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GENERAL PURPOSE HIGH-RESOLUTION PLOTTING PACKAGE FOR TEKTRONIX --ETC(U)
AUG 81 C H RUGGIERO, R W ANDERSON
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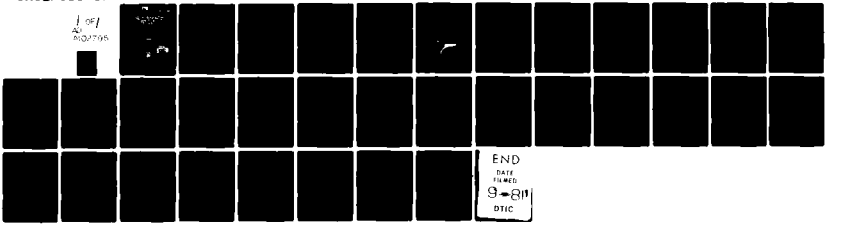

NRL Memorandum Report [illegible]

General-Purpose High-Resolution Plotting Package for Tektronix 4662 Plotter and Compatible CRT Terminals.

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Tektronix 4662
Interactive plotting

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

An interactive plotting package to accommodate XY data in any format is presented. Automatic scaling, choice of line types, labels, and multiple curves on a single plot are some of the options provided to make this package versatile and easy to use.

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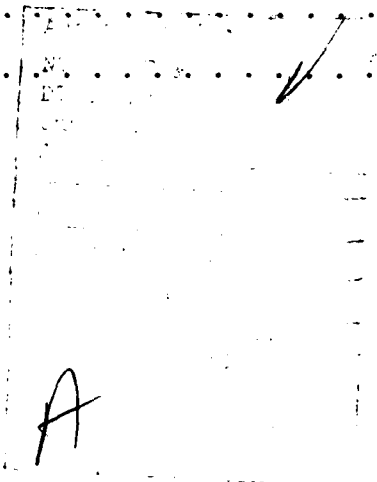
CONTENTS



GENERAL PURPOSE HIGH-RESOLUTION PLOTTING PACKAGE FOR TEKTRONIX 4662 PLOTTER AND COMPATIBLE CRT TERMINALS

1. IDENTIFICATION

1.1. Identification Name: PLOTTER

1.2. Subroutines: XYPLOT, SCALE, AXIS, PLREAD, PON, POFF, TKDASH, MINMAX, TPLOT, TERM, A4662

1.3. Programming Language:

Language: FORTRAN 4-Plus, Version 3.0
Routine Type: Source Program and Subroutines
Operating System: RSX-11M, Version 3.2

1.4. Computer: Digital Equipment Corp. PDP-11/45

1.5. Program Availability:

Submittal: Program Descriptions and Listings
On File: USRD Source Library

2. PURPOSE

2.1. Description of the Routine: The program PLOTTER generates a 12-bit resolution plot of absissa and ordinate values. This program can adapt to formatted or unformatted data contained in one or two files. PLOTTER also has the capability to allow the user to manually enter points for an XY plot. The program contains the following options:

- Automatic Scaling
- Point Plot
- Choice of Line (solid, dashed, dot-dash, small dashes)
- Create New Data File
- Labels
- Multiple Curves on One Graph

2.2. Program Background: The PLOTTER program was designed to provide USRD with an interactive graphics package that is both versatile and easy to use.

3. USAGE

3.1. Preparation of Terminal and Plotter: The preparation needed before running the program PLOTTER depends upon the instrument used; either the Tektronix CRT or the Tektronix 4662 plotter may be used for plotting. If a Tektronix CRT is used, one needs only to be logged on the computer and to type RUN PLOTTER.

Manuscript submitted June 3, 1981.

Since the program is self-explanatory (see Sec. 4.1.) there is no need for further instructions. However, if the Tektronix 4662 flat-bed plotter (Fig. 1) is used, the plotter must be prepared before running the program. This involves a few simple steps.

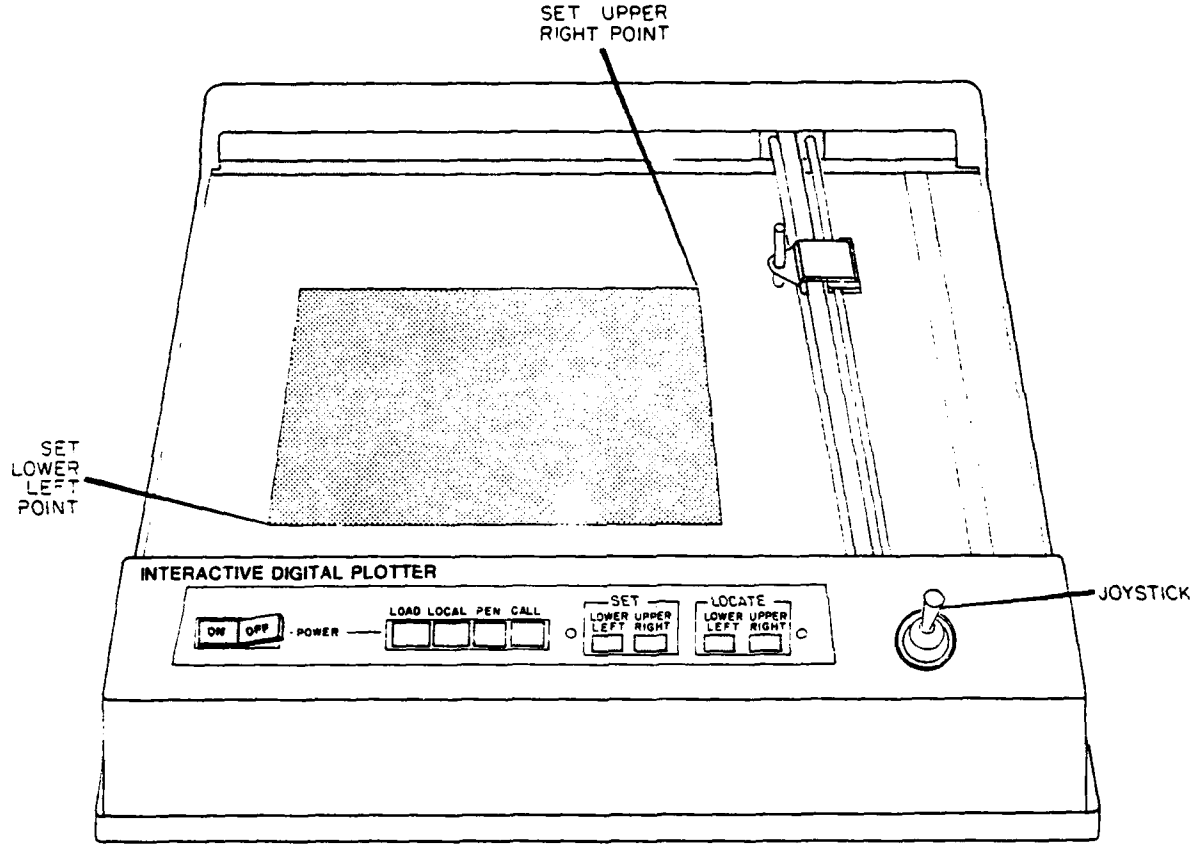


Fig. 1 - Flat-bed plotter (Tektronix 4662)

- Rock the POWER switch to the right to turn the plotter on. The POWER indicator will light and the pen will move down along the right boundary until it reaches the lower right corner where it will stop.

- Depress the LOAD key to its locked position. This will lift the pen and move it to the LOAD position (upper right corner of platen), and the electrostatic paper hold-down will be disengaged.

- Position a new piece of paper on the platen so the bottom edge of the paper lays evenly along the paper guide.

- Press the LOAD key to release it from its locked position; this will activate the electrostatic paper hold-down. If "bubbles" appear under the paper, smooth them out with your hand.

- Choose a scale so that the graph fits the page. Use the joystick to position the pen to the lower left corner of the paper.

- Press the SET LOWER LEFT key and hold it down until the plotter bell rings.

- Using the joystick, move the pen to the upper right corner of the paper.

- Press the SET UPPER RIGHT key and hold it down until the plotter bell rings.

After logging-in on the terminal, you may now type RUN PLOTTER <CR> (<CR> represents depressing the RETURN key). The graphs produced on the CRT and on the flat-bed plotter (Tektronix 4662) are identical except there is 12-bit resolution on the Tektronix 4662 and 10-bit resolution on the CRT plots. To ensure a 12-bit resolution, the rear-panel switches of the 4662 must be properly set. These parameter settings are vital to proper system operation. Figure 2 shows the switch positions.

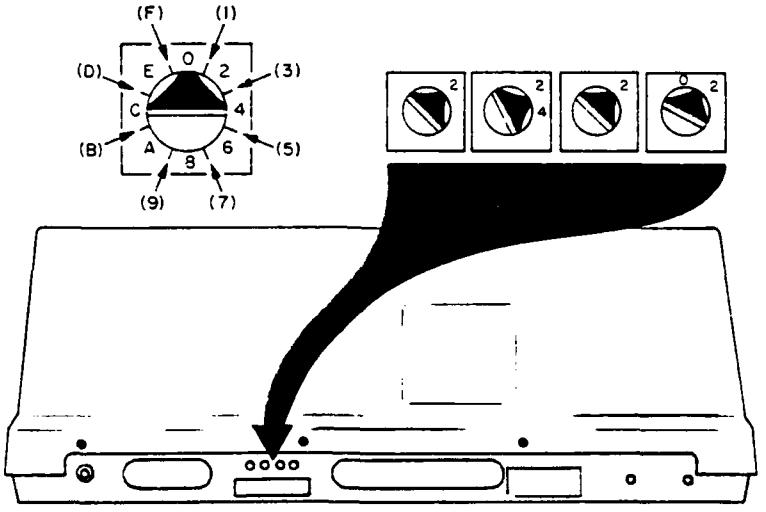


Fig. 2 - There are four hexadecimal switches labeled A, B, C, and D in the rear panel of the 4662. The switches should be set at the 2321 position as shown.

