CHAPTER 5 RESULT

5-1 Examination of the Result

As a result of the survey, all VES curves are classified as table IV-3. All VES curves except at A line station 17.5 show that low resistivity zone with resistivity of between 10 Ω-m and 50 Ω-m continues down to over 100 m deep. Geoelectrical section along A line (Fig. IV-4) show that low resistivity zone continues deeper if survey point moves to west (in the direction where station number gets bigger).

Resistivities of the low resistivity zone is a little higher than them in many well known geothermal reservoir. Because an assumed ground water table is at least 1,000 meters below the ground surface and maximum current electrode separation used is 1,000 meters, if we make current electrode separation large, much lower resistivity zone may be detected. Moreover geochemical survey suggests that the geothermal reservoir in this area may be steam-dominated type. If the top of the reservoir is only filled by steam, bulk resistivity of the reservoir may not be lower than 10Ω-m.

The result of the current survey closely agree with the result of UNDP geoelectrical survey (Bhogal, 1972).

Table IV-2-(1) Calculations of Resistivity at A Line No. 15

A Line No. 15 Center

AB/2	MN/2	K.	V (mv)	I (A)	Resistivity (ohm-meter)
3	1	12.56	3210	0.5000	80.6
5	1	37.68	2130	0.487	165
7	1	75.36	2420	1.200	152
10	1	155.43	418	0.457	142
10	3	47.62	1870	0.467	191
15	1	351.7	335	0.920	128
15	3	113.0	1360	0.903	170
20	3	204.6	837	0.867	198
30	3	466.2	185	0.483	179
50	3	1304	17.7	0.370	62.4
50	10	376.8	163	0.370	166
70	3	2560	14.2	0.723	50.3
70	10	753.6	84.2	0.710	89.4
100	10	1555	21.6	0.750	44.8
150	10	3517	7.40	0.967	26.9
200	10	6264	1.03	0.700	9.22
200	50	1179	2.43	0.710	4.04
250	10	9797	1.40	0.733	18.7
250	50	1884	4.75	0.720	12.4
300	50	2748	2.90	0.747	10.7
400	50	4946	1.80	0.980	9.08
500	50	7772	1.60	0.937	13.3

Table IV-2-(2) Calculations of Resistivity at A Line No. 17.5

A Line No. 17.5 Center

AB/2	MN/2	K	V (mv)	I (A)	Resistivity (ohm-meter)
3	1	12.56	6370	0.3000	267
5	1	37.68	563	0.297	71.4
7	1	75.36	173	0.470	27.7
10	1	155.43	34.0	0.283	18.7
10	3	47.62	99.7	0.287	16.5
15	1	351.7	20.0	0.443	15.9
15	3	113.0	46.0	0.443	11.7
20	3	204.6	16.7	0.290	11.3
30	3	466.2	7.33	0.277	12.3
50	3	1304	7.57	0.557	17.7
50	10	376.8	22.3	0.560	15.0
70	3	2560	3.37	0.297	29.0
70	10	753.6	6.67	0.297	16.9
100	10	1555	4.17	0.297	21.8
150	10	3517	2.73	0.197	48.6
200	10	6264	4.50	0.157	180
200	50	1178	8.33	0.163	60.2
250	10	9797	20.1	0.810	243
250	50	1884	5.43	0.807	12.7
300	50	2748	4.33	0.500	23.8
400	50	4946	3.33	0.490	33.6
500	50	7772	6.83	0.803	66.1

Table IV-2-(3) Calculations of Resistivity at A Line No. 20

A Line No. 20 Center

AB/2	MN/2	K	V (mv)	I (A)	Resistivity (ohm-meter)
3	1	12.56	2550	0.300	107
5	1	37.68	580	0.287	76.1
7	1	75.36	347	0.297	88.0
10	1	155.43	262	0.377	108
10	3	47.62	853	0.390	104
15	1	351.7	51.9	0.293	62.3
15	3	113.0	162	0.300	61.0
20	3	204.6	88	0.297	60.6
30	3	466.2	35.5	0.293	56.5
50	3	1304	15.4	0.297	67.6
50	10	376.8	65.2	0.293	83.8
70	3	2560	5.63	0.297	48.5
70	10	753.6	20.8	0.300	52.2
100	10	1555	7.15	0.300	37.1
150	10	3517	5.00	0.297	59.2
200	10	6264	3.33	0.30	68.9
200	50	1178		0.300	30.1
250	10	9797	3.63	0.300	104
250	50	1884	8.00	0.300	50.2
300	50	2748	16.5	1.00	45.3
400	50	4946	6.67	0.500	66.0
500	50	7772	3.83	0.297	100

Table IV-2-(4) Calculations of Resistivity at A Line No. 22.5

A Line No. 22.5 Center

AB/2	MN/2	K	V (mv)	I (A)	Resistivity (ohm-meter)
3	1	12.56	860	0.553	19.5
5	1	37.68	322	0.803	15.1
7	1	75.36	253	1.17	16.3
10	1	155.43	104	0.923	17.5
10	3	47.62	392	0.983	19.0
15	1	351.7	63	1.10	20.1
15	3	113.0	202	0.723	31.6
20	3	204.6	115	1.04	22.6
30	3	466.2	52.0	1.06	22.9
50	3	1304	10.9	0.503	28.3
50	10	376.8	22.8	0.497	17.3
70	3	2560	3.47	0.323	27.5
70	10	753.6	8.33	0.327	19.2
100	10	1555	4.90	0.310	24.5
150	10	3517	1.88	0.297	22.3
200	10	6264	1.17	0.298	24.6
200	50	1179	5.33	0.300	12.5
250	10	9797	0.617	0.503	12.0
250	50	1884	7.12	0.503	26.7
300	50	2748	2.87	0.297	26.6
400	50	4946	2.11	0.297	35.1
500	50	7772	2.00	0.260	59.8
150	50	628.2	10.75	0.297	22.7

Table IV-2-(5) Calculations of Resistivity at A Line No. 25

A Line No. 25 Center

AB/2	MN/2	K	V (mv)	I (A)	Resistivity (ohm-meter)
3	1	12.56	5530	0.757	91.8
5	1	37.68	1970	0.300	247
7	1	75.36	1340	0.368	274
10	1	155.43	467	0.278	261
10	3	47.62	1425	0.282	241
15	1	351.7	102	0.205	175
15	3	113.0	323	0.205	178
20	3	204.6	223	0.425	107
30	3	466.2	50.3	0.537	43.8
50	3	1304	14.6	0.535	35.6
50	10	376.8	41.7	0.530	29.6
70	3	2560	1.88	0.215	22.4
70	10	753.6	7.67	0.235	24.6
100	10	1555	8.83	0.505	27.2
150	10	3517	7.43	0.917	28.5
200	10	6264	2.30	0.530	27.2
200	50	1178	13.3	0.540	29.0
250	10	9797	1.05	0.590	17.4
250	50	1884	7.58	0.590	24.2
300	50	2748	7.00	0.343	56.1
400	50	4946	2.27	0.480	23.4
500	50	7772	1.13	0.417	21.1

Table IV-2-(6) Calculations of Resistivity at B Line No. 20

B Line No. 20 Center

AB/2	MN/2	K	V (mv)	I (A)	Resistivity (ohm-meter)
3	1	12.56	3200	0.503	79.9
5	1	37.68	860	0.260	125
7	1	75.36	570	0.440	97.6
10	1	155.43	247	0.507	75.7
10	3	47.62	607	0.503	57.5
15	1	351.7	146	0.503	102
15	3	113.0	199	0.503	44.7
20	3	204.6	194	1.01	39.3
30	3	466.2	60.0	0.503	55.6
50	3	1304	10.4	0.253	53.6
50	10	376.8	12.78	0.263	18.3
70	3	2560	11.1	0.430	66.1
70	10	753.6	11.0	0.423	19.6
100	10	1555	5.32	0.290	28.5
150	10	3517	2.46	0.300	28.8
200	10	6264	2.07	0.507	25.6
200	50	1179	5.91	0.517	13.5
250	10	9797	1.42	0.510	27.3
250	50	1884	4.20	0.513	15.4
300	50	2748	3.17	0.517	16.8
400	50	4946	2.03	0.517	19.4
500	50	7772	1.32	0.51	20.1

Table IV-2-(7) Calculations of Resistivity at C Line No. 20

C Line No. 20

AB/2	MN/2	K	V (mv)	I (A)	Resistivity (ohm-meter)
3	1	12.56	3310	0.737	56.4
5	1	37.68	1370	0.690	74.8
7	1	75.36	313	0.510	46.3
10	1	155.43	127	0.503	39.2
10	3	47.62	438	0.503	41.5
15	1	351.7	70.3	0.503	49.2
15	3	113.0	219	0.503	49.2
20	3	204.6	145	0.503	59.0
30	3	466.2	78.3	0.503	72.6
50	3	1304	29.8	0.503	77.3
50	10	376.8	102	0.503	76.4
70	3	2560	13.3	0.507	67.2
70	10	753.6	44.8	0.503	67.1
100	10	1555	16.3	0.503	50.4
150	10	3517	3.8	0.510	26.2
200	10	6264	1.22	0.310	24.7
200	50	1179	5.07	0.303	19.7
250	10	9797	1.18	0.517	22.4
250	50	1884	5.50	0.517	20.0
300	50	2748	3.72	0.510	20.0
400	50	4946	1.50	0.357	20.8
500	50	7772	1.12	0.380	22.9

Table IV-3 Classification of VES Curves

Center		Feature of VES Curve
Line	Station	
A	15	$\rho_1 > \rho_2$
A	17.5	$\rho_1 > \rho_2 < \rho_3$
A	20	$\rho_1 > \rho_2 < \rho_3$
A	22.5	$\rho_1 < \rho_2$
A	25	$\rho_1 > \rho_2$
B	20	$\rho_1 > \rho_2$
C	20	$\rho_1 > \rho_2 < \rho_3 > \rho_4$

