

REFERENCES

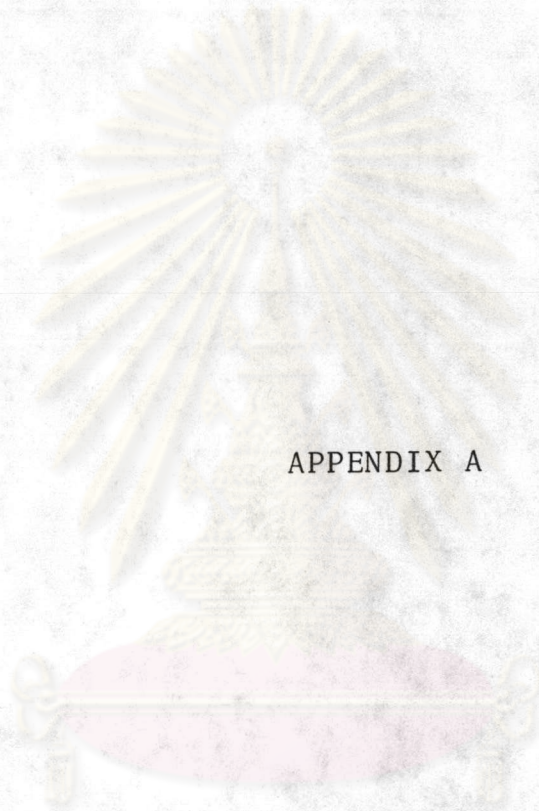
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APPENDIX A

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

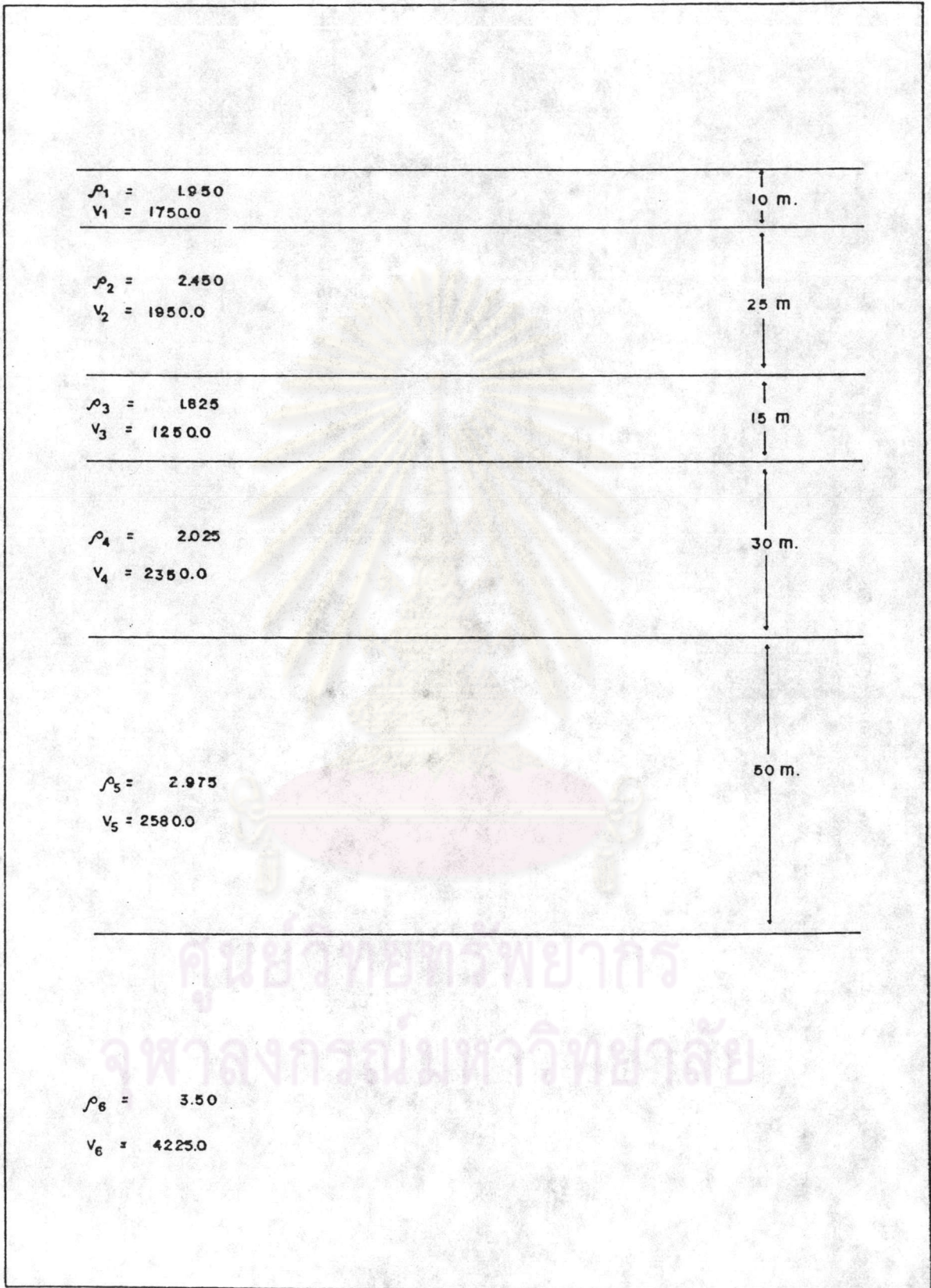


Figure A-1 The 5-layer model of non dipping layer.

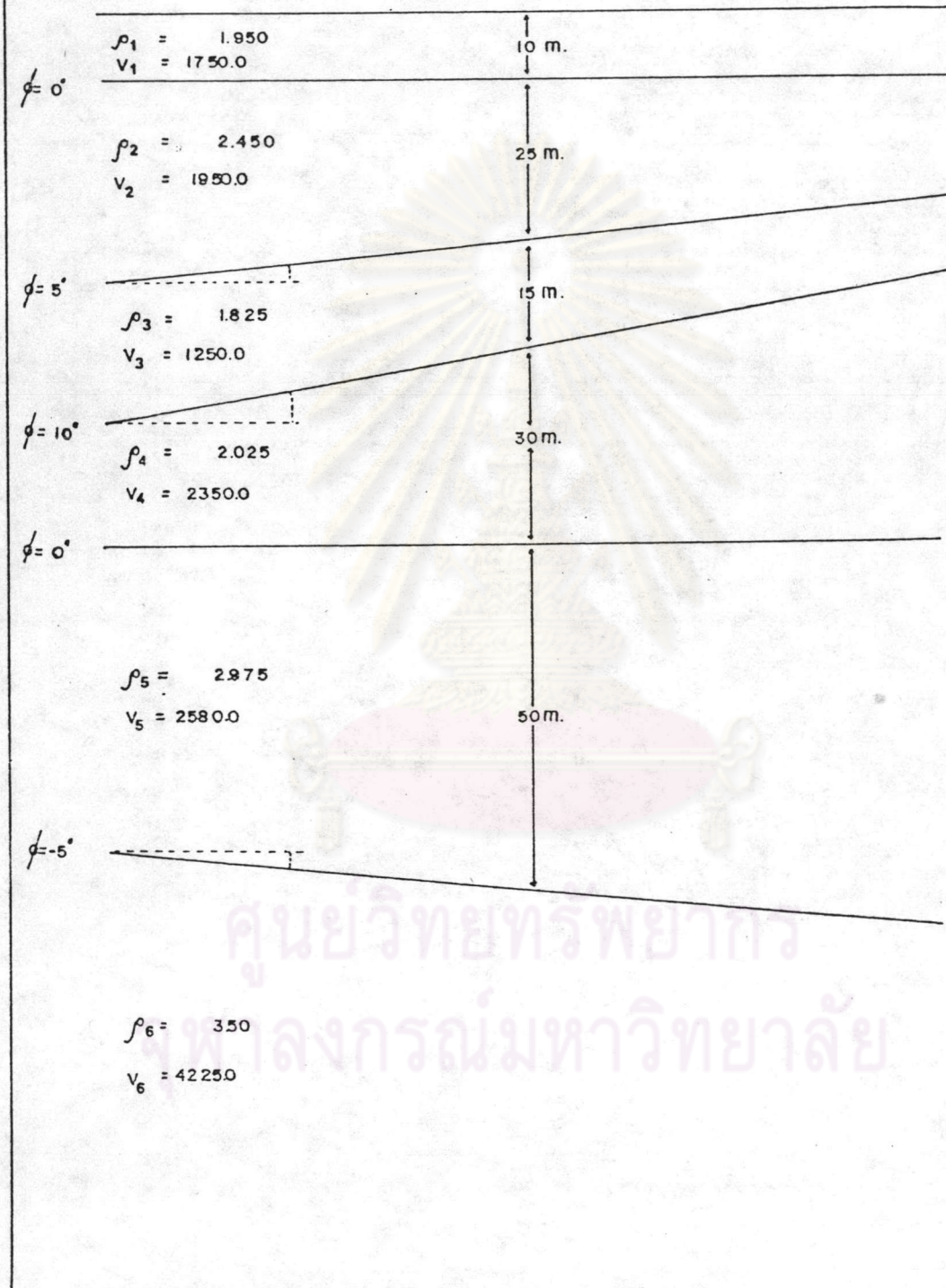


Figure A-2 The 5-layer model of arbitrary dipping

LAYER	DIP ANGLE	VELOCITY	DENSITY	VERTICAL THICKNESS
1	0	1750	1.950	10
2	0	1950	2.450	25
3	0	1250	1.825	15
4	0	2350	2.025	30
5	0	2580	2.975	50

