



OPEN FILE 1011

OPTIMUM OFFSET SHALLOW SEISMIC REFLECTION SOFTWARE
E.J. Norminton and S.E. Pullan

Two OPEN FILE reports have been released by J.A.Hunter of the GEOLOGICAL SURVEY OF CANADA: Open Files 552 (1980) and 881 (1982). These files were software packages concerned with the processing and display of engineering seismic data which have been developed by the Terrain Geophysics section. The programs were released with very little documentation in a relatively raw form in order to keep other workers in this field aware of current developments.

Recent research in this field within the Survey and by other workers has resulted in improvements in the software to transfer, interpret, and display results of engineering refraction and reflection seismology. Open File 1011 is a release of this improved software. Programs written in Applesoft basic are greatly enhanced by the use of a compiler. At the Survey a software package produced by Sierra On-line Systems has been used to compile our current software. A software package produced for Exploranium of Toronto for transfer of data from the Nimbus seismograph to disk has been a great improvement over the transfer by the Survey program published in the open file release.

The current OPEN FILE 1011 uses the data as transferred by the Exploranium software and all programs have used the Expediter software.

The GEOLOGICAL SURVEY OF CANADA has not made licensing arrangements with On-line systems and Exploranium and the use of these programs is conditional to the user obtaining the NIMTODISK SOFTWARE FROM EXPLORANIUM (\$250) AND THE EXPEDITER SOFTWARE FROM SIERRA ON-LINE SYSTEMS.

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GEOLOGICAL SURVEY OF CANADA



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GEOLOGICAL SURVEY OF CANADA
TERRAIN GEOPHYSICS SECTION

OPEN FILE #1011 - FEB 84

FOR INTRO - TYPE 'RUN INTRO'

TO RUN - TYPE 'RUN MENU'

JCATALOG

DISK VOLUME 254

*A 002 HELLO
*A 004 MENU
*B 004 CONVERT 2.0A
*B 004 CONVERT 2.0B
*B 002 KEYTOLOAD-#5004 (FIXS/D)
*B 003 FASTLOAD
*A 009 EPLOTR
*A 009 EPLOTV
*B 040 COMMON OFFSET GRAP +
*A 025 BIN.EPLOTV
*A 025 BIN.EPLOTR
*A 020 P-PICKER 2.1
*A 070 BIN.P-PICKER 2.1
*A 018 STAT-PICK 2.2
*A 065 BIN.STAT-PICK 2.2
*B 040 COMMON OFFSET WIZARD
*B 040 COMMON OFFSET EPSON
*B 066 TESTDATA
*A 003 INTRO
*B 006 OP.1
*B 006 OP
*B 006 OP.2

```
5 HIMEM: 20480
10 D$ = CHR$(13) + CHR$(4)
20 TEXT :
   HOME :
   VTAB 4
30 PRINT "<E>PLOT":
   PRINT :
   PRINT "<P>-PICK":
   PRINT :
   PRINT "<S>TAT-PICK":
   PRINT :
   PRINT "<C>COMMON OFFSET":
   PRINT :
   PRINT "SELECT: ";
40 GET A$
45 HOME
50 IF A$ = "E" THEN
   PRINT D$"BRUN FASTLOAD":
   PRINT D$"BLOAD CONVERT 2.0B":
   PRINT D$"BLOAD KEYTOLOAD-$5004(FIXS/D)":
   PRINT D$"RUN BIN.EPLOT/VA"
60 IF A$ = "P" THEN
   PRINT D$"BRUN FASTLOAD":
   PRINT D$"BLOAD CONVERT 2.0B":
   PRINT D$"BLOAD KEYTOLOAD-$5004(FIXS/D)":
   PRINT D$"RUN BIN.P-PICKER 2.1"
70 IF A$ = "S" THEN
   PRINT D$"BRUN FASTLOAD":
   PRINT D$"BLOAD CONVERT 2.0B":
   PRINT D$"BLOAD KEYTOLOAD-$5004(FIXS/D)":
   PRINT D$"RUN BIN.STAT-PICK 2.2"
80 IF A$ = "C" THEN
   PRINT D$"BRUN COMMON OFFSET EPSON"
90 END
```

NOTE To run Applesoft versions of EPLOT, P-PICKER or STAT-PICK:

- BLOAD CONVERT 2.0A rather than CONVERT 2.0B
- change order of variables (SF, SK, GI, HC, LC, TD, TS) declared at beginning of program (see "Instructions for writing programs that use the Norminton data format").

Instructions for writing programs that use the Norminton data format.

1) This format loads in the data from \$5000 to \$90FF. Note that this overlaps the 2nd hi-res graphics page and makes it unavailable for use in the program.

2) A conversion routine (CONVERT 2.0B) must be loaded at \$9400. This routine allows the user to transfer the header parameters from the NIM TO DISK file to the EXPEDITED variable location and also to obtain the trace readings for any point. (Note that a companion program exists for a similar procedure in Applesoft programs - CONVERT 2.0A).

3) Any program that uses this format must have as its first variables on of the following-

```
10 REM <L>TR,PN,V
20 DIM GN(12)
30 REM <L>TS,TD,LC,HC,GI,SK,SF
```

or

```
10 TR=0:PN=0:V=0:DIM GN(12):TS=0:TD=0:LC=0:HC=0:GI=0:SK=0:SF=0
```

for EXPEDITED versions or

```
10 TR=0:PN=0:V=0:DIM GN(12):SF=0:SK=0:GI=0:HC=0:LC=0:TD=0:TS=0
```

for APPLESOFT versions.

Note that TR is the trace number (1 - 12)
PN is the point in the trace (1 - 1024)
V is the reading at point PN in TR<ace>.

TS = time scale; TD = time delay; LC = lo cut; HC = hi cut; GI = group interval; SK = stack; SF = shot offset.

Note that the names are not important but the order of appearance is.

4) The data file is BLOADED rather than OPENED, and the header parameters are moved to the variables by

```
CALL 37891 REM $9403.
```

The parameters are moved back by a

```
CALL 37888 REM $9400.
```

If we wish to find the reading at point PN in trace TR we must simply define these values and

```
CALL 37894 REM $9406.
```

The reading appears in the variable V (0 - 1024) and can be unbiased by $V = V - 511$ and converted to the usual GSC scale by dividing by 4.