3.2. Input: The user must supply the name of the single file containing the XY coordinates or the names of the files containing the X data and the Y data. The data files can be formatted or unformatted. As an option, the XY data can be entered interactively. This option will store the data in two unformatted files: DATAX.DAT. and DATAY.DAT.

3.3. Output: A typical output is shown in Section 4. The output is primarily the CRT plot or 4662 plot with appropriate labels.

3.4. Limitations: The data arrays have been dimensioned at 1000. To accommodate more than 1000 points the source-program statement must be changed.

3.5. Format: PLOTTER can accommodate data file(s) containing one X or Y value, or one XY coordinate per line in any format.

4. TEST METHOD AND RESULTS

To test PLOTTER, four data files were created in different formats. The interaction found in Section 4.1. is an example of the type of responses needed for this routine. Sections 4.2. and 4.3. give examples of the graphs produced by PLOTTER on the Tektronix 4662.

4.1. Running PLOTTER: This is an example of the interaction involved in running the program.

```
RUN PLOTTER   <CR>

DO YOU WANT TO CREATE NEW DATA FILES? Y/N:  N  <CR>

ENTER NUMBER OF POINTS TO BE PLOTTED: 200  <CR>

COORDINATES CONTAINED IN 1 OR 2 FILES? 1  <CR>

ARE FILES (1)UNFORMATTED OR (2)FORMATTED: 2  <CR>

ENTER FORMAT TO USE FOR READING:  (IE.   (2F10.6)  )  (F4.1,F7.1)  <CR>

FILENAME FOR X,Y DATA: CAL10.DAT  <CR>

DO YOU WANT AUTOMATIC SCALING? Y/N  N  <CR>
XMIN = 0.20000000E+01
XMAX = 0.70400002E+02
YMIN = 0.49976001E+01
YMAX = 0.50847101E+01

ENTER THE XMIN,XMAX,YMIN,YMAX YOU WISH TO
 USE SEPARATED BY COMMAS:  0.0,30.0,4.97,5.10  <CR>

ENTER THE # OF X TIC MARKS,# OF Y TIC MARKS:  5,6  <CR>

DO YOU WANT POINT PLOT? Y/N  Y  <CR>

DO YOU WANT LABELS?  IF USING CRT, TYPE N:  Y  <CR>

TYPE IN LABEL FOR PLOT:  CALIBRATION AT 10(C)  <CR>

TYPE IN LABEL FOR X AXIS:  PRESSURE  <CR>

TYPE IN LABEL FOR Y AXIS:  VOLUME  <CR>

DO YOU WANT ANOTHER CURVE ON THIS AXIS? Y/N  Y  <CR>

 YOU HAVE A CHOICE AS TO WHICH TYPE LINE TO USE.

 SOLID LINE - TYPE 1      DASHED LINE - TYPE 2
 DASH-DOT LINE - TYPE 3   SHORT DASHES - TYPE 4  1  <CR>

DO YOU WANT TO CREATE NEW DATA FILES? Y/N:  N  <CR>

ENTER NUMBER OF POINTS TO BE PLOTTED: 200  <CR>

COORDINATES CONTAINED IN 1 OR 2 FILES? 1  <CR>

ARE FILES (1)UNFORMATTED OR (2)FORMATTED? 2  <CR>

ENTER FORMAT TO USE FOR READING:  (IE.   (2F10.6)   )  (2F10.6)  <CR>

FILENAME FOR X,Y DATA: CAL10.DAT  <CR>

DO YOU WANT ANOTHER CURVE ON THIS AXIS? Y/N  N  <CR>

 TO GRAPH ANOTHER CURVE, TYPE RUN PLOTTER

>
```

NOTE: All underlined portions are user-supplied.

4.2. PLOTTER Output Example: Figure 3 is a typical plot of four experimental data sets and a rational-fraction curve fit to the data.

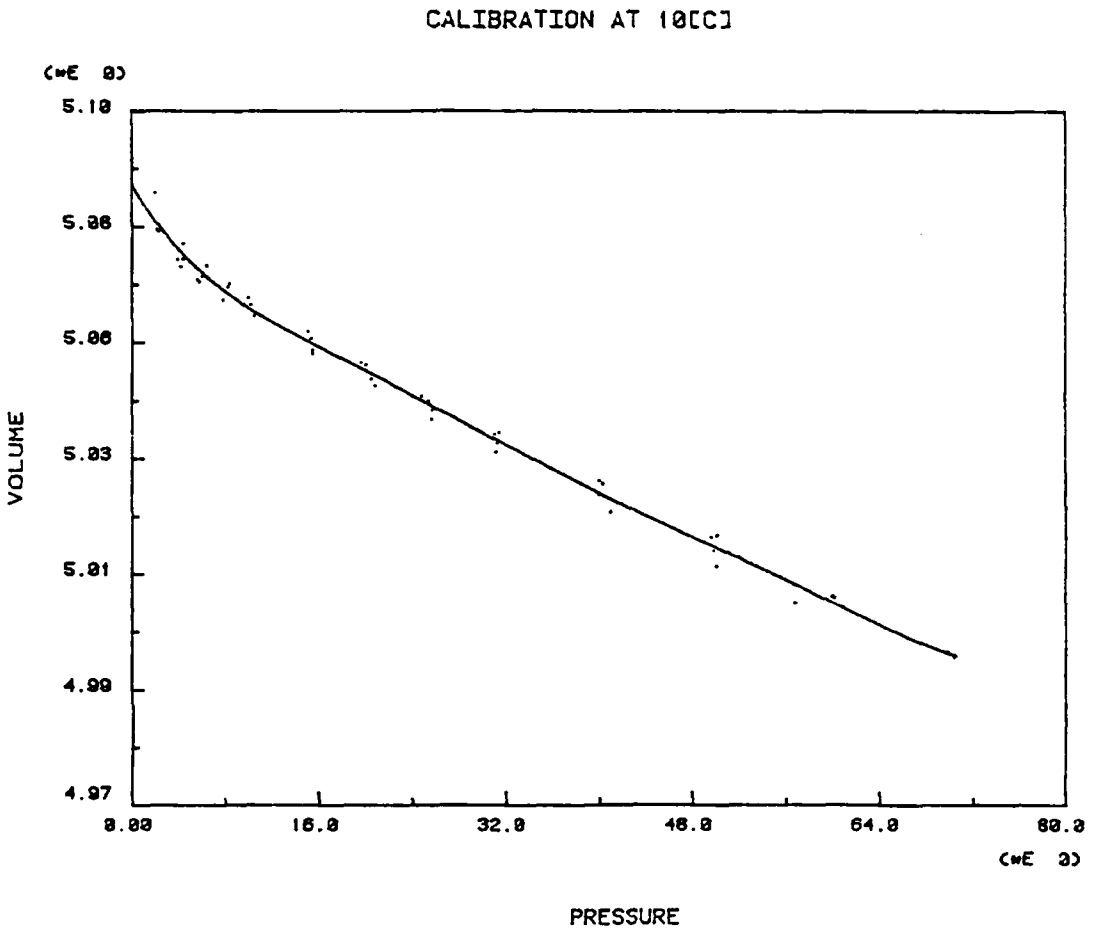


Fig. 3

4.3. PLOTTER Output Example: Figure 4 is another example of the output from the Tektronix 4662 plotter. This plot illustrates the various line types that can be obtained.