LAYER NO.	GEPHONE NO.	GEPHONE DISTANCE	TRAVEL TIME
1	SP	0	11.4286
	1	5	11.7803
	2	10	12.7775
	3	15	14.2857
	4	20	16.1624
	5	25	18.2946
	6	30	20.6031
	7	35	23.0350
	8	40	25.5550
	9	45	28.1395
	10	50	30.7723
	11	55	33.4419
	12	60	36.1403
2	SP	0	37.0695
	1	5	37.1621
	2	10	37.4462
	3	15	37.9049
	4	20	38.5424
	5	25	39.3528
	6	30	40.3148
	7	35	41.4423
	8	40	42.6715
	9	45	44.0484
	10	50	45.5187
	11	55	47.1177
	12	60	48.7786
3	SP	0	61.0695
	1	5	61.1443
	2	10	61.3611
	3	15	61.7258
	4	20	62.2368
	5	25	62.8727
	6	30	63.6486
	7	35	64.5630
	8	40	65.5771
	9	45	66.7170
	10	50	67.9652
	11	55	69.3149
	12	60	70.7591

LAYER NO.	GEOPHONE NO.	GEOPHONE DISTANCE	TRAVEL TIME
4	SP	0	86.6015
	1	5	86.6423
	2	10	86.7609
	3	15	86.9600
	4	20	87.2447
	5	25	87.5959
	6	30	88.0320
	7	35	88.5463
	8	40	89.1354
	9	45	89.7930
	10	50	90.5217
	11	55	91.3148
	12	60	92.1830
5	SP	0	125.3612
	1	5	125.3834
	2	10	125.4498
	3	15	125.5575
	4	20	125.7132
	5	25	125.9110
	6	30	126.1513
	7	35	126.4344
	8	40	126.7552
	9	45	127.1248
	10	50	127.5376
	11	55	127.9912
	12	60	128.4825

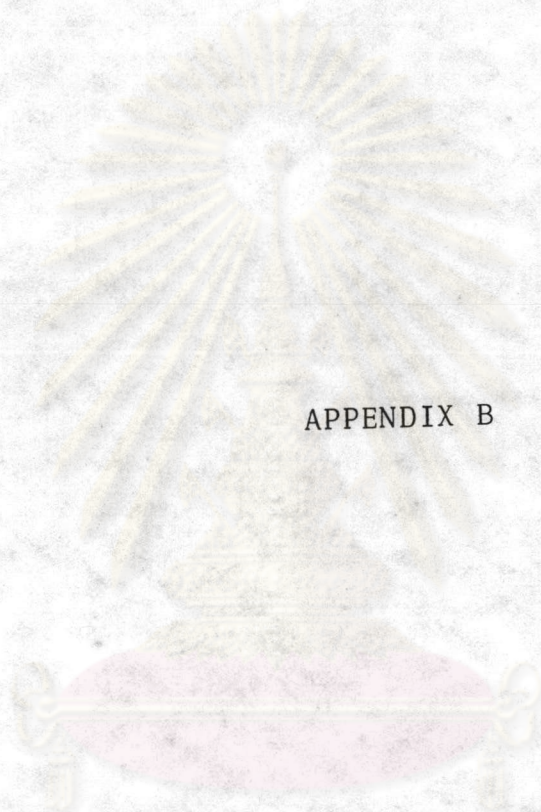
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LAYER	DIP ANGLE	VELOCITY	DENSITY	VERTICAL THICKNESS
1	0	1750	1.950	10
2	5	1950	2.450	25
3	10	1250	1.825	15
4	0	2350	2.025	30
5	-5	2580	2.975	50

LAYER NO.	GEOPHONE NO.	GEOPHONE DISTANCE	TRAVEL TIME
1	SP	0	11.4285
	1	5	11.7803
	2	10	12.7775
	3	15	14.2857
	4	20	16.1624
	5	25	18.2946
	6	30	20.6031
	7	35	23.0350
	8	40	25.5550
	9	45	28.1395
	10	50	30.7723
	11	55	33.4419
	12	60	36.1403
2	SP	0	36.9370
	1	5	36.8083
	2	10	36.8691
	3	15	37.1136
	4	20	37.5519
	5	25	38.1639
	6	30	38.9507
	7	35	39.9020
	8	40	40.9985
	9	45	42.2347
	10	50	43.6004
	11	55	45.0864
	12	60	46.6539
3	SP	0	59.8376
	1	5	59.3407
	2	10	58.9898
	3	15	58.7826
	4	20	58.7223
	5	25	58.8073
	6	30	59.0357
	7	35	59.4100
	8	40	59.9122
	9	45	60.5403
	10	50	61.2944
	11	55	62.1658
	12	60	63.1421

LAYER NO.	GEOPHONE NO.	GEOPHONE DISTANCE	TRAVEL TIME
4	SP	0	86.4118
	1	5	86.2472
	2	10	86.1632
	3	15	86.1545
	4	20	86.2215
	5	25	86.3630
	6	30	86.5780
	7	35	86.8651
	8	40	87.2231
	9	45	87.6461
	10	50	88.1339
	11	55	88.6837
	12	60	89.2923
5	SP	0	125.1099
	1	5	125.0947
	2	10	125.1221
	3	15	125.1895
	4	20	125.2989
	5	25	125.4492
	6	30	125.6400
	7	35	125.8709
	8	40	126.1404
	9	45	126.4472
	10	50	126.7907
	11	55	127.1649
	12	60	127.5859

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APPENDIX B

ศูนย์วิทยุทัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

Station No.	Line 1	Line 2	Line 3
1	309.00	308.63	308.82
2	309.00	308.63	308.80
3	309.00	308.64	308.79
4	309.00	308.64	308.79
5	309.00	308.64	308.78
6	309.00	308.65	308.78
7	309.00	308.65	308.78
8	308.97	308.65	308.76
9	308.96	308.65	308.76
10	308.95	308.66	308.75
11	308.95	308.67	308.70
12	308.94	308.68	308.60
13	308.93	308.69	308.52
14	308.92	308.69	308.41
15	308.87	308.69	308.32
16	308.85	308.69	308.22
17	308.82	308.70	308.13
18	308.86	308.71	308.04
19	308.90	308.72	307.97
20	308.94	308.72	307.92
21	308.96	308.72	307.91
22	308.93	308.72	307.91
23	308.89	308.72	307.91
24	308.85	308.72	307.91
25	308.81	308.72	307.92
26	308.77	308.71	307.92
27	308.72	308.71	307.92
28	308.63	308.70	307.93
29	308.53	308.70	307.93
30	308.44	308.70	307.93
31	308.33	308.70	307.93
32	308.25	308.65	307.93
33	308.20	308.60	307.93
34	308.23	308.55	307.94
35	308.26	308.51	307.94
36	308.30	308.46	307.94
37	308.35	308.42	307.94
38	308.35	308.37	307.94
39	308.25	308.32	307.95
40	308.20	308.28	307.95
41	308.15	308.23	307.96
42	308.30	308.22	307.96
43	308.32	308.21	307.97
44	308.35	308.21	307.97
45	308.34	308.21	307.98

Station Elevation at Ban Rong Wua

Station No.	Line 1	Line 2	Line 3
46	308.36	308.21	307.98
47	308.35	308.21	307.97
48	308.34	308.20	307.97
49	308.30	308.20	307.99
50	308.35	308.20	307.99
51	308.40	308.20	307.98
52	308.45	308.20	307.98
53	308.48	308.20	307.98
54	308.50	308.20	307.97
55	308.52	308.21	307.97
56	308.55	308.21	307.96
57	308.57	308.22	307.96
58	308.51	308.22	307.96
59	308.56	308.22	307.95
60	308.48	308.22	307.94
61	308.52	308.22	307.92
62	308.55	308.20	
63	308.54	308.18	
64	308.58	308.17	
65	308.57	308.15	
66	308.56	308.12	
67	308.54	308.11	
68	308.55	308.08	
69	308.50	308.07	
70	308.57	308.04	
71	308.54	308.03	
72	308.52	308.03	

