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INVESTIGATION OF THE ACCURACY OF PLOTTING AND SCALING - OFF

by

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CHAPTER I

Determination of standard errors

§1 *Introduction.* As far as I know little has been published in literature concerning land surveying about the accuracy of plotting and scaling-off with divider and plotting scale or with tracing point and engineer scale. Only a rather circumstantial paper by Kummer (Mitteilungen von Beobachtungsergebnissen über die Schätzungs- und Kartierungsgenauigkeit an Mass-stäben und Kartierungsinstrumenten) in "Zeitschrift für Vermessungswesen" (year 1907 page 531, 561, 593) deals with part of this subject.

In the following paper the whole procedure of plotting and scaling-off will be submitted to an accuracy test. By applying the law of propagation of errors one may form an idea of the accuracy of plotting and the accuracy with which distances and areas can be scaled-off from a plot. Finally, theoretical results will be checked in practice and conclusions will then be drawn.

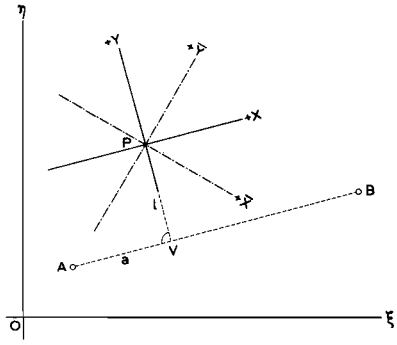

fig. 1

The manipulations mentioned above are many. In order to find the standard error with which the coordinates ξ_P and η_P of a point P (fig. 1) can be scaled-off from a plot, it is, first of all, necessary to know the accuracy with which the points A, B, the origin O and a second point of the ξ- and η-axis can be plotted with a coordinatograph. Then the accuracy must be found of a line to be drawn with a pencil between A and B, how accurately the distance AV = a can be scaled-off with divider and plotting scale

(tracing point and engineer scale) and V can be plotted upon AV. Further it is necessary to examine the accuracy of raising the perpendicular VP in V. The accuracy of P then depends upon the accuracy of drawing VP through V, of scaling-off the distance VP=1 and of plotting P upon VP.

Finally, in order to find the accuracy with which ξ_P and η_P can be scaled-off with respect to the inked in axes ξ and η, it is necessary to know how accurately these two can be inked in with a ruling pen and the desired distances can be obtained from the plot with the expedients mentioned above.

Hereafter

m_1 is the standard error in plotting an abscissa or an ordinate with a coordinatograph.

m_2 the standard error in the location of a calibration line on a plotting scale or an engineer scale.

m_3 the standard error in a scale interval of 1 cm of a plotting scale or engineer scale.

m_4 the standard error in plotting a distance with divider and plotting scale or with tracing point and engineer scale.

m_5 the standard error in scaling-off a distance with divider and plotting scale or with engineer scale.

m_6 the standard deviation in the perpendicular distance between a plotted point and the pencil line which can be drawn through that point along a triangle.

m_7 the standard deviation in the perpendicular distance between an ink line which can be drawn with a ruling pen along a triangle through two plotted points and the theoretical straight line connecting these two points.

m_8 the standard deviation in the perpendicular distance between a pencil line which can be drawn along a triangle through two plotted points and the theoretical straight line connecting these two points.

m_9 the standard error in plotting a point upon a pencil line with a divider or tracing point when the scale is placed along that line.

m_{10} the standard deviation from the perpendicular position at the top of a "perpendicular" of 10 cm, erected in V (fig. 1) with triangles. AB is taken to be longer than 1; m_θ and m_ϑ are not included in this standard error.

m_{11} the standard error in putting a needlepoint of a divider on an ink line from where distances must be scaled-off. Pricking a point is not necessary for this manipulation.

§2 *Standard measure used.* For the measurements, necessary for the determination of these standard errors, a height scale is used of the Wild Autograph A6 no. 176. It has a length of 20 cm and is calibrated in tenths of a mm. In these intervals hundredth parts (microns) were measured with the comparator of the Geodetic institute in Delft, each of the 100 parts of the division of its micrometer representing 2 microns (2μ).

The height scale was gauged with the standard measure in the Zeiss-Universal Measuring Microscope no. 867, mounted in the Government Industrial Laboratory in Delft. The differences were negligible (some microns). [1])

§3 *Determination of* m_1.[2]) For the determination of m_1 the accuracy was tested of plotting with the coordinatograph of the Wild Autograph A5 no. 45 and the Coradi coordinatograph 205, both belonging to the Surveying Department of the Ministery of "Waterstaat". With the two instruments series of points were plotted at distances of 0.5 or 1.0 cm in the direction of the axes. These series were checked with height scale and comparator.

For the Wild-instrument, slightly damaged by war actions, m_1 was about 25μ [3]), for the Coradi-instrument 9μ. [4])

For safety's sake m_1 is taken to be 16μ.

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1) See Appendix I, table 25
2) See Appendix II
3) Tables 30, 31 and 27
4) Tables 28, 29 and 27

§4 *Determination of* m_2.[5] The accuracy of the calibration of the plotting instruments checked is given in table fig. 2.

	instrument	material	scale	calibration lines checked	table	m_2 (μ)	length Y of 1cm (mm)	m_Y (μ)
1	Plotting scale	nickel silver	1 à 1000	20	32	11	10.0023	0.4
2	" "	" "	"	10	33	4	9.9996	0.5
3	" "	" "	"	15	34	5	9.9970	0.3
4	" "	copper	"	13	35	4	9.9998	0.3
5	Calibrated ruler	plexiglass	"	20	36	3	9.9974	0.1
6	" "	"	"	20	37	7	9.9927	0.3
7	Engineer scale	wood	"	20	38	7	10.0073	0.3
8	" "	"	"	20	39	3	9.9988	0.1
9	" "	"	"	20	40	8	9.9981	0.3
							9.9992	

table fig. 2

The standard error, for instance, of the location of a calibration line on the four plotting scales was 11, 4, 5 and 4μ respectively (mean 6μ).

For the two Haag Streit-plexiglass instruments, each having 20 calibration lines checked, these amounts were 3 and 7μ (mean 5μ) and for the 3 engineer scales 7, 3 and 8μ respectively (mean 6μ). Hereafter m_2 is taken to be 6μ.

§5 *Determination of* m_3.[6] The observations described under m_2 gave at the same time the opportunity to determine the interval between the centimeter lines on each of the instruments checked. The results of this test are also shown in table fig. 2. For the four plotting scales this interval was 10.0023, 9.9996, 9.9970 and 9.9998 mm respectively with a mean value of 10.000 mm. The standard deviation of this mean is 2μ; for the 9 instruments it is about 4μ. The number of the scales checked is too small to attach too great a value to this amount.

[5] See Appendix III and tables 32 - 40

[6] See Appendix III

The conclusion may be drawn however that m_3 is very small and can be neglected in the complex of influences determining the accuracy of plotting and scaling-off.

It appears from the values mentioned above that these sometimes clearly deviate from 10 mm. It follows from calculations however that for each of the scales checked the standard error in an interval computed in such a way is very small. It amounts for the plotting scales to about 0.4μ, for the Haag Streit scales to about 0.2μ and for the wooden scales to about 0.3μ (see table fig. 2). The internal accuracy of the scales checked is therefore high.

§6 *Determination of* m_4.[7]) For the determination of m_4 a sheet of aluminium mounted paper was given to each of five testpersons (good draftsmen). Each of them had to plot the distances 5.89, 10.17, 16.06, 21.78, 27.92, 31.38, 38.69, 43.01, 49.27, 54.91, 60.15, 65.50, 71.22, 76.83, 82.74, 87.34, 93.43, 98.45, 104.60 and 109.56 mm, five times with divider and plotting scale[8]) and five times with tracing point and engineer scale.[9]) For each distance the deviation v was determined with respect to the mean of the series of five, plotted by each of them. From these v's the standard error m_4 was computed for each testperson; it provides an indication of the internal accuracy of plotting.
It ranged from 0.016 mm to 0.048 mm for the method with divider and plotting scale and from 0.029 to 0.065 mm for that with tracing point and engineer scale. The mean value was $m_4 = 33\mu$ and $m_4 = 50\mu$ respectively. These values agree very well with the amounts 40μ and 46μ given by Kummer (pages 574 and 571 of his paper). In plotting with divider and plotting scale m_4 is independent from the plotted distance, at least for the distances between 6 and 110 mm mentioned above. Kummer too comes to this conclusion (page 574). The accuracy of plotting with the Haag Streit scale appears to be the same as that with engineer scale.[10])

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7) See Appendix IV
8) Tables 41 - 70
9) Tables 71 - 100
10) Tables 102 - 131

It is remarkable that each testperson plotting with divider and plotting scale, was inclined to plot a greater distance than was asked.[11]) Plotting with tracing point and engineer scale four of them inclined to do the same; [12]) the fifth distinctly proved to plot the distances too small. Because of the small number of testpersons it is impossible to draw definite conclusions. The differences mentioned above have no tendency however to become greater with increasing distance. Therefore possible stretch or shrinkage of the drawing paper or a scale error of the scale used need not to be taken into account. Perhaps a slight flexibility of the divider is the cause of this phenomenon, perhaps - and this concerns plotting with an engineer scale by righthanded persons - it is due to parallax as indicated in fig. 3 (intention of plotting 22.4, plotted 22.5). The difference between the given and the plotted distance depends too much upon personal influences to give a value for it.

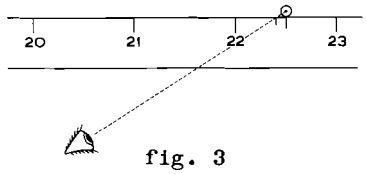

fig. 3

§7 *Determination of* m_5.[13]) Five testpersons co-operated to determine m_5. Each of them received a sheet of aluminium mounted paper on which 20 distances 5.43, 10.22, 16.11, 21.70, 27.89, 32.08, 38.97, 43.66, 49.55, 54.34, 60.13, 65.89, 71.57, 76.21, 82.95, 87.64, 93.30, 98.08, 104.72 and 109.46 mm were plotted with a coordinatograph Coradi in such a way, that on each of 20 parallels only one of these distances was marked. Each distance was scaled-off by each observer five times, first with an engineer scale or a Haag Streit-scale, next with divider and plotting scale.[14]) Conformable to the method described under m_4 the deviations v were determined with respect to the mean of the five scaled-off distances of each line by each of the five testpersons.[14]) As the lenghts 5.43, 10.43.....109.46 mm are left out of consideration, the amount m_5[14]), calculated from these v's, represents the internal

11) Table 101
12) Table 101; for tracing point and plexiglass-scale table 132
13) See Appendix V
14) Tables 133 - 149

accuracy of scaling-off. For divider and plotting scale it varied from 11 to 38μ (mean 24μ), for engineer scale from 33 to 50μ (mean 43μ) [15] and for the Haag Streit-scale from 28 to 48μ (mean 36μ). It is important to state that with divider and plotting scale, each observer was inclined to scale-off smaller distances than were plotted.[16] With one of them[17] the difference was even remarkably great (about 0.15 mm for every scaled-off distance), his standard error m_5 being only 0.013 mm. The difference is all the more striking because another testperson using the same plotting scale for the same test appeared to have a personal error only a sixth of the one just mentioned.[18] It is obvious that, here too, the systematic errors too much depend upon the draftsman to give figures for them.

§8 *Determination of* m_6.[19] m_6 was determined from the work of five testpersons. Each of them had to draw a pencil line along a triangle through each of 29 plotted points. The perpendicular distances between the 5 x 29 plotted points and the corresponding 145 pencil lines were measured with the comparator.[20] It was remarkable that these deviations were not accidental, but that there was a strong tendency to draw the pencil line through or along that part of the plotted point where the triangle was placed. When the measured deviations are split up into a systematic and an accidental part standard accidental errors m_6 are obtained ranging from 25 to 58μ, the mean value for the five observers being about 40μ. Here too, the systematic error depends very much upon the draftsman.

§9 *Determination of* m_7.[21] For the determination of m_7 a testperson drew an ink line with a ruling pen along a triangle, the two terminal points of the line, which was about 15 cm in length, being marked by plotted points. With another triangle he repeated his experiment of drawing a second line through another pair of

15) Kummer, page 600 : 37μ and 32μ respectively
16) Table 143; for plexiglass scale table 143, for engineer scale table 149
17) no. 11; see tables 135 and 143
18) no. 13; see tables 137 and 143
19) See Appendix VI
20) Tables 150 - 154
21) See Appendix VII

plotted points. Four other testpersons did the same; so ten lines were drawn by five different draftsmen along ten different triangles through ten pairs of plotted points. Every other centimeter, that is on every line at 16 points, the deviations A_iL_i ($i = 1 \rightarrow 16$) (fig. 4) of each of the ten lines were determined with respect to the straight line through the centres of each pair of plotted points. In order to realize this straight line accurately enough a grid plate 25 x 25cm of the Wild Autograph A5 was used. From the distances A_1L_1, $A_{16}L_{16}$ and P_iL_i ($i = 1 \rightarrow 16$) measured with the comparator[22]) the amounts $A_iL_i = P_iL_i - P_iA_i$ could be computed.[22])

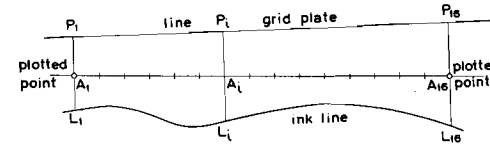

fig. 4

The ten lines and the plotted points through which they had to be drawn are shown in fig. 5. The "mean" line M is also shown. Its deviation with respect to the theoretical straight line is the mean of the deviations of the ten lines, measured at corresponding points.[23]) It may be regarded as the systematic error made by the "average" draftsman in drawing an ink line. The other deviations are accidental. The amount $m_7 = 42\mu$ can be computed from them.[23]) For safety's sake it is rounded off to 45μ.

§10 *Determination of* m_8.[24]) m_8 was determined in a corresponding manner.[25]) The ten pencil lines with their "mean" are shown in fig. 6. The systematic error, mentioned already under m_8 is evident: with 19 of the 20 plotted points the pencil line was drawn at the side of the point where the triangle was placed. The standard deviation m_8 is 33μ[26]); it is rounded off to 40μ. The deviation due to the fact that the triangles used were not true is included in the deviations shown in fig.5 and 6. Fig.7 shows the deviations of ten different triangles. They are measured with grid plate and comparator.[27]) The "mean" triangle M is true.[28])

22) Tables 155 - 164
23) Table 165
24) See Appendix VIII
25) Tables 166 - 176
26) Table 176
27) See Appendix IX and tables 178 - 187
28) Table 188

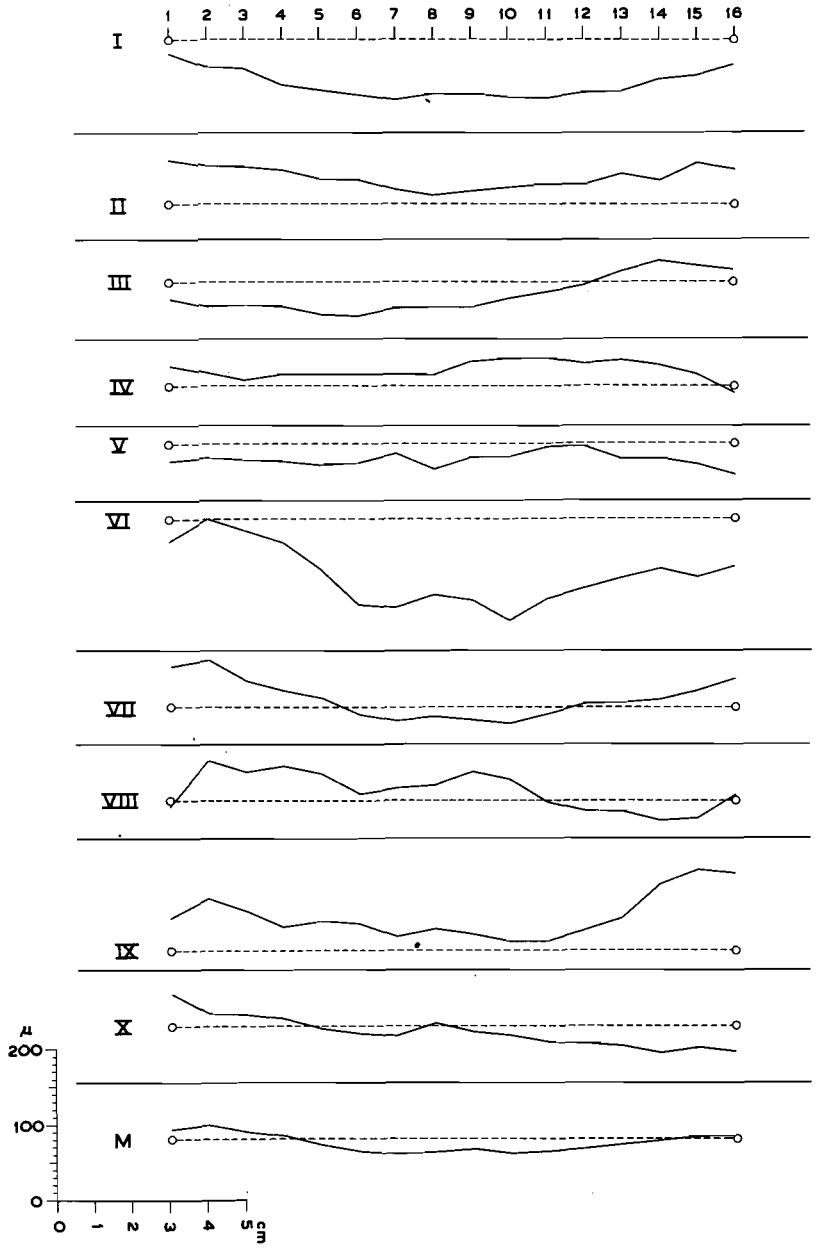
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
I
II
III
IV
V
VI
VII
VIII
IX
X
M
μ
200
100
0
0 1 2 3 4 5 cm

fig. 5

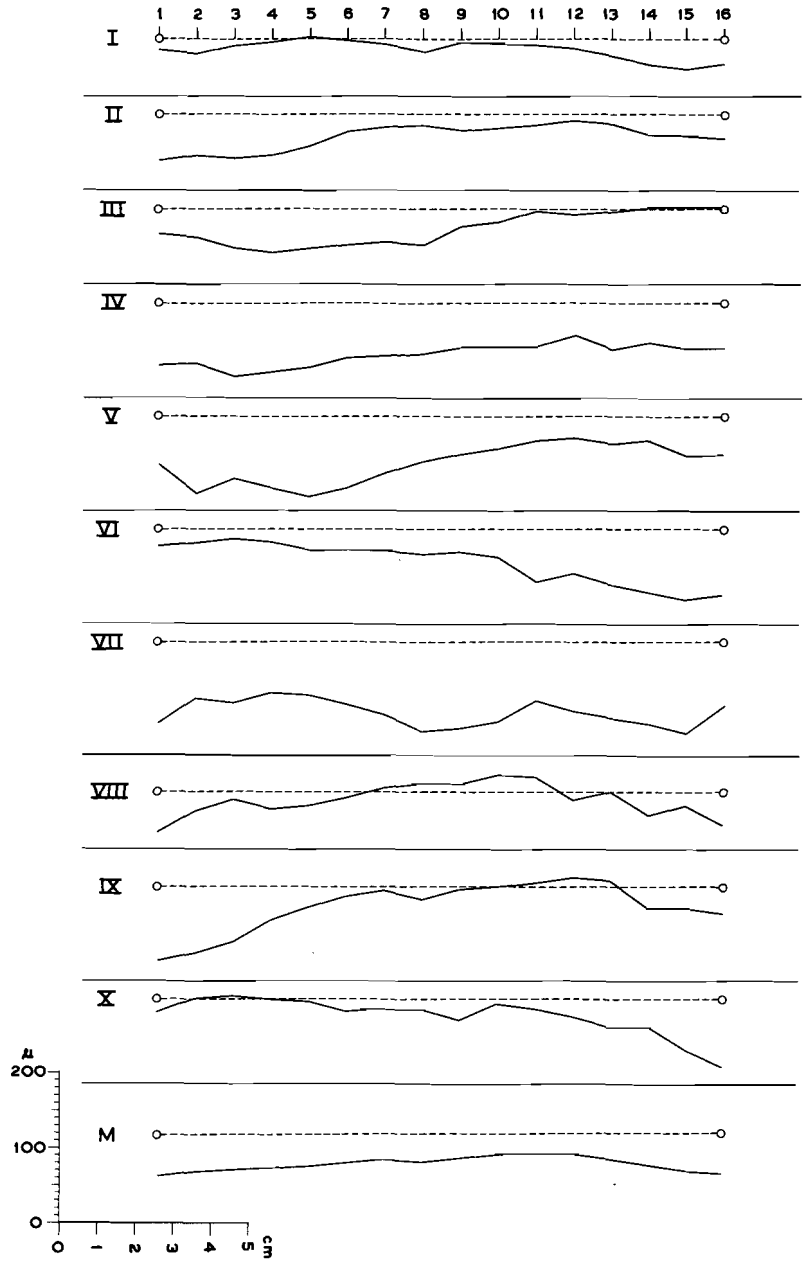
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
I
II
III
IV
V
VI
VII
VIII
IX
X
M
μ
200
100
0
0 1 2 3 4 5 cm