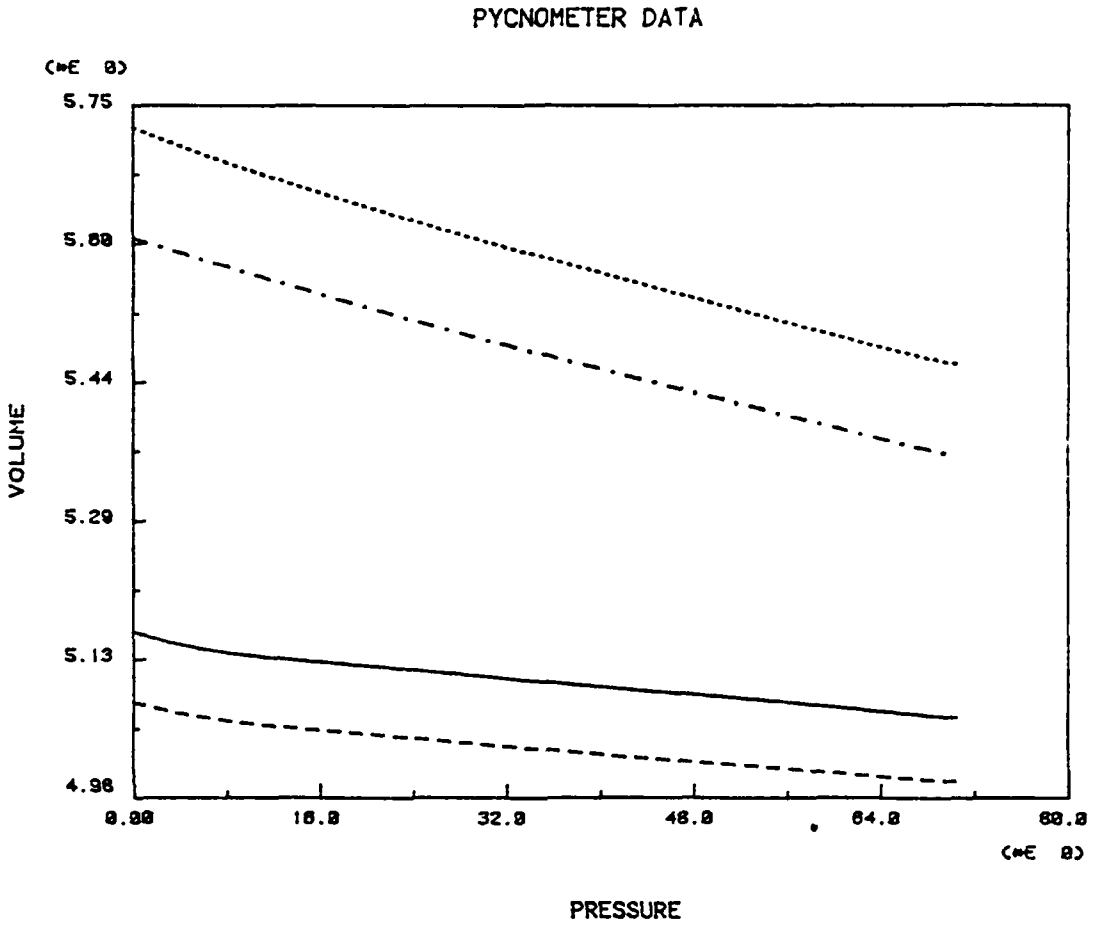


Fig. 4

Acknowledgments

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APPENDIX A

SOURCE LANGUAGE LISTING

```
C     :.....:
C     :                                                                     :
C     :                PLOTTER PROGRAM                                      :
C     :                SEPTEMBER,1980                                       :
C     :                PROGRAMMED BY TINA RUGGIERO AND BOB ANDERSON         :
C     :.....:


C     :.....:
C     :                                                                     :
C     :       THIS PROGRAM IS DESIGNED FOR THE TEKTRONIX-4662 FLAT BED PLOTTER :
C     :       IN WHERE X AND Y DATA CAN BE PLOTTED IN THE FOLLOWING FORMS:  :
C     :         1)X AND Y DATA IN SEPARATE FILES-UNFORMATTED                :
C     :         2)X AND Y DATA IN SEPARATE FILES-FORMATTED                  :
C     :         3)X AND Y DATA IN SAME FILE-UNFORMATTED                     :
C     :         4)X AND Y DATA IN SAME FILE-FORMATTED  OR                   :
C     :         5)POINTS CAN BE INPUTED MANUALLY.                           :
C     :                                                                     :
C     :.....:


C     :.....:
C     :                                                                     :
C     :       SUBROUTINES USED ARE:  TPLOT, XYPLOT, TERM, AXIS, MINMAX, TKDASH, :
C     :                              A4662, PON, POFF, SCALE, PLREAD        :
C     :                                                                     :
C     :.....:


C     :.....:
C     :                                                                     :
C     :       LIMITATIONS:                                                  :
C     :         DATA ARRAYS ARE DIMENTIONED AT 1000 POINTS                  :
C     :         DATA MUST BE REAL                                           :
C     :                                                                     :
C     :.....:


C     :.....:
C     :                                                                     :
C     :       NOTE:                                                         :
C     :         THERE IS A PROGRAM CALLED 'UEDIT' WHICH CAN BE USED FOR     :
C     :         EDITING UNFORMATTED SINGLE ARRAYS.                          :
C     :                                                                     :
C     :.....:
```

```
C       :                                                                    :
C       :                                                                    :
C       :      BEFORE RUNNING PROGRAM, TURN PLOTTER ON, LOAD PAPER, AND SET THE
C       :      LOWER LEFT AND UPPER RIGHT POINTS                             :
C       :....................................................................:

        BYTE DATAX(32), DATAY(32), COOR(4), ILFA(7Ø), ITXT(148)
        REAL X(2Ø5Ø),Y(2Ø5Ø),XMIN,XMAX,YMIN,YMAX,XMIN1,XMAX1,YMIN1,YMAX1,
       1 XRANG,YRANG,DASH(8)
        INTEGER NPOINT,NPONT,LENX, LENY, NANS,
       1   ITYPE,XVAL(2Ø5Ø),YVAL(2Ø5Ø),
       1 ITYMAX,ITXMIN,ITYMIN

        CALL ERRSET(29,,.FALSE.,,.FALSE.,,)
        CALL ERRSET(3Ø,,.FALSE.,,.FALSE.,,)



C       ....................................................................
C       :                                                                  :
C       :       ICENT IS HALF THE NUMBER OF CHARACTERS USED IN THE LABEL   :
C       :                                                                  :
C       :..................................................................:



        ICENT=42
        NDASH=1



C       ....................................................................
C       :                                                                  :
C       :       POFF TURNS THE PLOTTER OFF                                 :
C       :                                                                  :
C       :..................................................................:



        CALL POFF(5)
1Ø      WRITE(5,11)

C       ....................................................................
C       :                                                                  :
C       :       IF YOU HAVE YOUR DATA ON A FILE YOU DON'T WANT A           :
C       :       NEW DATA FILE.                                             :
C       :                                                                  :
C       :..................................................................:


11      FORMAT(/,'SDO YOU WANT TO CREATE NEW DATA FILES? Y/N:  ')
        READ (5,12)NANS
12      FORMAT(A1)
        NAN='N'
        IF (NANS .EQ. 'N') GO TO 16
        IF (NANS .EQ. 'Y') GO TO 15
        GO TO 1Ø

C       ....................................................................
C       :                                                                  :
C       :       XYPLOT IS WHERE NEW DATA FILE IS CREATED IF POINTS         :
C       :       ARE ENTERED MANUALLY                                       :
C       :                                                                  :
C       :..................................................................:
```

```
15      CALL XYPLOT(X,Y,NPONT)
        GO TO 2Ø
16      WRITE(5,17)
        READ(5,18)NPOINT
17      FORMAT(/,'$ENTER NUMBER OF POINTS TO BE PLOTTED: ')

C       .....................................................................
C       :                                                                   :
C       :       IF YOU DON'T KNOW THE NUMBER OF POINTS IN THE FILE,         :
C       :       MAKE SURE YOU ENTER A NUMBER THAT IS POSITIVELY             :
C       :       LARGER THAN THE NUMBER OF POINTS YOU HAVE.                  :
C       :                                                                   :
C       :...................................................................:

18      FORMAT(I4)



C       .....................................................................
C       :                                                                   :
C       :       PLREAD DETERMINES THE NUMBER OF FILES AND THE FORMAT THAT YOUR :
C       :       DATA IS IN                                                  :
C       :                                                                   :
C       :...................................................................:



        CALL PLREAD(X,Y,NPOINT)


        NPONT=NPOINT
2Ø      IF(ANSW .EQ. 'Y')CALL PON(5)
        IF(ANSW .EQ. 'Y')GO TO 6Ø



C       .....................................................................
C       :                                                                   :
C       :       MINMAX DETERMINES THE MINIMUM AND MAXIMUM VALUE OF AN ARRAY :
C       :                                                                   :
C       :...................................................................:



        CALL MINMAX(X,XMIN,XMAX,NPONT)
        CALL MINMAX(Y,YMIN,YMAX,NPONT)
        WRITE(5,21)

C       .....................................................................
C       :                                                                   :
C       :       AUTOMATIC SCALING WILL SCALE YOUR DATA AND WILL             :
C       :       CALL THE SUBROUTINE AXIS.                                   :
C       :                                                                   :
C       :...................................................................:
```

```
21      FORMAT(/,'SDO YOU WANT AUTOMATIC SCALING? Y/N  ')
        READ(5,23)AUTO
23      FORMAT(A1)
        IF(AUTO.NE. 'Y')GO TO 3Ø



C       ..........................................................................
C       :                                                                        :
C       :       SCALE DRAWS AND LABELS AXIS                                      :
C       :                                                                        :
C       :........................................................................:



        CALL SCALE(XMIN-(XMIN*5.ØE-Ø5),XMAX+(XMAX*5.ØE-Ø5),XMIN1,XMAX1,NTICX)
        CALL SCALE (YMIN-(YMIN*5.ØE-Ø5),YMAX+(YMAX*5.ØE-Ø5),YMIN1,YMAX1,NTICY)
        GO TO 42
C       THE X AND Y MIN AND MAX WILL BE PRINTED.

3Ø      WRITE(5,31)XMIN,XMAX,YMIN,YMAX
31      FORMAT(' XMIN=',E15.8,/,' XMAX=',E15.8,/,' YMIN=',E15.8,/,
        1 ' YMAX=',E15.8)
        WRITE(5,32)
        WRITE(5,33)
32      FORMAT(/,' ENTER THE XMIN,XMAX,YMIN,YMAX YOU WISH TO')
33      FORMAT('$ USE SEPARATED BY COMMAS:  ')
        READ(5,34)XMIN1,XMAX1,YMIN1,YMAX1
34      FORMAT(4E15.Ø)
        WRITE(5,4Ø)


C       ..........................................................................
C       :                                                                        :
C       :       TIC MARKS ARE THE DIVISIONS ON THE AXIS                          :
C       :                                                                        :
C       :........................................................................:


4Ø      FORMAT(/,'SENTER THE # OF X TIC MARKS,# OF Y TIC MARKS:  ')
        READ (5,41)NTICX,NTICY
41      FORMAT(2I2)
42      CONTINUE