Staion Elevation at Ban Rong Wua			
Datum Ele. =	308.00	308.00	307.50

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

Station No.	Line 1	Line 2	Line 3
1	340.50	338.60	
2	340.60	338.80	
3	340.65	339.00	
4	340.70	339.25	
5	340.80	339.40	
6	340.85	339.65	
7	340.90	339.85	
8	341.00	340.10	
9	341.00	340.30	
10	341.15	340.50	
11	341.10	340.70	
12	341.10	340.70	
13	341.10	340.90	
14	341.10	341.00	
15	341.10	341.10	
16	340.95	341.20	
17	340.90	341.30	
18	340.85	341.40	
19	340.80	341.45	
20	340.80	341.55	
21	340.75	341.70	
22	340.70	341.65	
23	340.60	341.60	
24	340.50	341.55	
25	340.45	341.50	
26	340.40	341.45	
27	340.30	341.40	
28	340.30	341.35	
29	340.20	341.30	
30	340.15	341.30	
31	340.10	341.20	
32	340.00	341.15	
33	339.90	341.10	
34	339.80	341.00	
35	339.70	340.95	
36	339.60	340.90	
37	339.50	340.80	
38	339.35	340.75	
39	339.30	340.70	
40	339.15	340.60	
41	339.10	340.50	
42	338.95	340.40	
43	338.80	340.30	
44	338.70	340.20	
45	338.55	340.10	



Station Elevation at Ban Huai Kieng

Station No.	Line 1	Line 2	Line 3
46	338.40	340.00	
47	338.30	339.90	
48	338.20	339.80	
49	338.05	339.70	
50	337.90	339.55	
51	337.80	339.45	
52	337.55	339.30	
53	337.30	339.20	
54	337.10	339.10	
55	336.90	339.00	
56	336.70	338.90	
57	336.40	338.75	
58	336.20	338.65	
59	336.00	338.55	
60	335.90	338.40	
61	335.55	338.30	
62	335.55	338.20	
63	335.55		
64	335.50		
65	335.45		
66	335.40		
67	335.35		
68	335.35		
69	335.35		
70	335.30		
71	335.30		
72	335.30		

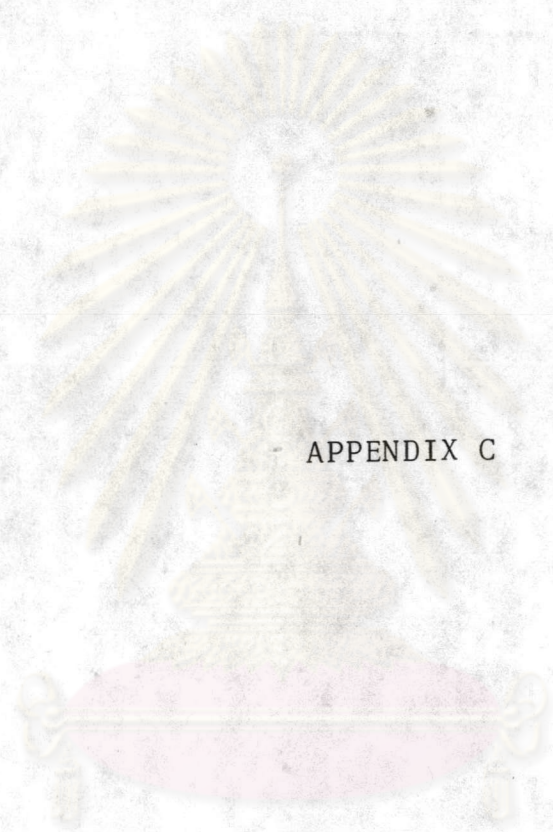
Staion Elevation at Ban Huai Kieng
Datum Elevation = 335.00 338.00

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STATIC CORRECTION PROGRAM

This program was designed to handle up to 128 stations. The program include AGC (optional) and 3-point smoothing. The instructions are as follow :

1. Insert the diskette with STA.EXE in disk drive.
2. To start program
 - a) Key "STA" and press <RETURN>
3. When "Insert SEISMIC DATA in drive A:"
"Insert formatted disk for STATIC CORRECTION DATA in drive B:"
"Press any key when ready" are displayed
 - a) Insert diskette with seismic data in drive A:
 - b) Insert formatted diskette in drive B:
 - c) Press any key
4. When "Static Correction of CDP or COS (1/2):"
is displayed.
 - a) Enter "1" if static correction on command depth point data is desired.
 - b) Goto 5
 - or c) Enter "2" if static correction on common offset data is desired.
5. When "Enter Elevation from Header of Record or from Key board (H/K)" is displayed.
 - a) Enter "H" if elevations of stations were saved within Header block of data on diskette.
 - b) Goto 6



- APPENDIX C

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or c) Enter "K" if elevations of stations are to be entered from Key board.

6. When " File name (4 characters) : " is displayed

a) Enter characters which is the file name to be used .

7. When "Static correction of Profile no." is displayed

a) Enter two number (xx) which is the profile number of the file to be used.

8. When "Number of station on Profile no. xx = " is displayed.

a) Enter the total number of stations in profile number (xx) entered in step 7.

9) When "Static Correction Begin at Record No." is displayed .

a) Enter the record number which is needed to start correction .

b) When "Which Shot at Station no." is displayed then enter the station number of shot point of the record number entered in step 9 a)

10. When "Static Correction End at Record no." is displayed .

a) Enter the record number on which correction is needed to stop .

11. When "Shot offset (M) = " is displayed

a) Enter distance between shot point and
st
1 geophone .

12. When "Geophone Spacing (M)" is displayed .
 - a) Enter geophone to geophone distance.
13. When "Number of Traces/record = " is displayed
 - a) Enter number of Traces in one record
14. When "Datum Elevation (M) =" is displayed .
 - a) Enter datum elevation
15. When "Station no. xx Elevation (M) = " is displayed .
 - a) Enter elevation of Station xx
 - b) Repeat step 15 until all elevation are entered.
 - or c) Go to 16 if "2" was selected in step 4
16. If number of traces/record (step 13) + Static Correction End (Step 10) + Shot offset (step 11)/geophone spacing (step12) > Number of station on profile no. (step 8) then " End record number is too large" and "Static Correction End at Record no." is displayed
 - a) Enter new end record number
17. When "Average Velocity to Datum (M/S) =" is displayed
 - a) Enter the velocity of weathered layer
18. When "If AGC is required type 1 or 0 if not:" is displayed
 - a) Enter "1" if AGC is desired.
 - b) Goto step 19
 - or a) Enter "0" if AGC is not desired.
 - b) Goto step 21

19. Window before, window after:" is displayed
 a) Enter the number of data (before and after)
 to be used in AGC computation.
20. When "AGC constant, Gain factor : is displayed
 a) Enter AGC constant and Gain factor.
21. When "***** STATIC CORRECTION *****
 ***** AGC *****
 ***** 3-POINT SMOOTHING *****
 IN PROGRESS "
 are displayed.
 a) Wait to changed diskette when program demand

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100 REM Program for Static Correction
105 OPTION BASE 0 :CLS
110 DIM ST(256),T$(2048),SCOR(250),CORN(24),T1$(200),T2$(2048),V1$(256),V2$(256),T(1125),W(3),GARE(15),
      T1(1125),ADD$(100)
115 W(1)=.25 :W(2)=.5 :W(3)=.25 :TER$=".TER" :NS%=0
120 ADD$=MKI$(0) :FOR I%=1 TO 50 :ADD$=ADD$+MKI$(0) :NEXT I%
125 GOSUB 685 'Set up I/O port
130 LOCATE 15,1 :PRINT TAB(20);"Insert SEISMIC DATA in drive A: "
135 LOCATE 16,1 :PRINT TAB(8);"Insert formatted disk for STATIC CORRECTION data in drive B: "
140 LOCATE 17,1 :PRINT TAB(25);"Press any key when ready " :X$=INPUT$(1) :CLS 'Select input for Elevation
145 INPUT "Static Correction of CDP or COS (1/2) : ",CI
150 IF CI=1 THEN CDP$="COS" :CDP1$="CDP" ELSE CDP$="CDP" :CDP1$="COS"
155 INPUT "Enter Elevation from Header of Record or from Key board (H/K) ",K$
160 INPUT "File name (4 characters) : ",Q1$ 'Set up input record to be static correction
165 INPUT "Static correction of profile no. ",SP
170 PRINT "Number of Station on Profile no. ";SP;"=" " :INPUT "",NST
175 LOCATE 6,1 :INPUT "Static Correction Begin at Record No. ",JR% :JR%=JR%-1 : LOCATE 6,40 :PRINT " Which
      Shot at Station no.": :INPUT " ",SCB
180 INPUT "Static Correction End at Record No. ",SCE
185 INPUT "Shot offset (M) = ",STG :INPUT "Geophone Spacing (M) = ",GS : INC=FIX(STG/GS)
190 INPUT "Number of Traces/record = ",NR :NT=NR-1 :SC=SCE+INC+NT
195 INPUT "Datum Elevation (M) = ",DE
200 L$=STR$(SP) :IF SP<10 THEN L$=RIGHT$(L$,1) :L$="0"+L$ ELSE L$=RIGHT$(L$,2)
205 A$=MKI$(0) : ADD$="" :FOR K%=1 TO 22 :ADD$=ADD$+A$ :NEXT K% :ADD$=ADD$+CHR$(13)
210 IF (K$="H") OR (K$="h") THEN 255 'Enter elevation on Key board then compute difference from Datum
215 FOR I%=1 TO NST
220 LOCATE 7,1 :FOR D=1 TO 40 :PRINT " ";:NEXT D :PRINT
225 LOCATE 7,2 :PRINT "Station no. ";I%:;INPUT " Elevation (M) = ",EL
230 ST(I%)=EL
235 NEXT I%
240 FOR I%=1 TO NST
245 SCOR(I%)=DE-ST(I%)
250 NEXT I%
255 IF SC>NST THEN LOCATE 14,1 :FOR I=1 TO 20 :PRINT " ";:NEXT I : LOCATE 14,1 :PRINT "End record n
      umber is too large ":INPUT "Static Correction End at record no. ",SCE :SC=SCE+INC+NT :GOTO 255

