+01
 SEGMENT NO. =    2
 COORDINATES OF CONC. MAXIMUM - - J =    2  , K =  21
```



ELAPSED TIME = .573
CUMULATIVE ELAPSED TIME = 1.108
MAXIMUM VALUE OF T = 8.110725E-01
SUM OF T-VALUES OVER THE REGION = 6.635223E+01
SEGMENT NO. = 2
COORDINATES OF GLOBAL MAXIMUM - - J = 2 , K = 21

T-FIELD

GRAPH OF 2 VARIABLES WITH EVERY 20 LINES MARKED

VARIABLE	LOWER LIMIT	SCALE FACTOR	SYMBOL
1	0.	2.500E-02	*
2	0.	1.000E+00	+

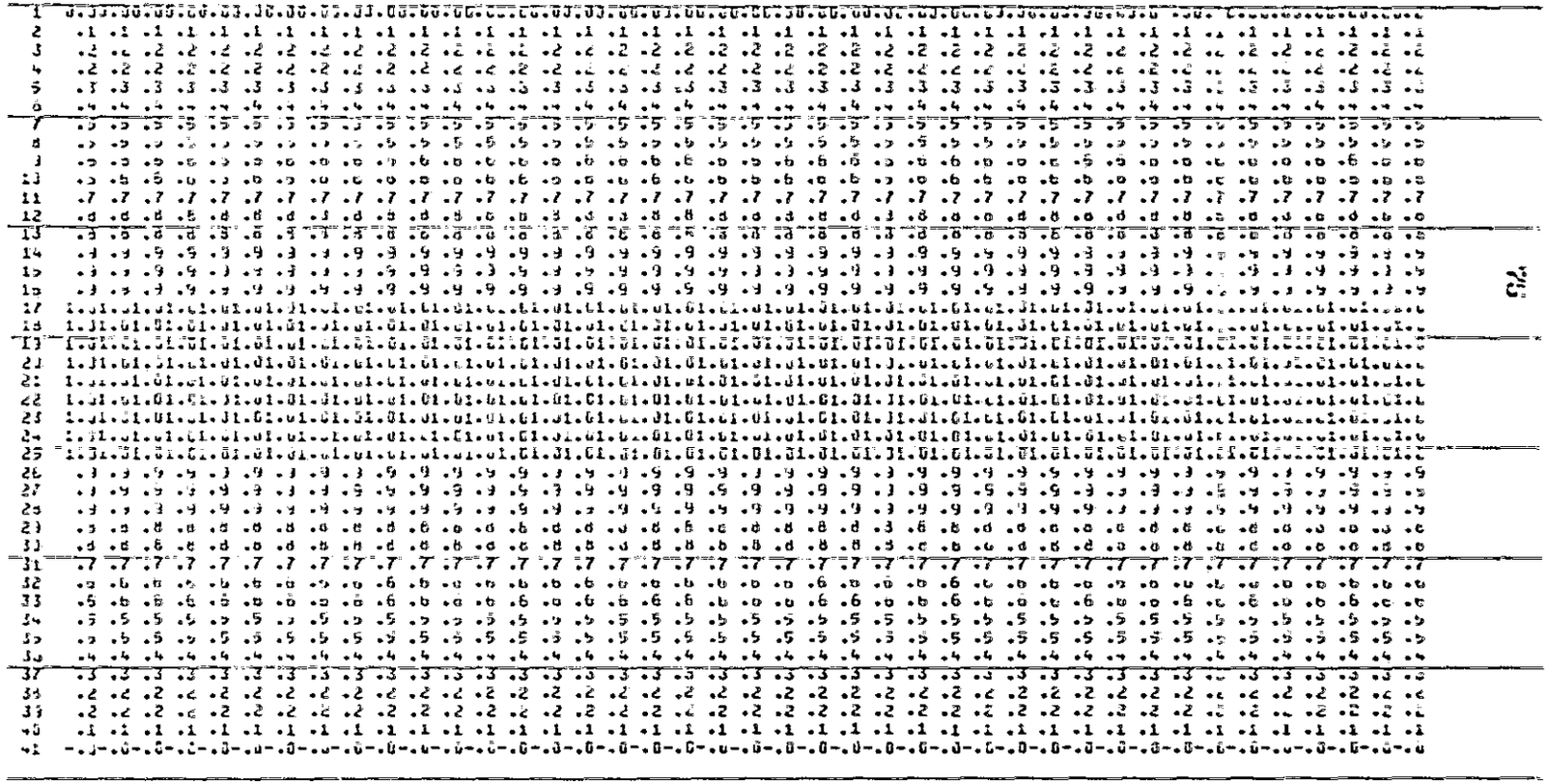
EXCEEDING LIMITS RESULTS IN .X. IN FIRST OR LAST COLUMN.
DUPLICATION OF POINTS IS INDICATED BY .=.

THE FOLLOWING ARE THE VALUES OF THE VERTICAL REFERENCE LINES FOR EACH VARIABLE.

*	0.	5.000E-01	1.000E+00	1.500E+00	2.000E+00	2.500E+00	3.000E+00
+	0.	2.000E+01	4.000E+01	6.000E+01	8.000E+01	1.000E+02	1.200E+02

ELAPSED TIME = .671
CUMULATIVE ELAPSED TIME = .970
MAXIMUM VALUE OF T = 6.110725E-01
SUM OF T-SQUARED OVER THE REGION = 6.605229E+01
SEGMENT NO. = 3
COORDINATES OF CONC. MAXIMUM - - J = 1 , K = 21

INITIAL U-VELOCITY FIELD



ELAPSED TIME = .57u
CUMULATIVE ELAPSED TIME = .57u
MAXIMUM VALUE OF T = 6.110725E-01
SUM OF T-SQUARED OVER THE REGION = 6.685229E+01
SEGMENT NO. = 3
COORDINATES OF LONG. MAXIMUM - - J = 1 , K = 21

INITIAL U-VELOCITY FIELD