fig. 6

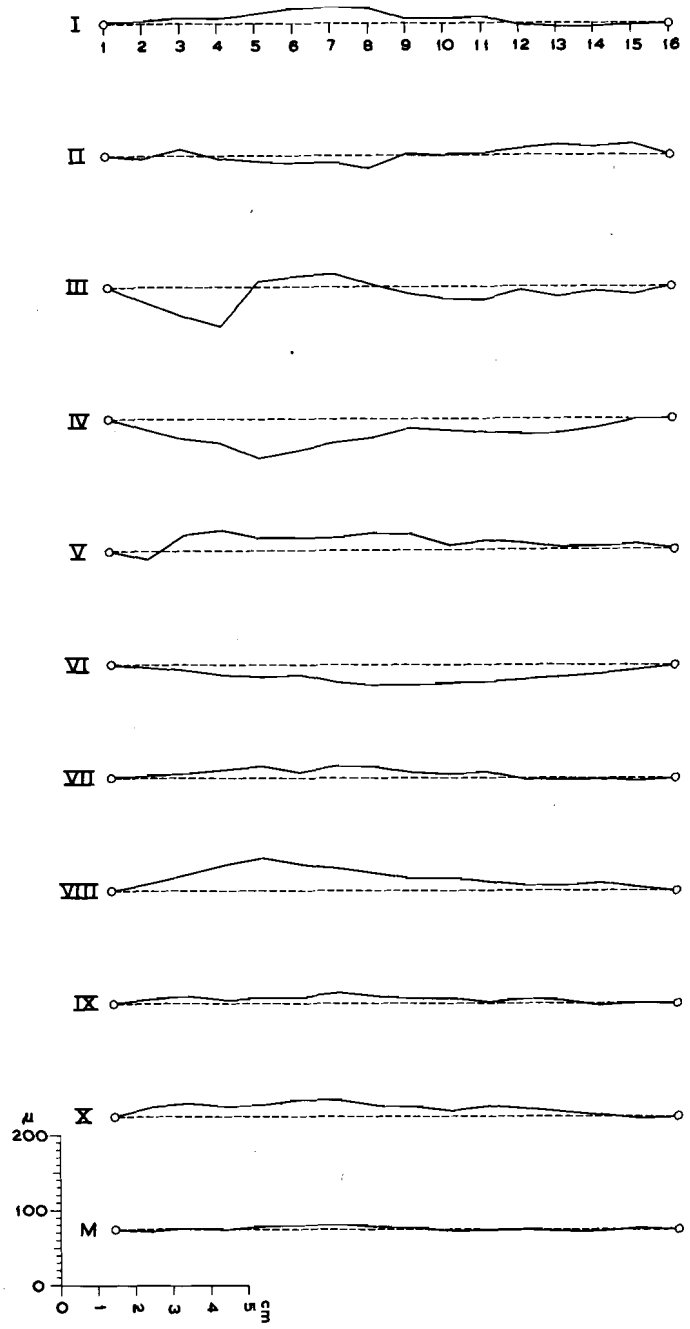
I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
II
III
IV
V
VI
VII
VIII
IX
X
M
μ
200
100
0
0 1 2 3 4 5 sec

fig. 7

§11 *Determination of* m_e.[29] On each of 29 parallel pencil lines $V_iQ_iP_i$ ($i = 2 \rightarrow 30$) (fig. 8) two needle points P_i and Q_i were plotted by one testperson, once with an opening of the divider of 10 cm (V_iP_i), once with an opening of 5 cm (V_iQ_i). The experiment was repeated by four other testpersons on 4 x 29 other lines. The perpendicular distance between each of the plotted points and the corresponding pencil line was measured with the comparator.[30] With one of the testpersons[31] a systematic error was obvious; nearly always he pricked the point at the same side of the line, perpendicular to the eye-base.[32] After elimination of these personal errors standard values were computed for the accidental errors. For $V_iP_i = 10$ cm they ranged from 21 to 45μ[33]; for an opening of the divider of 5 cm from 22 to 46μ.[34] The mean of the first series agreed practically with that of the second so that $m_e = 32\mu$.

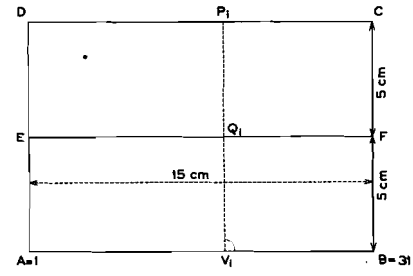

fig. 8

In order to determine the standard deviation between a pencil line and the point plotted on it with a tracing point, with an engineer scale along the pencil line, each of 9 testpersons plotted 17 points on three different lines.[35] After elimination of the personal (systematic) errors - three of the draftsmen[36] pricked nearly all the points on the scale-side of the line - the standard value of the (accidental) errors was computed. It ranged from 17 to 49μ with a mean of 32μ, the same amount found for the method with a divider.

§12 *Determination of* m_{10}.[37] m_{10} was deduced from the drawing work

29) See Appendix X
30) Tables 190 - 194 and 195 - 199
31) no. 17
32) Tables 194 and 199
33) Tables 190 - 194 and table 189
34) Tables 195 - 199 and table 189
35) Tables 200 - 208 and table 189
36) nrs. 15, 21 and 24 (tables 203, 204 and 208); see also table 189
37) See Appendix XI

of 5 testpersons. Each of them was given an emulsified undeveloped photographic plate 30 x 30 cm upon which points A up to and including F (fig. 8) were plotted with a coordinatograph Coradi.
A up to and including D are the angular points of a rectangle having sides 15 and 10 cm long, E and F the midpoints of the short sides. The plotting was done on glass in order to prevent deformation of the rectangle during the test. From 29 points between A and B (every 5 mm) each testperson had to draw a pencil line $V_iQ_iP_i$ ($i = 2 \rightarrow 30$) perpendicular to AB, by means of triangles only. In order to avoid correlation different combinations of triangles were used; every time another triangle was placed along the base AB. With the distances AV_i, DP_i and EQ_i, measured with height scale and comparator[38]) the standard error can be computed in the position of the tops P_i and Q_i.[39]) In order to check the perpendicular position of AD and BC on AB for any deviation the sides of the rectangles ABCD and ABFE and their diagonals AC, BD, AF and BE were measured on the photographic plate of one of the testpersons.[40])

It followed that the deviation from the rectangular form of the basic figure could be neglected. The foot of the perpendicular dropped from D on AB for instance, is only 0.002 mm from A. On the plates of the other testpersons the rectangular form of ABCD is therefore no longer checked.

The standard deviation from the perpendicular at the tops P_i was 163, 135, 97, 115 and 209μ respectively.[39]) At the tops Q_i these amounts were 93, 96, 46, 59 and 113μ respectively.[39]) As could be expected the first amounts were almost twice the amounts of the second.

A mean value for m_{10} for a perpendicular of 10 cm is about 144μ. To facilitate the following calculations m_{10}^2 is assumed to be 20000μ^2. m_8 and m_9 are not included in this standard error.

§13 *Determination of* m_{11}. It is not easy to measure m_{11} as it is not necessary to prick a point on the line. It is estimated at 15μ.

38) Tables 210 - 229
39) Tables 213, 217, 221, 225, 229
40) No. 9; see table 209

§14 *Summary* $m_1 - m_{11}$. In the following table fig. 9 the standard errors $m_1 - m_{11}$ are arranged systematically, referring to the test-persons[41]) who co-operated and to the tables with their results.

description of the standard error		instrument or method checked	test-person	table	stand. error (μ)	stand. error (mean) (μ)
m_1	standard error in plotting an abscissa or an ordinate with a coordinatograph	Coradi 205	--	28	9	16
		" "	--	29	10	
		" "	--	29	6	
		Wild A5 no45	--	30	27	
		" "	--	30	26	
		" "	--	30	15	
		" "	--	31	35	
		" "	--	31	22	
		" "	--	31	26	
m_2	standard error in the location of a calibration line on a plotting scale, an engineer scale or a plexiglass scale (see also table fig. 2)	plott.scale	--	32	11	6
		" "	--	33	4	
		" "	--	34	5	
		" "	--	35	4	
		plex.gl.sc.	--	36	3	
		" "	--	37	7	
		eng.scale	--	38	7	
		" "	--	39	3	
		" "	--	40	8	
m_3	standard error in a scale interval of 1 cm of a plotting scale, an engineer scale or a plexiglass scale	see m_2	--	32-40 and table fig. 2	--	neglected
m_4	standard error in plotting a distance with divider and plotting scale, tracing point and engineer scale or tracing point and plexiglass scale.	plott.scale	1	41-46	37	33
		" "	2	47-52	33	
		" "	3	53-58	48	
		" "	4	59-64	16	
		" "	5	65-70	30	
		eng.scale	1	71-76	41	50
		" "	2	77-82	51	
		" "	3	83-88	64	
		" "	4	89-94	29	
		" "	5	95-100	65	
		plex.gl.sc.	6	102-107	51	50
		" "	7	108-113	62	
		" "	8	114-119	44	
		" "	4	120-125	32	
		" "	9	126-131	65	

Table fig. 9

41) See Appendix XIII

m_6	standard error in scaling-off a distance with divider and plotting scale, plexiglass scale and engineer scale.	plott.scale	4	133	11	24
		" "	10	134	23	
		" "	11	135	13	
		" "	12	136	36	
		" "	13	137	38	
		plex.gl.sc.	4	138	33	36
		" "	10	139	35	
		" "	11	140	28	
		" "	12	141	35	
		" "	13	142	48	
		eng.scale	4	144	42	43
		" "	3	145	45	
		" "	14	146	50	
		" "	2	147	44	
		" "	15	148	33	
m_8	standard deviation in the perpendicular distance between a plotted point and the pencil line which can be drawn through that point along a triangle.	--	9	150	46	42
		--	16	151	54	
		--	4	152	25	
		--	11	153	33	
		--	17	154	58	
m_7	standard deviation in the perpendicular distance between an ink line that can be drawn with a ruling pen along a triangle through two plotted points and the theoretical straight line connecting these two points.	--	4	155,156		45
		--	9	157,158		
		--	18	159,160		
		--	7	161,162		
		--	6	163,164 165		
m_8	standard deviation in the perpendicular distance between a pencil line that can be drawn along a triangle through two plotted points and the theoretical straight line connecting these two points.	--	4	166,167		40
		--	9	168,169		
		--	18	170,171		
		--	7	172,173		
		--	6	174,175 176		

table fig. 9 (continuation)

description of the standard error		instrument or method checked	test-person	table	stand. error (μ)	stand. error (mean) (μ)
m_9	standard error	Divider 100 mm	9	190	41	32
	in plotting a	"	16	191	45	
	point upon a	"	4	192	21	
	pencil line with	"	11	193	21	
	a divider or	"	17	194	43	
	tracing point	Divider 50 mm	9	195	27	
	when the scale	"	16	196	33	
	is placed along	"	4	197	22	
	that line.	"	11	198	24	
		"	17	199	46	
		trac.point	4	200	17	32
		" "	19	201	21	
		" "	20	202	28	
		" "	15	203	37	
		" "	21	204	44	
		" "	5	205	42	
		" "	22	206	25	
		" "	23	207	19	
		" "	24	208	49	
m_{10}	standard de-	10 cm	9	210,211,213	163	144
	viation from	"	16	214,215,217	135	
	the perpendi-	"	4	218,219,221	97	
	cular position	"	11	222,223,225	115	
	at the top of	"	17	226,227,229	209	
	a "perpendicular"	5 cm	9	210,212,213	93	
	of 10 cm, erected	"	16	214,216,217	96	
	in V (fig. 8)	"	4	218,220,221	46	
	with triangles.	"	11	222,224,225	59	
		"	17	226,228,229	113	
m_{11}	standard error in putting a needle point of a divider on an ink line from where distances must be scaled-off. Pricking a point is not necessary.	--	--	--	--	15 (estimated)

table fig. 9 (continuation)

CHAPTER II

Results of the Investigation

§15 *Derivation of formulae.* It can be seen how the standard deviations m_1, m_2, m_3, m_4, m_6, m_8, m_9 and m_{10} are of influence in the points A up to and including Z in fig. 10. Since (see fig. 1):

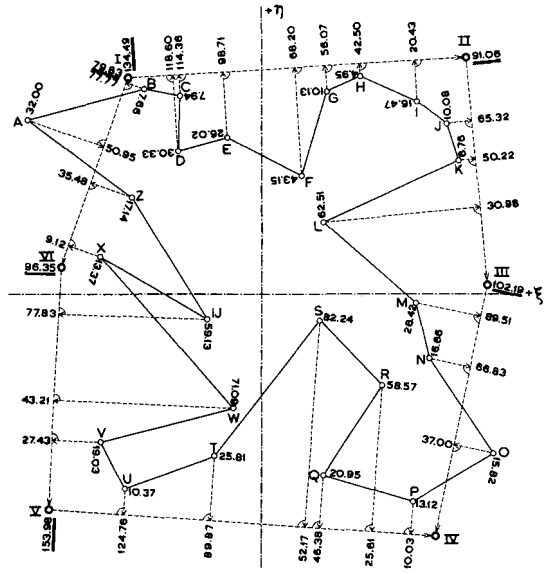

fig. 10

$$\xi_V = \xi_A + \frac{\xi_B - \xi_A}{AB}\, a =$$

$$\xi_A \frac{AB - a}{AB} + \xi_B \frac{a}{AB} \text{ and accordingly:}$$

$$\eta_V = \eta_A \frac{AB - a}{AB} + \eta_B \frac{a}{AB}\text{, the standard error in the foot V,}$$

coming from the standard error m_1 in A and B exclusively, is:

$$m_1^2 \xi_V = m_1^2 \eta_V = m_1^2 \left\{ \left(\frac{AB - a}{AB} \right)^2 + \left(\frac{a}{AB} \right)^2 \right\}$$

or $$m_1^2 \xi_V = m_1^2 \eta_V = m_1^2 \left\{ 1 - \frac{2a(AB - a)}{AB^2} \right\} \quad \text{(1)}$$

$m_1 \xi_V = m_1 \eta_V = m_1$ for a = 0 (in A) and for a = AB (in B).

$\frac{2a(AB - a)}{AB^2}$ is maximum for AB = 2a (in the midpoint of AB) and $m_1^2 \xi_V = m_1^2 \eta_V = \frac{1}{2} m_1^2 = 128\mu^2$ (minimum).

As the error figures of A and B are circles with radii of 16μ, formula (1) holds in all directions, also in two directions X and Y, mutually perpendicular and coinciding with the directions AB and VP. In these directions the standard error in P can be determined in applying the law of propagation of errors. We obtain:

$$m_{X_P}^2 = \left\{ 1 - \frac{2a(AB - a)}{AB^2} \right\} m_1^2 + 2m_2^2 + m_4^2 + m_8^2 + \frac{l^2}{100} m_{10}^2 + m_9^2 \quad \text{(2)}$$

$$m_{Y_P}^2 = \left\{ 1 - \frac{2a(AB - a)}{AB^2} \right\} m_1^2 + m_8^2 + m_9^2 + 2m_2^2 + m_4^2 \quad \text{(3)}$$

In these formulae, AB, a and l are expressed in cm; the terms with m_3^2 are ignored.

Rotating the coordinate-axes XY of fig. 1 to the right over an angle θ and writing the new coordinates $\overline{X}$ $\overline{Y}$ we have:

$\overline{X}_P = X_P \cos\theta - Y_P \sin\theta$

$\overline{Y}_P = X_P \sin\theta + Y_P \cos\theta$ and accordingly

$$m_{\overline{X}_P}^2 = m_{X_P}^2 \cos^2\theta + m_{Y_P}^2 \sin^2\theta - 2\sin\theta\cos\theta \, m_{X_P Y_P}$$

$$m_{\overline{Y}_P}^2 = m_{X_P}^2 \sin^2\theta + m_{Y_P}^2 \cos^2\theta + 2\sin\theta\cos\theta \, m_{X_P Y_P}$$

$m_{X_P Y_P}$ is the amount of correlation as a result of using the same plotting scale or the same engineer scale. It can be ignored.

For $\theta = 45^\circ$ these formulae for $m_{\overline{X}_P}^2$ and $m_{\overline{Y}_P}^2$ change into

$$m_{\bar{X}_P}^2 = m_{\bar{Y}_P}^2 = \frac{1}{2}\left(m_{X_P}^2 + m_{Y_P}^2\right) \text{ or in}$$

$$m_{\bar{X}_P}^2 = m_{\bar{Y}_P}^2 = m_1^2 + 2m_2^2 + m_4^2 + \frac{1}{2}m_6^2 + \frac{1}{2}m_8^2 + m_9^2 +$$

$$+ \frac{l^2}{200}m_{10}^2 - \frac{2a(AB-a)}{AB^2}m_1^2 \quad \ldots\ldots(4)$$

Substituting for m_1, m_2, m_4, m_6, m_8, m_9 and m_{10} the amounts found, (3), (4) and (2) change into

$$\left.\begin{aligned} m_{Y_P}^2 &= 4041 - 512\frac{a(AB-a)}{AB^2} \\ m_{\bar{X}_P}^2 &= m_{\bar{Y}_P}^2 = m_{Y_P}^2 + 100\,l^2 \\ m_{X_P}^2 &= m_{\bar{X}_P}^2 + 100\,l^2 \end{aligned}\right\} \quad \ldots\ldots(5)$$

or

$$\left.\begin{aligned} m_{Y_P}^2 &= 5452 - 512\frac{a(AB-a)}{AB^2} \\ m_{\bar{X}_P}^2 &= m_{\bar{Y}_P}^2 = m_{Y_P}^2 + 100\,l^2 \\ m_{X_P}^2 &= m_{\bar{X}_P}^2 + 100\,l^2 \end{aligned}\right\} \quad \ldots\ldots(6)$$

The formulae (5) refer to plotting with divider and plotting scale, (6) to plotting with engineer scale and tracing point. In plotting the length of the perpendicular l, the plotted point in V and not the pencil line is assumed to coincide with the zero point of the scale in (6). This is the most unfavourable case; actually the result can be slightly better.

If a, AB and l are known, m_{X_P}, m_{Y_P}, $m_{\bar{X}_P}$ and $m_{\bar{Y}_P}$ can be computed with formulae (5) and (6). Plotting these amounts on any scale 8 points of the error figure of P are found. Since this curve is the footcurve of the error ellipse, this ellipse can easily be drawn with the aid of the 8 tangents. This is done in fig. 11 for the points A up to and including Z of fig. 10. The ———-line is the error ellipse when plotting with divider and plotting scale, the ---------line that when using tracing point and engineer scale. As a result of the slightly smaller constant term in (5) plotting

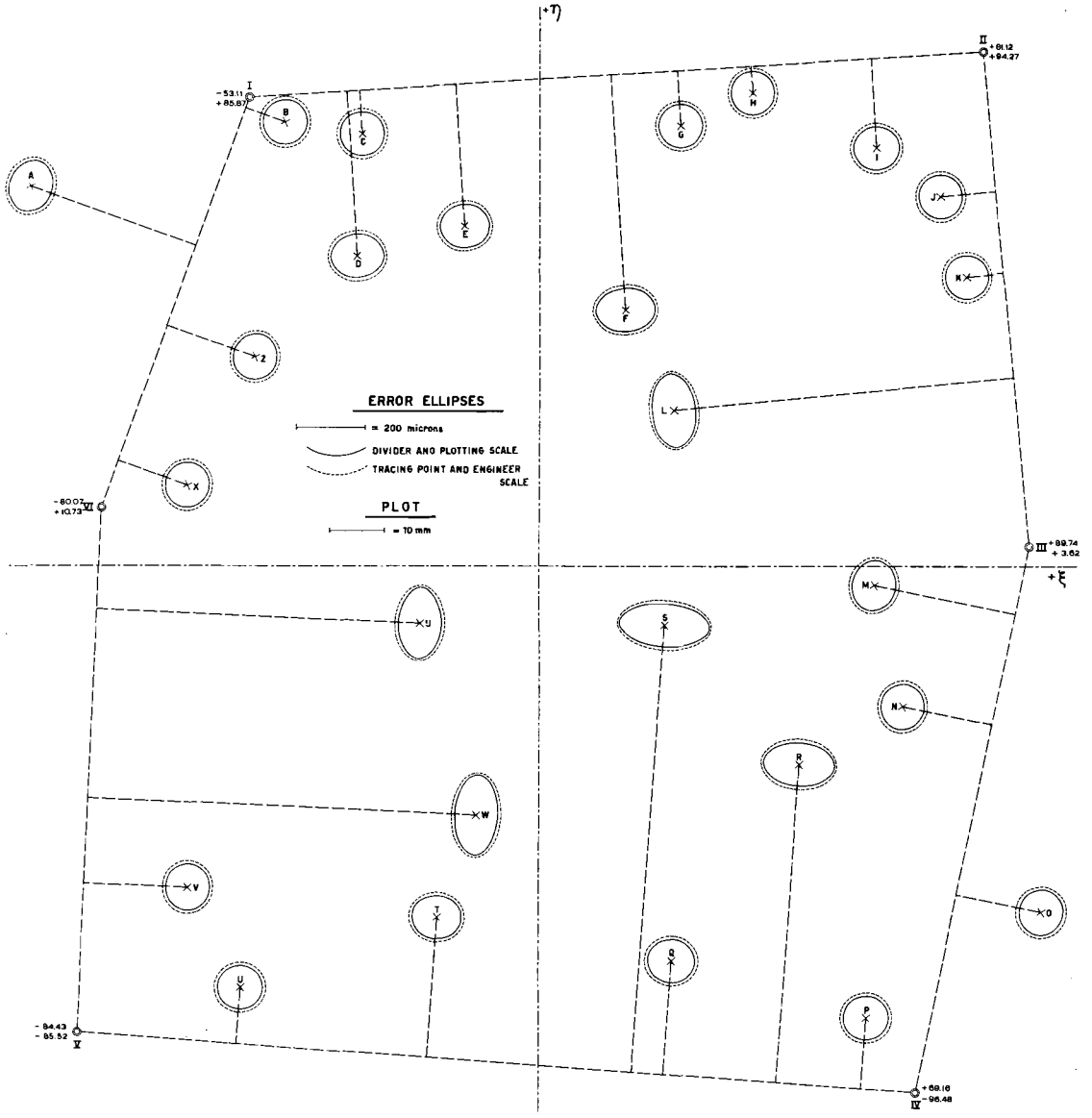
+η
+ξ
I
- 53.11
+ 85.67
II
+ 91.12
+ 94.27
III
+ 89.74
+ 3.62
IV
+ 59.16
- 96.48
V
- 84.43
- 85.52
VI
- 80.07
+ 10.73
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Z
ERROR ELLIPSES
= 200 microns
DIVIDER AND PLOTTING SCALE
TRACING POINT AND ENGINEER SCALE
PLOT
= 10 mm

fig. 11

with divider and scale is obviously more accurate than with tracing point and engineer scale. In many cases, however, the fact that much time is gained, will lead to using the latter method, notwithstanding a slight loss of accuracy.