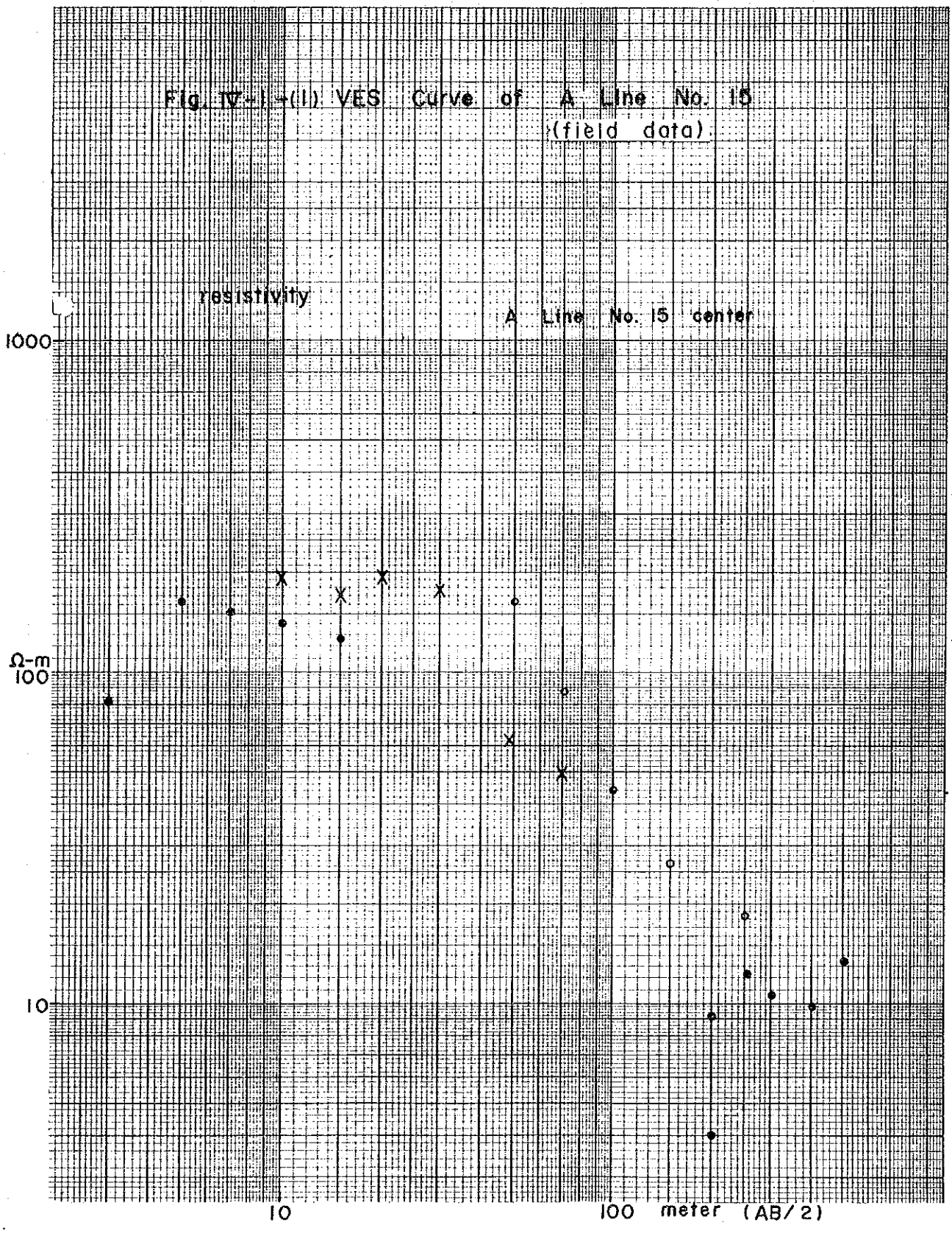


Fig. IV-1-(1) VES Curve of A Line No. 15
(field data)
resistivity
A Line No. 15 center
1000
Ω-m
100
10
10
100 meter (AB/2)

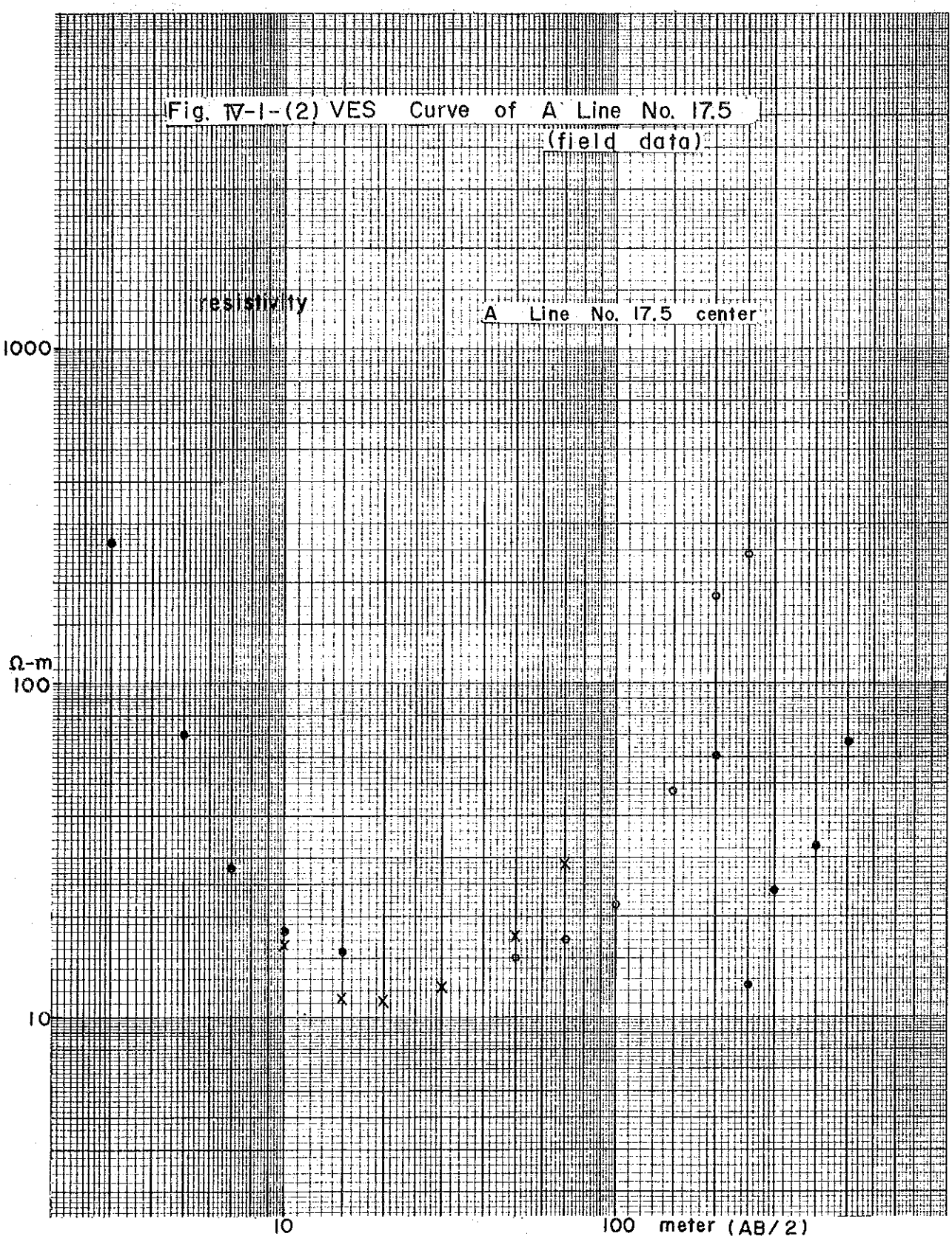


Fig. IV-1-(2) VES Curve of A Line No. 17.5
(field data)
resistivity
A Line No. 17.5 center
1000
Ω-m
100
10
10
100 meter (AB/2)

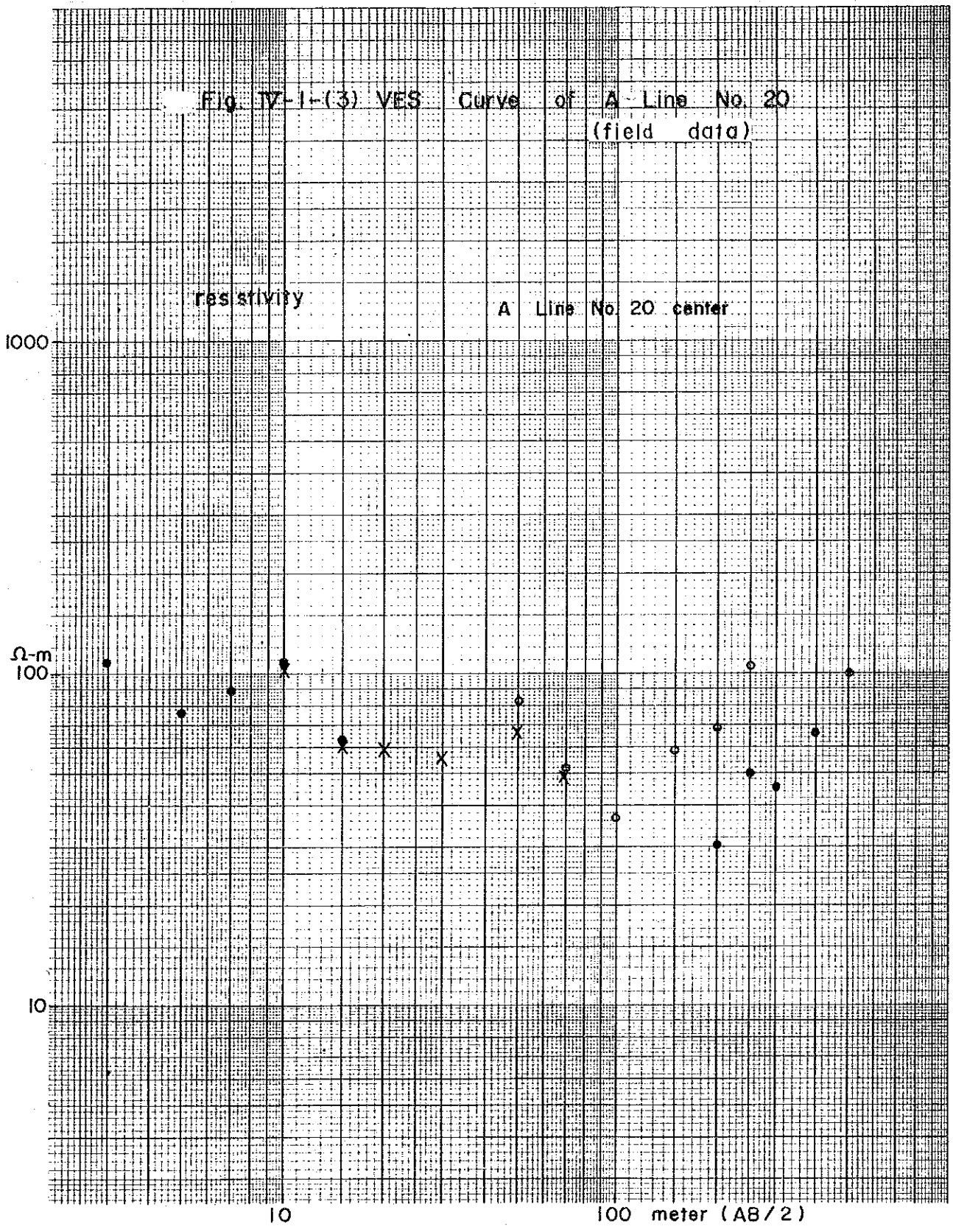


Fig. IV-1-(3) VES Curve of A Line No. 20
(field data)
resistivity
A Line No. 20 center
1000
Ω-m
100
10
10
100 meter (AB/2)