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260 N10=FIX(JR%/14)+1
265 INPUT "Average Velocity to Datum (M/S) = ",AD :AVD=AD/1000 'Enter average velocity in M/S and set to M/mS
270 INPUT "If AGC is required type 1 or 0 if not : ",AGC% 'Set up AGC parameter
275 IF AGC%=0 THEN 290
280 INPUT "Window before, window after : ",P%,Q%
285 INPUT "AGC constant, Gain factor : ",C1%,W0
290 CLS :GOSUB 685
295 OPEN "0",#3,"B:TERRALOC.FIN"
300 'Loop to compute static shift for station SC3 to SCE
305 FOR J%=SCB TO SCE
310 C%=0 :N12=1 :JR%=JR%+1 :IF JR%>14*N10 THEN N10=N10+1 :CLOSE#3 :GOSUB 495 'Changes Diskette
315 C$=STR$(JR%):IF JR%<10 THEN C$=RIGHT$(C$,1) :C$="0"+C$ ELSE C$=RIGHT$(C$,2)
320 IF JR%>=100 THEN TER$="."+MID$(STR$(JR%),2,1)+MID$(TER$,3,2)
325 Q2%=Q1%+L$+C$+TER$ :PRINT#3,Q2$
330 LOCATE 9,1 :PRINT TAB(26);Q2$;TAB(41);"IN PROGRESS"
335 OPEN "R",#1,"A:"+Q2$,512 :OPEN "R",#2,"B:"+Q2$,512
340 GOSUB 460 'Read and Write Elevation to diskette
345 FOR I%=0 TO NT
350 ND=N12+I%+1
355 IF CI=1 THEN NS%=0 :IND=I% :C%=FIX(C1%*(.25*I%+1)):TR%=J%+NS% ELSE IND=0 :C%=C1% : TR%=J%+I%+NS%
'check for CDP or COS
360 CORN(I%)=(SCOR(TR%)+SCOR(TR%+INC+IND))/AVD :COR=FIX(5*CORN(I%)):SID=SGN(COR) :COR=ABS(COR) :T1$="" :
'use 5*corn(i%) only record length =200 mS ; calculated value for shift trace
365 FOR I1=1 TO COR :A$=MKI$(0) :T1$=T1$+A$ :NEXT I1 :V1$=""
370 GOSUB 415 'shift static of trace
375 N12=N12+3
380 NEXT I% :CLOSE#1 :CLOSE#2 :NS%=NR+1 :NEXT J%
385 BEEP :LOCATE 15,1 :PRINT "Now the STATIC CORRECTION of ";CDP1$;" record is complete"
390 PRINT "If the STATIC of ";CDP$;" is needed in this profile then type 1 or 0 if not";:INPUT CI
395 IF CI=1 THEN CDP$="CDP" :CDP1$="COS" :GOTO 195 ELSE END
400 END
405 '

```



```

410 'Routine to read trace data from diskette then apply AGC & 3-pts smoothing and save
415 T$="" :T2$="" :E%=I%+1
420 FOR Z=0 TO 3 :R1$="" :FIELD#1,512 AS R1$ :GET#1,ND+Z :T$=T$+R1$ :NEXT Z :      T$=T$+ADD$ :LOCATE 10,1 :
      PRINT TAB(38);MID$(T$,1,3)
425 FOR Z%=1 TO N% :T(Z%)=CVI(MID$(T$,2+2*Z%,2)) :NEXT Z% :A%=MID$(T$,1,3)
430 IF AGC%=1 THEN S=0 :GOSUB 535 :'Apply AGC
435 GOSUB 615 :LNT%=LEN(T1$) :T2$=A$+T2$+ADD$ :T$="" :'Apply 3 point smoothin
440 IF SID=-1 OR SID=0 THEN T$=MID$(T2$,1,3)+MID$(T2$,4+2*CORN,2046-LNT%)+T1$      ELSE T$=MID$(T2$,1,3)
+T1$+MID$(T2$,4,2048-LEN(T1$)) 'trace chift ,variable CORN from 350
445 FOR Z=1 TO 4 :FIELD#2,512 AS R1$ :LSET R1$=MID$(T$, (Z-1)*512+1,512) :PUT#2      :NEXT Z      'save shifted
data to diskette
450 RETURN
455 '
460 V1$="" :V2$="" :R1$="" :R2$=""
465 FIELD#2,512 AS R2$ :GET#2,1 :FIELD#1,512 AS R1$ :GET#1,1
470 N%=VAL(MID$(R1$,51,4)) :V2$=MID$(R1$,1,256) :IF N%<1000 THEN N%=1000
475 IF (K$="H") OR (K$="h") THEN FOR Z=0 TO 127: V$=MID$(R2$,Z*2+257,2) :      ST(Z+1)=(CVI(V$)+32000)*.01
:SCOR(Z+1)=DE-ST(Z+1) :NEXT Z :GOTO 485 'read elevation from Header
480 FOR Z=1 TO 128 :V$=MKI$(ST(Z)*100-32000) :V1$=V1$+V$ :NEXT Z :R1$=V2$+V1$ :      FIELD#2,512 AS R2$
:LSET R2$=R1$ :PUT#2,1 'save elevation to Header
485 'FOR Z=0 TO NT :GN=VAL(MID$(R2$,95+13*Z,3)) :GN=GN/6 :GARE(Z+1)=2^GN :NEXT Z      'de-gain !not used
490 RETURN
495 BEEP :LOCATE 5,1 :PRINT TAB(20);"***** STATIC CORRECTION ***** "
500 LOCATE 15,1 :PRINT TAB(20);"Change SEISMIC DATA in drive A:      "
505 LOCATE 16,1 :PRINT TAB(8);"Insert formatted disk for STATIC CORRECTION data in drive B: "
510 LOCATE 17,1 :PRINT TAB(25);"Press any key when ready " :X$=INPUT$(1)
515 LOCATE 15,1 :FOR I=1 TO 30 :PRINT "      "; :NEXT I
520 '
525 OPEN "D",#3,"B:TERRALOC.FIN" :RETURN

```

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```

530 ' Routine to compute AGC
535 S=0 :I1%=Q%
540 FOR KK%=1 TO N% :T1(KK%)=T(KK%) :NEXT KK%
545 FOR KK%=1 TO Q%
550 S=S+ABS(T1(KK%))
555 NEXT KK%
560 FOR JK%=1 TO N%
565 IF (JK%+Q%)>N% THEN 580
570 S=S+ABS(T1(KJ%+Q%)) :I1%=I1%+1
575 IF (JK%-P%)<2 THEN 585
580 I1%=I1%-1 :S=S-ABS(T1(JK%-P%))
585 IF S=0 THEN W=0 ELSE W=C%*I1%/S
590 W=W0*(1+W)*T(JK%)
595 IF ABS(W)>31000 THEN W=SGN(W)*31000
600 T(JK%)=W :NEXT JK%
605 RETURN
610 ' Routine to compute 3-point smoothing
615 FOR KK%=1 TO N% :T1(KK%)=T(KK%) :NEXT KK%
620 FOR JC%=1 TO N%
625 S=0 :JMN%=JC%-1
630 FOR IC%=JMN% TO JC%+1
635 IF IC%>N% OR IC%<1 THEN 650
640 JI%=JC%-IC%+2
645 S=S+W(JI%)*T1(IC%)
650 NEXT IC%
655 T(JC%)=S
660 NEXT JC%
665 T2$=""
670 FOR KK%=1 TO N% :V$=MKI$(T(KK%)) :T2$=T2$+V$ :NEXT KK%
675 RETURN
680 '
685 LOCATE 5,1 :PRINT TAB(20);"***** STATIC CORRECTION *****"
690 LOCATE 6,1 :PRINT TAB(20);"***** AGC *****"
695 LOCATE 7,1 :PRINT TAB(20);"***** 3-POINT SMOOTHING *****"
700 RETURN

```

CDP-SORT

This program was designed to handle up to more than 100 gathers. The program requires visual disk created by DOS. The instructions are as follow :

1. Insert the diskette with CDP.EXE in disk drive
2. To start program
 - a) Key "CDP" and press <RETURN>
3. When

"This program requires data of 12-traces/record"
 "and 14 records/diskette when start gather for 6-fold
 sorting"

"Insert 'Data diskette' in drive A:"

"Insert formatted diskette for 'GATHER DATA' in drive B"

"Press any key when ready" are displayed

- a) Insert data diskette in drive A:
- b) Insert formatted diskette in drive B:
- c) press any key

4. When "CDP-SORT on Filtered data or Field
 data(1/2)" is displayed

- a) Enter "1" if to sort Filtered data
- b) Enter "2" if to sort Field data

5. When "Enter file name (4 characters):" is
 displayed

- a) Enter name of the file to be sorted

6) When "Enter Profile no.:" is displayed

- a) Enter the profile number of file to be sorted

7) When "Total number of record to be sorted:" is
 displayed

- a) Enter the total number of record in the profile (step 6).
8. When "Start CDP-sorting at Record No.:" is displayed
 - a) Enter the record number to start sorting
 9. When "***** CDP-SORT *****"
"***** IN PROGRESS *****"
are displayed
 - a) Wait to change diskette when program demand.

