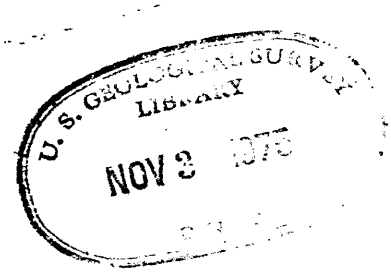
UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

COMPUTER PROGRAM DESIGNED TO DRAW A TERNARY DIAGRAM BASED ON PROPORTIONS OF ANY THREE VARIABLES FROM OIL-SHALE FISCHER ASSAY OR SALINE-MINERAL DATA



BY

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Open-file report 75-524

1975

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C     * * * * * * SHALE/SALINE TRIANGULAR DIAGRAMS - USGS * * * * * *
C                          PROGRAM NAME  TRIANG
C                          US GEOLOGICAL SURVEY
C                    GEOLOGIC DIVISION, DENVER, COLORADO
C                      WRITTEN BY GEORGE VAN TRUMP, JR.
C                           ON SEPT 22, 1975
C     ------------------------------------------------------------------
C        THIS PROGRAM IS USED TO PREPARE A GERBER 622 PLOT TAPE FOR A
C     CONVENTIONAL TRIANGULAR DIAGRAM OF ANY DESIRED SIZE TO A MAXIMUM
C     OF 50 X 50 INCHES.  THE PROGRAM ALSO PRINTS A TABLE OF THE
C     NORMALIZED DATA THAT FALLS IN THE DIAGRAM.  THE VARIABLES CONTAIN-
C     ED IN ANY THREE COLUMNS OF THE SHALE/SALINE MATRIX COMPOSE THE
C     THREE ELEMENTS PLOTTED ON THE DIAGRAM.  THE PROGRAM REQUIRES THAT
C     THE DATA HAVE BEEN STORED ON MAGNETIC DEVICE BY PROGRAM D0102
C     (SHALE/SALINE DATA ANALYSIS) IN THE SHALE/SALINE DATA BASE.
C        SUBROUTINES PLTSET, PLTFIL, SCALE, CHAR, LINE, AND ENDPLT ARE
C     ROUTINES FOR THE USGS GERBER 622 PLOTTER.  THESE ROUTINES WERE
C     WRITTEN BY GERALD I. EVENDEN, GEOLOGIC DIVISION, DENVER, COLORADO.
C        SUBROUTINE JULDAT IS A SYSTEM ROUTINE, MACHINE DEPENDENT, AND
C     IS USED TO ACQUIRE THE CURRENT DATE ON WHICH THE PROGRAM IS
C     EXECUTED.
C        SUBROUTINES START AND CUT ARE USED TO DETERMINED ON WHICH SIDE
C     OF A LINE, DESCRIBED IN THE DIAGRAM, POINTS FALL.
C     ------------------------------------------------------------------
C
C        WHEN PROGRAM STARTS EXECUTION, IT PROMPTS FOR A FILE NAME
C     (MAX 5 CHARACTERS WITH A ",DAT" EXTENSION) WHICH MUST CONTAIN THE
C     FOLLOWING DATA:
C     1. HEADER CARD
C       OPTIONS - COL 1-6
C         1 OPT(1) = 0 USE ENTIRE CORE
C                  = 1 USE SELECTED ZONES OF THE CORE(REQUIRES "SELECTED
C                      ZONES" CARDS BE INCLUDED).
C         2 OPT(2) = 0 DISK T018 WILL BE USED FOR INPUT.
C                  = 1 PUBLIC DISK WILL BE USED FOR INPUT.
C         3 OPT(3) = 0 DOES NOT PLOT DIAGRAM.
C                  = 1 PLOTS ONLY THAT DATA FROM SELECTED ZONE WHICH
C                      FALLS IN SELECTED AREA, AS DESCRIBED IN OPT(6),
C                      OF DIAGRAM.(REQUIRES A "SELECTED AREA" CARD BE
C                      INCLUDED)
C                  = 2 PLOTS ALL DATA FROM SELECTED ZONE OR ENTIRE CORE.
C         4 OPT(4) = 0 DOES NOT PRINT NORMALIZED TABLE.