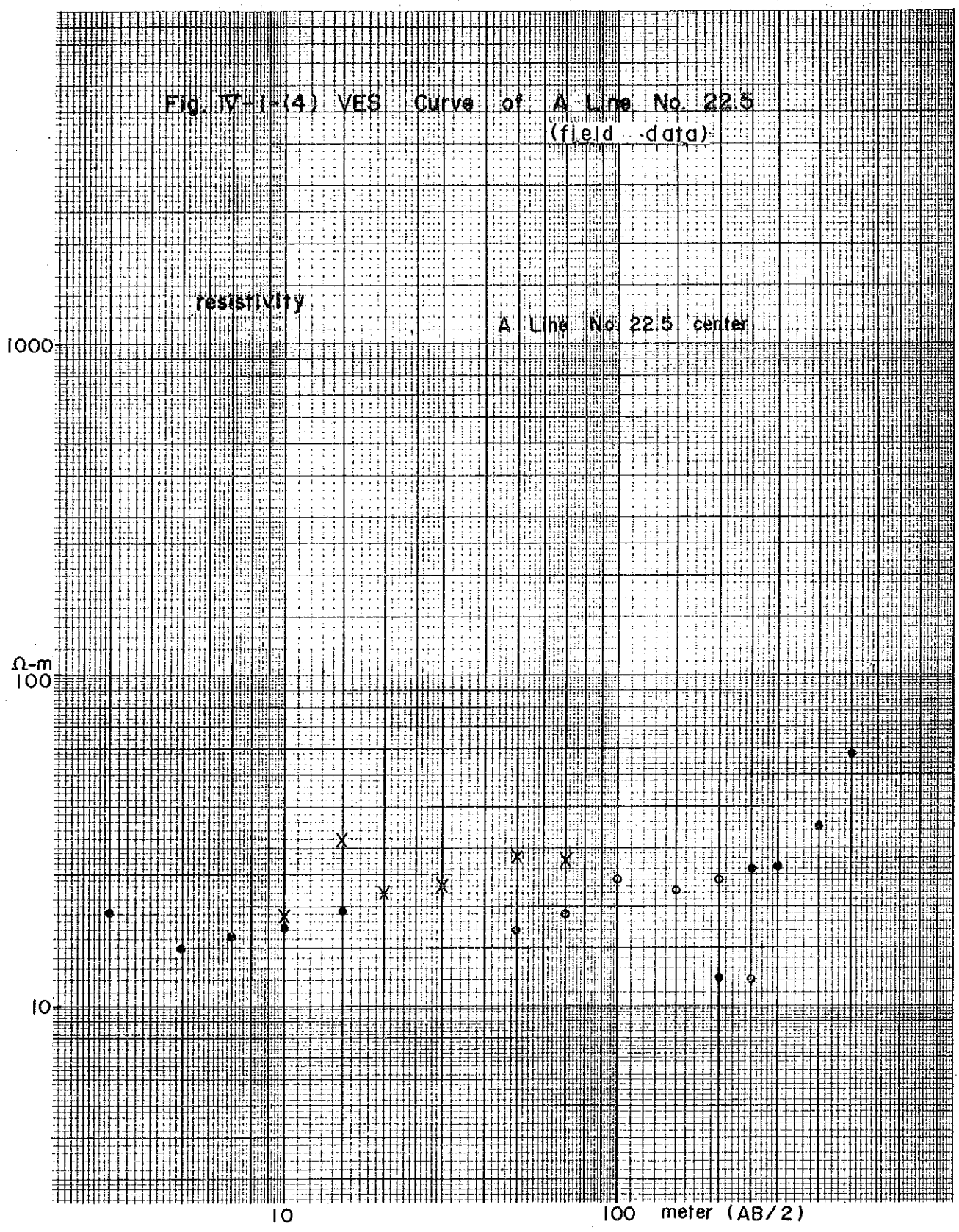


Fig. IV-1-(4) VES Curve of A Line No. 22.5
(field data)
resistivity
A Line No. 22.5 center
1000
Ω-m
100
10
10
100 meter (AB/2)

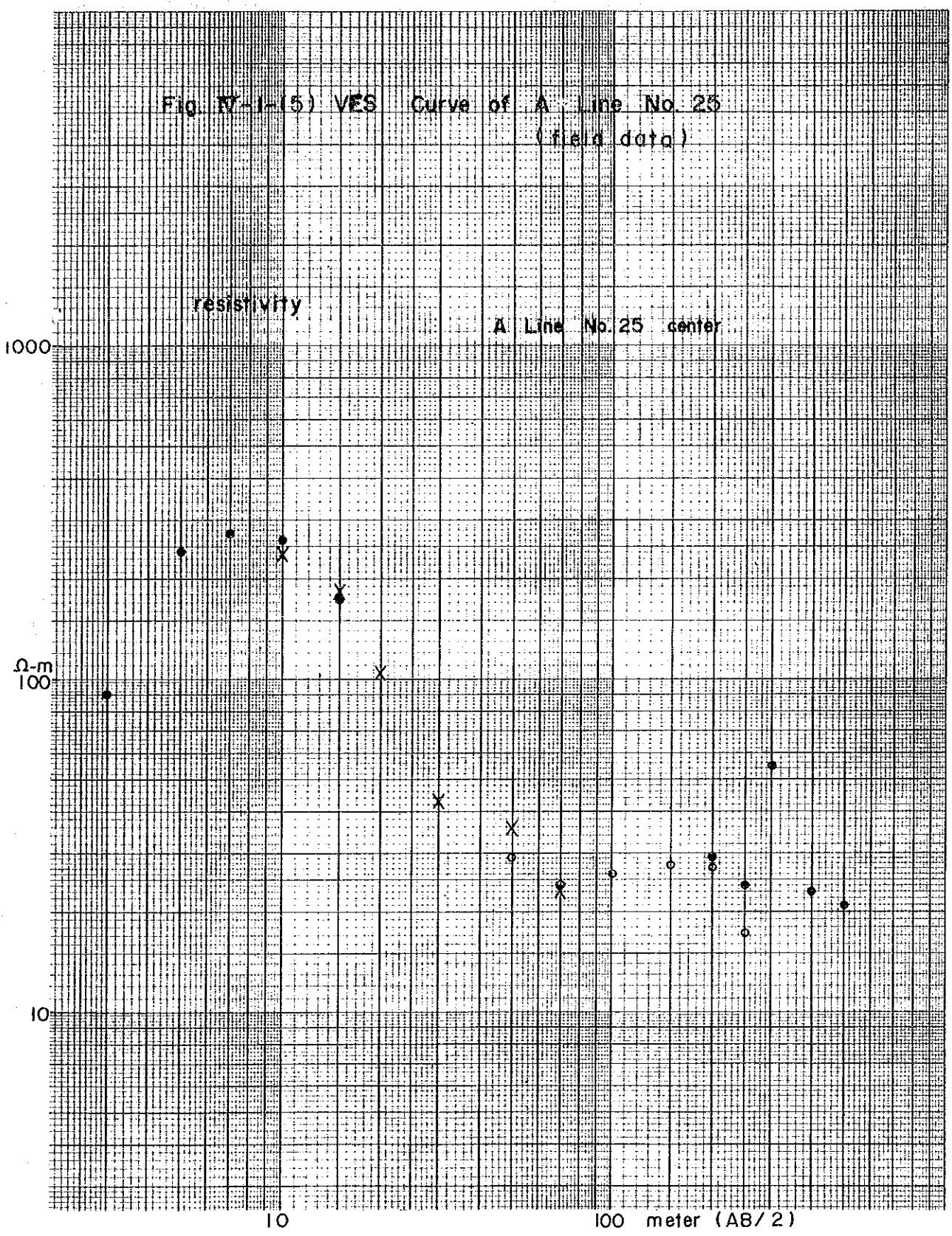


Fig. IV-1-(5) VES Curve of A Line No. 25
(field data)
resistivity
A Line No. 25 center
1000
Ω-m
100
10
10
100 meter (AB/2)

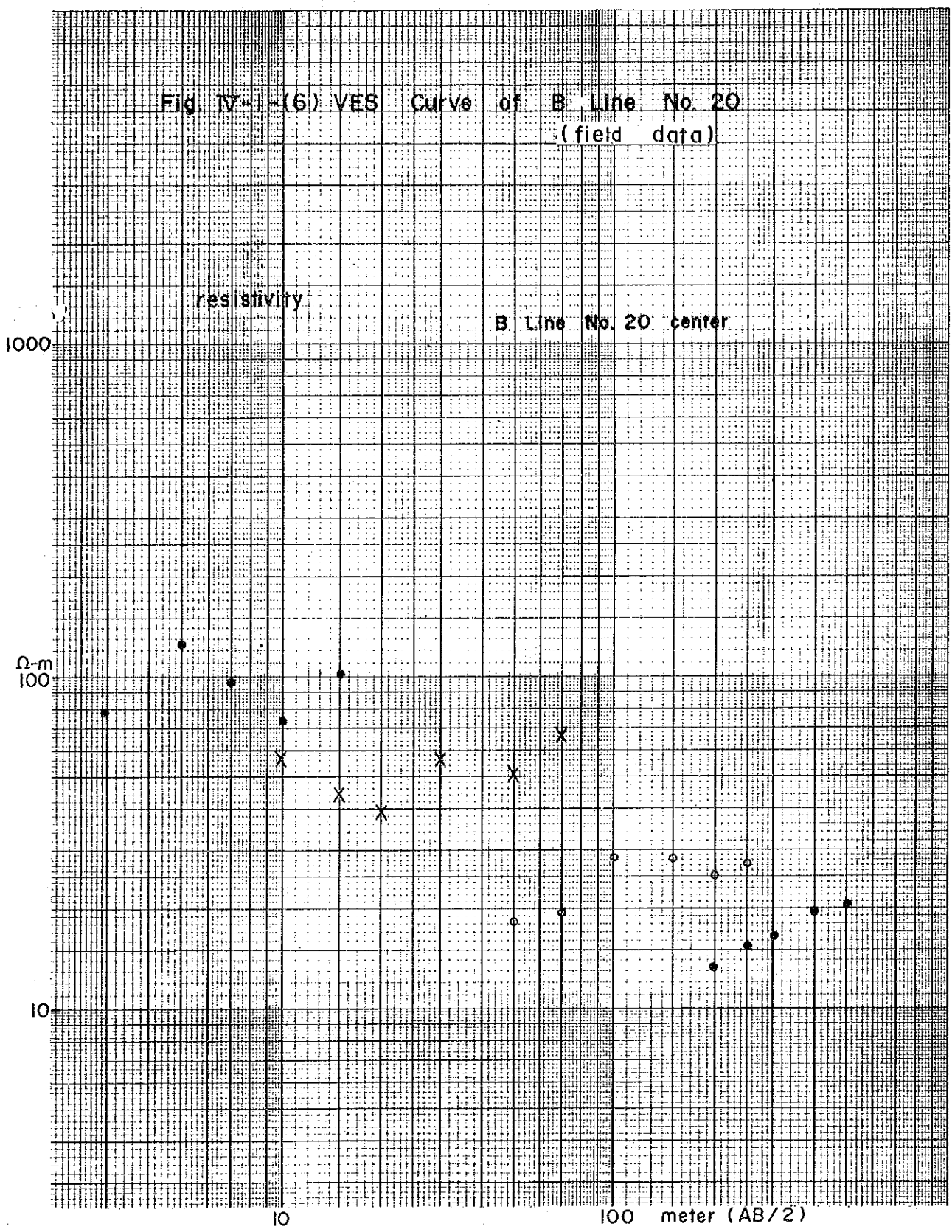


Fig. IV-1-(6) VES Curve of B Line No. 20
(field data)
resistivity
B Line No. 20 center
1000
Ω-m
100
10
10
100 meter (AB/2)

