ORKUSTOFNUN
Jarðkönnunardeild

Grundartangi, Hvalfjörður
Water Supply Investigation

By
Freyr Þórarinsson and
Laufey Hannesdóttir

Prepared for
Icelandic Alloys, Ltd.
Ferrosilican Plant

OSJKD7505

August 1975

Contents

Figures

Tables

1.0 Introduction

In June 1975 a survey for potable water for the Ferrosilicon Plant at Grundartangi was commenced. The main effort was put into the area north of mountain Akrafjall down towards lake Eiðisvatn as in this area there seemed to be some possibilities of obtaining water by drilling. Also lake Eiðisvatn itself was looked at as a possible provider of potable water with a water treatment plant. Another possibility could be mentioned, this is Skorrholtsmelar in Melasveit. Here good water in considerable quantities is available in morainic hills.

In short the water survey in the area north of Akrafjall gave negative results. Geophysical surveys showed the thickness of unconsolidated material too thin for drilling to be worth while in the area from the road to the lake and a drillhole above the road in the gravel terrace is almost dry as it penetrates silty sediments.

This report includes a chapter on geology, geophysical surveys, exploration pits, and Eiðisvatn study. The main part of the geology work went into the making of the surficial geology map of the area around Eiðisvatn. In the text bedrock geology and loose sediments are treated to some extent. Geophysical surveys include both resistivity and seismic surveys with interpretations. The chapter on exploration pits is about the information obtained by some pits dug in the study area. Eiðisvatn study is about research done on the bottom sediments and the water in the lake. In a conclusion the borehole is disscussed and given the result of an extensive water sampling for germ analysis from lake Eiðisvatn.

2.0 Geology

2.1 Bedrock

The bedrock in the study area, the valley north of Akrafjall is made up of basalt layers dipping 10°- 14° towards SSE, the strike beeing N 50° - 70° E. The bedrock is older than 3 million years with vesicles filled with secondary minerals. Dykes cut the bedrock with a strike around N 30° E. These dykes can be traced along the Hvalfjörður coast.

The bedrock is exposed in several places in the valley as rims extending in the direction of the strike or as isolated hummocks. In other places the bedrock is believed to be present under a thin layer of bouldery material.

An extensive geophysical survey has been carried out in the area between the road and lake Eiðisvatn to clarify the configuration of the bedrock surface under the overburden. The bedrock surface is found to be quite uneven as can be read in the chapter on geophysical surveys.

2.2 Surficial geology

Map 2.1 shows the surficial geology of the study area. Most of the area is covered with peat but bedrock or gravelly hills crop out in some places.

The gravel terrace on the north side of Akrafjall extends to over 100 m a.s.l. and is most bulky between the farm Fellsendi and Fannahlíð. East of this bedrock crops out on the surface and towards west the gravel terrace becomes lower and covered to a large extent by peat. In a gravel mine between Stóra-Fellsöxl and Fannahlíð there is a good exposure in the terrace. There the gravel is rather coarse and bedded. The beds slope away from the mountain 24°, the strike beeing close to N 120° E. The gravel is well sorted and of sand and gravel sizes. The gravel terrace is made up of much finer material mostly sand just east of the mine in exploration pit G3 at least the top few meters.

The gravel terrace is by no means homogeneous. Just above Fannahlíð is a small mine and there the terrace is made of almost horizontal sandbeds with few irregularly sloping gravel beds on top but a short distance to the east gravel is reattained.

Farther west near the farm Kjalardalur there is another good exposure in the gravel terrace in a mine. Here the beds also slope 30° away fram the mountain with a strike of N 84° E. The gravel is even more coarse than in the former mine, boulders up to 0,4 m in diameter beeing common. The gravel terrace was not traced farther around the mountain Akrafjall.
The hillock west and north of Eiðisvatn on which the farms Litli-Lambhagi and Galtarholt stand are probably made of unconsolidated material that is not bedrock. On the western most part of this hillock is a gravel mine. Here the gravel is only 2-3 m thick and under it there is a hard silty moraine. This moraine is penetrated in a roadcut nearby and succeeded by bedded gravel irregularly sloping. It should be mentioned here that in a similar height as this roadcut on the opposite side of Urriðaá in a stream channel there is a washed sandlayer with no clear bedding under a silty moraine containing striated boulders and shell fragments.

Farther east near a sheepfold, gravel on top of the moraine is at least 4 m thick. It is of fine gravel and sand sizes and in roughly horizontal beds. In a gravel mine near the farm Litli-Lambhagi the gravel beds dip 25° WNW and strike N 25° E and in a mine near the farm Galtarholt the gravel is little more coarse and dips 30° N and strikes N 70° - 80° E. These beds are probably formed as glacifluvial deposits when a glacial tongue from the main glacier in Hvalfjörður occupied the Eiðisvatn area.

In the area from the above mentioned gravel terrace down to Laxárvogur bay the evidence of the end of the last glacial period can be found. The retreat of the glacier has not been uninterrupted as some alluvial deposits show. These alluvial deposits are found in heights from 2 m.a. s.l. to 30 m a.s.l. and they have formed when sea level was the same as at presnt or lower. On top of the alluvial deposits there are morainic beds formed under or close to sea level. In some places these morainic beds are quite silty and contain fragments of seashells but in other places above 30 m a.s.l. they are gravelly, that is the gravel terrace.

3.0 GEOPHYSICAL SURVEY

A geophysical survey was carried out, south of Eiðisvatn, in late June, July and early August. This included a seismic refraction survey and an earth resistivity survey. The detailed results appear in the appendix.

3.1 Seismic measurements

Sound velocity in the loose material covering the bedrock was measured with a portable 12-geophone ABEM Trio Seismic Refraction System, and the seismic refraction method used to calculate the thickness of loose material. The results are presented in details in the appendix in figures AB-1 to AB-11 and NS and VA 1 to 12. The location of the seismic profiles are shown on fig. 3.1.1.

The interpretation of the seismic data is not all that obvious and it has in fact been interpretated in two different ways. The first interpretation aimed at a simple picture of the stratigraphy. This results in only two layers in many profiles and widely scattered values for the second velocity. The second interpretation aimed at less scattered values for the velocities, and resulted in three layered interpretation in all profiles, but in many cases no clear boundary exists between velocity layers no. 2 and no. 3, indicating heavily fractured bed-rock underlying the loose material. This latter interpretation is the one presented with the data in the appendix.

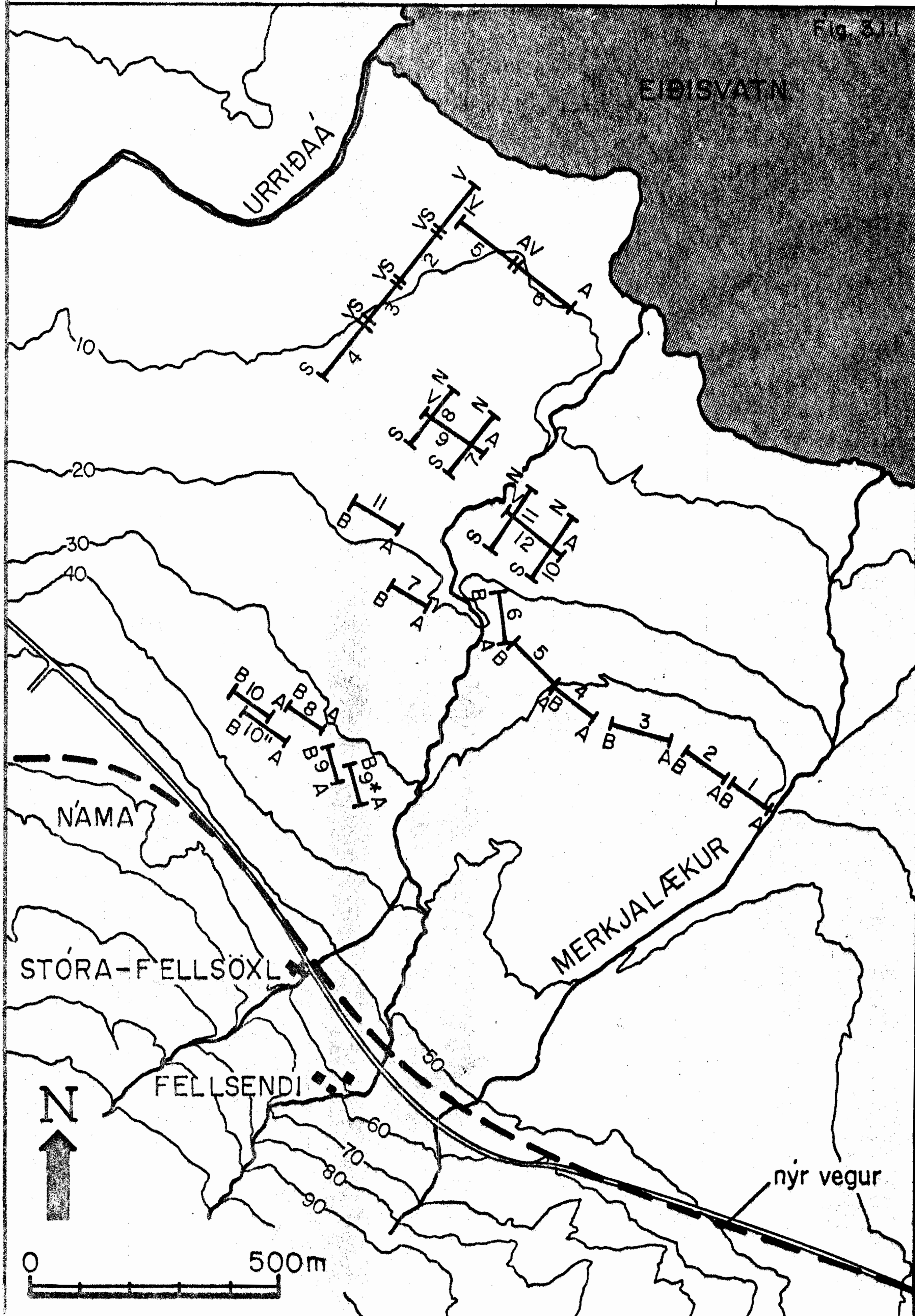
On the location map some profiles are marked with an asterix, i.e. 11*. These are repeated measurements of profiles and are not presented seperately in this report.

ORKUSTOFNUN
Raforkudeild (jarðkönnunardeild)

GRUNDARTANGI

Jarðsveiflumælingar, staðsetningarkort *Seismic Retraction Profiles*

20.8.'75 F.Þ./A.T.R
Tnr. 71 Tnr. 312
B-90 J-Jarðsvm
Fnr. 13261



3.2 Resistivity measurements

Earth resistivity was measured with a portable ABEM Terrameter using the Schlumberger array. The resistivity data was then interpretated in the usual way by using three-layer master curves in combination with the auxiliary point method. The results are presented in details in the appendix, fig. G-1 to G-15. Since the bedrock underlying the loose material is fractured and uneven, it should be stressed that the resistivity data can not be taken as point measurements, as it only indicates some average thickness of the strata.

Although included in the appendix, three resistivity profiles, G-4, G-6 and G-14, differ so radically from the rest, that they should not be taken into consideration as depth measurements. They are therefore left out of figure 3.2.2., which connects the resistivity-layer interpretation to the geological formations.

3.3 General results

The geophysical measurements were carried out in two parts. The first part was a general study of all the area under consideration and included seismic profiles AB-1 to AB-11 and resistivity measurements G-1 to G-15.

The general results were, that the depth down to bedrock does not exceed 10-15 meters, and this depth tends to increase downwards to lake Eiðisvatn and westwards into the marshes. The latter was especially the case with seismic profiles AB-7 to AB-11, when interpretated by the first method explained in 3.1.

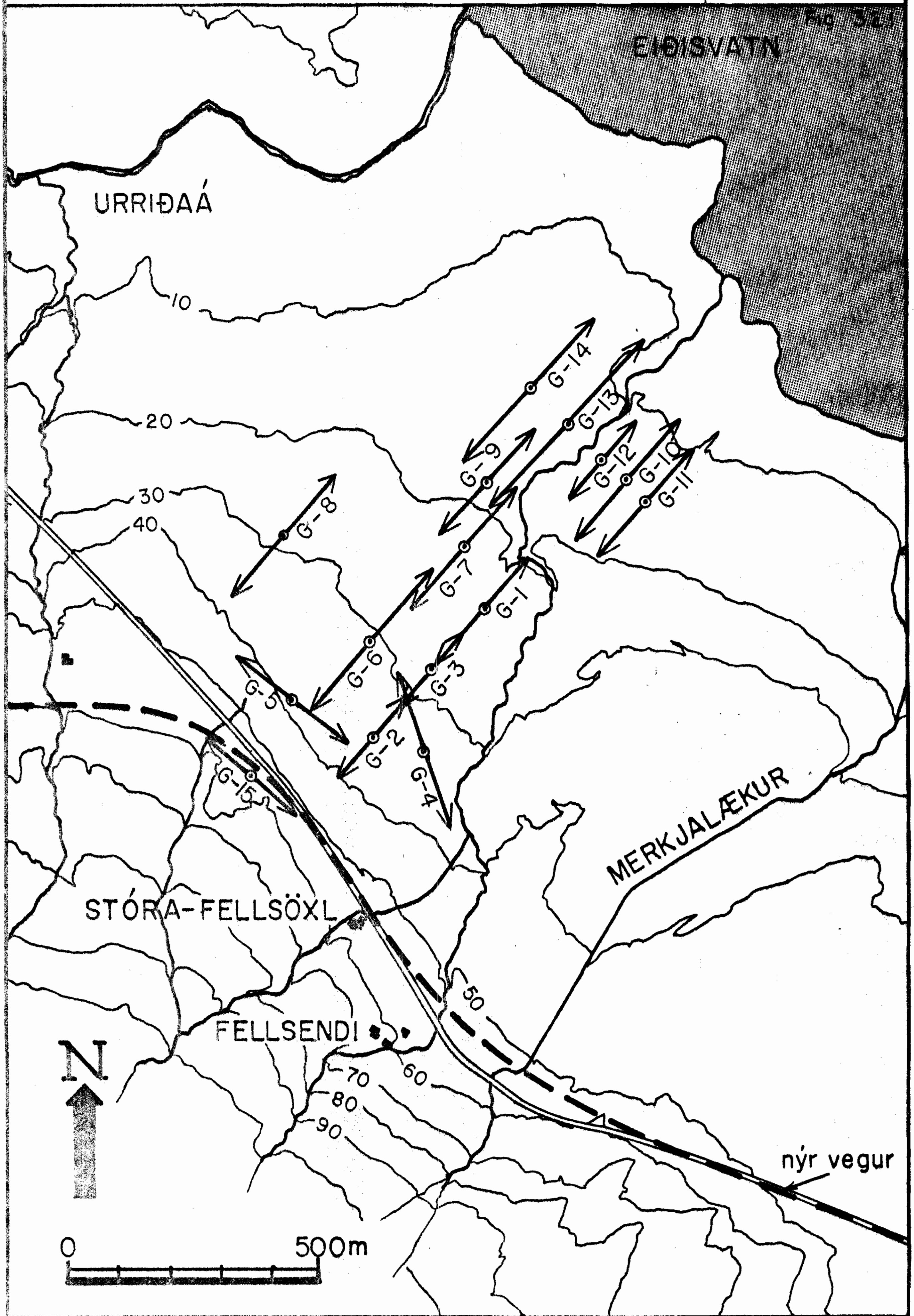
According to these results, the drilling of a borehole was planned near the center of resistivity profile G-13, and a more detailed geophysical survey was started in the area which had been chosen for drilling.

ORKUSTOFNUN
Raforkudeild (jarðkönnunardeild)

20.8.'75 Fþ./A.T.R
Tnr. 69 Tnr. 1365
B-90 J-Viðn.
Fnr. 13259

GRUNDARTANGI

Viðnámsmælingar, staðsetningarkort – *Resistivity Profiles*



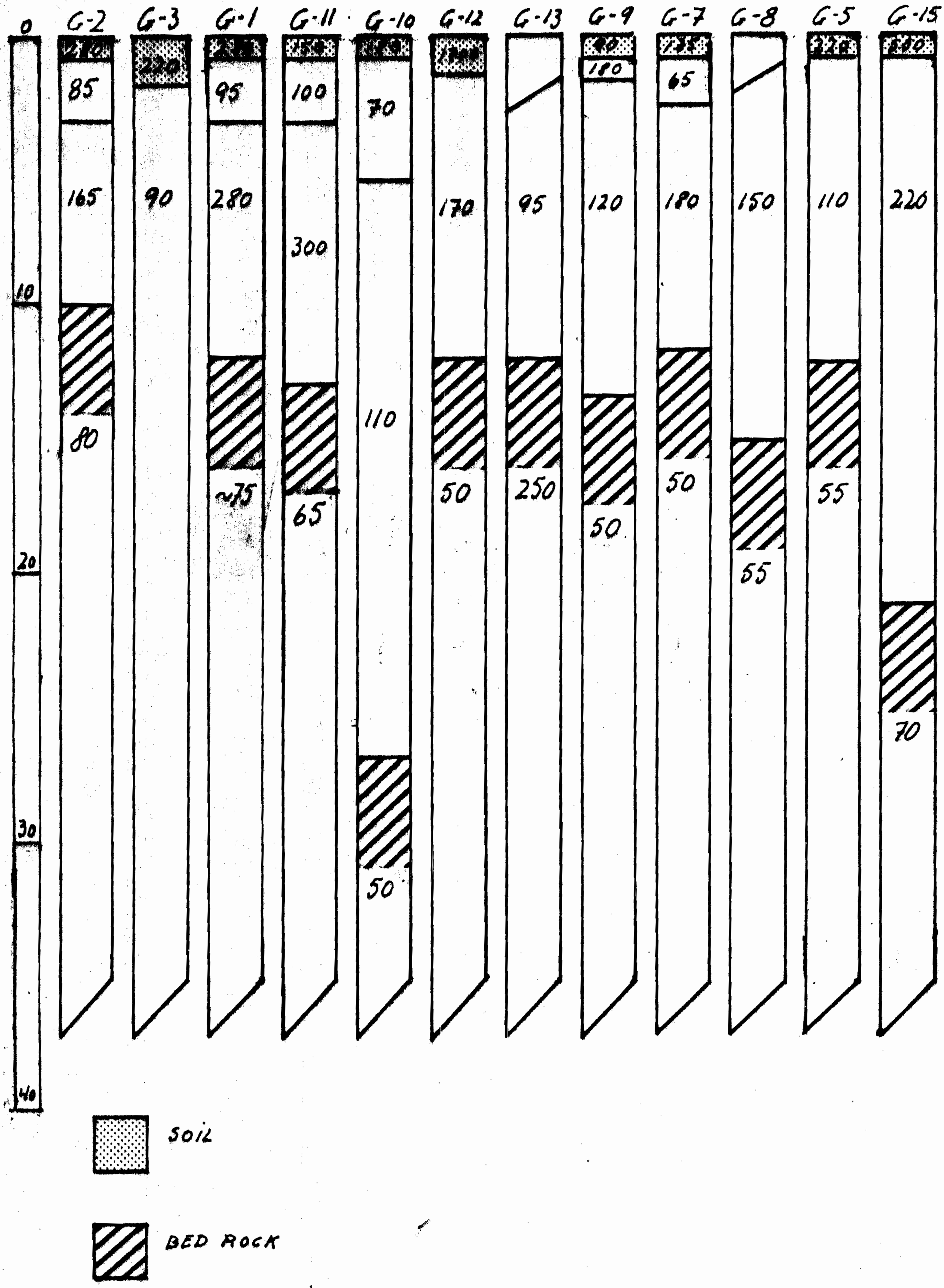
ORKUSTOFNUN
JARÐKÖNNUNARDEILD

Fig. 3.2.2.

22.8'75 HH/FP

GRUNDARTANGI

LAGSKIPTING EÐLISVIÐNÁMS - RESISTIVITY LAYERS



Since the drilling for various reasons could not start at this short notice, the results from this second part of the geophysical measurements, including seismic profiles NS and VA 1 to 12 and resistivity measurements G-11 to G-15, were at hand before any drilling had started. These results finally excluded the possibility of finding an aquifer connected to lake Eiðisvatn and thick enough to allow a reasonable drawdown when pumping a waterhole. Thus, all plans of drilling near lake Eiðisvatn were cancelled.

The only remaining possibility of reaching an aquifer of a reasonable thickness was to drill near the gravel terrace by the road, where resistivity measurement G-15 is located. The results of this drilling are discussed in 6.0 Conclusions.

4.0 Exploration Pits

Pits were dug by a tractor with a back-hoe up to 4 m deep in the study area to find out the physical properties of the layer defined by the seismic study under the peat and has sound velocity 2-3 km/sec. Also few pits were dug above the road in the gravel and these were pumped to find out how permeable the gravel is. The pits are marked on the surface geology map.

Four pits were dug just below the road (H_1, H_2, H_3, H_4,). Two of these are beond the gravel and go directly through peat to moraine, the other two are nearer the road go through peat and into gravel. Therefore it can be said that under the gravel there is moraine or the moraine starts where the gravel terminates.

The next pits were dug about 200 m below the road in seismic profile II. (H_5, H_6, H_7, H_8, H_9,) the peat is 3-4 m deep and was only penetrated in H_6 where it was followed by a silty moraine. One pit H_5 was dug farther to the North-West where the peat was only 1 m thick followed by silty moraine to the bottom of the pit, 2,5 m.

The last group of holes was dug near the end of the gravel bar midway between the road and the lake in seismic profile I, (H_{10}, H_{11}, H_{12}, H_{13}, H_{14}). There the peat is 2-4 m deep followed by a fairly homogeneous siltlayer.

Where this was penetrated in pits H_{12} and H_{14} it was 0,2 to 1,0 m thick and followed by moraine which was less silty. From this moraine water was seen to percolate. This water must be isolated from the peat water by the impermeable siltlayer.

Three pits were dug in the gravel above the road. They are marked on the map by G1, G2 and G3. Pit G2 is in the mine and penetrates coarse gravel. After pumping from it in one hour 1,5-2,0 l/sek. the drawdown was 0,5 m. It could be crudely estimated that with 7 m drawdown the pit would yield 10 l/sek. Pit G1 could probably yield 1 l/sek with 1,5 m dawndown. Pit G3 by the farm Stóra-Fellsöxl is in much less permeable gravel and was emptied of 0,6 m deep water in only 6 min. by pumping 4,5 l/sec. The permeability is higer along the bedding than across it. The gravel beds in the mine dip 24° NW and strike 120°E.

5.0 Eiðisvatn study

5.1 Introduction

Lake Eiðisvatn is on the lowland between the mountains Akrafjall and Miðfellsmúli. It drains into the bay Leirárvogur which is little more than one km west of the lake. The fiord Hvalfjörður is in an equal distance to the SE. The outflow of the lake, Urriðaá, was measured July 14, 1975 and was 0,26 m^3/sec which is probably higher than the mean annual flow. The lake is 2,33 km^2 in area and its volume is about 2,6 Gl. If the mean outflow is 0,2 m^3/sec the recircling time of the lake is around six months. The surface drainage area of the Eiðisvatn outlet is about 14 km^2.

The lake is quite shallow and its bottom is covered with thick loose sediments. Gravel on the beach extends to 0,6 - 0,7 m depth of water where it disappers under the bottom sediments. Above the waterlevel about 7 m a.s.l. a former waterlevel can be traced around the lake where it stands out as a sharp bank. From this bank to the lake the beach is either covered by gravel or soil.

The lake was cruised on a small oarboat in still weather the 14th and 15th of July 1975. On sampling stations the depth of water and thickness of loose sediments was measured. The sampling stations were located by measuring the angle between fixed points on land from the boat but these locations can only be regarded as approximate. Samples were taken of the bottom sediments by a sampler penetrating the top 5 cm. Samples of water for chemical, germ and sediment analysis were also taken.

5.2 Depth of Water and Loose Sediments

A map of the depth of water has been drawn, see fig 5.1. Only 1,0, 1,2 and 1,4 m isodepth lines are drawn. Few depth points are taken directly from the map produced be "Forverk" as the lake botton is easily visiable on air-photos. Also on the water depth map figures of the thickness of loose sediments are shown. This was found by pussing a 1,5 cm diameter rod into the bottom. In many places the rod was too short as it could only reach 1,4 m into the sediments. The bottom sediments are thinnest near the south coast where there are possible springs in the lakebottom. The lake freezes over very seldom in this part.

On the map it is shown what kind of material the beach is covered with. A distinction is made between a gravel beach and a soil beach which is covered with grass right to the bank.

5.3 Bottom Sediments

Samples of the bottom sediments were taken on 11 sample stations but only 6 of these have been analysed. The results are summarized in table 5.1 and for locations see fig 5.2. The bottom scraper used for sampling penetrates about 5 cm into the sediments and on the way out of the water some of the fine material is lost with the water running out of the sampler.

The sediment is made up of an organic part and an inorganic part. The grain size analysis is considered to reprecent only the inoganic part as organics were removed by H_2O_2 in the silt and clay sizes before analysis and less than 20% of the organics is in coarser sediments.

Figures 5.3 to 5.8 show the grain size curves in appendix.

ORKUSTOFNUN Jarðkönnunardeild	23.8.'75 HH/SJ
GRUNDARTANGI, EIÐISVATN	Tnr. 71
	B-90
Dýpi vatns og þykkt botnleðju / *Depth of water and loose sediments*	Fnr. 13291

Fig. 5.1.