From (5) and (6) it follows that the error ellipses can never be circles. They deviate more from the circle as l increases (see e.g the very flat ellipses for the points L and S). Long perpendiculars therefore must be avoided in practice; they are more harmful to the accuracy than the use of an engineer scale instead of a divider and plotting scale.

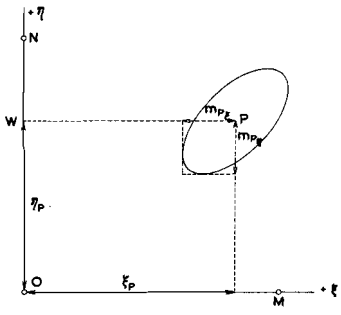

fig. 12

In order to determine the standard error in the scaled-off coordinate ξ_P of P (fig. 12), the square of the standard error in ξ-direction of W must first be determined. The η-axis is assumed to be inked between the points O and N, which are plotted with a coordinatograph.

It is $\left\{ 1 - \frac{2\eta_P(ON - \eta_P)}{ON^2} \right\} m_1^2 + m_7^2$

The contribution in the square of the standard error in PW as to scaling-off is $2m_2^2 + m_5^2 + m_{11}^2$. Hence:

$$m_{\xi_P}^2 = \left\{ 1 - \frac{2\eta_P(ON - \eta_P)}{ON^2} \right\} m_1^2 + m_7^2 + 2m_2^2 + m_5^2 + m_{11}^2 + m_{P_\xi}^2$$ in which

$m_{P_\xi}^2$ is the square of the standard error of P in ξ-direction. For ON = 10.1 cm we obtain

$$m_{\xi_P}^2 = m_1^2 + m_7^2 + 2m_2^2 + m_5^2 + m_{11}^2 + m_{P_\xi}^2 - 5\eta_P(10.1 - \eta_P)$$

For OM = 10.1 cm follows analogously:

$$m_{\eta_P}^2 = m_1^2 + m_7^2 + 2m_2^2 + m_5^2 + m_{11}^2 + m_{P_\eta}^2 - 5\xi_P(10.1 - \xi_P)$$

The (absolute) values of ξ_P and η_P can be scaled-off from a plot; m_{P_ξ} and m_{P_η} are taken from the error ellipses.

Substituting the amounts for m_1, m_7, etc. we obtain:

$$\left.\begin{aligned} m_{\xi_P}^2 &= 3154 + m_{P_\xi}^2 - 5\eta_P(10.1 - \eta_P) \\ m_{\eta_P}^2 &= 3154 + m_{P_\eta}^2 - 5\xi_P(10.1 - \xi_P) \end{aligned}\right\} \quad \ldots\ldots (7)$$

or

$$\left.\begin{aligned} m_{\xi_P}^2 &= 4202 + m_{P_\xi}^2 - 5\eta_P(10.1 - \eta_P) \\ m_{\eta_P}^2 &= 4202 + m_{P_\eta}^2 - 5\xi_P(10.1 - \xi_P) \end{aligned}\right\} \quad \ldots\ldots (8)$$

from which m_{ξ_P} and m_{η_P} can be computed.

The formulae (7) relate to the method with divider and plotting scale, (8) to that with engineer scale. As for accuracy, the first method is slightly better.

§16 *Standard errors in scaled-off coordinates.* In order to test the accuracy of formulae (7) and (8) and also that of (5) and (6), 12 testpersons, skilled draftsmen, plotted the points A up to and including Z (fig. 10) on a sheet of aluminium mounted paper.
The plotting was done both with divider and plotting scale and with tracing point and engineer scale. For regularity's sake these draftsmen are referred to as a up to and including l in the following mathematical observations.

For the former method these letters refer to the testpersons 4, 2, 25, 11, 26, 1, 3, 14, 16, 27, 28 and 24 and for the latter to the numbers 4, 19, 25, 11, 20, 15, 21, 5, 16, 22, 23 and 24.

On the paper points I up to and including VI, the origin 0 and 4 points of the ξ-and η-axis at 10.1 cm from 0 were marked with a coordinatograph Coradi.

An instruction was given how to go to work. In drawing several perpendiculars on one line for instance it was not allowed to place a triangle along that line and to erect all perpendiculars by a parallel shifting of another triangle. This is to avoid correlation.

Next they had to ink the axes ξ and η and to scale-off the coordinates of the 26 plotted points.

The results[42]) turned out to be strongly influenced by perso-

[42]) Appendix XII, tables 231 - 234

nal errors. In addition to the 26 abscissae ξ^A up to and including ξ^Z and the 26 ordinates η^A up to and including η^Z, which were taken to be unknown, 12 personal errors X_a up to and including X_l thus had to be computed in such a way that the sum of the squares of the remaining accidental errors was a minimum.

From the correction equations

$$v_a^I = \xi^I - p_a^I - X_a , \quad w_a^I = \eta^I - q_a^I - X_a$$

$$v_b^I = \xi^I - p_b^I - X_b , \quad w_b^I = \eta^I - q_b^I - X_b$$

$$\vdots$$

$$v_l^I = \xi^I - p_l^I - X_l , \quad w_l^I = \eta^I - q_l^I - X_l$$

(I = A $\longrightarrow$ Z) follow the normal equations

$$\xi^A = \frac{[p_i^A] + [X]}{12}, \qquad \xi^B = \frac{[p_i^B] + [X]}{12}, \ldots\ldots \xi^Z = \frac{[p_i^Z] + [X]}{12},$$

(26 equations; i = a $\longrightarrow$ l),

$$\eta^A = \frac{[q_i^A] + [X]}{12}, \qquad \eta^B = \frac{[q_i^B] + [X]}{12}, \ldots\ldots \eta^Z = \frac{[q_i^Z] + [X]}{12},$$

(26 equations; i = a $\longrightarrow$ l),

$$52X_a = (\xi^A + \xi^B + \ldots\ldots + \xi^Z) + (\eta^A + \eta^B + \ldots\ldots + \eta^Z) - [p_a^I] - [q_a^I],$$

$$52X_b = (\xi^A + \xi^B + \ldots\ldots + \xi^Z) + (\eta^A + \eta^B + \ldots\ldots + \eta^Z) - [p_b^I] - [q_b^I],$$

$$\vdots$$

$$52X_l = (\xi^A + \xi^B + \ldots\ldots + \xi^Z) + (\eta^A + \eta^B + \ldots\ldots + \eta^Z) - [p_l^I] - [q_l^I].$$

(12 equations; I = A $\longrightarrow$ Z).

In these equations p_i^A and q_i^A (i = a $\longrightarrow$ l) are the amounts scaled-off by testpersons a $\longrightarrow$ l for the abscissa and the ordinate of A; p_a^I and q_a^I (I = A $\longrightarrow$ Z) are the amounts scaled-off by a for the abscissae and the ordinates of the points A $\longrightarrow$ Z, etc.

The 64 equations mentioned above are interdependent, for, taking the sum of the latter 12 equations and introducing the expressions for ξ^A, η^A, etc. according to the former 52, an identity is obtained. In order to determine [X], the sum of the personal errors X_i (i = a $\longrightarrow$ l), we have to take a reference value, that is to say, we shall have to compare the sum of all scaled-off abscissae and ordinates of the points A up to and including Z with the amount found arithmatically.

In starting, therefore, from the quantities ξ_I and η_I ($I = A \rightarrow Z$) and not from ξ^I and η^I, [X] can be computed from

$52[X] = 12(\xi_A + \xi_B + ... + \xi_Z) + 12(\eta_A + \eta_B + ... + \eta_Z) - [p_i^I] - [q_i^I]$

($i = a \rightarrow 1$; $I = A \rightarrow Z$).

ξ_I and η_I are the coordinates of the points A up to and including Z, computed by means of the coordinates of I up to and including VI (fig. 11); of course these coordinates were not given to the testpersons.

ξ^I and η^I are derived from the first 52 normal equations, X_i from the latter 12. The sum of the squares of the v's and w's from the correction equations, arranged in the form $[v_i^A v_i^A]$ or $[w_i^A w_i^A]$ ($i = a \rightarrow 1$) shows the accuracy with which the abscissa or the ordinate of A can be scaled-off. Arranged in the form $[v_a^I v_a^I] + [w_a^I w_a^I]$ ($I = A \rightarrow Z$) it gives an idea of the accuracy of the testperson a.

From provisional computations[43]) it followed that $[v_c^I v_c^I] + [w_c^I w_c^I]$ was twice as large as the corresponding amount of the draftsman following c in accuracy, both for the method with divider and plotting scale and for that with engineer scale. It is therefore doubtful whether c[44]) fits in the group of the average good draftsman as required. In the following analysis of the final result of the computations his observations therefore are not taken into account ($i = a, b, d \rightarrow 1$).

divider and plotting scale				tracing point and engineer scale			
testperson	Xi (mm/100)	[vv]+[ww] ($mm^2/10^4$)	number	testperson	Xi (mm/100)	[vv]+[ww] ($mm^2/10^4$)	number
a = 4	+ 3	1152	1	a = 4	+ 8	3634	2
b = 2	0	2155	3	b = 19	- 4	8049	9
c = 25	+ 1	14746	12	c = 25	+ 4	22875	12
d = 11	+21	6197	8	d = 11	+15	5705	6
e = 26	-12	4161	4	e = 20	- 4	3474	1
f = 1	+ 8	1880	2	f = 15	+ 5	4925	3
g = 3	+10	5349	7	g = 21	+ 3	10239	10
h = 14	+ 3	4260	5	h = 5	+ 5	5210	4
i = 16	+ 8	7307	11	i = 16	- 8	10357	11
j = 27	+ 5	7289	10	j = 22	+ 4	5300	5
k = 28	- 3	4363	6	k = 23	+ 8	6619	7
l = 24	+ 6	6330	9	l = 24	- 2	6629	8
	+49				+30		

table fig. 13

43) See also tables 232 and 234

44) Testperson 25

The considerable difference between the personal errors of the various testpersons is shown in table fig. 13. The amounts X_i [45]) are given with their symbols. The plus-symbol indicates that the testperson is inclined to scale-off smaller distances than the amounts ξ^I and η^I computed, the minus-symbol greater distances. The resemblance of the personal error of d (no.11) (method divider and plotting scale) to that of the same observer mentioned already in the analysis of m_5 [46]) is striking.

It appears from table fig. 13 that there is no connection between the personal error and the accuracy with which the testper-

points	divider and plotting scale				tracing point and engineer scale			
	form. (7) (μ)		table 232		form. (8) (μ)		table 234	
	m_ξ	m_η	m_ξ	m_η	m_ξ	m_η	m_ξ	m_η
A	85	94	101	99	99	107	99	119
B	85	85	84	74	98	99	96	126
C	85	84	132	79	98	98	136	102
D	95	84	84	83	106	98	115	59
E	91	84	66	105	104	98	98	60
F	103	84	111	83	114	97	84	112
G	85	84	76	70	98	97	104	122
H	84	84	82	78	97	97	160	93
I	87	84	85	107	100	98	141	163
J	84	85	109	103	97	99	141	85
K	84	84	92	105	97	98	92	99
L	84	121	103	111	97	132	107	123
M	84	91	61	88	98	104	101	107
N	84	86	119	150	97	99	108	95
O	84	87	112	55	98	99	103	144
P	86	84	117	87	100	98	102	97
Q	88	84	68	113	102	97	163	71
R	118	84	128	90	128	98	191	88
S	143	85	115	99	152	98	189	91
T	91	84	90	116	104	97	144	94
U	85	84	119	74	99	97	102	181
V	84	87	85	99	97	101	82	88
W	84	131	100	125	97	140	77	143
X	86	86	63	78	98	99	109	122
Y	84	119	74	125	98	128	91	117
Z	84	87	102	132	97	100	62	127
	2337	2336	2478	2528	2670	2673	2997	2828

table fig. 14

45) computed in tables 231 and 233

46) Table 143

son works.[47]) The relative working-accuracy of each person is indicated by a sequence-number in fig. 13. It is evident that for both types of plotting the sequence-numbers for each person (who actually did both plottings) are almost equal.

In table fig. 14 the standard errors m_{ξ_I} and m_{η_I} in the abscissae and ordinates of the points I (I = A→Z) are given in microns. They are obtained from a computation of the theoretical formulae (7) and (8) and from the practical results $[v_i^I v_i^I]$ and $[w_i^I w_i^I]$ (i = a, b, d→1) mentioned above.[48]) The sum of the theoretical amounts in each of the columns is almost equal to the sum of the m's obtained in practice. The standard deviation between the corresponding m's is about 0.02 mm for the divider and plotting scale-method and 0.03 mm for that with engineer scale.

§17 *Standard errors in scaled-off distances between plotted points.* In order to set up formulae for the computation of the standard error in the scaled-off distance between two points P and Q (fig.15) plotted with divider and plotting scale or with tracing point and engineer scale two cases must be distinguished:

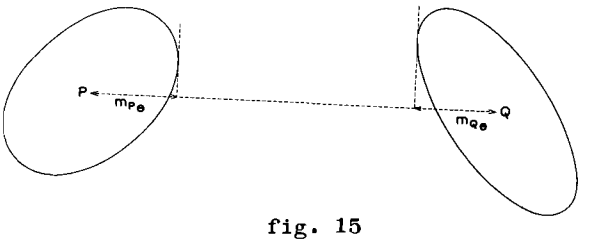

fig. 15

a) P and Q are the tops of perpendiculars on the same line,

b) P and Q are the tops of perpendiculars on different lines.

ad.a When the standard error in the location of P and Q in the direction PQ is m_{P_θ} and m_{Q_θ} respectively the square of the standard error in PQ is as a result of plotting:

$$m_{PQ}^2 = m_{P_\theta}^2 + m_{Q_\theta}^2$$

As m_5, the standard error in a scaled-off distance, is 24μ (divider and plotting scale)[49]) or 43μ (engineer scale)[49]), we have

[47]) $52X_{25} = \{[\xi^I] + [\eta^I]\} - \{[p_{25}^I] + [q_{25}^I]\}$

$v_{25}^I = \xi^I - (p_{25}^I + X_{25})$; $w_{25}^I = \eta^I - (q_{25}^I + X_{25})$

[48]) Tables 232 and 234.

[49]) Table fig. 9.

$m^2_{PQ} = 576 + m^2_{P_\theta} + m^2_{Q_\theta}$ ..... (9) and

$m^2_{PQ} = 1849 + m^2_{P_\theta} + m^2_{Q_\theta}$ ..... (10) respectively

m_{P_θ} and m_{Q_θ} can be derived from the error ellipses.

In order to check these formulae the 12 testpersons a up to and including l mentioned before scaled off 15 distances from the plots they had made (see table fig. 16). The results of c (no. 25) had to be rejected. In a similar way as described in the determination of m_ξ and m_η personal errors X_i (i = a, b, d→l) had to be

distance PQ = d (fig.10)	divider and plotting scale $m_{PQ} = m_d$ (μ)		engineer scale $m_{PQ} = m_d$ (μ)		distance PQ = d (fig.10)	divider and plotting scale $m_{PQ} = m_d$ (μ)		engineer scale $m_{PQ} = m_d$ (μ)	
	form. (9)	table 236	form. (10)	table 238		form. (9)	table 236	form. (10)	table 238
PM	100	119	119	112	YS	148	140	161	159
YC	124	76	140	173	ZL	95	118	114	155
UZ	95	168	114	112	MT	100	101	118	164
NI	94	108	114	94	CJ	93	121	112	165
LQ	127	65	143	173	FW	135	138	151	109
DK	102	53	120	109	DU	94	80	113	77
TO	99	105	119	86	AV	102	125	121	123
BG	94	64	113	111					
					sum	1602	1581	1872	1922

table fig. 16

introduced. The manner in which they are computed from the observations p_i^I (I = PM→AV) and from the distances d_I is about the same as that for the former method.[50] The determination of d^I [50], v_i^I and m_d[51] is analogous to that of $\xi^I(\eta^I)$, $v_i^I(w_i^I)$ and $m_\xi(m_\eta)$.

$m_d = m_{PQ}$ is tabulated in microns in table fig. 16 next to the amounts computed with formulae (9) and (10).

The sums of the theoretical and the practical results agree very well, the standard deviation between two corresponding amounts being about 0.03 mm for both methods.

50) Tables 235 and 237
51) Tables 236 and 238

ad. b. If P and Q are plotted with respect to the same line AB (X-axis, see fig. 17) formulae (9) and (10) must be somewhat extended. For, in plotting P and Q, AB is drawn once only. Y_P and Y_Q therefore are correlated.

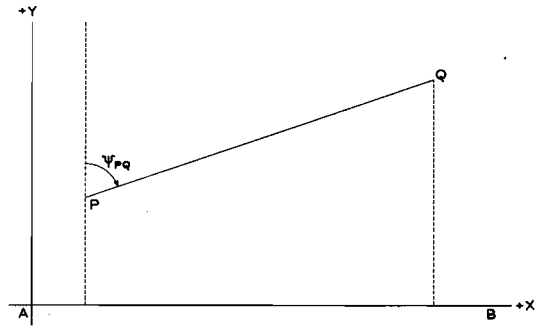

fig. 17

Since

$PQ = \left\{(X_Q - X_P)^2 + (Y_Q - Y_P)^2\right\}^{\frac{1}{2}}$ then, as regards plotting:

$$m_{PQ}^2 = \left[\left(\frac{\partial PQ}{\partial X_Q}\right)^2 m_{X_Q}^2 + \left(\frac{\partial PQ}{\partial X_P}\right)^2 m_{X_P}^2 + \left(\frac{\partial PQ}{\partial Y_Q}\right)^2 m_{Y_Q}^2 + \left(\frac{\partial PQ}{\partial Y_P}\right)^2 m_{Y_P}^2\right] + 2\left(\frac{\partial PQ}{\partial Y_Q}\right)\left(\frac{\partial PQ}{\partial Y_P}\right) m_{Y_P Y_Q}$$

The part of this formula written between square brackets is the amount $m_{P_\theta}^2 + m_{Q_\theta}^2$ from (9) and (10). $2\left(\frac{\partial PQ}{\partial Y_Q}\right)\left(\frac{\partial PQ}{\partial Y_P}\right) m_{Y_P Y_Q}$ is the amount of correlation.