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```

100 'Program for CMP Sorting
105 OPTION BASE 1
110 DIM T$(512),R$(512),V$(100),AF(15) :CLS
115 PRINT "This program requires data of 12 traces/record ";
120 PRINT "and 14 records/diskette when start gather for 6-fold sorting."
125 PRINT :PRINT "Insert 'DATA diskette' in drive A:"
130 PRINT "Insert formatted diskette for 'GATHER data' in drive B:"
135 BEEP :PRINT "Press any key when ready " :A1$=INPUT$(1)
140 LOCATE 3,1 :FOR I=1 TO 160 :PRINT " "; :NEXT I
145 LOCATE 4,1 :INPUT "CDP-SORT of FILTERed data or FIEld data (1/2) : ",SLT
150 IF SLT=1 THEN TER$=".FIL" ELSE TER$=".TER"
155 LOCATE 5,1 :INPUT "Enter file name (4 Characters) : ",Q1$
160 LOCATE 6,1 :INPUT "Enter Profile No. : ",L% :L$=STR$(L%)
165 LOCATE 7,1 :INPUT "Total Number of Record to be sorted : ",NO
170 IF L%<10 THEN L$=RIGHT$(L$,1) :L$="0"+L$ ELSE L$=RIGHT$(L$,2)
175 LOCATE 8,1 :INPUT "Start CDP-Sorting at Record No. :",SRN
180 CLS :LOCATE 7,1 :PRINT TAB(20);"***** CDP-SORT *****"
185 LOCATE 8,1 :PRINT TAB(20);"***** IN PROGRESS *****"
190 LOCATE 12,1:PRINT TAB(18);"Gather no.          at record no.          trace no.";
195 NG=2*NO-10:A3=0:A5=.5*NG :A4=14 :A6=1 :A7=0 :AT%=1 :GAT$=".0GT"
200 FOR I=1 TO 5 :AF(I)=I-1 :NEXT I
205 OPEN "0",#3,"B:TERRALOC.FIN"
210 FOR J=0 TO A5-1
215 FOR K%=0 TO 1
220 I1%=10 :A3=1+A3 :CK=1 :AR%=AF(AT%) '220 is change target diskette if full
225 IF A3=27*A6+1 THEN A6=A6+1 :CLOSE#3 :BEEP:LOCATE 18,1 :PRINT "Change GATHER disk in drive B:
":PRINT "Press any key when ready " :X$=INPUT$(1) :OPEN "0",#3,"B:TERRALOC.FIN" :LOCATE 18,1 :FOR F=1 TO 160
:PRINT " ";:NEXT F
230 M$=STR$(A3):IF A3<10 THEN M$=RIGHT$(M$,1):M$="0"+M$ ELSE M$=RIGHT$(M$,2)
235 IF A3=>100 THEN GAT$="."+MID$(STR$(A3),2,1)+"GT"
240 Q2$=Q1$+L$+M$+GAT$ :PRINT #3,Q2$ :Q2$="B:"+Q2$ 'Open target diskette file as#2
245 OPEN "R",#2,Q2$,512 :FIELD#2,512 AS T$
250 FOR I=J+SRN TO J+SRN+5
255 R$=STR$(I):IF I<10 THEN R$=RIGHT$(R$,1):R$="0"+R$ ELSE R$=RIGHT$(R$,2)

```

```

260 IF I>=100 THEN TER$="."+MID$(STR$(I),2,1)+MID$(TER$,3,2)
265 Q2$="A:"+Q1$+L$+R$+TER$ :A11=I
270 IF (A11>(SRN-6+A7)) AND (A11<(A7+SRN)) THEN AR%=AR%+1 :Q2$="C:ATC"+STR$(AR%)+TER$ 'select input file path
275 OPEN "R",#1,Q2$,512 'open source file as #1
280 R$="" :T$="" :V$=""
285 IF CK=1 THEN FIELD#1,512 AS R$ :GET#1,CK :FIELD#2,512 AS T$ :LSET T$=R$ :PUT#2,CK 'Transfer header
290 IND%=4*(I1%+K%)+2 'Transfer data from#1 to #2
295 FOR R0%=0 TO 3: CK=CK+1 : GET#1,IND%+R0% :LSET T$=R$ :PUT#2,CK :V$=V$+MID$(R$,1,2) :NEXT R0%
300 LOCATE 13,1:PRINT TAB(2);Q2$;TAB(20);A3;TAB(40);I;TAB(58);MID$(V$,1,2);" " ;IND%
305 I1%=I1%-2 :A10=VAL(MID$(V$,1,2)):CLOSE#1
310 IF (A10=2) AND (A11=SRN+A7+13) THEN CLOSE#2 :GOSUB 360
315 NEXT I
320 CLOSE#2
325 IF (K%=1) AND (AR%>=5) THEN AT%=AT%+1
330 IF AT%>5 THEN AT%=1
335 NEXT K%
340 NEXT J
345 CLOSE
350 END
355 'Tranfer data from drive A: to VDISK drive C:
360 IF (A3+1)>NG THEN 420
365 FOR TR%=0 TO 4
370 V1$=STR$(A7+SRN+TR%+9) :IF (TR%+A7+SRN+9)<10 THEN V1$=RIGHT$(V1$,1) :V1$="0"+V1$ ELSE V1$=RIGHT$(V1$,2)
375 Q9$="C:ATC"+STR$(TR%+1)+TER$ :OPEN "R",#2,Q9$,512 :FIELD#2,512 AS T$
380 Q2$="A:"+Q1$+L$+V1$+TER$ :OPEN "R",#1,Q2$,512 :LOCATE 18,1 :PRINT Q2$,Q9$
385 FIELD#1,512 AS R$
390 FOR NT%=1 TO 49 :GET#1,NT% :LSET T$=R$ :PUT#2,NT% :NEXT NT%
395 CLOSE#1 :CLOSE#2
400 NEXT TR%
405 A7=A7+14 :AT%=1
410 BEEP :LOCATE 18,1 :PRINT "Change DATA disk in drive A: " :PRINT "Press any key when
ready ":X$=INPUT$(1)
415 LOCATE 18,1 :FOR F%=1 TO 180 :PRINT " " ; :NEXT F%
420 RETURN

```

NMO CORRECTION

This program was designed to handle up to more than 100 gathers. Both common offset data and CDP data can be used. For CDP data, near traces can be skipped from stacking. The instructions are as follow :

1. Insert the diskette with NMO.EXE in disk drive
2. To start program
 - a) Key "NMO" and press "RETURN"
3. When "***** Normal Moveout Analysis *****"

"Insert 'Gathered data disk' in drive A:"

"Insert formatted disk for 'NMO data' in drive B:"

"Press ant key when ready" are displayed

 - a) Insert gathered data in drive A:
 - b) Insert formatted disketted for NMO data in drive B:
 - c) Press any key
4. When "NMO of CDP or COS data(1/2)" is displayed
 - a) Enter "1" for CDP data
 - b) Goto step 5
 - or c) Enter "2" for Common Offset data
5. When "Enter file name (4 characters):" is displayed
 - a) Enter the name of file to be NMO corrected.
6. When "Profile no." is displayed
 - a) Enter the profile number of file to be NMO corrected.

7. When "Total number of Gathers=" is displayed
 - a) Enter the total number of gathered data to be NMO corrected.
8. When "Start NMO at Gather no." is displayed
 - a) Enter the starting gather number.
9. When "End of NMO at Gather no." is displayed
 - a) Enter the number of the last gather.
10. When "Number of fold =" is displayed
 - a) Enter number of fold in gathered data
 - b) For COS data enter number of traces/record
11. When "Number of fold to be skipped (0 for none) = " is displayed
 - a) Enter number of fold to be skipped
 - b) For COS data Enter "0"
12. When "Shot offset (M) =" is displayed
 - a) Enter distance between shot point to 1st geophone

Note: For COS data, shot offset is the optimum offset.
13. When "Geophone Spacing (M) =" is displayed
 - a) Enter distance between geophone to geophone

Note: For COS data, geophone spacing = 0
14. When "If Stacking is require type 1 or 0 if not:" is displayed
 - a) Enter "1" for CDP data
 - b) Enter "0" for COS data
15. When "Required NMO correction ? (Y/N)" is displayed

- a) Enter "Y" if there are more than 1 average velocity
 - b) Goto step 16
- or a) Enter "N" if there is 1 average velocity
- b) Goto step 17
16. When "No. of Reflector =" is displayed
- a) Enter the number of intercept time and average velocity pairs.
17. When "Reflector (x)"
"Zero offset travel time (ms) =" are displayed
- a) Enter the 2-way travel time from surface to reflector (x) at offset = 0
18. When "Velocity (M/S) =" is displayed
- a) Enter average velocity to the reflector (x) in step 17
 - b) Repeat step 17 until all of intercept time and velocity pairs are entered.
 - c) Goto step 21
19. When "Velocity to 1st Reflector(M/S) =" is displayed
- a) Enter average velocity to 1st reflector
20. When "Zero offset travel time (MS) =" is displayed
- a) Enter the 2-way travel time from surface to 1st reflector at offset = 0

21. When "***** NMO *****"
"***** IN PROGRESS *****"
are displayed

a) Wait to change diskette when program demand.



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100 OPTION BASE 1 :CLS
105 'This is NMO analysis program is modified from FORTRAN VI program written by LOHAWIJARN (1984)
110 DIM X(1250),Y(1024),R(1024),T$(2048),FINT(774),VSTK(10),TVSTK(10),R1$(512), R2$(512)
115 A$=MKI$(0):ADD$="":FOR K%=1 TO 22 :ADD$=ADD$+A$:NEXT K% :ADD$=ADD$+CHR$(13)
120 'Main program to calculate normal moveout
125 NSAMP=1000
130 NVSTK=-1 :PRINT TAB(8);"***** Normal Moveout Analysis *****" 'set up I/O and processing parameters
135 PRINT "Insert 'GATthered data disk' in drive A:"
140 PRINT "Insert formatted disk for 'NMO data' in drive B:"
145 BEEP :PRINT "Press any key when ready " :A$=INPUT$(1) :SCREEN 0,0,0
150 INPUT "NMO at CDP data or COS data (1/2) ",FT%
155 IF FT%=2 THEN GAT$=".TER" ELSE GAT$=".0GT"
160 INPUT "Enter File name (4 character) : ",Q1$
165 INPUT "Profile no. : ",PN:L$=STR$(PN):IF PN<10 THEN L$=RIGHT$(L$,1):L$="0"+L$ ELSE L$=RIGHT$(L$,2)
170 INPUT "Total Number of Gatherers = ",NGAT
175 INPUT "Start NMO at GATher no. ",SNG
180 INPUT "End of NMO at GATher no. ",ENG :NGAT=ENG-SNG+1
185 INPUT "Number of Fold = ",NTRACE
190 INPUT "Number of Fold to be Skipped ( 0 for None ) = ",SKIP%
195 INPUT "Shot offset (M) = ",SOFF
200 INPUT "Geophone Spacing (M) = ",GS:GR=GS*2 'for common offset data GS=0
205 INPUT "If STACKing is require type 1 or 0 if not : ",ST
210 IF (ST=1) OR (ST=0) THEN GOTO 220 ELSE GOTO 205
215 INPUT "If Mute is require type 1 or 0 if not : ",NMUTE 'not used
220 INPUT "Required NMO correction ? (Y/N) ",NC$
225 IF NC$="Y" OR NC$="y" THEN 240
230 IF NC$="N" OR NC$="n" THEN 265
235 GOTO 220
240 INPUT "No. of Reflector = ",NVSTK
245 FOR I=1 TO NVSTK
250 PRINT "Reflector ";I:INPUT "Zero offset travel time (mS) = ",TVSTK(I) : INPUT "Velocity (M/S) = ",VSTK(I)

255 NEXT I
260 NVSTK=-NVSTK :GOTO 275
265 INPUT "Velocity to 1st Reflector (M/S) = ",VSTK(1)

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```

270 INPUT "Zero offset travel time (mS) = ",TVSTK(1)
275 NCOUNT=SNG :N12=1 :N10=1 :XOFF=SOFF :N9=1 :NTRA%=6
280 NPUT "Record length (mS) = ",DT :DT=DT*.001
285 ISTART=0 :M0=1 :NID%=1 :N20=1 :N30=1
290 IF ISTART<>0 THEN 450
295 ' SNCOP6(FINT) !compute interpolating coefficients
300 FOR I=1 TO 6:FINT(I)=0:NEXT I
305 FINT(3)=1
310 SINDEL=3.371908E-02
315 COSDEL=.9994646
320 SING=SINDEL
325 COSG=COSDEL
330 SF=622.5174
335 ROOT3=1.732051
340 IB=1
345 FOR I=1 TO 63
350 IB=IB+6
355 CCG=SF*(COSG*(COSG-.5)-.5)
360 SCG=SF*ROOT3*SING*(COSG+.5)
365 CPS=CCG+SCG
370 CMS=CCG-SCG
375 CPCM=-2*CCG
380 FINT(IB)=CPS/(I+128)/(I+128)
385 FINT(IB+1)=CMS/(64+I)/(64+I)
390 FINT(IB+2)=CPCM/(I*I)
395 FINT(IB+3)=CPS/(64-I)/(64-I)
400 FINT(IB+4)=CMS/(128-I)/(128-I)
405 FINT(IB+5)=CPCM/(192-I)/(192-I)
410 DUMP=SING
415 SING=SING*COSDEL+COSG*SINDEL
420 COSG=COSG*COSDEL-DUMP*SINDEL
425 NEXT I
430 FOR I=385 TO 390:FINT(I)=0:NEXT I
435 FINT(388)=1