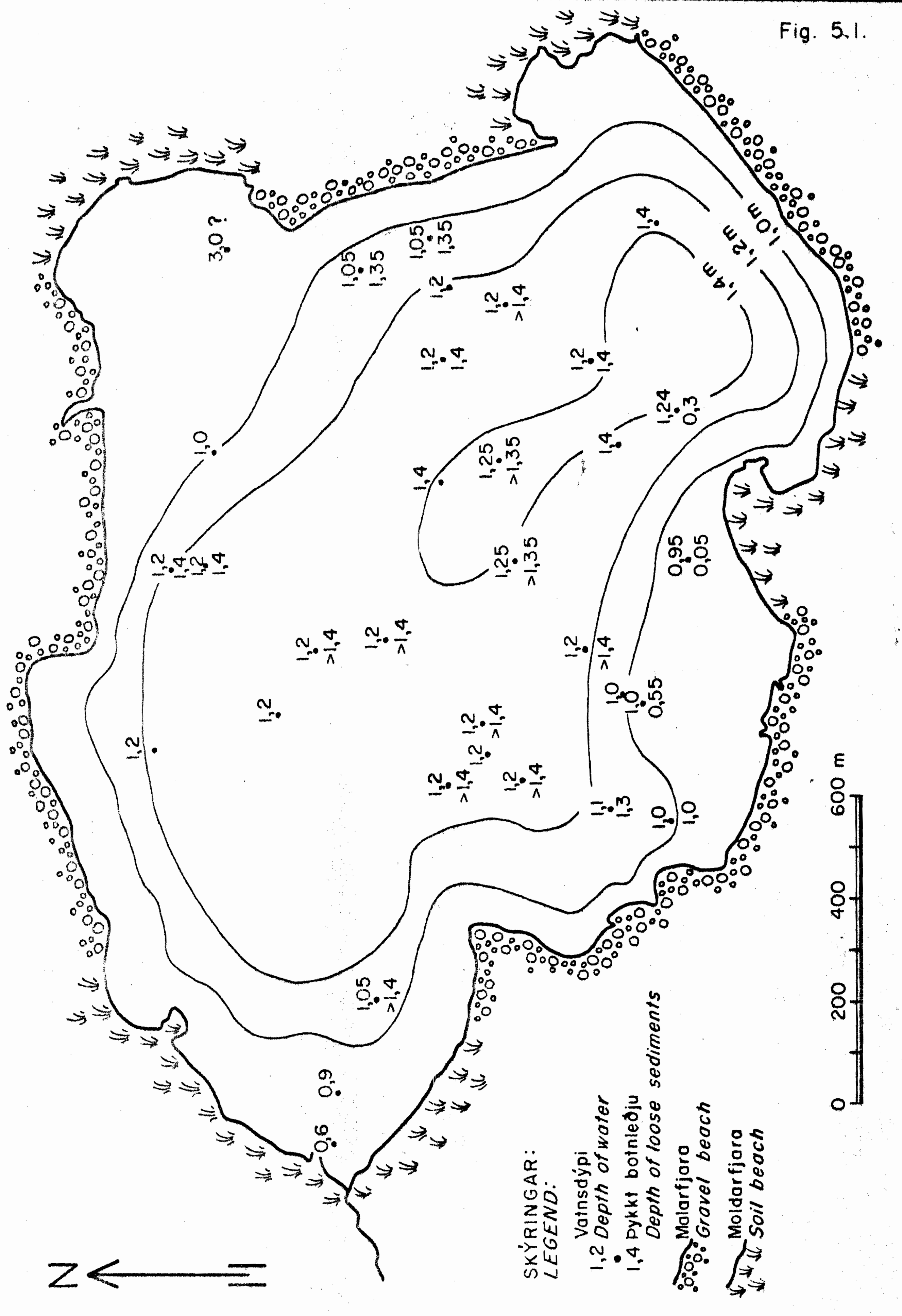


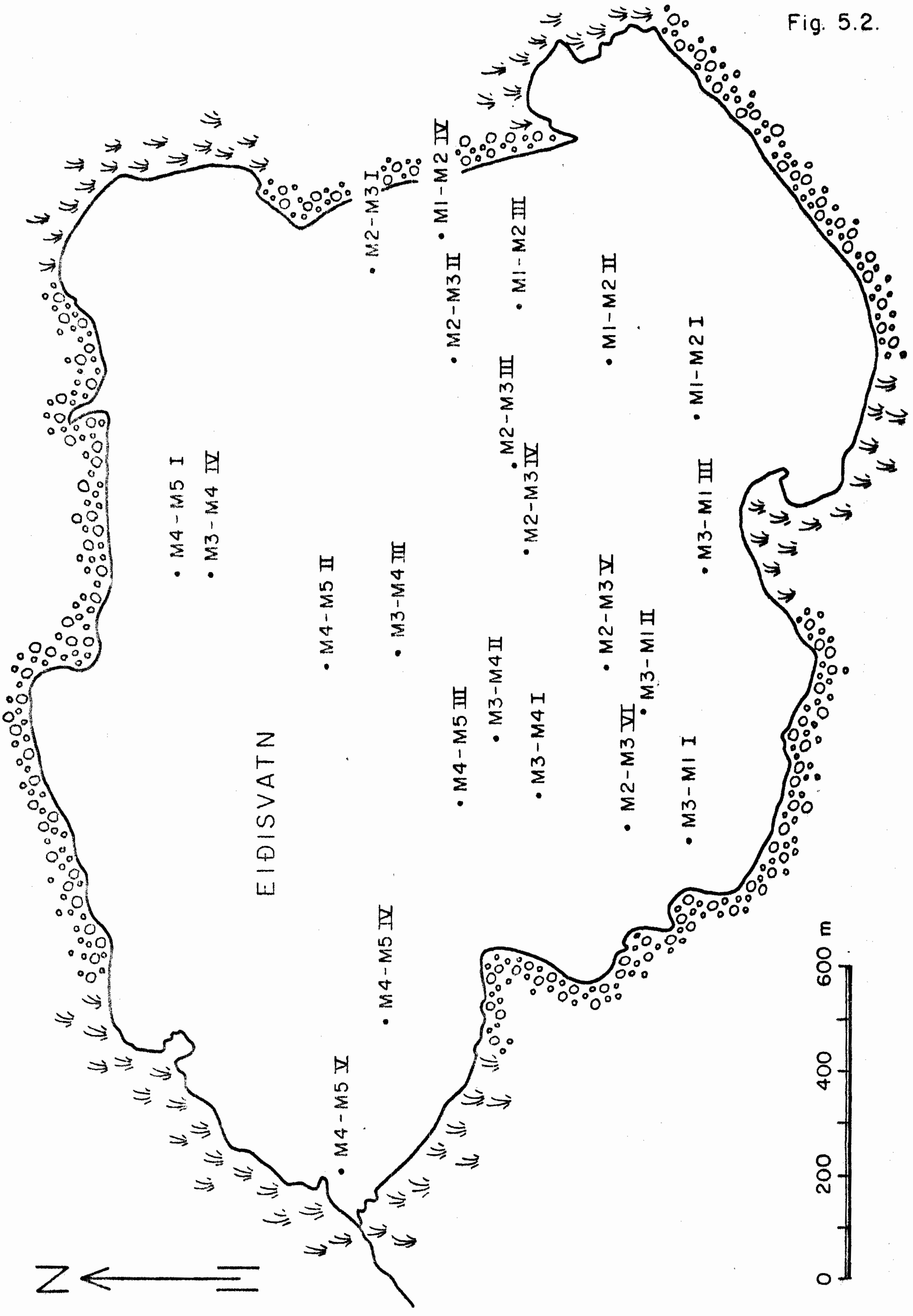
Table 5.1

Bottom Sediments
Eiðisvatn

Sampling Point	d50 (mm)	clay%	silt%	≥ sand%	organics%
M1-M2 I	0,025	ca.5	82	13	21
M1-M2 IV	0,022	7	76	17	20
M2-M3 IV	0,019	9	81	10	21
M2-M3 VI	0,030	ca.5	88	7	16
M4-M5 II	0,038	3	84	13	16
M4-M5 V	0,095	0	22	78	5

ORKUSTOFNUN Jarðkönnunardeild	23.8.'75 HH/SJ
	Tnr. 73
GRUNDARTANGI, EIÐISVATN	B-90
Sýnatökustaðir / *Sampling stations*	Fnr. 13292

Fig. 5.2.



The organic percentage is found by baking the sediment in 500-600°C for about 10 hours. The mass lost in this process is called organics.

According to grain size the samples of sediment can be devided into three groups. The first with mean diameter, d50, form 0,019 to 0,025 mm, the second with d50 from 0,03 to 0,038 mm and the third with d50 0,095 mm. The grain size distribution and the organic percentage of the sediment shows the same grouping. The three samples in the first group are all from the east side of the lake. The two samples in the second group are from the western side of lake and the one sample in the third group is from the outlet on the west side of the lake.

5.4 Water analyses

Samples of water for various analyses were taken from the lake. Ten samples were taken for chemical analyses and Cl^- content and total dissolved solids measured in all of them to see how homogeneous the lake is. The result appears in table 5.2. The Cl^- content varies from 24,2 to 25,2 ppm and dissolved solids form 82,3 to 102,4 ppm. The lake can therefor be considered quite homogeneous regarding chemical constitudents.

Total chemical analysis of one water sample is not yet available.

Two samples were taken for germ analyses. The result is as follows:

Sampling point	E.coli in 100ccm M.P.N.	Agar at 37°C for 48 hours	Agar/Geletini at 22°C for 48 hours
M2 M3 II	3	12	30
M4 M5 IV	5	23	100

The water is judged not potable by icelandic standards.

Table 5.2

Chemical Analysis
Eiðisvatn

Sampling Point	pH	resist. (Ωm)	CO_2tot (ppm)	Cl^- (ppm)	tot. dissolved solids (ppm)
M3-M1 III	8,29/22	66,7	29,5	25,2	90,3
M1-M2 II		66,7		24,4	92,6
M1-M2 IV	8,96/22	59,5	31,26	25,2	102,4
M2-M3 II		64,5		25,0	92,5
M2-M3 IV	8,22/22	66,7	30,39	24,3	82,3
M2-M3 VI		64,5		24,5	87,8
M3-M4 I		65,4		24,4	90,5
M3-M4 III	8,13/22	65,8	30,38	24,2	85,6
M4-M5 II		64,5		25,2	83,2
M4-M5 IV	8,36/22	63,3	30,82	24,6	90,0

The sediment samples of the water were taken by a hand integrating sampler. The results of grain size analyses is found in table 5.3. As the weather was quite still the day the samples were taken the sediments in the water are only 9 to 15 mg/l. In two of the samples there is no clay but in the other three almost 50%. The two samples with no clay are from near the south cost but the other three are from nearer the north cost or the middle of the lake. The variation in measured dissolved solids from 73 to 82 mg/l by distillation is within measurment accuracy.

Table 5.3

Dissolved Sediments
Eiðisvatn

Sampling Point	total (mg/l)	clay%	silt%	≥sand%	dissolved solids (mg/l)
M1-M2 IV	9	33	66	1	79
M2-M3 VI	15	0	93	7	80
M3-M1 III	8	0	75	25	78
M4-M5 II	10	50	40	10	82
M4-M5 IV	13	46	58	4	73

6.0 Conclusion

As already stated no drilling was performed in the area from the road north of Akrafjall towards lake Eiðisvatn because geophysical surveys indicated thin unconsolidated layer on top of the bedrock. A borehole was drilled in the gravel terrace just above the road in exploration pit G3. Being nearer the mine with a waterhole is not adviceable. One resistivity profile, G15, is in this same place and it showed 220 Ωm resistivity down to 20 m depth and 70 Ω m there below. The borehole penetrates 13 m thickness of sand then silt or clay to the bottom of the hole at 17 m depth. The sand is poorly permeable as the top 4 m in the exploration pit had already shown. The borehole has not been pumped so it is not known how much water it could give.

The results of germ analyses of 11 water samples taken August 12,1975 from lake Eiðisvatn are in table 6.1 with the two samples taken in July. For location of the samples see figure 6.1. E. Coli germs are found in all samples so the water is not potable by icelandic standards, and they are more numerous in the samples taken in August than in the samples taken in July, indicating more surface runoff in August.

This concludes the water supply investigation for the Ferrocilican Plant done up to the middle of August 1975. What will be done in the furture is open for discussion.

Table 6.1

Lake Eiðisvatn
Germ Analysis

Sample	E.coli in 100ccm M.P.N.	Agar at 37°C for 48 hours	Agar/Gelatini at 22°C for 48 hours
E 1	11	48	220
E 2	5	13	48
E 3	1	31	270
E 4	35	32	530
E 5	54	55	280
E 6	1	20	163
E 7	54	22	83
E 8	7	19	180
E 9	3	34	240
E 10	13	49	230
E 11	13	16	131
M2-M3 II	3	12	30
M4-M5 IV	5	23	100

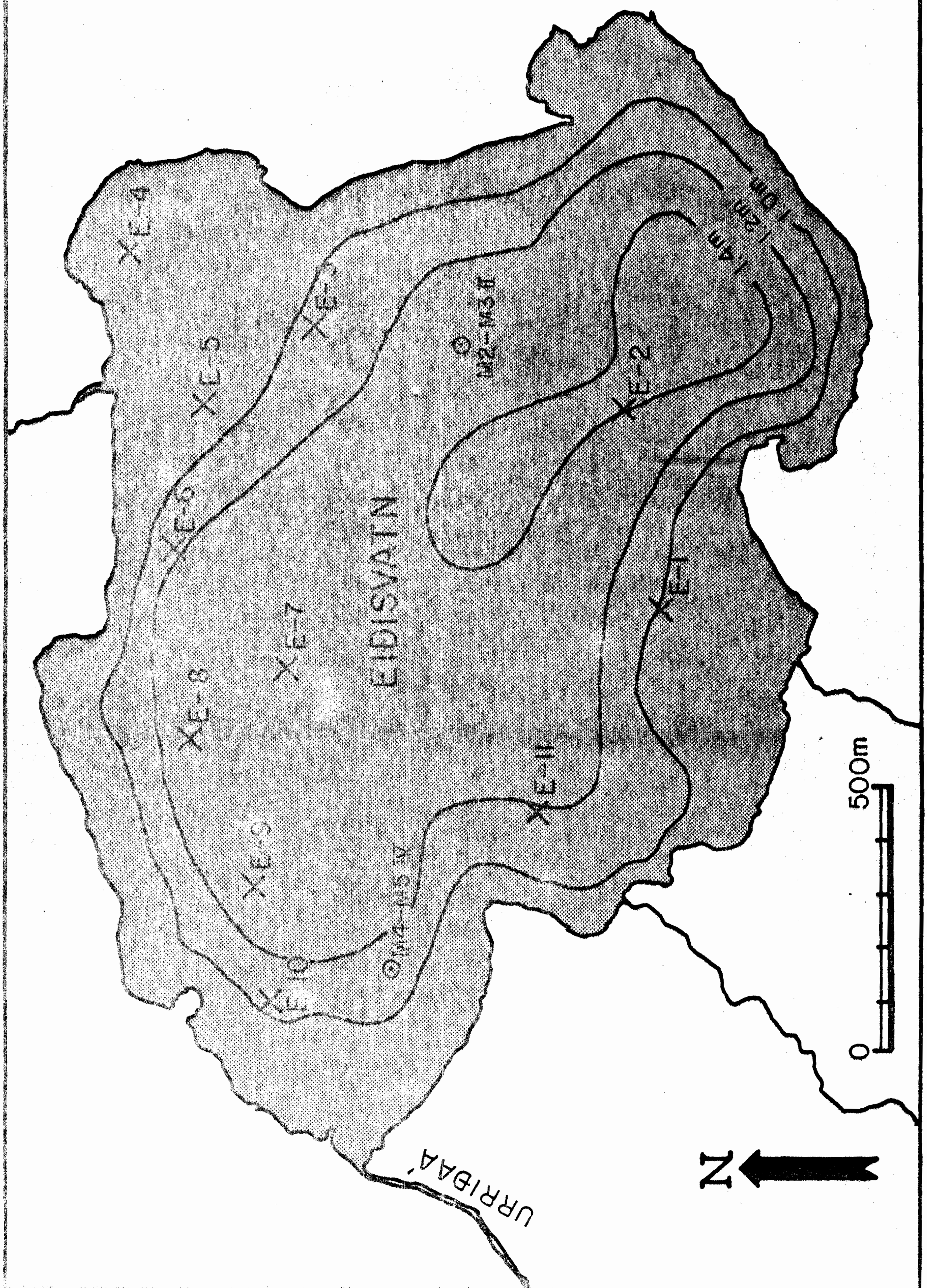
ORKUSTOFNUN
Raforkudeild (jarðkönnunardeild)

20.8.'75 F.P./AT.R
Tnr. 70 Tnr. 1366
B-90 J-Viðn.
Fnr. 13260

GRUNDARTANGI

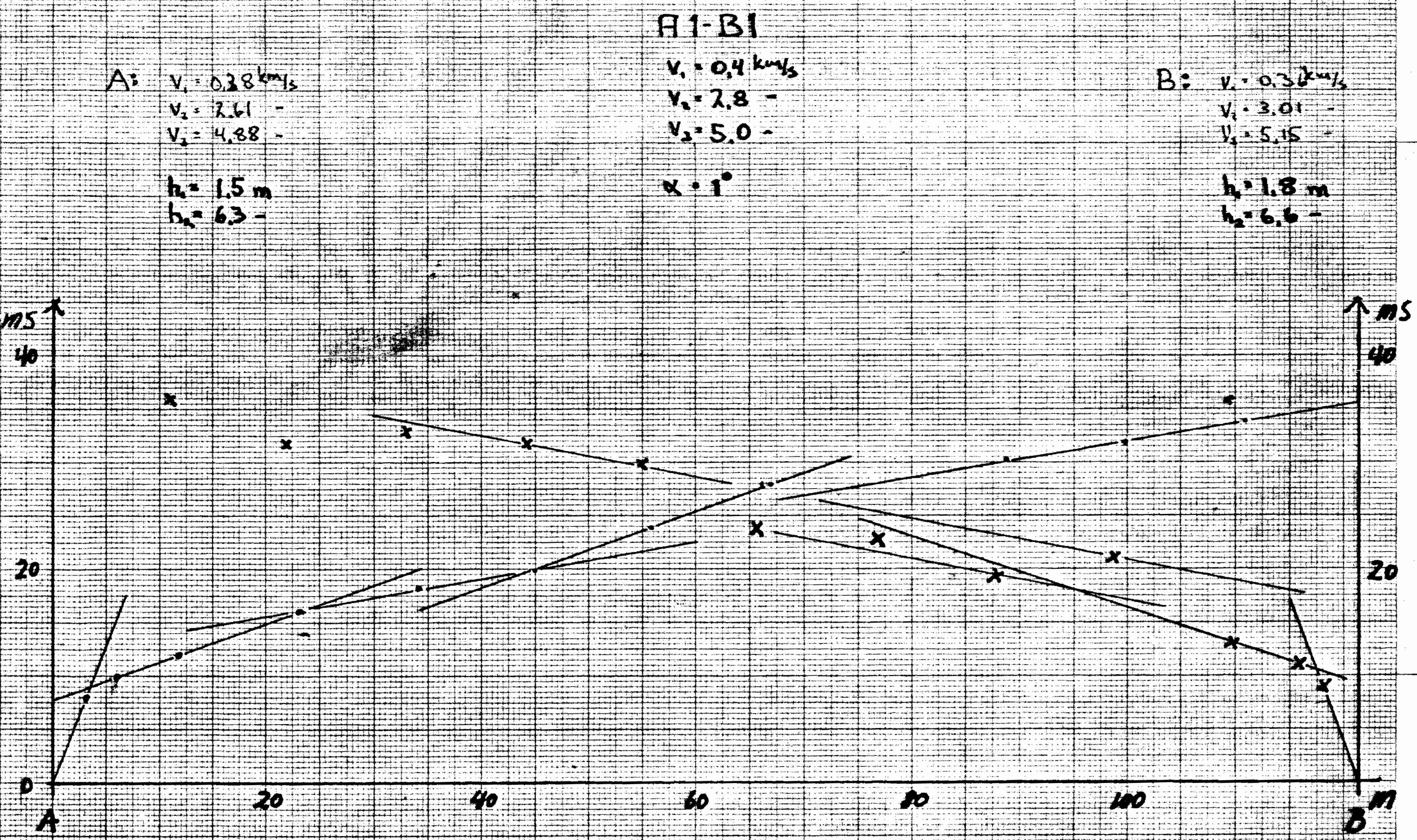
Staðsetningakort vatnssýna *Location of Water Samples*

Fig. .6.1



APPENDIX


EIÐISVATN
HÓLMAVATN
LITLI-LAMBHAGI
GALTARHOLT
LITLA-FELLSÖXL
FANNA-HLÍÐ
STÓRA-FELLSÖXL
FELLSENDI
KLAFASTAÐIR
GRUNDARTANGI
KATANES
GALTALÆKUR
H2 H3 H4 H5 H6 H7 H8 H9 H10 H11 H12 H13 H14
G1 G2 G3
N
GRUNDARTANGI
AKRAFJALL
HVALFJÖRÐUR
AKRANES
0 5 10 km
SKÝRINGAR / LEGEND
Berggrunnur oft þakinn þunnum jarðvegi eða stórgrýti
Bedrock often covered with thin soil or boulders
Melur óskilgreindur
Gravelly hill undefined
Fjörusandur
Beach sand
Möl við vatnsbakka
Lacustrine beach gravel
Ár og malareyrar
Alluvial deposits
Marbakki
Gravel terrace
Mýrlendi
Peat
Framræstar mýrar - tún
Drained peat - field
Gróið þurrlendi
Vegetation on dry soil
Forn vatnsbakki
Lake bank, agent
Lind
Spring
Jökulrispa á klöpp oft ofaní skurði
Glacial striae on bedrock often on the bottom of a deep channel.
●H2 ●G1 Rannsóknargryfja / Exploration pit
0 200 400 600 800 1000 m
ORKUSTOFNUN Jarðkönnunardeild
PREPARED FOR ICELANDIC ALLOYS, Ltd.
FERROSILICON PLANT
GRUNDARTANGI
Jarðgrunnskort - Surficial Geology
Water supply investigation
26.8.'75 LH/IS
B-90
Tnr. 74
Fnr. 13295


A1-B1
$v_1 = 0{,}4$ km/s
$v_2 = 2{,}8$ -
$v_3 = 5{,}0$ -
$\alpha = 1°$
A: $v_1 = 0{,}38$ km/s
$v_2 = 2{,}61$ -
$v_3 = 4{,}88$ -
$h_1 = 1{,}5$ m
$h_2 = 6{,}3$ -
B: $v_1 = 0{,}36$ km/s
$v_2 = 3{,}01$ -
$v_3 = 5{,}15$ -
$h_1 = 1{,}8$ m
$h_2 = 6{,}6$ -
ms
40
20
0
20
40
60
80
100
m
A
B

A2-B2

A: $v_1 = 0{,}27$ km/s
$v_2 = 2{,}40$ -
$v_3 = 4{,}76$ -

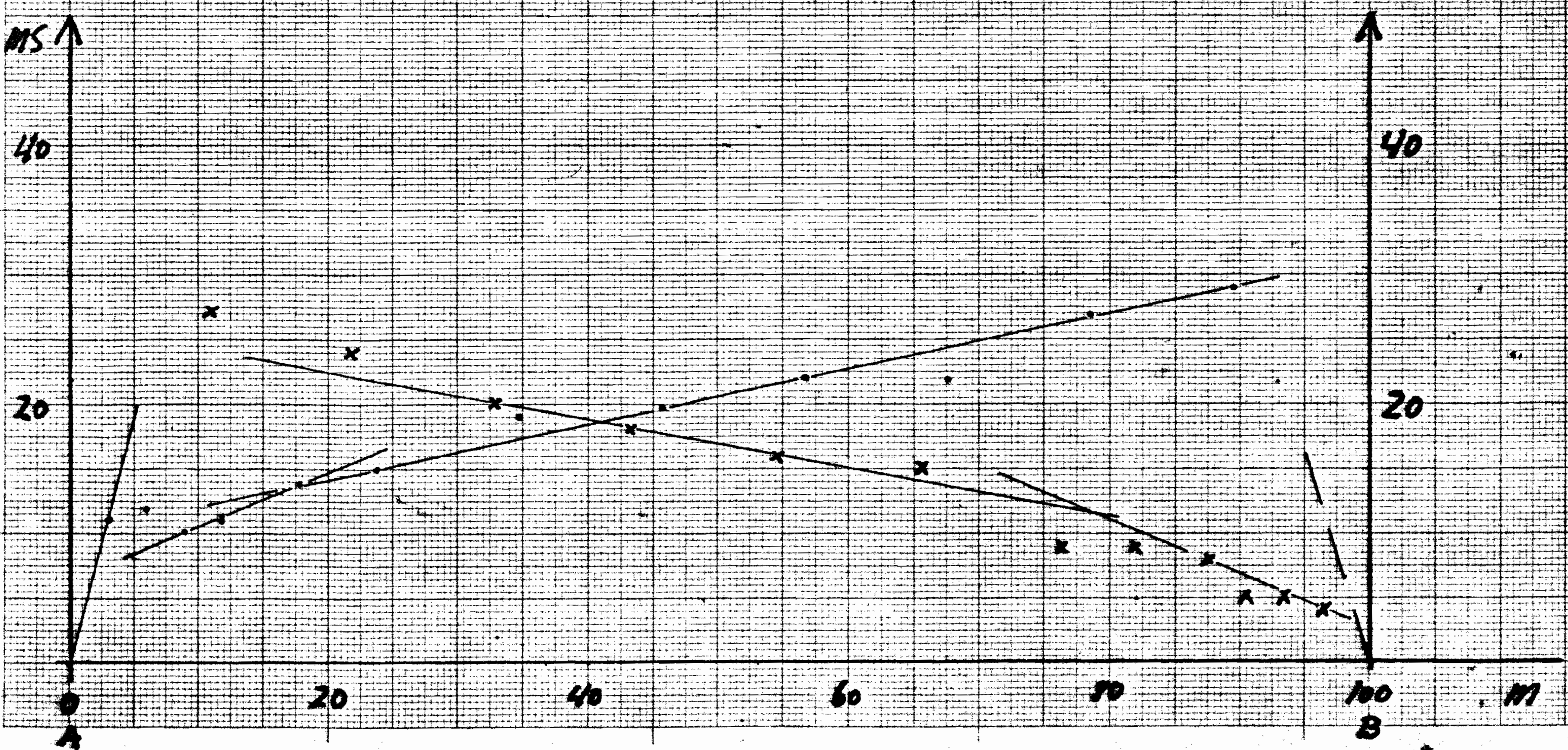
$h_1 = 1{,}3$ m
$h_2 = 5{,}0$ -

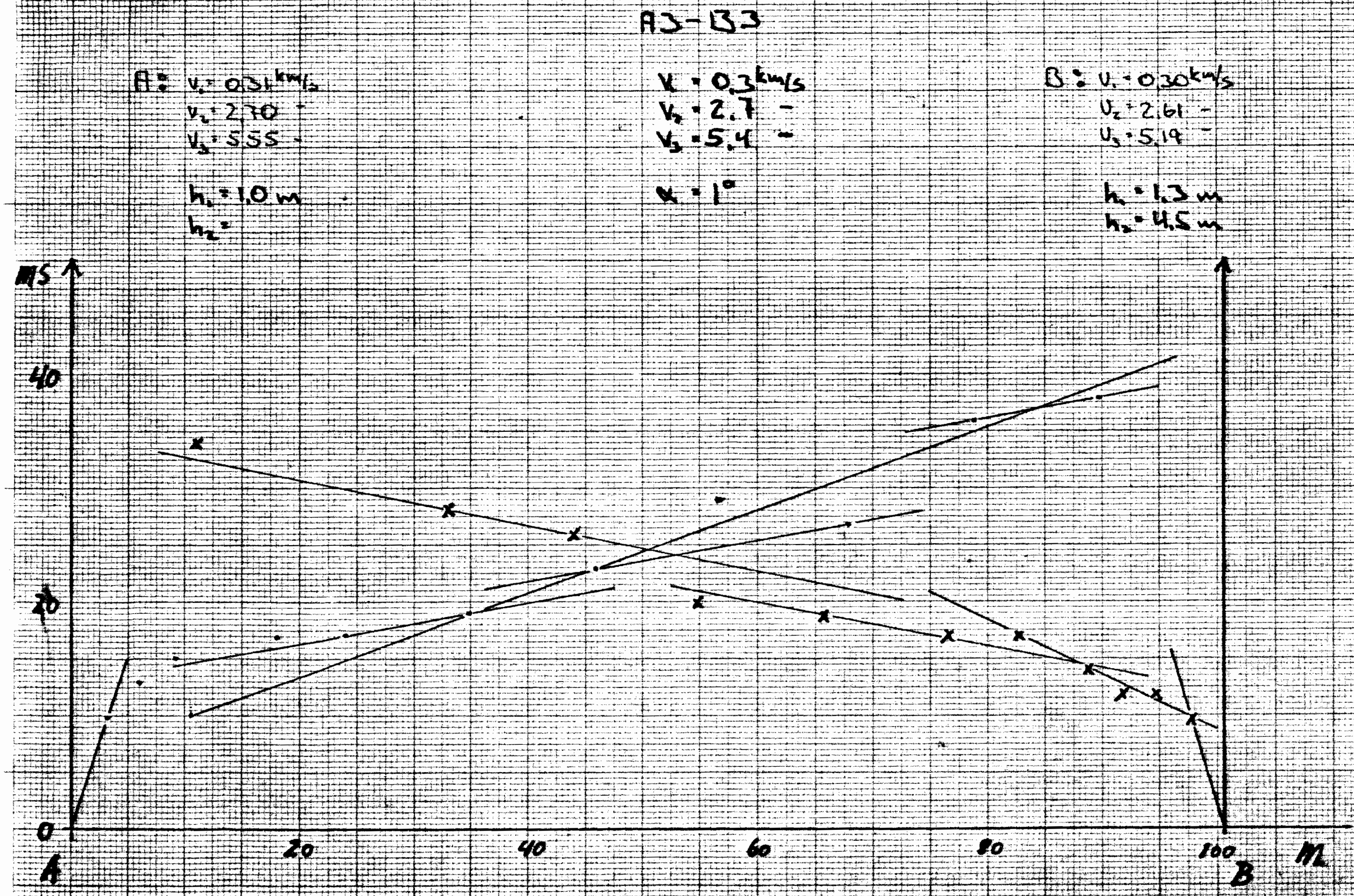
$v_1 = 0{,}3$ km/s
$v_2 = 2{,}4$ -
$v_3 = 5{,}0$ -