As

$$\frac{\partial PQ}{\partial Y_Q} = \frac{Y_Q - Y_P}{PQ} = \cos\psi_{PQ} \text{ and}$$

$$\frac{\partial PQ}{\partial Y_P} = -\frac{Y_Q - Y_P}{PQ} = -\cos\psi_{PQ} \text{ this amount is } -2\cos^2\psi_{PQ} m_{Y_P Y_Q} \text{ in which}$$

$m_{Y_P Y_Q} = m_s^2 = 1600.$[52]) (9) and (10) then change into

$$m_{PQ}^2 = 576 + m_{P_\theta}^2 + m_{Q_\theta}^2 - 3200\cos^2\psi_{PQ} \quad \text{.....(11)}$$

$$m_{PQ}^2 = 1849 + m_{P_\theta}^2 + m_{Q_\theta}^2 - 3200\cos^2\psi_{PQ} \quad \text{.....(12)}$$

As shown by the formulae, correlation is maximum for $\psi_{PQ}=0°$ or 180° and zero for $\psi_{PQ}=90°$ or 270°. In order to get an idea of the

52) Table fig. 9

influence of correlation the results of a computation on theoretical basis of the standard error in the distances AB, VW, LK and HG (fig. 10) are given in table fig. 18. They are for both working methods, once without and once with correlation. As the amount $-3200\cos^2\psi_{PQ}$ is the same in formulae (11) and (12) the correlation is more evident in the first method than in the second.

distance PQ (fig.10)	divider and plotting scale m_{PQ} (μ) form.(11)		engineer scale m_{PQ} (μ) form.(12)	
	no correlation	correlation	no correlation	correlation
CS	114	--	132	---
ZY	116	--	132	---
AB	96	84	116	106
VW	98	81	117	104
LK	97	81	116	103
HG	92	90	112	111
WO	92	--	112	---
NY	93	--	112	---

table fig. 18

It is of little influence however. It is advisible to neglect it and to use, for safety's sake, the somewhat higher amount without correlation. The standard errors in CS, ZY, WO and NY, also mentioned in table fig. 18, will be used later on.

§18. *Standard errors in scaled-off heights of triangles and trapezia.* If we want to know the standard error of the scaled-off height h of a triangle (fig.19) or of the height of a trapezium (fig.20) of which the base PQ or the parallel sides PQ and RS are drawn in ink, we shall have to determine first of all the standard error in the points α (β) in a direction σ perpendicular to PQ (RS).

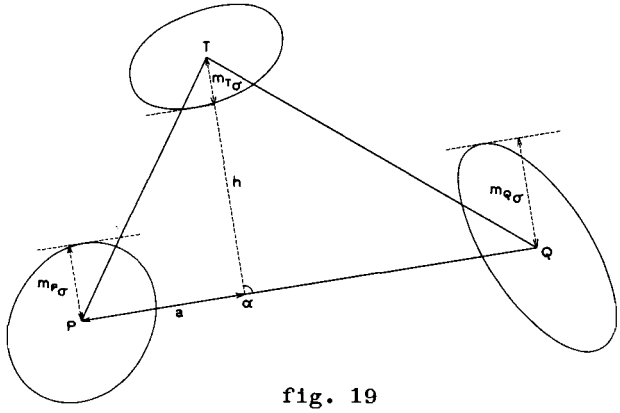

fig. 19

Apart from other possibilities (P, Q and T for instance are plotted with respect to the same base) two cases are possible. In the first P and Q (R and S) are tops of perpendiculars on the same line AB, in the second on different lines. In the first case there is correlation. If we compute an amount of correlation this amount is zero in the second case.

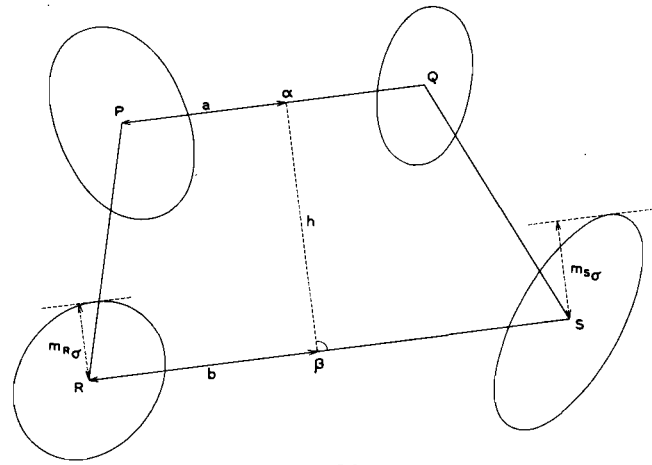

fig. 20

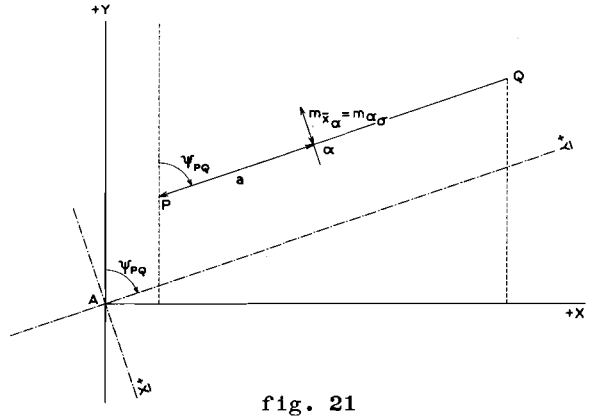

fig. 21

With respect to the perpendicular axes X (=AB) and Y (fig. 21) we have $X_\alpha = X_P\left(1 - \frac{a}{PQ}\right) + \frac{a}{PQ} X_Q$; $Y_\alpha = Y_P\left(1 - \frac{a}{PQ}\right) + \frac{a}{PQ} Y_Q$ Hence:

$$m^2_{X_\alpha} = \left(1 - \frac{a}{PQ}\right)^2 m^2_{X_P} + \left(\frac{a}{PQ}\right)^2 m^2_{X_Q} + 2\left(1 - \frac{a}{PQ}\right)\frac{a}{PQ} m_{X_P X_Q}$$

$$m^2_{Y_\alpha} = \left(1 - \frac{a}{PQ}\right)^2 m^2_{Y_P} + \left(\frac{a}{PQ}\right)^2 m^2_{Y_Q} + 2\left(1 - \frac{a}{PQ}\right)\frac{a}{PQ} m_{Y_P Y_Q}.$$

In the first formula $m_{X_P X_Q} = 0$, in the second $m_{Y_P Y_Q} = m_e^2 = 1600$.

It follows from fig. 21:

$$\bar{X}_a = X_a\cos\psi_{PQ} - Y_a\sin\psi_{PQ} \quad \text{Hence:}$$

$$m^2_{\bar{X}_a} = m^2_{X_a}\cos^2\psi_{PQ} + m^2_{Y_a}\sin^2\psi_{PQ} - \sin 2\psi_{PQ} m_{X_aY_a}$$

As $m_{X_aY_a} = 0$ and (fig. 19 and 21) $m_{\bar{X}_a} = m_{a_\sigma}$ we have

$$m^2_{\bar{X}_a} = m^2_{a_\sigma} = m^2_{X_a}\cos^2\psi_{PQ} + m^2_{Y_a}\sin^2\psi_{PQ}$$

Substituting the values for $m^2_{X_a}$ and $m^2_{Y_a}$ mentioned above we obtain:

$$m^2_{\bar{X}_a} = m^2_{a_\sigma} = \left[\left(1 - \frac{a}{PQ}\right)^2 m^2_{X_P}\cos^2\psi_{PQ} + \left(\frac{a}{PQ}\right)^2 m^2_{X_Q}\cos^2\psi_{PQ} + \left(1 - \frac{a}{PQ}\right)^2 m^2_{Y_P}\sin^2\psi_{PQ} + \right.$$

$$\left. + \left(\frac{a}{PQ}\right)^2 m^2_{Y_Q}\sin^2\psi_{PQ} \right] + 3200\sin^2\psi_{PQ}\left(1 - \frac{a}{PQ}\right)\frac{a}{PQ}.$$

The term between square brackets is the amount that can be derived in a simple manner from the error ellipses of P and Q for

$$\left[\quad\right] = \left\{\left(1 - \frac{a}{PQ}\right)m_{P_\sigma}\right\}^2 + \left\{\frac{a}{PQ}m_{Q_\sigma}\right\}^2$$

The amount $m^2_{a_\sigma}$, derived above, is part of the square of the standard error in the distance αT in so far as it is due to the standard error in P and Q.

When drawing ink line PQ with a ruling pen and scaling-off the height h of the triangle PQT (fig. 19) the square of the standard error m_h is

$$m_h{}^2 = m^2_{T_\sigma} + m_7{}^2 + m_{11}{}^2 + m_5{}^2 + \left\{\left(1 - \frac{a}{PQ}\right)m_{P_\sigma}\right\}^2 + \left\{\frac{a}{PQ}m_{Q_\sigma}\right\}^2 +$$

$$+ 3200\sin^2\psi_{PQ}\left(1 - \frac{a}{PQ}\right)\frac{a}{PQ}.$$

The last term, the amount of correlation, is zero if P and Q are tops of perpendiculars on different lines AB.

For divider and plotting scale this formula is

$$m_h{}^2 = 2826 + m^2_{T_\sigma} + \left\{\left(1 - \frac{a}{PQ}\right)m_{P_\sigma}\right\}^2 + \left\{\frac{a}{PQ}m_{Q_\sigma}\right\}^2 +$$

$$+ 3200\sin^2\psi_{PQ}\left(1 - \frac{a}{PQ}\right)\frac{a}{PQ} \quad \text{------(13)}$$

and for engineer scale:

$$m_h^2 = 3874 + m_{T_\sigma}^2 + \left\{\left(1 - \frac{a}{PQ}\right)m_{P_\sigma}\right\}^2 + \left\{\frac{a}{PQ}m_{Q_\sigma}\right\}^2 + 3200\sin^2\psi_{PQ}\left(1 - \frac{a}{PQ}\right)\frac{a}{PQ}. \quad \text{.....(14)}$$

For the standard error in the scaled-off height h of the trapezium PQSR (fig.20) of which the parallel sides PQ and RS are drawn with a ruling pen we find in an analogous way:

$$m_h^2 = 2m_7^2 + 2m_{11}^2 + m_5^2 + \left\{\left(1 - \frac{a}{PQ}\right)m_{P_\sigma}\right\}^2 + \left\{\frac{a}{PQ}m_{Q_\sigma}\right\}^2 + \left\{\left(1 - \frac{b}{RS}\right)m_{R_\sigma}\right\}^2 +$$

$$+ \left\{\frac{b}{RS}m_{S_\sigma}\right\}^2 + \left[3200\sin^2\psi_{PQ}\left(1 - \frac{a}{PQ}\right)\frac{a}{PQ} + 3200\sin^2\psi_{RS}\left(1 - \frac{b}{RS}\right)\frac{b}{RS}\right]. \quad \text{.....(15)}$$

The term between square brackets which is maximum $1600\mu^2$, is the amount of correlation if P and Q are plotted with respect to the same line and R and S are tops of perpendiculars on the same base. If there is no correlation in one of these cases the corresponding amount is zero.
In formula (15) $2m_7^2 + 2m_{11}^2 + m_5^2 = 5076$ for divider and plotting scale, 5899 for engineer scale.

Formulae (13) and (14) are checked in practice by the testpersons a up to and including l already mentioned before. By means of divider and plotting scale and of engineer scale they scaled-off the heights h of 5 triangles the bases of which drawn in ink with a ruling pen.[53]) Of course the observations of c (no. 25) were not taken into account. Here, too, personal errors X_i had to be intro-

triangle PQT (fig.10)	base PQ	top T	divider and plotting scale m_h (μ)		engineer scale m_h (μ)	
			form. (13)	tables 239-240	form. (14)	tables 241-242
MTE	MT	E	102	130	117	94
CJS	CJ	S	94	79	110	75
FWO	FW	O	102	71	118	69
DUY	DU	Y	97	99	112	128
AVX	AV	X	96	106	111	71
		sum	491	485	568	437

table fig. 22

53) Tables 239 - 242

duced. They could be determined with the aid of the computed heights h_I of the triangles.[54]) The standard errors m_h (in microns)[55]) are given in table fig. 22 beside the amounts computed with formulae (13) and (14). The amount of correlation in these formulae is zero. In computing m_h in triangle AVX the correlation arising from the fact that A and X are plotted with respect to the same line I - VI is not taken into account.

(15) is also checked on its accuracy. The 11 testpersons scaled-off the heights of trapezia CSZY, ABVW, LKHG and NYWO near the midpoints of CS, AB, LK and NY. The standard errors m_h computed from the observations[56]) are mentioned in table fig. 23 beside the amounts obtained theoretically.

trapezia PQRS (fig.10)	divider and plotting scale m_h (μ)			engineer scale m_h (μ)		
	form. (15)		tables 243 - 244	form. (15)		tables 245 - 246
	no correlation	correlation		no correlation	correlation	
CSZY	109	(109)	136	119	(119)	125
ABVW	(109)	111	105	(119)	121	109
LKHG	(104)	108	61	(114)	118	98
NYWO	129	(129)	108	138	(138)	85
	sum	457	410	sum	496	417

table fig. 23

In the four trapezia the computation of X_i, h^I, $v_i{}^I$ and m_h[56]) is done in one adjustment though the sides CS and ZY, AB and VW of the first two are drawn with a ruling pen in the same direction and the parallels LK and HG, NY and WO of the latter two in the opposite direction (e.g. $\psi_{CS} = \psi_{ZY}$; $\psi_{LK} = \psi_{HG} + 180°$).

This seems justified because there is no tendency to draw an ink line always on the same side of the plotted points (see fig. 5). The amounts of correlation caused by the fact that A and B, V and W, L and K and H and G respectively are plotted with respect to the same line are small. It appears from table fig. 23 that they have hardly any influence on the standard errors in the scaled-off heights. Correlation in trapezium NYWO in which W and Y and N and

54) Tables 239 and 241

55) Computed in tables 240 and 242

56) Tables 243 - 246

O respectively are plotted with respect to the same base is neglected.[57]) The sums of the standard errors in the tables fig.22 and 23 correspond satisfactorily.

§19 *Standard errors in scaled-off areas of triangles.*
From the standard errors in the base PQ and the height h of a triangle PQT the standard error m_O in the area of this triangle can easily be found

$$m_O^2 = \frac{1}{4} PQ^2 m_h^2 + \frac{1}{4} h^2 m_{PQ}^2 \quad \text{.....(16)}$$

In order to form an idea of the accuracy of the scaled-off area of such a triangle the standard errors m_O for the 5 triangles of table fig. 22 are computed with this formula. The amounts m_{PQ} are taken from table fig. 16, the amounts m_h from table fig. 23. The results of the computation are shown in table fig.24. The relative large standard error in the small triangles DUY and AVX is due to the unfavourable form of these triangles, the most favourable form being PQ = h.

triangle PQT fig. 10,230	base PQ=d	top T	PQ=d (mm)	h (mm)	O (mm^2)	divider and plotting scale m_O (mm^2)		engineer scale m_O (mm^2)	
						theoret.	pract.	theoret.	pract.
MTE	MT	E	100.48	99.79	4913	7.1	8.2	8.2	9.4
CJS	CJ	S	106.68	83.41	4449	6.4	6.6	7.5	8.0
FWO	FW	O	96.43	104.40	5034	8.6	8.0	9.7	6.6
DUY	DU	Y	135.64	21.87	1483	6.6	6.8	7.7	8.7
AVX	AV	X	131.66	15.92	1048	6.4	7.1	7.4	4.8
					sum	35.1	36.7	40.5	37.5

table fig. 24

Here too the sums of the standard errors, obtained theoretically and practically, agree very well.

57) See the instruction on page 28.

§20 *Summary.* Summarising the matter of the preceding pages it follows from (5) that for small lengths of l the error ellipses of points P are approximately circles with radii 0.06 or 0.07 mm when these points are plotted with divider and plotting scale. Plotting with tracing point and engineer scale these radii are about 0.07 or 0.08 mm as appears from (6). The method of plotting with divider and plotting scale is therefore almost equivalent to that with tracing point and engineer scale. As the length of the perpendicular increases the standard error in P quickly increases in the direction parallel with AB as a result of the high value of m_{10}. In practice therefore long perpendiculars must be avoided. With short perpendiculars it follows from (7) that the abscissa or the ordinate of a point P, plotted with divider and plotting scale can be scaled-off with these instruments with a standard error between 0.08 and 0.09 mm. According to (8) it is about 0.10 mm when plotting and scaling-off is done with tracing point and engineer scale. In this respect, too, both methods are nearly equivalent. With the second method gain of time is often an advantage. If the error ellipses of P and Q are almost circles then the standard error in the distance PQ, scaled-off with divider and plotting scale, according to (9) is about 0.09 or 0.10 mm. According to (10) it is about 0.11 or 0.12 mm for scaling-off with engineer scale. Though in practice these standard errors are round about the theoretical values mentioned above, a standard deviation of about 0.03 mm can be expected. In many cases the slight influence of correlation can be neglected also in connection with the uncertainties mentioned above. It must be emphasized that in these standard errors the influence of personal (systematic) errors has not been taken into account; they varied considerably for different testpersons.

It is recommended to try and eliminate these systematic errors as well as possible by using a judicious working method. If, for instance, the height h of the trapezium in fig. 20 has to be scaled-off, it is advisable to draw the parallels PQ and RS in the same direction, e.g. from P and R. By doing this the systematic part of the error in h described under m_6 and m_8 is eliminated. If m_5 is small for a draftsman, but on the contrary his personal

error in scaling-off a distance great[58]), it is advisible not to scale-off h directly but in two phases. From any point on $\alpha\beta$ below RS the distance to β is first scaled-off and then the distance to α. h is computed from the difference of these distances. Because of this the standard (accidental) error in h is multiplied by $\sqrt{2}$; the systematic error however is eliminated.

---

[58]) no. 11 e.g.; see tables 135 and 143.

APPENDIX I

Checking of the standard measure used

Table 25

Calibration line	First series Obs. Mr. de With	Second series Obs. Mr. Rolff	Mean (mm)	Reduced to a zero initial (mm)
0	199.7415	199.7412	199.7414	0.0000
10	189.7423	189.7419	189.7421	9.9993
20	179.7425	179.7425	179.7425	19.9989
30	169.7431	169.7424	169.7428	29.9986
40	159.7430	159.7439	159.7434	39.9980
50	149.7433	149.7430	149.7432	49.9982
60	139.7425	139.7416	139.7420	59.9994
70	129.7432	129.7421	129.7426	69.9988
80	119.7434	119.7428	119.7431	79.9983
90	109.7428	109.7419	109.7424	89.9990
0	99.7429	99.7421	99.7425	99.9989
10	89.7429	89.7425	89.7427	109.9987
20	79.7432	79.7432	79.7432	119.9982
30	69.7427	69.7430	69.7428	129.9986
40	59.7440	59.7440	59.7440	139.9974
50	49.7445	49.7434	49.7440	149.9974
60	39.7443	39.7431	39.7437	159.9977
70	29.7440	29.7432	29.7436	169.9978
80	19.7443	19.7445	19.7444	179.9970
90	9.7446	9.7436	9.7441	189.9973
80	22.5994	22.5992	22.5993	179.9970
90	12.6004	12.6002	12.6003	189.9973
0	2.6005	2.6010	2.6008	199.9962

Temperature at the beginning of the first series 18.3° C,
at the end of the second 19.1° C.
Date April 20, 1950.

TABLE no. 25

APPENDIX II

Determination of m_1

Tables 28 - 31

Instruments checked: Coordinatograph Coradi no. 205 and
Coordinatograph Autograph Wild A5 no. 45.

In the direction of the horizontal axis of the Coradi-instrument the points 1 - 31 at distances of 0.5 cm apart were plotted on an emulsified undeveloped photographic plate and in the direction of the vertical axis the points 32-52 and 53-73 respectively (1 = 52; 31 = 73; see fig. 26). The three series of points were checked with height scale (standard measure) and comparator.[59]

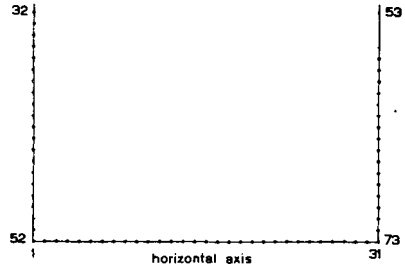

fig. 26

If X is the adjusted value of the beginpoint 1 and Y the equal interval between two successive points on the horizontal axis, the values X and Y must be determined from the equations

$$\left.\begin{aligned} 0 + v_1 &= X + 0\,Y \\ 5.002 + v_2 &= X + 1\,Y \\ 10.000 + v_3 &= X + 2\,Y \\ 14.970 + v_4 &= X + 3\,Y \\ &\vdots \\ 149.978 + v_{31} &= X + 30\,Y \end{aligned}\right\} \quad (16) \quad \text{(Table 28)}$$

in such a way, that [vv] is a minimum. If $X = X' + \Delta X$ and $Y = Y' + \Delta Y$ in which $X' = 0.000$ and $Y' = 5.000$ mm, the correction equations (16) change into

$$\begin{aligned} v_1 &= \Delta X + 0\,\Delta Y \\ v_2 &= \Delta X + 1\,\Delta Y - 0.002 \\ v_3 &= \Delta X + 2\,\Delta Y \\ v_4 &= \Delta X + 3\,\Delta Y + 0.030 \\ &\vdots \\ v_{31} &= \Delta X + 30\,\Delta Y + 0.022, \end{aligned}$$

59) Tables 28 and 29.

all of the type $v_i = a_i\Delta X + b_i\Delta Y + f_i$ $(i = 1 \rightarrow 31)$. From the correction equations follow the normal equations

$[aa]\Delta X + [ab]\Delta Y + [af] = 0$ and
$[ab]\Delta X + [bb]\Delta Y + [bf] = 0$ that is
$31\ \Delta X + 465\ \Delta Y + 0.395 = 0$ and
$465\ \Delta X + 9455\ \Delta Y + 7.218 = 0$ whence
$\Delta X = -\ 0.0049$ mm and $\Delta Y = -\ 0.0005$ mm

As $[vv] = 0.00259\ mm^2$, $m_1^2 = \frac{0.00259}{29} mm^2$ whence $m_1 = 9\mu$.