C       ..........................................................................
C       :                                                                        :
C       :       THESE VALUES ARE THE MAX. & MIN OF THE TEKTRONICS PLOTTER        :
C       :                                                                        :
C       :........................................................................:



        TXMIN=6ØØ
        TXMAX=3999
        TYMIN=55Ø
        TYMAX=2731
        ITXMIN=TXMIN
        ITXMAX=TXMAX
        ITYMIN=TYMIN
        ITYMAX=TYMAX
        GO TO 72
```

```
C       .....................................................................
C       :                                                                   :
C       :       THE SUBROUTINE SCALE, AUTOMATICALLY SCALES THE DATA AND CALLS :
C       :       SUBROUTINE AXIS                                             :
C       :                                                                   :
C       :...................................................................:
50      CALL PON(5)
        CALL TERM(0,0)



51      CALL AXIS(XMIN1,XMAX1,NTICX,TXMIN,TXMAX,YMIN1,YMAX1,NTICY,TYMIN,
        1 TYMAX,0)



C       .....................................................................
C       :                                                                   :
C       :       A4662 CHANGES THE SIZES OF THE CHARACTERS IN LABEL          :
C       :                                                                   :
C       :...................................................................:



        CALL A4662(5,'A',56,80,0,0)

C       SCALE THE POINTS

        XRANG=XMAX1-XMIN1
        TXRANG=TXMAX-TXMIN
        YRANG=YMAX1-YMIN1
        TYRANG=TYMAX-TYMIN

C       .....................................................................
C       :                                                                   :
C       :       THIS SECTION DETERMINES THE TYPE LINE DESIRED.   WHEN NDASH=1 :
C       :       -SOLID LINE,NDASH=2-DASHED LINE,NDASH=3-DASH-DOT,           :
C       :       AND NDASH=4 IS SMALL DASHES.                                :
C       :                                                                   :
C       :...................................................................:



60      CONTINUE
        IF (NDASH .EQ. 1) DASH(1)=2000.0

        IF (NDASH .EQ.2) DASH(1)=40.0
        IF (NDASH .EQ.2)DASH(2)=40.0

        IF(NDASH .EQ.3)DASH(1)=50.0
        IF(NDASH .EQ.3)DASH(2)=50.0
        IF(NDASH .EQ.3)DASH(3)=4.0
        IF(NDASH .EQ.3)DASH(4)=50.0

        IF(NDASH .EQ.4)DASH(1)=10.0
        IF(NDASH .EQ.4)DASH(2)=25.0
        IF(NDASH .EQ.4)DASH(3)=10.0
        IF(NDASH .EQ.4)DASH(4)=25.0
        IF(NDASH .EQ.4)DASH(5)=10.0
        IF(NDASH .EQ.4)DASH(6)=25.0

        IF(NDASH .EQ.4)NDASH=6
        IF(NDASH .EQ.3)NDASH=4
        MO=1
```

```
      DO 62 I=1,NPONT
      IF(Y(I).LT.YMIN1 .OR. X(I) .LT. XMIN1 .OR. X(I) .GT. XMAX1)GOTO 62
      XVAL(MO)=INT(((X(I)-XMIN1)*(TXRANG)/(XRANG))+TXMIN)
      YVAL(MO)=INT(((Y(I)-YMIN1)*(TYRANG)/(YRANG))+TYMIN)
61    FORMAT(2E15.8,2I4)


C     .....................................................................
C     :                                                                   :
C     :       TPLOT POSITIONS PEN AND WHEN ITYPE<0, A POINT IS DRAWN      :
C     :                                                                   :
C     :...................................................................:



      IF(NAN .EQ. 'Y') CALL TPLOT (XVAL(MO),YVAL(MO),-1)

C     .....................................................................
C     :                                                                   :
C     :       TKDASH PLOTS THE DESIRED TYPE LINE                          :
C     :                                                                   :
C     :...................................................................:

      IF (NAN .NE. 'Y') CALL TKDASH(XVAL(MO),YVAL(MO),MO,DASH,NDASH)
      MO=MO+1
62    CONTINUE
      CALL TPLOT(XVAL(MO),YVAL(MO),0)



C     .....................................................................
C     :                                                                   :
C     :       TERM(1,0) DUMPS THE BUFFER                                  :
C     :                                                                   :
C     :...................................................................:









      CALL TERM(1,0)
      CLOSE(UNIT=1)
      CLOSE(UNIT=2)
63    CONTINUE
      CALL POFF(5)
      WRITE(5,70)

C     .....................................................................
C     :                                                                   :
C     :       THIS ALLOWS FOR UP TO 4 CURVES ON 1 GRAPH.                  :
C     :                                                                   :
C     :...................................................................:

70    FORMAT(/,'$DO YOU WANT ANOTHER CURVE ON THIS AXIS? Y/N  ')
      READ(5,71)ANSW
71    FORMAT(A1)
      IF(ANSW .EQ. 'Y') GO TO 120
      GO TO 140
72    CONTINUE
      ITYPE=0
      WRITE(5,80)
```

```
C       .....................................................................
C       :                                                                   :
C       :       IF YOU DON'T WANT A LINE PLOT YOU WILL GET A                :
C       :       POINT PLOT.                                                 :
C       :                                                                   :
C       :...................................................................:

80      FORMAT(/,'$DO YOU WANT POINT PLOT? Y/N  ')
        READ(5,81)NAN
81      FORMAT(A1)
        IF (NAN .EQ. 'Y') ITYPE=-1
        WRITE(5,82)

C       .....................................................................
C       :                                                                   :
C       :       THERE ARE THREE LABELS.  ONE LABEL IS THE TITLE LABEL       :
C       :       AND THEN THERE IS A LABEL FOR THE X AND Y AXIS.             :
C       :                                                                   :
C       :...................................................................:

82      FORMAT(/,'$DO YOU WANT LABELS? IF USING CRT, TYPE N:  ')
        READ(5,83)ILAB
83      FORMAT(A2)
        IF(ILAB .EQ. 'N') GO TO 50
        WRITE(6,84)
84      FORMAT(/,'$TYPE IN LABEL FOR PLOT:  ')

C       .....................................................................
C       :                                                                   :
C       :       ICNT IS THE LENGTH OF WORD, ILFA IS THE WORD                :
C       :                                                                   :
C       :...................................................................:

90      READ(5,91)ICNT,ILFA
91      FORMAT(Q,70A1)
        IF(ICNT.EQ.0)GO TO 93
        DO 92 I=1,ICNT
        ITXT(I)=ILFA(I)
92      CONTINUE
        NT=ICNT
        IF(A .EQ.1)GO TO 111
        IF(B .EQ.1)GO TO 113

C       .....................................................................
C       :                                                                   :
C       :       PON TURNS THE PLOTTER ON                                    :
C       :                                                                   :
C       :...................................................................:

93      CALL PON(5)
```

```
C     .....................................................................
C     :                                                                   :
C     :       TERM(Ø,Ø) CLEARS THE SCREEN                                 :
C     :                                                                   :
C     :...................................................................:



      CALL TERM(Ø,Ø)
      CALL TPLOT(Ø,24ØØ,Ø)
      IF(NT .GT. 1)WRITE (6,1ØØ)(ITXT(IX),IX=1,NT)
1ØØ   FORMAT(' ',T<ICENT-(ICNT/2)>,<NT>A1)
      CALL POFF(5)
      WRITE(5,11Ø)
11Ø   FORMAT(/,'STYPE IN LABEL FOR X AXIS:  ')
      A=1
      GO TO 9Ø
111   CALL TPLOT(Ø,25Ø,Ø)
      ICENT=5Ø
      CALL PON(5)
      CALL A4662(5,'A',5Ø,75,Ø,Ø)
      CALL TERM(2,Ø)
      WRITE(6,1ØØ)(ITXT(IX),IX=1,NT)
      CALL POFF(5)
      WRITE(5,112)
112   FORMAT(/,'STYPE IN LABEL FOR Y AXIS:  ')
      B=1
      A=Ø
      GO TO 9Ø
113   CALL TPLOT(125,Ø,Ø)
      ICENT=35
      CALL PON(5)
      CALL A4662(5,'A',5Ø,75,9Ø,Ø)



      CALL TERM(2,Ø)
      WRITE(6,1ØØ)(ITXT(IX),IX=1,NT)
      CALL A4662(5,'A',44,6Ø,Ø,Ø)

      GO TO 51
12Ø   WRITE(5,121)
121   FORMAT(/,'  YOU HAVE A CHOICE AS TO WHICH TYPE LINE TO USE.  ')
      WRITE(5,122)
122   FORMAT(/,'  SOLID LINE - TYPE 1     DASHED LINE - TYPE 2')
      WRITE(5,123)
123   FORMAT('$ DASH-DOT LINE - TYPE 3   SHORT DASHES - TYPE 4   ')
      READ (5,124)NDASH
124   FORMAT(I1)
      GO TO 1Ø
125   WRITE(5,13Ø)
13Ø   FORMAT('   ENTERED WRONG DATA FILE')
      CLOSE(UNIT=5)
      CALL PLREAD(X,Y,NPOINT)
131   WRITE(5,13Ø)
      CALL PLREAD(X,Y,NPOINT)
14Ø   WRITE(5,141)
141   FORMAT(/,'  TO GRAPH ANOTHER CURVE, TYPE RUN PLOTTER')
      END
```