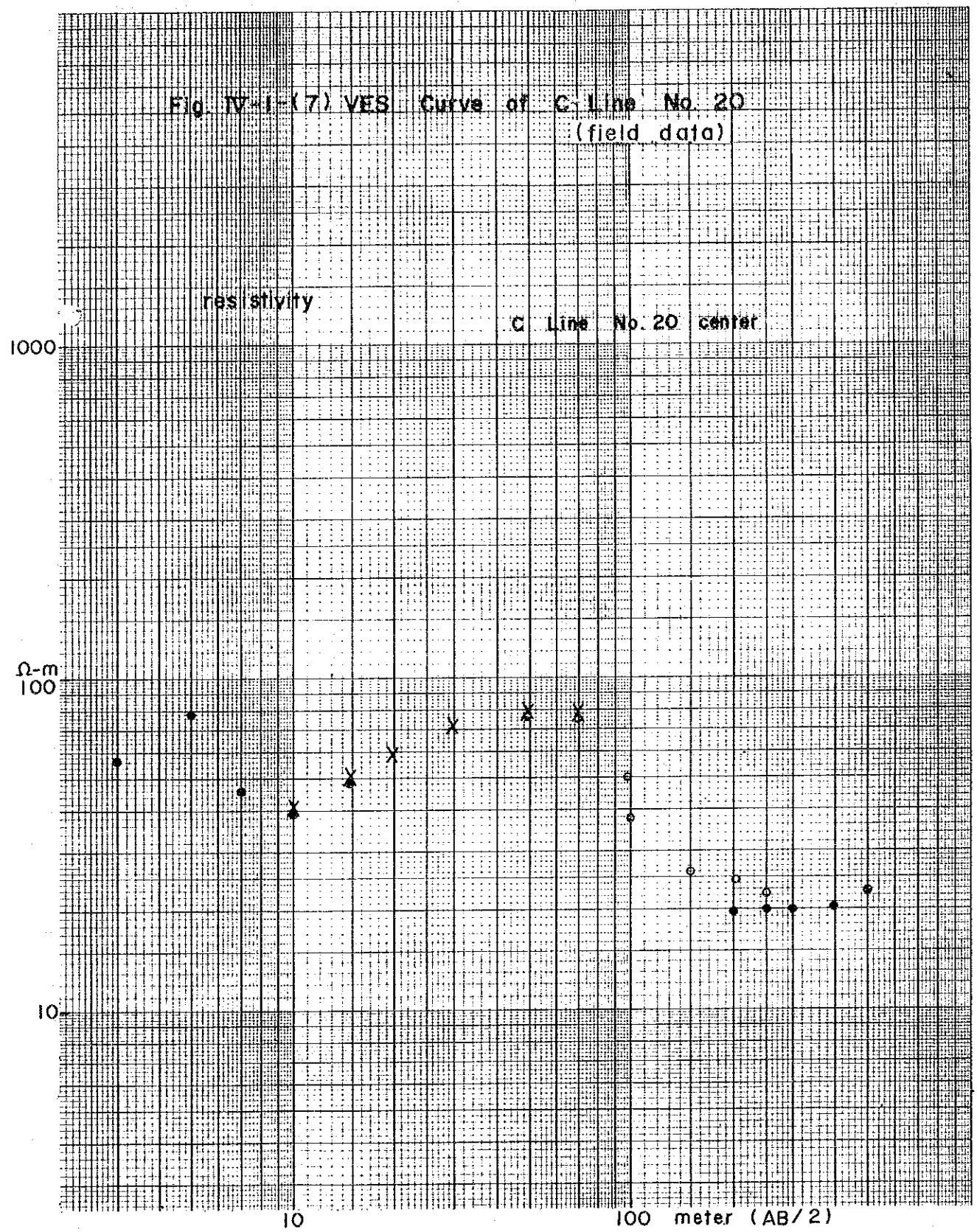
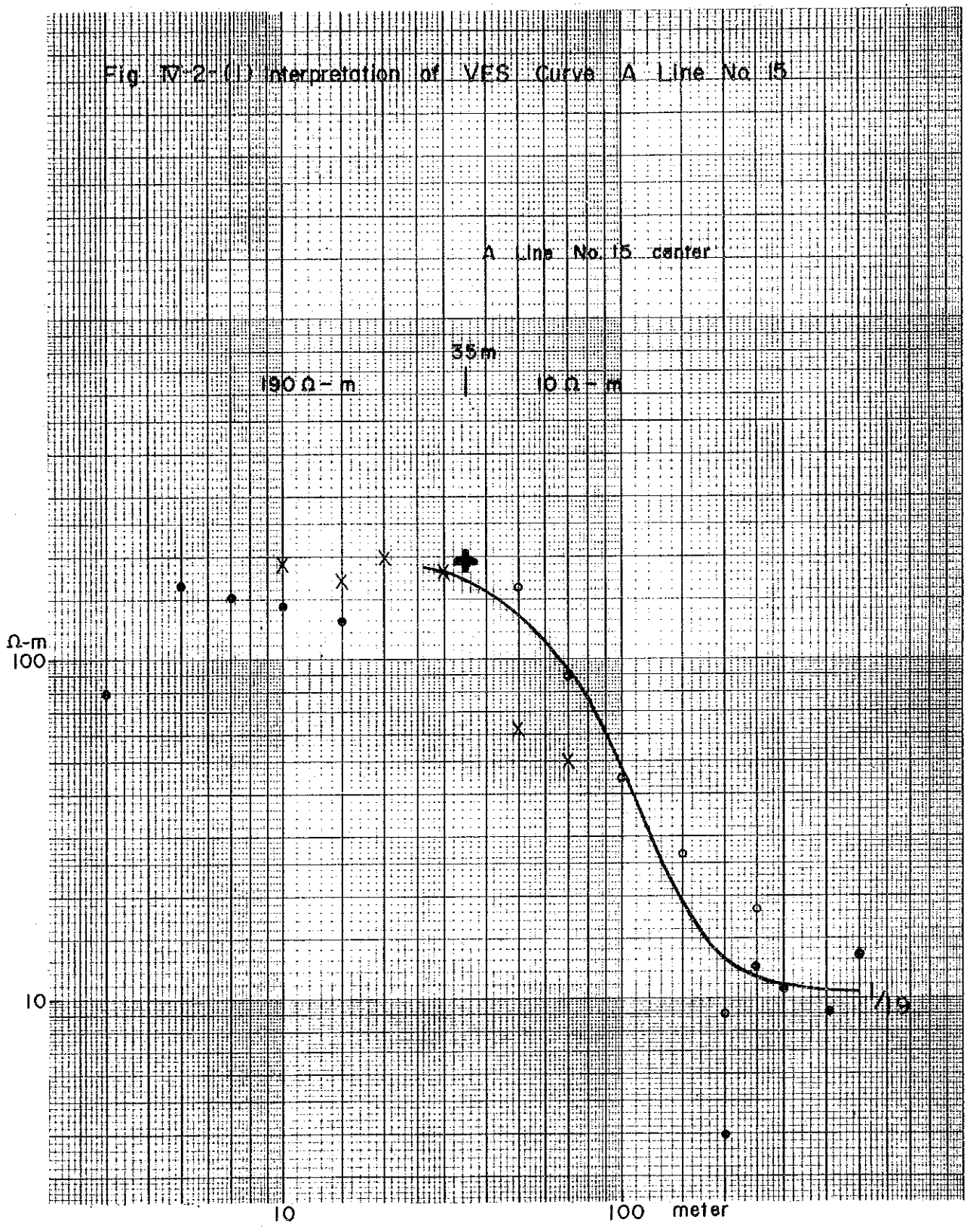


Fig. IV-1-(7) VES Curve of C-Line No. 20
(field data)
resistivity
C Line No. 20 center
1000
Ω-m
100
10
10
100 meter (AB/2)