5) It should be noted that APPLESOFT programs may be too large to test if they use the hires page.

SAMPLE RUN OF EXPEDITER

JLOAD EPL0T/R

JBRUN EXPEDITER

EXPEDITER JI
(C) 1981 BY S. EINSTEIN & D. GOODROW
PUBLISHED BY ON-LINE SYSTEMS
VERSION 2.3

DEFAULT PARAMETERS (YES)? N
PROGRAM COUNTER (\$1100): \$
LOCAL VARIABLES (\$9600): \$5000
GLOBAL VARIABLES (\$9600): \$5000
STRING LENGTH (40):
ENABLE LINE TRACE (YES)?
RESERVE MEMORY (NO)? Y
STARTING ADDRESS (\$0000): \$2000
ENDING ADDRESS+1 (\$0000): \$4000
STARTING ADDRESS (\$0000): \$
DISPLAY ADDRESSES (YES)? N

< ** SYMBOL TABLE ** >

TR	4FFB	PN	4FF6	V	4FF1
G	* 4FB0	TS	4FAB	TD	4FA6
LC	4FA1	HC	4F9C	GI	4F97
SK	4F92	SF	4F8D	H	* 4F60
A \$	* 4C03	D \$	4BDA	T#\$	4BB1
Q \$	4B88	NR	4B83	I	4B7E
T#	4B79	T#	4B74	T#	4B6F
GG	4B6A	M	4B65	T#	4B60
T#	4B5B	T#	4B56	RT	4B51
SY	4B4C	L	4B47	T#	4B42
XP	4B3D	YP	4B38	T#	4B33
YY	4B2E	XX	4B29	T#	4B24
K	4B1F				

	START	END	LENGTH	
PROCEDURE:	\$1100	\$1F41	\$0E41	(3649)
GLOBAL DATA:	\$5000	\$5000	\$0000	(0)
LOCAL DATA:	\$4B1F	\$5000	\$04E1	(1249)

NUMBER OF LINES COMPILED: 85
NUMBER OF VARIABLES: 38
NUMBER OF DATA STATEMENTS: 0
TEMPORARY STORAGE: 46
FORWARD REFERENCES: 11

JSAVE BIN.EPL0T/R

RECORD NO TESTDATA

SHOT OFFSET 180

DIRECTION S

GROUP INTERVAL 10

NO. OF STACKS 2

CHANNEL GAINS 1 TO 12 - 54 54 54 54 54 54 54 54 54 54 54 54

LOW CUT FILTER 100

HIGH CUT FILTER OUT

TAPE IDENT. NO. 02063308

30

130

230



SAMPLE OUTPUT OF EPILOT/VA (TESTDATA)

- ** The AGC routine adjusts the amplitude of each sample according to the amplitudes of all points in a window about that sample. The window does not have to be exactly centred about the point of interest. The user is asked to specify the "WINDOW BEFORE" and the "WINDOW AFTER" in number of sample points. The AGC constant must also be specified. In the "Sample output of COMMON OFFSET", a centred window 160 sample points (32 msec) long was used, with an AGC constant of 20.
- + The user will be asked to input the end (in msec) of each of 3 gain taper zones, as well as the linear gain taper to be used within each zone. Beyond the third time window, the gain is set to zero. It is probably best to illustrate this using the accompanying "Sample output". In this example, the gain increases linearly from 0.25 at the start of record to $0.25 \times 2.5 = 0.625$ at $t = 120$ msec. The end of the first taper zone was specified as 120, and the corresponding taper was 2.5. The gain level then remains constant at 0.625 between $t = 120$ and $t = 170$ msec (gain taper = 1). After that it drops off linearly to $0.625 \times 0.2 = 0.25$ at $t = 250$ msec. This feature allows the user to bring up low-amplitude events (e.g. within the overburden) and to reduce high-amplitude events or unwanted signal (e.g. the air wave found between $t = 220$ and $t = 240$ msec in the example provided).
- ++ The static corrections are assumed to be on disk in the format corresponding to the output of STAT-PICK.