APPENDIX B

SUBROUTINES

The following subroutines are those required for the program PLOTTER:

Subroutine: XYPLOT

```
C       :.....................................................................:
C       :                                                                     :
C       :       THIS SUBROUTINE CREATES TWO UNFORMATTED REAL ARRAYS           :
C       :       PROGRAMMED BY TINA RUGGIERO                                   :
C       :       SEPTEMBER, 1980                                               :
C       :.....................................................................:

        SUBROUTINE XYPLOT(X,Y,NPONT)

C       :.....................................................................:
C       :                                                                     :
C       :       THE ARGUMENTS X,Y,NPONT ARE RESPECTIVELY, THE ARRAY CONTAINING:
C       :       ABSISSAS, THE ARRAY CONTAINING ORDINATES, AND THE NUMBER OF   :
C       :       POINTS TO BE PLOTTED.                                         :
C       :                                                                     :
C       :.....................................................................:

        REALX(1),Y(1)
        INTEGER I,SUB,ANS,NPONT

        WRITE(5,10)
10      FORMAT(//,'  ENTER ORDERED PAIR SEPARATED BY A COMMA')

        I=0
        WRITE(5,20)

20      FORMAT(/' WHEN FINISHED ENTERING DATA,TYPE "CTRL Z"')
        OPEN(UNIT=1,NAME='DATAX.DAT',TYPE='NEW',FORM='UNFORMATTED')
        OPEN(UNIT=2,NAME='DATAY.DAT',TYPE='NEW',FORM='UNFORMATTED')
15      I=I+1
        WRITE(5,22)
22      FORMAT( /'$DATA?  ')
        READ(5,30,END=49)X(I),Y(I)
30      FORMAT(2E15.8)
        GO TO 15
49      CLOSE(UNIT=5)
        WRITE(5,50)
50      FORMAT(/,'$DO YOU WANT TO CHANGE ANY VALUES (Y/N)?  ')
        READ(5,60)ANS
60      FORMAT(A1)
        IF (ANS.EQ.'N')GO TO 40
        WRITE(5,70)
70      FORMAT('$ENTER SUBSCRIPT NUMBER OF CORRECTION   ')

        READ(5,30)SUB
80      FORMAT(I2)
        WRITE(5,90)
90      FORMAT('$RE-ENTER BOTH THE X AND Y VALUES  ')
        READ (5,30) X(SUB),Y(SUB)
        GO TO 49
40      NPONT=I-1
        DO 91 I=1,NPONT
```

(continued)

Subroutine: XYPLOT (continued)

```
        WRITE(1)X(I)
        WRITE(2)Y(I)
91      CONTINUE
        CLOSE(UNIT=1)
        CLOSE(UNIT=2)
        WRITE(5,800)
800     FORMAT(/,'  REMEMBER YOU HAVE JUST CREATED TWO UNFORMATTED ARRAYS')
        WRITE (5,801)
801     FORMAT('      WHICH ARE CALLED DATAX.DAT AND DATAY.DAT')
        WRITE(5,100)
100     FORMAT(/,' DATA FILE CLOSED')
        RETURN
        END
```

Subroutine: SCALE
Entry: AXIS

```
        SUBROUTINE SCALE(DMN,DMX,SMN,SMX,NDIV)
C   "SCALE" DETERMINES AN APPROPRIATE SCALE WITH NEAT LABELS
C   AT MULTIPLES OF 1,2, OR 5.
C    REQUIRES:
C      DMN=MIN DATA VALUE
C      DMX=MAX DATA VALUE
C    RETURNS:
C      SMN=MIN SCALE VALUE
C      SMX=MAX SCALE VALUE
C      NDIV=NUMBER OF SCALE DIVISIONS
C   L. D. LUKER         8/15/80
C   REVISED BY TINA RUGGIERO
        TEKINT(Z)=ANINT(Z-.499999)
        NFMT(VAL)=MINI(3.-TEKINT(1.+ALOG10(ABS(VAL))),2.)
D       TYPE *,'SCALE ',' DMN=',DMN,' DMX=',DMX
        R=(DMX-DMN)/6.
        S=10.**(TEKINT(ALOG10(R)))
        T=R/S
        IF (T.GT.2) GOTO 110
        IF (T.EQ.1) GOTO 130
        S=S*2
        GOTO 130
110     IF (T.GT.5) GOTO 120
        S=5*S
        GOTO 130
120     S=10*S
130     SMN=TEKINT(DMN/S)
        SMN=S*(SMN+2)
140     IF ((SMN-DMN)/(DMX-DMN).LE.1E-5) GOTO 150
        SMN=SMN-S
        GOTO 140
150     SMX=TEKINT(DMX/S)
        SMX=S*(SMX-2)
160     IF ((DMX-SMX)/(DMX-DMN).LE.1E-5) GOTO 170
        SMX=SMX+S
        GOTO 160
170     NDIV=NINT((SMX-SMN)/S)
D       TYPE *,'SCALE ',' SMN=',SMN,' SMX=',SMX,' NDIV=',NDIV
        RETURN
```

(continued)

Subroutine: SCALE (continued)
Entry: AXIS (continued)

```
C
      ENTRY AXIS(XMN,XMX,NXDIV,TXMN,TXMX,YMN,YMX,NYDIV,TYMN,TYMX,IZL)
C  DRAWS AND LABELS THE X & Y AXES
C   REQUIRES:
C    XMN=MIN X VAL
C    XMX=MAX X VAL
C    NXDIV=NUMBER OF X SCALE DIVISIONS
C    TXMN=TERMINAL X VAL CORRESPONDING TO MIN X VAL
C    TXMX=TERMINAL X VAL CORRESPONDING TO MAX X VAL
C    ALSO ALL THE ABOVE FOR Y
C    IZL=Ø DON'T DRAW ZERO LINE , IZL=1 DRAW ZERO LINE
D       TYPE *,'AXIS=',XMN,XMX,NXDIV,TXMN,TXMX,YMN,YMX,NYDIV,TYMN,TYMX
        T1=AMAX1(ABS(XMN),ABS(XMX))
        T1=1Ø.**(3*TEKINT((TEKINT(ALOG1Ø(T1+ABS((XMX-XMN)/1E4))))/3.))
        X1=XMN/T1
        XDIV=(XMX-XMN)/(2*NXDIV)
        XDX=(TXMX-TXMN)/(2*NXDIV)
        IX=TXMN
        IY=TYMN
        CALL TPLOT(IX-144,IY-2Ø,Ø)
        N=2
        IF (ABS(X1).GT..ØØ1) N=NFMT(X1)
        CALL TERM(2,Ø)
        WRITE(6,21Ø)X1
        DO 18Ø I=1,NXDIV*2
        X1=(XMN+I*XDIV)/T1
        IF (ABS(X1).LT..1) X1=Ø.
        IX=TXMN+(I-1)*XDX
        CALL TPLOT(IX,IY,Ø)
        IX=TXMN+I*XDX
        CALL TPLOT(IX,IY,1)
        CALL TPLOT(IX,IY+2Ø,1)
        IF (I/2..NE.AINT(I/2.)) GOTO 18Ø
        CALL TPLOT(IX,IY+4Ø,1)
        CALL TPLOT(IX-144,IY-2Ø,Ø)
        N=2
        IF (ABS(X1).GT..ØØ1) N=NFMT(X1)
        CALL TERM(2,Ø)
        WRITE(6,21Ø)X1
18Ø     CONTINUE
        CALL TPLOT(IX-24Ø,IY-128,Ø)
        CALL TERM(2,Ø)
        IT1=ANINT(ALOG1Ø(T1))
        WRITE(6,22Ø)IT1
C
        T1=AMAX1(ABS(YMN),ABS(YMX))
        T1=1Ø.**(3*TEKINT((TEKINT(ALOG1Ø(T1+ABS((YMX-YMN)/1E4))))/3.))
        Y1=YMN/T1
        YDIV=(YMX-YMN)/(2*NYDIV)
        YDX=(TYMX-TYMN)/(2*NYDIV)
        IY=TYMN
        IX=TXMN
        CALL TPLOT(IX-288,IY+8Ø,Ø)
        N=2
        IF (ABS(Y1).GT..ØØ1) N=NFMT(Y1)
        CALL TERM(2,Ø)
        WRITE(6,21Ø)Y1
        DO 19Ø I=1,NYDIV*2
        Y1=(YMN+I*YDIV)/T1
        IF (ABS(Y1).LT..1) Y1=Ø.
        IY=TYMN+(I-1)*YDX
        CALL TPLOT(IX,IY,Ø)
        IY=TYMN+I*YDX
```

(continued)

