

DR. JOHN MANIOTES
COMPUTER TECHNOLOGY DEPT.
BURDICK UNIVERSITY
CALUMET CAMPUS
HAMMOND, IN 46324

1620 GENERAL PROGRAM LIBRARY

Multipoint Plotter

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DR JOHN MAROTTS
COMPUTER TECHNOLOGY DEPT.
PURDUE UNIVERSITY
CALUMET CAMPUS
HAMMOND, IN 46323

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COMMON USERS GROUP PROGRAM REVIEW AND EVALUATION
(fill out in typewriter, ink or pencil)

Program No. _____

Date _____

Program Name: _____

1. Does the abstract adequately describe what the program is and what it does? Yes ___ No ___
Comment _____

2. Does the program do what the abstract says? Yes ___ No ___
Comment _____

3. Is the description clear, understandable, and adequate? Yes ___ No ___
Comment _____

4. Are the Operating Instructions understandable and in sufficient detail? Yes ___ No ___
Comment _____
Are the Sense Switch options adequately described (if applicable)? Yes ___ No ___
Are the mnemonic labels identified or sufficiently understandable? Yes ___ No ___
Comment _____

5. Does the source program compile satisfactorily (if applicable)? Yes ___ No ___
Comment _____

6. Does the object program run satisfactorily? Yes ___ No ___
Comment _____

7. Number of test cases run _____. Are any restrictions as to data, size, range, etc. covered adequately in description? Yes ___ No ___
Comment _____

8. Does the Program meet the minimal standards of COMMON? Yes ___ No ___
Comment _____

9. Were all necessary parts of the program received? Yes ___ No ___
Comment _____

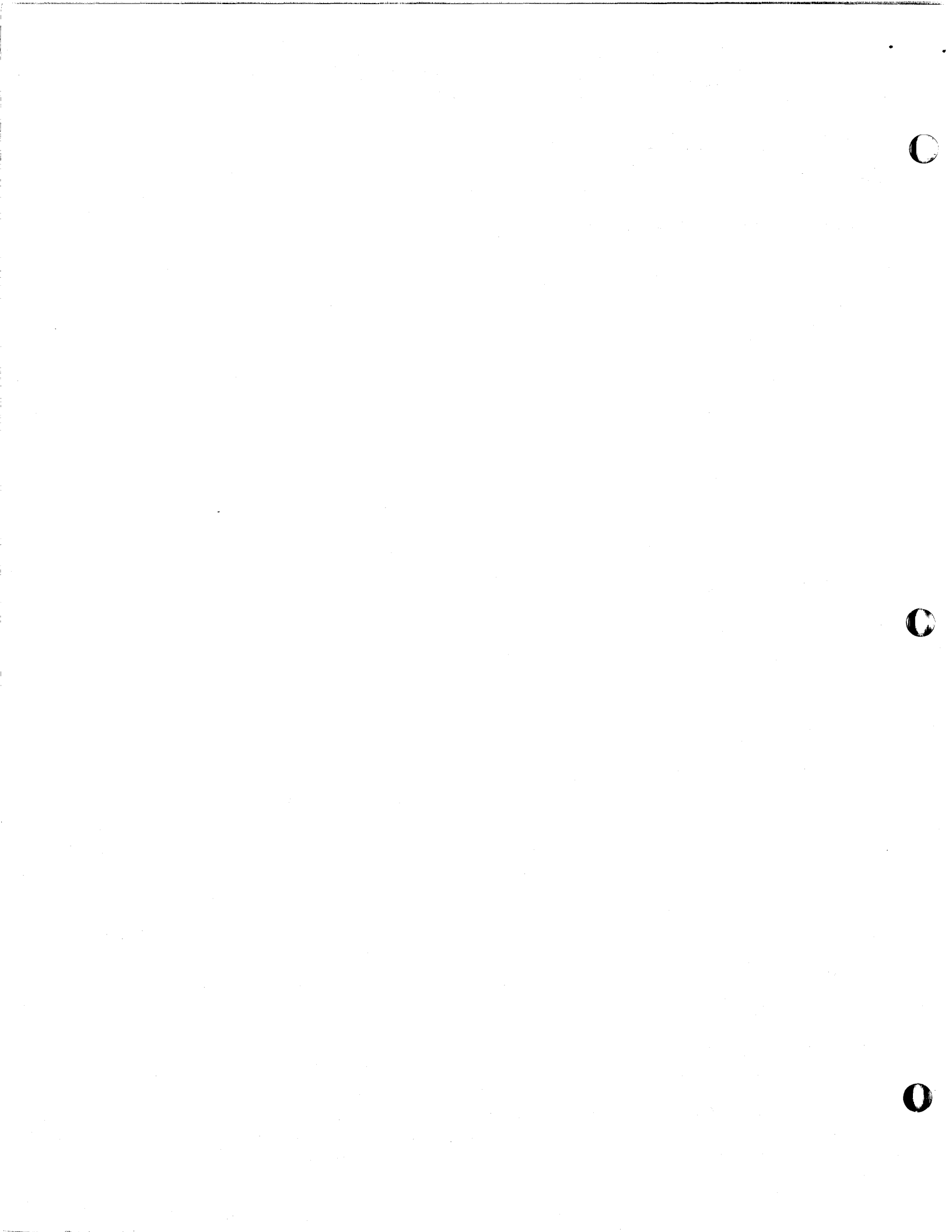
10. Please list on the back any suggestions to improve the usefulness of the program. These will be passed onto the author for his consideration.