C                  = 1 PRINTS A TABLE OF THE NORMALIZED DATA FOR ONLY
C                      THAT DATA FROM THE SELECTED ZONE WHICH FALLS IN
C                      THE SELECTED AREA, AS DESCRIBED IN OPT(6).
C                      (REQUIRES A "SELECTED AREA" CARD BE INCLUDED)
C                  = 2 PRINTS A TABLE OF ALL DATA FROM SELECTED ZONE OR
C                      ENTIRE CORE.
C         5 OPT(5) = 0 SHALE DATA
C                  = 1 SALINE DATA
C         6 OPT(6) = 0 SELECTS ONLY THOSE POINTS THAT LIE TO THE RIGHT
C                      AND BELOW THE LINE DESCRIBED ON THE "SELECTED
C                      AREA CARD".
C                  = 1 SELECTS ONLY THOSE POINTS THAT LIE TO THE LEFT
C                      AND ABOVE THE LINE.
C       CORE NM - COL  7-11 (I.E. THE FILE NAME OF THE CORE)
C         TITLE - COL 12-66
C                 COL 67-80 (NOT USED)
C
C     2. PLOT SIZE, POINT SIZE, SELECTED COLUMNS CARD (FOR PLOTTING)
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C       COL  1- 5 LENGTH OF TRIANGLE SIDE IN INCHES.  IF BLANK OR ZERO,
C                 THEN A LENGTH OF 10.0 INCHES IS USED.
C             6-10 PLOT CHARACTER SIZE IN INCHES FOR USE IN DIAGRAM.  IF
C                 BLANK OR ZERO, THEN A SIZE OF 0.10 IS USED.
C            14-15(IX) COL NO TO BE USED FOR LWR LT OF DIAG(RT ALIGNED)
C            19-20(IY)                       LWR RT
C            24-25(IZ)                       TOP
C
C     3. SELECTED ZONES CARDS (USED ONLY IF OPTION(1) = 1)
C        THESE CARDS ARE USED TO SELECT ZONES FROM CORE FOR ANALYSIS.
C      FIRST CARD = NO OF ZONES SELECTED = COLS 4-5(RT ALIGNED)
C             (MAXIMUM 20 SELECTED ZONES)
C      SECOND THRU LAST CARD = ZONE CARDS
C      EACH CARD:
C       COL 11-17 STARTING DEPTH OF ZONE.
C       COL 19-27 ENDING DEPTH.
C             NOTE: SELECTED ZONES MAY OVERLAP.
C
C     4. SELECTED AREA CARD (USED ONLY IF OPTION(3) OR (4) = 1)
C        THIS CARD IS USED TO SELECT AN AREA IN THE DIAGRAM BY DE-
C      SCRIBING A LINE IN THE DIAGRAM.
C       COL  1-10 VALUE OF IX COORD. FOR BEGINNING OF LINE.
C           11-20           IY
C           21-30           IZ
C       COL 31-40 VALUE OF IX COORD. FOR END OF LINE.
C           41-50           IY
C           51-60           IZ
C
C     5. STEPS 1 THRU 4 MAY BE REPEATED AS MANY TIMES AS NECESSARY.
C
C     ------------------------------------------------------------------
      REAL*8 DATE
      INTEGER VID(2,10),TITLE(11),CID(2),OPTION(6),OBSID(2),AA(10),CN,CN
     1,INPUT,LIST,SHALID(2,10),SALID(2,10)
      DIMENSION ICOL(3),STR(3),ENN(3),NUM(4),XP(4),YP(4),X(10),
     1 ZONE(20,2),XS(2),XE(2),SIDE(2)
      EQUIVALENCE (ICOL(1),IX),(ICOL(2),IY),(ICOL(3),IZ)
      DATA NUM/'20','40','60','80'/,INPUT,LIST,IN/4,3,10/,IBLK/' '/
      DATA SHALID/
     1 'DEPTH','-ST','DEPTH','-ED','OIL W','T %','WTR W','T %',
     2 'SPT S','HAL','GAS+L','OSS','OIL G','PT ','WTR G','PT ',
     3 'SPECG','RAV','TENDC','OKE'/
      DATA SALID/
     1 'DEPTH','-ST','DEPTH','-ED','GRAMS','/CC','CUMM ','    ',
     2 'AL2O3','  %','CUMM ','    ','NAHCO','3 %','CUMM ','    ',
     3 'OILW/','ONA','CUMM ','OIL'/
      DATA DATE/'(10/22/75)'/,SIDE/'RIGHT','LEFT '/
      CALL OPENCD (INPUT,IDEV)
      CALL JULDAT (IYEAR,IMONTH,IDAY)
C     ------------------------------------------------------------------
C ... READ NEW DATA FOR PROCESSING A CORE.