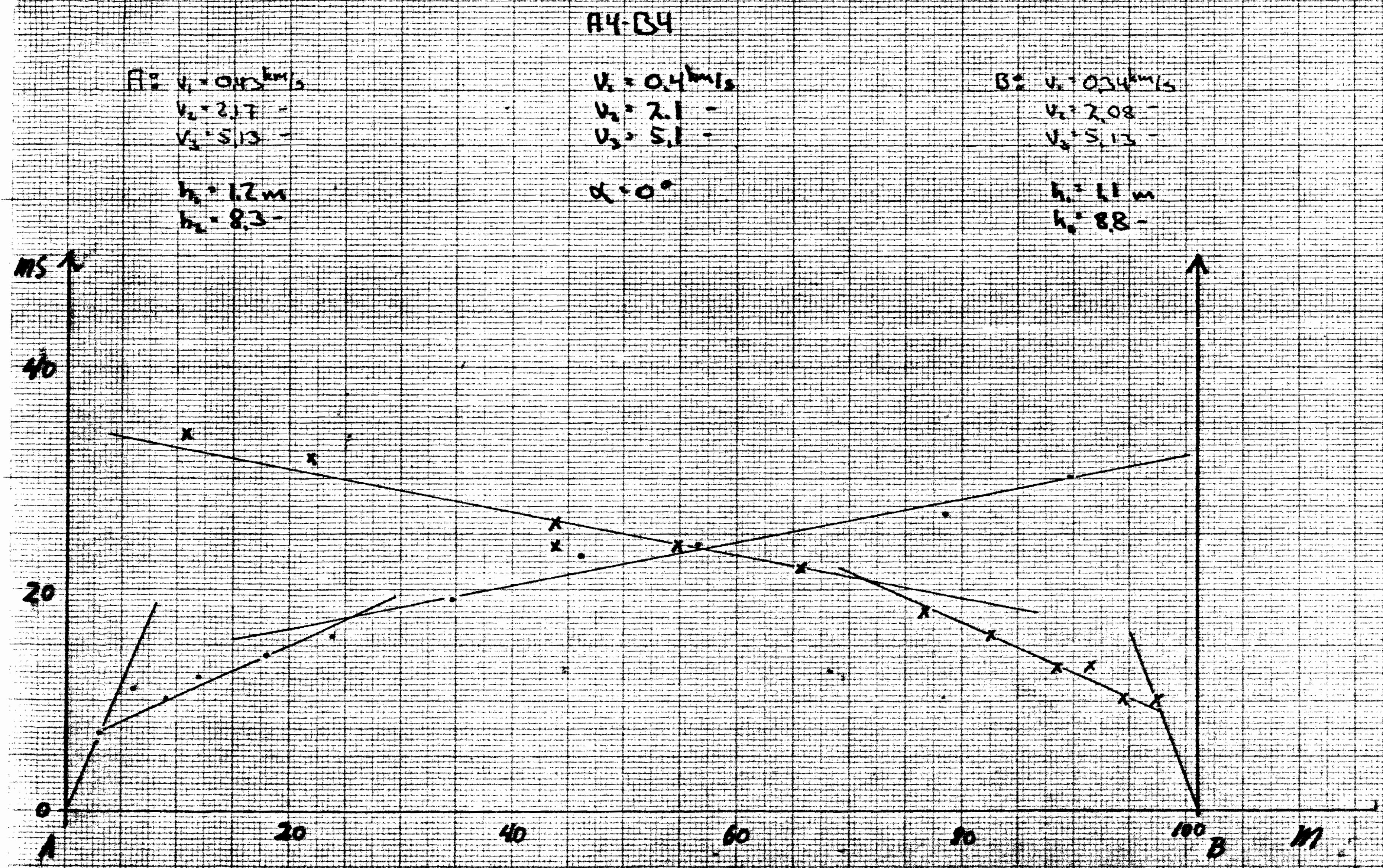
$\alpha = 2°$

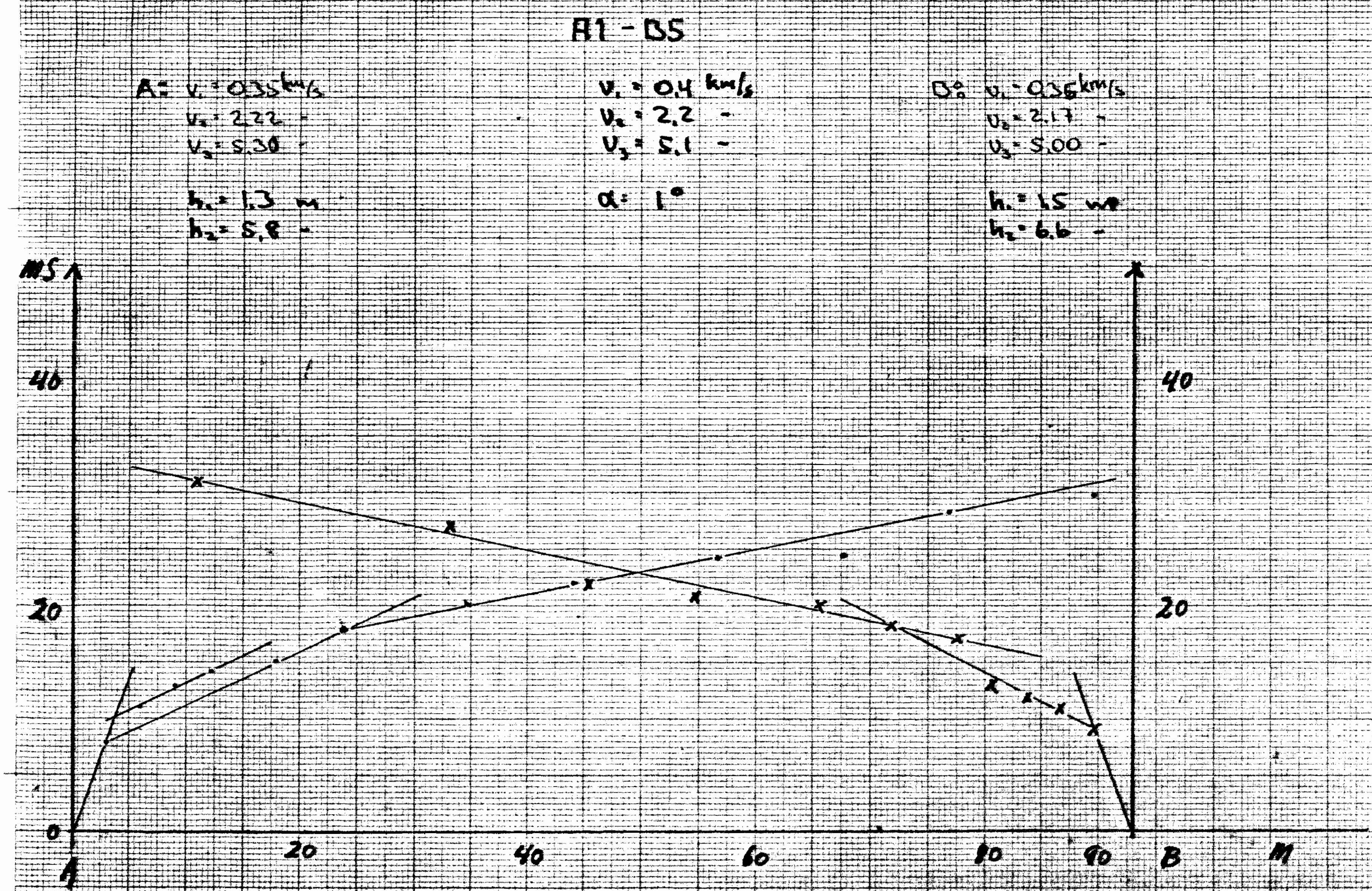
B: $v_1 = 0{,}3$ km/s
$v_2 = 2{,}30$ -
$v_3 = 5{,}26$ -

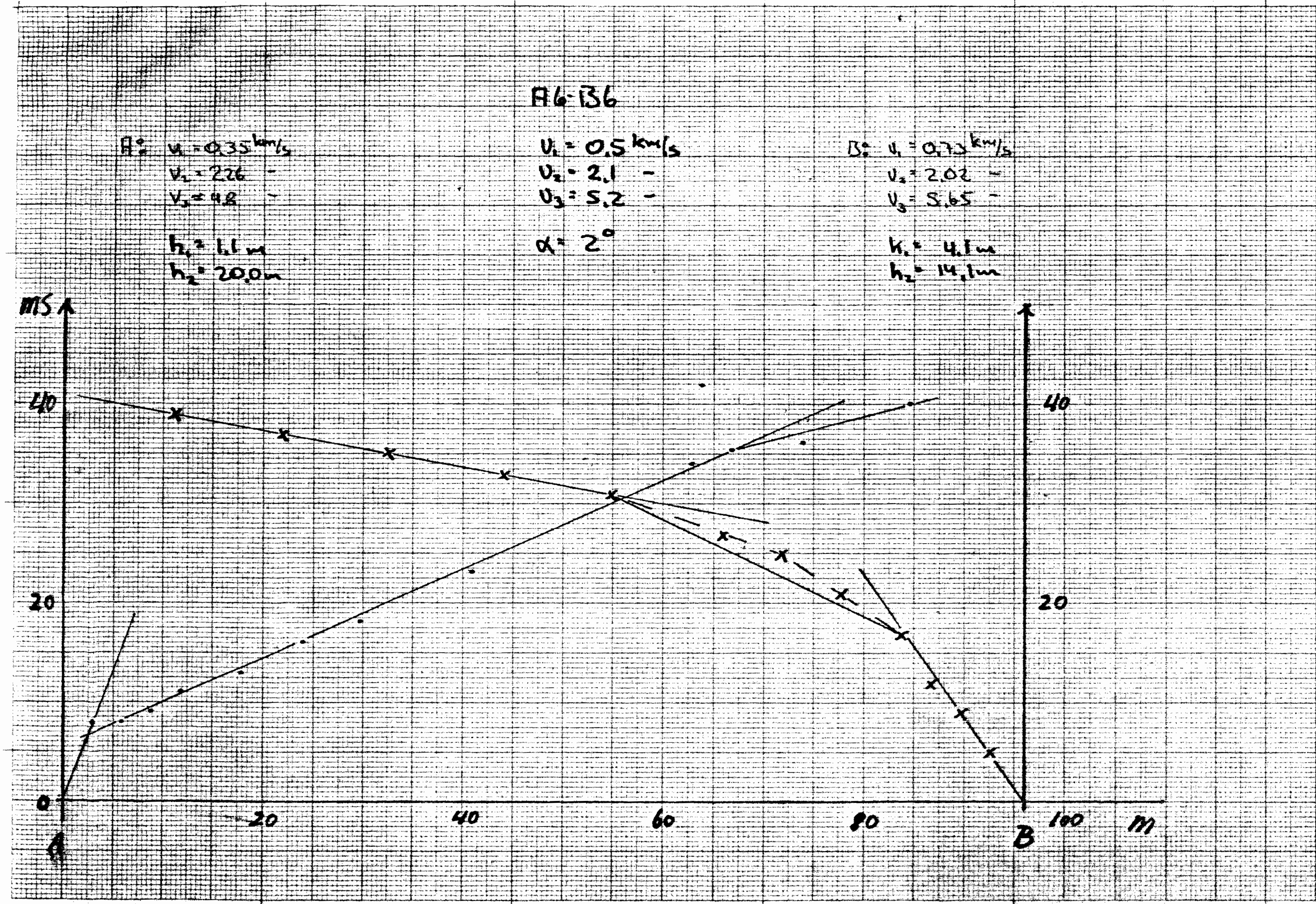
$h_1 = 0{,}4$ m
$h_2 = 6{,}3$ m

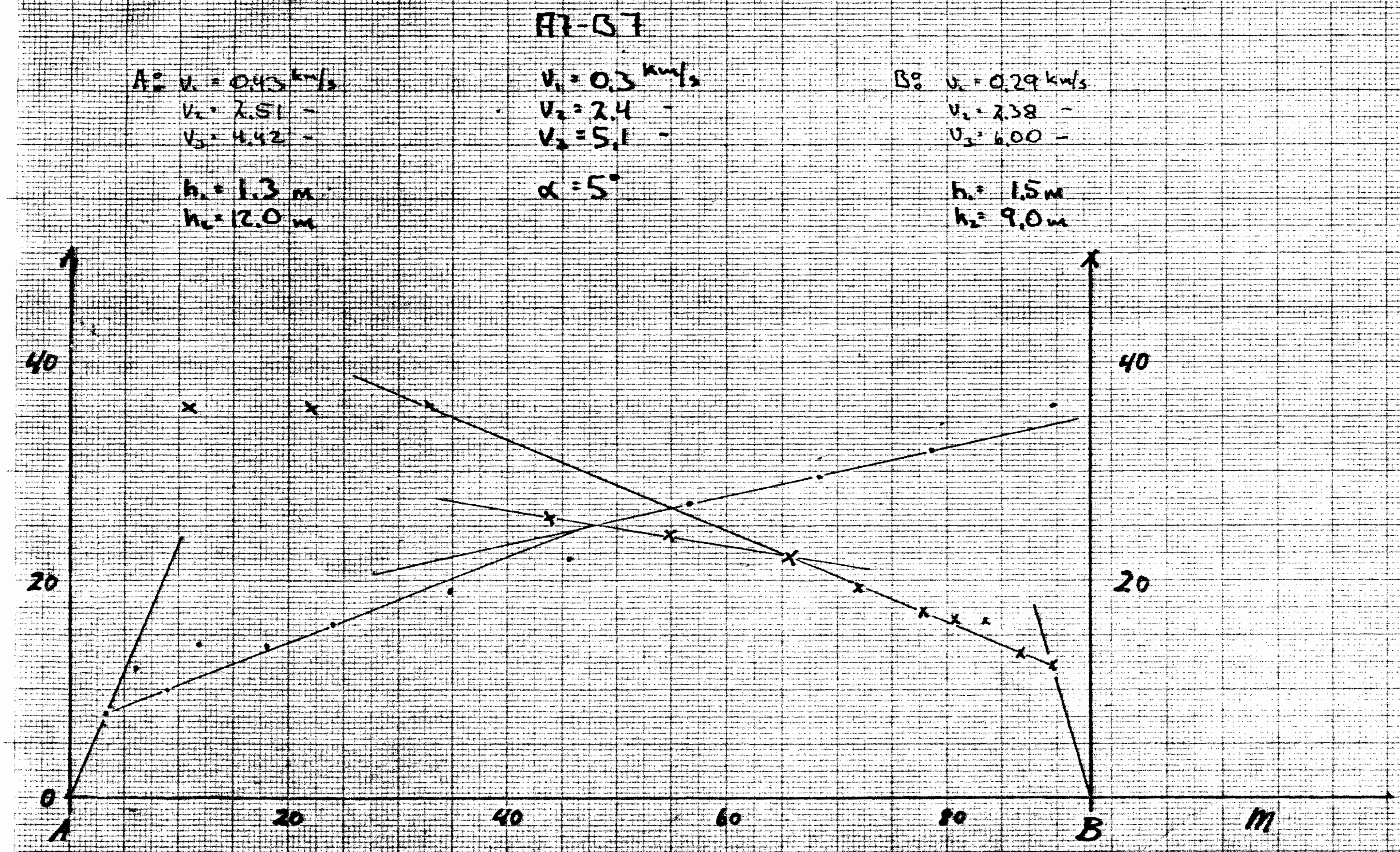


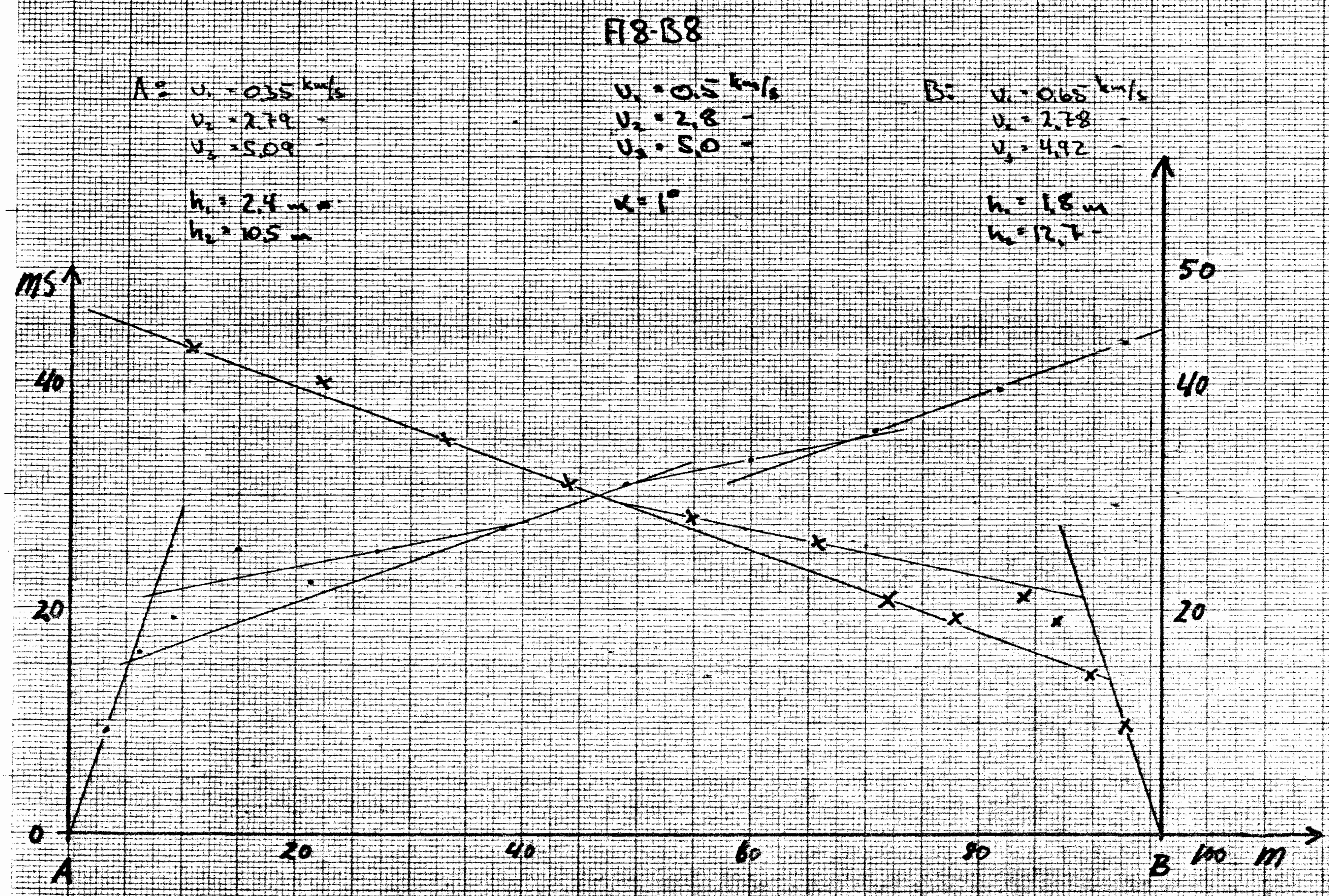

A3-B3
A: v_1 = 0,31 km/s
v_2 = 2,70 -
v_3 = 5,55 -
h_1 = 1,0 m
h_2 =
V_1 = 0,3 km/s
V_2 = 2,7 -
V_3 = 5,4 -
α = 1°
B: v_1 = 0,30 km/s
v_2 = 2,61 -
v_3 = 5,19 -
h_1 = 1,3 m
h_2 = 4,5 m
ms
40
20
0
A
20
40
60
80
100
B
m

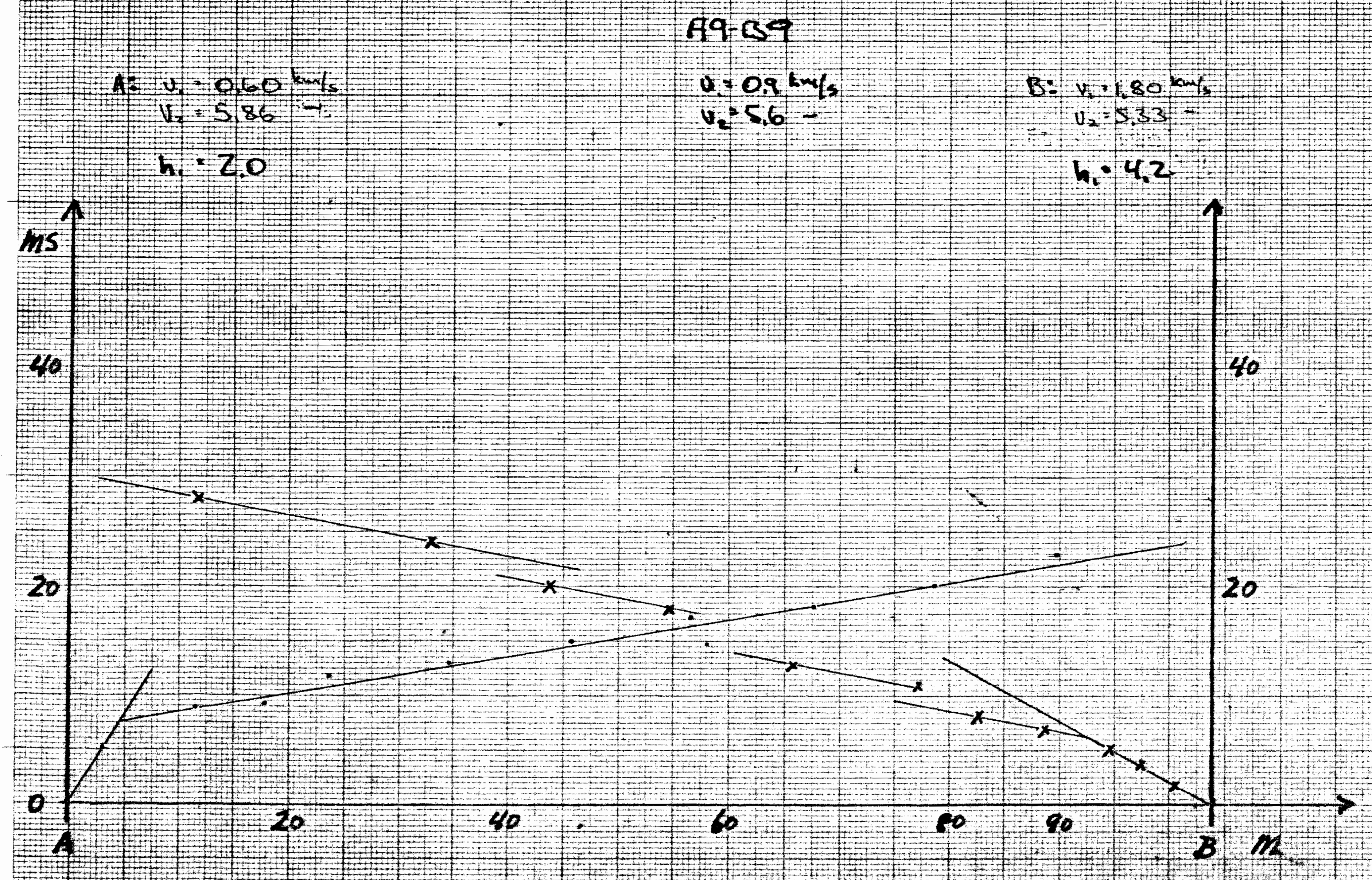

A4-B4
A: V_1 = 0,43 km/s
V_2 = 2,17 -
V_3 = 5,13 -
h_1 = 1,2 m
h_2 = 8,3 -
V_1 = 0,4 km/s
V_2 = 2,1 -
V_3 = 5,1 -
α = 0°
B: V_1 = 0,34 km/s
V_2 = 2,08 -
V_3 = 5,13 -
h_1 = 1,1 m
h_2 = 8,8 -
ms
40
20
0
A
20
40
60
80
100
B
m

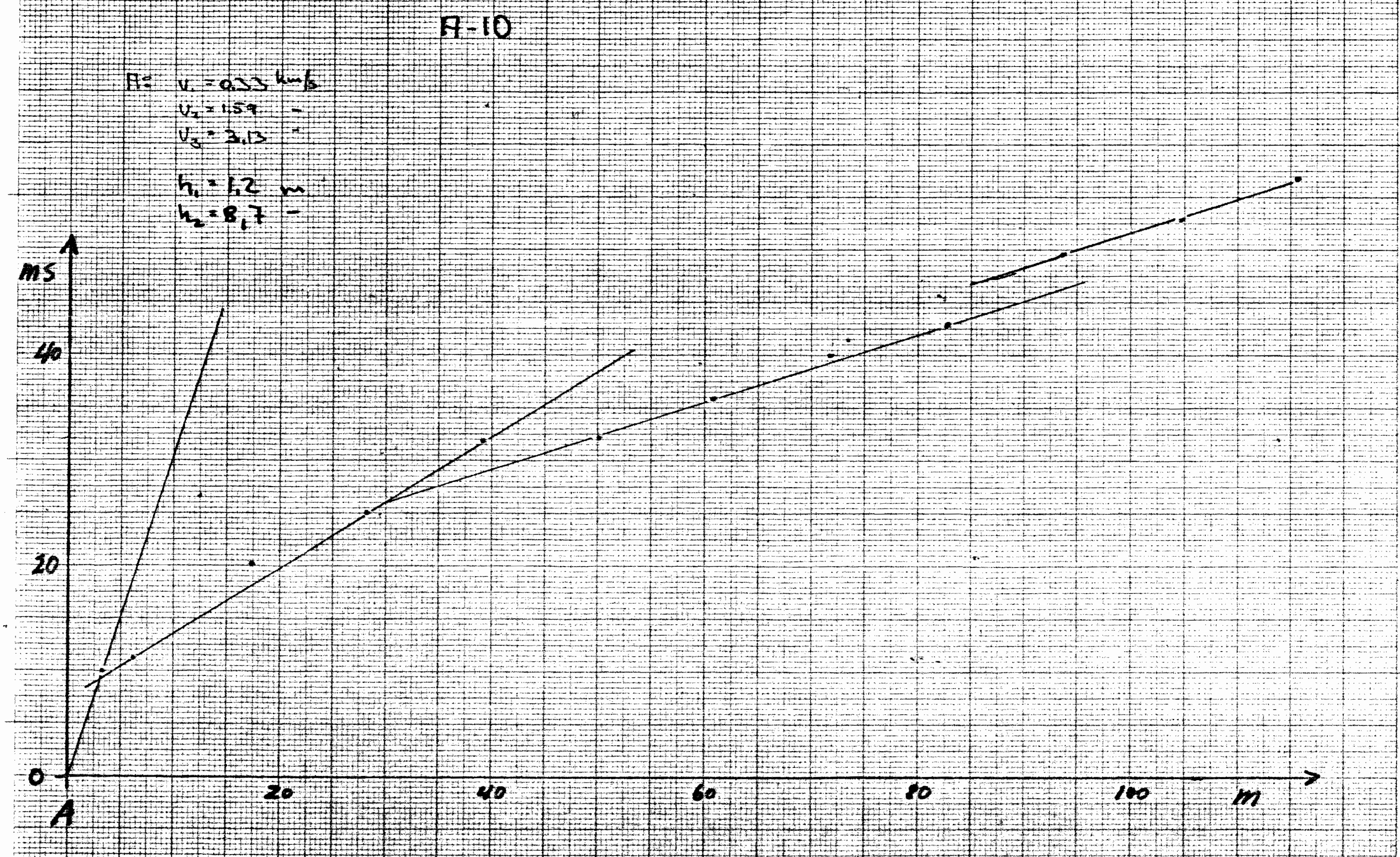

A1 - B5
A: v₁ = 0.35 km/s
v₂ = 2.22 -
v₃ = 5.30 -
h₁ = 1.3 m
h₂ = 5.8 -
v₁ = 0.4 km/s
v₂ = 2.2 -
v₃ = 5.1 -
α: 1°
B: v₁ = 0.36 km/s
v₂ = 2.17 -
v₃ = 5.00 -
h₁ = 1.5 m
h₂ = 6.6 -
MS
40
20
0
A
20
40
60
80
90
B
M