WINDOW BEFORE 80

WINDOW AFTER 80

AGC CONSTANT 20

INITIAL GAIN .25

SAMPLE OUTPUT OF COMMON OFFSET

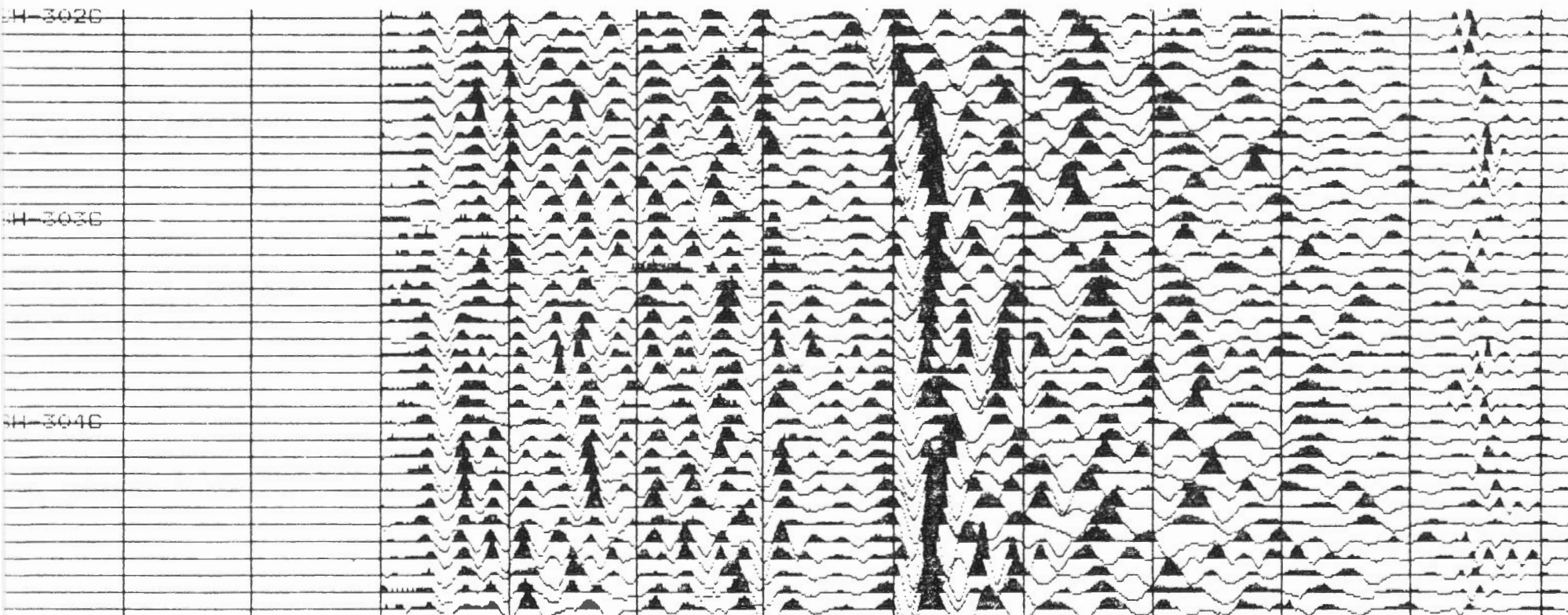
FILE AT 60

AP - 1 : 2.5 / 120

AP - 2 : 1 / 170

AP - 3 : .2 / 250

20 40 60 80 100 120 140 160 180 200 220 240



20 40 60 80 100 120 140 160 180 200 220 240

```
=====
+-----+
1      !   **E P L O T / R - UPDATED JAN 25/84**
2      !   P L O T S S E I S M I C R E C O R D S I N W I G G L E T R A C E M O D E O N S C R E E N
3      !   D U M P S S C R E E N P L O T T O E P S O N M X - 1 0 0 P R I N T E R
4      !   A L S O P R I N T S O U T A L L H E A D E R I N F O R M A T I O N
5      !   D A T A M U S T R E S I D E O N D I S K I N N O R M I N T O N F O R M A T
6      !   R O U T I N E W R I T T E N F O R A P P L E I I E P S O N I N T E R F A C E K I T T Y P E 2 A
7      !   P R I N T E R I N P R # 1
+-----+

20 TR = 0:
   FN = 0:
   V = 0
30 DIM G(12)
40 TS = 0:
   TD = 0:
   LC = 0:
   HC = 0:
   GI = 0:
   SK = 0:
   SF = 0
50 DIM H(8),A$(20)
60 D$ = CHR$(13) + CHR$(4)
100 HOME :
    VTAB 10:
    PRINT "TURN PRINTER ON AND PRESS ";:
    INVERSE :
    PRINT "RETURN";:
    NORMAL :
    GET Q$
110 IF Q$ < > CHR$(13) THEN
    GOTO 100
120 HOME :
    VTAB 3:
    INPUT "INPUT NO OF RECORDS TO BE PLOTTED ";NF
130 PRINT :
    PRINT "INPUT RECORD NAMES ONE/LINE"
140 FOR I = 1 TO NR:
    INPUT A$(I):
    NEXT I
150 HOME :
    VTAB 3:
    PRINT "CHECK RECORD NAMES"
160 PRINT
170 FOR I = 1 TO NR:
    PRINT A$(I):
    NEXT I
180 PRINT :
    INPUT "OK? (Y/N) ";Q$
190 IF Q$ = "Y" THEN
    GOTO 220
200 IF Q$ = "N" THEN
    GOTO 120
210 GOTO 180
220 HOME :
    VTAB 3:
```

```
=====
INPUT "ENTER GAIN ";GG
230 HOME :
    VTAB 10:
    PRINT "INSERT DATA DISK IN DRIVE 1":
    PRINT "AND PRESS ";;
    INVERSE :
    PRINT "RETURN";:
    NORMAL :
    GET Q$
240 IF Q$ < > CHR$(13) THEN
    GOTO 230
250 FOR M = 1 TO NR
260     PRINT D$"BLOAD"A$(M)",A$5004":
        CALL 37891:                !   MOVE PARAMETERS TO PROGRAM
300     PRINT D$;"PR#1"
310     PRINT :
        PRINT :
        PRINT
320     PRINT "RECORD NO ";A$(M)
330     PRINT
340     PRINT "SHOT OFFSET ";SF
350     PRINT "DIRECTION ";;
        PRINT CHR$(PEEK(20495))
360     PRINT "GROUP INTERVAL ";GI
370     PRINT "NO. OF STACKS ";SK
380     PRINT "CHANNEL GAINS 1 TO 12 - ";
390     FOR I = 1 TO 12:
        PRINT G(I);SPC( 1);:
    NEXT I
400     PRINT
410     IF LC = 0 THEN
        PRINT "LOW CUT FILTER OUT":
        GOTO 430
420     PRINT "LOW CUT FILTER ";LC
430     IF HC = 999 THEN
        PRINT "HIGH CUT FILTER OUT":
        GOTO 450
440     PRINT "HIGH CUT FILTER ";HC
450     PRINT "TAPE IDENT. NO. ";
460     FOR I = 0 TO 7:
        PRINT CHR$(PEEK(20486 + I));:
    NEXT I:
    PRINT
470     PRINT
480     ST = (TS / 2) + TD:
        TS = TS + TD
485     PRINT
490     PRINT TD;SPC( 39);ST;SPC( 39);TS
500     PRINT D$;"PR#0"
510     HGR :
        POKE 49234,0:                !   FULL GRAPHICS
520     HCOLOR= 3
530     SY = - 8
540     FOR L = 0 TO 11
541         TR = L + 1
```

```
=====
545     SY = SY + 16
550     XP = 1:
        YP = SY
560     FOR I = 1 TO 256
565         PN = 4 * I - 3:
            CALL 37894:
            V = (V - 511) / 4:           !   GET POINT
570         YY = SY + V * GG
580         IF YY < 1 THEN
            YY = 1
590         IF YY > 191 THEN
            YY = 191
600         HPLOT XP,YP TO I,YY
610         XP = I:
            YP = YY
620     NEXT I
630     NEXT L
640     XX = - 24
650     FOR I = 1 TO 10
660         XX = XX + 25
670         HPLOT XX,1 TO XX,191
680     NEXT I
690     HPLOT 125,1 TO 125,191
700     HPLOT 250,1 TO 250,191
705     HPLOT 251,1 TO 251,191