```
ELAPSED TIME =  .570
CUMULATIVE ELAPSED TIME =     .570
MAXIMUM VALUE OF T =  6.114725E-01
SUM OF T-SQUARED OVER THE REGION =  6.635229E+01
SEGMENT NO. =   3
COORDINATES OF CONC. MAXIMUM - - J =   1  , K =  21
```

INITIAL V-VELOCITY FIELD

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 1  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
 2  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
 3  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
 4  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
 5  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
 6  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
 7  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
 8  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
 9  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
10  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
11  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
12  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
13  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
14  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
15  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
16  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
17  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
18  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
19  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
20  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
21  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
22  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
23  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
24  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
25  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
26  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
27  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
28  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
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30  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
31  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
32  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
33  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
34  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
35  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
36  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
37  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
38  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
39  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
40  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
41  0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0
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```
ELAPSED TIME =  .570
CUMULATIVE ELAPSED TIME =     .570
MAXIMUM VALUE OF T =  6.1107250E+01
SUM OF T-SQUARED OVER THE REGION =  6.6352292E+01
SEGMENT NO. =   3
COORDINATES OF CONC. MAXIMUM - - J =   1  , K =  21
```

INITIAL V-VELOCITY FIELD

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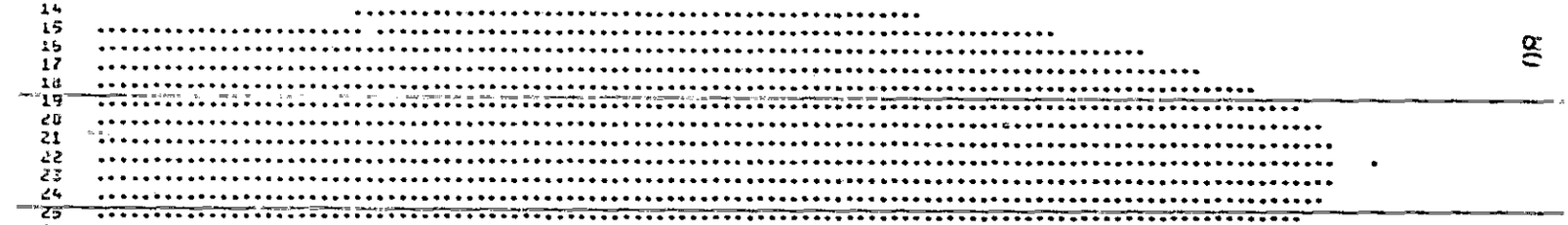
```
      ELAPSED TIME =   .571
      CUMULATIVE ELAPSED TIME =     .570
      MAXIMUM VALUE OF T =  5.1107295E-01
      SUM OF T-SQUARED OVER THE REGION =  6.6052229E+01
      SEGMENT NO. =   3
      COORDINATES OF COND. MAXIMUM - - J =   1  , K =  21
```

INITIAL T-FIELD

ELAPSED TIME = .071
CUMULATIVE ELAPSED TIME = .070
MAXIMUM VALUE OF T = 6.1137c9E-01
SUM OF T-SQUARED OVER THE REGION = 6.6052c9E+01
SEGMENT NO. = 3
COORDINATES OF CONC. MAXIMUM - - J = 1 , K = 21