Coordinatograph Coradi no. 205				
points	X (mm)	Y (mm)	m_1 (μ)	table
1 - 31	- 0.0049	4.9995	9	28
32 - 52	- 0.0087	5.0000	10	29
53 - 73	- 0.0018	5.0005	6	29
			9	
Coordinatograph Autograph Wild A5 no. 45				
1 - 31	- 0.0122	10.0018	27	30
1 - 31	- 0.0106	9.9952	35	31
32 - 52	- 0.0114	10.0012	26	30
32 - 52	+ 0.0018	9.9973	22	31
53 - 73	- 0.0118	9.9978	15	30
53 - 73	+ 0.0150	9.9994	26	31
			25	

table fig. 27

For the series of points 32-52 and 53-73 X, Y and m_1 are determined analogously. They are tabulated in table fig.27. It is concluded from these computations that the points plotted with the Coradi coordinatograph have circular error curves with radii of 9μ.
The Wild-instrument, slightly damaged by war actions, has been checked twice, by plotting the points 1,3,5,....31,32,34,36,....52 and 53,55,57,....73 on a sheet of aluminium mounted paper and by checking the distances between the plotted points with height scale and comparator (tables 30 and 31). The results of the analogous computations of X, Y and m_1 are also mentioned in table fig. 27. The points plotted with this instrument are assumed to have circular error curves with radii of 25μ. For safety's sake m_1 is taken to be 16μ.

Instrument: Coordinatograph Coradi no. 205. Obs. Mr. Breemans Date: May 12, 1950								
Point no.	First series			Second series			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Point	Point - S.M.	Stand. Meas.	Point	Point - S.M.		
1	15.3875	1166	[1] 15.358	15.3490	775	15.357	15.358	0.000
2	20.3922	1225	20.361	20.3161	450	20.358	20.360	5.002
3	25.3776	1056	25.356	25.3833	1130	25.359	25.358	10.000
4	30.3318	442	30.325	30.3972	1123	30.330	30.328	14.970
5	35.3052	307	35.351	35.3556	830	35.355	35.353	19.995
6	40.3378	632	40.351	40.3315	585	40.354	40.352	24.994
7	45.3550	762	45.342	45.3010	265	45.351	45.346	29.988
8	50.3850	1096	50.349	50.3688	940	50.350	50.350	34.992
9	55.3362	550	55.338	55.3511	716	55.341	55.340	39.982
10	60.3590	785	60.339	60.3252	460	60.342	60.340	44.982
11	65.3118	348	65.346	65.3045	270	65.345	65.346	49.988
12	70.3172	435	70.353	70.3071	380	70.362	70.358	55.000
13	75.3462	737	75.355	75.3710	1005	75.359	75.357	59.999
14	80.3760	1000	80.348	80.3463	698	80.347	80.348	64.990
15	85.3981	1170	85.338	85.3312	490	85.336	85.337	69.979
16	90.3246	440	90.339	90.3945	1150	90.341	90.340	74.982
17	95.3462	756	95.359	95.3095	412	95.363	95.361	80.003
18	100.3686	1000	100.363	100.3178	505	100.365	100.364	85.006
19	105.3166	315	105.330	105.3963	1120	105.331	105.330	89.972
20	110.3149	384	110.347	110.3722	970	110.350	110.348	94.990
21	115.3410	631	115.344	115.3430	674	115.349	115.346	99.988
22	120.3660	861	120.340	120.3193	405	120.342	120.341	104.983
23	125.3536	678	125.328	125.3468	613	125.329	125.328	109.970
24	130.3522	741	130.344	130.3296	506	130.342	130.343	114.985
25	135.3815	1035	135.344	135.3990	1216	135.345	135.344	119.986
26	140.3030	250	140.344	140.3761	980	140.344	140.344	124.986
27	145.3311	446	145.327	145.3639	754	145.323	145.325	129.967
28	150.3712	953	150.348	150.3342	568	150.345	150.346	134.988
29	155.3060	285	155.345	155.3109	319	155.342	155.344	139.986
30	160.3198	373	160.335	160.3470	620	160.330	160.332	144.974
31	165.3811	998	165.337	165.3298	470	165.334	165.336	149.978

[1] 15.3 mm + 2μ (116.6 − 87.5) = 15.358 mm

TABLE no. 28

Instrument: Coordinatograph Coradi no. 205 Obs. Mr. Breemans Date: May 13, 1950

Point no.	First series			Second series			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Point	Point - S.M.	Stand. Meas.	Point	Point - S.M.		
32	23.3215	418	23.341	23.3634	810	23.335	23.338	0.000
33	28.3285	468	28.337	28.3495	672	28.335	28.336	4.998
34	33.3525	590	33.313	33.3475	516	33.308	33.310	9.972
35	38.3619	682	38.313	38.3321	401	38.316	38.314	14.976
36	43.3180	348	43.334	43.3062	235	43.335	43.334	19.996
37	48.3416	612	48.339	48.3026	245	48.344	48.342	25.004
38	53.3652	758	53.321	53.3638	750	53.322	53.322	29.984
39	58.3802	942	58.328	58.3620	742	58.324	58.326	34.988
40	63.3002	206	63.341	63.3375	555	63.336	63.338	40.000
41	68.3163	396	68.347	68.3185	390	68.341	68.344	45.006
42	73.3396	535	73.328	73.3035	183	73.330	73.329	49.991
43	78.3498	560	78.312	78.3880	945	78.313	78.312	54.974
44	83.3438	598	83.332	83.3768	934	83.333	83.332	59.994
45	88.3530	735	88.341	88.3406	640	88.347	88.344	65.006
46	93.3692	850	93.332	93.3340	520	93.336	93.334	69.996
47	98.3658	790	98.326	98.3045	176	98.326	98.326	74.988
48	103.3812	960	103.330	103.3762	942	103.336	103.333	79.995
49	108.3842	970	108.326	108.3293	425	108.326	108.326	84.988
50	113.3842	1008	113.333	113.3938	1080	113.328	113.330	89.992
51	118.3058	152	118.319	118.3858	950	118.318	118.318	94.980
52	123.3116	296	123.336	123.3726	900	123.335	123.336	99.998
53	15.6742	888	15.629	15.6257	402	15.629	15.629	0.000
54	20.6911	1042	20.626	20.6200	328	20.626	20.626	4.997
55	25.6105	235	25.626	25.6902	1036	25.627	25.626	9.997
56	30.6448	582	30.627	30.6120	263	30.629	30.628	14.999
57	35.6566	690	35.625	35.6770	898	35.626	35.626	19.997
58	40.6700	871	40.634	40.6600	783	40.637	40.636	25.007
59	45.6770	881	45.622	45.6678	758	45.616	45.619	29.990
60	50.6672	815	50.629	50.6668	820	50.630	50.630	35.001
61	55.6870	1112	55.648	55.6628	850	55.644	55.646	40.017
62	60.6220	361	60.628	60.6560	680	60.624	60.626	44.997
63	65.6288	410	65.624	65.6280	414	65.627	65.626	49.997
64	70.6392	550	70.632	70.6136	300	70.633	70.632	55.003
65	75.6538	755	75.643	75.6882	1095	75.643	75.643	60.014
66	80.6540	700	80.632	80.6745	875	80.626	80.629	65.000
67	85.6848	1048	85.640	85.6506	665	85.632	85.636	70.007
68	90.6618	793	90.635	90.6382	536	90.631	90.633	75.004
69	95.6840	1070	95.646	95.6382	600	95.644	95.645	80.016
70	100.6122	260	100.628	100.6112	265	100.631	100.630	85.001
71	105.6282	450	105.634	105.6370	522	105.630	105.632	90.003
72	110.6332	490	110.632	110.6815	1002	110.637	110.634	95.005
73	115.6292	480	115.638	115.6721	875	115.631	115.634	100.005

TABLE no. 29

Instrument: Coordinatograph Wild (Autograph A 5 no. 45)								Date: May 4, 1950
Point no.	First series (Obs. Mr. Dijkstra)			Second series (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Point	Point - S.M.	Stand. Meas.	Point	Point - S.M.		
1	1.7299	794	1.799	1.7363	779	1.783	1.791	0.000
3	11.7681	831	11.730	11.7650	991	11.768	11.749	9.958
5	21.7326	810	21.797	21.7363	784	21.784	21.790	19.999
7	31.7681	1000	31.764	31.7363	636	31.755	31.760	29.969
9	41.7800	471	——	41.7395	842	41.789	41.789	39.998
11	51.8452	488	51.807	51.8658	669	51.802	51.804	50.013
13	61.8161	412	61.850	61.8640	816	61.835	61.842	60.051
15	71.8020	031	71.802	71.8762	776	71.803	71.802	70.011
17	81.8307	310	81.801	81.8481	487	81.801	81.801	80.010
19	91.7074	505	91.786	91.7906	1333	91.785	91.786	89.995
21	101.7148	515	101.773	101.7586	969	101.777	101.775	99.984
23	111.7688	974	111.757	111.7754	1102	111.770	111.764	109.973
25	121.7693	1025	121.766	121.7428	817	121.778	121.772	119.981
27	131.7009	435	131.785	131.7050	475	131.785	131.785	129.994
29	141.8124	422	141.860	141.8031	267	141.847	141.854	140.063
31	151.8427	511	151.817	151.8813	932	151.824	151.820	150.029
32	39.2057	239	39.236	39.2507	667	39.232	39.234	100.012
34	49.2902	948	49.209	49.2970	1026	49.211	49.210	90.036
36	59.2798	1104	59.261	59.2908	1173	59.253	59.257	79.989
38	69.2373	800	69.285	69.2293	720	69.285	69.285	69.961
40	79.2065	361	79.259	79.2210	493	79.257	79.258	59.988
42	89.2216	425	89.242	89.2050	307	89.251	89.246	50.000
44	99.2168	543	99.275	99.2636	1037	99.280	99.278	39.968
46	109.2394	755	109.272	109.2575	918	109.269	109.270	29.976
48	119.2788	1185	119.279	119.2933	1329	119.279	119.279	19.967
50	129.2870	960	129.218	129.2391	488	129.219	129.218	10.028
52	139.2143	380	139.247	139.2324	550	139.245	139.246	0.000
53	117.4073	495	117.484	117.4303	703	117.480	117.482	99.957
55	107.4365	841	107.495	107.4128	597	107.494	107.494	89.969
57	97.4198	610	97.482	97.4510	950	97.488	97.485	79.960
59	87.5954	997	87.509	87.5868	868	87.500	87.504	69.979
61	77.5851	1053	77.540	77.5716	869	77.531	77.536	60.011
63	67.4425	900	67.495	67.4452	880	67.486	67.490	49.965
65	57.5007	040	57.507	57.4372	858	57.497	57.502	39.977
67	47.5971	999	47.506	47.4369	848	47.496	47.501	29.976
69	37.5569	569	37.500	37.4392	865	37.495	37.498	19.973
71	27.5317	370	27.511	27.4968	1442	27.495	27.503	9.978
73	17.5246	367	17.524	17.5770	900	17.526	17.525	0.000

TABLE no. 30

Instrument: Coordinatograph Wild (Autograph A 5 no. 45)								Date: May 1950
Point no.	First series (Obs. Mr. Dijkstra)			Second series (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Point	Point - S.M.	Stand. Meas.	Point	Point - S.M.		
1	175.7718	890	175.734	175.7440	567	175.725	175.730	0.000
3	165.7678	1138	165.792	165.7876	1361	165.797	165.794	9.936
5	155.7685	1020	155.767	155.7800	1157	155.771	155.769	19.961
7	145.7556	898	145.768	145.7008	387	145.776	145.772	29.958
9	135.7981	1068	135.717	135.7357	481	135.725	135.721	40.009
11	125.7054	366	125.762	125.7721	1125	125.781	125.772	49.958
13	115.7900	1276	115.775	115.7585	1061	115.795	115.785	59.945
15	105.7770	1129	105.772	105.7596	961	105.773	105.772	69.958
17	95.7563	606	95.709	95.7642	691	95.710	95.710	80.020
19	85.7950	1327	85.775	85.7428	802	85.775	85.775	89.955
21	75.8320	385	75.813	75.8669	765	75.819	75.816	99.914
23	65.7188	407	65.744	65.7558	840	65.756	65.750	109.980
25	55.7743	1198	55.791	55.8241	280	55.808	55.800	119.930
27	45.7740	1106	45.773	45.7259	609	45.770	45.772	129.958
29	35.8650	860	35.842	35.8947	1230	35.857	35.850	139.880
31	25.8402	740	25.868	25.8389	667	25.856	25.862	149.868
32	5.3230	648	5.384	5.3810	1265	5.391	5.388	99.976
34	15.4948	973	15.405	15.4754	795	15.408	15.406	89.958
36	25.3888	1226	25.368	25.3261	581	25.364	25.366	79.998
38	35.3760	1056	35.359	35.3362	720	35.372	35.366	69.998
40	45.3341	653	45.362	45.3917	1240	45.365	45.364	60.000
42	55.4536	557	55.404	55.4015	015	55.400	55.402	49.962
44	65.4340	340	65.400	65.4865	865	65.400	65.400	39.964
46	75.4202	202	75.400	75.3738	1211	75.395	75.398	29.966
48	85.3983	1252	85.354	85.3920	1138	85.344	85.349	20.015
50	95.3258	493	95.347	95.3580	819	95.348	95.348	10.016
52	105.3906	1229	105.365	105.3471	779	105.362	105.364	0.000
53	105.2030	375	105.269	105.2823	1246	105.285	105.277	100.039
55	95.2108	443	95.267	95.2800	1158	95.272	95.270	90.032
57	85.2489	518	85.206	85.2257	272	85.203	85.204	79.966
59	75.2513	530	75.203	75.2277	350	75.215	75.209	69.971
61	65.2352	600	65.250	65.2209	475	65.253	65.252	60.014
63	55.2535	743	55.242	55.2304	523	55.244	55.243	50.005
65	45.2400	747	45.269	45.2981	1340	45.272	45.270	40.032
67	35.2305	700	35.279	35.2380	768	35.278	35.278	30.040
69	25.2425	716	25.258	25.2639	933	25.259	25.258	20.020
71	15.2872	1142	15.254	15.2013	288	15.255	15.254	10.016
73	5.2965	1140	5.235	5.2961	1161	5.240	5.238	0.000

TABLE no. 31

APPENDIX III

Determination of m_2 and m_3

Tables 32 - 40

The 9 plotting instruments checked - four plotting scales, three engineer scales and two Haag Streit - plexiglass rulers - have already been mentioned in table fig. 2. Of each of them the location of n calibration lines at distances of 1 cm apart was checked with the standard measure and the comparator (see tables 32 - 40). In order to determine m_2 the same mathematical problem had to be solved, as already mentioned in Appendix II. Here, too, the correction equations are of the type $v_i = a_i\Delta X + b_i\Delta Y + f_i$ ($i = 1 \rightarrow n$, $a_i = 1$, $b_i = 0 \rightarrow n-1$), ΔX and ΔY having the same significance as in the determination of m_1.

ΔX and ΔY (X and Y) are solved from the normal equations $[aa]\Delta X + [ab]\Delta Y + [af] = 0$ and $[ab]\Delta X + [bb]\Delta Y + [bf] = 0$,

m_2 from $m_2^2 = \frac{[vv]}{n-2}$. m_2 and Y are tabulated in fig.2. m_2 has a mean of 6μ (see also table fig. 9).

The standard error m_Y in Y, which determines the accuracy of the calibration of the plotting instrument is computed from the formula $m_Y^2 = m_2^2 Q_{YY}$, Q_{YY} being determined from the weight equations $[aa]Q_{XY} + [ab]Q_{YY} = 0$

$$[ab]Q_{XY} + [bb]Q_{YY} = 1.$$

The amounts m_Y are tabulated in table fig. 2.

For the 9 plotting instruments m_3, the standard deviation for Y - 10.000, is about 4μ. It is neglected.

1	Instrument: PLOTTING SCALE REISS			Temp. 20.0°- 20.5°C			Date: 21 - 3 - '50	
Calibration No:	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Haasbroek)			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Calibr.	Cal. - S.M.	Stand. Meas.	Calibr.	Cal. - S.M.		
1	0.5520	584	[1] 0.5128	0.5418	442	0.5048	0.509	0.000
2	10.5983	1022	10.5078	10.5506	510	10.5008	10.504	9.995
3	20.5768	814	20.5092	20.4090	565	20.4950	20.502	19.993
4	30.5291	389	30.5196	30.5729	748	30.5038	30.512	30.003
5	40.5812	994	40.5364	40.5210	308	40.5196	40.528	40.019
6	50.5918	986	50.5136	50.5759	795	50.5072	50.510	50.001
7	60.5173	334	60.5322	60.5028	121	60.5186	60.525	60.016
8	70.5815	940	70.5250	70.5105	175	70.5140	70.520	70.011
9	80.5849	1060	80.5422	80.5961	1087	80.5252	80.534	80.025
10	90.5576	710	90.5268	90.5076	194	90.5236	90.525	90.016
11	100.5752	853	100.5202	100.5075	186	100.5222	100.521	100.012
12	110.5718	765	110.5094	110.5286	350	110.5128	110.511	110.002
13	120.5532	580	120.5096	120.5542	630	120.5176	120.514	120.005
14	130.5472	567	130.5190	130.5538	642	130.5208	130.520	130.011
15	140.5658	762	140.5208	140.5660	816	140.5312	140.526	140.017
16	150.5810	948	150.5276	150.5079	225	150.5292	150.528	150.019
17	160.5846	1026	160.5360	160.5923	1129	160.5412	160.539	160.030
18	170.5881	1148	170.5534	170.5964	1252	170.5576	170.556	170.047
19	180.5992	1235	180.5486	180.5273	579	180.5612	180.555	180.046
20	190.5787	1085	190.5596	190.5665	971	190.5612	190.560	190.051

[1] $0.5\,mm + 2\mu(58.4 - 52.0) = 0.5128\,mm$

TABLE no. 32

2	Instrument: PLOTTING SCALE AHREND			Temp. 20.8°- 20.9°C			Date: 21 - 3 - '50	
Calibration No:	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Haasbroek)			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Calibr.	Cal. - S.M.	Stand. Meas.	Calibr.	Cal. - S.M.		
1	5.8837	870	5.8066	5.8122	150	5.8056	5.806	0.000
2	15.8538	595	15.8114	15.8849	897	15.8096	15.810	10.004
3	25.8543	572	25.8058	25.8895	931	25.8072	25.806	20.000
4	35.8686	705	35.8038	35.8967	1007	35.8080	35.806	30.000
5	45.8550	640	45.8180	45.8098	145	45.8094	45.814	40.008
6	55.7742	1224	55.7964	55.8808	851	55.8086	55.802	49.996
7	65.8902	956	65.8108	65.8583	635	65.8104	65.811	60.005
8	75.7790	1276	75.7972	75.8684	695	75.8022	75.800	69.994
9	85.8695	750	85.8110	85.8696	730	85.8068	85.809	80.003
10	95.7770	1268	95.7996	95.8606	637	95.8062	95.803	89.997

TABLE no. 33

3	Instrument: PLOTTING SCALE			Temp. 18.8°- 19.5°C			Date: March '50	
Calibration No:	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Haasbroek)			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Calibr.	Cal.-S.M.	Stand. Meas.	Calibr.	Cal.-S.M.		
1	3.1163	320	3.1314	3.1495	648	3.1306	3.131	0.000
2	13.1915	1096	13.1362	13.1495	592	13.1194	13.128	9.997
3	23.1008	105	23.1194	23.1178	278	23.1200	23.120	19.989
4	33.1306	456	33.1300	33.1756	902	33.1292	33.130	29.999
5	43.1035	102	43.1134	43.1629	705	43.1152	43.114	39.983
6	53.1285	365	53.1160	53.1675	740	53.1130	53.114	49.983
7	63.1550	566	63.1032	63.1271	278	63.1014	63.102	59.971
8	73.1678	706	73.1056	73.1435	474	73.1078	73.107	69.976
9	83.1810	822	83.1024	83.1938	950	83.1024	83.102	79.971
10	93.1081	086	93.1010	93.1171	184	93.1026	93.102	89.971
11	103.0146	630	103.0968	103.0474	950	103.0952	103.096	99.965
12	113.0442	890	113.0896	113.1624	638	113.1028	113.096	109.965
13	123.0380	840	123.0920	123.0990	1448	123.0916	123.092	119.961
14	133.0663	1138	133.0950	133.0358	855	133.0994	133.097	129.966
15	143.0832	1292	143.0920	143.0678	1097	143.0838	143.088	139.957