710     PRINT D$;"PR#1"
720     POKE 1913,65
730     Q$ = CHR$(17)
740     PRINT Q$
745     PRINT CHR$(12)
750     PRINT D$;"PR#0"
760     TEXT
770     K = FRE(0)
780     NEXT M
800     END
```

```
=====
+-----+
1      !  **EPlot/VA - UPDATED JAN 25/84**      !
2      !  PLOTS SEISMIC RECORDS IN VARIABLE AREA MODE ON SCREEN      !
3      !  DUMPS SCREEN PLOT TO EPSON MX-100 PRINTER                    !
4      !  ALSO PRINTS OUT ALL HEADER INFORMATION                       !
5      !  DATA MUST RESIDE ON DISK IN NORMINTON FORMAT               !
6      !  ROUTINE WRITTEN FOR APPLE II EPSON INTERFACE KIT TYPE 2A    !
7      !  PRINTER IN PR#1                                             !
+-----+

20 TR = 0:
   PN = 0:
   V = 0
30 DIM G(12)
40 TS = 0:
   TD = 0:
   LC = 0:
   HC = 0:
   GI = 0:
   SK = 0:
   SF = 0
50 DIM H(8),A$(20)
60 D$ = CHR$(13) + CHR$(4)
100 HOME :
   VTAB 10:
   PRINT "TURN PRINTER ON AND PRESS ";;
   INVERSE :
   PRINT "RETURN";:
   NORMAL :
   GET Q$
110 IF Q$ < > CHR$(13) THEN
   GOTO 100
120 HOME :
   VTAB 3:
   INPUT "INPUT NO OF RECORDS TO BE PLOTTED ";NR
130 PRINT :
   PRINT "INPUT RECORD NAMES ONE/LINE"
140 FOR I = 1 TO NR:
   INPUT A$(I):
   NEXT I
150 HOME :
   VTAB 3:
   PRINT "CHECK RECORD NAMES"
160 PRINT
170 FOR I = 1 TO NR:
   PRINT A$(I):
   NEXT I
180 PRINT :
   INPUT "OK? (Y/N) ";Q$
190 IF Q$ = "Y" THEN
   GOTO 220
200 IF Q$ = "N" THEN
   GOTO 120
210 GOTO 180
220 HOME :
   VTAB 3:
```

```
=====
      INPUT "ENTER GAIN ";GG
230 HOME :
      VTAB 10:
      PRINT "INSERT DATA DISK IN DRIVE 1":
      PRINT "AND PRESS ";;
      INVERSE :
      PRINT "RETURN";:
      NORMAL :
      GET Q$
240 IF Q$ < > CHR$(13) THEN
      GOTO 230
250 FOR M = 1 TO NR
260   PRINT D$"BLOAD"A$(M)",A$5004":
      CALL 37891:           !   MOVE PARAMETERS TO PROGRAM
300   PRINT D$;"PR#1"
310   PRINT :
      PRINT :
      PRINT
320   PRINT "RECORD NO ";A$(M)
330   PRINT
340   PRINT "SHOT OFFSET ";SF
350   PRINT "DIRECTION ";;
      PRINT CHR$(PEEK(20495))
360   PRINT "GROUP INTERVAL ";GI
370   PRINT "NO. OF STACKS ";SK
380   PRINT "CHANNEL GAINS 1 TO 12 - ";
390   FOR I = 1 TO 12:
      PRINT G(I);SPC( 1);:
      NEXT I
400   PRINT
410   IF LC = 0 THEN
      PRINT "LOW CUT FILTER OUT":
      GOTO 430
420   PRINT "LOW CUT FILTER ";LC
430   IF HC = 999 THEN
      PRINT "HIGH CUT FILTER OUT":
      GOTO 450
440   PRINT "HIGH CUT FILTER ";HC
450   PRINT "TAPE IDENT. NO. ";
460   FOR I = 0 TO 7:
      PRINT CHR$(PEEK(20486 + I));:
      NEXT I:
      PRINT
470   PRINT
480   ST = (TS / 2) + TD:
      TS = TS + TD
485   PRINT
490   PRINT TD;SPC( 39);ST;SPC( 39);TS
500   PRINT D$;"PR#0"
510   HGR :
      POKE 49234,0:           !   FULL GRAPHICS
520   HCOLOR= 3
530   SY = - 8
540   FOR L = 0 TO 11
541     TR = L + 1
```

```
545     SY = SY + 16
550     XP = 1:
        YP = SY
560     FOR I = 1 TO 256
565         PN = 4 * I - 3:
            CALL 37894:
            V = (V - 511) / 4:           !   GET POINT
570         YY = SY + V * GG
580         IF YY < 1 THEN
            YY = 1
590         IF YY > 191 THEN
            YY = 191
600         HPLOT XP, YP TO I, YY
605         IF V < 0 THEN
            HPLOT I, (SY - 1) TO I, YY
610         XP = I:
            YP = YY
620     NEXT I
630     NEXT L
640     XX = - 24
650     FOR I = 1 TO 10
660         XX = XX + 25
670         HPLOT XX, 1 TO XX, 191
680     NEXT I
690     HPLOT 125, 1 TO 125, 191
700     HPLOT 250, 1 TO 250, 191
705     HPLOT 251, 1 TO 251, 191
710     PRINT D$; "PR#1"
720     POKE 1913, 65
730     Q$ = CHR$(17)
740     PRINT Q$
745     PRINT CHR$(12)
750     PRINT D$; "PR#0"
760     TEXT
770     K = FRE(0)
780     NEXT M
800     END
```