```

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440 CLS: LOCATE 5,1:PRINT TAB(20);"***** NORMAL MOVEOUT *****"
445 LOCATE 6,1:PRINT TAB(20);"***** IN PROGRESS *****"
450 LOCATE 15,1:PRINT TAB(20);"NMO at Gather no.      Trace no."
455 OPEN "0",#3,"B:TERRALOC.FIN"
460 NCO=M0 :IF ST=0 THEN NCO=NCOUNT :NID%=1
465 C$=STR$(NCO) :NMO$=".0MO"
470 GOSUB 990 'determine file extension
475 Q2$="B:"+Q1$+L$+C$+NMO$ :T$="" :IF ST=0 THEN PRINT#3,MID$(Q2$,3,12)
480 OPEN "R",#2,Q2$,512
485 FOR I=1 TO NSAMP :R(I)=0 :Y(I)=0 :NEXT I
490 NCO=NCOUNT :C$=STR$(NCO) :NMO$=".0MO"
495 GOSUB 990 'check number of record =>100 for changes file extension to .1GT and/or .1MO
500 N12=1 :Q2$="A:"+Q1$+L$+C$+GAT$
505 OPEN "R",#1,Q2$,512 :FIELD#2,512 AS R2$ :FIELD#1,512 AS R1$
510 FOR I0=1 TO NTRACE 'read data and NMO trace by trace
515 IF I0>NTRACE-SKIP% THEN 895
520 T$="" :V1$="" :ND%=N12+I0
525 IF I0=1 THEN GET#1,I0 :LSET R2$=R1$ :PUT#2,I0
530 FOR Z%=0 TO 3 :GET#1,ND%+Z% :T$=T$+R1$ :NEXT Z% :V1$=MID$(T$,1,3) :TN=VAL(MID$(V1$,1,2))/2 :TN%=INT(TN)
535 IF TN<>TN% THEN XOFF=SOFF ELSE XOFF=SOFF+GS
540 XXFF=XOFF+(NTRACE-I0)*GR 'offset selected
545 LOCATE 16,27:PRINT NCOUNT :LOCATE 16,45:PRINT V1$,XXFF
550 FOR Z%=1 TO NSAMP :V$=MID$(T$,Z%*2+2,2) :X(Z%)=CVI(V$) :NEXT Z%
555 ' This is NMO
560 ISTART=0
565 SAMP=DT/1000
570 NMUTE=0
575 IF NVSTK<0 THEN NMUTE=1
580 NVSTK=ABS(NVSTK)
585 IF ISTART<>0 THEN 605
590 ISTART=1
595 DTFILT=SAMP/64
600 LR=6
605 TFIRST=0

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610 FOR I=1 TO NVSTK 'convert into second
615 TVSTK(I)=TVSTK(I)/1000
620 NEXT I
625 'Loop on output sample number
630 FOR I=1 TO NSAMP
635 Y(I)=0
640 T0=(I-1)*SAMP
645 'Find the moveout velocity for this time
650 IF T0>=TVSTK(1) THEN 665
655 VST=VSTK(1)
660 GOTO 730
665 IF T0<TVSTK(NVSTK) THEN 680
670 VST=VSTK(NVSTK)
675 GOTO 730
680 FOR J=1 TO NVSTK-1
685 IF (T0<TVSTK(J)) AND (T0>=TVSTK(J+1)) THEN 720
690 IF T0<>TVSTK(J) THEN 705
695 VST=VSTK(J)
700 GOTO 730
705 SLOPE=(VSTK(J+1)-VSTK(J))/(TVSTK(J+1)-TVSTK(J))
710 VST=VSTK(J)+SLOPE*(T0-TVSTK(J))
715 GOTO 730
720 NEXT J
725 'Calculate the time corresponding to T0 on the input trace
730 TX=(T0*T0+XXFF*XXFF/VST/VST):TX=SQR(TX)
735 'If NVSTK I/P>0 & NMO stretch exceeds SQR(2.0)-1 :Mute
740 'IF (NMUTE=0) AND (TX>T0*SQR(2)) THEN 890 'mute not use
745 'Calculate the position of the sample such that TX>= an integral sample point
750 N1%=FIX((TX-TFIRST)/SAMP)+1
755 'Devide the sample interval N1 into 64 subintervals
760 DTX=TX-(N1%-1)*SAMP-TFIRST
765 NF1%=FIX(DTX/DTFILT)+1
770 DIFF1=DTX-DTFILT*(NF1%-1)
775 DIFF2=NF1%*DTFILT-DTX