C     ------------------------------------------------------------------
  100 READ (INPUT,290,END=280) OPTION,NAME,TITLE
      WRITE (LIST,300) DATE,IMONTH,IDAY,IYEAR
      WRITE (LIST,310) TITLE,OPTION,NAME
      IF (OPTION(3).NE.0) CALL PLOTER (IDEV)
      IF (OPTION(6).NE.0.AND.OPTION(6).NE.1) OPTION(6)=0
      CALL OPEN (OPTION(2),IN,NAME)
C
C ... READ PLOT SIZE, CHAR SIZE, AND ELEMENTS TO BE PLOTTED.
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C
      READ (INPUT,320) TLEN,SCHAR,IX,IY,IZ
      IF (TLEN.EQ.0.0) TLEN=10.0
      IF (SCHAR.EQ.0.0) SCHAR=0.10
      IF (SCHAR.GT.0.20)SCHAR=0.20
      WRITE (LIST,330) TLEN,SCHAR
      DO 120 I=1,10
      DO 120 J=1,2
      IF (OPTION(5).EQ.1) GO TO 110
      VID(J,I)=SHALID(J,I)
      GO TO 120
  110 VID(J,I)=SALID(J,I)
  120 CONTINUE
      WRITE (LIST,340) IX,VID(1,IX),VID(2,IX),IY,
     1 VID(1,IY),VID(2,IY),IZ,VID(1,IZ),VID(2,IZ)
      STDEP=0.0
      ENDEP=100000.0
      IF (OPTION(1).NE.1) GO TO 130
C
C ... READ SELECTED ZONE.
C
      READ (INPUT,350) NZONES,(ZONE(I,1),ZONE(I,2),I=1,NZONES)
      WRITE (LIST,360) (ZONE(I,1),ZONE(I,2),I=1,NZONES)
  130 IF (OPTION(3).NE.1.AND.OPTION(4).NE.1) GO TO 135
C
C ... READ PARAMETERS FOR SELECTING ZONE OF DIAGRAM.
C
      READ (INPUT,370) STR,ENN
      WRITE (LIST,380) (((VID(K,ICOL(J)),K=1,2),J=1,3),I=1,2),STR,ENN
  135 IF (OPTION(3).NE.0.OR.OPTION(4).NE.0) GO TO 140
      WRITE (LIST,470)
      GO TO 100
C     ------------------------------------------------------------------
C ... START PROCESSING CORE.
C ... MAKE A GERGER PLOT OF THE CORE.
C     ------------------------------------------------------------------
  140 IF (OPTION(1).EQ.1) GO TO 143
      NZONES=1
      ZONE(1,1)=0.0
      ZONE(1,2)=1.0E10
  143 IF (OPTION(3).EQ.0) GO TO 145
C
C ... DRAW TRIANGLE WITH TITLE.
C
      XMIN=0.0
      YMIN=0.0
      XMAX=TLEN
      YMAX=0.8660254*TLEN
      XP(1)=XMIN
      YP(1)=YMIN
      XP(2)=XMAX
      YP(2)=YMIN
      XP(3)=0.5*(XMIN+XMAX)
      YP(3)=YMAX
      XP(4)=XMIN
      YP(4)=YMIN
  145 IF (OPTION(3).EQ.1.OR.OPTION(4).EQ.1) CALL START (STR,ENN,XS,XE,
     1 TLEN)
      DO 270 II=1,NZONES
      REWIND IN
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      READ (IN) CID,CN,CM
      STDEP=ZONE(II,1)
      ENDEP=ZONE(II,2)
      IF (OPTION(3).EQ.0) GO TO 225
      CALL TSCALE (XP,YP,SVEEE,SCHAR,SLABL,SCORN,STITL)
      CALL LINE(XP,YP,4,0,0)
      IF (OPTION(3).EQ.1) CALL LINE(XS,XE,2,0,0)
      XPOS=(XP(1)+XP(2))*0.5
      YPOS=YP(1)
      DO 150 I=11,1,-1
      NO=5*I
  150 IF (TITLE(I).NE.IBLK) GO TO 160
      GO TO 170
  160 XOFF=-STITL*(NO-STITL)*0.5
      YOFF=-3.0*STITL
      CALL CHAR(XPOS,YPOS,TITLE,NO,2,STITL,0.0,XOFF,YOFF)
C
C ... DRAW ANNOTATION AND TICK MARKS ALONG SIDES OF TRIANGLE.