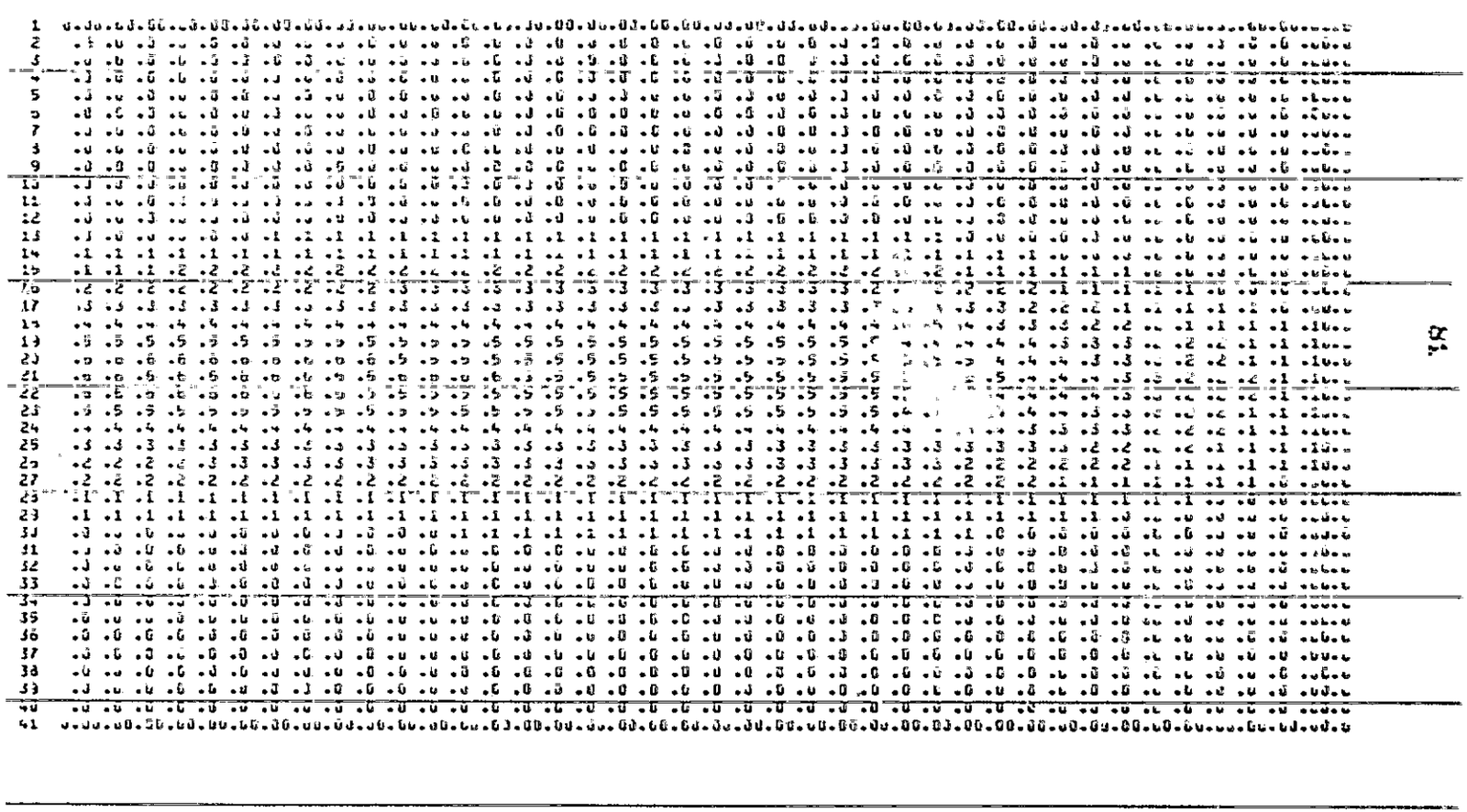
INITIAL T-FIELD



80

ELAPSED TIME = .94d
CUMULATIVE ELAPSED TIME = .81G
MAXIMUM VALUE OF T = 8.076735E+01
SUM OF T-SQUARED OVER THE REGION = 6.721012E+11
SEGMENT NO. = 3
COORDINATES OF CONC. MAXIMUM - - J = 2 , K = 21