Fig. IV-2-(1) Interpretation of VES Curve A Line No. 15



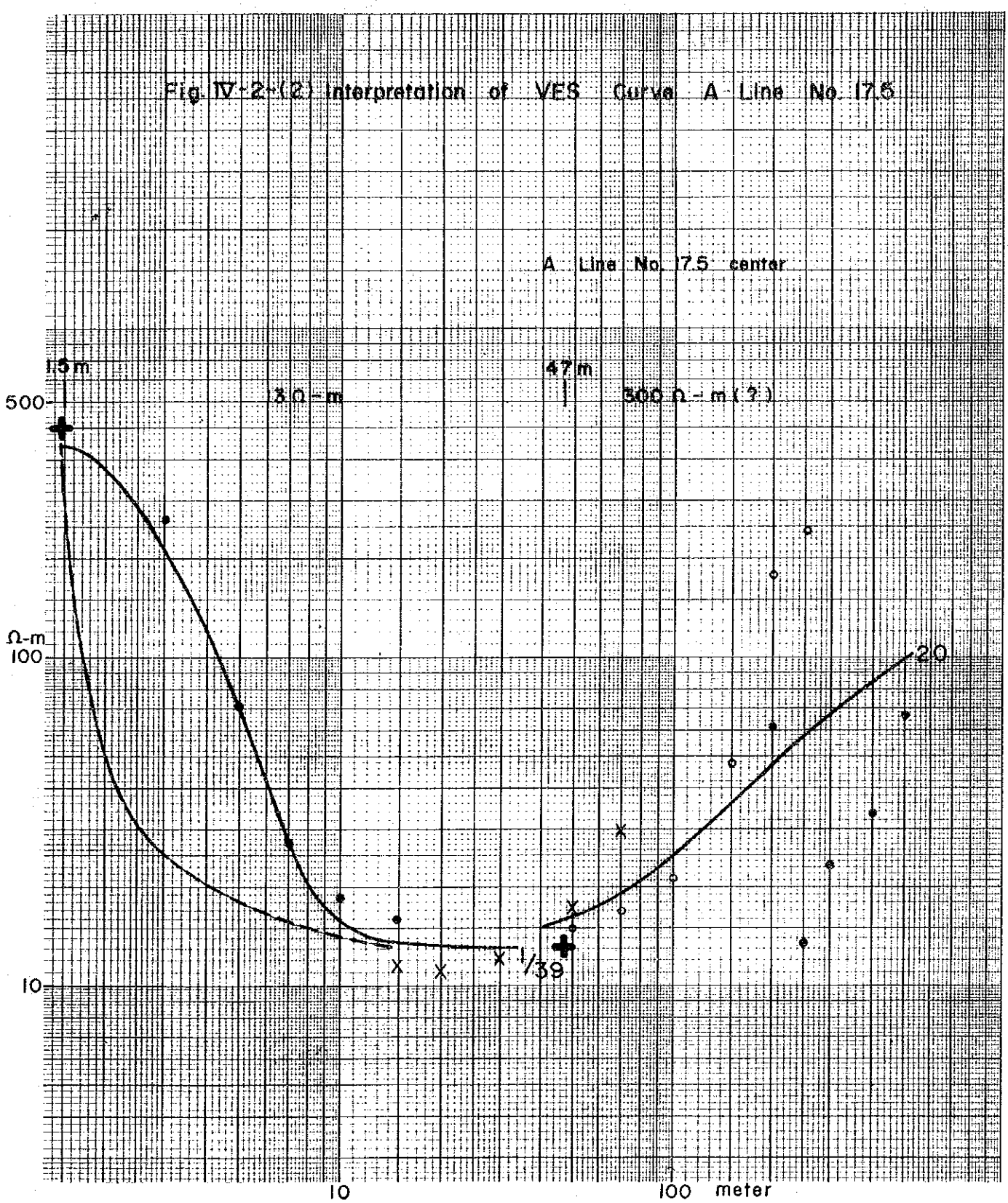


Fig. IV-2-(2) Interpretation of VES Curve A Line No. 17.5

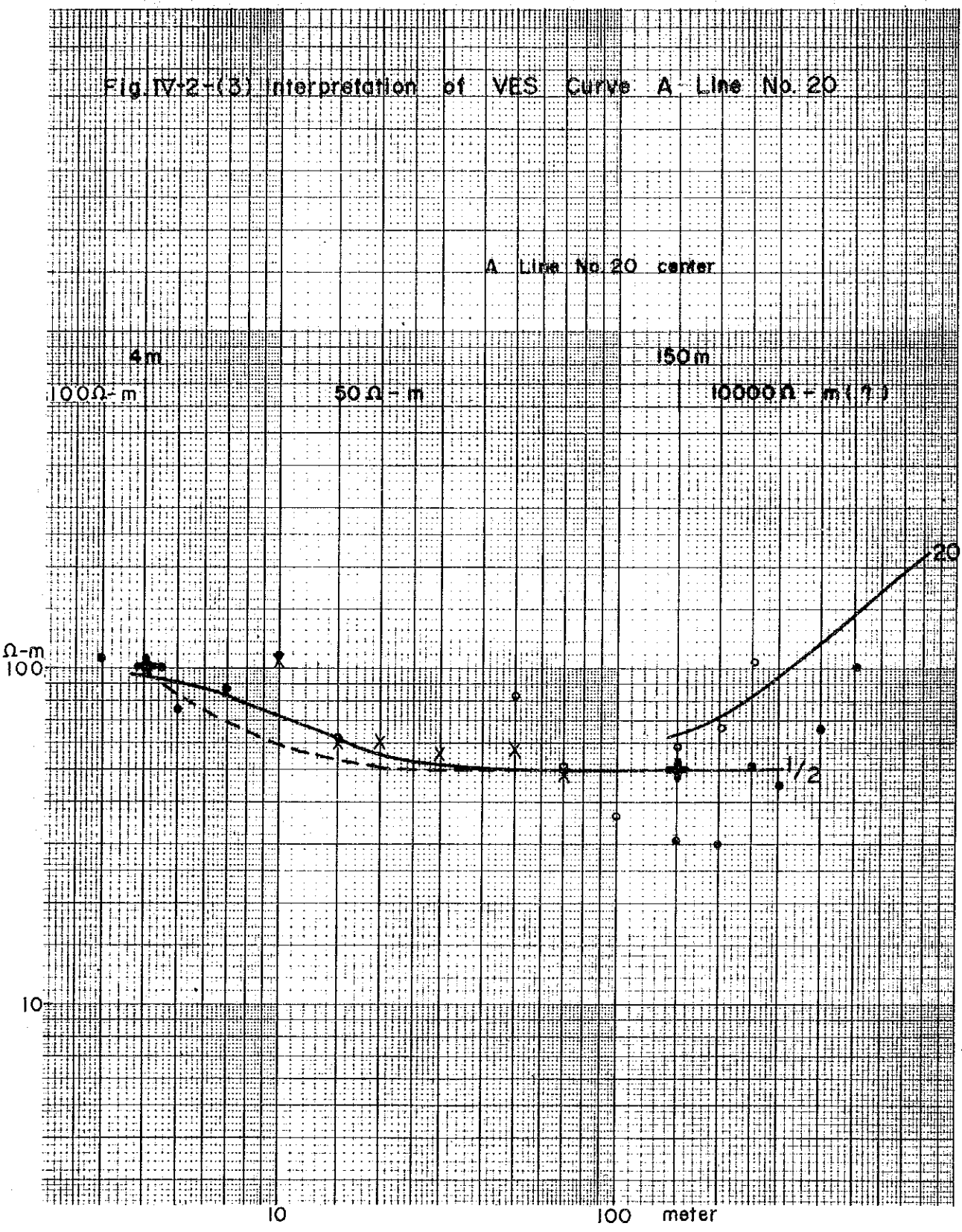


Fig. IV-2-(3) Interpretation of VES Curve A Line No. 20
A Line No. 20 center
4m
150m
100Ω-m
50Ω-m
10000Ω-m(?)
20
Ω-m
100
1/2
10
10
100
meter

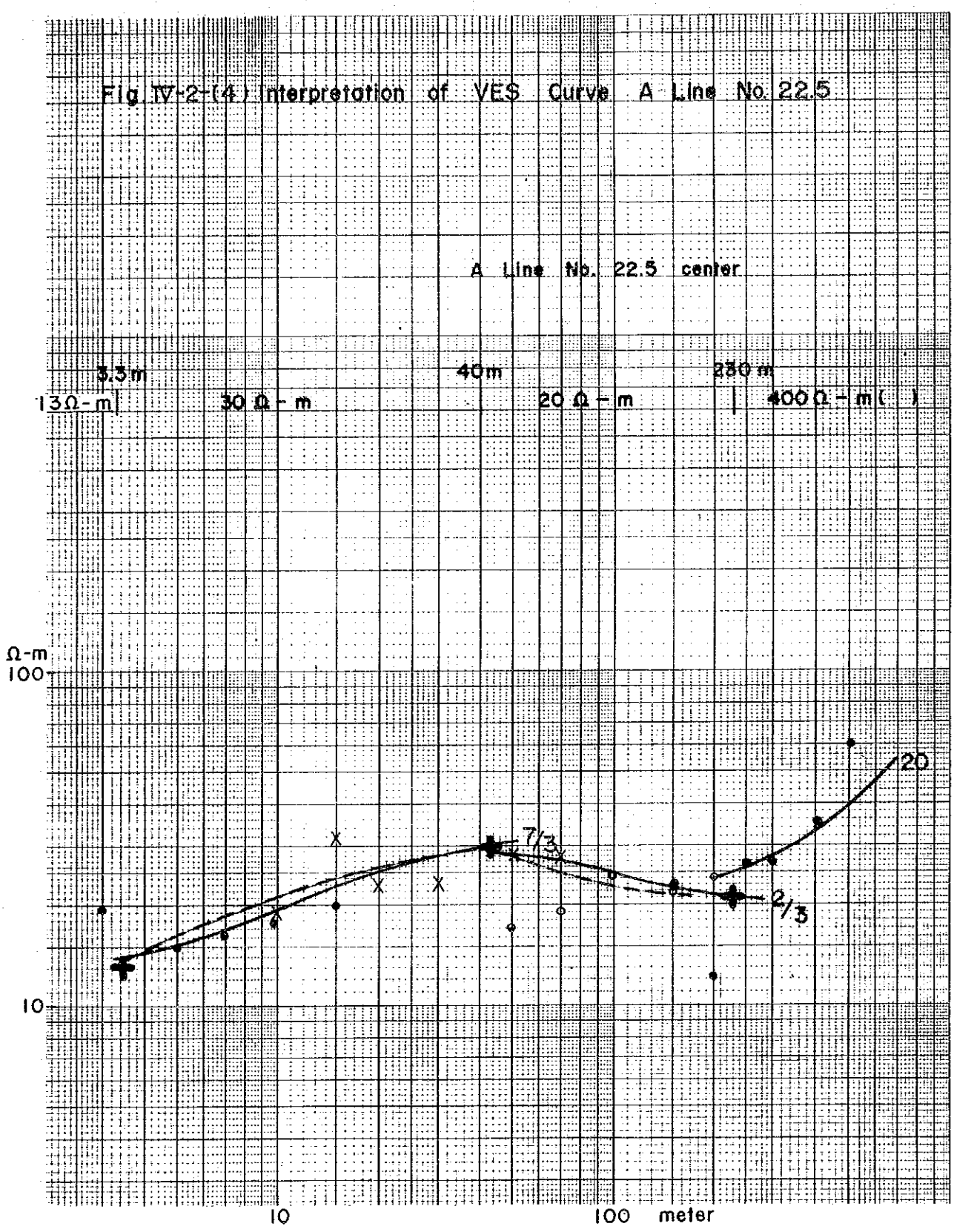


Fig IV-2-(4) Interpretation of VES Curve A Line No. 22.5
A Line No. 22.5 center
3.3m
13Ω-m
30 Ω-m
40m
20 Ω-m
230 m
400 Ω-m ( )
Ω-m
100
10
7/3
2/3
20
10
100 meter

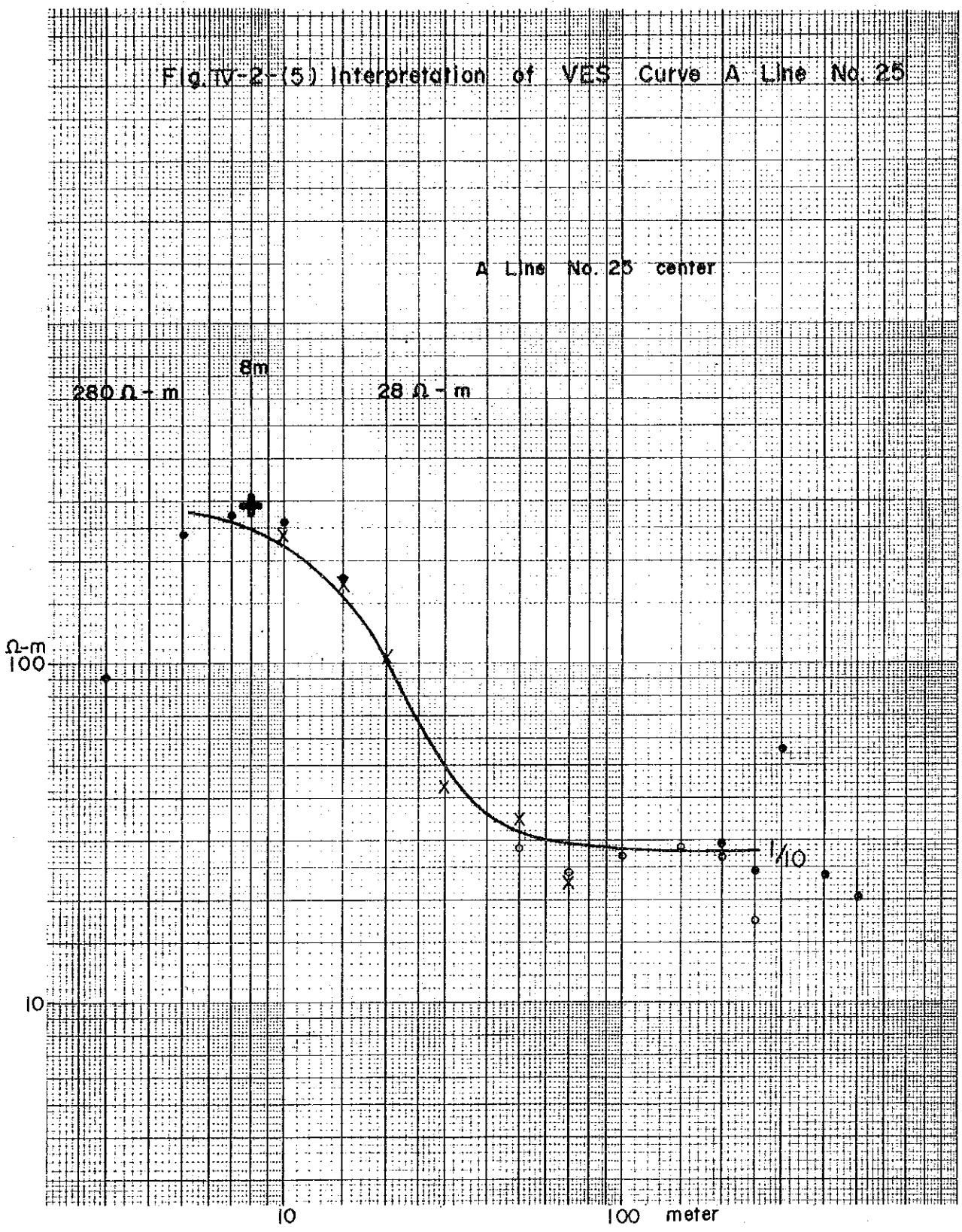
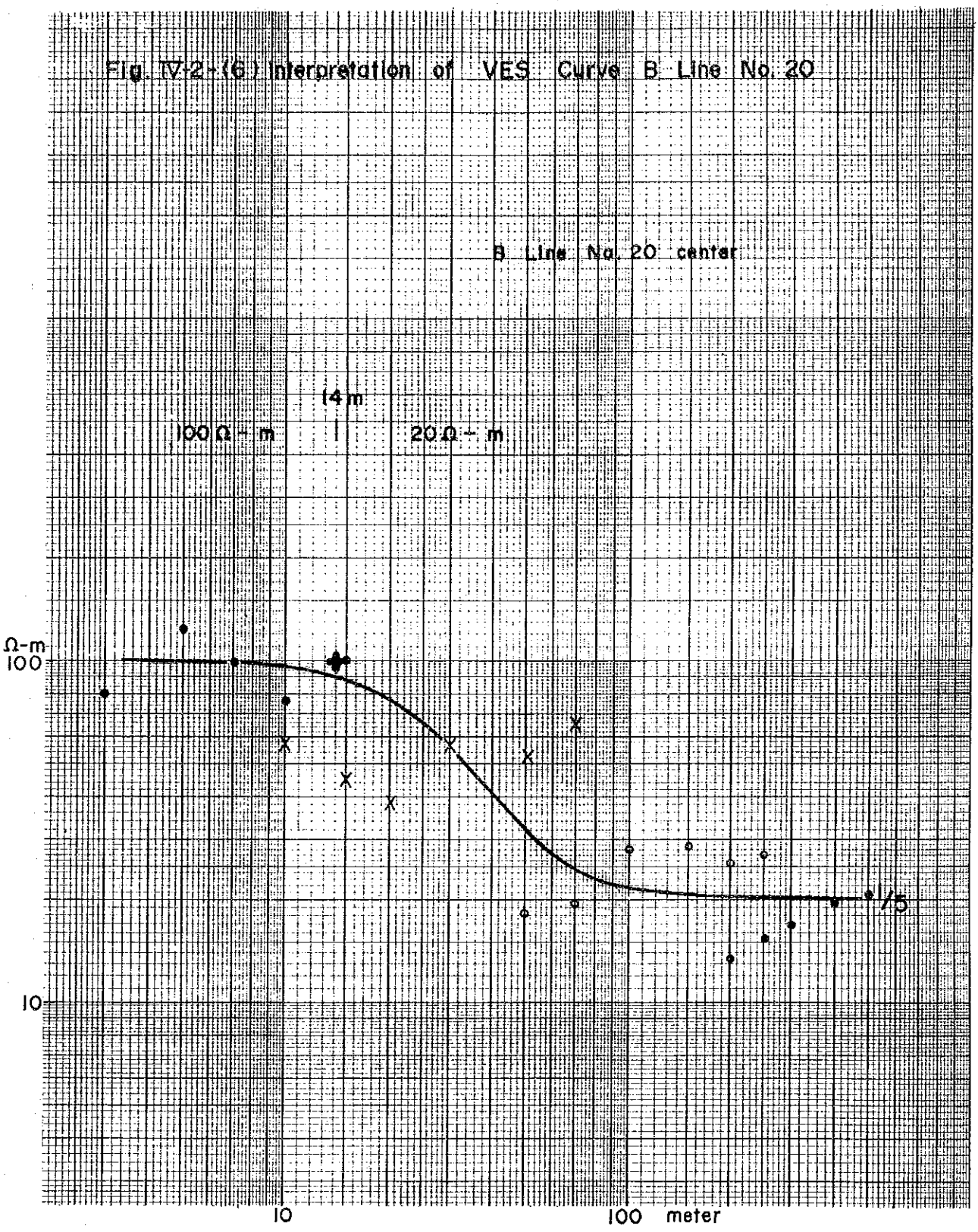