Subroutine: SCALE (continued)
Entry: AXIS (continued)

```
        CALL TPLOT(IX,IY,1)
        CALL TPLOT(IX+2Ø,IY,1)
        IF (I/2..NE.AINT(I/2.)) GOTO 19Ø
        CALL TPLOT(IX+4Ø,IY,1)
        CALL TPLOT(IX-288,IY+56,Ø)
        N=2
        IF (ABS(Y1).GT..ØØ1) N=NFMT(Y1)
        CALL TERM(2,Ø)
        WRITE(6,21Ø)Y1
19Ø     CONTINUE
        CALL TPLOT(IX-316,IY+16Ø,Ø)
        CALL TERM(2,Ø)
        IT1=ANINT(ALOG1Ø(T1))
        WRITE(6,22Ø)IT1
        ITXMN=TXMN
        ITXMX=TXMX
        ITYMN=TYMN
        ITYMX=TYMX
        CALL TPLOT(ITXMN,ITYMX,Ø)
        CALL TPLOT(ITXMX,ITYMX,1)
        CALL TPLOT(ITXMX,ITYMN,1)
        IF (IZL.EQ.Ø) GOTO 2ØØ
        IF (YMN*YMX.GT.Ø) GOTO 2ØØ
        IYZERO=(-YMN)*(TYMX-TYMN)/(YMX-YMN)+TYMN
        CALL TPLOT(ITXMN,IYZERO,Ø)
        CALL TPLOT(ITXMX,IYZERO,1)
2ØØ     RETURN
C  FORMAT STATEMENTS
21Ø     FORMAT(' ',F5.<N>)
22Ø     FORMAT(' ','(*E',I3,')')
        END
```

Subroutine: PLREAD

```
C       .....................................................................
C       :                                                                   :
C       : THIS SUBROUTINE IS DESIGNED TO READ X AND Y COORDINATES FROM EITHER       :
C       : FORMATTED OR UNFORMATTED FILES CONTAINING X, Y, OR X AND Y DATA.          :
C       : AS IT READS THE NUMBER OF POINTS SPECIFIED (NPTS) IT ALSO DETERMINES      :
C       : THE MINIMUM AND MAXIMUM VALUES OF EITHER OR BOTH COORDINATES. IT ALSO     :
C       : MODIFIES NPTS IF AN ATTEMPT IS MADE TO READ MORE VALUES (OR SETS OF       :
C       : VALUES) THAN ARE CONTAINED IN THE SPECIFIED FILE.                         :
C       :                                                                   :
C       :...................................................................:
C       WRITTEN BY BOB ANDERSON AND TINA RUGGIERO


        SUBROUTINE PLREAD(X,Y,NPTS)
```

(continued)

Subroutine: PLREAD (continued)

```
C       :.....................................................................:
C       :                                                                     :
C       : THE FILE NAME(S) ARE SAVED ALONG WITH THE NUMBER OF FILES AND THE   :
C       : FILE TYPE(S).  FILE TYPE = 2 * NUMBER OF FILES + 1 FOR UNFORMATTED, OR :
C       : 2 FOR FORMATTED.                                                    :
C       :                                                                     :
C       :.....................................................................:

        COMMON FILEX,FILEY,IFTYP

C       :.....................................................................:
C       :                                                                     :
C       : ARRAYS TO SAVE UP TO NPTS COORDINATE VALUES.                        :
C       :                                                                     :
C       :.....................................................................:

        DIMENSION X(1),Y(1)

C       :.....................................................................:
C       :                                                                     :
C       : ARRAYS IN COMMON TO SAVE THE FILE NAME(S). FILEX IS USED FOR ONLY ONE :
C       : FILE.                                                               :
C       :                                                                     :
C       :.....................................................................:

        BYTE FILEX(32),FILEY(32),FMT(32)

C       :.....................................................................:
C       :                                                                     :
C       : DETERMINE IFTYP BY FIRST FINDING OUT HOW MANY FILES ARE TO BE USED. :
C       :                                                                     :
C       :.....................................................................:

50      CLOSE(UNIT=5)
        WRITE(5,1000)
1000    FORMAT(/'$COORDINATES CONTAINED IN 1 OR 2 FILES? ')
        READ(5,1010,END=50)NFILES
1010    FORMAT(I4)
        IF(NFILES.LT.1.OR.NFILES.GT.2) GOTO 50

C       :.....................................................................:
C       :                                                                     :
C       : AND THEN FIND OUT IF IT OR THEY ARE FORMATTED OR UNFORMATTED.       :
C       :                                                                     :
C       :.....................................................................:
```

(continued)

Subroutine: PLREAD (continued)

```
100     CLOSE(UNIT=5)
        WRITE(5,102Ø)
102Ø    FORMAT(/,'$ARE FILES (1)UNFORMATTED OR (2)FORMATTED: ')
        READ(5,101Ø,END=1ØØ) ITYPE
        IFTYP=NFILES*2+ITYPE



C       ..........................................................................
C       :                                                                        :
C       : NOW READ THE DATA UP TO NPTS. MODIFY NPTS IF < PARAMETER PASSED.       :
C       :                                                                        :
C       :........................................................................:



105     IF(IFTYP.EQ.3) GOTO 2ØØ
        IF(IFTYP.EQ.4) GOTO 3ØØ
        IF(IFTYP.EQ.5) GOTO 4ØØ
        IF(IFTYP.EQ.6) GOTO 5ØØ
        GOTO 5Ø



C       ..........................................................................
C       :                                                                        :
C       : BOTH COORDINATES ARE CONTAINED IN ONE FILE AND IT IS UNFORMATTED.      :
C       :                                                                        :
C       :........................................................................:

2ØØ     WRITE(5,105Ø)
105Ø    FORMAT(/'$FILENAME FOR X,Y DATA: ')
        READ(5,106Ø,END=5Ø)LEN,FILEX
C       NOTICE LAST CHANCE TO START OVER! (^Z)
106Ø    FORMAT(Q,32A1)
        FILEX(LEN+1)=Ø
        OPEN(UNIT=1,NAME=FILEX,FORM='UNFORMATTED',TYPE='OLD',ERR=8ØØ)
C       NOTICE THERE MUST BE AT LEAST ONE POINT.
        DO 22Ø I=1,NPTS
                READ(1,END=24Ø)X(I),Y(I)
                J=I
22Ø     CONTINUE
C       MODIFY NPTS TO REFLECT THE ACTUAL NUMBER OF POINTS READ.
24Ø     NPTS=J
        CLOSE(UNIT=1)
        GOTO 9ØØ



C       ..........................................................................
C       :                                                                        :
C       : BOTH COORDINATES ARE CONTAINED IN ONE FILE AND IT IS FORMATTED.        :
C       :                                                                        :
C       :........................................................................:
```

(continued)

Subroutine: PLREAD (continued)

```
300     CLOSE(UNIT=1)
        WRITE(5,3000)
3000    FORMAT(/'$ENTER FORMAT TO USE FOR READING: (IE.   (2F10.0)  ) ')
        READ(5,3010)FMT
3010    FORMAT(32A1)
        WRITE(5,1050)
        READ(5,1060,END=50)LEN,FILEX
        FILEX(LEN + 1)=0
        OPEN(UNIT=1,NAME=FILEX,TYPE='OLD',ERR=800)
        DO 330 I=1,NPTS
        READ(1,FMT,ERR=300,END=240)X(I),Y(I)
        J=I
330     CONTINUE
        GO TO 240

C       .....................................................................
C       :                                                                   :
C       :       COORDINATES ARE CONTAINED IN TWO FILES AND ARE UNFORMATTED   :
C       :                                                                   :
C       :...................................................................:

400     WRITE(5,160)
160     FORMAT(/,'$ENTER FILENAME FOR X VALUES:  ')
        READ (5,1060,END=900)LENX,FILEX
        WRITE(5,360)
360     FORMAT(/,'$ENTER FILENAME FOR Y VALUES:  ')
        READ(5,1060,END=900)LENY,FILEY
        FILEX(LENX+1)=0
        FILEY(LENY+1)=0
        OPEN(UNIT=1,NAME=FILEX,TYPE='OLD',ERR=800,FORM='UNFORMATTED')
        OPEN(UNIT=2,NAME=FILEY,TYPE='OLD',ERR=800,FORM='UNFORMATTED')
        DO 460 I=1,NPTS
        READ(1,END=340)X(I)
        READ(2,END=340)Y(I)
        J=I
460     CONTINUE
340     NPTS=J
        CLOSE(UNIT=1)
        CLOSE(UNIT=2)
        GO TO 900

C       .....................................................................
C       :                                                                   :
C       :       COORDINATES ARE IN TWO FILES AND ARE FORMATTED               :
C       :                                                                   :
C       :...................................................................:

500     CLOSE(UNIT=1)
        WRITE(5,3000)
        READ(5,3010)FMT
        WRITE(5,160)
        READ(5,260,END=900)LENX,FILEX
260     FORMAT(Q,32A1)
        WRITE(5,360)
        READ(5,250,END=900)LENY,FILEY
        FILEX(LENX+1)=0
        FILEY(LENY+1)=0
        OPEN(UNIT=1,NAME=FILEX,ERR=800,TYPE='OLD')
        OPEN(UNIT=2,NAME=FILEY,ERR=800,TYPE='OLD')
        DO 560 I=1,NPTS
        READ(1,FMT,END=340)X(I)
        READ(1,FMT,END=340)Y(I)
        J=I
```

(continued)

Subroutine: PLREAD (continued)

```
56Ø       CONTINUE
          GO TO 34Ø
8ØØ       WRITE(5,8Ø1)
8Ø1       FORMAT(//,'  YOU ENTERED WRONG DATA FILE(S)!  ')
          GO TO 1Ø5
9ØØ       RETURN
          END
```