T-FIELD



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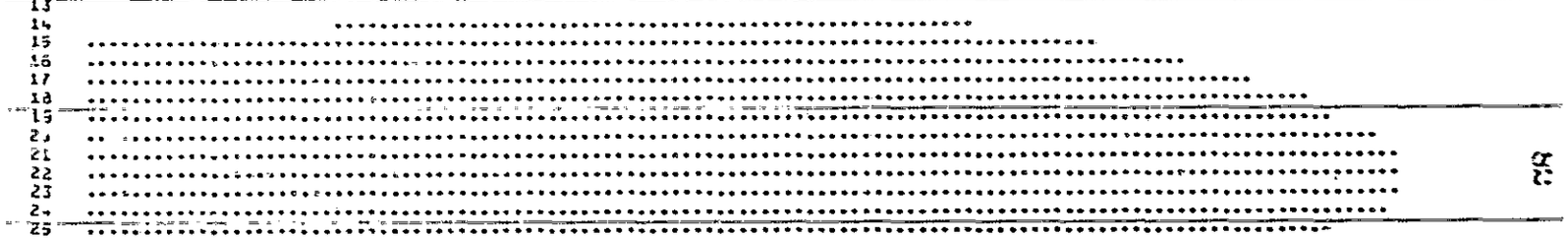
 ELAPSED TIME =   .843
 CUMULATIVE ELAPSED TIME =     .918
 MAXIMUM VALUE OF T =  6.076735E-01
 SUM OF T-SQUARED OVER THE REGION =  6.721012E+01
 SEGMENT NO. =   3
 COORDINATES OF COND. MAXIMUM - - J =   2  , K =  21
```



ELAPSED TIME = .040
CUMULATIVE ELAPSED TIME = .616
MAXIMUM VALUE OF T = 6.476735E-01
SUM OF T-SQUARED OVER THE REGION = 6.7210122E+01
SEGMENT NO. = 3
COORDINATES OF CONC. MAXIMUM - - J = 2 , K = 21

T-FIELD

1	0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0																																									
2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
4	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
6	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
7	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
8	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
9	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
10	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
11	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
12	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
13	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
14	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.0	.1	.1	.0	.0	.0	.0	.0	.00.0
15	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.1	.1	.1	.1	.1	.1	.0	.0	.0	.0	.0	.00.0
16	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.2	.2	.2	.2	.2	.2	.1	.1	.1	.1	.1	.0	.0	.0	.00.0
17	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.2	.2	.2	.1	.1	.1	.1	.1	.0	.00.0
18	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.3	.3	.3	.2	.2	.1	.1	.1	.1	.1	.10.0
19	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.4	.4	.4	.4	.4	.3	.3	.3	.2	.2	.2	.1	.1	.10.0
20	.6	.5	.6	.6	.6	.6	.5	.6	.5	.6	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.4	.4	.4	.3	.3	.2	.2	.2	.1	.1	.10.0
21	.5	.6	.6	.6	.6	.5	.5	.6	.6	.6	.6	.6	.6	.6	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.4	.4	.4	.3	.3	.2	.2	.2	.1	.10.0
22	.5	.6	.5	.5	.5	.6	.5	.6	.6	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.4	.4	.4	.4	.3	.3	.2	.2	.2	.1	.10.0
23	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.4	.4	.4	.4	.4	.4	.3	.3	.2	.2	.2	.1	.1	.10.0
24	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.3	.3	.3	.3	.2	.2	.2	.1	.1	.10.0
25	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.2	.2	.2	.2	.1	.1	.1	.10.0
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29	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.00.0
30	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
32	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
33	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
34	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