P-PICKER 2.1

FEB 13/84

PAGE - 1

```
=====
+-----+
1  !  **P-PICKER 2.1 - UPDATED FEB 13/84**
2  !  SEISMIC RECORD IS DISPLAYED ON SCREEN
3  !  FOR INTERACTIVE PICKING OF REFRACTED OR REFLECTED EVENTS
4  !  *****
5  !  OPTION TO DISPLAY 1ST HALF, MIDDLE, OR 2ND HALF OF RECORD
6  !  OPTION TO SET INDIVIDUAL TRACE GAINS
7  !  CONTROL CURSOR USING H,I,J,K,L,M KEYS
8  !  ENTER PICK BY PRESSING <ESC>
9  !  PICKS UPDATED IF A GIVEN TRACE IS PICKED MORE THAN ONCE
10 !  ENTER TRACE NUMBER>12 TO STOP PICKING
11 !  REFRACTION (T-X) OR REFLECTION (T2-X2) LEAST SQUARES ANALYSIS
12 !  FOR TIME-INT AND VELOCITY
13 !  T-X DATA CAN BE PRINTED OR STORED ON DISK
15 !  *****
20 !  EXPEDITE WITH LOCAL & GLOBAL $5000; RESERVE $2000-$4000
+-----+

100 TR = 0:
    FNT = 0:
    V = 0:
    DIM GN(12):
    TS = 0:
    TD = 0:
    LC = 0:
    HC = 0:
    GI = 0:
    SK = 0:
    SF = 0
110 SCALE= 5:
    ROT= 0
115 DIM D(12),T(12),R(12),TT(12),TG(12)
120 GOTO 140
+-----+
+
125 !      PN IS POINT IN TRACE; 37894 = $9406 LOCATION FOR POINT FINDER
!
+-----+
+
130 CALL 37894:
    V = (V - 511) / 4:
    RETURN
+-----+
135 !      READ SHAPE TABLE (37632=$9300)
+-----+

140 A = 37632:
    FOR I = 0 TO 8:
        READ B:
        POKE A + I, B:
    NEXT I
    POKE 232, 0:
    POKE 233, 147
150 DATA 1, 0, 4, 0, 226, 45, 35, 0, 0
160 D$ = CHR$(13) + CHR$(4)
170 ID = 1:
180 HOME :
                                     ID=ACTIVE DRIVE
```



```
=====
VTAB 12
190 PRINT "INSERT DATA DISK IN ";;
  INVERSE :
  PRINT "DRIVE";:
  NORMAL :
  PRINT " "ID:
  PRINT :
  PRINT "AND PRESS ";;
  INVERSE :
  PRINT "RETURN";:
  NORMAL
200 GET A$:
  IF ASC(A$) < > 13GOTO 200
210 POKE 43624,ID:
  POKE 43625,96:           !   SLOT*16
220 HOME
230 CALL 768
240 IF PEEK(206) = 160 THEN
  HOME :
  VTAB 10:
  PRINT "NO FILE ENTERED - PRESS ANY KEY";:
  GET A$:
  GOTO 180
250 CALL 37891:           !   $9403 MOVE VARS
260 AF$ = CHR$(PEEK(43637))
270 FOR I = 2 TO 15:
  AF$ = AF$ + CHR$(PEEK(43636 + I)):
  NEXT I
280 TEXT :
  HOME :
  VTAB 3
290 PRINT "1ST HALF (1)":
  PRINT "MIDDLE (2)":
  PRINT "2ND HALF (3) ";;
  INPUT " 1, 2 OR 3? ";PP
295 IF PP < 1 OR PP > 3GOTO 280
300 PF = 256 * (PP - 1)
310 HOME :
  VTAB 6:
  PRINT "ALL TRACE GAINS EQUAL? (Y/N) ";;
  GOSUB 2000
311 IF Q$ = "Y" THEN
  GOTO 320
312 PRINT :
  PRINT "INPUT TRACE GAINS ONE/LINE"
313 FOR I = 1 TO 12:
  PRINT I;;
  INPUT " ";TG(I):
  NEXT I
314 PRINT :
  PRINT "OK? (Y/N) ";;
  GOSUB 2000
315 IF Q$ = "N" THEN
  GOTO 310
316 GOTO 330
```

```

=====
320 PRINT :
    INPUT "INPUT TRACE GAIN ";TG
325 FOR I = 1 TO 12:
    TG(I) = TG:
    NEXT I
330 HOME :
    HGR
340 HCOLOR= 3
    +-----+
350 ! XX = BASE LINE; (I,Y) CURRENT POINT; (XP,YP) PREVIOUS POINT !
    +-----+
360 XX = 1
370 FOR TR = 1 TO 12
380 XX = XX + 12:
    XP = 1:
    YP = XX

390                                     +-----+
                                     ! PLOT RECORD !
                                     +-----+

400 FOR I = 1 TO 256
410 FN = 2 * I + PF:
    GOSUB 130
450 Y = INT(XX + TG(TR) * V)
460 IF Y < 1 THEN
    Y = 1
470 IF Y > 159 THEN
    Y = 159
480 HPLOT XP,YP TO I,Y
485 XP = I:
    YP = Y
490 NEXT I
500 NEXT TR
520 XP = 0
525 FOR I = 1 TO 10:
    XP = XP + 25:
    HPLOT XP,1 TO XP,159:
    NEXT I
530 VTAB 21
535 PRINT AF$;SPC( 2);TD + PF * TS / 4;SPC( 15);TD + (PF + 1) * TS / 4
537 POKE 34,21
540 VTAB 22:
    PRINT :
    PRINT "IS THIS CORRECT? (Y/N)":
    GOSUB 2000
550 IF Q$ = "N" THEN
    GOTO 280
555 PRINT "TO PICK REFLEXIONS ENTER TRACE"
560 PRINT "USE I,H,J,K,L,M, ESC"
570 J = 0:
    TX = 50
580 INPUT "ENTER DELAY TIME IN MS ";T0
590 PRINT :
    INPUT "REFLECTION (0) OR REFRACTION (1) ? ";KI
600 IF KI < > 0 AND KI < > 1 THEN
    GOTO 590