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```

780 IF DIFF1>DIFF2 THEN NCENT=NF1%+1 ELSE NCENT=NF1%
785 'Find the starting location of the relevant filter in FINT
790 'this filter is the one centered on subsample point NCENT
795 IFINT=NCENT*LR-5
800 'Perform vector dot product of the relevant part
805 'of X with the interpolation filter selected above
810 IF N1%<=2 THEN 850
815 'DOT(L,X,Y,P)      !interpolated
820 P=0
825 IF LR<=0 THEN 845
830 FOR I1=1 TO LR
835 P=P+X(N1%+I1-3)*FINT(IFINT+I1-1)
840 NEXT I1
845 Y(I)=P
850 NEXT I
855 FOR I=1 TO NVSTK      : 'return 2 - Way times to mS
860 TVSTK(I)=TVSTK(I)*1000
865 NEXT I
870 'NVSTK returned as INPUT(I/P)
875 IF NMUTE=1 THEN NVSTK=-NVSTK
880 'RETURN
885 IF ST=1 THEN FOR K=1 TO NSAMP :R(K)=R(K)+Y(K) :NEXT K :GOTO 895 'stacked NTRACE to 1 trace
890 FOR K=1 TO NSAMP :R(K)=Y(K) :NEXT K :GOSUB 955 :NID%=NID%+4
895 N12=N12+3
900 NEXT I0
905 IF ST=1 THEN I0=N9 :N9=N9+1 :GOSUB 955 :NID%=NID%+4
910 NCOUNT=NCOUNT+1 : 'count record number to NMO
915 IF N9=13 THEN NCO=M0 :C$=STR$(NCO) :GOSUB 990 :Q9$=Q1$+L$+C$+NMO$ :N9=1 :M0=M0+1 :NID%=1 :PRINT#3,Q9$ ELSE
EXIT=1 'check for 12 traces/record of NMO data
920 IF (NCOUNT>27*N10) THEN N10=N10+1 :LOCATE 20,1 :BEEP :PRINT "Change 'GATher data disk im A:      " :PRINT
"Press any key when ready " :X$=INPUT$(1)
925 IF (M0>14*N20) AND (ST=1) THEN N20=N20+1 :CLOSE#2 :BEEP :LOCATE 21,1 :PRINT "Change formatted disk for 'NMO
data ' in drive B: " :PRINT "Press any key when ready " :X$=INPUT$(1)

```

```

930 IF (NCOUNT>27*N30) AND (ST=0) THEN N30=N30+1 :CLOSE#2 :BEEP :LOCATE 20,1 :PRINT "Change formatted disk for '
NMO data' in drive B: and 'GATher data disk' in drive A:":PRINT "Press any key when ready": X%=INPUT$(1)
935 LOCATE 18,1 :FOR I1%=1 TO 90 :PRINT " "; :NEXT I1% :IF NCOUNT<=NGAT THEN CLOSE#1 :CLOSE#2 :GOTO 460
940 IF (M0-1)*12=NGAT THEN 945 ELSE GOSUB 1005
945 CLOSE
950 END
955 M1%=STR$(I0)+", " 'save data to diskette
960 IF I0<10 THEN M1%=RIGHT$(M1%,2):M1%="0"+M1% ELSE M1%=RIGHT$(M1%,3)
965 T%="" :T%=T%+M1%:T%=RIGHT$(T%,3)
970 FOR I=1 TO NSAMP :CV=INT(R(I) :A%=MKI$(CV):T%=T%+A% :R(I)=0 :NEXT I
975 T%=T%+ADD%
980 FOR I%=1 TO 4 :FIELD#2,512 AS R1% :LSET R1%=MID$(T%,(I%-1)*512+1,512) :PUT#2,NID%+I% :NEXT I%
985 RETURN
990 IF NCO<10 THEN C%=RIGHT$(C%,1):C%="0"+C% ELSE C%=RIGHT$(C%,2)
995 IF NCO>=100 THEN GAT%="."+MID$(STR$(NCO),2,1)+MID$(GAT%,3,2) :IF M0>=100 THEN NMO%="."+MID$(STR$(M0),2,1)+
MID$(NMO%,3,2)
1000 RETURN
1005 IF (EXIT=1) AND (ST=1) THEN NCO=M0 :C%=STR$(NCO) :GOSUB 990 :Q9%=Q1%+L%+C%+NMO% :PRINT#3,Q9% :I0=N9+12
:GOSUB 1015 :NEXT I0 'last NMO data recorded
1010 RETURN
1015 M1%=STR$(I0)+", "
1020 IF I0<10 THEN M1%=RIGHT$(M1%,2):M1%="0"+M1% ELSE M1%=RIGHT$(M1%,3)
1025 T%="" :T%=T%+M1%:T%=RIGHT$(T%,3)
1030 FOR I=1 TO NSAMP :CV=INT(R(I) :A%=MKI$(CV) :T%=T%+A% :R(I)=0 :NEXT I
1035 T%=T%+ADD%
1040 FOR I%=1 TO 4 :FIELD#2,512 AS R1% :LSET R1%=MID$(T%,(I%-1)*512+1,512) :PUT#2 :NEXT I%
1045 RETURN

```

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VELOCITY ANALYSIS

This program was designed to handle data up to 12 traces/record. The instructions are as follows:

1. Insert the diskette with VEL.EXE in disk drive
2. To start program
 - a) Key "VEL"
 - b) Press "RETURN"
3. When "***** VELOCITY ANALYSIS *****"

"Insert Gathered data in drive A:"

"Enter file name:"

are displayed

 - a) Insert gather data disk in drive A:
 - b) Enter the name of the file to be used
(4 characters)
4. When "Profile no.:" is displayed
 - a) Enter profile number of the file to be analyzed
5. When "Number of Gathers =" is displayed
 - a) Enter the total number of gathers in this profile.
6. When "No. of fold =" is displayed
 - a) Enter the number of data traces in a record(file)
7. When "Shot offset (M) =" is displayed
 - a) Enter distance between shot point and 1st geophone
8. When "Geophone Spacing (M) =" is displayed
 - a) Enter geophone to geophone distance.

9. When "Minimum velocity to begin analysis(M/S):"
is displayed

a) Enter the starting velocity

10. When "Maximum velocity to stop analysis(M/S):"
is displayed

a) Enter the maximum velocity

11. When "Increment of velocity(M/S):" is displayed.

a) Enter velocity increment in each step.

12. When "Start analysis at Gather no. " is
displayed

a) Enter the record number of gathered data that
is to be analysed.

13. When "Step " is displayed

a) Enter a number of records(files) that to be skip
from analysis.

14. When "AGC constant, Gain factor" is displayed

a) Enter number of AGC constant and gain factor
to be used in AGC before print.

15. When "For AGC input window before, window
after" is displayed

a) Enter number of sample before and after
sample point to be used in AGC before print.

16. When "***** VELOCITY ANALYSIS *****"

"***** IN PROGRESS *****"

are displayed

a) Wait for result on printer and

b) Wait to change data disk in drive A:
when program demand.

```

100 OPTION BASE 0 :CLS
105 'This is a velocity analysis program, modify from FORTRAN IV written by LOHAWIJARN(1984) and print
trace section is developed by Assistance Professor Somchai Sri-issaraporn,Department of Geology,Chul
alongkorn Univ.
110 DIM X(1250),Y(1024),T$(2048),FINT(390),VSTK(10),TVSTK(10),T%(13,1125),V$(30),T1%(1200),ST%(13),A$(70),F$(180
),FI%(16),FP%(16),R1%(1200)
115 NVSTK=-1 :A$=MKI$(0) :ADD$="" :FOR K%=1 TO 22 :ADD$=ADD$+A$ :NEXT K% :ADD$=ADD$+CHR$(13)
120 PRINT "***** VELOCITY ANALYSIS *****"
125 PRINT "Insert GATthered data disk in drive B:"
130 INPUT "Enter File name : ",Q1$
135 INPUT "Profile no. : ",LN :L$=STR$(LN) :IF LN<10 THEN L$=RIGHT$(L$,1) :L$="0"+L$ ELSE L$=RIGHT$(L$,2)
140 INPUT "Number of Gathers = ",NGAT
145 INPUT "No. of fold = ",NTRACE
150 INPUT "Shot Offset (M) = ",SOFF :XOFF
155 INPUT "Geophone Spacing (M) = ",GS:GR=GS*2
160 TVSTK(1)=200 :INPUT "Zero Offset Travel Times of 1st Layer = ",TVSTK(1)
165 INPUT "Minimum velocity to begin analysis (M/S) : ",VB
170 INPUT "Maximum velocity to stop analysis (M/S) : ",VS
175 INPUT "Increment of velocity (M/S) : ",VI
180 INPUT "Start analysis at GATher no. ",GT
185 INPUT "Step ",SG
190 PRINT "For AGC Input ";;INPUT "Window before ,Window after ",P%,Q% : INPUT "AGC constant ,Gain fa
ctor ",C%,W0 :AGC%=1
195 CLS :NCOUNT=GT :KC%=1:SK=96 :XOFF=SOFF :NSAMP=1000 :DT=.2
200 ISTART=0
205 SAMP=DT/1000
210 IF ISTART<>0 THEN 220
215 GOTO 700 :GOSUB 700
220 N10=1 :N12=1 :GAT$=".0GT"
225 CLS :LOCATE 5,1 :PRINT TAB(25);"***** VELOCITY ANALYSIS *****"
230 LOCATE 6,1 :PRINT TAB(25);"***** IN PROGRESS *****"
235 LOCATE 15,1:PRINT TAB(27);"Gather no. Trace no."
240 C$=STR$(NCOUNT)
245 IF NCOUNT<10 THEN C$=RIGHT$(C$,1):C$="0"+C$ ELSE C$=RIGHT$(C$,2)

```