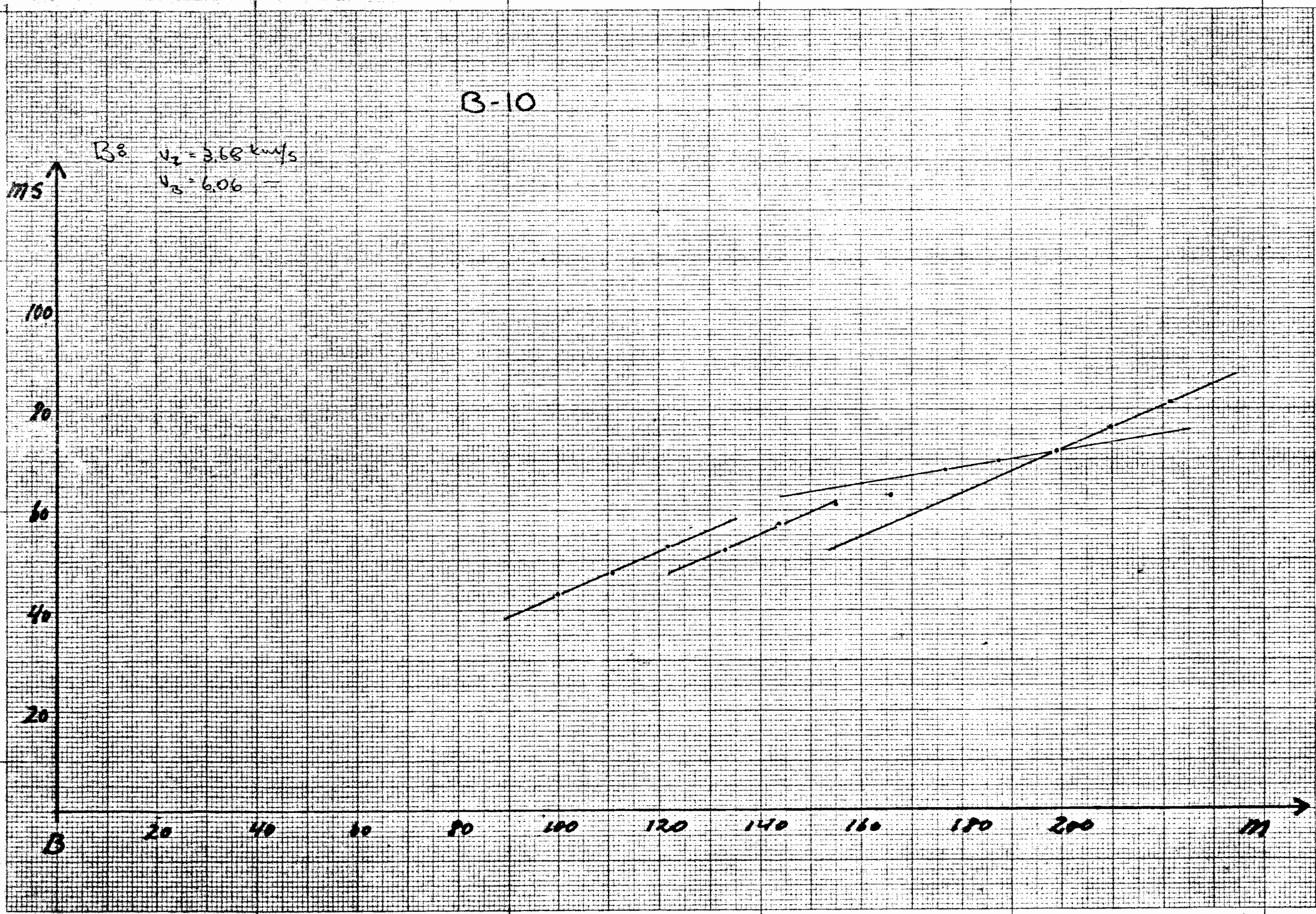

A6-136
A: $v_1 = 0{,}35$ km/s
$v_2 = 2{,}26$ –
$v_3 = 4{,}8$ –
$h_1 = 1{,}1$ m
$h_2 = 20{,}0$ m
$v_1 = 0{,}5$ km/s
$v_2 = 2{,}1$ –
$v_3 = 5{,}2$ –
$\alpha = 2°$
B: $v_1 = 0{,}73$ km/s
$v_2 = 2{,}02$ –
$v_3 = 5{,}65$ –
$h_1 = 4{,}1$ m
$h_2 = 14{,}1$ m
ms
40
20
0
20
40
60
80
100
m
A
B

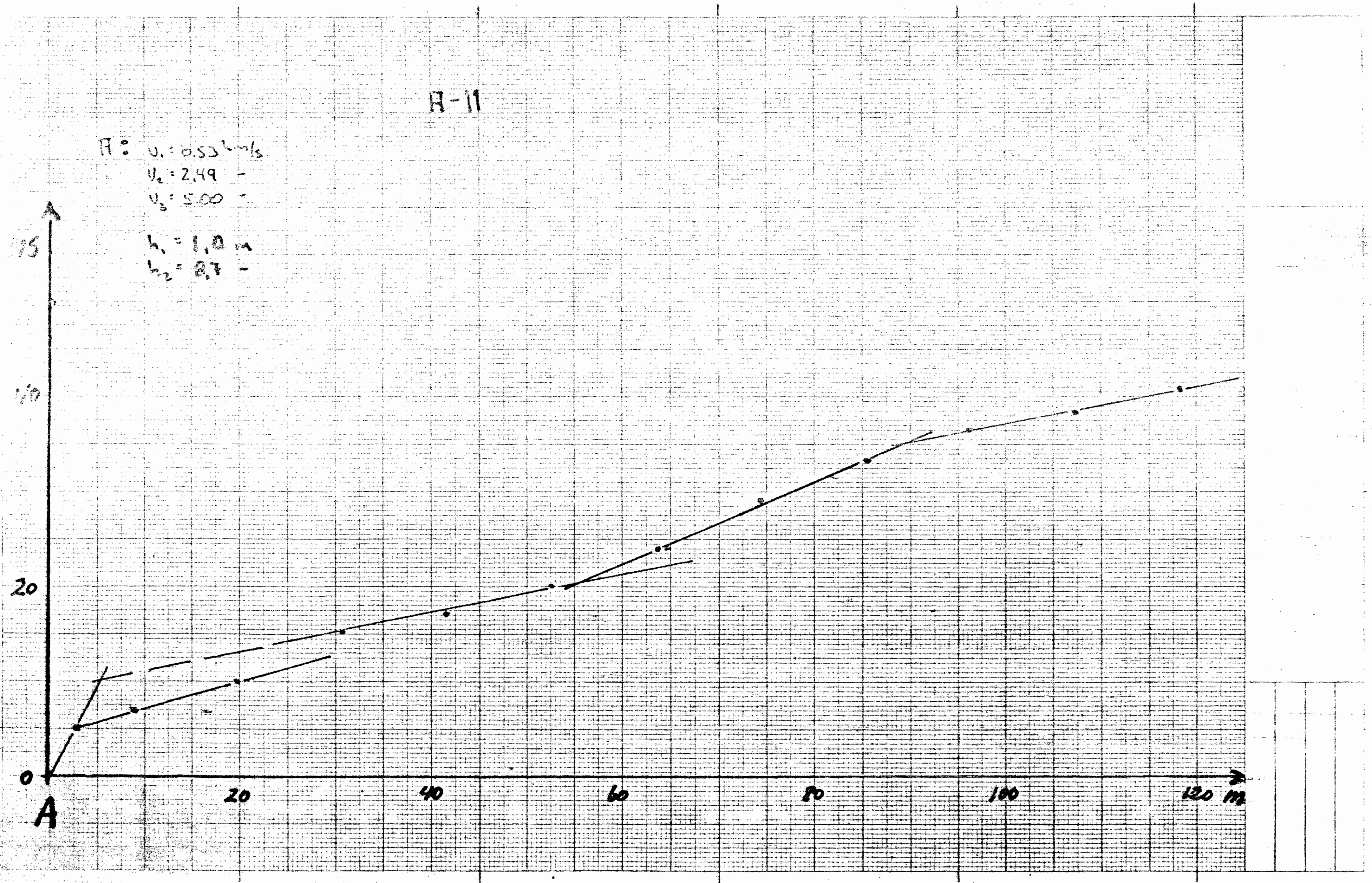

A7-B7
A: v1 = 0.43 km/s
v2 = 2.51 -
v3 = 4.42 -
h1 = 1.3 m
h2 = 12.0 m
V1 = 0.3 km/s
V2 = 2.4 -
V3 = 5.1 -
α = 5°
B: v1 = 0.29 km/s
v2 = 2.38 -
v3 = 6.00 -
h1 = 1.5 m
h2 = 9.0 m
40
20
0
20
40
60
80
m
A
B


A8-B8
A: v_1 = 0,35 km/s
v_2 = 2,79 -
v_3 = 5,09 -
h_1 = 2,4 m
h_2 = 10,5 m
v_1 = 0,5 km/s
v_2 = 2,8 -
v_3 = 5,0 -
α = 1°
B: v_1 = 0,65 km/s
v_2 = 2,78 -
v_3 = 4,92 -
h_1 = 1,8 m
h_2 = 12,7 -
ms
0
20
40
50
60
80
100
m
A
B

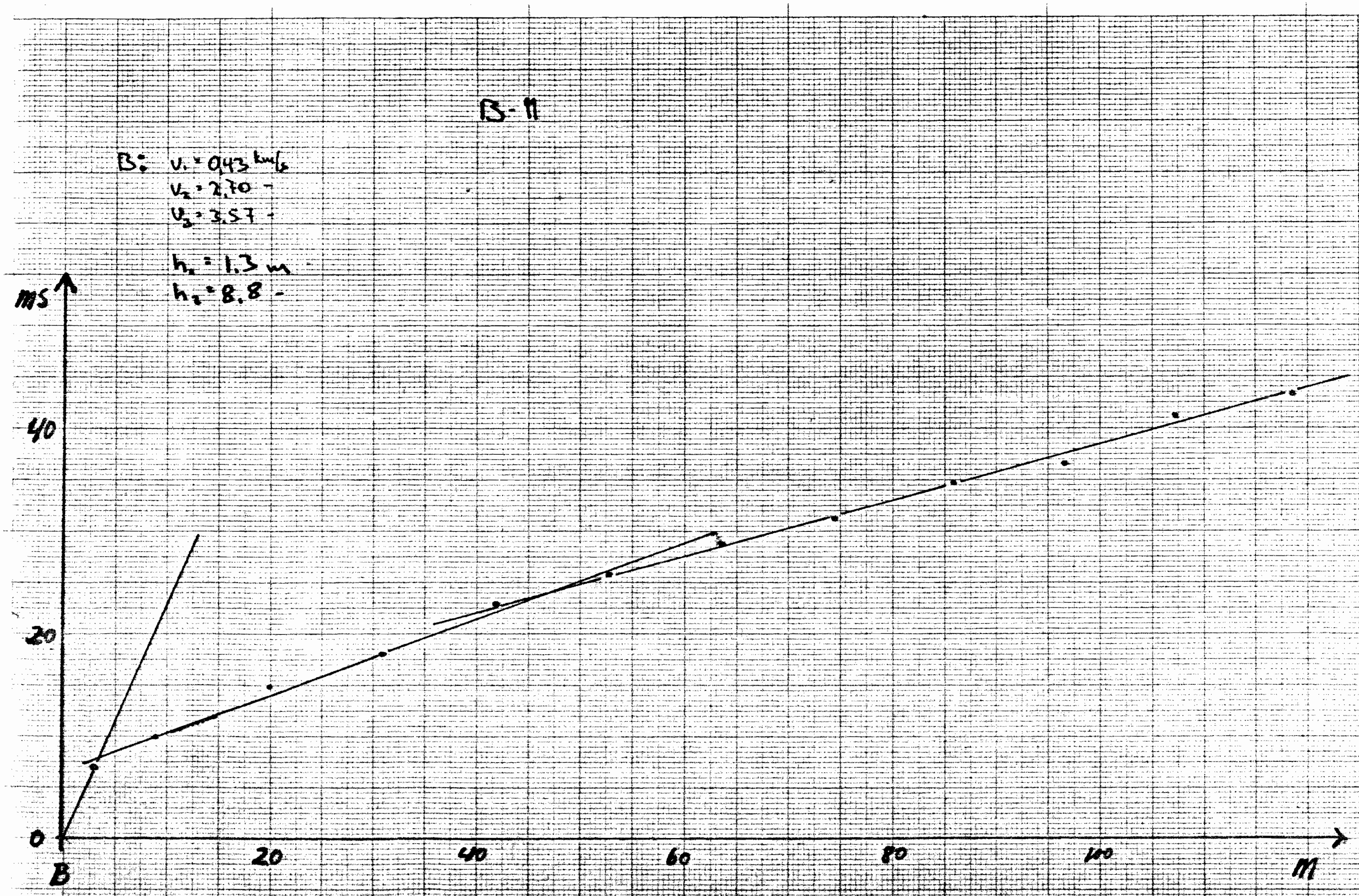

A9-B9
A: v_1 = 0,60 km/s
V_2 = 5,86 –
h_1 = 2,0
v_1 = 0,9 km/s
v_2 = 5,6 –
B: v_1 = 1,80 km/s
v_2 = 5,33 –
h_1 = 4,2
MS
40
20
0
20
40
60
80
90
A
B
m
40
20


A-10
A: v_1 = 0.33 km/s
v_2 = 1.59 -
v_3 = 3.13 -
h_1 = 1.2 m
h_2 = 8.7 -
ms
40
20
0
A
20
40
60
80
100
m

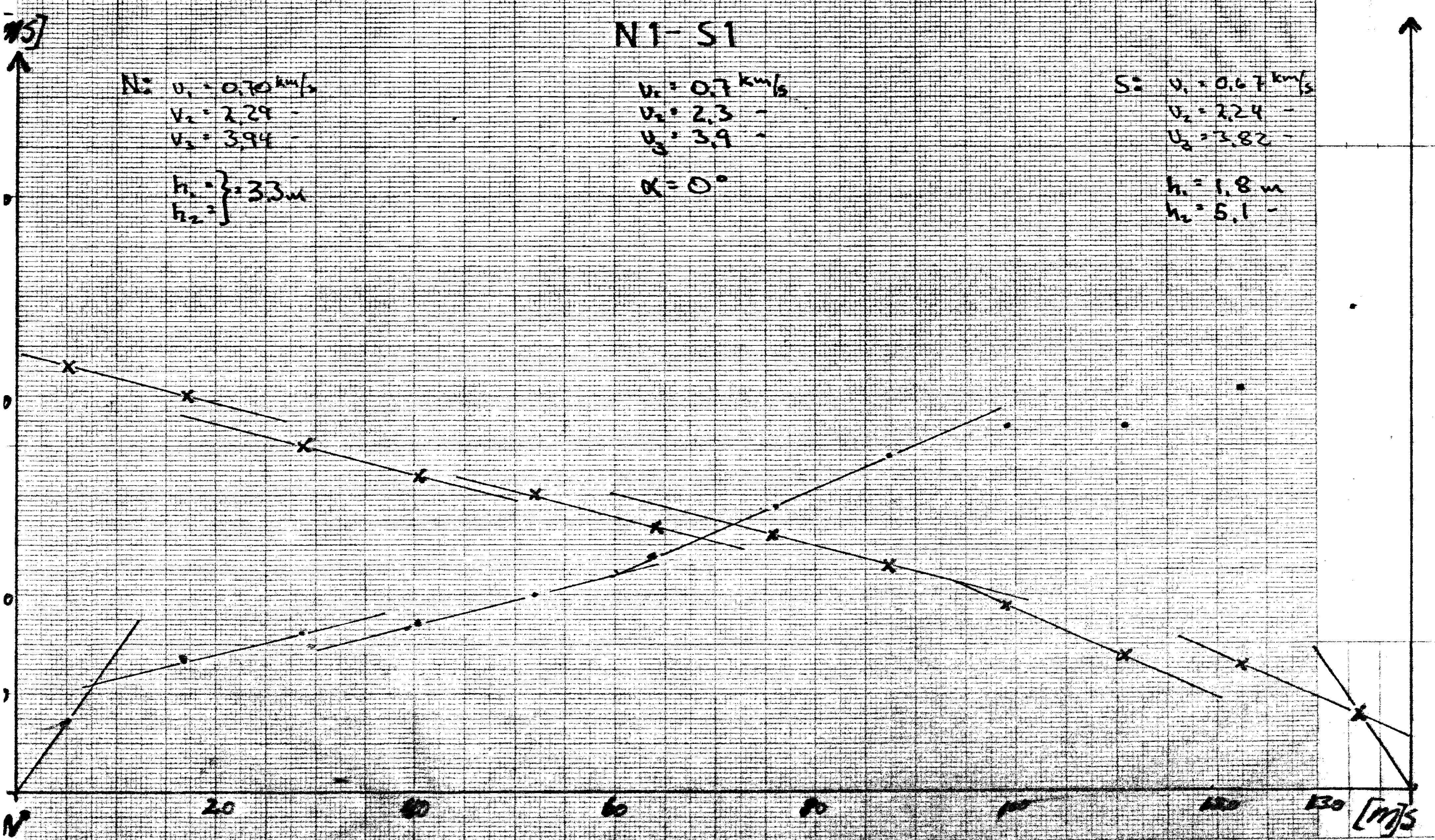

B-10
B: v_2 = 3.68 km/s
v_3 = 6.06 —
ms
100
90
60
40
20
B
20
40
60
80
100
120
140
160
180
200
m

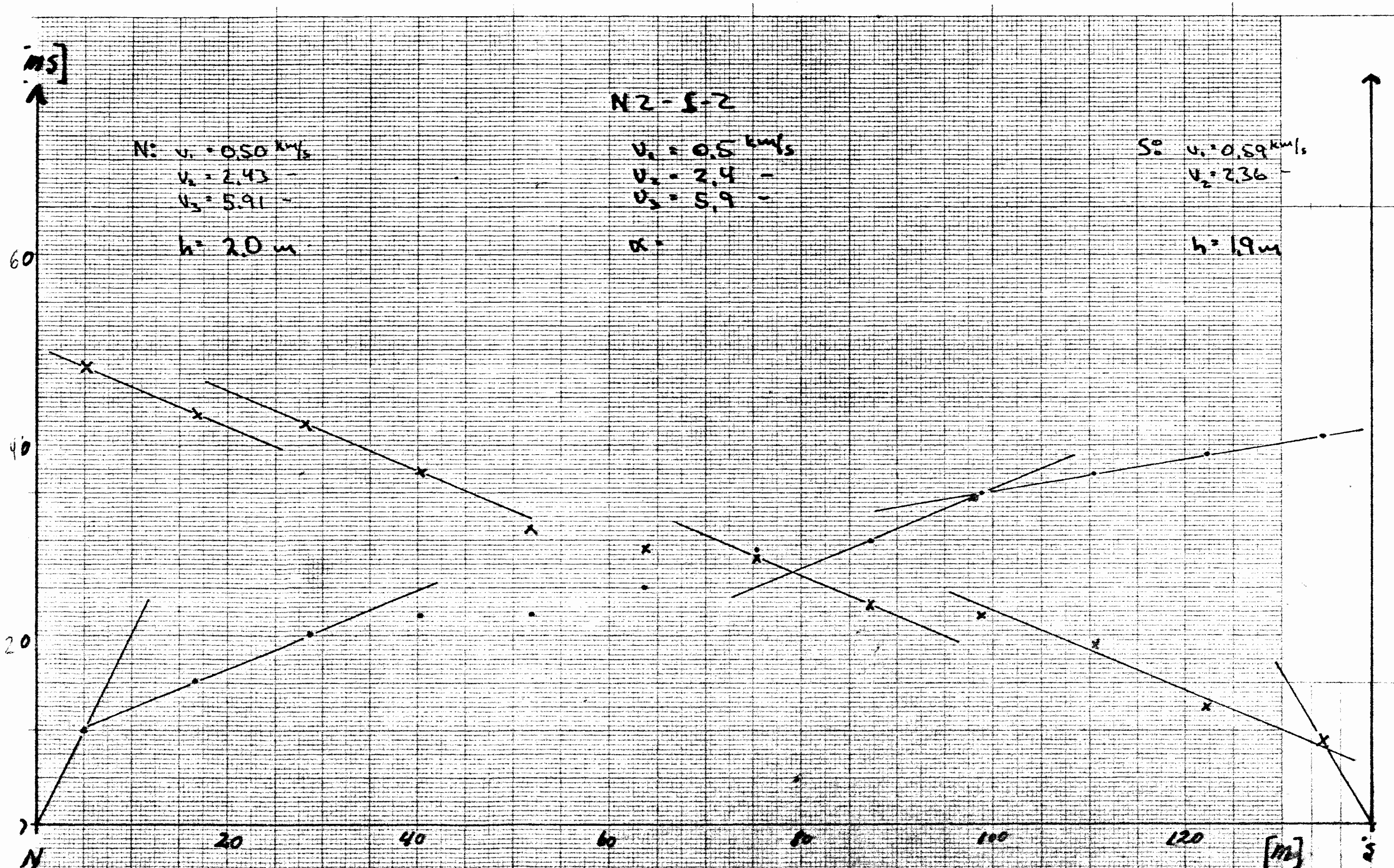


A-11
A: $v_1 = 0.53$ km/s
$v_2 = 2.49$ -
$v_3 = 5.00$ -
$h_1 = 1.0$ m
$h_2 = 8.7$ -
0
20
40
60
80
100
120 m
A

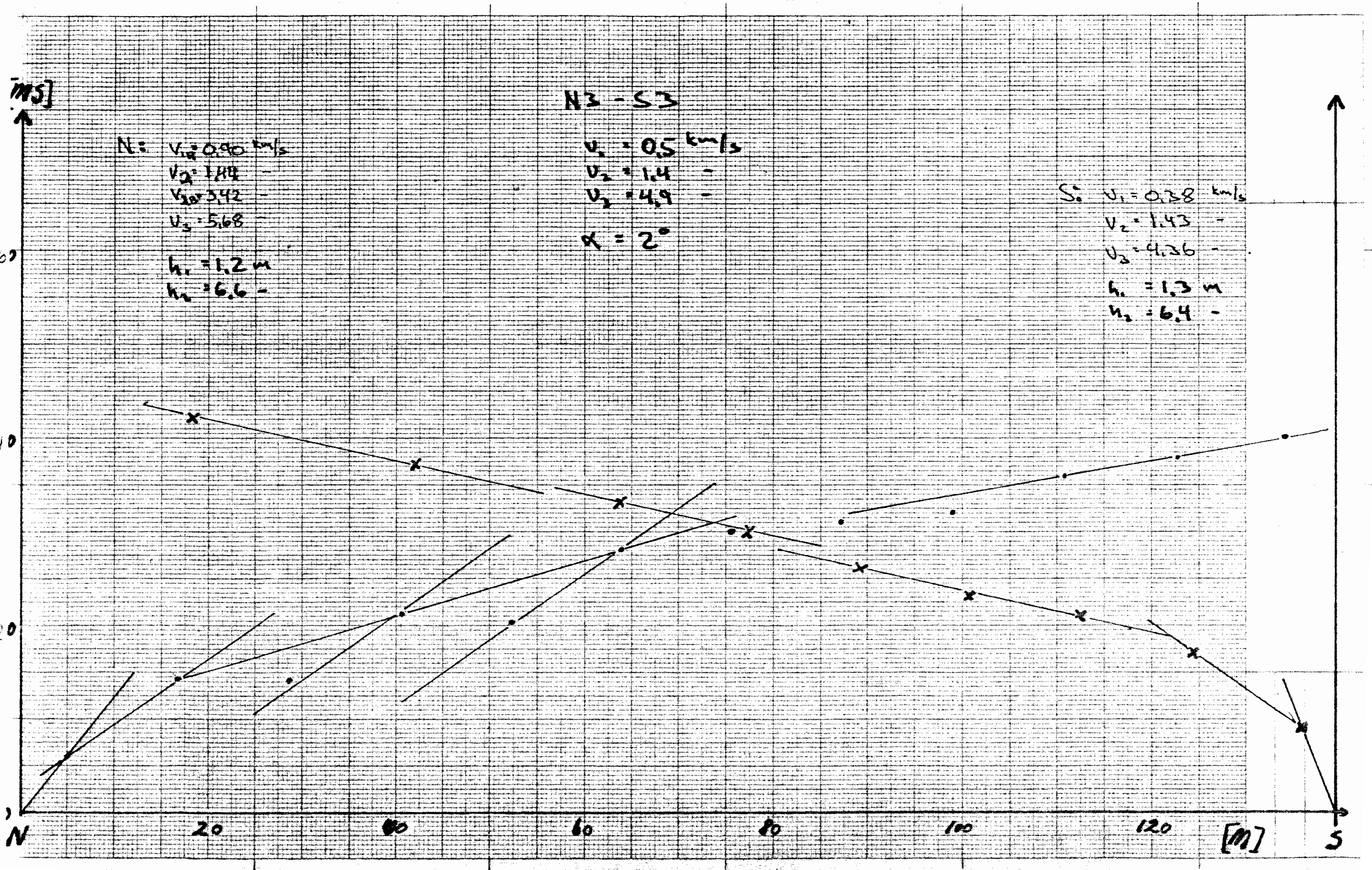

B-11
B: v1 = 0,43 km/s
v2 = 2,70 -
v3 = 3,57 -
h1 = 1.3 m
h2 = 8,8 -
ms
40
20
0
B
20
40
60
80
100
m