Fig. IV-2-(5) Interpretation of VES Curve A Line No. 25
A Line No. 25 center
8m
280 Ω - m
28 Ω - m
Ω-m
100
10
1/10
10
100 meter

Fig. IV-2-(6) Interpretation of VES Curve B Line No. 20



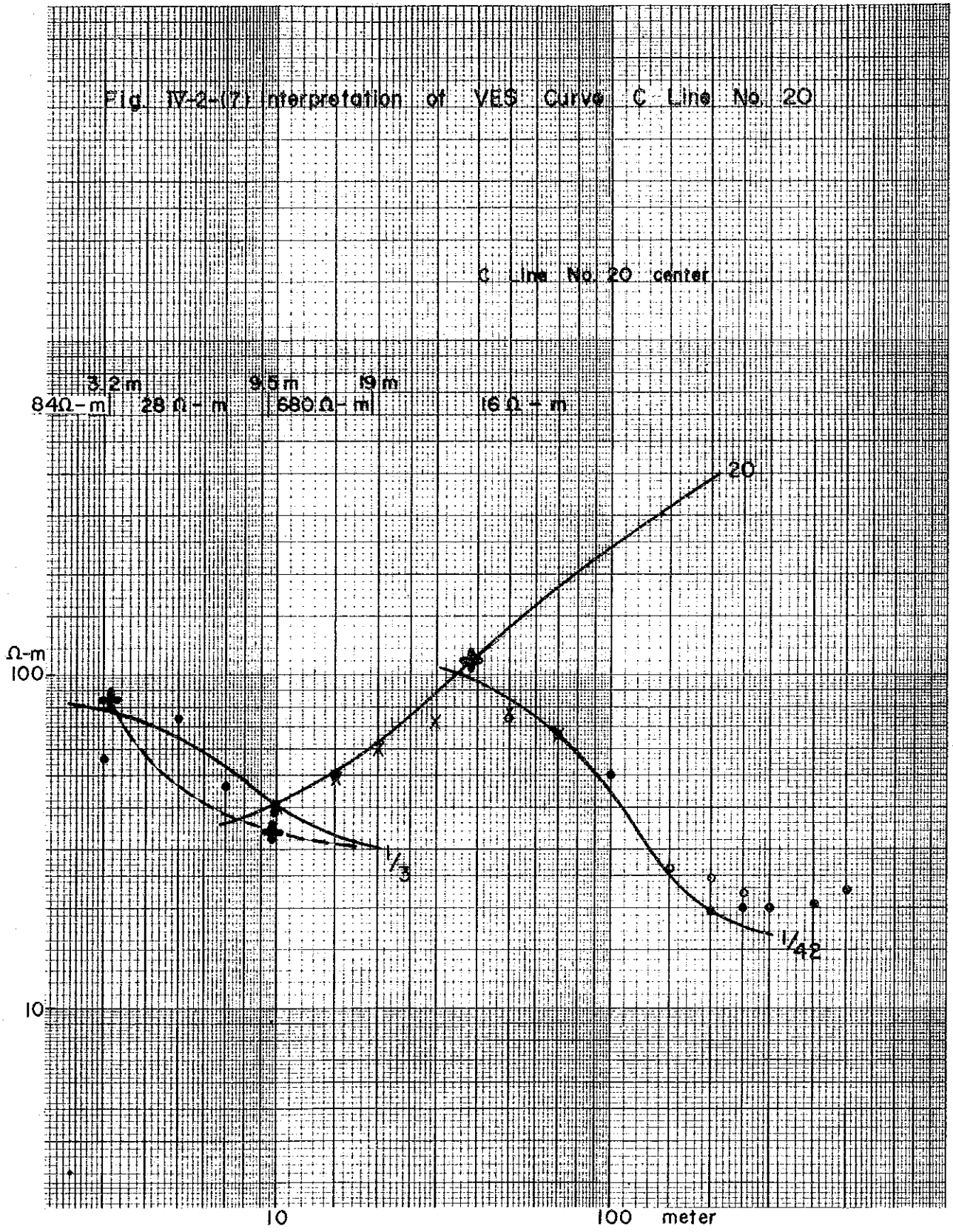


Fig. IV-2-(7) Interpretation of VES Curve C Line No. 20
C Line No. 20 center
3.2 m
84Ω-m
28 Ω-m
9.5 m
19 m
680Ω-m
16 Ω-m
20
Ω-m
100
1/3
1/42
10
10
100
meter