```

```
=====
610 PRINT
620 FOR I = 1 TO 12:
    R(I) = 0:
    D(I) = 0:
    T(I) = 0:
    TT(I) = 0:
NEXT I
640 INPUT "ENTER TRACE NO ";TR
650 IF TR > 12GOTO 760
660 IF R(TR) = 0 THEN
    J = J + 1
670 R(TR) = TR
680 D(TR) = SF + (TR - 1) * GI
700 TY = (TR - 1) * 12 + 13:
    GOSUB 1500
710 TT(TR) = TX
720 T(TR) = (TX * 2 - 1 + PF) * TS / 1000 + TD - TQ
725 VTAB 23:
    PRINT "TRACE NO ";TR;" - ";T(TR);" MSECS"
730 IF KI = 0 THEN
    T(TR) = T(TR) * T(TR):
    D(TR) = D(TR) * D(TR)
740 GOTO 640

                                     +-----+
760                                     !  LEAST SQRS FIT  !
                                     +-----+

770 MX = 0:
    MY = 0:
    X2 = 0:
    XY = 0
780 FOR I = 1 TO 12
790     MX = MX + D(I)
800     MY = MY + T(I)
810     X2 = X2 + D(I) * D(I)
820     XY = XY + D(I) * T(I)
830 NEXT I
840 V = (J * X2 - MX^2) / (J * XY - MX * MY)
850 TC = (X2 * MY - MX * XY) / (J * X2 - MX^2)
855 IF KI = 0 THEN
    V = SQR(V):
    TC = SQR(TC)
860 V = INT(V * 1000) / 1000:
    TC = INT(TC * 1000) / 1000

                                     +-----+
865                                     !  JOIN PICKED PTS ON SCREEN  !
                                     +-----+

870 FOR I = 1 TO 12
875     IF R(I) = 0 THEN
        GOTO 885
880     RP = R(I) * 12 + 1:
        SP = TT(I):
        GOTO 890
885 NEXT I
890 FOR M = I TO 12
895     IF R(M) = 0 THEN
```

```

=====
                GOTO 950
900      RR = R(M) * 12 + 1
910      SS = TT(M)
920      H PLOT SP,RP TO SS,RR
930      RP = RR
940      SP = SS
950 NEXT M
955 IF KI = 1 GOTO 980
960 FOR I = 1 TO 12
965     IF R(I) = 0 THEN
          GOTO 975
970     D(I) = SQR(D(I));
          T(I) = SQR(T(I))
975 NEXT I
980 PRINT "T-INT = ";TC;SPC( 5);"V = ";V
985 PRINT D$;"PR#1"

990                                     +-----+
          !          PRINT FILE NAME          !
          +-----+

1000 PRINT :
      PRINT AF$:
      PRINT

                                     +-----+
1010                                     !   PRINT HEADER   !
          +-----+

1020 FOR I = 0 TO 7:
      PRINT CHR$(PEEK(20486 + I));:
      NEXT
1030 PRINT :
      PRINT
1040 IF KI = 1 THEN
      PRINT "REFRAC INT T = ";TC;:
      GOTO 1050
1045 PRINT "REFLEC INT T = ";TC;
1050 PRINT SPC( 5);"VEL= ";V
1060 PRINT D$;"PR#0"
1090 PRINT "PRINT T-X DATA? (Y/N)":
      GOSUB 2000
1100 IF Q$ = "N" GOTO 1170
1110 PRINT D$;"PR#1"
1120 FOR I = 1 TO 12
1130     IF R(I) = 0 THEN
          GOTO 1150
1140     PRINT D(I),T(I)
1150 NEXT I
1160 PRINT D$;"PR#0"
1170 PRINT "STORE T-X DATA ON DISK? (Y/N)":
      GOSUB 2000
1180 IF Q$ = "N" GOTO 1310
1190 INPUT "INPUT DISK FILE NAME ";F$
1200 PRINT "INSERT T-X DISK IN ";;
      INVERSE :
      PRINT "DRIVE ";ID:
      NORMAL :
      PRINT "AND PRESS ";;

```

```
=====
INVERSE :
PRINT "RETURN";:
NORMAL
1205 GET A$:
    IF ASC(A$) < > 13GOTO 1205
1210 PRINT D$;"OPEN ";F$
1220 PRINT D$;"WRITE ";F$
1230 PRINT J
1240 FOR I = 1 TO 12
1250     IF R(I) = 0 THEN
        GOTO 1280
1260     PRINT D(I)
1270     PRINT T(I)
1280 NEXT I
1290 PRINT D$;"CLOSE ";F$
1300 INVERSE :
    PRINT "TRANSFER TO DISK COMPLETE":
    NORMAL
1310 PRINT "CONTINUE ON THIS HALF? (Y/N)":
    GOSUB 2000
1315 IF Q$ = "Y"GOTO 570
1320 PRINT "VIEW OTHER HALF OF THIS RECORD? (Y/N)":
    GOSUB 2000
1325 IF Q$ = "Y"GOTO 280
1330 PRINT "PICK ANOTHER RECORD? (Y/N)":
    GOSUB 2000
1335 IF Q$ = "Y" THEN
    TEXT :
    GOTO 180
1340 TEXT
1350 END
```

1490

```
+-----+
!     CURSOR MONITOR ROUTINE     !
+-----+
```

```
1500 XDRAW 1AT TX,TY
1510 GET K$
1520 IF K$ = "I" THEN
    XDRAW 1AT TX,TY:
    TY = TY - 1:
    GOTO 1600
1530 IF K$ = "M" THEN
    XDRAW 1AT TX,TY:
    TY = TY + 1:
    GOTO 1600
1540 IF K$ = "J" THEN
    XDRAW 1AT TX,TY:
    TX = TX - 1:
    GOTO 1600
1550 IF K$ = "K" THEN
    XDRAW 1AT TX,TY:
    TX = TX + 1:
    GOTO 1600
1555 IF K$ = "H" THEN
    XDRAW 1AT TX,TY:
    TX = TX - 5:
```

```
=====
      GOTO 1600
1560 IF K$ = "L" THEN
      XDRAW 1AT TX, TY:
      TX = TX + 5:
      GOTO 1600
1570 IF ASC(K$) = 27 THEN
      RETURN
1580 GOTO 1510
1600 IF TY > 159 THEN
      TY = 159
1610 IF TY < 0 THEN
      TY = 0
1620 IF TX > 255 THEN
      TX = 255
1630 IF TX < 0 THEN
      TX = 0
1640 GOTO 1500
2000 GET Q$:
      IF Q$ < > "Y" AND Q$ < > "N" THEN
      GOTO 2000
2010 RETURN
```