TABLE no. 34

4	Instrument: PLOTTING SCALE			Temp. 19.7°- 20.0°C			Date: 22 - 3 -'50	
Calibration No:	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Haasbroek)			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Calibr.	Cal.-S.M.	Stand. Meas.	Calibr.	Cal.-S.M.		
1	8.8398	562	8.8328	8.8038	145	8.8214	8.827	0.000
2	18.8122	198	18.8152	18.8863	959	18.8192	18.817	9.990
3	28.8675	790	28.8230	28.8042	118	28.8152	28.819	19.992
4	38.8921	1070	38.8298	38.8706	824	38.8236	38.827	30.000
5	48.8142	282	48.8280	48.8480	590	48.8220	48.825	39.998
6	58.8440	553	58.8226	58.8293	365	58.8144	58.818	49.991
7	68.8350	482	68.8264	68.8835	927	68.8184	68.822	59.995
8	78.8395	540	78.8290	78.8335	445	78.8220	78.826	69.999
9	88.8610	706	88.8192	88.8755	855	88.8200	88.820	79.993
10	98.8742	873	98.8262	98.8776	871	98.8190	98.823	89.996
11	108.8928	1048	108.8240	108.8800	896	108.8192	108.822	99.995
12	118.8060	188	118.8256	118.8623	753	118.8260	118.826	109.999
13	128.8206	283	128.8154	128.8971	1038	128.8134	128.814	119.987

TABLE no. 35

5	Instrument: PLEXIGLASS SCALE HAAG STREIT Temp. 20.6°-21.2°C Date: 22-3-'50							
Calibration No:	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Calibr.	Cal.-S.M.	Stand. Meas.	Calibr.	Cal.-S.M.		
1	0.7681	1098	0.7834	0.7476	948	0.7944	0.789	0.000
2	10.7105	492	10.7774	10.7648	1026	10.7756	10.776	9.987
3	20.7858	1214	20.7712	20.7679	1043	20.7728	20.772	19.983
4	30.7670	1020	30.7700	30.7550	895	30.7690	30.770	29.981
5	40.7305	642	40.7674	40.7709	1042	40.7666	40.767	39.978
6	50.7562	880	50.7636	50.7441	786	50.7690	50.766	49.977
7	60.7682	978	60.7592	60.7524	863	60.7678	60.764	59.975
8	70.7598	922	70.7648	70.7782	1070	70.7576	70.761	69.972
9	80.7870	1145	80.7550	80.7358	622	80.7528	80.754	79.965
10	90.7132	402	90.7540	90.7139	389	90.7500	90.752	89.963
11	100.7002	228	100.7452	100.7471	742	100.7542	100.750	99.961
12	110.7004	230	110.7452	110.7638	860	110.7444	110.745	109.956
13	120.7270	526	120.7512	120.7465	684	120.7438	120.748	119.959
14	130.7750	971	130.7442	130.7771	979	130.7416	130.743	129.954
15	140.7715	910	140.7390	140.7753	966	140.7426	140.741	139.952
16	150.7850	1036	150.7372	150.7426	627	150.7402	150.739	149.950
17	160.7913	1106	160.7386	160.7699	884	160.7370	160.738	159.949
18	170.7680	872	170.7384	170.7477	682	170.7410	170.740	169.951
19	180.7470	658	180.7376	180.7928	1059	180.7262	180.732	179.943
20	190.7796	996	190.7400	190.7626	771	190.7290	190.734	189.945

TABLE no. 36

6	Instrument: PLEXIGLASS SCALE HAAG STREIT Temp. 21.3°-21.5°C Date: 22-3-'50							
Calibration No:	First series (Obs. Mr. Henkel)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Calibr.	Cal.-S.M.	Stand. Meas.	Calibr.	Cal.-S.M.		
1	9.2681	935	9.2508	9.2436	560	9.2248	9.238	0.000
2	19.2972	1180	19.2416	19.2105	246	19.2282	19.235	9.997
3	29.2942	1182	29.2480	29.2702	863	29.2322	29.240	20.002
4	39.2751	910	39.2318	39.2870	970	39.2200	39.226	29.988
5	49.2209	358	49.2298	49.2448	530	49.2164	49.223	39.985
6	59.2486	671	59.2370	59.2550	614	59.2128	59.225	49.987
7	69.2830	948	69.2236	69.2826	873	69.2094	69.216	59.978
8	79.2262	306	79.2088	79.2504	510	79.2012	79.205	69.967
9	89.2342	350	89.2016	89.1600	1046	89.1892	89.195	79.957
10	99.1468	894	99.1852	99.1030	369	99.1678	99.176	89.938
11	109.1020	392	109.1744	109.1040	380	109.1680	109.171	99.933
12	119.1869	1170	119.1602	119.1661	948	119.1574	119.159	109.921
13	129.1708	1017	129.1618	129.1966	1228	129.1524	129.157	119.919
14	139.1883	1139	139.1512	139.1361	600	139.1478	139.150	129.912
15	149.1253	497	149.1488	149.1495	729	149.1468	149.148	139.910
16	159.1393	623	159.1460	159.1180	348	159.1336	159.140	149.902
17	169.1577	772	169.1390	169.1031	120	169.1178	169.128	159.890
18	179.1765	950	179.1370	179.1192	280	179.1176	179.127	169.889
19	189.1800	951	189.1302	189.1760	830	189.1140	189.122	179.884
20	199.1834	949	199.1230	199.1802	830	199.1056	199.114	189.876

TABLE no. 37

7	Instrument: WOODEN ENGINEER SCALE CARL SCHLEICHER Temp. 19.6°- 20.2°C							Date: 23 - 3 -'50
Calibration No:	First series (Obs. Mr. v. d. Meulen)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Calibr.	Cal.- S.M.	Stand. Meas.	Calibr.	Cal.- S.M.		
1	1.8742	836	1.8188	1.8216	300	1.8168	1.818	0.000
2	11.8721	837	11.8232	11.8284	388	11.8208	11.822	10.004
3	21.8723	870	21.8294	21.8152	290	21.8276	21.828	20.010
4	31.8710	920	31.8420	31.8212	412	31.8400	31.841	30.023
5	41.8712	955	41.8486	41.8288	525	41.8474	41.848	40.030
6	51.8745	1063	51.8636	51.8170	505	51.8670	51.865	50.047
7	61.8710	1037	61.8654	61.8270	646	61.8752	61.870	60.052
8	71.8700	1032	71.8664	71.8240	585	71.8690	71.868	70.050
9	81.8721	1120	81.8798	81.8183	580	81.8794	81.880	80.062
10	91.8725	1150	91.8850	91.8220	635	91.8830	91.884	90.066
11	101.8728	1202	101.8948	101.8173	671	101.8996	101.897	100.079
12	111.9173	182	111.9018	111.9198	203	111.9010	111.901	110.083
13	121.8165	614	121.8898	121.8270	700	121.8860	121.888	120.070
14	131.9190	222	131.9064	131.8204	700	131.8992	131.903	130.085
15	141.9177	280	141.9206	141.9258	320	141.9124	141.916	140.098
16	151.9192	420	151.9456	151.9178	360	151.9364	151.941	150.123
17	161.9210	390	161.9360	161.9282	450	161.9336	161.935	160.117
18	171.9203	424	171.9442	171.9225	445	171.9440	171.944	170.126
19	181.9195	464	181.9538	181.9283	520	181.9474	181.951	180.133
20	191.9171	461	191.9580	191.9176	462	191.9572	191.958	190.140

TABLE no. 38

8	Instrument: WOODEN ENGINEER SCALE Temp. 20.8°- 21.4°C							Date: 23 - 3 -'50
Calibration No:	First series (Obs. Mr. Henkel)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Calibr.	Cal.- S.M.	Stand. Meas.	Calibr.	Cal.- S.M.		
1	0.3213	385	0.3344	0.3303	476	0.3346	0.334	0.000
2	10.3041	200	10.3318	10.3142	286	10.3288	10.330	9.996
3	20.3024	216	20.3384	20.3380	540	20.3320	20.335	20.001
4	30.3416	572	30.3312	30.3461	605	30.3288	30.330	29.996
5	40.3046	194	40.3296	40.3015	161	40.3292	40.329	39.995
6	50.3345	449	50.3208	50.3210	361	50.3302	50.326	49.992
7	60.3280	378	60.3196	60.3360	478	60.3236	60.322	59.988
8	70.3162	250	70.3176	70.3045	188	70.3286	70.323	69.989
9	80.3152	203	80.3102	80.3171	280	80.3218	80.316	79.982
10	90.3218	318	90.3200	90.3413	512	90.3198	90.320	89.986
11	100.3208	297	100.3178	100.3240	356	100.3232	100.320	99.986
12	110.3286	370	110.3168	110.3105	203	110.3196	110.318	109.984
13	120.3007	069	120.3124	120.3396	458	120.3124	120.312	119.978
14	130.3139	218	130.3158	130.3093	192	130.3198	130.318	129.984
15	140.3409	530	140.3242	140.3140	248	140.3216	140.323	139.989
16	150.3281	341	150.3120	150.3258	308	150.3100	150.311	149.977
17	160.3182	260	160.3156	160.3307	351	160.3088	160.312	159.978
18	170.3008	048	170.3080	170.3405	483	170.3156	170.312	169.978
19	180.3365	413	180.3096	180.3340	410	180.3140	180.312	179.978
20	190.3234	302	190.3136	190.3321	378	190.3114	190.312	189.978

TABLE no. 39

9	Instrument: WOODEN ENGINEER SCALE Temp. 22.0°- 22.2°C Date: 23 - 3 -'50							
Calibration No:	First series (Obs. Mr. Henkel)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Calibr.	Cal.-S.M.	Stand. Meas.	Calibr.	Cal.-S.M.		
1	0.1406	600	0.1388	0.1560	750	0.1380	0.138	0.000
2	10.1897	1120	10.1446	10.1775	952	10.1354	10.140	10.002
3	20.1191	368	20.1354	20.1118	285	20.1334	20.134	19.996
4	30.1896	1010	30.1228	30.1088	233	30.1290	30.126	29.988
5	40.1087	318	40.1462	40.1228	476	40.1496	40.148	40.010
6	50.1358	502	50.1288	50.1510	659	50.1298	50.129	49.991
7	60.1590	728	60.1276	60.1775	912	60.1274	60.128	59.990
8	70.1496	590	70.1188	70.1015	102	70.1174	70.118	69.980
9	80.1458	541	80.1166	80.1055	135	80.1160	80.116	79.978
10	90.1737	900	90.1326	90.1327	476	90.1298	90.131	89.993
11	100.1791	857	100.1132	100.1566	638	100.1144	100.114	99.976
12	110.1451	546	110.1190	110.1725	790	110.1130	110.116	109.978
13	120.1118	238	120.1240	120.1790	802	120.1024	120.113	119.975
14	130.1162	204	130.1084	130.1905	921	130.1032	130.106	129.968
15	140.1110	233	140.1246	140.1950	1023	140.1146	140.120	139.982
16	150.1507	524	150.1034	150.0425	898	150.0946	150.099	149.961
17	160.1126	223	160.1194	160.1710	778	160.1136	160.116	159.978
18	170.1186	229	170.1086	170.1819	832	170.1026	170.106	169.968
19	180.1167	254	180.1174	180.1486	563	180.1154	180.116	179.978
20	190.0149	644	190.0990	190.1585	591	190.1012	190.100	189.962

TABLE no. 40

APPENDIX IV

Determination of m_4

Tables 41 - 132

General Survey

instrument	test-person	table	s.e. (μ)	s.e. (mean) (μ)
plotting scale	1	41-46	37	33
" "	2	47-52	33	
" "	3	53-58	48	
" "	4	59-64	16	
" "	5	65-70	30	
engineer scale	1	71-76	41	50
" "	2	77-82	51	
" "	3	83-88	64	
" "	4	89-94	29	
" "	5	95-100	65	
plexigl. scale	6	102-107	51	50
" "	7	108-113	62	
" "	8	114-119	44	
" "	4	120-125	32	
" "	9	126-131	65	

Comparison of given and plotted distances

divider and plotting scale	table 101
tracing point and engineer scale	table 101
tracing point and plexiglass scale	table 132

Testperson 1	DIVIDER AND PLOTTING SCALE							First series
1.1	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	34.4947	1220	[1] 34.455	34.4718	1017	34.460	34.458	0.000
5.89	40.3478	543	40.313	40.3870	1035	40.333	40.323	5.865
10.17	44.7996	1010	44.703	44.7340	372	44.706	44.704	10.246
16.06	50.5392	630	50.548	50.5930	1262	50.566	50.557	16.099
21.78	56.2208	437	56.246	56.2792	1146	56.271	56.258	21.800
27.92	62.3314	791	62.395	62.4662	729	62.413	62.404	27.946
31.38	65.8499	772	65.855	65.8565	906	65.868	65.862	31.404
38.69	73.2130	130	73.200	73.2137	137	73.200	73.200	38.742
43.01	77.5649	808	77.532	77.5717	957	77.548	77.540	43.082
49.27	83.8342	449	83.821	83.8270	390	83.824	83.822	49.364
54.91	89.4594	750	89.431	89.4351	545	89.439	89.435	54.977
60.15	94.7002	087	94.717	94.7597	721	94.725	94.721	60.263
65.50	100.0173	470	100.059	100.0027	331	100.061	100.060	65.602
71.22	105.7585	715	105.726	105.7835	1006	105.734	105.730	71.272
76.83	111.3822	923	111.320	111.3892	987	111.319	111.320	76.862
82.74	117.2610	764	117.231	117.2115	283	117.234	117.232	82.774
87.34	121.8560	879	121.864	121.8906	1262	121.871	121.868	87.410
93.43	127.9550	879	127.966	127.9860	1153	127.959	127.962	93.504
98.45	132.9319	640	132.964	132.9362	694	132.966	132.965	98.507
104.60	139.1250	250	139.100	139.1562	562	139.100	139.100	104.642
109.56	144.0413	717	144.061	144.0787	1090	144.061	144.061	109.603

[1]) 34.4 mm + 2μ(122.0 - 94.7) = 34.455 mm.

TABLE no. 41

Testperson 1	DIVIDER AND PLOTTING SCALE							Second series
1.2	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	35.3991	991	35.300	35.3170	170	35.300	35.300	0.000
5.89	41.2243	338	41.219	41.2081	172	41.218	41.218	5.918
10.17	45.4104	571	45.493	45.4412	900	45.498	45.496	10.196
16.06	51.4755	755	51.400	51.4082	082	51.400	51.400	16.100
21.78	57.1440	469	57.106	57.1402	448	57.109	57.108	21.808
27.92	63.2353	646	63.259	63.2650	1020	63.274	63.266	27.966
31.38	66.7298	390	66.718	66.7262	383	66.724	66.721	31.421
38.69	73.9816	1190	73.975	73.9888	1317	73.986	73.980	38.680
43.01	78.3580	890	78.362	78.3140	500	78.372	78.367	43.067
49.27	84.5510	906	84.579	84.5092	570	84.596	84.588	49.288
54.91	90.2024	120	90.219	90.2195	330	90.227	90.223	54.923
60.15	95.4443	785	95.468	95.4212	580	95.474	95.471	60.171
65.50	100.8326	414	100.818	100.8522	717	100.839	100.828	65.528
71.22	106.5479	479	106.500	106.5110	110	106.500	106.500	71.200
76.83	112.1875	954	112.116	112.1455	505	112.110	112.113	76.813
82.74	118.0046	119	118.015	118.0103	143	118.008	118.012	82.712
87.34	122.6103	320	122.643	122.6227	486	122.652	122.648	87.348
93.43	128.7389	525	128.727	128.7895	1032	128.727	128.727	93.427
98.45	133.7998	1104	133.721	133.7820	931	133.722	133.722	98.422
104.60	139.9464	525	139.912	139.9840	893	139.911	139.912	104.612
109.56	144.7100	317	144.743	144.7869	1172	144.761	144.752	109.452

TABLE no. 42

Testperson 1	DIVIDER AND PLOTTING SCALE							Third series
1.3	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	35.5794	1198	35.581	35.5537	911	35.575	35.578	0.000
5.89	41.4527	825	41.460	41.4272	552	41.456	41.458	5.880
10.17	45.7465	670	45.741	45.7850	1112	45.752	45.746	10.168
16.06	51.6318	390	51.614	51.6702	775	51.615	51.614	16.036
21.78	57.3370	409	57.308	57.3505	585	57.316	57.312	21.734
27.92	63.4370	692	63.464	63.4860	1151	63.458	63.461	27.883
31.38	66.9750	1036	66.957	66.9995	1322	66.965	66.961	31.383
38.69	74.2569	832	74.253	74.2321	635	74.263	74.258	38.680
43.01	78.6760	889	78.626	78.6395	648	78.651	78.638	43.060
49.27	84.8600	914	84.863	84.8887	1237	84.870	84.866	49.288
54.91	90.5721	856	90.527	90.5323	496	90.535	90.531	54.953
60.15	95.8018	086	95.814	95.8800	874	95.815	95.814	60.236
65.50	101.1383	531	101.130	101.1955	1186	101.146	101.138	65.560
71.22	106.7738	1036	106.760	106.7027	371	106.769	106.764	71.186
76.83	112.4728	830	112.420	112.4190	385	112.439	112.430	76.852
82.74	118.3818	1083	118.353	118.3563	796	118.347	118.350	82.772
87.34	122.9280	490	122.942	122.9429	600	122.934	122.938	87.360
93.43	129.0162	438	129.055	129.0385	622	129.047	129.051	93.473
98.45	134.0505	730	134.045	134.0400	608	134.042	134.044	98.466
104.60	140.1253	652	140.180	140.1223	637	140.183	140.182	104.604
109.56	145.0932	1470	145.108	145.1742	808	145.113	145.110	109.532

TABLE no. 43

Testperson 1	DIVIDER AND PLOTTING SCALE							Fourth series
1.4	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	38.9836	1148	38.962	38.9116	380	38.953	38.958	0.000
5.89	44.8062	375	44.863	44.8928	1212	44.857	44.860	5.902
10.17	49.2305	481	49.235	49.2436	555	49.224	49.230	10.272
16.06	55.0619	937	55.064	55.0191	467	55.055	55.060	16.102
21.78	60.7733	1142	60.782	60.7870	1234	60.773	60.778	21.820
27.92	66.9015	285	66.954	66.9450	628	66.936	66.945	27.987
31.38	70.3813	1194	70.376	70.3827	1201	70.375	70.376	31.418
38.69	77.6926	1390	77.693	77.6167	607	77.688	77.690	38.732
43.01	82.0148	310	82.032	82.0760	927	82.033	82.032	43.074
49.27	88.2447	844	88.279	88.2085	400	88.263	88.271	49.313
54.91	93.9013	358	93.969	93.9291	657	93.973	93.971	55.013
60.15	99.2285	285	99.200	99.2460	585	99.225	99.212	60.254
65.50	104.5685	749	104.513	104.5670	795	104.525	104.519	65.561
71.22	110.2729	1083	110.271	110.2157	485	110.266	110.268	71.310
76.83	115.8508	864	115.871	115.8517	825	115.862	115.866	76.908
82.74	121.7290	599	121.762	121.7476	807	121.766	121.764	82.806
87.34	126.4240	240	126.400	126.4451	451	126.400	126.400	87.442
93.43	132.3838	1142	132.361	132.3017	368	132.370	132.366	93.408
98.45	137.4100	316	137.443	137.4425	615	137.438	137.440	98.482
104.60	143.5295	772	143.595	143.5201	720	143.604	143.600	104.642
109.56	148.5867	1167	148.560	148.5860	1137	148.555	148.558	109.600

TABLE no. 44

Testperson 1	DIVIDER AND PLOTTING SCALE							Fifth series
1.5	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	39.3453	505	39.310	39.3552	662	39.322	39.316	0.000
5.89	45.1980	1308	45.166	45.1540	796	45.151	45.158	5.842
10.17	49.5620	672	49.510	49.5656	728	49.514	49.512	10.196
16.06	55.4732	900	55.434	55.4752	949	55.439	55.436	16.120
21.78	61.0150	501	61.070	61.0523	875	61.070	61.070	21.754
27.92	67.2640	780	67.228	67.2721	911	67.238	67.233	27.917
31.38	70.7423	590	70.733	70.7062	133	70.714	70.724	31.408
38.69	78.0810	926	78.023	78.0747	889	78.028	78.026	38.710
43.01	82.3727	884	82.331	82.3132	361	82.346	82.338	43.022
49.27	88.5448	915	88.593	88.5080	543	88.593	88.593	49.277
54.91	94.2054	370	94.263	94.2848	1154	94.261	94.262	54.946
60.15	99.5422	724	99.560	99.5764	1108	99.569	99.564	60.248
65.50	104.8377	560	104.837	104.8596	745	104.830	104.834	65.518
71.22	110.5163	463	110.560	110.5413	710	110.559	110.560	71.244
76.83	116.1268	675	116.181	116.1207	571	116.173	116.177	76.861
82.74	122.0175	576	122.080	122.0851	1243	122.078	122.079	82.763
87.34	126.6004	358	126.671	126.6580	989	126.682	126.676	87.360
93.43	132.7894	1140	132.749	132.7657	879	132.744	132.746	93.430
98.45	137.7474	761	137.757	137.7175	456	137.756	137.756	98.440
104.60	143.9666	666	143.900	143.9902	902	143.900	143.900	104.584
109.56	148.8815	892	148.815	148.8151	295	148.829	148.822	109.506