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36	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
37	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
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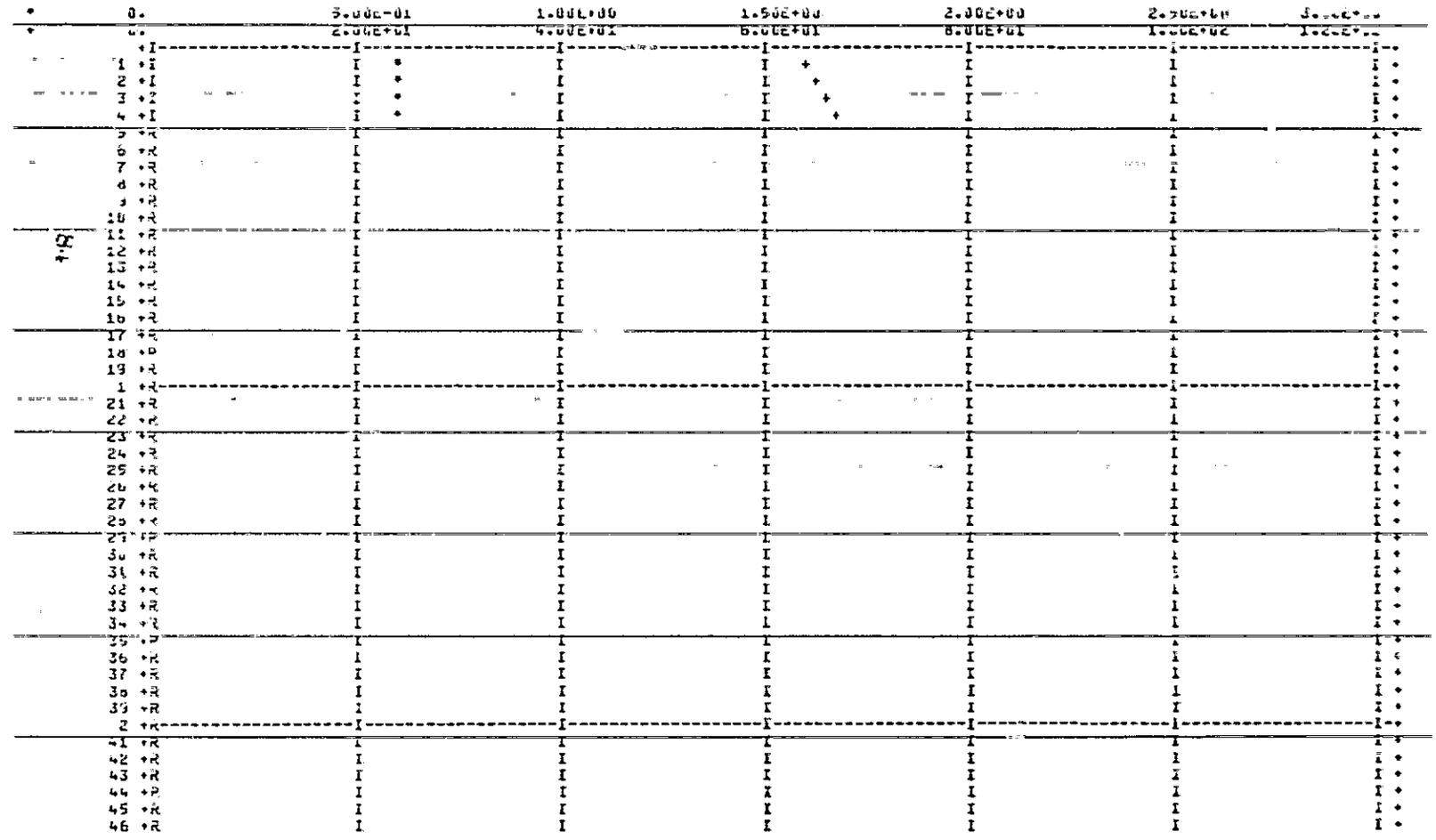
40	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00.0
41	0.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0																																									

GRAPH OF 2 VARIABLES WITH EVERY 20 LINES MARKED

VARIABLE	LOWER LIMIT	SCALE FACTOR	SYMBOL
1	0.	2.500E-02	*
2	0.	1.000E+00	+

EXCLUDING LIMITS RESULTS IN .X. IN FIRST OR LAST COLUMN.
DUPLICATION OF POINTS IS INDICATED BY .=.

* THE FOLLOWING ARE THE VALUES OF THE VERTICAL REFERENCE LINES FOR EACH VARIABLE.



DMPX.

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RA  032200  A1  000001  B1  000001   C(A1)=  0102 2400 0000 0000 0000   C(B1)=  0102 2400 0000 0000 0000
FL  034200  A2  027411  B2  027401   C(A2)=  0301 2204 5503 0114 1454   C(B2)=  0000 0300 0000 0002 7264
EM  070000  A3  031534  B3  027067   C(A3)=  0000 0000 0000 0500 3000   C(B3)=  0300 0300 0000 0000 0000
RE  030000  A4  031535  B4  032054   C(A4)=  2310 0104 0500 0002 4474   C(B4)=  0000 0000 0000 0000 0003
FE  030000  A5  032236  B5  025700   C(A5)=  0000 0000 0000 0000 3000   C(B5)=  1362 2107 3351 0000 7434
MA  032000  A6  030001  B6  031776   C(A6)=  0102 2400 0000 0000 3000   C(B6)=  1407 1700 0000 0000 0013
            A7  027435  B7  033037   C(A7)=  0000 0000 0000 0000 0000   C(B7)=  5110 6362 2543 2010 0245
X0  7777  7777  7777  7700  0000
X1  0000  0000  3000  0000  0000
X2  0000  0000  0000  0000  0024
X3  0000  0000  3000  0000  0000
X4  2310  0104  0500  0002  4474
X5  3000  0003  0000  0000  0000
X6  0102  2400  0000  0000  0000
X7  0000  0000  0000  0000  0000

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   00004   24012 00540 00000 15563      24612 00541 00000 [illegible]      00000 00000 00000 00000
   00010   [illegible] 00000 00000 10000      00000 00000 [illegible]
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   00022   00000 00000 00100 31143      00000 00000 [illegible]      00025025140 00000 01000 65200      [illegible]
   00035   [illegible] 00000 30000 31143      00000 00000 0000 [illegible]      00000 00000 00000 64277
   00050   00000 00000 00000 3000      00000 00000 00000 00002      00000 00000 00000 00000      00000 00000 00000 07000
   00054   14071 70000 00000 00000      00000 00000 00000 25307      00020 23040 00000 00000      00000 00000 20000 00171
   00070   00000 00000 00000 00000
   00100   [illegible] 00000 00000 00000

   25557   23052 40000 00000 00133
   25560   04000 00000 00000 00127      16172 36507 00000 00126      23050 71617 00000 00125      13251 51000 00000 00123