Please return to:

Mr. Richard L. Pratt
Data Corporation
7500 Old Xenia Pike
Dayton, Ohio 45432

Your Name _____
Company _____
Address _____
Users Group Code _____

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1620 USERS GROUP LIBRARY PROGRAM ABSTRACT

MULTIPOINT PLOTTER

1. Title: Multipoint Plotter
2. Author: Robert F. Gates, Jr.
Computing Center
University of Delaware
Newark, Delaware 19711
368-0611 Ext. 662
Users Group Membership Code: 1328
Date: June 9, 1966
3. Direct inquiries to author.
4. Description/purpose: The purpose of the Multipoint Plotter is to accept data in the form of independent points, each data point being given by its X and Y coordinates, scale the data, and plot it on cards. Each data point may be given a separate symbol, data need not be presorted and scaling may be controlled by the user if desired.
5. Specifications:
 - a. Subroutines VAFP1F and VAFP2F (users group no.: 13.0.010) must be in library deck or on disc.
 - b. Storage 40 K
 - c. Programming type: FORTRAN II with SPS Sub-routines VAFP1F and VAFP2F

Robert F. Gates, Jr.
Computing Center
University of Delaware
Newark, Delaware 19711
368-0611 Ext. 662

Users Group Membership Code: 1328

June 9, 1966

Modifications or revisions to this program, as they occur, will be announced in the appropriate Catalog of Programs for IBM Data Processing Systems. When such an announcement occurs, users should order a complete new program from the Program Information Department.

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DECK LABELING SHEET

1. Program
2. Sample Data
3. Output for Data

PROGRAM WRITEUP

Name: Multipoint Plotter

Purpose: The purpose of the program is to plot data, each data point being given by its X and Y coordinates. It is important to note that there is no relationship assumed between individual data points.

Subroutines: SPS Subroutines VAFP1F and VAFP2F must be in library deck or on disc. They are available from the users group under the title Variable Format - Plot Relocatable Subroutines number 13.0.010.

Data Setup: The program is designed to read a set of data, scale it and plot it, after which it will repeat the cycle. After all the data sets have been plotted the program will TRP ERR if under MONITOR or end in a read interlock. Each data block is set up as follows:

1. Title Card
2. Control Card
3. Optional control data cards
4. Data, 1 card per data point
5. LC card

1. Title Card: This card may contain any information desired, it will be reproduced as the title of the plot.

2. Control Card: This card determines what scaling options are to be used and what symbol is to be used in plotting. A 1 in col. 2-7

turns the switch on.

Column 1 - symbol to be used
Column 2 - Switch 1, 0 for off, 1 for on
Column 3 - Switch 2
Column 4 - Switch 3
Column 5 - Switch 4
Column 6 - Switch 5
Column 7 - Switch 6

3. Optional Control Data Cards: Some of the control switches above require further data to be read in

Switch 1 - ymax, ymin (2F20.)
Switch 2 - no. of X positions (I4)
Switch 3 - X incr. (f20.)
Switch 4 - Y incr. (f20.)

