

TR19. 142-146

18. Computer plotting of profiles from delay time seismic refraction data.

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This programme (2A4) for the Wang 700/702 computer enables the rapid plotting of profiles from delay time seismic refraction data obtained by using Dr D.E. Leamah's programme (2A1). A modified version of programme 2A1 has been written (2A3) in which the depth and offset tabulations are transposed, so that they are in the input order required by the plot programme.

Programme 2A4 will produce a plot at a scale suitable for drafting for publication. Input may be in imperial or metric units. The scale at the left-hand of the plot is in 5 m intervals.

Provision is made for the insertion of extended shot points at any stage in the plotting procedure and the plot origin may be changed from one shot point to another as required.

The operation of the revised interpretation programme (2A3), which differs in some respects from the original programme, and of the plot programme (2A4) is described in the following pages.

The calculation programme sets in a sequential fashion the accuracy of the calculation as a function of the accuracy of the input data. [28 October 1974]

The accuracy achieved varies according to the position of the point within each subdivision and is always better than one half second. Due to rounding during printing this may be apparently exceeded on some occasions. An alternative would be to print the result as decimal degrees. The actual provision is therefore about 30 m in latitude, and 50 m in longitude.

EXAMPLE OF PRINT-OUT

TRANSFORMATION OF COORDINATES  
GRID TO GEOGRAPHIC

GRID #	GRID X	LATITUDE	GRID Y	LONGITUDE
212721	5588856	19 47 27	143 53 43	
21444	5588821	19	143 56 21	
21622	5588753	17 16	143 58 38	

accuracy of calculation approx one second

[14 March 1974]

SEISMIC REFRACTION INTERPRETATION

CRITICAL DISTANCE CALCULATION

- Operation:
- (1) SEARCH 0
  - (2) Key  $V_1$ , GO
  - (3) Key  $V_0$ , GO
  - (4) Key  $x_C$ , GO
  - (5) Read answer in Y-register.

ALGEBRAIC VELOCITY AVERAGE

- Operation:
- (1) SEARCH X
  - (2) Key  $V_A$ , GO
  - (3) Key  $V_B$ , GO
  - (4) Read answer in Y-register.

DELAY TIME INTERPRETATION

- Operation:
- (1) SEARCH 1
  - (2) Type locality (if required), GO
  - (3) Key spread number, GO

FIRST LAYER

- (4) Enter N, S, E or W (or the appropriate combination) to designate shot point. Find letter required on plastic strip on keyboard and press the special function key immediately above it (N = 06; S = 01, E = 05; W = 00), GO
- (5) Key shot depth, GO
- (6) Key intercept time, GO
- (7) Key  $V_0$ , GO
- (8) Key  $V_1$ , GO; shot point offset and depth will be printed.  
Calculation of offset and depth for each geophone position.
- (9) Key geophone no., GO; key time, GO; key distance, GO (repeat as required).

SECOND LAYER

- (10) SEARCH 2
- (11) As for operation 4
- (12) Key intercept time, GO
- (13) Key  $V_2$ , GO
- (14) Key thickness of layer 1 ( $Z_0$ ), GO  
Calculation of offset and depth for each geophone position.
- (15) Key geophone no., GO; key time, GO; key distance, GO; key thickness ( $L_1$ ), GO (repeat as required).  
To return to first layer calculation, SEARCH 3.

SEISMIC REFRACTION INTERPRETATION

CRITICAL REFRACTION CALCULATION

DELAY TIME REFRACTION INTERPRETATION

Locality: Northdown  
 Spread 2

Operation: (1) SEARCH 0  
 (2) Key V<sub>1</sub>, GO  
 (3) Key V<sub>0</sub>, GO  
 (4) Key X<sub>c</sub>, GO  
 (5) Read answer in Y-register

End N  
 Shot depth = 3.0  
 Intercept time (ms) = 27.0  
 V<sub>0</sub> = 1250  
 V<sub>1</sub> = 5600

ALGEBRAIC VELOCITY AVERAGE

POINT: shot	TIME	DISTANCE	X OFFSET	DEPTH
1	31.5	25	4.6	20.3
2	33.0	50	4.3	18.8
3	40.0	75	3.8	16.9
4	44.0	100	4.2	18.5
5	46.0	125	4.1	18.3
6	46.5	150	3.8	16.7
7	50.5	175	3.2	14.1
8	53.0	200	3.1	13.8
			2.8	12.6

Second layer

FIRST LAYER

End N  
 Intercept time (ms) = 34.0  
 V<sub>2</sub> = 11000

POINT: shot	TIME	DISTANCE	OFFSET	DEPTH
4	44.0	100	7.5	25.2
5	46.0	125	15.3	37.2
6	46.0	150	19.3	43.0
7	50.0	175	22.0	46.0
8	52.0	200	19.1	42.4
9	52.0	200	11.8	31.5
10	53.0	225	12.8	32.4
11	57.0	250	11.6	31.4
	60.0	275	15.8	37.9

End S  
 Shot depth = 3.0  
 Intercept time (ms) = 26.0  
 V<sub>0</sub> = 1250  
 V<sub>1</sub> = 5600