TABLE no. 45

Testperson 1	DIVIDER AND PLOTTING SCALE					Recap. tables 41-45				
Series					Mean (mm)	v (mm/100)				
1	2	3	4	5		1	2	3	4	5
0.00	00	00	00	00	0.00					
5.86	92	88	90	84	5.88	+ 2	− 4	0	− 2	+ 4
10.25	20	17	27	20	10.22	− 3	+ 2	+ 5	− 5	+ 2
16.10	10	04	10	12	16.09	− 1	− 1	+ 5	− 1	− 3
21.80	81	73	82	75	21.78	− 2	− 3	+ 5	− 4	+ 3
27.95	97	88	99	92	27.94	− 1	− 3	+ 6	− 5	+ 2
31.40	42	38	42	41	31.41	+ 1	− 1	+ 3	− 1	0
38.74	68	68	73	71	38.71	− 3	+ 3	+ 3	− 2	0
43.08	07	06	07	02	43.06	− 2	− 1	0	− 1	+ 4
49.36	29	29	31	28	49.31	− 5	+ 2	+ 2	0	+ 3
54.98	92	95	5.01	95	54.96	− 2	+ 4	+ 1	− 5	+ 1
60.26	17	24	25	25	60.23	− 3	+ 6	− 1	− 2	− 2
65.60	53	56	56	52	65.55	− 5	+ 2	− 1	− 1	+ 3
71.27	20	19	31	24	71.24	− 3	+ 4	+ 5	− 7	0
76.86	81	85	91	86	76.86	0	+ 5	+ 1	− 5	0
82.77	71	77	81	76	82.76	− 1	+ 5	− 1	− 5	0
87.41	35	36	44	36	87.38	− 3	+ 3	+ 2	− 6	+ 2
93.50	43	47	41	43	93.45	− 5	+ 2	− 2	+ 4	+ 2
98.51	42	47	48	44	98.46	− 5	+ 4	− 1	− 2	+ 2
104.64	61	60	64	58	104.61	− 3	0	+ 1	− 3	+ 3
109.60	45	53	60	51	109.54	− 6	+ 9	+ 1	− 6	+ 3

$m^2 = \frac{[vv]}{80} = \frac{1088}{80} = 13.6 \frac{mm^2}{10^4}$; $m = 0.037$ mm

TABLE no. 46

Testperson 2	DIVIDER AND PLOTTING SCALE							First series
2.1	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	43.2082	308	43.245	43.2327	540	43.243	43.244	0.000
5.89	49.1170	430	49.152	49.1230	460	49.146	49.149	5.905
10.17	53.3604	1000	53.379	53.3017	412	53.379	53.379	10.135
16.06	59.3793	793	59.300	59.3076	076	59.300	59.300	16.056
21.78	65.0211	244	65.007	65.0231	280	65.010	65.008	21.764
27.92	71.2547	594	71.209	71.2835	877	71.208	71.208	27.964
31.38	74.6416	796	74.676	74.6455	850	74.679	74.678	31.434
38.69	81.8511	967	81.891	81.8757	1178	81.884	81.888	38.644
43.01	86.2390	555	86.233	86.2410	579	86.234	86.234	42.990
49.27	92.4248	620	92.474	92.4037	467	92.486	92.480	49.236
54.91	98.1500	736	98.147	98.1264	506	98.148	98.148	54.904
60.15	103.3886	1260	103.375	103.3286	627	103.368	103.372	60.128
65.50	108.7858	880	108.704	108.7938	970	108.706	108.705	65.461
71.22	114.4060	246	114.437	114.4218	337	114.424	114.430	71.186
76.83	120.0184	535	120.070	120.0976	1357	120.076	120.073	76.829
82.74	126.0476	504	126.006	126.0954	976	126.004	126.005	82.761
87.34	130.5470	1000	130.606	130.6058	121	130.613	130.610	87.366
93.43	136.6590	988	136.680	136.6476	814	136.668	136.674	93.430
98.45	141.6760	1161	141.680	141.6662	1090	141.686	141.683	98.439
104.60	147.8228	310	147.816	147.8471	586	147.823	147.820	104.576
109.56	152.8060	163	152.821	152.8509	607	152.820	152.820	109.576

TABLE no. 47

Testperson 2	DIVIDER AND PLOTTING SCALE							Second series
2.2	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	42.1789	1099	42.162	42.1468	790	42.164	42.163	0.000
5.89	48.0110	232	48.024	48.0509	630	48.024	48.024	5.861
10.17	52.3337	337	52.300	52.3487	487	52.300	52.300	10.137
16.06	58.2386	457	58.214	58.2528	600	58.214	58.214	16.051
21.78	63.9236	462	63.945	63.9676	922	63.949	63.947	21.784
27.92	70.1632	692	70.112	70.1603	690	70.117	70.114	27.951
31.38	73.5071	342	73.554	73.5772	938	73.533	73.544	31.381
38.69	80.8349	579	80.846	80.8893	1073	80.836	80.841	38.678
43.01	85.1602	913	85.162	85.1285	597	85.162	85.162	42.999
49.27	91.4053	406	91.471	91.4308	600	91.458	91.464	49.301
54.91	97.1484	518	97.107	97.0605	1105	97.100	97.104	54.941
60.15	102.2063	520	102.291	102.2608	1060	102.290	102.290	60.127
65.50	107.6964	1404	107.688	107.6910	1385	107.695	107.692	65.529
71.22	113.3893	1103	113.342	113.3726	904	113.336	113.339	71.176
76.83	119.0542	542	119.000	119.0006	006	119.000	119.000	76.837
82.74	124.9450	769	124.964	124.9827	1070	124.949	124.956	82.793
87.34	129.5579	803	129.545	129.5498	675	129.535	129.540	87.377
93.43	135.6769	854	135.617	135.6582	657	135.615	135.616	93.453
98.45	140.6178	507	140.666	140.6881	1222	140.668	140.667	98.504
104.60	146.8489	738	146.850	146.8418	734	146.863	146.856	104.693
109.56	151.7738	1046	151.762	151.7105	435	151.766	151.764	109.601

TABLE no. 48

Testperson 2	DIVIDER AND PLOTTING SCALE							Third series
2.3	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	42.8275	536	42.852	42.8546	830	42.857	42.854	0.000
5.89	48.7611	678	48.713	48.7695	733	48.708	48.710	5.856
10.17	52.9122	382	52.952	52.9127	440	52.963	52.958	10.104
16.06	58.9856	856	58.900	58.9299	299	58.900	58.900	16.046
21.78	64.6537	654	64.623	64.6260	361	64.620	64.622	21.768
27.92	70.7330	520	70.738	70.7787	968	70.736	70.737	27.883
31.38	74.2429	740	74.262	74.2261	515	74.251	74.256	31.402
38.69	81.5619	940	81.564	81.5740	1060	81.564	81.564	38.710
43.01	85.9585	585	85.900	85.9721	721	85.900	85.900	43.046
49.27	92.1101	461	92.172	92.1320	656	92.167	92.170	49.316
54.91	97.8283	386	97.821	97.8161	249	97.818	97.820	54.966
60.15	103.0882	1192	103.062	103.0651	882	103.046	103.054	60.200
65.50	108.3843	1296	108.391	108.3285	767	108.396	108.394	65.540
71.22	114.1238	373	114.127	114.1286	429	114.129	114.128	71.274
76.83	119.6227	460	119.647	119.6877	1062	119.637	119.642	76.788
82.74	125.6750	750	125.600	125.6484	484	125.600	125.600	82.746
87.34	130.1451	840	130.178	130.1183	557	130.175	130.176	87.322
93.43	136.2106	596	136.298	136.3536	536	136.300	136.299	93.445
98.45	141.3723	913	141.338	141.3346	597	141.350	141.344	98.490
104.60	147.4857	1085	147.446	147.4043	296	147.451	147.448	104.594
109.56	152.4840	940	152.420	152.4215	308	152.419	152.420	109.566

TABLE no. 49

Testperson 2	DIVIDER AND PLOTTING SCALE							Fourth series
2.4	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	42.2673	720	42.209	42.2041	097	42.211	42.210	0.000
5.89	48.1523	712	48.138	48.1785	895	48.122	48.130	5.920
10.17	52.3835	1142	52.361	52.3972	1277	52.361	52.361	10.151
16.06	58.2650	945	58.259	58.2760	971	58.242	58.250	16.040
21.78	64.0260	329	64.014	64.0110	162	64.010	64.012	21.802
27.92	70.1400	656	70.151	70.1246	547	70.160	70.156	27.946
31.38	73.6178	489	73.662	73.6060	417	73.671	73.666	31.456
38.69	80.9269	326	80.911	80.9851	860	80.902	80.906	38.696
43.01	85.2575	687	85.222	85.2966	1102	85.227	85.224	43.014
49.27	91.4479	767	91.458	91.4914	1226	91.462	91.460	49.250
54.91	97.1139	386	97.149	97.1872	1091	97.144	97.146	54.936
60.15	102.3590	915	102.365	102.3520	786	102.353	102.359	60.149
65.50	107.6840	1276	107.687	107.6062	510	107.690	107.688	65.478
71.22	113.4393	479	113.417	113.4105	202	113.419	113.418	71.208
76.83	119.0353	595	119.048	119.0991	1276	119.057	119.052	76.842
82.74	124.9671	1047	124.975	124.9064	369	124.961	124.968	82.758
87.34	129.5910	1310	129.580	129.5651	1077	129.585	129.582	87.372
93.43	135.6387	666	135.656	135.6150	432	135.656	135.656	93.446
98.45	140.6193	598	140.681	140.6766	1167	140.680	140.680	98.470
104.60	146.8530	530	146.800	146.7438	941	146.801	146.800	104.590
109.56	151.8628	841	151.843	151.8790	966	151.835	151.839	109.629

TABLE no. 50

Testperson 2	DIVIDER AND PLOTTING SCALE						Fifth series	
2.5	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	42.3958	1419	42.392	42.3809	1280	42.394	42.393	0.000
5.89	48.2309	569	48.252	48.2234	515	48.256	48.254	5.861
10.17	52.5608	1000	52.578	52.5494	830	52.567	52.572	10.179
16.06	59.1103	315	59.142	59.1446	583	59.127	59.134	16.741
21.78	64.2298	362	64.213	64.2150	290	64.228	64.220	21.827
27.92	70.2521	939	70.284	70.2390	793	70.281	70.282	27.889
31.38	73.7946	1049	73.721	73.7856	962	73.721	73.721	31.328
38.69	81.0369	751	81.076	81.0215	600	81.077	81.076	38.683
43.01	85.3252	436	85.337	85.3592	805	85.343	85.340	42.947
49.27	91.6923	923	91.600	91.6967	967	91.600	91.600	49.207
54.91	97.2150	441	97.258	97.2400	665	97.253	97.256	54.863
60.15	102.5489	764	102.555	102.5811	1078	102.553	102.554	60.161
65.50	107.9965	1156	107.938	107.9858	1005	107.929	107.934	65.541
71.22	113.6083	290	113.641	113.6781	981	113.640	113.640	71.247
76.83	119.2503	545	119.208	119.2972	1000	119.206	119.207	76.814
82.74	125.1720	873	125.131	125.1039	218	125.136	125.134	82.741
87.34	129.7971	1202	129.746	129.7250	495	129.749	129.748	87.355
93.43	135.8621	873	135.850	135.8114	365	135.850	135.850	93.457
98.45	140.8178	646	140.894	140.8487	903	140.883	140.888	98.495
104.60	147.0294	294	147.000	146.9506	1010	147.001	147.000	104.607
109.56	151.9532	673	151.928	151.9775	946	151.934	151.931	109.538

TABLE no. 51

Testperson 2	DIVIDER AND PLOTTING SCALE					Recap. tables 47-51	v(mm/100)			
Series					Mean (mm)					
1	2	3	4	5		1	2	3	4	5
0.00	00	00	00	00	0.00					
5.90	86	86	92	86	5.88	− 2	+ 2	+ 2	− 4	+ 2
10.14	14	10	15	18	10.14	0	0	+ 4	− 1	− 4
16.06	05	05	04	—	—	—	—	—	—	—
21.76	78	77	80	83	21.79	+ 3	+ 1	+ 2	− 1	− 4
27.96	95	88	95	89	27.93	− 3	− 2	+ 5	− 2	+ 4
31.43	38	40	46	33	31.40	− 3	+ 2	0	− 6	+ 7
38.64	68	71	70	68	38.68	+ 4	0	− 3	− 2	0
42.99	3.00	3.05	3.01	95	43.00	+ 1	0	− 5	− 1	+ 5
49.24	30	32	25	21	49.26	+ 2	− 4	− 6	+ 1	+ 5
54.90	94	97	94	86	54.92	+ 2	− 2	− 5	− 2	+ 6
60.13	13	20	15	16	60.15	+ 2	+ 2	− 5	0	− 1
65.46	53	54	48	54	65.51	+ 5	− 2	− 3	+ 3	− 3
71.19	18	27	21	25	71.22	+ 3	+ 4	− 5	+ 1	− 3
76.83	84	79	84	81	76.82	− 1	− 2	+ 3	− 2	+ 1
82.76	79	75	76	74	82.76	0	− 3	+ 1	0	+ 2
87.37	38	32	37	36	87.36	− 1	− 2	+ 4	− 1	0
93.43	45	44	45	46	93.45	+ 2	0	+ 1	0	− 1
98.44	50	49	47	50	98.48	+ 4	− 2	− 1	+ 1	− 2
104.58	69	59	59	61	104.61	+ 3	− 8	+ 2	+ 2	0
109.58	60	57	63	54	109.58	0	− 2	+ 1	− 5	+ 4

$m^2 = \frac{[vv]}{76} = \frac{852}{76} = 11.2 \frac{mm^2}{10^4}$; m = 0.033 mm

TABLE no. 52

Testperson 3	DIVIDER AND PLOTTING SCALE						First series	
3.1	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	66.9373	537	66.933	66.9512	796	66.957	66.945	0.000
5.89	72.7095	180	72.717	72.7132	207	72.715	72.716	5.771
10.17	77.2335	728	77.279	77.2518	768	77.250	77.264	10.319
16.06	83.1889	889	83.100	83.0716	1112	83.079	83.090	16.145
21.78	88.7712	915	88.741	88.7741	892	88.730	88.736	21.791
27.92	94.8000	387	94.877	94.8637	1070	94.887	94.882	27.937
31.38	98.3187	451	98.353	98.3800	1087	98.357	98.355	31.410
38.69	105.7589	680	105.718	105.7553	553	105.700	105.709	38.764
43.01	109.9905	1235	109.966	109.9151	452	109.960	109.963	43.018
49.27	116.2084	084	116.200	116.2267	354	116.217	116.208	49.263
54.91	121.8787	787	121.800	121.8147	147	121.800	121.800	54.855
60.15	127.1400	702	127.160	127.1862	1150	127.158	127.159	60.214
65.50	132.4613	828	132.443	132.4485	708	132.445	132.444	65.499
71.22	138.2093	129	138.207	138.2658	658	138.200	138.204	71.259
76.83	143.9916	916	143.900	143.9354	354	143.900	143.900	76.955
82.74	149.7370	779	149.782	149.7281	549	149.754	149.768	82.823
87.34	154.3785	883	154.320	154.3552	552	154.300	154.310	87.365
93.43	160.3437	609	160.334	160.3926	1068	160.328	160.331	93.386
98.45	165.4212	362	165.430	165.4968	1146	165.436	165.433	98.488
104.60	171.5384	502	171.524	171.5160	236	171.515	171.520	104.575
109.56	176.3830	830	176.300	176.3675	675	176.300	176.300	109.355

TABLE no. 53

Testperson 3	DIVIDER AND PLOTTING SCALE						Second series	
3.2	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	22.8479	621	22.828	22.8421	552	22.826	22.827	0.000
5.89	28.7883	883	28.700	28.6560	1000	28.688	28.694	5.867
10.17	33.0817	871	33.011	33.0970	1029	33.012	33.012	10.185
16.06	38.9968	1077	38.922	38.9593	727	38.927	38.924	16.097
21.78	44.5978	1430	44.590	44.5740	1193	44.591	44.590	21.763
27.92	50.7382	583	50.740	50.7670	948	50.756	50.748	27.921
31.38	54.2018	238	54.244	54.2574	742	54.234	54.239	31.412
38.69	61.5545	720	61.535	61.5568	747	61.536	61.536	38.709
43.01	65.8000	364	65.873	65.8053	400	65.869	65.871	43.044
49.27	72.1660	780	72.124	72.1250	360	72.122	72.123	49.296
54.91	77.7724	724	77.700	77.7555	555	77.700	77.700	54.873
60.15	83.0938	1197	83.052	83.0597	876	83.056	83.054	60.227
65.50	88.3336	363	88.305	88.3235	235	88.300	88.302	65.475
71.22	94.0112	559	94.089	94.0578	1072	94.099	94.094	71.267
76.83	99.7510	650	99.728	99.7837	968	99.726	99.727	76.900
82.74	105.5620	967	105.569	105.5041	352	105.562	105.566	82.739
87.34	110.2108	370	110.252	110.2300	618	110.264	110.258	87.431
93.43	116.3280	490	116.342	116.3462	730	116.354	116.348	93.521
98.45	121.2528	895	121.273	121.2289	622	121.267	121.270	98.443
104.60	127.3255	443	127.338	127.3048	226	127.336	127.337	104.510
109.56	132.2572	799	132.245	132.2441	658	132.243	132.244	109.417

TABLE no. 54

Testperson 3	DIVIDER AND PLOTTING SCALE							Third series
3.3	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	22.6402	792	22.678	—	—	—	22.678	0.000
5.89	28.5771	1074	28.561	28.5973	1239	28.553	28.557	5.879
10.17	32.8184	563	32.876	32.8908	1328	32.884	32.880	10.202
16.06	38.8111	111	38.800	38.7240	600	38.772	38.786	16.108
21.78	44.5290	290	44.500	44.5575	575	44.500	44.500	21.822
27.92	50.5089	311	50.544	50.5514	767	50.551	50.548	27.870
31.38	54.1104	104	54.100	54.1150	150	54.100	54.100	31.422
38.69	61.3605	980	61.375	61.3920	1128	61.342	61.358	38.680
43.01	65.7552	739	65.737	65.7632	839	65.741	65.739	43.061
49.27	71.9582	900	71.964	71.9438	812	71.975	71.970	49.292
54.91	77.6718	828	77.622	77.6440	509	77.614	77.618	54.940
60.15	82.8917	1020	82.821	82.8465	590	82.825	82.823	60.145
65.50	88.2572	954	88.276	88.2817	1211	88.279	88.278	65.600
71.22	93.9701	888	93.937	93.9633	796	93.933	93.935	71.257
76.83	99.5145	362	99.543	99.5118	352	99.547	99.545	76.867
82.74	105.4255	548	105.459	105.4617	955	105.468	105.464	82.786
87.34	110.1105	105	110.100	110.1662	662	110.100	110.100	87.422
93.43	116.1904	1238	116.167	116.1283	596	116.163	116.165	93.487
98.45	121.1300	620	121.164	121.1316	638	121.164	121.164	98.486
104.60	127.2830	949	127.224	127.2112	290	127.236	127.230	104.552
109.56	131.8580	705	131.825	131.8591	710	131.824	131.824	109.146

TABLE no. 55

Testperson 3	DIVIDER AND PLOTTING SCALE							Fourth series
3.4	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	23.5575	769	23.539	23.5777	875	23.520	23.530	0.000
5.89	29.4308	308	29.400	29.4945	945	29.400	29.400	5.870
10.17	33.7402	648	33.749	33.7270	534	33.753	33.751	10.221
16.06	39.5130	402	39.554	39.5549	831	39.556	39.555	16.025
21.78	45.2080	529	45.290	45.3656	656	45.300	45.295	21.765
27.92	51.3874	1169	51.359	51.3790	1176	51.377	51.368	27.838
31.38	54.8420	711	54.858	54.8380	696	54.863	54.860	31.330
38.69	62.1123	394	62.154	62.1228	620	62.178	62.166	38.636
43.01	66.5572	572	66.500	66.5003	003	66.500	66.500	42.970
49.27	72.7407	407	72.700	72.6937	1469	72.706	72.703	49.173
54.91	78.4668	945	78.455	78.4000	321	78.464	78.460	54.930
60.15	83.7576	782	83.741	83.7320	694	83.775	83.758	60.228
65.50	89.0913	913	89.000	89.0199	199	89.000	89.000	65.470
71.22	94.8235	302	94.813	94.8412	496	94.817	94.815	71.285
76.83	100.4660	820	100.432	100.4387	442	100.411	100.422	76.892
82.74	106.3194	450	106.351	106.3760	1000	106.348	106.350	82.820
87.34	110.9860	1115	110.951	110.9434	725	110.958	110.954	87.424
93.43	116.9645	858	116.943	116.9810	1061	116.950	116.946	93.416
98.45	122.0565	565	122.000	121.9987	1442	121.991	121.996	98.466
104.60	128.1402	546	128.129	128.1695	834	128.128	128.128	104.598
109.56	133.1577	690	133.123	133.1580	692	133.122	133.122	109.592