Subroutine: PON
Entry: POFF

```
          SUBROUTINE PON (LUN)
C         SUBROUTINE TO TURN ON OR OFF THE TEKTRONIX 4662 PLOTTER.
C         WRITTEN BY RICK SCOTT
          BYTE PLON(3),PLOFF(3)
          INTEGER IPRM(6)
          DATA PLON/27,65,69/PLOFF/27,65,7Ø/


          CALL GETADR (IPRM,PLON)
          IPRM(2)=3
          CALL QIO ('41Ø,LUN,24,,,IPRM,)
          CALL WAITFR (24)
          RETURN

          ENTRY POFF
          CALL GETADR (IPRM,PLOFF)
          IPRM(2)=3
          CALL QIO ('41Ø,LUN,24,,,IPRM,)
          CALL WAITFR (24)
          RETURN

          END
```

Subroutine: TKDASH

```
C         TKDASH.FTN      J.D.GEORGE OCTOBER 1975
C
C THE PURPOSE OF SUBROUTINE TKDASH IS TO PLOT A CURVE AS A SERIES OF
C ALTERNATING BRITE AND DARK LINE SEGMENTS OF ARC LENGTHS SPECIFIED
C BY THE USER
C
C         SUBROUTINE TKDASH(IX,IY,N,DASH,NDASH)
C
C         IX,IY   ARE SCREEN OR PAPER COORDINATES
C
C         N       IS THE NUMBER OR INDEX OF THE POINT IX,IY
C                 N=1, IS TREATED SEPERATELY, N.GE.1
```

(continued)

Subroutine: TKDASH (continued)

```
C       DASH    IS AN ARRAY OF SCREEN COORDINATE ARC LENGTHS
C               FOR ALTERNATELY BRITE AND DARK LINE SEGMENTS
C               ODD INDICES ARE BRITE SEGMENTS
C               EVEN INDICES ARE DARK SEGMENTS
C               I.E.        I       1       2       3       4
C                       DASH(I)    1Ø      1Ø       2      1Ø
C
C                                 BRITE    DARK    BRITE   DARK
C
C       NDASH   IS THE LENGTH OF THE DASH ARRAY
C               4 SHOULD PROVIDE A WIDE RANGE OF SYMBOLS
C               TO FORCE ALTERNATE BRITE-DK LINE SEGMENTS
C               NDASH IS EVEN
C               FOR SOLID LINE USE NDASH = 1 & DASH(1)=LARGE#
C
C
C *****
C SUBROUTINES REQUIRED:TPLOT
C *****
C
C
C
C
        SUBROUTINE TKDASH(IX,IY,N,DASH,NDASH)
        COMMON /LUN /LUN
        DIMENSION DASH(NDASH)
        DATA ZERO/Ø.Ø/
        LUN=5
        IF(N.GT.1)GOTO 1ØØ
C
C THE FIRST POINT INITIALIZES THINGS
C
        XLAST=IX
        YLAST=IY
        LASTDK=1
        IDASH=1
        OLDARC=ZERO
        CALL TPLOT (IX,IY,Ø)
        RETURN
C
C
C ENTRY FOR N.GT.1
C
1ØØ     CONTINUE
        X=IX
        Y=IY
C
C THE CODE BELOW IS REPEATED UNTIL HAVE PLOTTED SEGMENTS TO
C POINT IX,IY
C
2ØØ     CONTINUE

        DX=X-XLAST
        DY=Y-YLAST
        ARC=SQRT(DX*DX+DY*DY)
        IF(ARC.EQ.ZERO)GOTO 1ØØØ
C
C THE PATH DEPENDS ON WHETHER ARC EXTENDS BEYOND THE NEXT
C LINE SEGMENT SPECIFIED IN DASH(IDASH)
C
        IF((OLDARC+ARC).GE.(DASH(IDASH)))GOTO 3ØØ
C
C THE ARC TERMINATES WITHIN THE CURRENT LINE SEGMENT
C
```

(continued)

Subroutine: TKDASH (continued)

```
        XINC=DX
        YINC=DY
        OLDARC=OLDARC+ARC
        GOTO 400
C
C
C THE ARC TERMINATES AT OR BEYOND THE CURRENT LINE SEGMENT
C
C
300     CONTINUE
        XINC=DX*(DASH(IDASH)-OLDARC)/ARC
        YINC=DY*(DASH(IDASH)-OLDARC)/ARC
        OLDARC=ZERO
C
400     CONTINUE
        X0=XLAST+XINC
        Y0=YLAST+YINC
C
C IF IDASH IS EVEN PLOT DARK VECTOR
C IF IDASH IS ODD PLOT BRITE VECTOR
C
C MODIFY TO NOTE THE TRANSITION FROM LITE TO DARK
C MOVE TO EDGE WITH DK VECTOR, THEN PUT DOWN DK VECTOR AT EDGE
C
C FOR DK VECTOR SKIP PLOTTING UNTIL SENSE LITE-TO-DK TRANSITION
C
        IDARK=MOD(IDASH,2)
        IX0=X0
        IY0=Y0
        IF(IDARK.EQ.0)GOTO 410
        IF(LASTDK.EQ.IDARK)GOTO 405
        IXLAST=XLAST
        IYLAST=YLAST
        CALL TPLOT (IXLAST,IYLAST,0)
        CALL TPLOT (IXLAST,IYLAST,1)
405     CONTINUE
        CALL TPLOT (IX0,IY0,IDARK)
410     LASTDK=IDARK
C
C SETUP FOR NEXT POINT
C
        XLAST=X0
        YLAST=Y0
C
C REPEAT PLOTTING UNTIL ARC TERMINATES WITHIN A
C SEGMENT OF DASH
C
C I.E. OLDARC.NE.ZERO
C
       IF(OLDARC.NE.ZERO)GOTO 1000
       IDASH=MOD(IDASH,NDASH)+1
       GOTO 200
C
C EXIT
C
1000    CONTINUE
        RETURN
        END
```

Subroutine: MINMAX

```
C       .....................................................................
C       :                                                                   :
C       :       THIS SUBROUTINE DETERMINES THE MINIMUM AND MAXIMUM VALUE OF ARRAY   :
C       :       "A" WHERE N IS THE NUMBER OF POINTS.                        :
C       :                                                                   :
C       :...................................................................:
C       WRITTEN BY TINA RUGGIERO
        SUBROUTINE MINMAX(A,MIN,MAX,N)
        REAL A(N),MAX,MIN
        INTEGER I,N
        MIN=A(1)
        MAX=A(1)
        DO 3Ø I=2,N
        IF (A(I).LT.MIN)MIN=A(I)
        IF (A(I).GT.MAX)MAX=A(I)
3Ø      CONTINUE
        RETURN
        END
```

Subroutine: TPLOT

```
        SUBROUTINE TPLOT (IX,IY,M)
C       WRITTEN BY RICK SCOTT
C       REVISED BY BOB ANDERSON
C       SUBROUTINE TO PLOT ON THE TEKTRONIX 4Ø1Ø AND 613 DISPLAY
C       TERMINALS (AS CHOSEN IN "TERM" SUBROUTINE).
C       FORTRAN-IV BUFFERED VERSION.

C       VALUES TO PLOT: IX,IY
C       MODES TO PLOT: M>Ø (BRIGHT), M=Ø (DARK), M<Ø (POINT)
C       LUN 6: THIS SUBROUTINE USES QIOB.
C       REMEMBER TO PURGE THE BUFFER WHEN DONE (WITH TERM).

        BYTE IOUT(8)
        I=Ø
        IOUT(1)=ØØØ
        IF (M.GT.Ø) GOTO 11
C       INITIAL PLOT, DARK PLOT, POINT PLOT--
1Ø      I=I+1
        IOUT(I)="35

C       ALL MODES--SEPARATE COORDINATES INTO HIGH- AND LOW-ORDER BYTES
11      I=I+1
        IOUT(I)=IY/128+32
        I=I+1
        IOUT(I)=(IY-4*(IY/4))*4
        IOUT(I)=IOUT(I)+(IX-4*(IX/4))+96
        I=I+1
        IOUT(I)=IY-128*(IY/128)
        IOUT(I)=96+(IOUT(I)/4)
        I=I+1
        IOUT(I)=IX/128+32
        I=I+1
        IOUT(I)=IX-128*(IX/128)
        IOUT(I)=64+(IOUT(I)/4)
```

Subroutine: TPLOT (continued)

```
        IF (M.GE.Ø) GOTO 2Ø
C       REINFORCE FOR POINT PLOT
12      I=I+1
        IOUT(I)=IOUT(I-1)

C       EXECUTE QIO AND RETURN
2Ø      CALL QIOB ("51Ø,6,24,Ø,IOUT,I,ISW)
        CALL WAITFR (24)

        RETURN
        END
```