SECOND LAYER

POINT: shot	TIME	DISTANCE	OFFSET	DEPTH
1	31.5	25	4.5	19.6
2	35.0	50	4.3	18.8
3	41.0	75	4.1	18.2
4	43.0	100	4.4	19.2
5	48.0	125	4.0	17.6
6	48.0	125	4.1	18.0
7	50.0	150	3.7	16.4
8	51.0	175	3.2	14.2
	54.0	200	3.0	13.2

## Programme 2A4

### SEISMIC PROFILE PLOT

- Operation:
- (1) PRIME, GO; key spread no., GO
  - (2) Enter, N, S, E or W (or appropriate combination) to designate shot point. Press special function key(s) immediately above letter(s) on appropriate letters printed on plastic strip on keyboard (N = 06; S = 01; E = 05; W = 00), GO
  - (3) If wide format required key SF02  
If entering in metric units key SF03
  - (4) If a standard 25-foot spread, GO  
If otherwise SEARCH 9; key interval between SP and geophone, GO; key interval between geophone, GO; key interval between geophone 12 and other SP, GO.
  - (5) If you wish to correct plot for shot point depth, key depth.
  - (6) GO. You are now ready to plot from the left-hand shot point.
  - (7) For each point key distance, GO; offset, GO; depth, GO.

To plot from opposite shot point:

- (1) SEARCH RETURN
- (2) SEARCH + (if moving to the right), or  
SEARCH - (if moving to the left)
- (3) SEARCH 1 (if plotting from left SP), or  
SEARCH 2 (if plotting for right SP)
- (4) Continue as for operation (7).

To insert and plot from an extended shot point:

- (1) SEARCH RETURN
- (2) If not at end nearest XSP, SEARCH + or SEARCH - as appropriate
- (3) SEARCH SET EXP. Key shot point depth, GO; key distance from SP to XSP (if extended to left, then key CHANGE SIGN), GO
- (4) SEARCH 1 or SEARCH 2 as appropriate
- (5) Continue as for operation (7).

The above procedure may be used to return from an XSP to the original shot point, but an additional operation - (2a) key SEARCH |X| - is required.

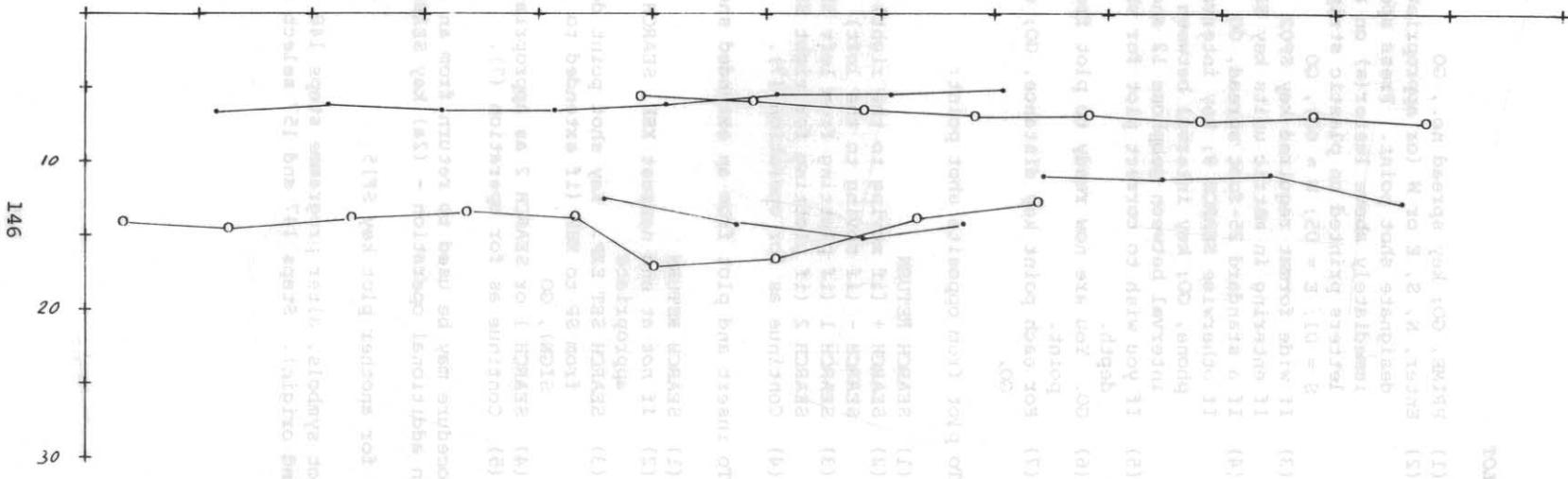
To space out for another plot key SF15.

To change plot symbols, alter programme steps 148 (left-hand origin) or 158 (right-hand origin). Steps 147 and 157 select upper or lower case.

EXAMPLE OF PRINT-OUT (WIDE FORMAT)

NORTHDOWN  
SPREAD 2

S P N



Note: Plot points have been connected by hand-drawn lines.