C
  170 DO 220 I=1,3
      XDEL=XP(I)-XP(I+1)
      SX=-SIGN(1.0,XDEL)
      YDEL=YP(I)-YP(I+1)
      SY=-SIGN(1.0,YDEL)
      AENGHT=SQRT(XDEL**2+YDEL**2)
      ANGLE=ATAN2(YDEL,XDEL)
      DELLG=AENGHT/10.0
      ANGL1=ATAN(YDEL/XDEL)
      DO 180 J=1,9
      DEL=J*DELLG
      XDEL=DEL*COS(ANGLE)
      XX=XP(I+1)+XDEL
      YDEL=DEL*SIN(ANGLE)
      YY=YP(I+1)+YDEL
      CALL CHAR (XX,YY,'V',1,2,SVEEE,ANGLE,0.0,0.5*SVEEE)
      XOFF=-0.5*SLABL-2.0*SLABL*SIN(ANGL1)
      YOFF=-1.9*SLABL*COS(ANGL1)*SX
  180 IF (MOD(J,2).EQ.0)
     1CALL CHAR (XX,YY,NUM(J/2),2,2,SLABL,0.0,XOFF,YOFF)
      GO TO (190,200,210),I
  190 CALL CHAR(XP(1),YP(1),VID(1,ICOL(1)),8,2,SCORN,0.0,0.5*SCORN,
     1 -2.0*SCORN)
      GO TO 220
  200 CALL CHAR(XP(2),YP(2),VID(1,ICOL(2)),8,2,SCORN,0.0,-7.5*SCORN,
     1 -2.0*SCORN)
      GO TO 220
  210 CALL CHAR(XP(3),YP(3),VID(1,ICOL(3)),8,2,SCORN,0.0,-3.5*SCORN,
     1 SCORN)
  220 CONTINUE
C
C ... READ DATA AND PLOT.
C
  225 NS=0
      NO=0
      NBAD=0
      SUMA=0.0
      SUMB=0.0
      SUMC=0.0
      SUMA2=0.0
      SUMB2=0.0
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      SUMC2=0.0
      IPRT=0
      DO 250 K=1,CN
      IF (MOD(NO,50).NE.0.OR.IPRT.NE.0) GO TO 226
      WRITE (LIST,390) TITLE,IMONTH,IDAY,IYEAR
      WRITE (LIST,400) VID(1,IX),VID(2,IX),VID(1,IY),VID(2,IY),VID(1,IZ)
     1,VID(2,IZ)
      IF (OPTION(1).EQ.1) WRITE (LIST,410) STDEP,ENDEP
      IPRT=1
  226 READ (IN) OBSID,X,IA
      CALL PACK (1,AA,IA)
      IF (X(1).LT.STDEP-0.04) GO TO 250
      IF (X(2).GT.ENDEP+0.04) GO TO 250
      NS=NS+1
      IF (AA(IX).NE.IBLK.OR.AA(IY).NE.IBLK.OR.AA(IZ).NE.IBLK) GO TO 240
      IOVER=1
      SUM=X(IX)+X(IY)+X(IZ)
      IF (SUM.LE.0.0) GO TO 240
      A=X(IX)*100.0/SUM
      B=X(IY)*100.0/SUM
      C=X(IZ)*100.0/SUM
      IF (OPTION(3).EQ.1.OR.OPTION(4).EQ.1) CALL CUT (A,B,C,IOVER)
      IF (OPTION(3).EQ.0) GO TO 228
      YY=C*TLEN*0.86603/100.0
      XX=(B+C/2.0)*TLEN/100.0
      IF (OPTION(3).EQ.1.AND.IOVER.EQ.OPTION(6)) CALL CHAR (XX,YY,'+',1,
     1 2,SCHAR,0.0,0.0,0.0,0.0)
      IF (OPTION(3).EQ.2) CALL CHAR (XX,YY,'+',1,2,SCHAR,0.0,0.0,0.0,0.0)
  228 IF (OPTION(4).EQ.0) GO TO 250
      IF (OPTION(4).EQ.1.AND.IOVER.NE.OPTION(6)) GO TO 250