4. Data Cards: Each data point is described by the data on a separate card. As many cards are used as data points

Cols. 1-20 - X coordinate (F20.)
Cols. 21-40- Y coordinate (f20.)
Col. 41 - Optional symbol
for this data
point (A1)

If a symbol is provided in column 41 it will be used in plotting this particular data point, if column 41 is left blank the symbol specified on the control card will be used.

5. LC Card: As the last card of every data set is a card with the letters "LC" in columns 79 and 80. This card causes termination of the data reading and the beginning of the scaling.

Control Card Switch Settings: The program plots the data on cards, the Y axis is formed by the 77 positions from columns 4 to 80 and the X axis is formed by

the number of cards punched. Unless specified otherwise the program makes the following scaling assumptions. The Y increment is set such that the total range of the Y coordinate is spread over all the 77 plotting positions. The X increment is set such that the total range of the X coordinate is spread over all the X plotting positions being arbitrarily set to the number of data points plotted. The scaling may be controlled by setting the control switches as follows.

Switch 1: Since the number of columns on a card is fixed the only way of spreading out the data is to eliminate some of the larger or smaller points from plotting. To do this, switch 1 is set (a 1 in column 2 of the control card) This causes a card to be read in with the maximum and minimum values of Y to be considered in the scaling. Any data points outside this range will not appear on the plot.

Switch 2: It is possible to specify the number of positions to be used for the X axis by setting switch 2 and supplying a data card with the number on it.

Switch 3: Rather than specify the number of positions to be used for the X axis, it is possible to specify the X increment by setting switch 3 and supplying a data card. The number of positions to be used for the plotting will

then be determined by the range of the X data and the increment given.

Switch 4: The Y increment may likewise be read in. If the increment is such that all the data cannot be plotted (except data eliminated by the switch 1 option) the Y increment will be computed in its normal fashion and a message typed on the typewriter.

Switch 5: If it is desired to have identical X and Y increments, switch 5 may be set. The Y increment is computed normally (with or without options 1 and 4) and the X increment is set to this value.

Switch 6: Time may be saved if the data is in ascending order of X. If it is, switch 6 may be set to bypass the sort. the sort method used is a very high speed one.

PROGRAM

DATA SET UP

1. Title card (80H)
2. Control card: symbol switches 1-6 switch on in not zero or blank (A1, 6I1)
3. ymax, ymin ---- if switch 1 set (2F20.x)
4. Size of X output --- if switch 2 set (I4)
5. X increment --- if switch 3 set (F20.x)
6. Y increment --- if switch 4 set (F20.x)
7. X position, Y position, optional symbol (2F20.x, A1)
8. Same as no. 7, 1 card for each data point (2F20.x, A1)
9. Last card indicator, LC in col. 79-80 (78x, A2)

CONTROL CARD SWITCH SETTING

Switch set by a 1 in the proper column

1. Read Y max, Y min, inhibit plotting of values greater than or less than these values --- col. 2
2. Read size of X axis (given in no. cards to be used in plotting the X axis) --- col. 3.
3. Read X increment --- col. 4.
4. Read Y increment --- Col. 5.
5. Set the X increment equal to the Y increment determined above --- col. 6.
6. Do not sort data, X data is already in ascending order --- col. 7.