```

250 IF NCOUNT>=100 THEN GAT$=".1GT"
255 Q2$="B:"+Q1$+L$+C$+GAT$ :T$="" '240-255 check record number and named a file
260 LX=VB
265 XK=LX :VSTK(1)=LX :N12=1 :OPEN "R",#2,Q2$,512 :FIELD#2,512 AS R1$
270 FOR I%=1 TO NSAMP:Y(I%)=0:NEXT I%
275 FOR I0%=1 TO NTRACE
280 T$="" :V1$="" :R1$="" :ND%=N12+I0%
285 IF I0%=1 THEN FIELD#2,512 AS R1$ :GET#2,I0%
290 FOR Z1%=0 TO 3 :R1$="" :FIELD#2,512 AS R1$ : GET#2,ND%+Z1% :T$=T$+R1$ :V1$=MID$(T$,1,3) :NEXT Z1
% :TN=VAL(MID$(V1$,1,2))/2 :TN%=INT(TN) :V1$=""
295 IF TN<>TN% THEN XOFF=SOFF ELSE XOFF=SOFF+GS
300 XFF=XOFF+(NTRACE-I0%)*GR 'NMO offset selected
305 LOCATE 16,1:PRINT TAB(30);NCOUNT;TAB(45);I0% ,Q2$
310 FOR K%=1 TO NSAMP :M$=MID$(T$,2*K%+2,2) :X(K%)=CVI(M$) :NEXT K%
315 GOTO 380 :GOSUB 380
320 FOR K%=1 TO NSAMP :T%(I0%-1,K%)=Y(K%)/2 :NEXT K%
325 N12=N12+3
330 NEXT I0%
335 GOTO 885 :GOSUB 2000 :KC%=KC%+1
340 LX=LX+VI :IF LX<=VS THEN CLOSE#2 :GOTO 265 'changes NMO velocity by increme nt velocity VI
345 NCOUNT=NCOUNT+SG :count for number of gather
350 IF NCOUNT>27*N10 THEN N10=N10+1 :BEEP :CLOSE#2 :LOCATE 20,1 :PRINT "Change GATher disk in drive A: " :PRI
NT "Press any key when ready " :X$=INPUT$(1) :LOCATE 20,1 :FOR Z%=1 TO 20 :PRINT " "; :NEXT Z%
355 IF NCOUNT<=NGAT THEN CLOSE#1 :CLOSE#2 :GOTO 240
360 CLOSE '350 check for changes gather file number
365 GOTO 1165 :END
370 ' NMO for desired velocity
375 ' NMOC
380 ISTART=0
385 SAMP=DT/1000
390 NMUTE=0
395 IF NVSTK<0 THEN NMUTE=1
400 NVSTK=ABS(NVSTK)
405 IF ISTART<>0 THEN 430
410 '

```

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```

415 ISTART=1
420 DTFILT=SAMP/64
425 LR=6
430 'CONTINUE
435 TFIRST=0
440 FOR I=1 TO NVSTK
445 TVSTK(I)=TVSTK(I)/1000
450 NEXT I
455 'Loop on output sample number
460 FOR I=1 TO NSAMP
465 Y(I)=0
470 T0=(I-1)*SAMP
475 'Find the moveout velocity for this time
480 IF T0>=TVSTK(1) THEN 495
485 VST=VSTK(1)
490 GOTO 565
495 IF T0<TVSTK(NVSTK) THEN 510
500 VST=VSTK(NVSTK)
505 GOTO 565
510 FOR J=1 TO NVSTK-1
515 IF (T0<TVSTK(J)) AND (T0>=TVSTK(J+1)) THEN 550
520 IF T0<>TVSTK(J) THEN 535
525 VST=VSTK(J)
530 GOTO 565
535 SLOPE=(VSTK(J+1)-VSTK(J))/(TVSTK(J+1)-TVSTK(J))
540 VST=VSTK(J)+SLOPE*(T0-TVSTK(J))
545 GOTO 565
550 NEXT J
555 'CONTINUE
560 'Calculate the time corresponding to T0 on the input trace
565 TX=(T0*T0+XXFF*XXFF/VST/VST):TX=SQR(TX)
570 'If NVSTK I/P>0 & NMO stretch exceeds SQR(2.0)-1 ;Mute
575 IF (NMUTE=0) AND (TX>(1.414214*T0)) THEN 665
580 'Calculate the position of the sample such

```

```

585 'that TX>= an integral sample point
590 N1%=FIX((TX-TFIRST)/SAMP)+1
595 'Devide the sample interval N1 into 64 subintervals
600 DTX=TX-(N1%-1)*SAMP-TFIRST
605 NF1%=FIX(DTX/DTFILT)+1
610 DIFF1=DTX-DTFILT*(NF1%-1)
615 DIFF2=NF1%*DTFILT-DTX
620 IF DIFF1>DIFF2 THEN NCENT=NF1%+1 ELSE NCENT=NF1%
625 'Find the starting location of the relevant filter in FINT
630 'this filter is the one centered on subsample point NCENT
635 IFINT=NCENT*LR-5
640 'Perform vector dot product of the relevant part
645 'of X with the interpolation filter selected above
650 IF N1%<=2 THEN 665
655 GOTO 850 : 'GOSUB 1670
660 Y(I)=P
665 NEXT I
670 FOR I=1 TO NVSTK      : 'return 2 - Way times to mS
675 TVSTK(I)=TVSTK(I)*1000
680 NEXT I
685 'NVSTK returned as INPUT(I/P)
690 IF NMUTE=1 THEN NVSTK=-NVSTK
695 GOTO 320 : 'RETURN
700 ' Shape filter SNCOP6(FINT)
705 FOR I=1 TO 6:FINT(I)=0:NEXT I
710 FINT(3)=1
715 SINDEL=3.371908E-02  : 'CSNG(.03371908#)
720 COSDEL=.9994646  : 'CSNG(.9994646#)
725 SING=SINDEL
730 COSG=COSDEL
735 SF=622.5174  : 'CSNG(622.5174#)
740 ROOT3=1.732051  : 'CSNG(1.733051#)
745 IB=1
750 FOR I=1 TO 63
755 IB=IB+6

```

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```

760 CCG=SF*(COSG*(COSG-.5)-.5)
765 SCG=SF*ROOT3*SING*(COSG+.5)
770 CPS=CCG+SCG
775 CMS=CCG-SCG
780 CPCM=-2*CCG
785 FINT(IB)=CPS/(I+128)/(I+128)
790 FINT(IB+1)=CMS/(64+I)/(64+I)
795 FINT(IB+2)=CPCM/(I*I)
800 FINT(IB+3)=CPS/(64-I)/(64-I)
805 FINT(IB+4)=CMS/(128-I)/(128-I)
810 FINT(IB+5)=CPCM/(192-I)/(192-I)
815 DUMP=SING
820 SING=SING*COSDEL+COSG*SINDEL
825 COSG=COSG*COSDEL-DUMP*SINDEL
830 NEXT I
835 FOR I=385 TO 390:FINT(I)=0:NEXT I
840 FINT(388)=1
845 GOTO 220 : 'RETURN
850 'DOT(L,X,Y,P)
855 P=0
860 IF LR<=0 THEN 880
865 FOR I1=1 TO LR
870 P=P+X(N1%+I1-3)*FINT(IFINT+I1-1)
875 NEXT I1
880 GOTO 660 : 'RETURN
885 '.....PLOT VELOCITY ANALYSIS.....
890 ' The plot routine using dot matrix printer was developed by
895 ' Assistant Professor Somchai Sri-israporn. The author has no authority
900 ' Therefore, the listing is not included here.

```

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BIOGRAPHY

Mr. Preecha Somphud was born in Pattalung, Thailand on April 26, 1953. In 1976, he graduate with a B.Sc. degree in Geology from Chiangmai University. After graduation, he was a Government Officer at Department of Highway and continue his post-graduate study leading to the M.Sc. degree in Geology at Chulalongkorn University.



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