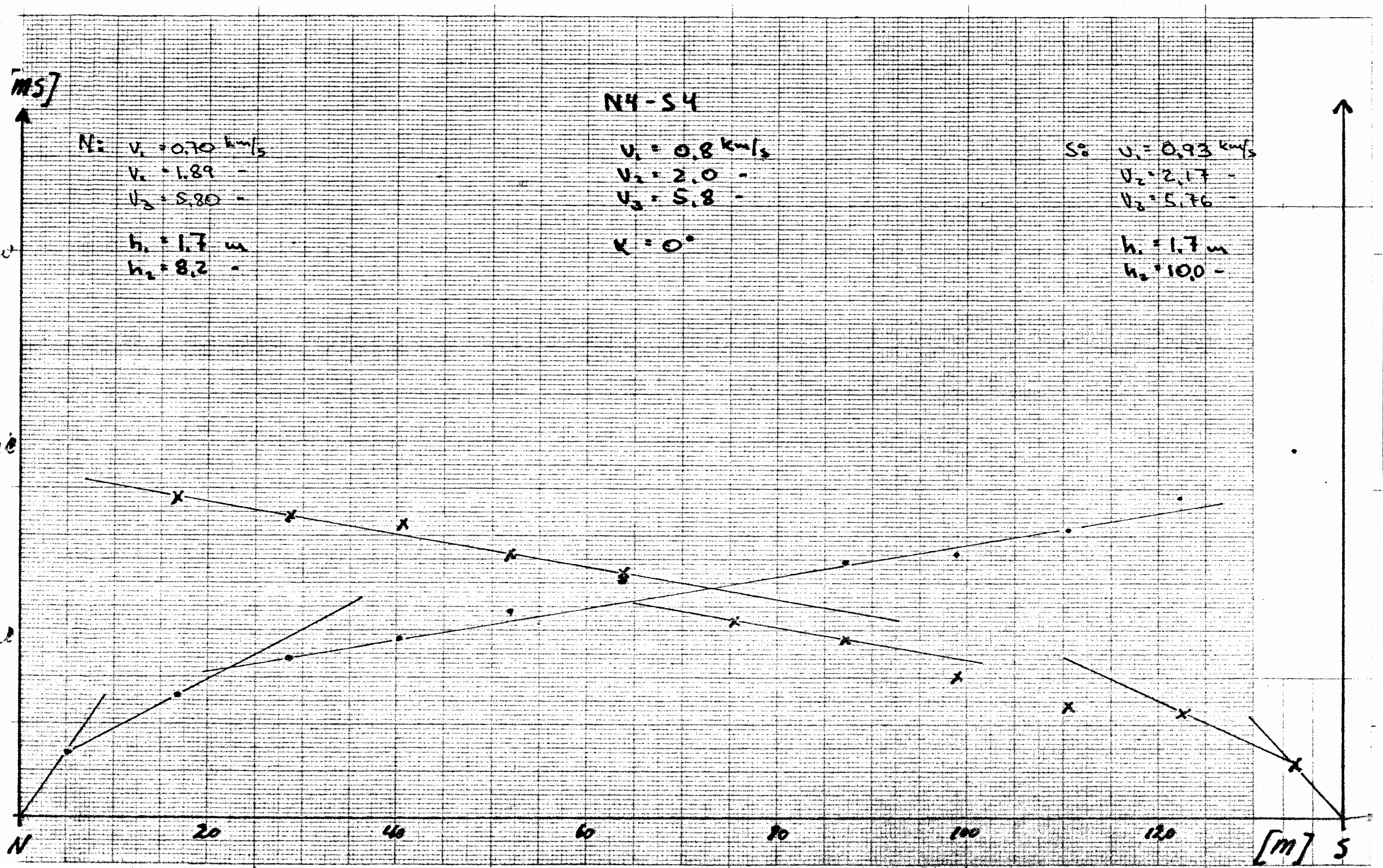
Esselte 4446 73 25 01 - 523 A4 - 1×1 mm

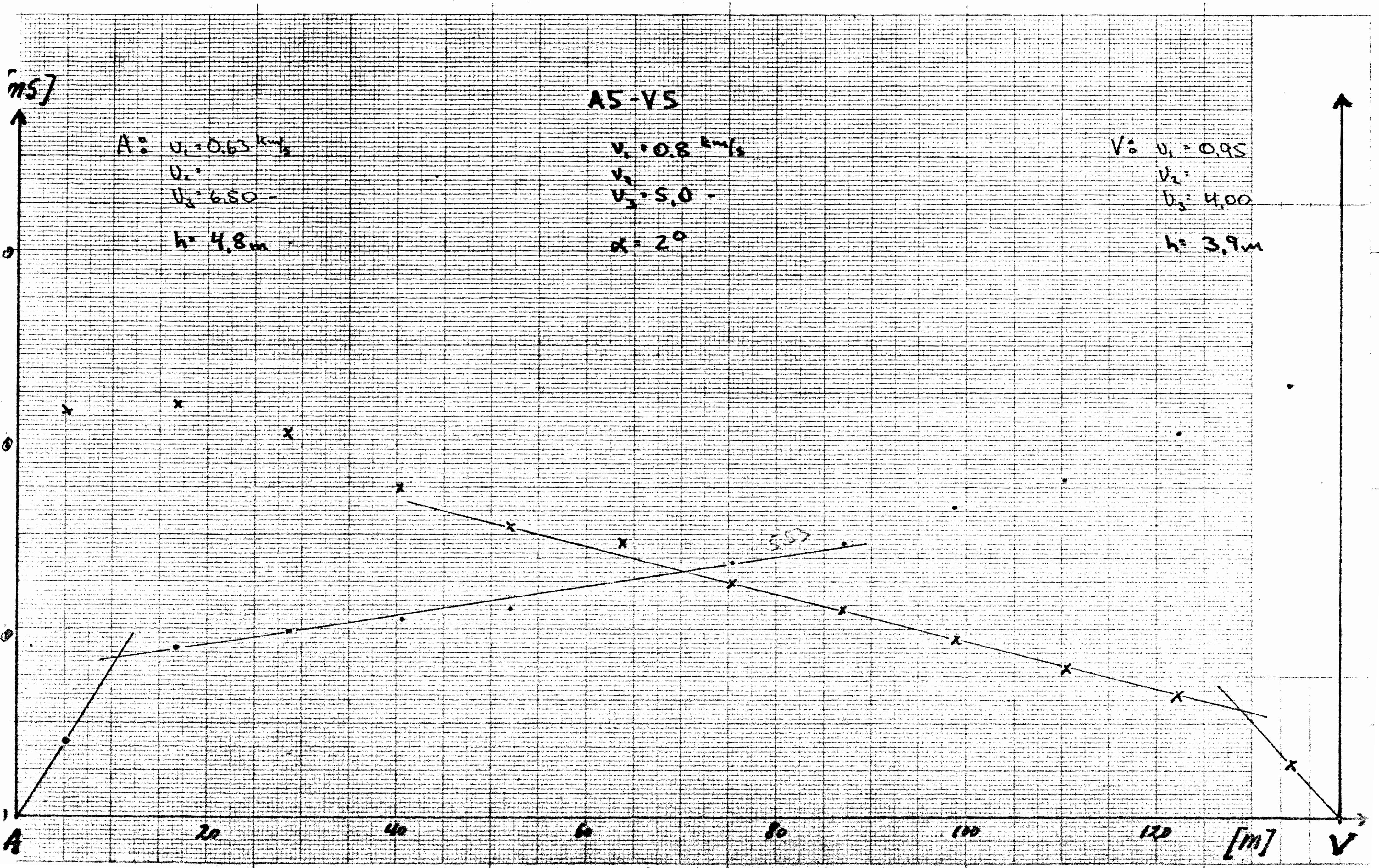


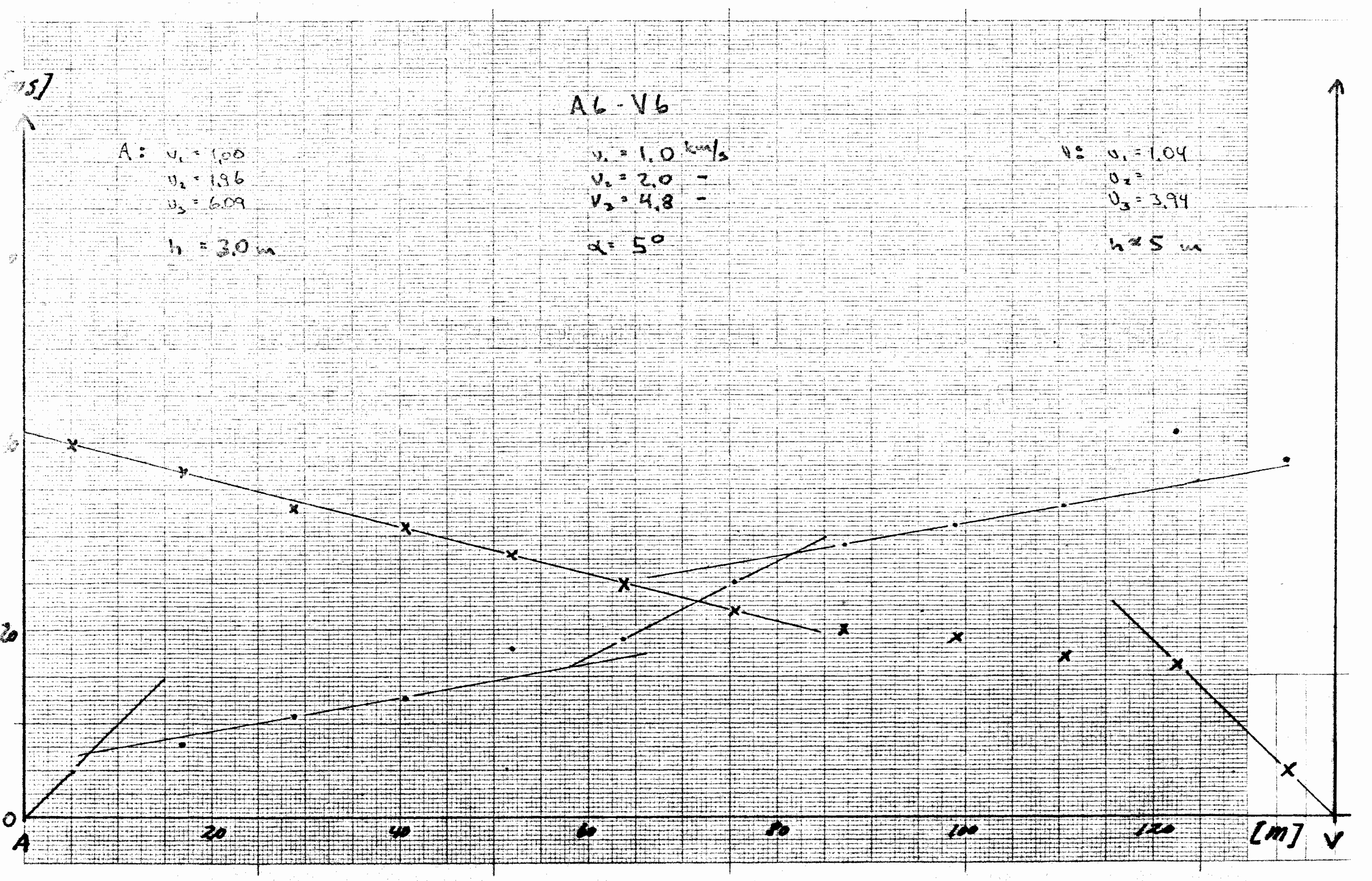

ms
N 2 - S - 2
N: v1 = 0,50 km/s
v2 = 2,43 -
v3 = 5,91 -
h = 2,0 m
v1 = 0,5 km/s
v2 = 2,4 -
v3 = 5,9 -
α =
S: v1 = 0,59 km/s
v2 = 2,36 -
h = 1,9 m
60
40
20
20
40
60
80
100
120
m
N
S

73 25 01 - 523 A4 - 1 x 1 mm
ESSELTE 4446

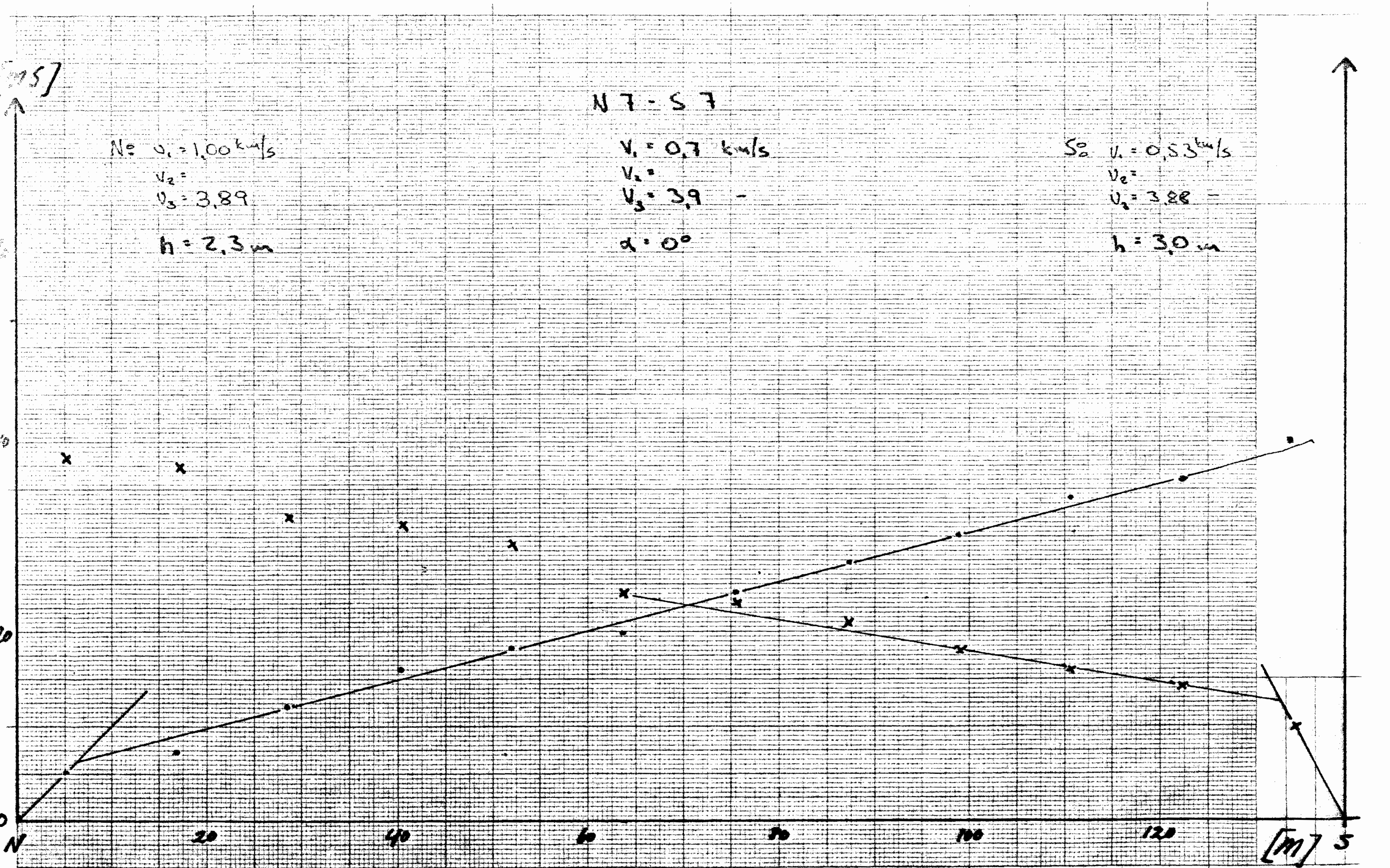



[ms]
N4 - S4
N: v₁ = 0,70 km/s
v₂ = 1,89 -
v₃ = 5,80 -
h₁ = 1,7 m
h₂ = 8,2 -
v₁ = 0,8 km/s
v₂ = 2,0 -
v₃ = 5,8 -
α = 0°
S: v₁ = 0,93 km/s
v₂ = 2,17 -
v₃ = 5,76 -
h₁ = 1,7 m
h₂ = 10,0 -
N
20
40
60
80
100
120
[m]
S

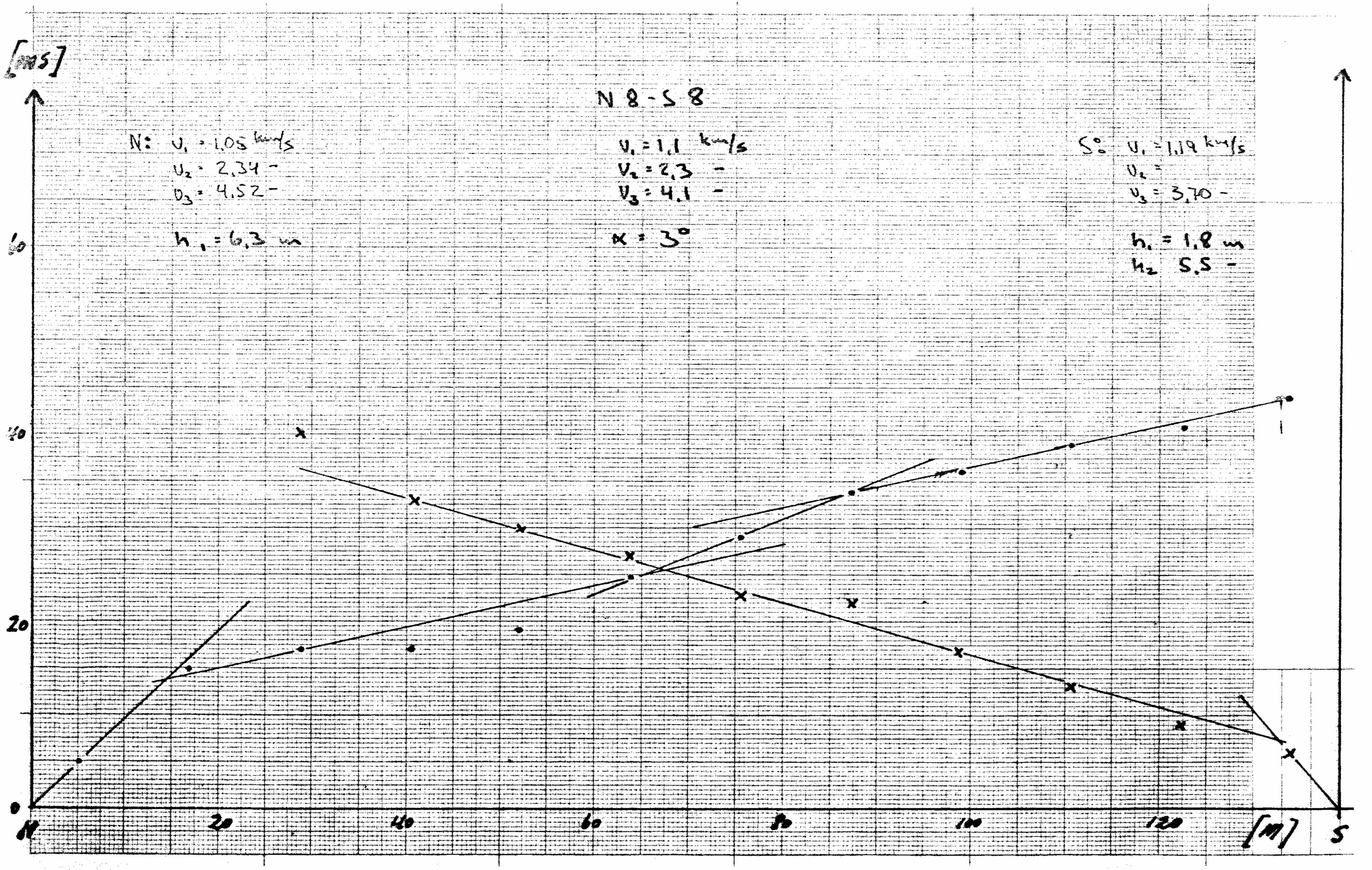

[ms]
A5-V5
A: v_1 = 0.63 km/s
v_2 =
v_3 = 6.50 -
h = 4.8 m
v_1 = 0.8 km/s
v_2
v_3 = 5.0 -
α = 2°
V: v_1 = 0.95
v_2 =
v_3 = 4.00
h = 3.9 m
20
40
60
80
100
120
[m]
A
V

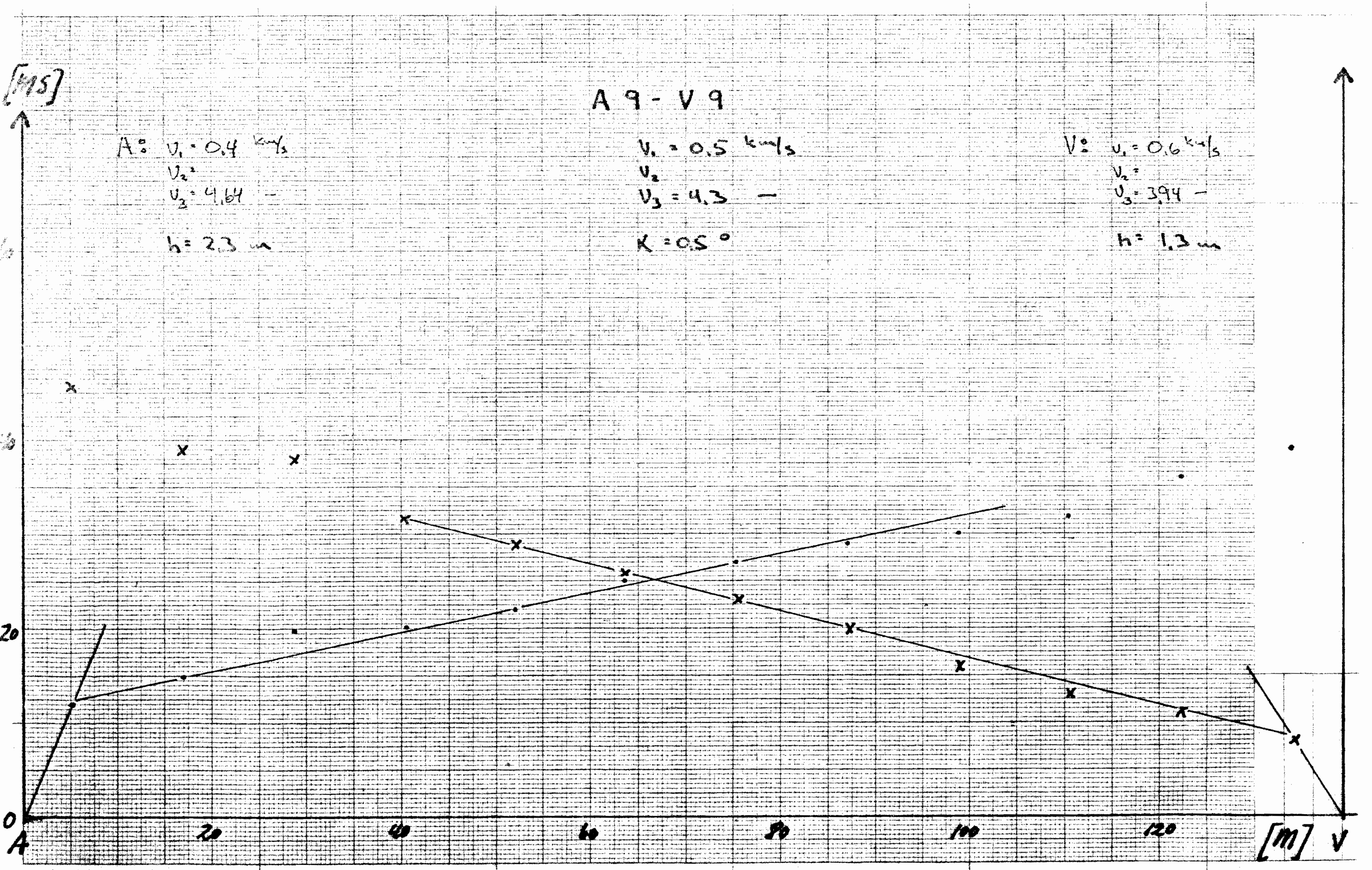


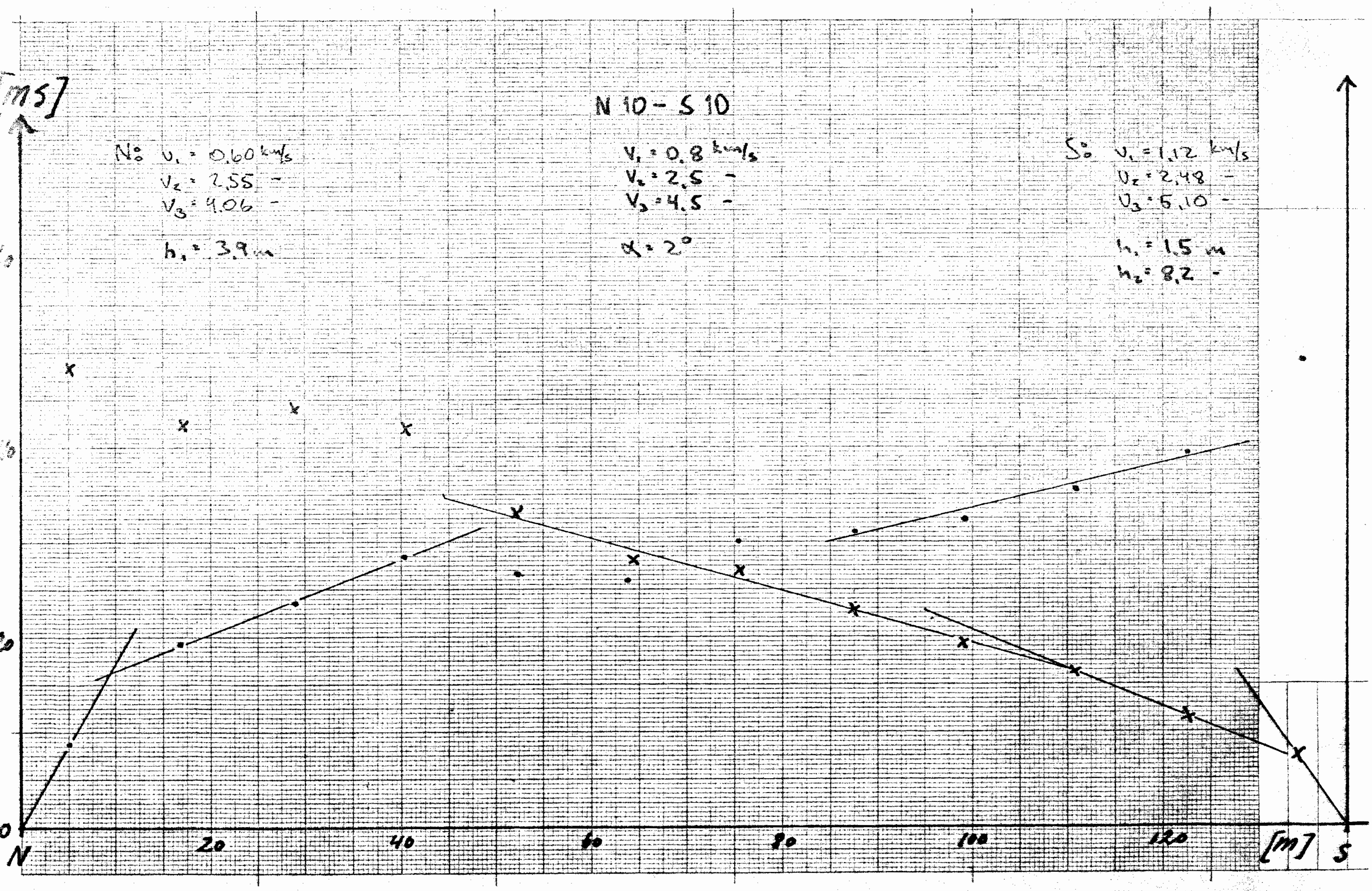
ESSELTE 4446
AL-V6
A: v1 = 1,00
v2 = 1,96
v3 = 6,09
h = 3,0 m
v1 = 1,0 km/s
v2 = 2,0 -
v3 = 4,8 -
α = 5°
V: v1 = 1,04
v2 =
v3 = 3,94
h ≈ 5 m
[ms]
20
0
A
20
40
60
80
100
120
[m]
V

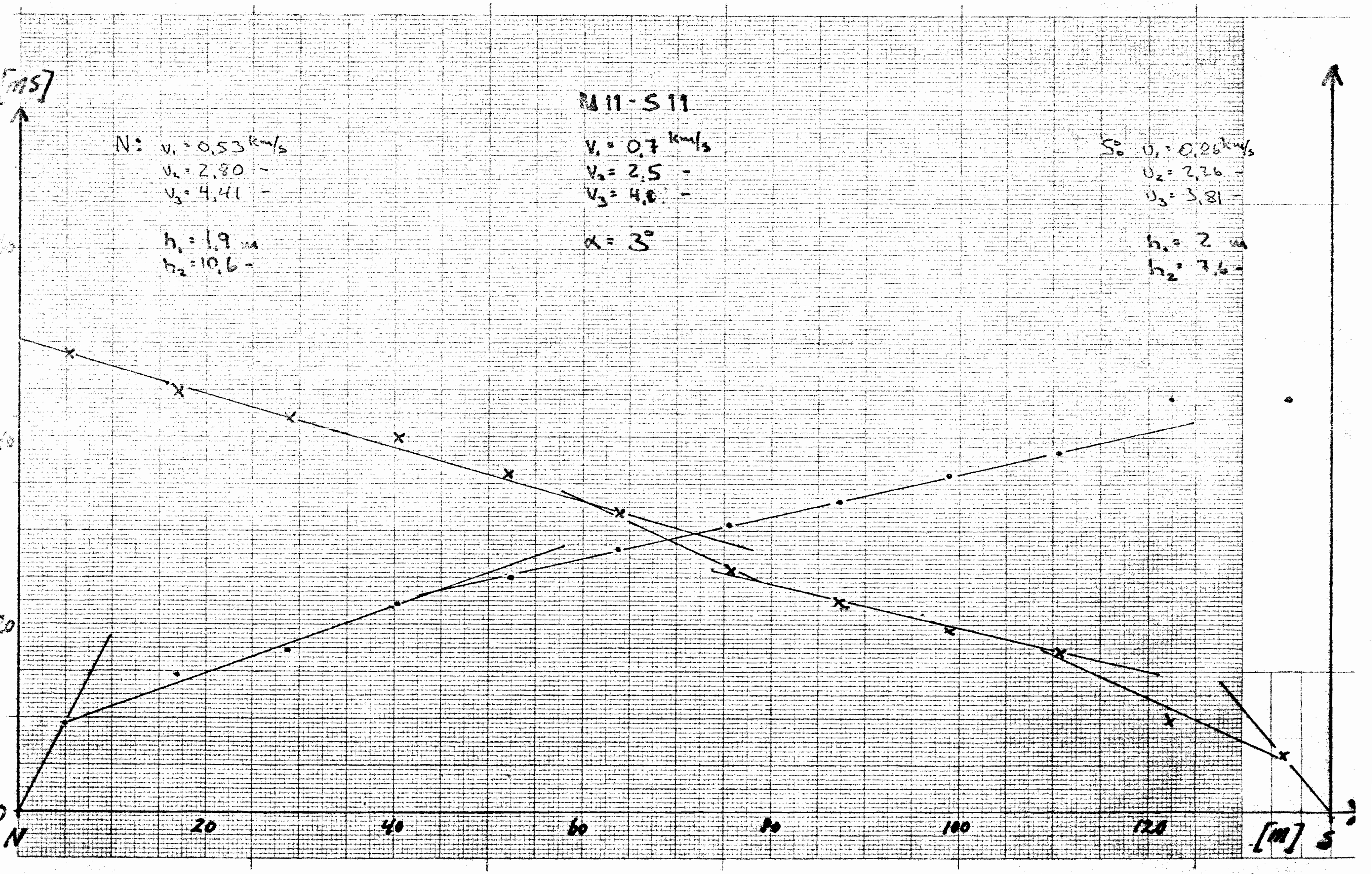


N 7 - S 7
N: v1 = 1,00 km/s
v2 =
v3 = 3,89
h = 2,3 m
V1 = 0,7 km/s
V2 =
V3 = 3,9
α = 0°
S: V1 = 0,53 km/s
V2 =
V3 = 3,88
h = 3,0 m
[ms]
N
20
40
60
80
100
120
[m]
S