Note: Some of the above switch settings conflict with others.

```

ZZJOB 5
((-
ZZFORX5
*LDISKMULTPP
*FANDK0604
C   UPDATED 6/24/65   R.F.G
C   MULTIPOINT PLOTTER---ROBERT F. GATES---10/19/63---A PROGRAM TO GRAPH
C   DATA PAIRS IN ASCENDING ORDER OF X DATA, MORE THAN ONE VALUE FOR EACH
C   VALUE OF X PERMITTED, PROGRAM CAN ACCEPT DATA OUT OF ORDER---VAFPIF
C   SUBROUTINE NO. 9 AND VAFP2F SUBROUTINE NO. 10 ARE NECESSARY IN SUBR. DECK--
C   SYMBOL READ IN WITH DATA WILL BE USED OVERIDING GENERAL SYMBOL--UNLESS
C   S.S. 2 OR 3 ARE ON X OUTPUT=NO. OF DATA POINTS READ IN.
C   INPUT INFORMATION---
C       1. TITLE OF GRAPH
C       2. SYMBOL, SWITCH SETTINGS
C           SWITCH 1 - READ YMAX, YMIN
C           SWITCH 2 - READ SIZE X OUTPUT
C           SWITCH 3 - READ X INCR
C           SWITCH 4 - READ Y INCR
C           SWITCH 5 - X INCR = Y INCR
C           SWITCH 6 - X DATA IS IN ASCENDING ORDER
C       (3.) Y MAX, Y MIN--IF S.S. 1 IS ON
C       (4.) SIZE OF X OUTPUT--IF S.S. 2 IS ON
C       (5.) X INCR.--IF S.S. 3 IS ON
C       (6.) Y INCR.--IF S.S. 4 IS ON
C       7. DATA X, DATA Y, SYMBOL FOR PARTICULAR PT. (OPTIONAL)
C       8. ADDITIONAL DATA (1 CARD FOR EACH POINT)
C       9. LC IN COLUMNS 79 AND 80
C       10. ADDITIONAL DATA SETS (1-9) OR END OF JOB
C   DIMENSION DATAX(933),DATAY(932),NSYMBL(932),NOGPH(932)
C   EQUIVALENCE (11, 1F, 1A, 1C),(TEMP, OUTPUT, PLACE, REP),
C   1(NSYMBL, NOGPH)
C
C   READ DATA
C   81 READ 1
C   READ 2, K, NS1, NS2, NS3, NS4, NS5, NS6
C   K=K/100
C   IF (NS1)204, 7737, 204
C   204 READ 3, YMAX, YMIN
C   7737 IF (NS2)70, 71, 70
C   70 READ 76, KMR
C   GO TO 74
C   71 IF (NS3)73, 74, 73
C   73 READ 3, VALX
C   74 IF (NS4)75, 72, 75
C   75 READ 3, VALY
C   72 NUM=0
C   5 NUM=NUM+1
C   READ 3, DATAX(NUM), DATAY(NUM), NSYMBL(NUM), LCARD
C   NSYMBL(NUM)=NSYMBL(NUM)
C   IF (NUM-945)8736,4,4
C   8736 IF (LCARD-5343)5,8737,5
C   8737 NUM=NUM-1
C
C   ARRANGE DATA PAIRS IN ASCENDING ORDER OF X, HIGH SPEED SORT
C   4 IF (NS5) 3472,3471,3472
C   3471 NUMII=NUM
C   7217 NUMII=NUMII/2

```

```

      IF (NUMII) 3472,3472,7215
7215 KUM=NUM-NUMII
      JUM=1
7216 IUM=JUM
7211 ITUM=IUM+NUMII
      IF (DATA(X(IUM))-DATA(X(ITUM))) 7213,7213,7212
7212 TEMP=DATA(X(IUM))
      DATA(X(IUM))=DATA(X(ITUM))
      DATA(X(ITUM))=TEMP
      TEMP=DATA(Y(IUM))
      DATA(Y(IUM))=DATA(Y(ITUM))
      DATA(Y(ITUM))=TEMP
      NTEMP=NSYMBL(IUM)
      NSYMBL(IUM)=NSYMBL(ITUM)
      NSYMBL(ITUM)=NTEMP
      IUM=IUM-NUMII
      IF (IUM-1) 7213,7211,7211
7213 JUM=JUM+1
      IF (JUM-KUM) 7216,7216,7217