Fig. Ⅳ-3-(1) VES Curve A Line NO. 15

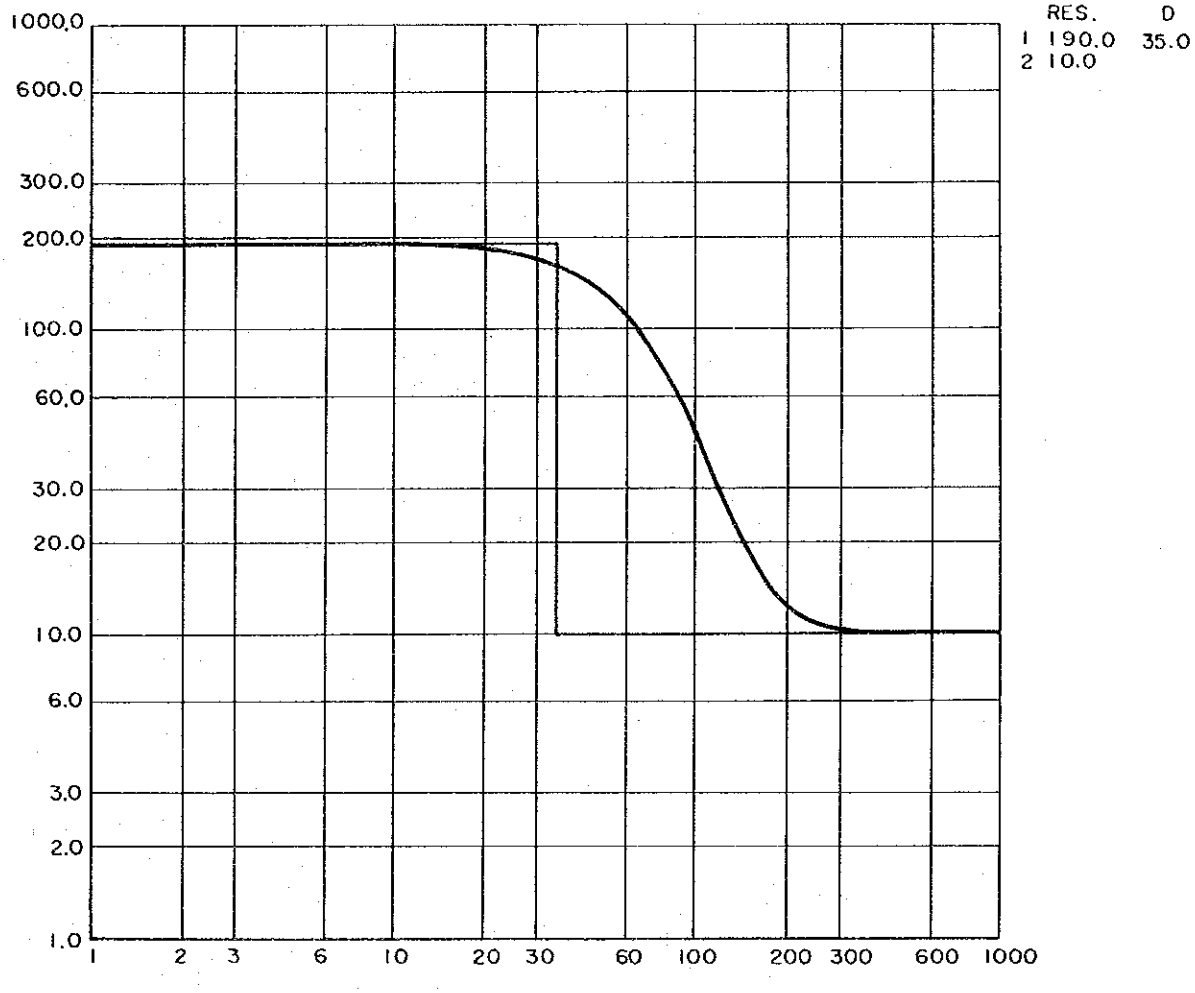


Fig. Ⅳ-3-(2) VES Curve A Line NO. 17.5

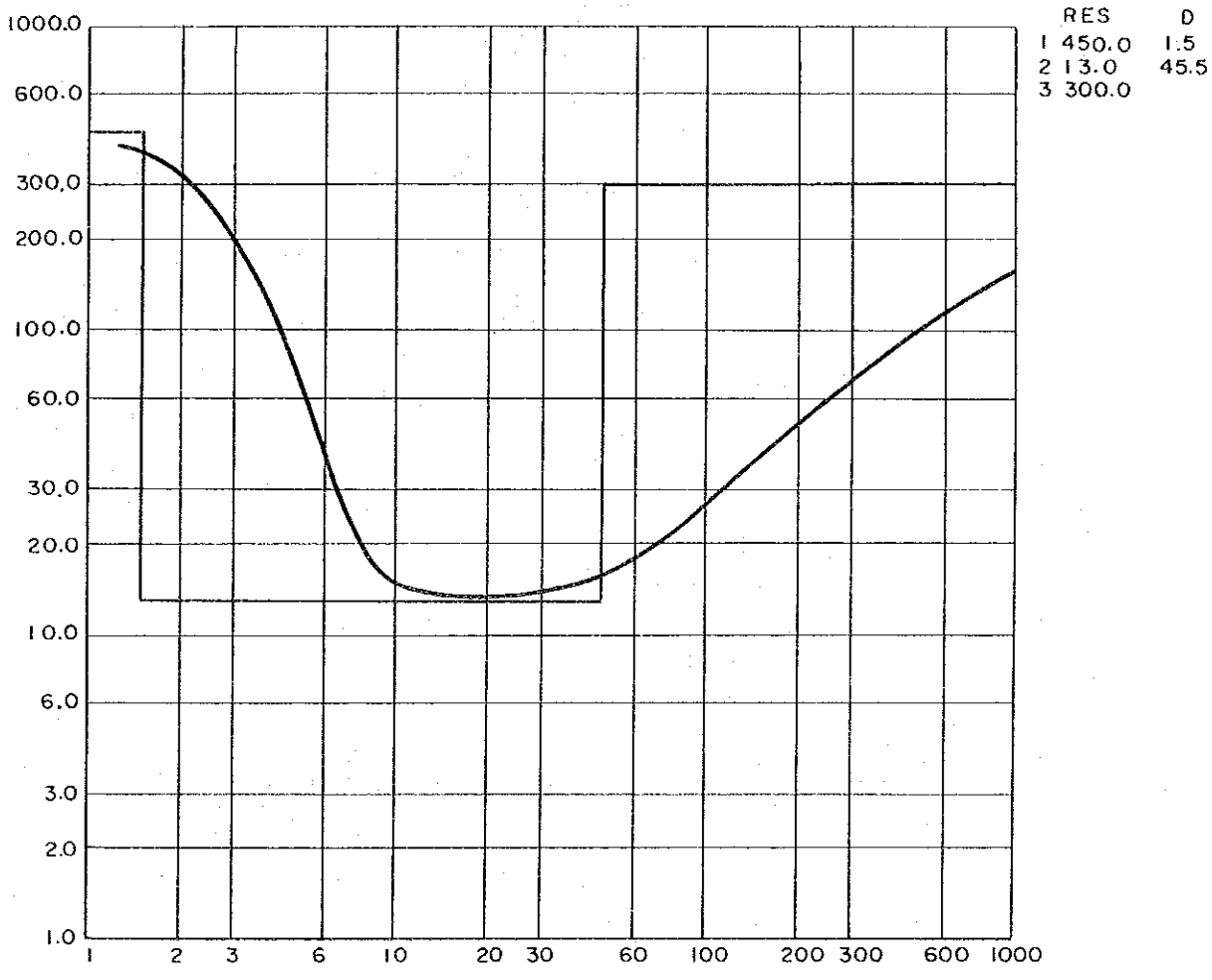


Fig. Ⅳ-3-(3) V E S Curve A Line NO. 20

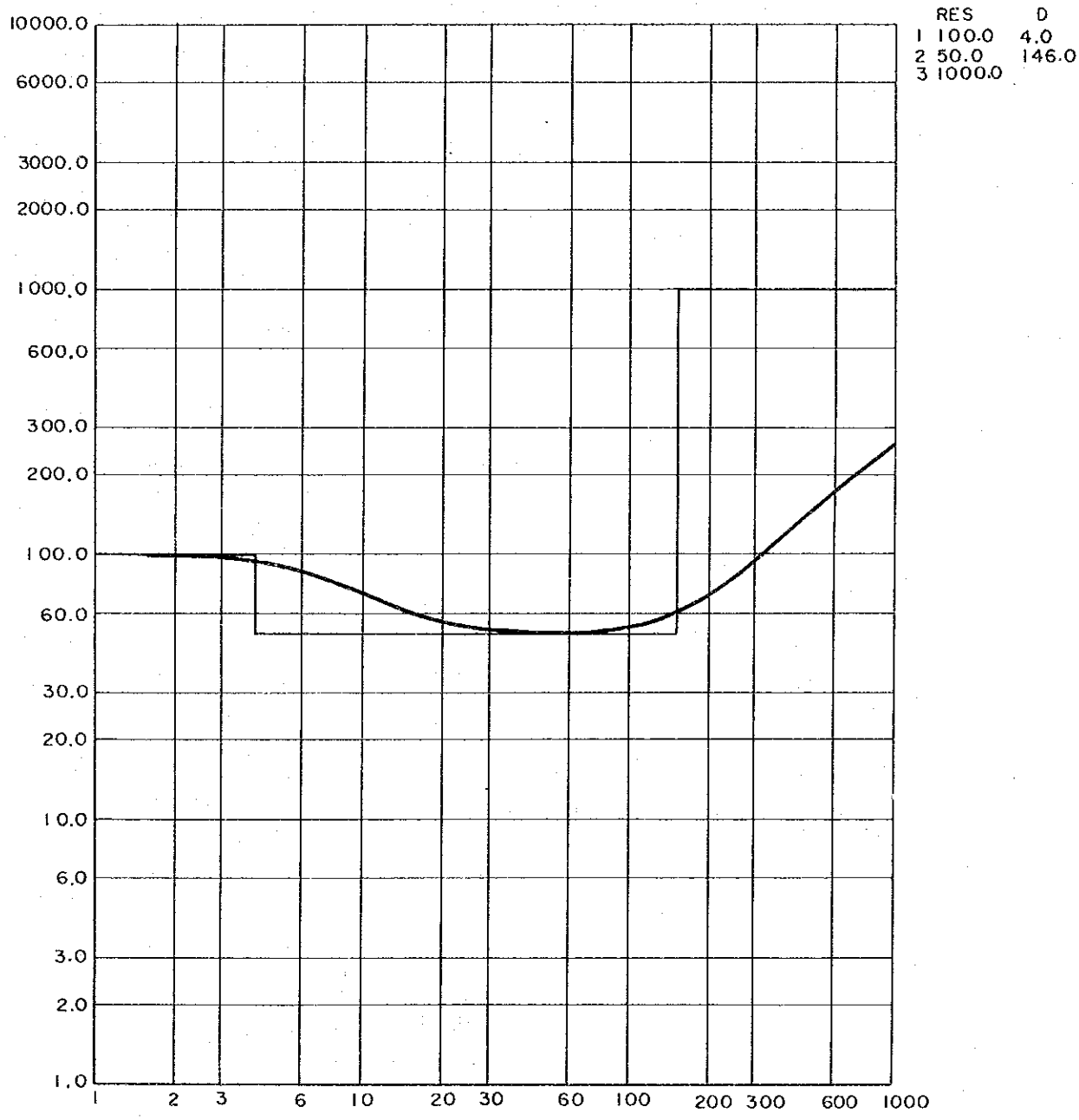


Fig. Ⅳ-3-(4) VES Curve A Line NO. 22.5

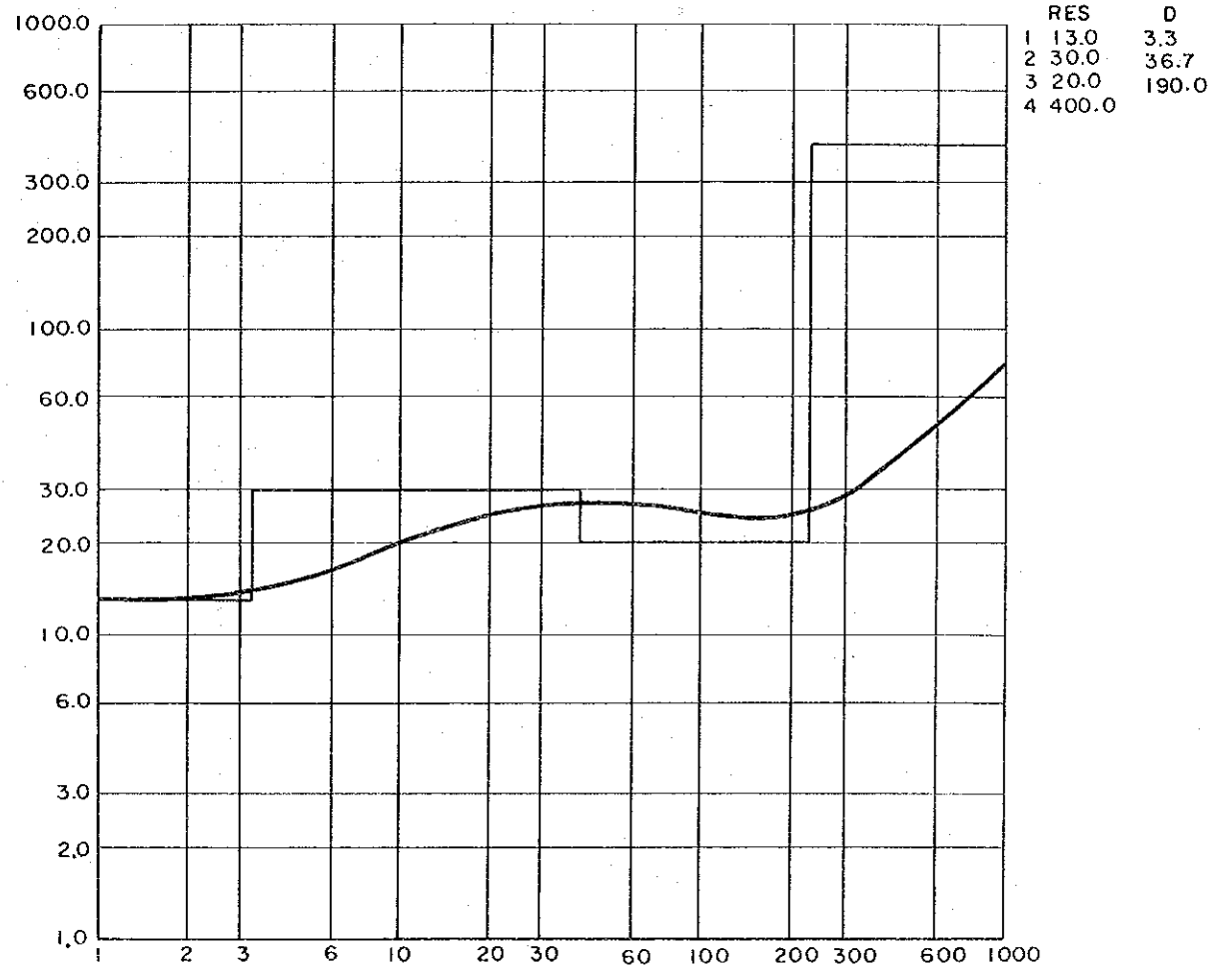


Fig. Ⅳ-3-(5) V E S Curve A Line NO. 25

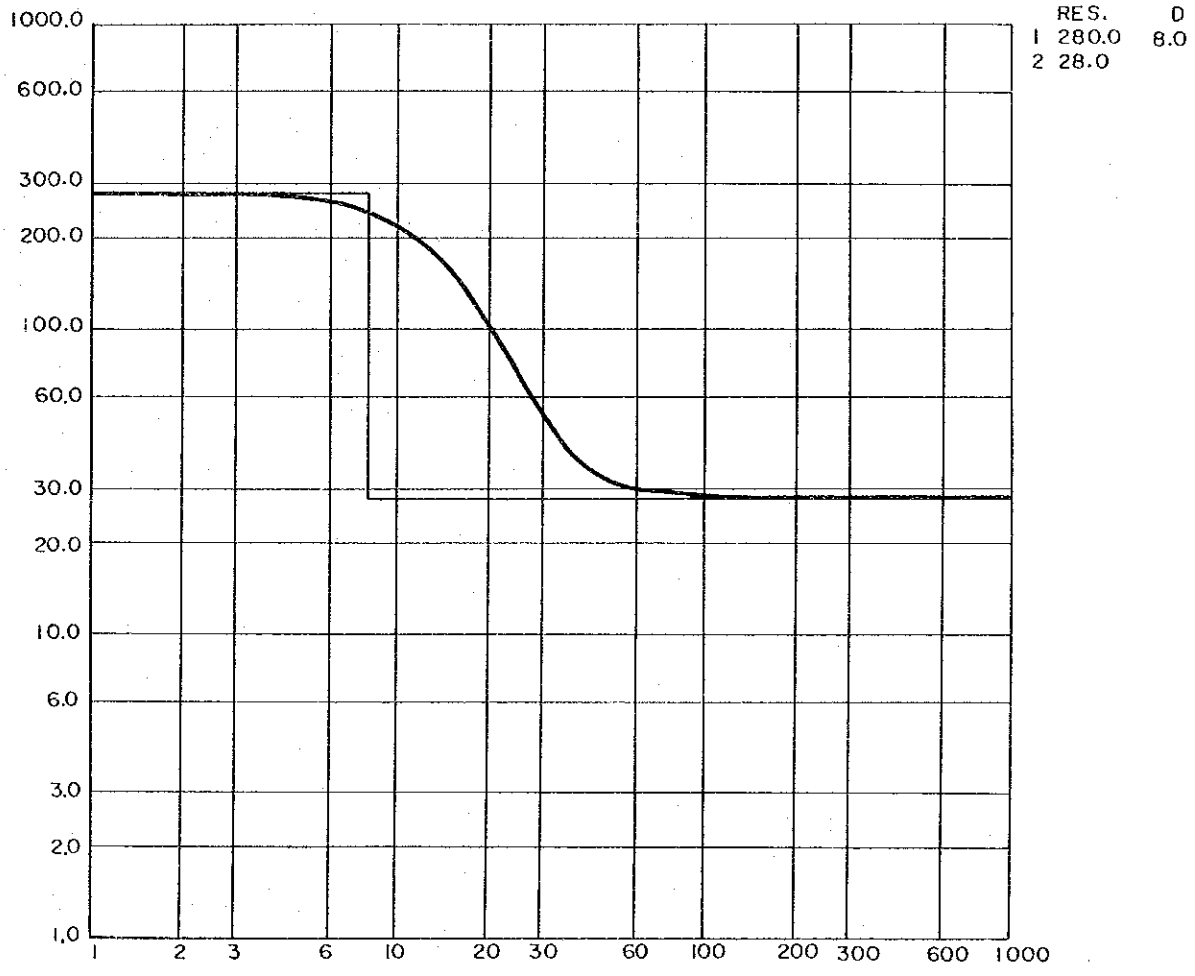


Fig. Ⅳ-3-(6) VES Curve B Line NO. 20

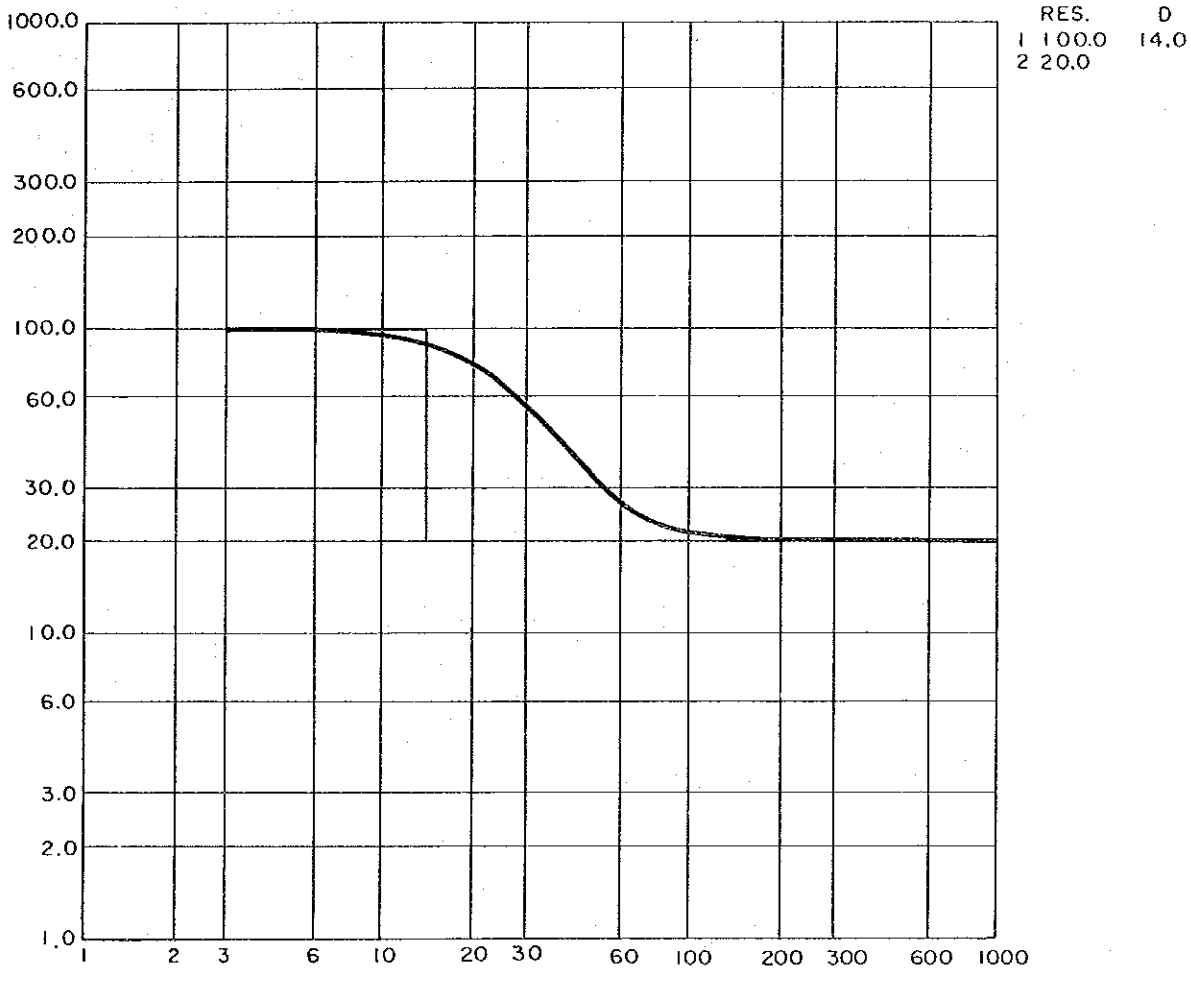
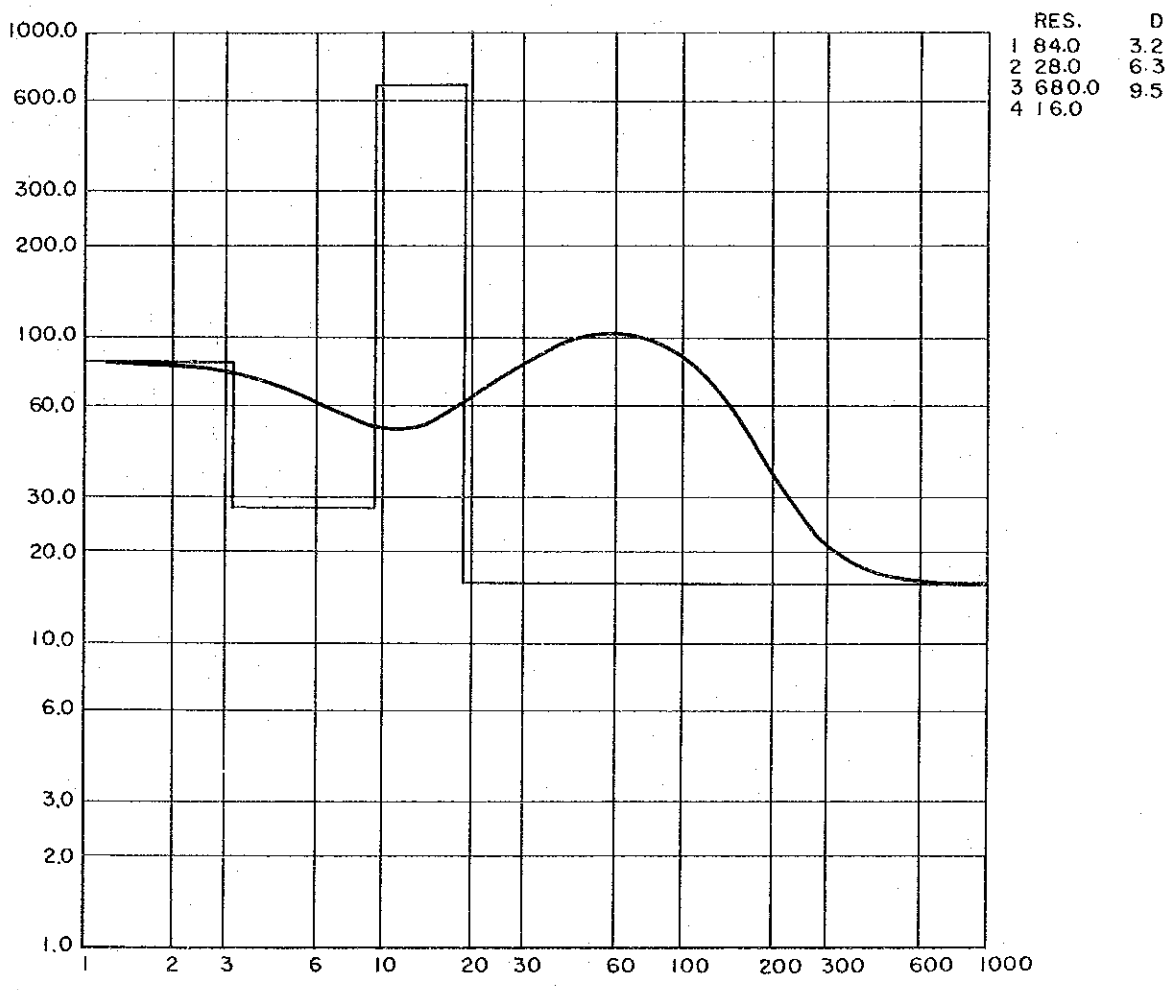


Fig. Ⅳ-3-(7) VES Curve C Line NO. 20



R E F E R E N C E S

Bhogal, P.S., 1972, Schlumberger resistivity survey at Hannington and Eburru porspects, United Nations Geothermal Exploration Project Kenya.

Eshleman, A., et al., 1971, Is mercury from Hawaiian volcanoes a natural source of pollution, Nature, pp 233.

Glover, R.B., 1972, Chemical characteristics of water and steam discharge in the Rift Valley Kenya, United Nations Geothermal Exploration Project Kenya, 59p.

Keller, G.V., and F. Frischknecht, 1966, Electrical methods in geophysical prospecting, Pergamon Press, New York, 519p.

Parkhomenko, E.I., 1967, Electrical properties of rocks, Plenum Press, New York, 314p.

Sergeyev, Y.A., 1957, Proceeding of the first all-union conference on geochemical method of prospecting for ore deposits.

Central Bureau of Statistics, 1978, Statistical Abstract, Ministry of Economic Planning and Community Affairs, Government of Kenya, 319p.