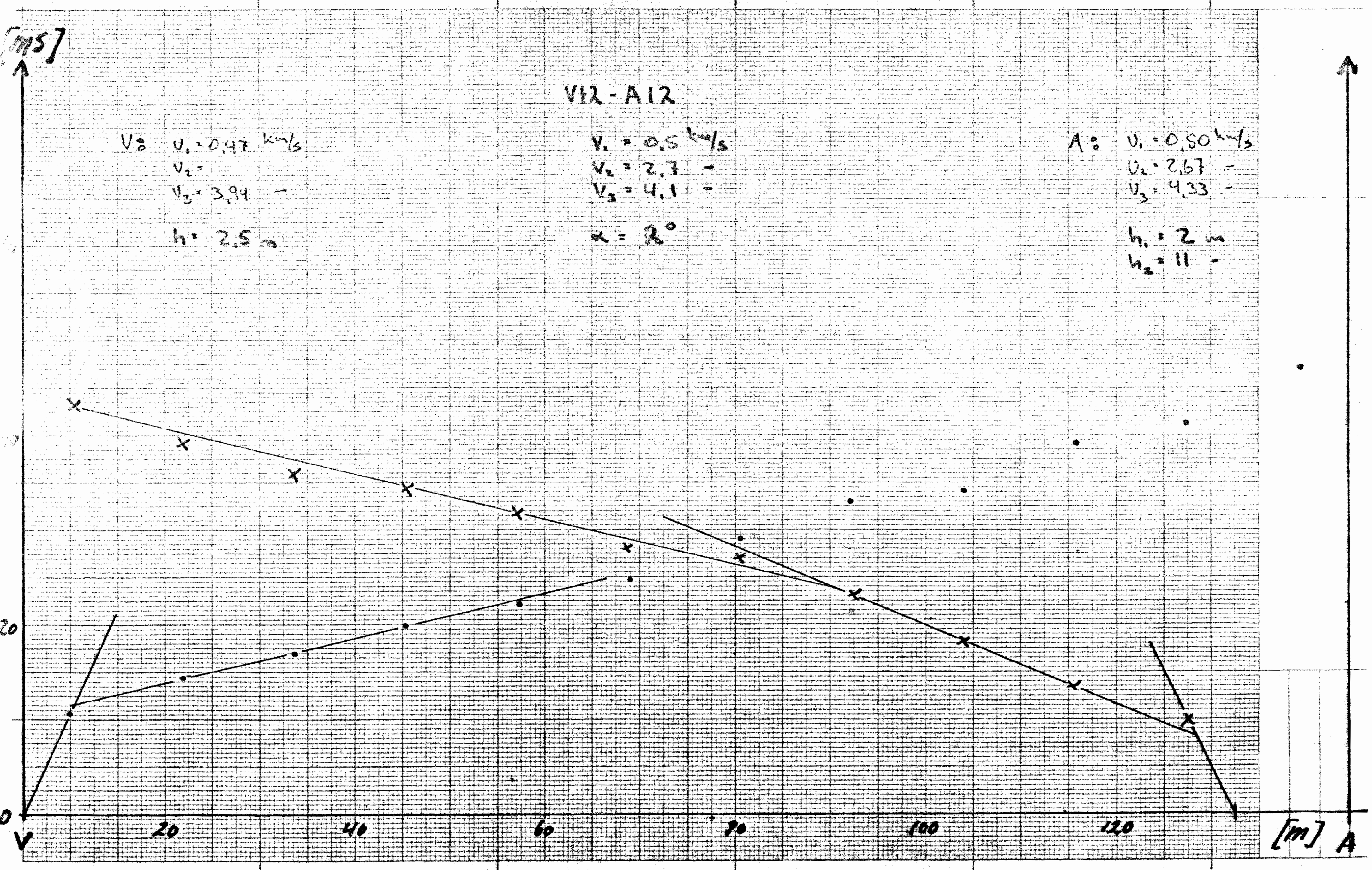

[ms]
N 8 - S 8
N: v_1 = 1,05 km/s
v_2 = 2,34 -
v_3 = 4,52 -
h_1 = 6,3 m
v_1 = 1,1 km/s
v_2 = 2,3 -
v_3 = 4,1 -
α = 3°
S: v_1 = 1,19 km/s
v_2 =
v_3 = 3,70 -
h_1 = 1,8 m
h_2 5,5 -
60
40
20
0
N
20
40
60
80
100
120
[m]
S


A 9 - V 9
[MS]
A: v1 = 0.4 km/s
v2 =
v3 = 4.64 –
h = 2.3 m
v1 = 0.5 km/s
v2
v3 = 4.3 –
K = 0.5 °
V: v1 = 0.6 km/s
v2 =
v3 = 3.94 –
h = 1.3 m
0
20
A
20
40
60
80
100
120
[m]
V

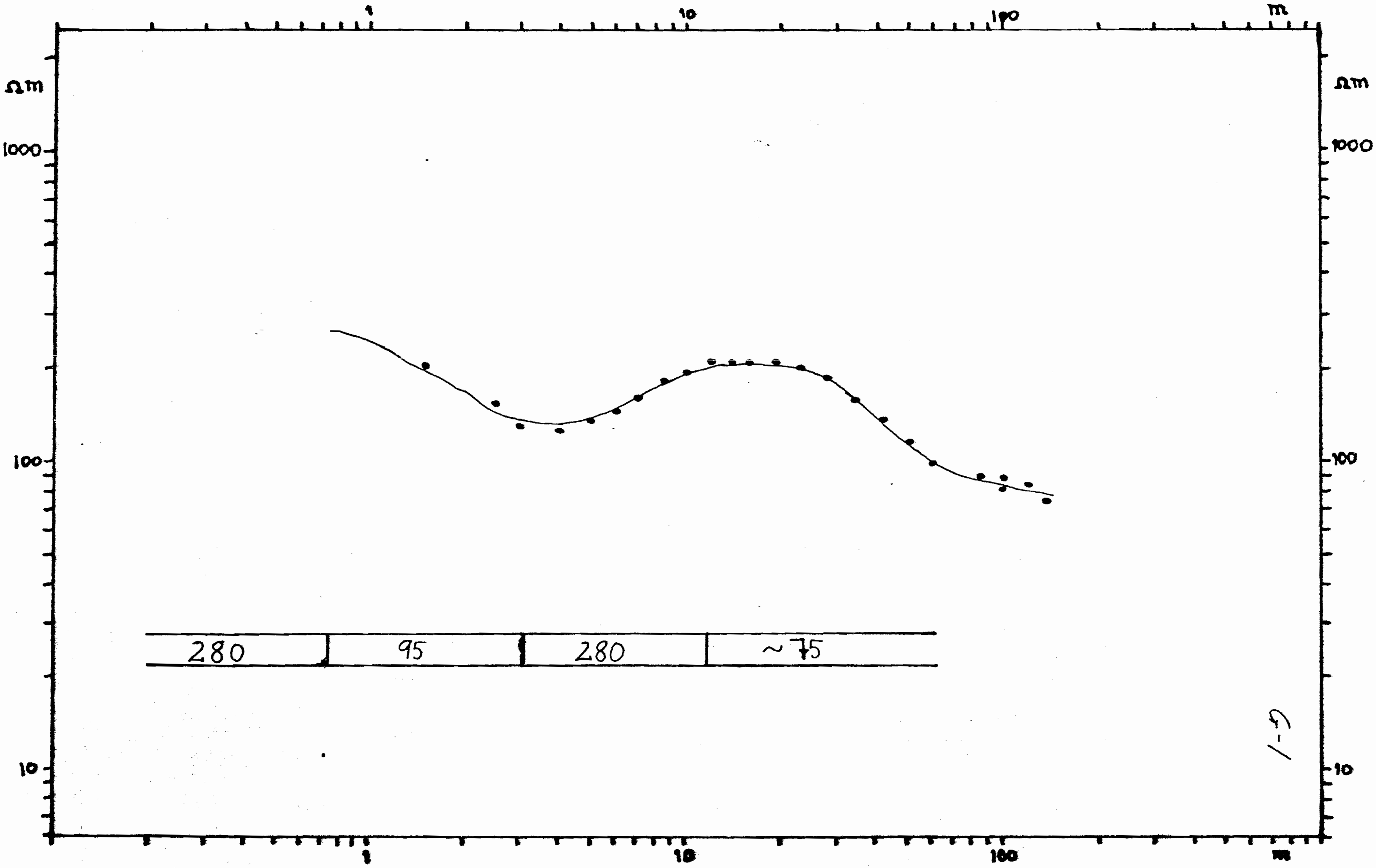

N 10 – S 10
N: v_1 = 0,60 km/s
v_2 = 2,55 –
v_3 = 4,06 –
h_1 = 3,9 m
V_1 = 0,8 km/s
V_2 = 2,5 –
V_3 = 4,5 –
α = 2°
S: v_1 = 1,12 km/s
v_2 = 2,48 –
v_3 = 5,10 –
h_1 = 1,5 m
h_2 = 8,2 –
[ms]
0
20
40
60
80
100
120
[m]
N
S



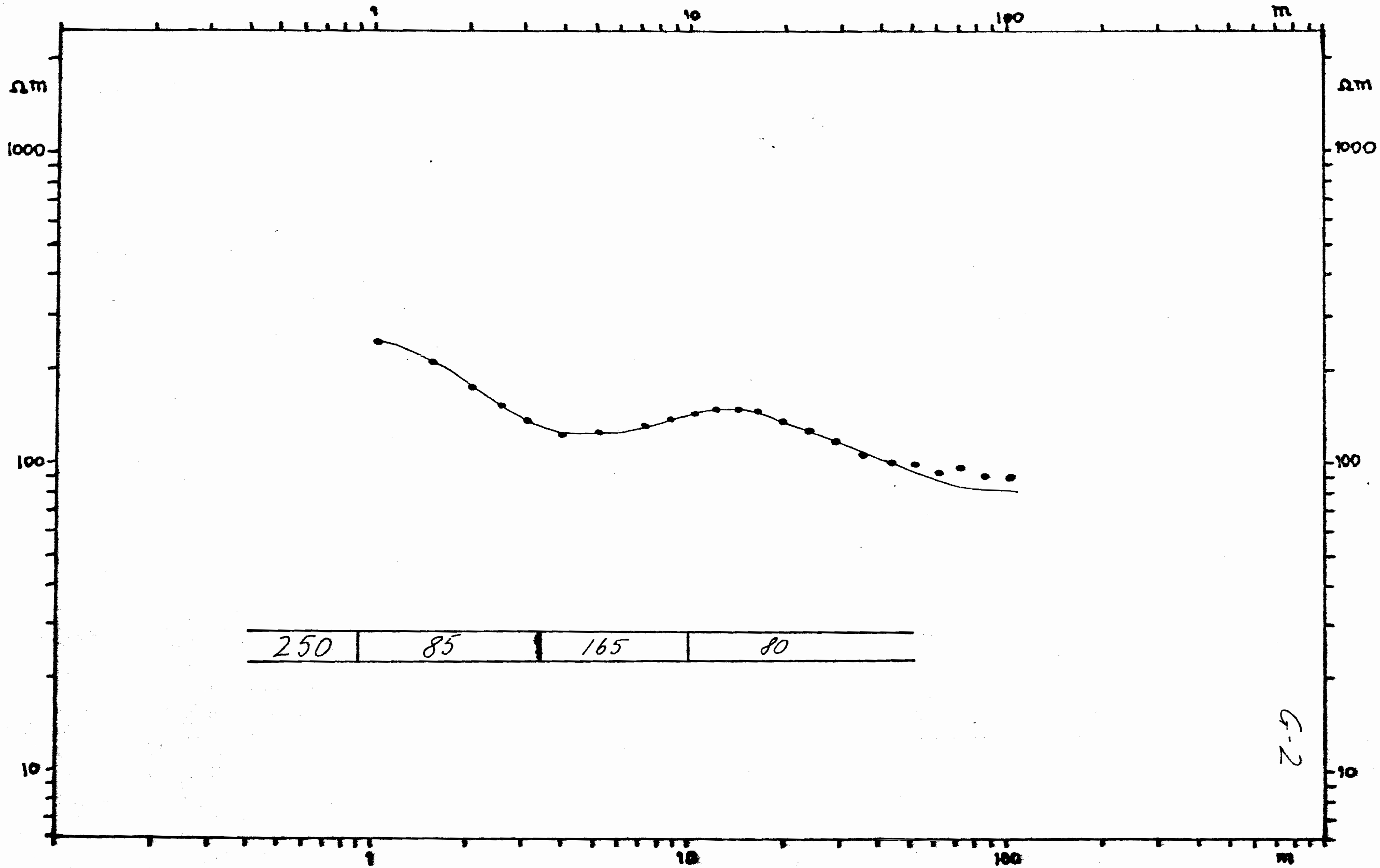
M11 - S11
N: v1 = 0,53 km/s
v2 = 2,80 -
v3 = 4,41 -
h1 = 1,9 m
h2 = 10,6 -
V1 = 0,7 km/s
V2 = 2,5 -
V3 = 4,0 -
α = 3°
S: v1 = 0,26 km/s
v2 = 2,26 -
v3 = 3,81 -
h1 = 2 m
h2 = 7,6 -
[ms]
N
20
40
60
80
100
120
[m]
S



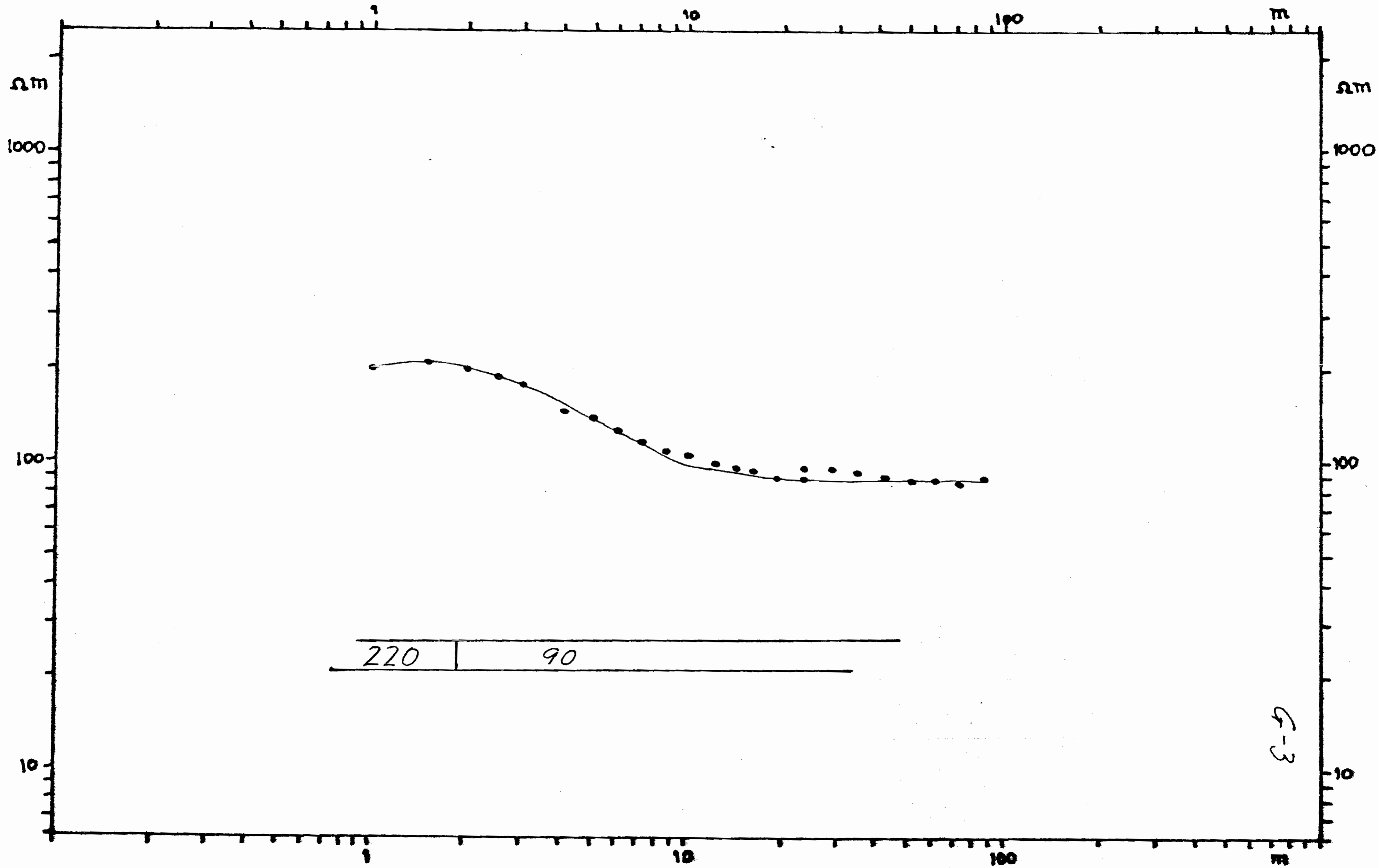
[ms]
V12 - A12
V: v_1 = 0,47 km/s
v_2 =
v_3 = 3,94 -
h = 2,5 m
v_1 = 0,5 km/s
v_2 = 2,7 -
v_3 = 4,1 -
α = 2°
A: v_1 = 0,50 km/s
v_2 = 2,67 -
v_3 = 4,33 -
h_1 = 2 m
h_2 = 11 -
0
20
20
40
60
80
100
120
[m]
V
A

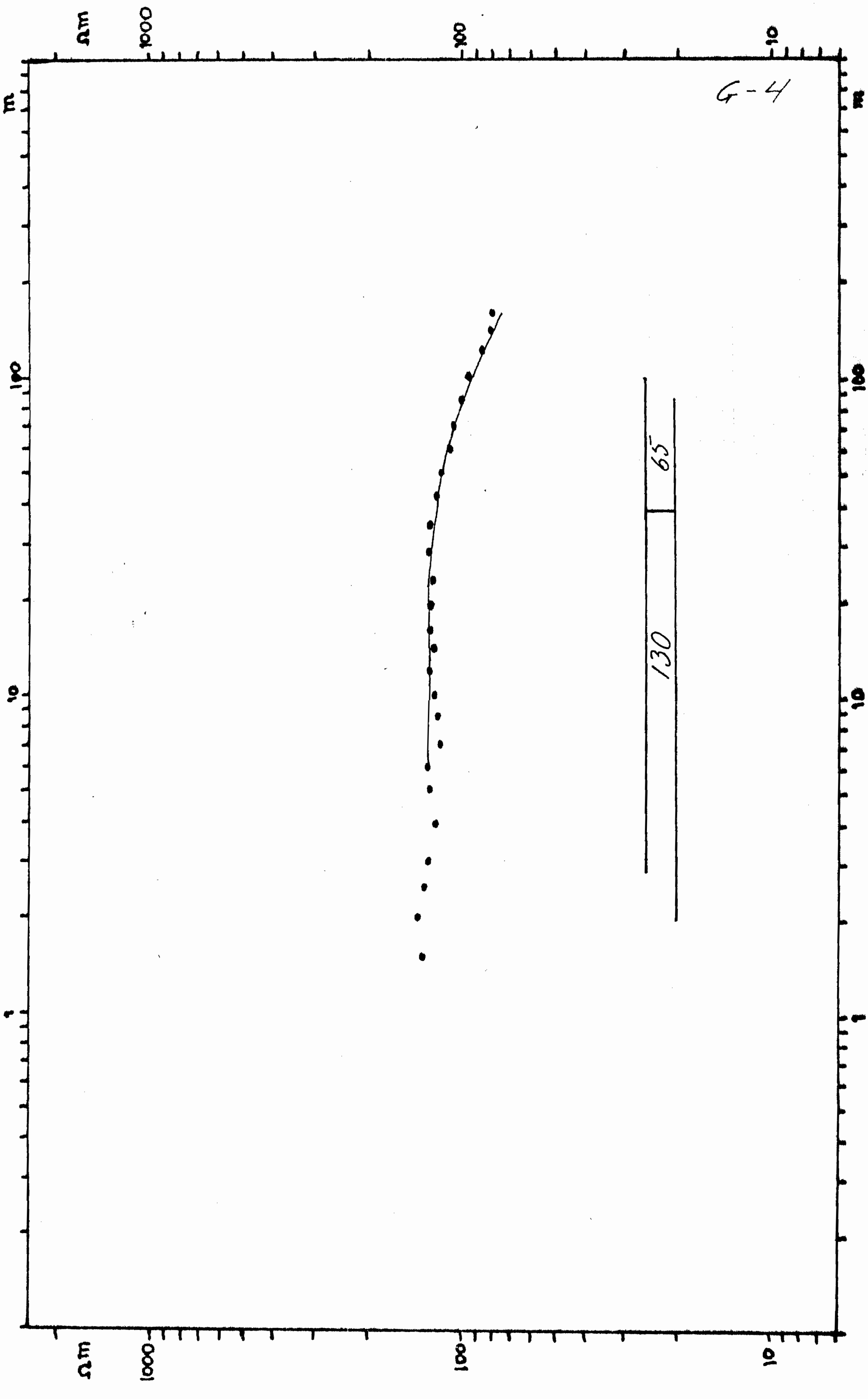


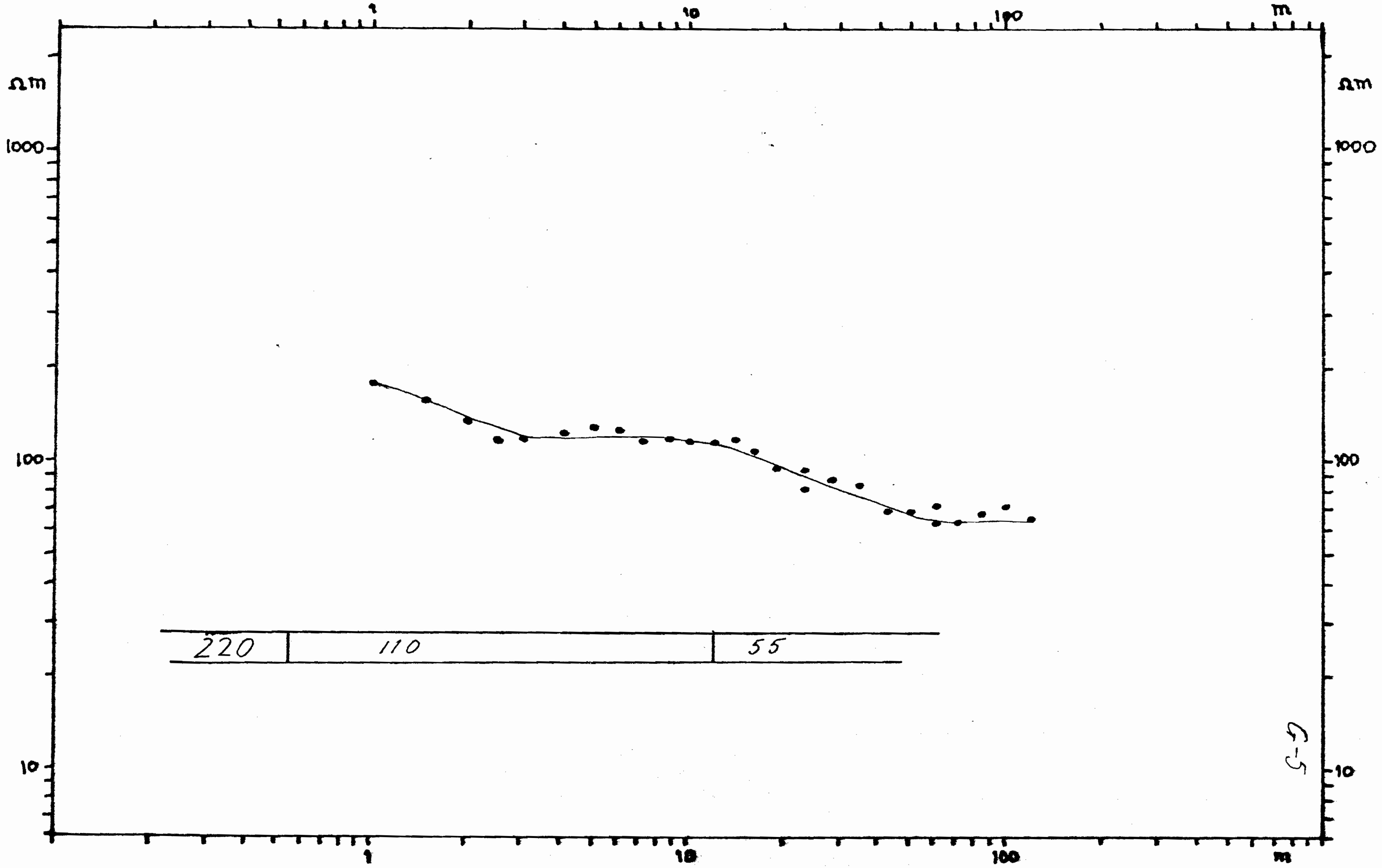
G-1
Ωm
1000
100
10
m
1
10
100
280
95
280
~75