```

C LIMIT Y DATA, FIND BIGGEST AND SMALLEST X AND Y DATA

```

3472 IF (NS1)501, 502, 501
501 DO 500 IF=1, NUM
      IF (YMAX-DATAY(IF))500, 504, 504
504 IF (DATAY(IF)-YMIN)500, 509, 509
509 SMALLX=DATA(X(1))
      SMALLY=DATA(Y(IF))
      BIGY=DATA(Y(IF))
      GO TO 510
500 CONTINUE
502 SMALLX=DATA(X(1))
      SMALLY=DATA(Y(1))
      BIGY=DATA(Y(1))
510 BIGX=DATA(X(NUM))
      DO 6 IA=1, NUM
      IF (NS1)210, 209, 210
210 IF (YMAX-DATAY(IA))206, 207, 207
206 NOGPH(IA)=NOGPH(IA)+1
      GO TO 6
207 IF (DATAY(IA)-YMIN)208, 209, 209
208 NOGPH(IA)=NOGPH(IA)+1
      GO TO 6
209 IF (BIGY-DATAY(IA))7, 8, 8
      7 BIGY=DATA(Y(IA))
      8 IF (DATAY(IA)-SMALLY)9,6,6
      9 SMALLY=DATA(Y(IA))
      6 CONTINUE

```

C ASSIGN OUTPUT POSITIONS TO X AND Y DATA, DETERMINE AMOUNT OF X OUTPUT

```

      IF (NS6)50, 51, 50
50 REP=1.+76.*(BIGX-SMALLX)/(BIGY-SMALLY)
      VALX=(BIGX-SMALLX)/(REP-1.)
      VALY=(BIGY-SMALLY)/76.
      GO TO 59
51 IF (NS2)58, 60, 58
58 REP=KMR
      VALX=(BIGX-SMALLX)/(REP-1.)
      GO TO 52
60 IF (NS3)61, 62, 61

```

```

61 REP=(BIGX-SMALLX)/VALX+1.
      GO TO 52
62 REP=NUM
      VALX=(BIGX-SMALLX)/(REP-1.)
52 BIGYF=BIGY
      IF (NS4)63, 69, 63
63 BIGY1=SMALLY+76.*VALY
      IF (BIGY-BIGY1)65, 65,64
64 PRINT 101
69 VALY=(BIGY-SMALLY)/76.
      GO TO 59
65 BIGY=BIGY1
59 DO 11 IB=1, NUM
      MX=1.5+(REP-1.)*(DATA(X(IB))-SMALLX)/(BIGX-SMALLX)
      DATA(X(IB))=MX
      IF (NOGPH(IB)*100/100)1121, 1121, 1122
1122 DATA(Y(IB))=0
      GO TO 11
1121 MY=4.5+76.*(DATA(Y(IB))-SMALLY)/(BIGY-SMALLY)
      DATA(Y(IB))=MY
11 CONTINUE

```

C PUNCH GRAPH AND HEADINGS

```

PUNCH 1
PUNCH 103, SMALLY, BIGYF, SMALLX
PUNCH 214
DATA(X(NUM+1))=0
DO 12 IC=1,NUM
MX=DATA(X(IC))
MY=DATA(Y(IC))
NPOS=MX/100+170
PLACE=VAFP1F(NPOS)
NPOS=MX/10-(MX/100)*10+270
PLACE=VAFP1F(NPOS)
NPOS=MX-(MX/10)*10+370
PLACE=VAFP1F(NPOS)
IF (NSYMBL(IC)/100)6739, 6738, 6739
6739 KQ=NSYMBL(IC)/100
      GO TO 6737
6738 KQ=K
6737 MON=MY*100+KQ
      PLACE=VAFP1F(MON)
      MXQ=MX
      JMY=DATA(X(IC+1))-DATA(X(IC))
      IF (JMY)21, 12, 21
21 PLACE=VAFP2F(MON)
      ID=0
221 IF (JMY-1-ID)12, 12, 13
13 ID=ID+1
      MXQ=MXQ+1
      NPOS=MXQ /100+170
      PLACE=VAFP1F(NPOS)
      NPOS=MXQ /10-(MXQ /100)*10 +270
      PLACE=VAFP1F(NPOS)
      NPOS=MXQ -(MXQ /10)*10+370
      PLACE=VAFP1F(NPOS)
      PLACE=VAFP2F(MXQ)
      GO TO 221
12 CONTINUE