      SUMA=SUMA+A
      SUMB=SUMB+B
      SUMC=SUMC+C
      SUMA2=SUMA2+A*A
      SUMB2=SUMB2+B*B
      SUMC2=SUMC2+C*C
      NO=NO+1
      IPRT=0
      WRITE (LIST,420) K,(X(J),AA(J),J=1,10),A,B,C
      GO TO 250
  240 NBAD=NBAD+1
  250 CONTINUE
      IF (OPTION(4).EQ.0) GO TO 265
      WRITE (LIST,430) NS
      IF (NS=NBAD.EQ.0) GO TO 260
      PER=NO*100.0/(NS-NBAD)
      IF (OPTION(3).EQ.1) WRITE (LIST,440) SIDE(OPTION(6)+1),PER
      IF (NO.LE.0) GO TO 260
      SUMA=SUMA/NO
      SUMB=SUMB/NO
      SUMC=SUMC/NO
      STDA=1.0E10
      STDB=1.0E10
      STDC=1.0E10
      IF (NO-1.LT.1) GO TO 255
      STDA=SQRT((SUMA2-SUMA**2/NO)/(NO-1))
      STDB=SQRT((SUMB2-SUMB**2/NO)/(NO-1))
      STDC=SQRT((SUMC2-SUMC**2/NO)/(NO-1))
  255 WRITE (LIST,450) IX,VID(1,IX),VID(2,IX),SUMA,STDA,IY,VID(1,IY),
     1 VID(2,IY),SUMB,STDB,IZ,VID(1,IZ),VID(2,IZ),SUMC,STDC
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  260 IF (NBAD.GT.0) WRITE (LIST,460) NBAD
C
C ... TERMINATE PLOT AND RECYCLE FOR NEW PLOT IF ANY.
C
  265 IF (OPTION(3).NE.0) CALL ENDPLT (0)
  270 CONTINUE
      CALL SHUT
      GO TO 100
  280 CALL SHUTCD
      STOP
C
  290 FORMAT (6I1,12A5)
  300 FORMAT ('1SHALE/SALINE TRIANGULAR DIAGRAMS - U S G S ',A10,T67,
     1'DATE',I4,2('/',I2)//)
  310 FORMAT (10X,'TITLE',T59,'* OPTIONS *'/1X,11A5,1X,T58,6I2//10X,
     1 'INPUT CORE FILE',9X,'=',A5)
  320 FORMAT (2F,3I)
  330 FORMAT (10X,'LENGTH OF TRIANGLE SIDE = ',F6.2,' INCHES'/
     1       10X,'SIZE OF PLOT CHARACTERS = ',F6.3,' INCHES'/)
  340 FORMAT (10X,'TRIANGLE AXIS:'/T17,'COL',4X,'NAME'/T11,'LEFT',I5,
     1 2X,A5,A3/T11,'RIGHT',I4,2X,A5,A3/T11,'TOP',I6,2X,A5,A3/)
  350 FORMAT (I/(2F))
  360 FORMAT ('0SELECTED CORE ZONE'/T11,'START',T20,'END'/T11,'DEPTH',
     1 T19,'DEPTH'/(7X,2F8.1))
  370 FORMAT (6F)
  380 FORMAT ('0LINE DEFINITION FOR DIAGRAM'/10X,5('* '),'FROM   ',
     1 5('* '),3X,5('* '),'  TO   ',5('* ')/10X,3(A5,A3,1X),3X,3(A5,A3,
     2 1X)/9X,3(F8.1,'%'),3X,3(F8.1,'%'))
  390 FORMAT ('1',11A5,T101,'DATE',I4,'/',I2,'/',I2,//)
  400 FORMAT (T34,'FISCHER ASSAY DATA',T97,'PERCENT PROPORTIONS',/
     1 T3,'OBS',T12,'TOP',T22,'BTM',T30,'* * * * WT PERCENT * * * *',