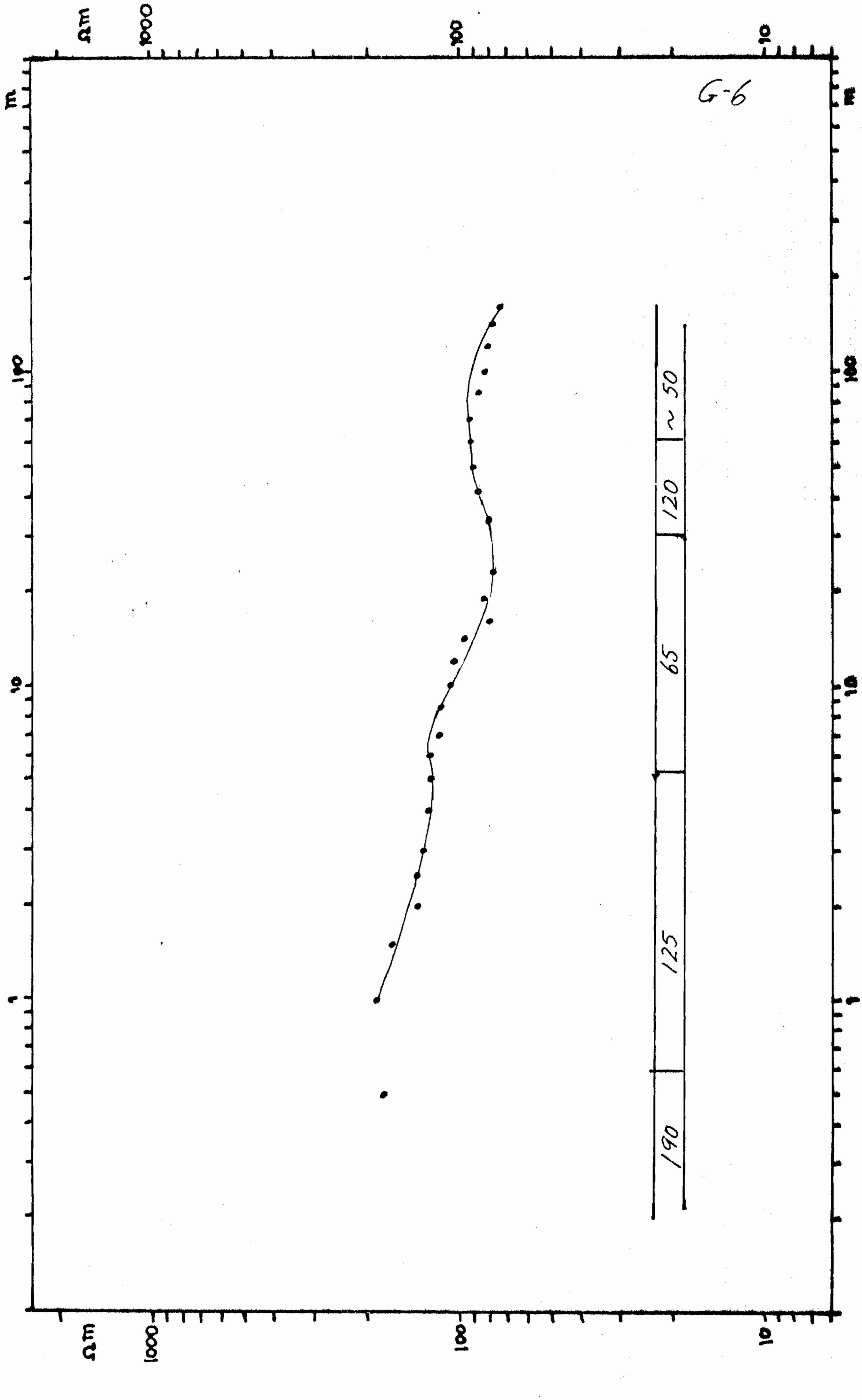


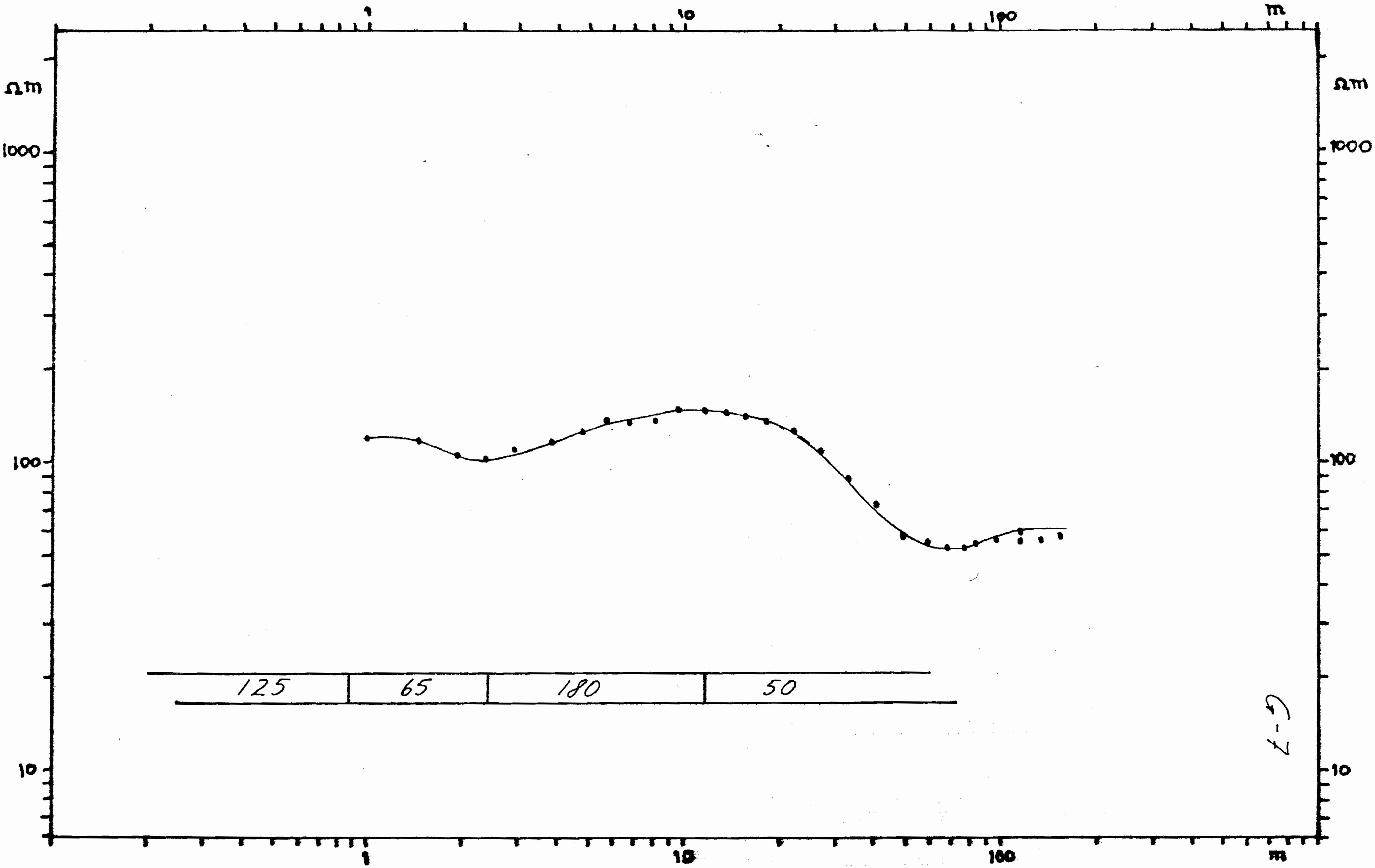
G-2
Ωm
1000
100
10
m
1
10
100
250
85
165
80


Ωm
1000
100
10
1
10
100
m
220
90
G-3

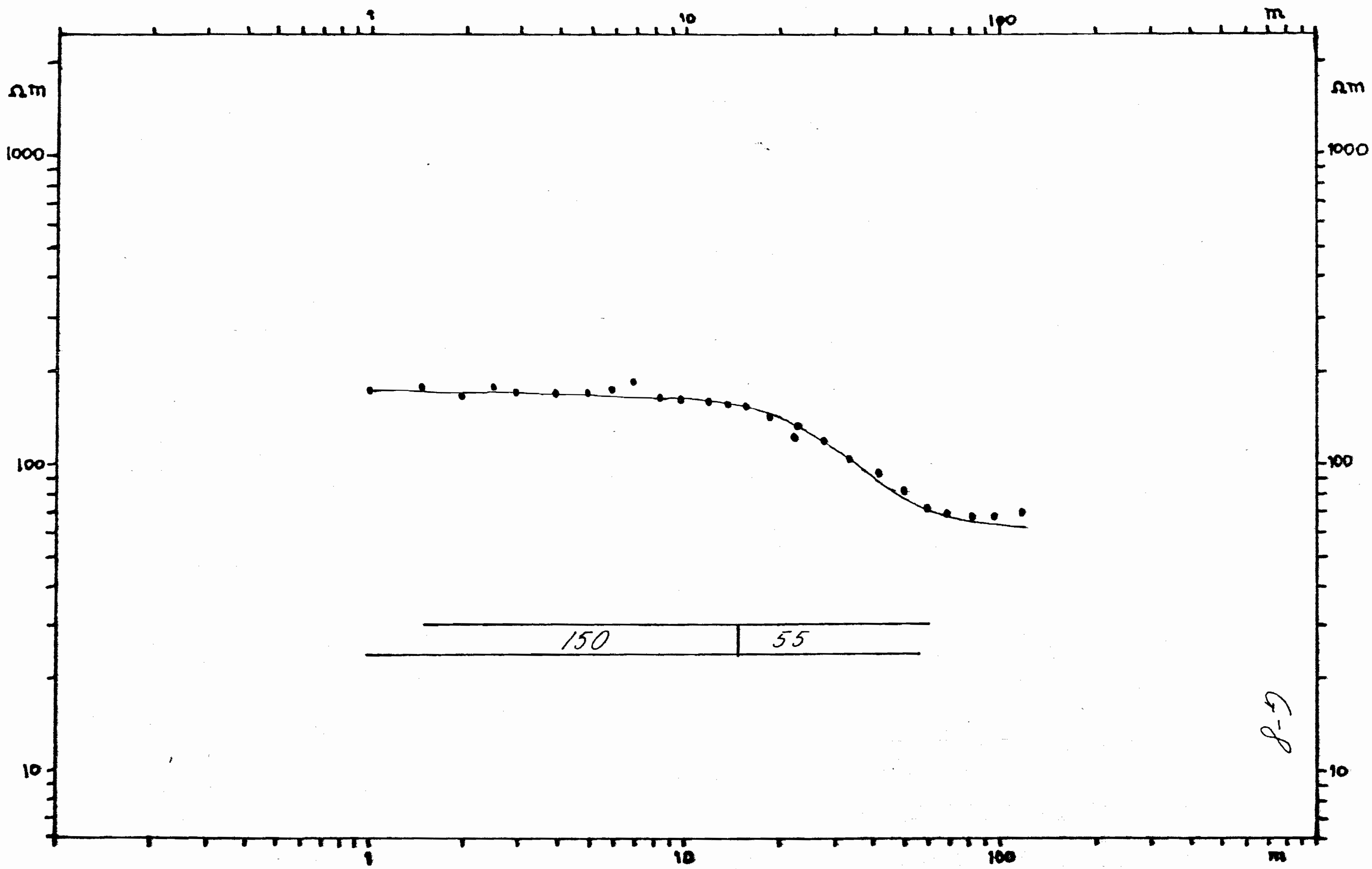

G-4
Ωm
1000
100
10
m
1
10
100
130
65


G-5
Ωm
1000
100
10
m
1
10
100
220
110
55

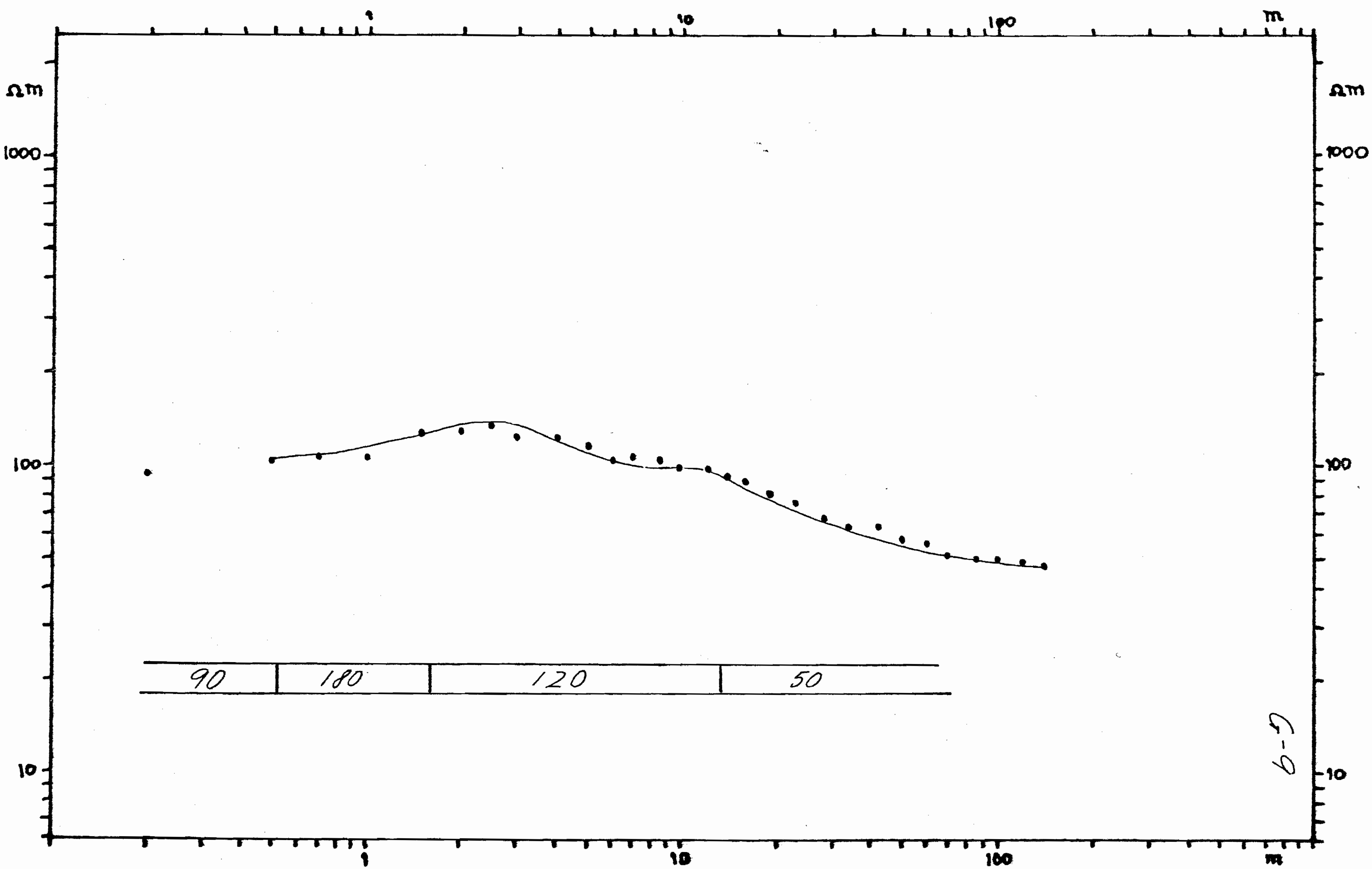

G-6
Ωm
1000
100
10
m
1
10
100
190
125
65
120
~ 50



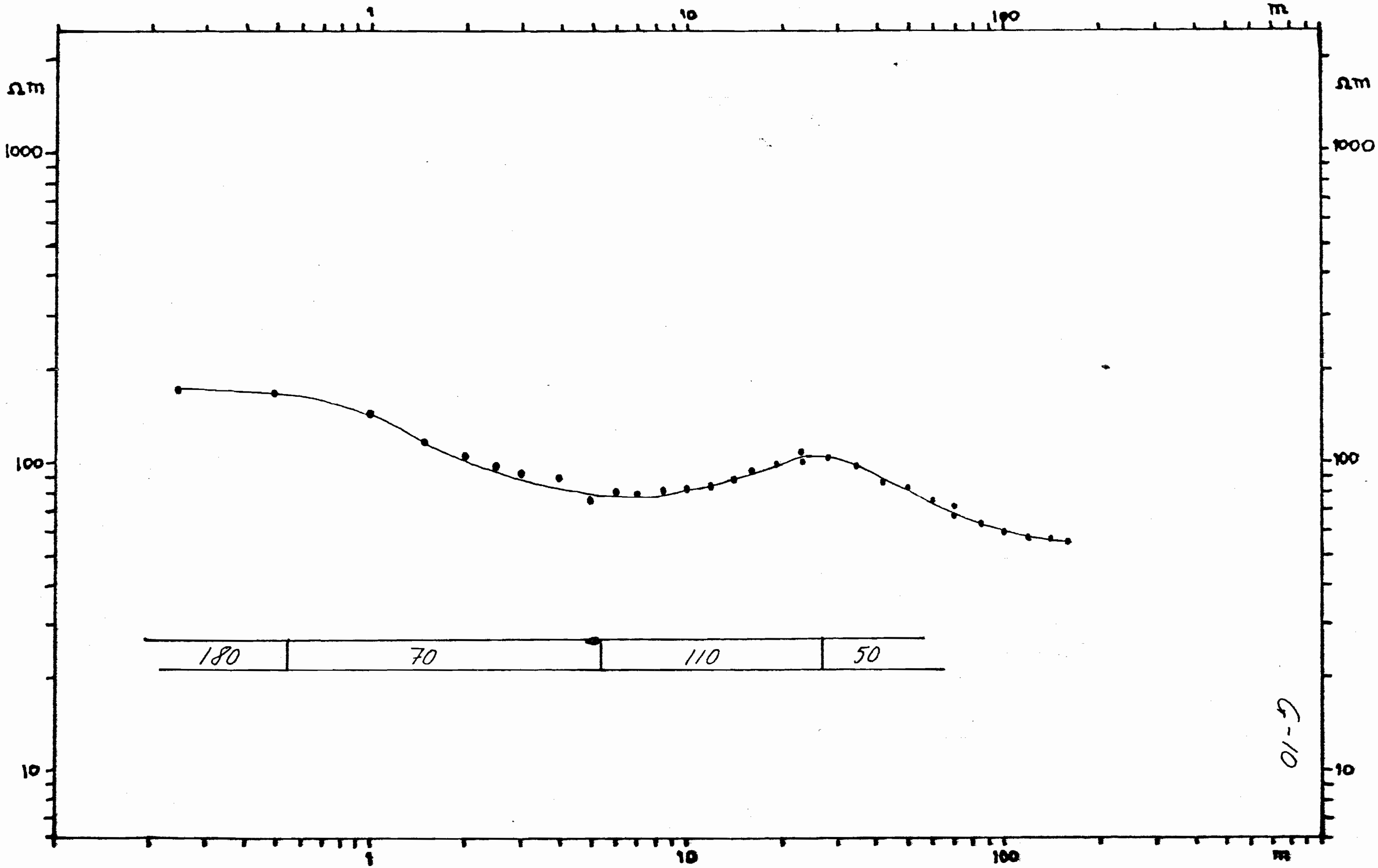
G-7
Ωm
1000
100
10
m
1
10
100
125
65
180
50

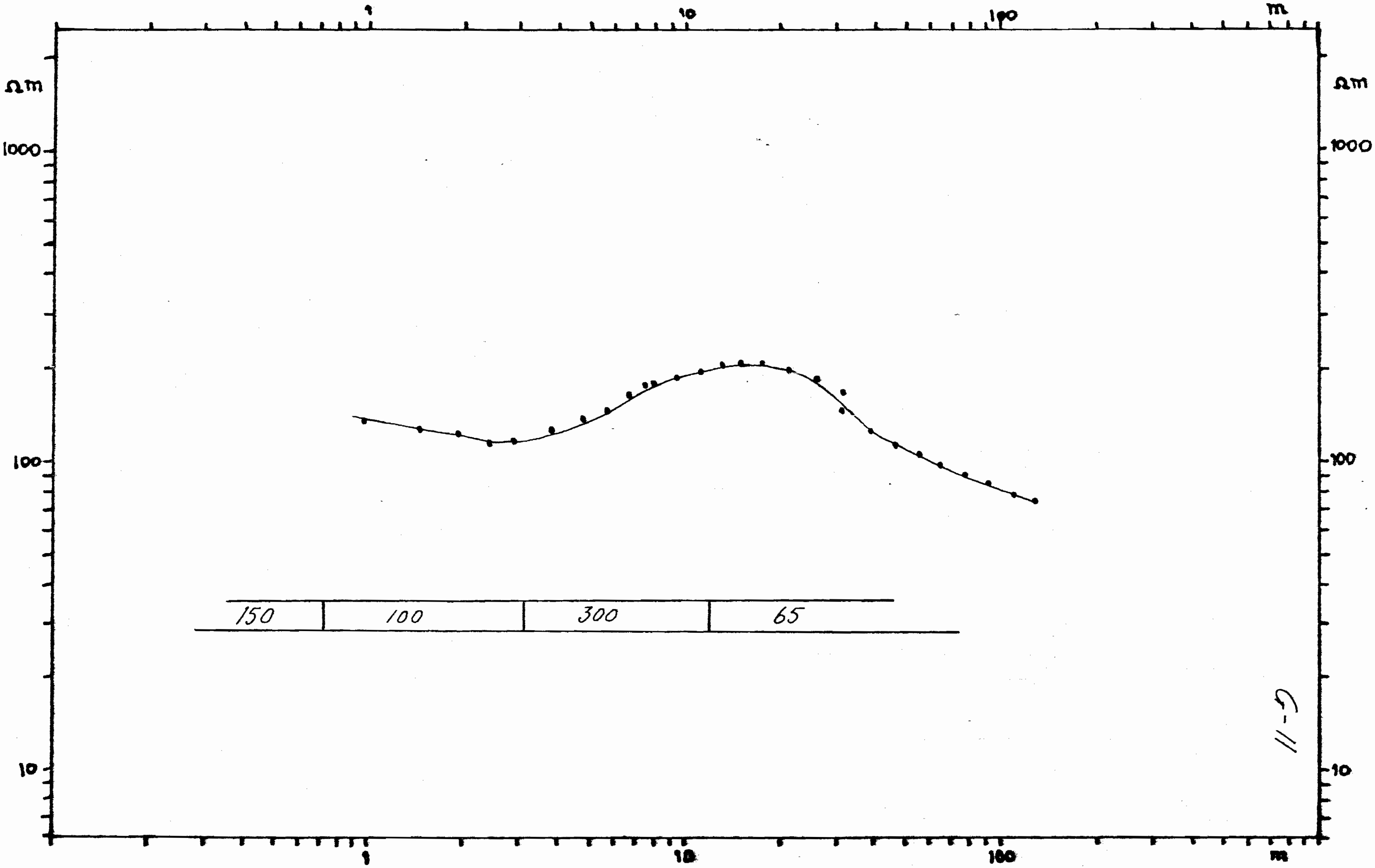


Ωm
1000
100
10
1
10
100
m
150
55
G-8

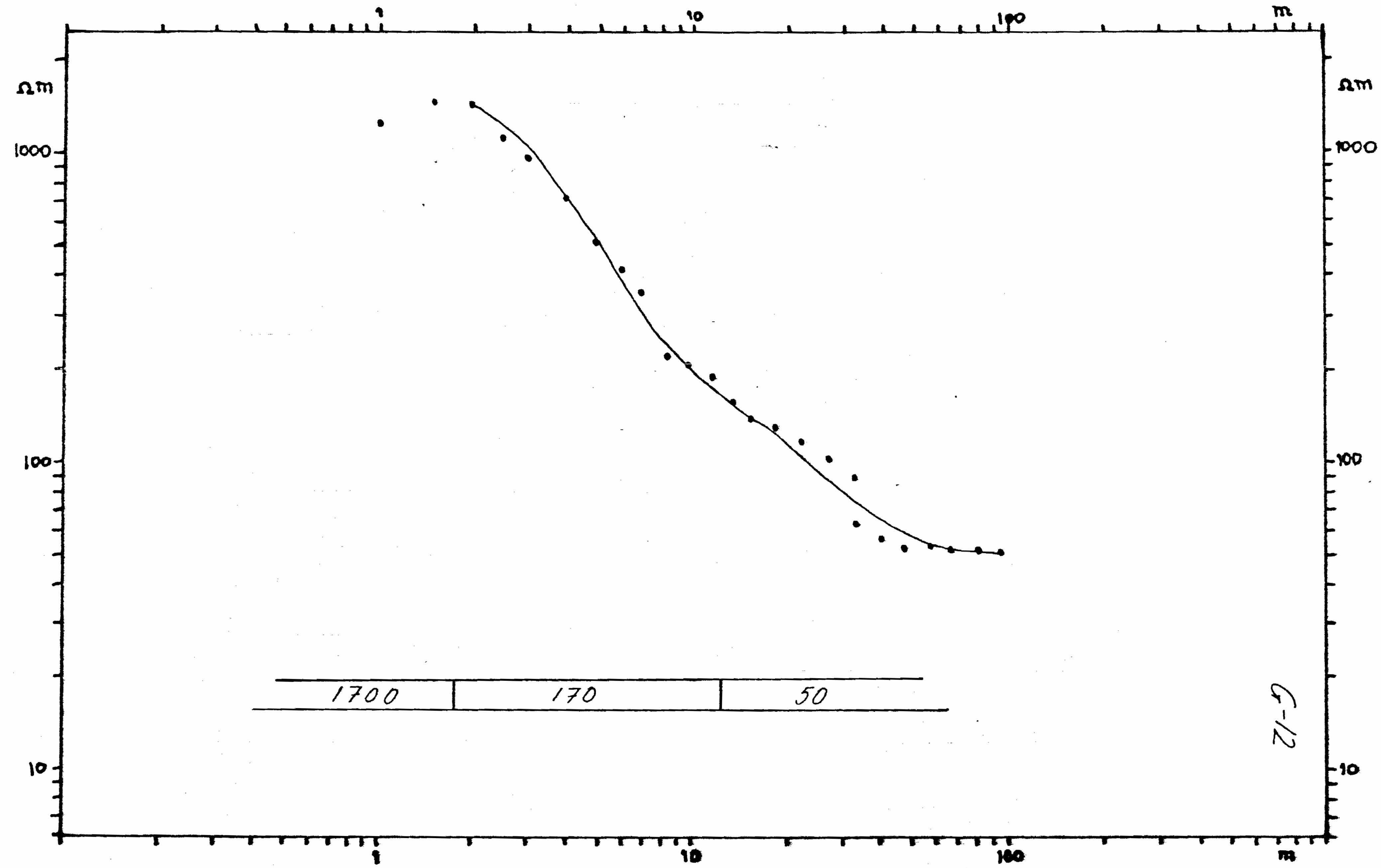


G-9
Ωm
1000
100
10
1
10
100
m
90
180
120
50

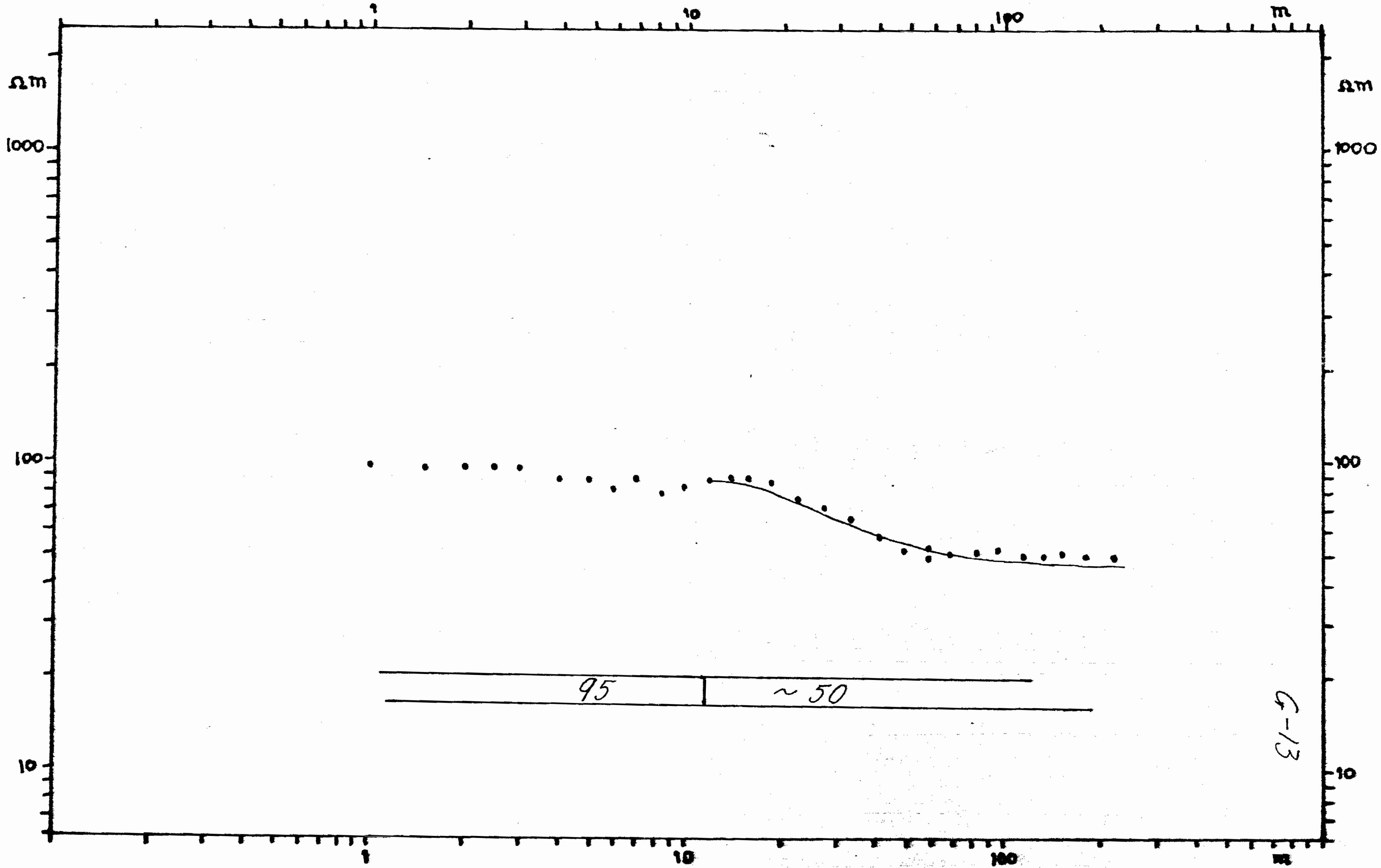

Ωm
1000
100
10
m
1
10
100
180
70
110
50
G-10



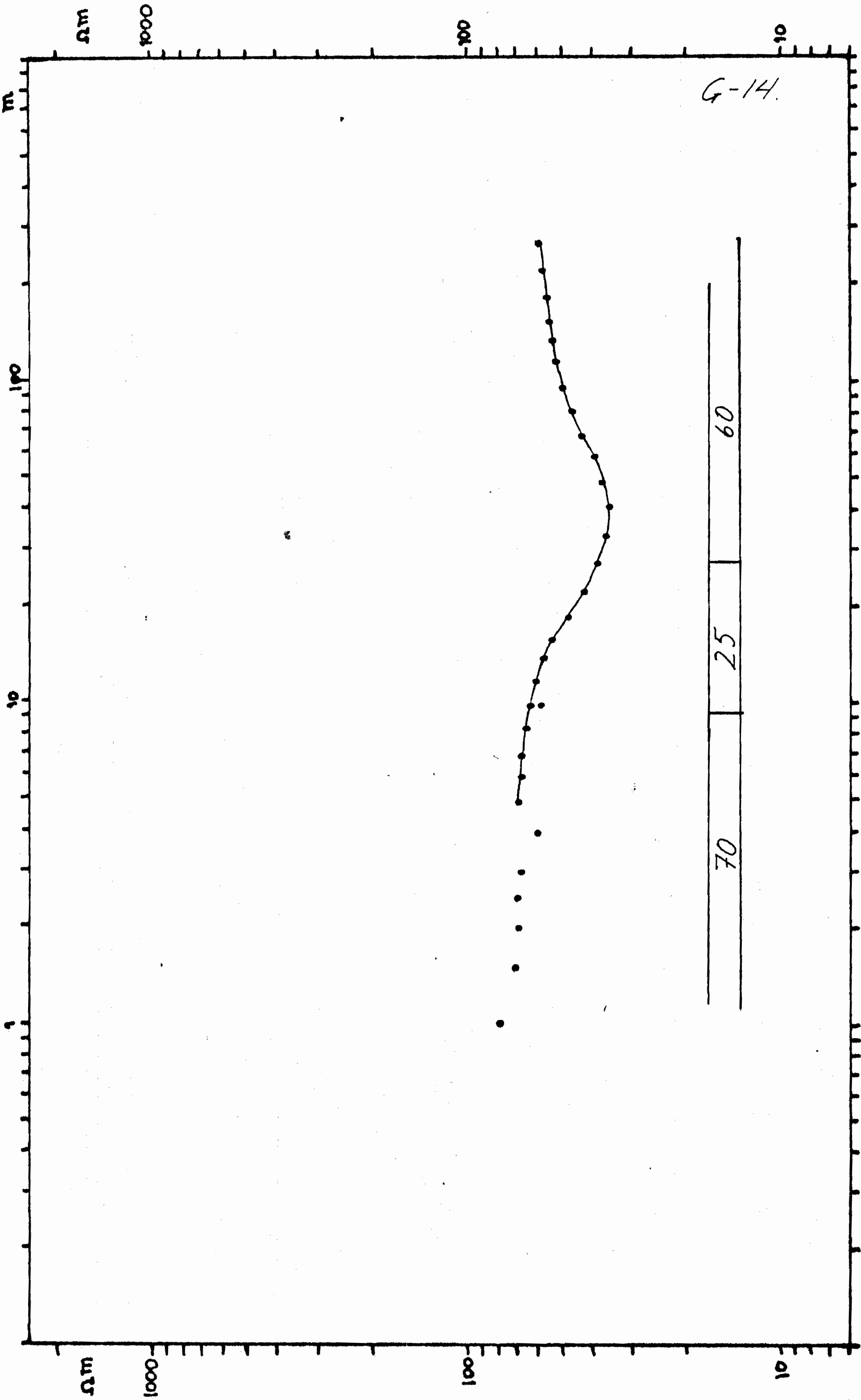
G-11
Ωm
1000
100
10
m
1
10
100
150
100
300
65