STAT-PICK 2.2

FEB 14/84

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```

1      !  **STAT-PICK 2.2 - UPDATED FEB 14/84**      !
2      !  SEISMIC RECORD IS DISPLAYED ON SCREEN      !
3      !  FOR INTERACTIVE PICKING OF FIRST ARRIVAL   !
4      !  FOR STATIC CORRECTIONS                     !
5      !  *****                                     !
6      !  OPTION TO DISPLAY 1ST HALF, MIDDLE, OR 2ND HALF OF RECORD !
7      !  OPTION TO SET INDIVIDUAL TRACE GAINS       !
8      !  CURSOR CONTROL USING H,I,J,K,L,M KEYS     !
9      !  ENTER PICK BY PRESSING <ESC> KEY          !
10     !  PICKS UPDATED IF: A GIVEN TRACE IS PICKED MORE THAN ONCE !
11     !  ENTER TRACE NUMBER>12 TO STOP PICKING     !
12     !  STATIC CORRECTIONS CALCULATED WRT AN INPUT DATUM !
13     !  CORRECTION SET TO 0 IF TRACE NOT PICKED   !
14     !  STATICS CAN BE PRINTED OR STORED ON DISK  !
15     !  *****                                     !
16     !  EXPEDITE WITH LOCAL & GLOBAL $5000; RESERVE $2000-$4000 !
17     !  *****                                     !
18     !  *****                                     !
19     !  *****                                     !
20     !  *****                                     !
21     !  *****                                     !
22     !  *****                                     !
23     !  *****                                     !
24     !  *****                                     !
25     !  *****                                     !
26     !  *****                                     !
27     !  *****                                     !
28     !  *****                                     !
29     !  *****                                     !
30     !  *****                                     !
31     !  *****                                     !
32     !  *****                                     !
33     !  *****                                     !
34     !  *****                                     !
35     !  *****                                     !
36     !  *****                                     !
37     !  *****                                     !
38     !  *****                                     !
39     !  *****                                     !
40     !  *****                                     !
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43     !  *****                                     !
44     !  *****                                     !
45     !  *****                                     !
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52     !  *****                                     !
53     !  *****                                     !
54     !  *****                                     !
55     !  *****                                     !
56     !  *****                                     !
57     !  *****                                     !
58     !  *****                                     !
59     !  *****                                     !
60     !  *****                                     !
61     !  *****                                     !
62     !  *****                                     !
63     !  *****                                     !
64     !  *****                                     !
65     !  *****                                     !
66     !  *****                                     !
67     !  *****                                     !
68     !  *****                                     !
69     !  *****                                     !
70     !  *****                                     !
71     !  *****                                     !
72     !  *****                                     !
73     !  *****                                     !
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75     !  *****                                     !
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83     !  *****                                     !
84     !  *****                                     !
85     !  *****                                     !
86     !  *****                                     !
87     !  *****                                     !
88     !  *****                                     !
89     !  *****                                     !
90     !  *****                                     !
91     !  *****                                     !
92     !  *****                                     !
93     !  *****                                     !
94     !  *****                                     !
95     !  *****                                     !
96     !  *****                                     !
97     !  *****                                     !
98     !  *****                                     !
99     !  *****                                     !
100    TR = 0:
101    PNT = 0:
102    V = 0:
103    DIM GN(12):
104    TS = 0:
105    TD = 0:
106    LC = 0:
107    HC = 0:
108    GI = 0:
109    SK = 0:
110    SF = 0
111    SCALE= 5:
112    ROT= 0
113    DIM T(12),TG(12)
114    GOTO 140
115
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117
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121
122
123     !  PN IS POINT IN TRACE; 37894 = $9406 LOCATION FOR POINT FINDER
124
125
126
127
128
129
130    CALL 37894:
131    V = (V - 511) / 4:
132    RETURN
133
134
135     !  READ SHAPE TABLE (37632=49300)
136
137
138
139
140    A = 37632:
141    FOR I = 0 TO 8:
142        READ B:
143        POKE A + I, B:
144    NEXT I:
145    POKE 232, 0:
146    POKE 233, 147
147
148
149
150    DATA 1, 0, 4, 0, 226, 45, 35, 0, 0
151
152
153
154
155
156    D$ = CHR$(13) + CHR$(4)
157
158
159
160    ID = 1:
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=====
180 HOME :
    VTAB 8
185 IF AF$ < > "" THEN
    PRINT "LAST RECORD PICKED WAS ";;
    INVERSE :
    PRINT AF$;
    NORMAL
190 VTAB 12:
    PRINT "INSERT DATA DISK IN ";;
    INVERSE :
    PRINT "DRIVE";:
    NORMAL :
    PRINT " "ID:
    PRINT :
    PRINT "AND PRESS ";;
    INVERSE :
    PRINT "RETURN";:
    NORMAL
200 GET A$:
    IF ASC(A$) < > 13GOTO 200
210 POKE 43624, ID:
    POKE 43625, 96:                !      SLOT*16
220 HOME
230 CALL 768
240 IF PEEK(206) = 160 THEN
    HOME :
    VTAB 10:
    PRINT "NO FILE ENTERED - PRESS ANY KEY";:
    GET A$:
    GOTO 180
250 CALL 37891:                    !      $9403 MOVE VARS
260 AF$ = CHR$(PEEK(43637))
270 FOR I = 2 TO 15:
    AF$ = AF$ + CHR$(PEEK(43636 + I));
NEXT I
280 TEXT :
    HOME :
    VTAB 3
290 PRINT "1ST HALF (1)":
    PRINT "MIDDLE (2)":
    PRINT "2ND HALF (3) ";;
    INPUT " 1, 2 OR 3? "; PP
295 IF PP < 1 OR PP > 3GOTO 280
300 PF = 256 * (PP - 1)
305 PRINT :
    PRINT "SMOOTH DATA? (Y/N) ":
    GOSUB 2000:
    SM$ = Q$
310 HOME :
    VTAB 6:
    PRINT "ALL TRACE GAINS EQUAL? (Y/N) ";;
    GOSUB 2000
311 IF Q$ = "Y" THEN
    GOTO 320
312 PRINT :
```