   25564   11040 00000 00000 00120      06032 41500 00000 00117      20150 00000 00000 00106      20171 41400 00000 00102
   25670   20171 40000 00000 00100      00640 01500 20000 00101      10312 00522 02100 00132      02007 77004 00000 27000
   25674   50117 77776 51000 32457      51200 27350 51300 27351      63120 21222 43220 21222      00000 00000 00000 00000
   25710   10522 10733 01000 27434      51700 27433 01100 00001      53000 43044 11302 46100      51200 27442 37000 40000
   25714   33160 25716 51100 27435      53117 10611 51000 27262      53110 30001 10611 45000      51600 27263 71100 00030
   25716   72017 77747 33000 25701      03000 25701 51500 27436      10044 51600 27437 40000      51100 27434 51200 27411
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   27010   20046 23206 01227 77771      15320 03130 27013 46004      05200 27010 04000 26777      07000 04000 20777 40000
   27014   04000 26757 30000 00000      10611 46300 61030 46000      51100 00001 03110 27016      54610 04000 27014 40000
   27020   04000 26727 00000 00000      20035 51000 27440 46000      71101 52307 20106 40000      71000 00000 12110 20144
   27024   74000 12101 01000 27014      51100 27440 20173 46000      03200 27025 04000 27020      00000 00000 00000 00000
   27030   00000 00000 00000 27123      00000 00000 00000 27127      00000 00000 00000 27134      00000 00000 00000 27141
   27034   00000 00000 00000 27140      00000 00000 00000 27152      00300 00000 00000 27155      00000 00000 00000 27161
   27040   00000 00000 00000 27165      00000 00000 00000 27173      00000 00000 00000 27176      00000 00000 00000 27204
   27044   00000 00000 00000 27207      00000 00000 00000 27211      00300 00000 00000 27216      00000 00000 00000 27222
   27050   00000 00000 00000 27220      00000 00000 00000 27232      00000 00000 00000 27235      00000 00000 00000 27242
```

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27054   00000 00000 00000 27246        00003 00070 00000 27251        00000 00000 00000 27255        00000 00000 00000 27260

 11/23/71 + UNIV. OF VIRGINIA SCP23 EL00 OCT 25,71 SUM 275
17.54.55.HYPER06
17.54.55.HYPER4,L20570,C167000,T300.ECHTERNACHT
17.54.55.                                           R
17.54.55.RUN.
17.55.13.LGO
17.55.13. (RFL - 034200)   CP  005.463 SEC.
17.55.13.                  PP  014.837 SEC.
17.55.13.                  IO  330.029 SEC.
17.55.53.STOP
17.56.53.LGO.
17.56.54.CARD CALL LOADER FATAL ERROR
17.56.54.FIELD LENGTH TOO SMALL
17.56.54.LAST PROGRAM NAME WHICH HAS BEEN READ
17.56.54.SHADE
17.56.54.CP    133.972 SEC.
17.56.54.PP    020.781 SEC.
17.56.54.IO    001.163 SEC.

           HYPER8   //// END OF LIST ////   0004223 LINES
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