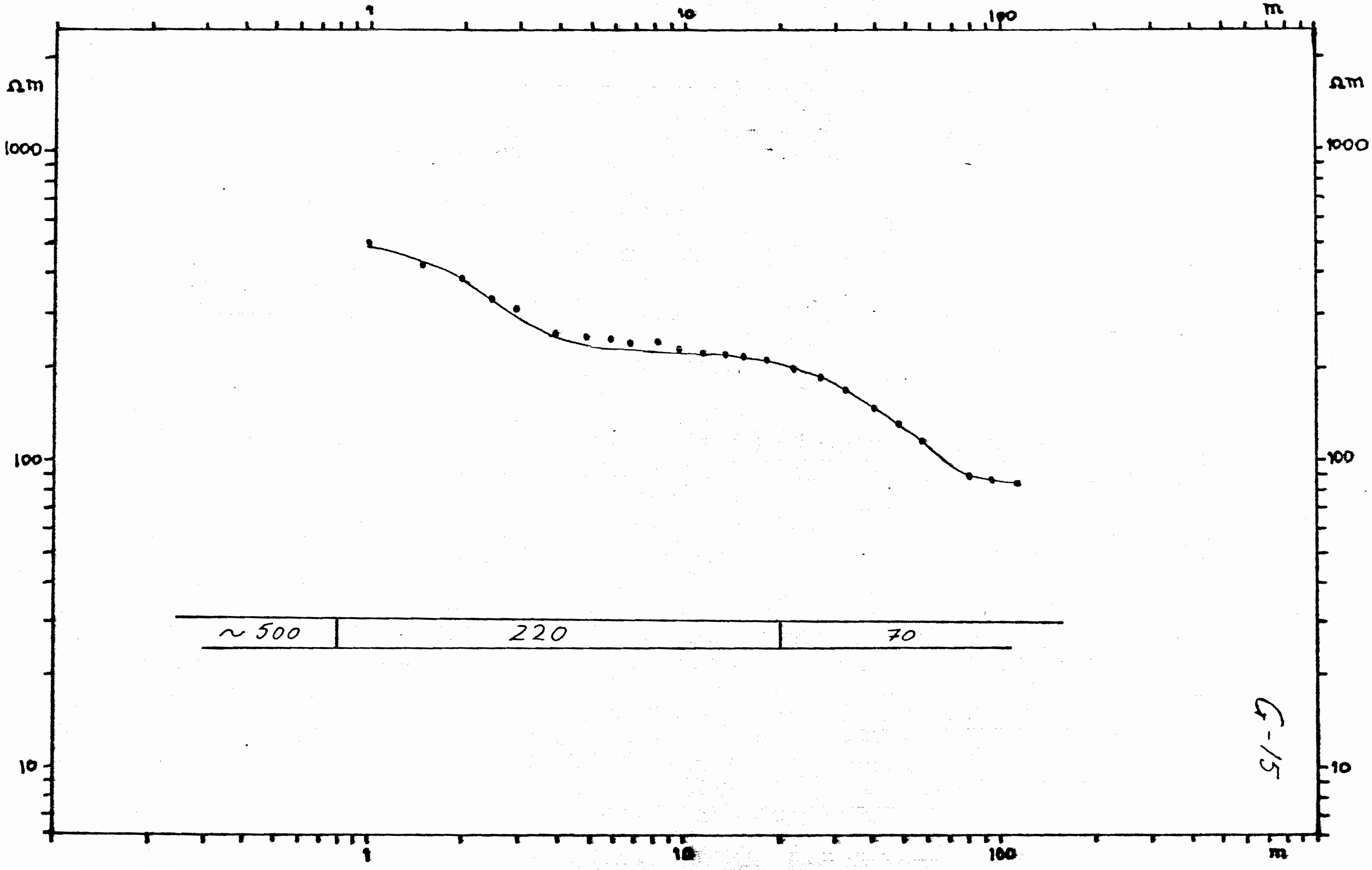


G-12
Ωm
1000
100
10
1
10
100
m
1700
170
50



1
10
100
m
Ωm
1000
100
10
95
~50
G-13

G-14.
Ωm
1000
100
10
m
100
10
1
60
25
70

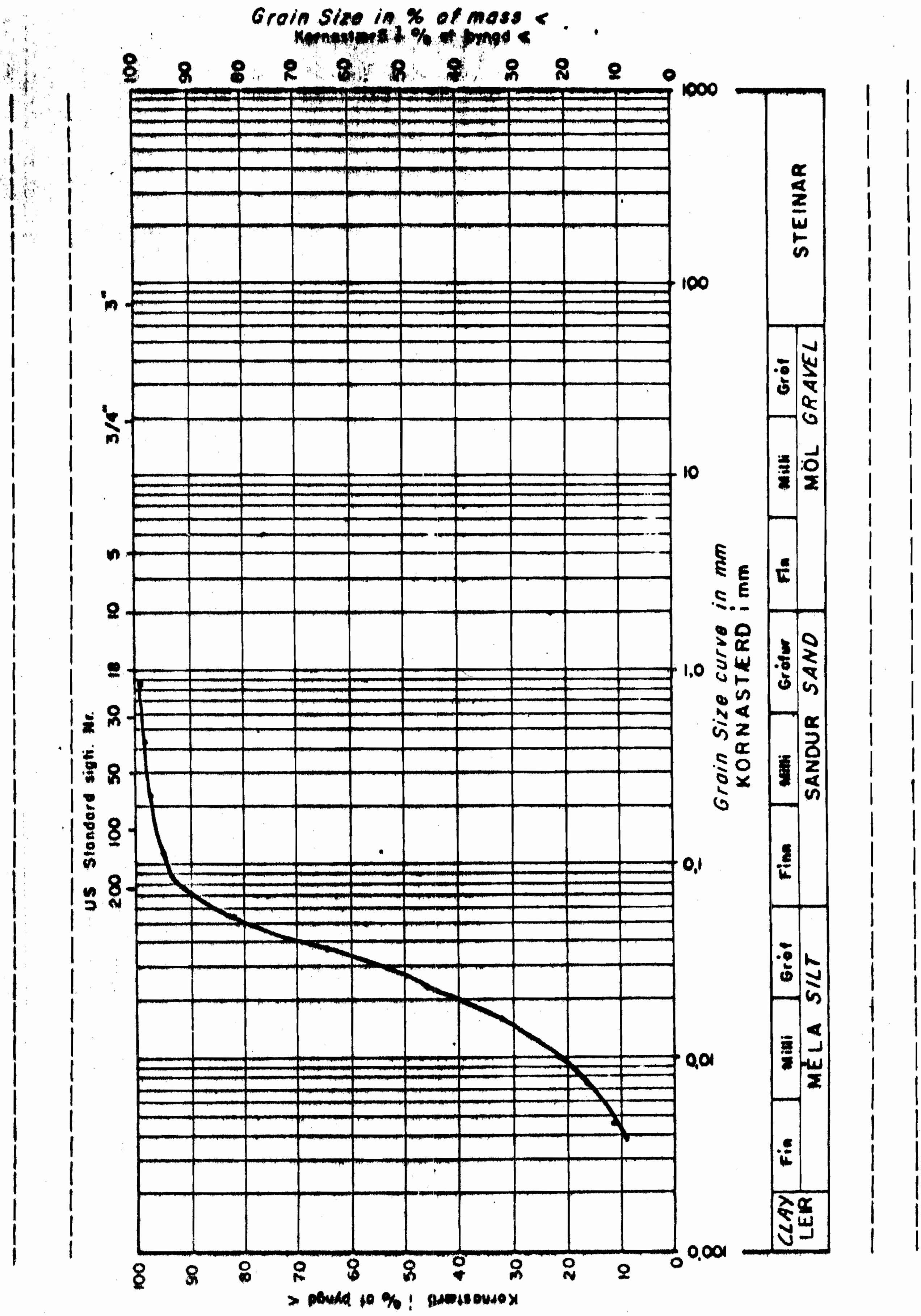

G-15
Ωm
1000
100
10
1
10
100
m
~ 500
220
70

ORKUSTOFNUN
Jarðkönnunardeild

Fig. 5.3

Sv.P/ttt

EIÐISVATN
BOTTOM SEDIMENTS-GRAIN SIZE CURVE
SAMPLE: M1-M2 I

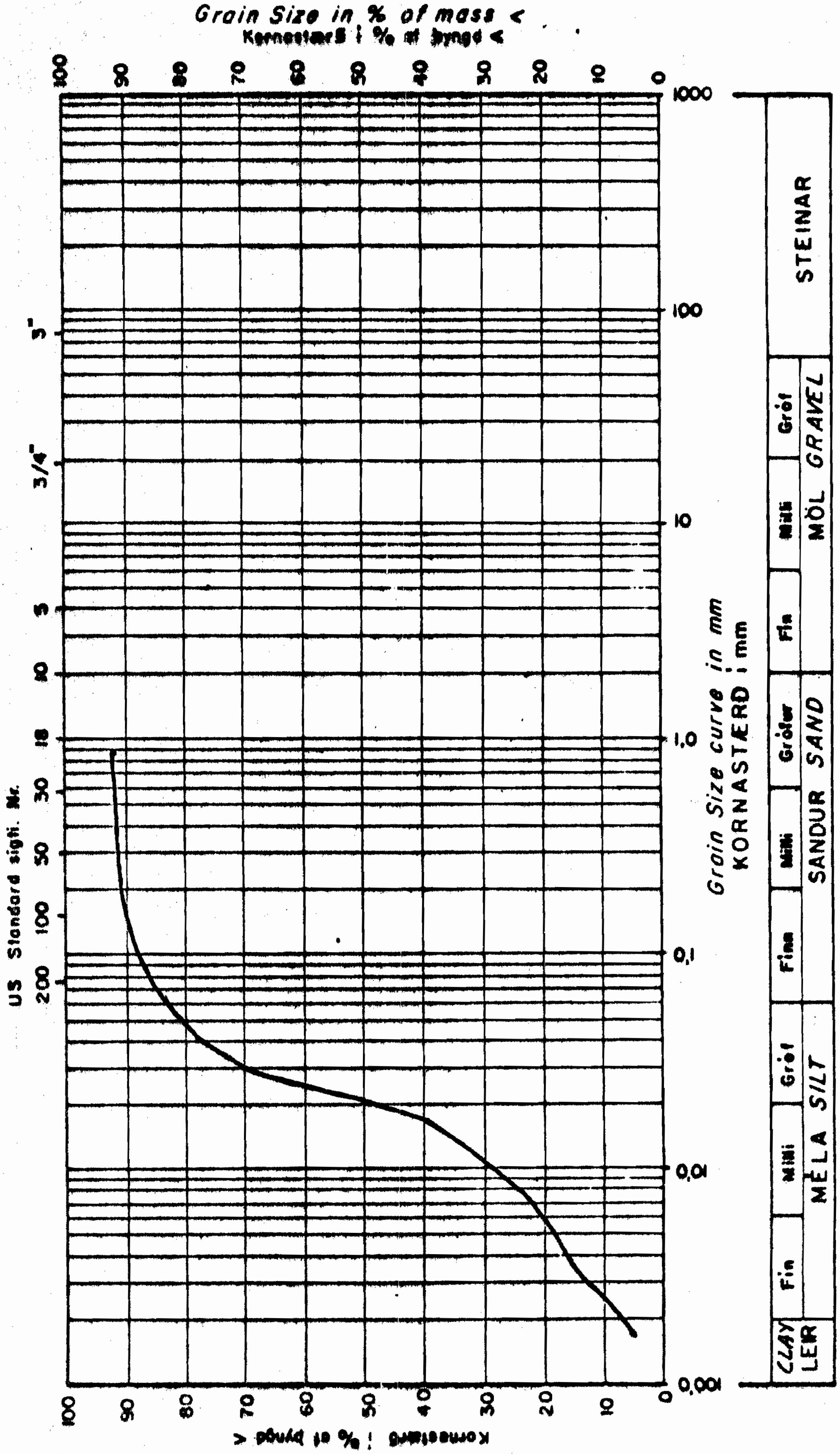


ORKUSTOFNUN
Jarðkönnunardeild

Fig. 5.4.

Sv.P/HH

EIÐISVATN
BOTTOM SEDIMENTS - GRAIN SIZE CURVE
SAMPLE: M1 - M2 IV

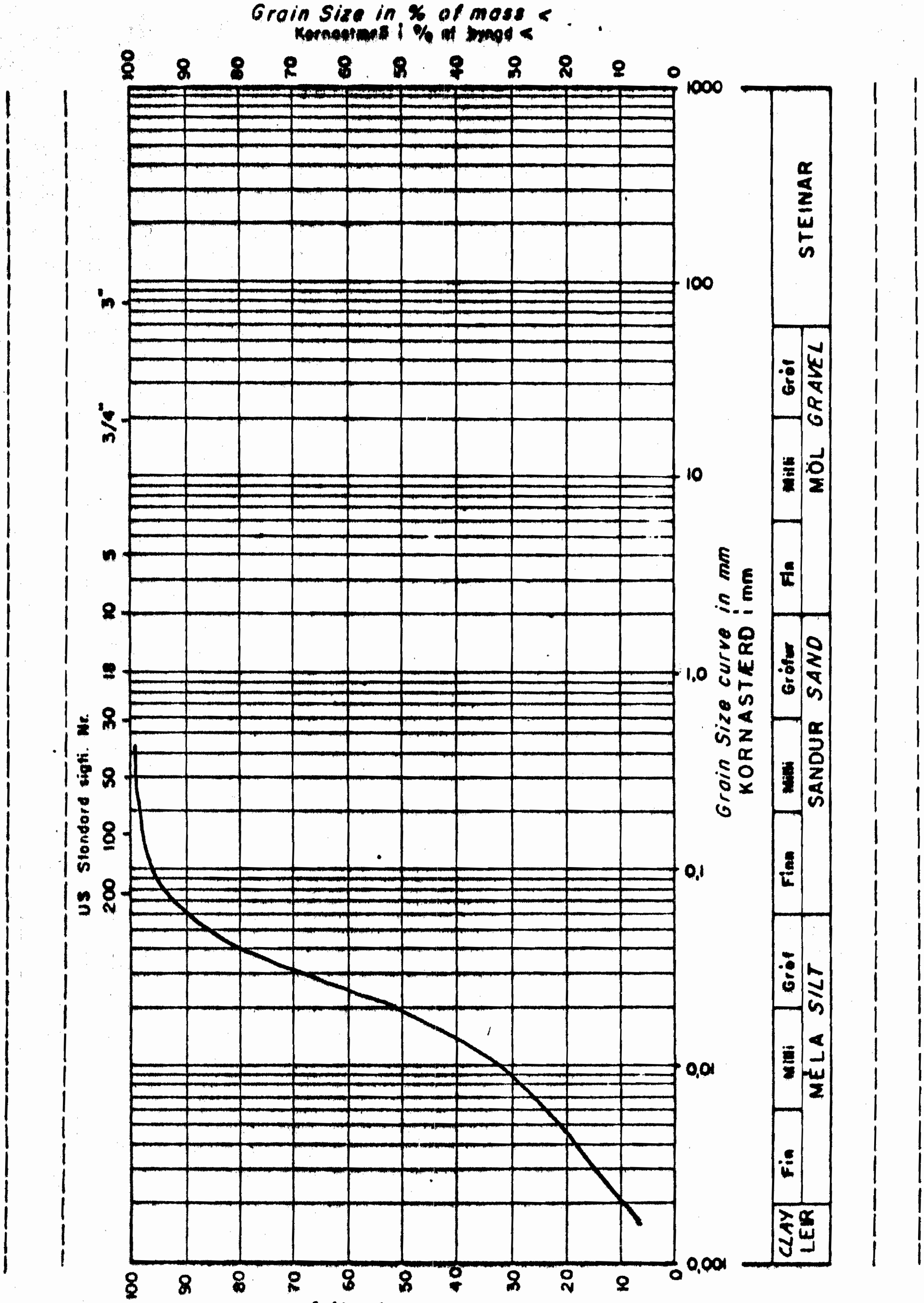


ORKUSTOFNUN
Jarðkönnunardeild

Fig. 5.5.

Sv. P/[illegible]

EIÐISVATN
BOTTOM SEDIMENTS-GRAINSIZE CURVE
SAMPLE: M2-M3 IV



ORKUSTOFNUN
Jarðkönnunardeild

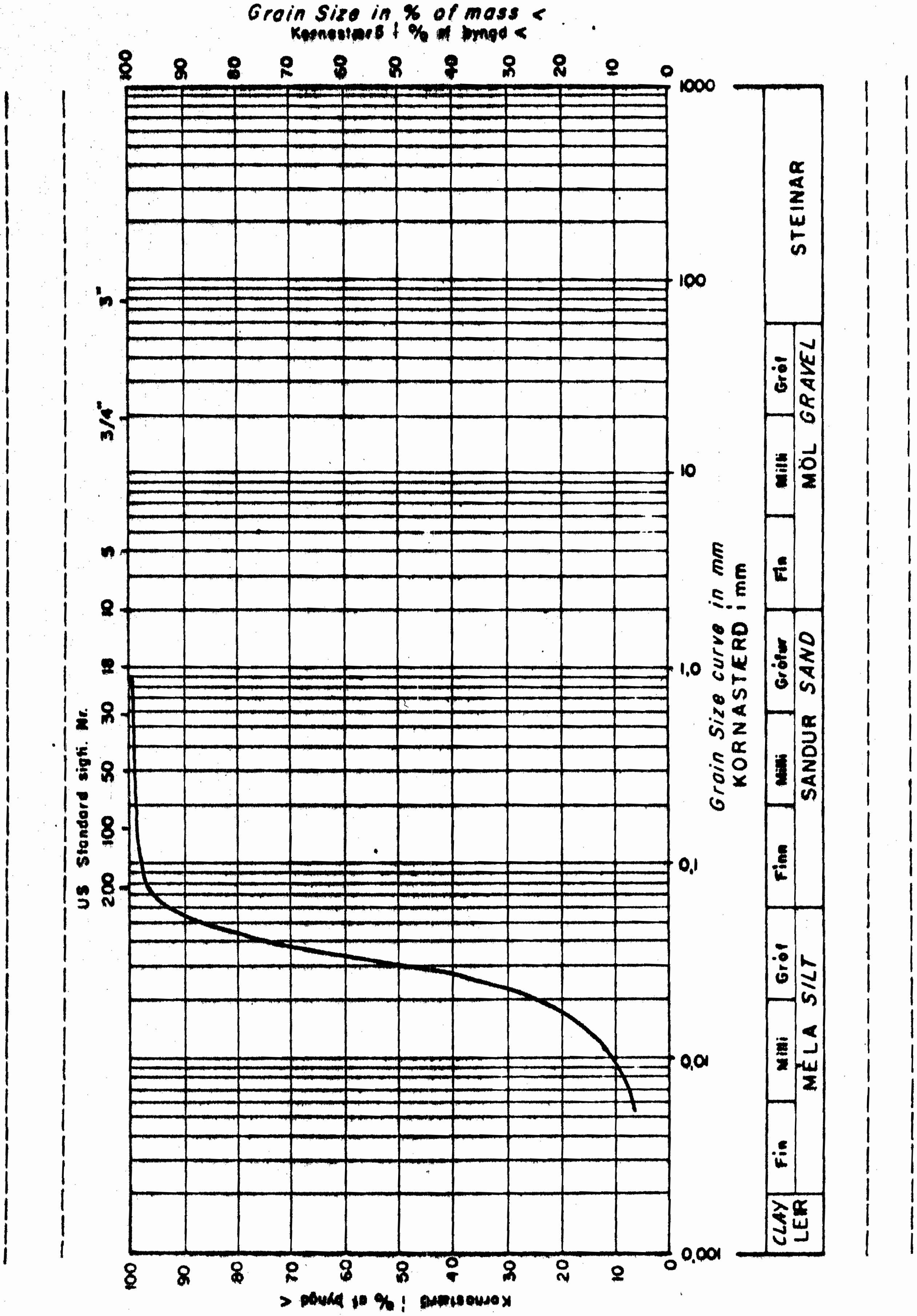
Fig. 5.6.

Sv.P./Ht

EIÐISVATN

BOTTOM SEDIMENTS-GRAIN SIZE CURVE

SAMPLE: M2-M3 VI



ORKUSTOFNUN
Jarðkönnunardeild

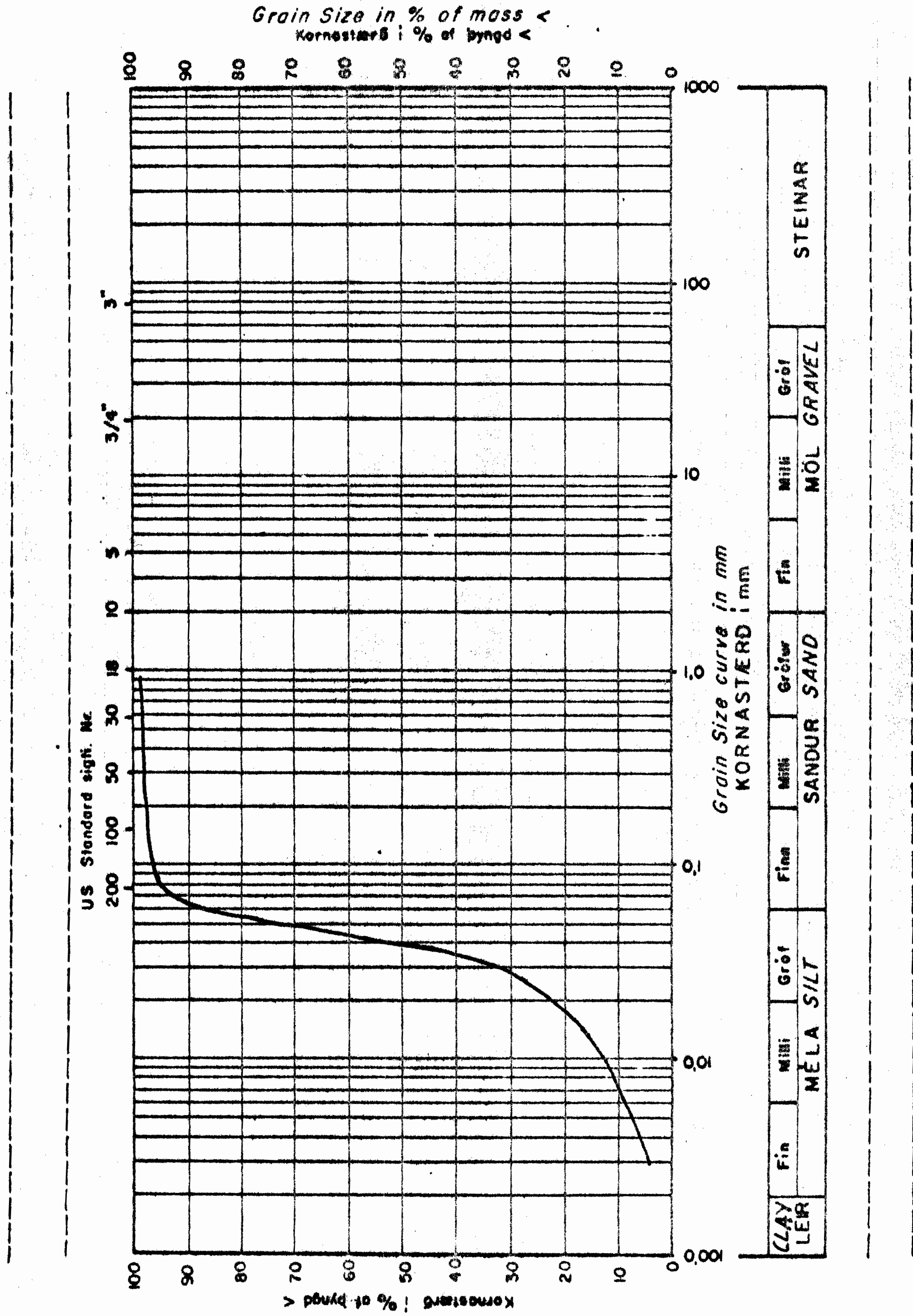
Fig. 5.7.

Sv. P/

EIÐISVATN

BOTTOM SEDIMENTS-GRAIN SIZE CURVE

SAMPLE: M4-M5 II



ORKUSTOFNUN
Jarðkönnunardeild

Fig. 5.8.

Sv. P/m

EIÐISVATN

BOTTOM SEDIMENTS - GRAIN SIZE CURVE

SAMPLE: M4-M5 V.