```
=====
PRINT "INPUT TRACE GAINS ONE/LINE"
313 FOR I = 1 TO 12:
    PRINT I;:
    INPUT " ";TG(I):
NEXT I
314 PRINT :
PRINT "OK? (Y/N) ";:
GOSUB 2000
315 IF Q$ = "N" THEN
    GOTO 310
316 GOTO 330
320 PRINT :
INPUT "INPUT TRACE GAIN ";TG
325 FOR I = 1 TO 12:
    TG(I) = TG:
NEXT I
330 HOME :
HGR
340 HCOLOR= 3
+-----+
350 ! XX = BASE LINE; (I,Y) CURRENT POINT; (XP,YP) PREVIOUS POINT !
+-----+
360 XX = 1
370 FOR TR = 1 TO 12
380 XX = XX + 12:
    XP = 1:
    YP = XX
+-----+
390 ! PLOT RECORD !
+-----+
400 FOR I = 1 TO 255
410 PN = 2 * I + PF:
    GOSUB 130:
    VV = V
420 IF SM$ = "N" THEN
    GOTO 450
430 PN = 2 * I - 1 + PF:
    GOSUB 130:
    VV = VV + V
440 PN = 2 * I + 1 + PF:
    GOSUB 130:
    VV = (VV + V) / 3
450 Y = INT(XX + TG(TR) * VV)
460 IF Y < 1 THEN
    Y = 1
470 IF Y > 159 THEN
    Y = 159
480 HPLOT XP,YP TO I,Y
485 XP = I:
    YP = Y
490 NEXT I
500 NEXT TR
520 XP = 0
525 FOR I = 1 TO 10:
    XP = XP + 25:
```

```
=====
      HPLOT XP,1 TO XP,159:
      NEXT I
530 VTAB 21
535 PRINT AF$;SPC( 2);TD + PP * TS / 4;SPC( 15);TD + (PP + 1) * TS / 4
537 POKE 34,21
540 VTAB 22:
      PRINT :
      PRINT "IS THIS CORRECT? (Y/N)":
      GOSUB 2000
550 IF Q$ = "N" THEN
      GOTO 280
555 PRINT "TO PICK TIMES ENTER TRACE"
560 PRINT "USE I,H,J,K,L,M, ESC"
570 TX = 50
620 FOR I = 1 TO 12:
      T(I) = 0:
      NEXT I
640 INPUT "ENTER TRACE NO ";TR
650 IF TR > 12GOTO 750
700 TY = (TR - 1) * 12 + 13:
      GOSUB 1500
720 T(TR) = (TX * 2 - 1 + PF) * TS / 1000 + TD
730 VTAB 23:
      PRINT "TRACE NO ";TR;" - ";T(TR);" MSECS"
740 GOTO 640
750 TEXT :
      HOME :
      VTAB 2
760 PRINT "PICKED TIMES FOR RECORD ";AF$
770 PRINT :
      PRINT "TRACE NO","TIME (MSEC)"
780 FOR I = 1 TO 12:
      PRINT I,T(I):
      NEXT I
790 PRINT :
      PRINT
800 INPUT "INPUT STATIC DATUM (MSEC) ";DM
805 FOR I = 1 TO 12
810     IF T(I) = 0 THEN
      T(I) = DM
815     T(I) = INT((T(I) - DM) * 100) / 100
820 NEXT I
825 PRINT :
      PRINT
830 GOSUB 2500
850 PRINT "DO YOU WANT A PRINTOUT? (Y/N) ":
      GOSUB 2000
860 IF Q$ = "N" THEN
      GOTO 900
870 PRINT D$;"PR#1"
880 GOSUB 2500
890 PRINT D$;"PR#0"
900 PRINT "STORE DATA ON DISK? (Y/N) ":
      GOSUB 2000
910 IF Q$ = "N" THEN
```

```
=====
          GOTO 950
920 GOSUB 3000
950 PRINT "PICK ANOTHER RECORD? (Y/N) ":
    GOSUB 2000
960 IF Q$ = "Y" THEN
    GOTO 180
970 POKE 43624,1
1000 END
```

1490

```
+-----+
!         CURSOR MONITOR ROUTINE         !
+-----+
```

```
1500 XDRAW 1AT TX,TY
1510 GET K$
1520 IF K$ = "I" THEN
    XDRAW 1AT TX,TY:
    TY = TY - 1:
    GOTO 1600
1530 IF K$ = "M" THEN
    XDRAW 1AT TX,TY:
    TY = TY + 1:
    GOTO 1600
1540 IF K$ = "J" THEN
    XDRAW 1AT TX,TY:
    TX = TX - 1:
    GOTO 1600
1550 IF K$ = "K" THEN
    XDRAW 1AT TX,TY:
    TX = TX + 1:
    GOTO 1600
1555 IF K$ = "H" THEN
    XDRAW 1AT TX,TY:
    TX = TX - 5:
    GOTO 1600
1560 IF K$ = "L" THEN
    XDRAW 1AT TX,TY:
    TX = TX + 5:
    GOTO 1600
1570 IF ASC(K$) = 27 THEN
    RETURN
1580 GOTO 1510
1600 IF TY > 159 THEN
    TY = 159
1610 IF TY < 0 THEN
    TY = 0
1620 IF TX > 255 THEN
    TX = 255
1630 IF TX < 0 THEN
    TX = 0
1640 GOTO 1500
2000 GET Q$:
    IF Q$ < > "Y" AND Q$ < > "N" THEN
    GOTO 2000
2010 RETURN
```

2500

```
+-----+
!         PRINT ROUTINE         !
+-----+
```

```
=====
+-----+
2510 PRINT :
    PRINT
2520 PRINT "STATIC CORRECTIONS FOR ";AF$
2530 PRINT "    DATUM = ";DM;" MSEC"
2540 PRINT
2550 PRINT "TRACE NO","TIME (MSEC)"
2560 FOR I = 1 TO 12
2570     PRINT I,T(I)
2580 NEXT I
2590 PRINT :
    PRINT
2600 RETURN
```

```
+-----+
3000     !     DISK ROUTINE     !
+-----+
```

```
3010 HOME :
    VTAB 12:
    PRINT "INSERT STATICS DISK IN ";;
    INVERSE :
    PRINT "DRIVE 2":
    NORMAL :
    PRINT :
    PRINT "AND PRESS ";;
    INVERSE :
    PRINT "RETURN";:
    NORMAL
3015 GET A$:
    IF ASC(A$) < > 13 THEN
        GOTO 3010
3020 AS$ = "STAT-" + AF$
3025 POKE 43624,2
3030 PRINT D$;"OPEN ";AS$
3040 PRINT D$;"DELETE ";AS$
3050 PRINT D$;"OPEN ";AS$
3060 PRINT D$;"WRITE ";AS$
3070 PRINT 12
3080 PRINT DM
3090 FOR I = 1 TO 12
3100     PRINT I:
        PRINT T(I)
3110 NEXT I
3120 PRINT D$;"CLOSE ";AS$
3130 RETURN
```