Subroutine: TERM

```
        SUBROUTINE TERM(K,L)
C       WRITTEN BY RICK SCOTT
C       THIS SUBROUTINE WILL MANIPULATE THE TERMINAL--
C       K=Ø, L=Ø  ERASE SCREEN
C       K=1, L=Ø  COPY SCREEN
C       K=2, L=Ø  RETURN TO ALPHA MODE
C       K=3, L=Ø  PURGE THE QIO BUFFER
C       K=B, L=C  IMPLEMENT MULTIPLEXER
C          WHERE B IS BOARD SELECT NUMBER Ø-3
C          WHERE C IS CONTROL NUMBER TERMINAL(1), A(2), B(3), C(4)
C          (COMBINATIONS OF TERMINALS ARE ALLOWED)

C       THIS PARTICULAR VERSION IS FOR USE WITH BUFFERED
C       PLOTTING, AND EVERY CALL TO TERM WILL PURGE THE BUFFER.

        BYTE IOUT(3)

        I=2
        IOUT(1)="33      !ESCAPE

        IF (L.NE.Ø) GOTO 1Ø
1       KX=K+1
        GOTO (2,3,5,4Ø),KX
2       IOUT(2)="14              !CLEAR THE SCREEN
        GOTO 3Ø
3       IOUT(2)="27              !COPY THE SCREEN
        GOTO 3Ø
5       IOUT(1)="37              !RETURN TO ALPHA MODE
        I=1
        GOTO 3Ø

C       PREPARE ASCII CHARACTERS FOR MUX BOARD AND CONTROL NUMBERS
1Ø      IOUT(2)=K+"6Ø
        IOUT(3)=2**(L-1)+"6Ø
        I=3

C       OUTPUT THE CONTROL SEQUENCE
3Ø      CALL QIOB ("61Ø,6,24,Ø,IOUT,I,ISW)
C       AND PURGE THE BUFFER
4Ø      CALL QIOP ("51Ø,6,24,Ø,IDAT,Ø,ISW)
```

(continued)

Subroutine: TERM (continued)

```
C       PAUSE A MOMENT IF SCREEN IS BEING CLEARED
        IF ((K+L).NE.Ø) RETURN
        CALL WAIT (1,2,M)
        RETURN

        END
```

Subroutine: A4662

```
        SUBROUTINE A4662 (LUN,DEV,KX,KY,KA,KF)
C       WRITTEN BY RICK SCOTT

C       SUBROUTINE TO SET UP THE ALPHABET OF PLOTTER DEV ON LINE LUN--
C       SIZE OF CHARACTERS (X AND Y), ANGLE, AND FONT.

C       ENTRY A4662R WILL RESET DEFAULT VALUES, WHICH ARE--
C       SIZE (56X88), ANGLE (Ø), FONT (Ø).

        INTEGER IPRM(6)
        BYTE STRING(23),IRST(3),DEV

        DATA STRING/"33,'A','T',Ø,"33,'A','I',3*Ø,',',3*Ø,4,
        1"33,'A','J',4*Ø,4/IRST/"33,'A','V'/

        STRING(2)=DEV
        STRING(4)=KF+"6Ø
        STRING(6)=DEV
        ENCODE (3,1ØØ,STRING(8)) KX
        ENCODE (3,1ØØ,STRING(12)) KY
1ØØ     FORMAT (I3)
        STRING(17)=DEV
        ENCODE (4,1Ø1,STRING(19)) KA
1Ø1     FORMAT (I4)

        CALL GETADR (IPRM,STRING)
        IPRM(2)=23

2ØØ     CALL QIO ("41Ø,LUN,24,,,IPRM,)
        CALL WAITFR (24)
        RETURN

        ENTRY A4662R (LUN,DEV)

        IRST(2)=DEV
        CALL GETADR (IPRM,IRST)
        IPRM(2)=3
        GOTO 2ØØ

        END
```

APPENDIX C

COMPILATION AND TASKBUILDING

The Digital Equipment Corporation RSX-11M operating system provides an indirect command file processor that will pass commands to a system utility from a file (indirectly) rather than interactively (directly) from your terminal. This facility allows the user to create a file containing commands only once, minimizing effort in rebuilding subsequent tasks and helping to eliminate typographical or syntax errors.

The indriect-command-file processor allows multiple levels of files, which expands the flexibility of its use. In the examples provided, note the second level of indirectness used in PLOTTER.CMD. The system-utility task name can be included in the indirect command file, as in Example 1, or can be external to the command file as in Examples 2 and 3. The processor completely executes one command before it goes on to the next command. The current command is also displayed on the user's terminal allowing the user to monitor progress.

Example 1 is an indirect command file used to completely manage the rebuilding of the task PLOTTER. The semicolon is used to denote comment and is therefore ignored. Lines 2 through 6 in Example 1 contain commands to the system utility PIP (Peripheral Interchange Program) to delete or purge the user's area of unnecessary or unwanted files. Line 7 is a call to the system FORTRAN Four Plus compiler (F4P), passing it a second level of indirect commands containing F4P commands. Finally, line 8 in Example 1 instructs the System Task Building (TKB) to receive its commands from the file PLOTTER.TKB.

```
;PLOTTER.CMD
PIP PLOTTER.TSK;*/DE
PIP *.FTN/PU:3
PIP *.F4P/PU
PIP *.TKB/PU
PIP *.OBJ;*/DE
F4P @PLOTTER.F4P
TKB @PLOTTER.TKB
```

Example 1

Example 2 is an indirect command file containing commands for F4P to accomplish recompilation of all the FORTRAN source files used in the task PLOTTER.

```
;RE-COMPILE SOURCES
PLOTTER=PLOTTER
TERM=TERM
TPLOT=TPLOT
SCALE=SCALE
MINMAX=MINMAX
QIOB=QIOB
PON=PON
XYPLOT=XYPLOT
A4662=A4662
PLREAD=PLREAD
TKDASH=TKDASH
```

Example 2

The default extensions are .FTN for the source files (right of equal sign) and .OBJ for the created object files (left). Example 3 is an indirect command file containing commands for TKB to accomplish linking of all the necessary objects and allocation of space for a new task image. The default extension for the input file(s) is .OBJ and the output extension is .TSK.

```
;PLOTTER.TKB
PLOTTER=PLOTTER,TERM,TPLOT,SCALE,MINMAX,QIOB,PON,XYPLOT,A4662,PLREAD,TKDASH
/
ASG=TI:5:6,SY:1:2
ACTFIL=3
```

Example 3

To execute the command file PLOTTER.CMD, the user types '@PLOTTER'.

APPENDIX D

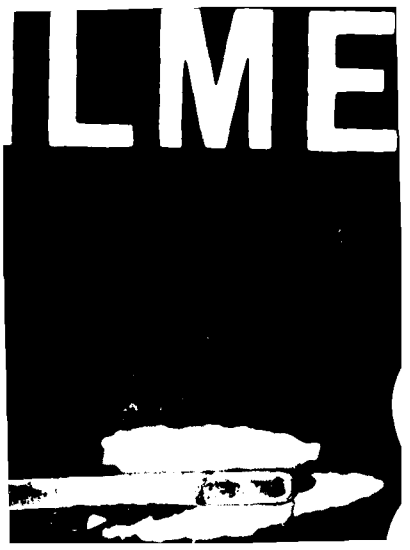
UEDIT

The program UEDIT allows the user to edit an unformatted file that has been created. Data may be changed or new data may be added.

```
      PROGRAM UEDIT
C
      BYTE FILE(32),ANS(4)
C
C
      CALL ERRSET(29,,,FALSE.,,,FALSE.,,)
      CALL ERRSET(39,,,FALSE.,,,FALSE.,,)
C---  GET THE FILENAME ---
C
5Ø    WRITE (5,1ØØØ)
1ØØØ  FORMAT (/'$ENTER FILENAME:')
      READ (5,1Ø1Ø,END=8ØØ) LF,FILE
1Ø1Ø  FORMAT (Q,32A1)
      FILE(LF+1)=Ø
C
      OPEN (UNIT=1,NAME=FILE,TYPE='OLD',FORM='UNFORMATTED',
     1    ERR=7ØØ)
C
C---  CHECK FOR VERSION # ---
C
9Ø    DO 1ØØ I=1,LF
      IF (FILE(I).EQ.';') FILE(I)=Ø
1ØØ   CONTINUE
C
C---  OPEN THE TEMPORARY WORK FILE ---
C
      OPEN (UNIT=2,NAME='TEMP.DAT',ACCESS='DIRECT',
     1    FORM='UNFORMATTED',RECORDSIZE=1,TYPE='NEW')
C
C---  XFER DATA TO TEMP WORK FILE ---
C
      NREC=Ø
2ØØ   READ (1,END=25Ø) VALUE
      NREC=NREC+1
      WRITE (2'NREC) VALUE
      GOTO 2ØØ
C
25Ø   CLOSE (UNIT=1)
C
C---  READY TO EDIT DATA FILE ---
      CALL EDIT (NREC)
C
C---  FINISHED WITH EDIT ---
C
      OPEN (UNIT=1,NAME=FILE,FORM='UNFORMATTED',TYPE='NEW')
C
C---  RE-WRITE DATA ---
C
      DO 4ØØ I=1,NREC
      READ (2'I) VALUE
      WRITE (1) VALUE
4ØØ   CONTINUE
      GOTO 8ØØ
```

(continued)

```
C
C---     OPEN FAILURE ON INPUT FILE ---
C
700      WRITE (5,1050)
1050     FORMAT (/'$CREATE NEW FILE?')
         READ (5,1055,END=800) ANS
1055     FORMAT (4A1)
         IF (ANS(1).NE.'Y') GOTO 50
         OPEN (UNIT=1,NAME=FILE,FORM='UNFORMATTED',TYPE='NEW')
         GOTO 90
C
C---     GO BYE BYE
C
800      WRITE (5,1060)
1060     FORMAT (/' EDITTING SESSION COMPLETE.')
         CLOSE (UNIT=1)
         CLOSE (UNIT=2,DISPOSE='DELETE')
         CALL EXIT
         END
```


LME