```

PUNCH 214
 PUNCH 104, BIGX, VALX, VALY
 GO TO 81

C
 C
 FORMAT STATEMENTS
 1 FORMAT (80H
 1
 2 FORMAT (1A1, 6I1)
 3 FORMAT (2F20.4, A1, 37X, A2)
 76 FORMAT (I4)
 101 FORMAT (18HY INCR. CALCULATED)
 103 FORMAT (/E12.6, 8H=SMALL Y, 38X, E12.6, 6H=BIG Y//E12.6, 8H=SMALL
 1X/)
 104 FORMAT (/E12.6, 6H=BIG X//E12.6, 7H=X INCR, 12X, E12.6, 7H=Y INCR)
 214 FORMAT (80H 000000001111111112222222222333333333344444444455
 155555555666666666677777777/80H 123456789012345678901234567890123
 245678901234567890123456789012345678901234567)
 END

SAMPLE DATA

TEST DATA FOR MULTIPPOINT PLOTTER

BOB GATES

JUNE 10, 1966

*000000		
17.555	6.77	
43.8	12.77	
5.	5.	+
10.	5.	+
15.	5.	+
20.	5.	+
25.	5.	+
	-10.	002.10
	039.	020.10
-4.9000		-.449814
.3000		3.313714
2.4000		-12.041614
-2.2000		-.155814
2.5000		-9.800014
-2.1000		-.140514
.4000		3.062514
.5000		3.000014
-4.8000		-.442414
-4.7000		-.434714
.6000		3.047614
2.6000		-8.307614
2.7000		-7.243314
-2.0000		-.125014
.7000		3.175814
.8000		3.375014
.9000		3.646414
1.0000		4.000014
1.1000		4.454514
2.8000		-6.446414
-1.9000		-.109314
-4.6000		-.426614
-4.5000		-.418814
2.9000		-5.827514
3.0000		-5.333314
3.1000		-4.929614
-1.8000		-.093514
-4.4000		-.410514
-1.7000		-.077914
3.2000		-4.593714
-1.6000		-.062514
3.3000		-4.310014
-4.3000		-.401914
-4.2000		-.393214
-4.1000		-.384214
-4.0000		-.375014
-3.9000		-.365414
-1.5000		-.047614
-1.4000		-.033614
-1.3000		-.020914
-1.2000		-.010414
-3.8000		-.355714
-3.7000		-.345614
-3.6000		-.335314
3.4000		-4.067214
-1.1000		-.002914
-1.0000		0.000014

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3.5000	-3.857114
-1.9000	-4.003814
-3.5000	-4.324614
-3.4000	-4.313714
-1.8000	-4.017614
-2.3000	-4.302414
1.2000	5.041614
3.6000	-3.673614
-1.7000	-4.047614
3.7000	-3.511914
-1.6000	-4.102514
3.8000	-3.368414
-1.5000	-4.200014
2.3000	-15.782614
1.3000	5.813114
1.4000	6.857114
-3.2000	-4.290814
3.9000	-3.240214
-1.4000	-4.375014
-3.1000	-4.278914
-3.0000	-4.266614
1.5000	8.333314
4.0000	-3.125014
4.1000	-3.020914
1.6000	10.562914
-1.3000	-4.710114
-2.9000	-4.710114
-2.8000	-4.241014
-2.7000	-4.227714
1.7000	14.294114
1.8000	21.777714
1.9000	44.263114
4.2000	-2.926414
4.3000	-2.840214
-2.6000	-4.214014
-2.5000	-4.200014
-2.4000	-4.185614
2.1000	-45.761914
2.2000	-23.272714
-2.3000	-4.170814
4.4000	-2.761314
4.5000	-2.688814
-1.2000	-4.1454514
-1.1000	-3.857114
1.000	6.368414
2000	4.000014
4.6000	-2.622014
4.7000	-2.560214
4.8000	-2.502914
10.	10.03
18.	18.03
29.	29.03
33.	33.03
50.	50.03
60.	60.03
72.	72.03
73.	73.03
74.	74.03
001.	-03.10

006.	-03.10
034.	045.10
008.	-03.10
-02.	015.10
035.	039.10
040.	002.10
041.	000.10
036.	033.10
009.	-02.10

ZZZZ
ZZPAUS

END OF JOB

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00000000011111111122222222233333333344444444555555556666666677777777
1234567890123456789012345678901234567890123456789012345678901234567

•740000E+02=BIG X

•682926E+00=X INCR

•157580E+01=Y INCR





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