     2 T60,'*  GAL/TON *',T76,'SPEC.',T86,'TEND',/
     3 T3,'NO.',T11,'(FT)',T21,'(FT)',T31,'OIL   WATER  SPENT  GAS+',
     4 T61,'OIL   WATER   GRAVITY',T86,'COKE ',3(2X,A5,A3),
     5 /,T44,'SHALE   LOSS')
  410 FORMAT (' ZONE =',F7.1,' - ',F8.1/)
  420 FORMAT (1X,I5,2(F9.1,A1),2X,4(F6.1,A1),2X,2(F6.1,A1),F8.3,A1,
     1 F8.1,A1,1X,3(F8.1,2X))
  430 FORMAT ('0TOTAL NUMBER OF INTERVALS IN ZONE = ',I3)
  440 FORMAT ('0PERCENT OF TOTAL(LESS BAD POINTS) THAT LIE TO ',A5,
     1' OF LINE = ',F5.1/)
  450 FORMAT (T3,'COLUMN',T17,'MEAN STANDARD'/T22,'DEVIATION'/
     1 (I2,'(',A5,A3,')',2(3X,F5.1)))
  460 FORMAT (/I5,' OBSERVATIONS CONTAIN DATA THAT COULD NOT BE USED IN
     1COMPUTING THE DIAGRAM.'//)
  470 FORMAT (//,'0OPTION(3) NOR OPTION(4) HAVE "NOT" BEEN CHOSEN. THE
     1REFORE NO OUTPUT WILL BE CREATED.')
      END
      SUBROUTINE START (P1,P2,XX,YY,TLEN)
C
C     THIS SUBROUTINE DELINEATES THE LINE IN THE DIAGRAM AND DETERMINES
C     WHICH POINTS ARE GOOD OR BAD FROM THIS LINE.
C
      DIMENSION P1(3),P2(3),XX(2),YY(2)
      S=(P1(1)+P1(2)+P1(3))/100.0
      IF (S.EQ.0.0) STOP 'ERROR IN LINE DEFINITION FOR PLOT'
      P1(1)=P1(1)/S
      P1(2)=P1(2)/S
      P1(3)=P1(3)/S
      S=(P2(1)+P2(2)+P2(3))/100.0
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      P2(1)=P2(1)/S
      P2(2)=P2(2)/S
      P2(3)=P2(3)/S
      YL1=0.86603*P1(3)
      XL1=P1(2)+P1(3)/2.0
      YL2=0.86603*P2(3)
      XL2=P2(2)+P2(3)/2.0
      XX(1)=XL1*TLEN/100.0
      XX(2)=XL2*TLEN/100.0
      YY(1)=YL1*TLEN/100.0
      YY(2)=YL2*TLEN/100.0
      LRTEST=0
      IF (ABS(XL1-XL2).LT.0.01) LRTEST=1
      IF (LRTEST.NE.0) RETURN
      SLOPE=(YL2-YL1)/(XL2-XL1)
      YINT=YL1-XL1*SLOPE
      RETURN
C
C
      ENTRY CUT (A,B,C,IOVER)
C
C     IOVER=0 POINT LIES RIGHT OR BELOW THE LINE. (GOOD POINT)
C     IOVER=1 POINT LIES LEFT OR ABOVE THE LINE. (BAD POINT)
C
      IOVER=0
      X=B+C/2.0
      IF (LRTEST.EQ.0) GO TO 100
      IF (X.GT.XL1) RETURN
      IOVER=1
      RETURN
  100 Y=0.86603*C
      YL=YINT+X*SLOPE
      IF (Y.LT.YL) RETURN
      IOVER=1
      RETURN
      END
      SUBROUTINE PLOTER (IDEV)
C
C     THIS SUBROUTINE OPENS THE PLOTTER DEVICE AND SCALES THIS DEVICE
C     FOR THE GIVEN DATA.
C
      DIMENSION X(4),Y(4),XD(2),YD(2),XS(4),YS(4)
      DATA ISET/0/
      IF (ISET.NE.0) RETURN
      ISET=1
      CALL PLTSET (IDEV,XBD,YBD,0)
      IF (IDEV.EQ.0) CALL PLTFIL('MTA',0,0,-1)
      IF (IDEV.NE.0) CALL PLTFIL('TTY',0,0,-1)
      RETURN
C
C
      ENTRY TSCALE(X,Y,SVEEE,SCHAR,SLABL,SCORN,STITL)
      SLABL=1.2*SCHAR
      SCORN=1.4*SCHAR
      IF (IDEV.EQ.0) GO TO 100
      SCHAR=0.10
      SLABL=SCHAR
      SCORN=SCHAR
  100 SVEEE=0.8*SCHAR
      STITL=1.8*SCHAR
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      XD(1)=X(1)
      XD(2)=X(2)
      YD(1)=Y(1)
      YD(2)=Y(3)
      XS(2)=0.0
      YS(2)=0.0
      IF (IDEV.EQ.0) GO TO 110
      XS(4)=XBD
      YS(4)=YBD
      YS(3)=3*STITL+0.5*STITL+0.1
      YS(1)=YS(4)-YS(3)-2.0*SCORN
      XS(1)=YS(1)/0.86603
      XS(3)=(XS(4)-XS(1))*0.5
      GO TO 120
  110 XS(1)=X(2)
      YS(1)=Y(3)
      XS(3)=2.0
      YS(3)=3*STITL+0.5*STITL+0.2
      XS(4)=XS(1)+2.0*XS(3)
      YS(4)=YS(1)+YS(3)+2*SLABL+0.2
  120 CONTINUE
      CALL SCALE (XD,YD,XS,YS,4,IC)
      IF (IC.EQ.0) RETURN
      STOP 'ERROR IN SCALING DATA FOR PLOTTER'
      END
      SUBROUTINE PACK(ICODE,IA,IY)
C
C     THIS SUBROUTINE PACKS AND UNPACKS 10 QUALIFIED CODES INTO AND OUT
C     OF 1 WORD.
C
      DIMENSION IA(10),IC(7)
      DATA IC/' ','B','L','N','G','T','H'/
      IF (ICODE.NE.0) GO TO 120
      IY=0
      DO 110 I=1,10
      DO 100 J=1,7
      IF (IA(I).EQ.IC(J)) GO TO 110
  100 CONTINUE
      J=2
  110 IY=8*IY+J
      RETURN
  120 K=11
      DO 130 I=1,10
      K=K-1
      LL=MOD(IY,8)
      IA(K)=IC(LL)
  130 IY=IY/8
      RETURN
      END
      SUBROUTINE FILES
C
C     THIS SUBROUTINE IS USED TO OPEN AND CLOSE INPUT FILES.  IT IS
C     MACHINE DEPENDENT AND WOULD REQUIRE MODIFICATION IF THIS PROGRAM
C     WERE EXECUTED ON A NON "DEC" MACHINE.
C
      DIMENSION NAMDSK(0/1)
      DATA NAMDSK/'T018','DSKB'/
      ENTRY OPENCD (INPUT,IDEV)
      TYPE 100
  100 FORMAT (' INPUT FILE = ',$)
```

```
      IDEV=0
      ACCEPT 110,NAMCRD
  110 FORMAT (A5)
      IF (NAMCRD.NE.' ') GO TO 140
      TYPE 120
  120 FORMAT (' ENTER DEVICE NO=0=GERBER, 1=TEKTRONIC  = ',$)
      ACCEPT 130,IDEV
  130 FORMAT (I)
      IF (IDEV.NE.0.AND.IDEV.NE.1) IDEV=0
      TYPE 100
      ACCEPT 110,NAMCRD
  140 OPEN (UNIT=INPUT,DEVICE='DSKB',ACCESS='SEQIN',FILE=NAMCRD,
     1 DISPOSE='SAVE')
      RETURN
      ENTRY SHUTCD
      CLOSE (UNIT=INPUT)
      RETURN
      ENTRY OPEN (IOPT,IN,NAME)
      IF (IOPT.LT.0.OR.IOPT.GT.1) IOPT=1
      OPEN (UNIT=IN,DEVICE=NAMDSK(IOPT),ACCESS='SEQIN',FILE=NAME)
      RETURN
      ENTRY SHUT
      CLOSE (UNIT=IN)
      RETURN
      END
```