TABLE no. 56

Testperson 3	DIVIDER AND PLOTTING SCALE							Fifth series
3.5	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	22.7284	450	22.733	22.7282	414	22.726	22.730	0.000
5.89	28.5442	850	28.582	28.5048	425	28.575	28.578	5.848
10.17	32.9660	660	32.900	32.9206	206	32.900	32.900	10.170
16.06	38.7055	343	38.758	38.7326	672	38.769	38.764	16.034
21.78	44.5570	807	44.547	44.5971	1098	44.525	44.536	21.806
27.92	50.6412	549	50.627	50.6376	482	50.621	50.624	27.894
31.38	54.1418	600	54.136	54.1793	950	54.131	54.134	31.404
38.69	61.3320	542	61.344	61.3740	797	61.311	61.328	38.598
43.01	65.9182	289	65.921	65.9502	502	65.900	65.910	43.180
49.27	72.0951	1174	72.045	72.0706	780	72.015	72.030	49.300
54.91	77.5601	699	77.520	77.5768	901	77.527	77.524	54.794
60.15	82.9869	1109	82.948	82.9600	868	82.954	82.951	60.221
65.50	88.2536	536	88.200	88.2274	416	88.228	88.214	65.484
71.22	93.9223	590	93.973	93.9903	1297	93.979	93.976	71.246
76.83	99.5360	709	99.570	99.5790	1184	99.579	99.574	76.844
82.74	105.5753	927	105.535	105.5024	233	105.542	105.538	82.808
87.34	110.1413	650	110.147	110.1858	1112	110.151	110.149	87.419
93.43	116.2523	603	116.216	116.2383	470	116.217	116.216	93.486
98.45	121.2526	913	121.277	121.2383	762	121.276	121.276	98.546
104.60	127.3324	648	127.365	127.3837	1222	127.377	127.371	104.641
109.56	132.3808	973	132.333	132.3695	891	132.339	132.336	109.606

TABLE no. 57

Testperson 3	DIVIDER AND PLOTTING SCALE					Recap. tables 53-57					
Series					Mean (mm)	v (mm/100)					
1	2	3	4	5		1	2	3	4	5	
0.00	00	00	00	00	0.00						
5.77	87	88	87	85	5.85	+ 8	− 2	− 3	− 2	0	
10.32	18	20	22	17	10.22	−10	+ 4	+ 2	0	+ 5	
16.14	10	11	02	03	16.08	− 6	− 2	− 3	+ 6	+ 5	
21.79	76	82	76	81	21.79	0	+ 3	− 3	+ 3	− 2	
27.94	92	87	84	89	27.89	− 5	− 3	+ 2	+ 5	0	
31.41	41	42	33	40	31.39	− 2	− 2	− 3	+ 6	− 1	
38.76	71	68	64	60	38.68	− 8	− 3	0	+ 4	+ 8	
43.02	04	06	2.97	18	43.05	+ 3	+ 1	− 1	+ 8	−13	
49.26	30	29	17	30	49.26	0	− 4	− 3	+ 9	− 4	
54.86	87	94	93	79	54.88	+ 2	+ 1	− 6	− 5	+ 9	
60.21	23	14	23	22	60.21	0	− 2	+ 7	− 2	− 1	
65.50	48	60	47	48	65.51	+ 1	+ 3	− 9	+ 4	+ 3	
71.26	27	26	28	25	71.26	0	− 1	0	− 2	+ 1	
76.96	90	87	89	84	76.89	− 7	− 1	+ 2	0	+ 5	
82.82	74	79	82	81	82.80	− 2	+ 6	+ 1	− 2	− 1	
87.36	43	42	42	42	87.41	+ 5	− 2	− 1	− 1	− 1	
93.39	52	49	42	49	93.46	+ 7	− 6	− 3	+ 4	− 3	
98.49	44	49	47	55	98.49	0	+ 5	0	+ 2	− 6	
104.58	51	55	60	64	104.58	0	+ 7	+ 3	− 2	− 6	
109.36	42	15	59	61	—	—	—	—	—	—	

$m^2 = \frac{[vv]}{76} = \frac{1769}{76} = 23.3 \frac{mm^2}{10^4}$; m = 0.048 mm

TABLE no. 58

Testperson 4	DIVIDER AND PLOTTING SCALE						First series	
4.1	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	37.4731	996	37.453	37.4651	936	37.457	37.455	0.000
5.89	43.3983	1408	43.385	43.3462	916	43.391	43.388	5.933
10.17	47.6396	746	47.670	47.6928	1300	47.674	47.672	10.217
16.06	53.5242	720	53.596	53.6539	539	53.600	53.598	16.143
21.78	59.2728	1150	59.284	59.2310	752	59.288	59.286	21.831
27.92	65.3155	571	65.383	65.3037	476	65.388	65.386	27.931
31.38	68.9532	693	68.932	68.9459	637	68.936	68.934	31.479
38.69	76.1702	1073	76.174	76.1680	1000	76.164	76.169	38.714
43.01	80.5066	370	80.561	80.5272	606	80.567	80.564	43.109
49.27	86.7840	1337	86.799	86.8548	583	86.807	86.803	49.348
54.91	92.4337	480	92.429	92.4056	225	92.434	92.432	54.977
60.15	97.7472	726	97.751	97.7591	864	97.755	97.753	60.298
65.50	103.0872	1114	103.048	103.0412	661	103.050	103.049	65.594
71.22	108.7114	518	108.781	108.7592	1029	108.787	108.784	71.329
76.83	114.3494	789	114.359	114.3890	1238	114.370	114.364	76.909
82.74	120.2780	990	120.242	120.2160	401	120.248	120.245	82.790
87.34	124.8001	380	124.876	124.8180	567	124.877	124.876	87.421
93.43	130.9640	850	130.942	130.9703	935	130.946	130.944	93.489
98.45	135.9791	1062	135.954	135.9591	853	135.952	135.953	98.498
104.60	142.1132	360	142.146	142.1309	585	142.155	142.150	104.695
109.56	147.0200	302	147.020	147.0249	432	147.037	147.028	109.573

TABLE no. 59

Testperson 4	DIVIDER AND PLOTTING SCALE						Second series	
4.2	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	37.1950	1148	37.140	37.1326	448	37.124	37.132	0.000
5.89	43.0850	1224	43.075	43.0242	636	43.079	43.077	5.945
10.17	47.3520	674	47.331	47.3508	668	47.332	47.332	10.200
16.06	53.2734	1122	53.278	53.2241	593	53.270	53.274	16.142
21.78	58.9832	1131	58.960	58.9651	927	58.955	58.958	21.826
27.92	65.0273	648	65.075	65.0151	560	65.082	65.078	27.946
31.38	68.5020	490	68.594	68.6625	641	68.603	68.598	31.466
38.69	75.8000	175	75.835	75.8210	404	75.839	75.837	38.705
43.01	80.2322	458	80.227	80.2389	566	80.235	80.231	43.099
49.27	86.4470	760	86.458	86.4225	515	86.458	86.458	49.326
54.91	92.1438	438	92.100	92.1112	112	92.100	92.100	54.968
60.15	97.3088	566	97.396	97.3310	813	97.401	97.398	60.266
65.50	102.6740	1222	102.696	102.7910	910	102.700	102.698	65.566
71.22	108.4302	658	108.471	108.4541	874	108.467	108.469	71.337
76.83	114.0592	776	114.037	114.0011	222	114.042	114.040	76.908
82.74	119.9808	936	119.926	119.9088	175	119.917	119.922	82.790
87.34	124.5625	808	124.537	124.5620	787	124.533	124.535	87.403
93.43	130.6140	278	130.628	130.6273	380	130.621	130.624	93.492
98.45	135.6758	893	135.627	135.6153	314	135.632	135.630	98.498
104.60	141.7828	1355	141.805	141.7489	1005	141.803	141.804	104.672
109.56	146.7000	175	146.735	146.7000	201	146.740	146.738	109.606

TABLE no. 60

Testperson 4	DIVIDER AND PLOTTING SCALE							Third series
4.3	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	36.9491	638	36.929	36.9678	828	36.930	36.930	0.000
5.89	42.8596	950	42.871	42.8091	456	42.873	42.872	5.942
10.17	47.1240	392	47.130	47.1136	306	47.134	47.132	10.202
16.06	53.0410	740	53.066	53.0742	1060	53.064	53.065	16.135
21.78	58.7632	875	58.749	58.7037	288	58.750	58.750	21.820
27.92	64.8980	1330	64.870	64.8458	762	64.861	64.866	27.936
31.38	68.3180	592	68.382	68.3837	1252	68.383	68.382	31.452
38.69	75.6630	885	75.651	75.6492	757	75.653	75.652	38.722
43.01	80.0083	288	80.041	80.0587	809	80.044	80.042	43.112
49.27	86.2330	708	86.276	86.2472	873	86.280	86.278	49.348
54.91	91.9902	945	91.909	91.9142	181	91.908	91.908	54.978
60.15	97.2885	1000	97.223	97.2184	232	97.210	97.216	60.286
65.50	102.5521	685	102.533	102.5706	802	102.519	102.526	65.596
71.22	108.2088	455	108.273	108.2052	408	108.271	108.272	71.342
76.83	113.8838	1125	113.857	113.8620	869	113.850	113.854	76.924
82.74	119.7078	262	119.737	119.7911	1108	119.739	119.738	82.808
87.34	124.3731	986	124.351	124.3194	479	124.357	124.354	87.424
93.43	130.4460	610	130.430	130.4601	732	130.426	130.428	93.498
98.45	135.4823	1068	135.449	135.4169	445	135.455	135.452	98.522
104.60	141.6050	174	141.625	141.6441	570	141.626	141.626	104.696
109.56	146.5596	862	146.553	146.5590	787	146.539	146.546	109.616

TABLE no. 61

Testperson 4	DIVIDER AND PLOTTING SCALE							Fourth series
4.4	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	36.1835	1258	36.185	36.1461	874	36.183	36.184	0.000
5.89	42.1670	960	42.158	42.1664	951	42.157	42.158	5.974
10.17	46.4060	060	46.400	46.3730	1199	46.394	46.397	10.213
16.06	52.3988	1192	52.341	52.3781	1002	52.344	52.342	16.158
21.78	58.0930	1130	58.040	58.0922	1180	58.052	58.046	21.862
27.92	64.1024	218	64.139	64.1748	975	64.145	64.142	27.958
31.38	67.6603	990	67.677	67.6565	955	67.678	67.678	31.494
38.69	74.9433	532	74.920	74.9494	605	74.922	74.921	38.737
43.01	79.3262	335	79.315	79.3010	098	79.318	79.316	43.132
49.27	85.5110	332	85.544	85.5425	648	85.545	85.544	49.360
54.91	91.1210	622	91.182	91.1734	1222	91.198	91.190	55.006
60.15	96.4190	548	96.472	96.4557	914	96.471	96.472	60.288
65.50	101.7820	1320	101.800	101.7519	962	101.789	101.794	65.610
71.22	107.5200	436	107.547	107.5611	851	107.548	107.548	71.364
76.83	113.1496	582	113.117	113.1650	728	113.116	113.116	76.932
82.74	119.0956	956	119.000	118.9490	963	118.995	118.998	82.814
87.34	123.6075	120	123.609	123.6605	664	123.612	123.610	87.426
93.43	129.7144	200	129.711	129.7946	1006	129.712	129.712	93.528
98.45	134.7358	462	134.721	134.7360	440	134.716	134.718	98.534
104.60	140.8380	842	140.892	140.8270	717	140.889	140.890	104.706
109.56	145.8568	650	145.816	145.8565	656	145.818	145.817	109.633

TABLE no. 62

Testperson 4	DIVIDER AND PLOTTING SCALE							Fifth series
4.5	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	35.7500	812	35.762	35.7302	586	35.757	35.760	0.000
5.89	41.6743	1240	41.699	41.7500	540	41.708	41.704	5.944
10.17	45.9142	392	45.950	45.9541	832	45.958	45.954	10.194
16.06	51.9350	350	51.900	51.9148	262	51.923	51.912	16.152
21.78	57.5552	972	57.584	57.5904	1429	57.605	57.594	21.834
27.92	63.7830	866	63.707	63.7234	234	63.700	63.704	27.944
31.38	67.2466	620	67.231	67.2776	960	67.237	67.234	31.474
38.69	74.4285	746	74.492	74.4869	1286	74.483	74.488	38.728
43.01	78.8740	1132	78.878	78.8881	1272	78.878	78.878	43.118
49.27	85.0770	1188	85.084	85.0737	1160	85.085	85.084	49.324
54.91	90.7178	343	90.733	90.7821	938	90.723	90.728	54.968
60.15	96.0286	522	96.047	96.0638	862	96.045	96.046	60.286
65.50	101.2035	540	101.301	101.2959	1474	101.303	101.302	65.542
71.22	107.1225	286	107.112	107.1557	592	107.107	107.110	71.350
76.83	112.6960	1274	112.663	112.6162	583	112.684	112.674	76.914
82.74	118.5912	1150	118.548	118.5585	740	118.531	118.540	82.780
87.34	123.1290	586	123.159	123.1030	324	123.159	123.159	87.399
93.43	129.2722	960	129.248	129.2313	486	129.235	129.242	93.482
98.45	134.2629	930	134.260	134.2195	502	134.261	134.260	98.500
104.60	140.4925	1150	140.445	140.4489	738	140.450	140.448	104.688
109.56	145.3760	1082	145.364	145.3758	1032	145.355	145.360	109.600

TABLE no. 63

Testperson 4	DIVIDER AND PLOTTING SCALE					Recap. tables 59-63				
Series					Mean (mm)	v (mm/100)				
1	2	3	4	5		1	2	3	4	5
0.00	00	00	00	00	0.00					
5.93	94	94	97	94	5.94	+ 1	0	0	− 3	0
10.22	20	20	21	19	10.20	− 2	0	0	− 1	+ 1
16.14	14	14	16	15	16.15	+ 1	+ 1	+ 1	− 1	0
21.83	83	82	86	83	21.83	0	0	+ 1	− 3	0
27.93	95	94	96	94	27.94	+ 1	− 1	0	− 2	0
31.48	47	45	49	47	31.47	− 1	0	+ 2	− 2	0
38.71	70	72	74	73	38.72	+ 1	+ 2	0	− 2	− 1
43.11	10	11	13	12	43.11	0	+ 1	0	− 2	− 1
49.35	33	35	36	32	49.34	− 1	+ 1	− 1	− 2	+ 2
54.98	97	98	5.01	97	54.98	0	+ 1	0	− 3	+ 1
60.30	27	29	29	29	60.29	− 1	+ 2	0	0	0
65.59	57	60	61	54	65.58	− 1	+ 1	− 2	− 3	+ 4
71.33	34	34	36	35	71.34	+ 1	0	0	− 2	− 1
76.91	91	92	93	91	76.92	+ 1	+ 1	0	− 1	+ 1
82.79	79	81	81	78	82.80	+ 1	+ 1	− 1	− 1	+ 2
87.42	40	42	43	40	87.41	− 1	+ 1	− 1	− 2	+ 1
93.49	49	50	53	48	93.50	+ 1	+ 1	0	− 3	+ 2
98.50	50	52	53	50	98.51	+ 1	+ 1	− 1	− 2	+ 1
104.70	67	70	71	69	104.69	− 1	+ 2	− 1	− 2	0
109.57	61	62	63	60	109.61	+ 4	0	− 1	− 2	+ 1

$m^2 = \frac{[vv]}{80} = \frac{200}{80} = 2.5 \frac{mm^2}{10^4}$; m = 0.016 mm

TABLE no. 64

Testperson 5	DIVIDER AND PLOTTING SCALE						First series	
5.1	First measurement (Obs. Mr. Henkel)			Second measurement (Obs. Mr. Dijkstra)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	23.2640	1074	23.287	23.3134	134	23.300	23.294	0.000
5.89	29.2296	296	29.200	29.2694	712	29.204	29.202	5.908
10.17	33.4432	499	33.413	33.4860	923	33.413	33.413	10.119
16.06	39.3156	437	39.356	39.3946	1298	39.370	39.363	16.069
21.78	45.0978	1400	45.084	45.0972	1453	45.096	45.090	21.796
27.92	51.2219	302	51.217	51.2479	604	51.225	51.221	27.927
31.38	54.6761	1069	54.662	54.6648	964	54.663	54.662	31.368
38.69	61.9488	914	61.985	61.9116	520	61.981	61.983	38.689
43.01	66.3465	594	66.326	66.3057	174	66.323	66.324	43.030
49.27	72.5018	329	72.562	72.5855	1155	72.560	72.561	49.267
54.91	78.2416	500	78.217	78.2063	109	78.209	78.213	54.919
60.15	83.4215	426	83.442	83.4146	346	83.440	83.441	60.147
65.50	88.9362	497	88.927	88.9622	653	88.906	88.916	65.622
71.22	94.5258	311	94.511	94.5583	630	94.509	94.510	71.216
76.83	100.2855	855	100.200	100.2470	470	100.200	100.200	76.906
82.74	106.0130	624	106.099	106.0496	994	106.100	106.100	82.806
87.34	110.6241	698	110.691	110.6327	757	110.686	110.688	87.394
93.43	116.7368	651	116.757	116.7600	844	116.749	116.753	93.459
98.45	121.8978	1333	121.871	121.8568	837	121.854	121.862	98.568
104.60	127.9831	1090	127.952	127.9805	1051	127.949	127.950	104.656
109.56	132.9313	401	132.918	132.9969	1020	132.910	132.914	109.620

TABLE no. 65

Testperson 5	DIVIDER AND PLOTTING SCALE						Second series	
5.2	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	23.4853	947	23.419	23.4093	200	23.421	23.420	0.000
5.89	29.3642	873	29.346	29.3080	400	29.364	29.355	5.935
10.17	33.5657	989	33.566	33.5542	948	33.581	33.574	10.154
16.06	39.4889	1110	39.444	39.4445	734	39.458	39.451	16.031
21.78	45.1914	1290	45.175	45.1688	1122	45.187	45.181	21.761
27.92	51.2990	1497	51.301	51.2882	1384	51.300	51.300	27.880
31.38	54.8470	599	54.826	54.8832	970	54.828	54.827	31.407
38.69	62.0152	635	62.097	62.1800	846	62.109	62.103	38.683
43.01	66.4415	515	66.420	66.4860	986	66.425	66.422	43.002
49.27	72.7020	020	72.700	72.7561	578	72.703	72.702	49.282
54.91	78.3623	742	78.324	78.3338	512	78.335	78.330	54.910
60.15	83.5300	707	83.581	83.5644	1024	83.576	83.578	60.158
65.50	88.9367	523	88.931	88.9319	490	88.934	88.932	65.512
71.22	94.6894	1062	94.634	94.6684	838	94.631	94.632	71.212
76.83	100.2700	1058	100.272	100.2576	919	100.269	100.270	76.850
82.74	106.2463	463	106.200	106.1680	1211	106.206	106.203	82.783
87.34	110.8978	978	110.800	110.8382	382	110.800	110.800	87.380
93.43	116.8310	703	116.879	116.8327	742	116.883	116.881	93.461
98.45	121.9300	300	121.900	121.9478	502	121.905	121.902	98.482
104.60	128.0488	837	128.070	128.0929	1293	128.073	128.072	104.652
109.56	133.0910	1306	133.079	133.0968	1395	133.085	133.082	109.662

TABLE no. 66

Testperson 5	DIVIDER AND PLOTTING SCALE							Third series
5.3	First measurement (Obs. Mr. Henkel)			Second measurement (Obs. Mr. Dijkstra)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	23.1068	445	23.175	23.1278	654	23.175	23.175	0.000
5.89	29.0515	774	29.052	29.0400	633	29.047	29.050	5.875
10.17	33.3301	612	33.362	33.3610	880	33.354	33.358	10.183
16.06	39.2062	464	39.280	39.2215	613	39.280	39.280	16.105
21.78	45.0310	361	45.010	45.0364	504	45.028	45.019	21.844
27.92	51.0500	976	51.095	51.0749	1268	51.104	51.100	27.925
31.38	54.5180	406	54.545	54.5055	238	54.537	54.541	31.366
38.69	61.8942	1251	61.862	61.8836	1090	61.851	61.856	38.681
43.01	66.2948	998	66.210	66.2714	773	66.212	66.211	43.036
49.27	72.4421	900	72.496	72.5322	322	72.500	72.498	49.323
54.91	78.1909	909	78.100	78.1050	050	78.100	78.100	54.925
60.15	83.3079	394	83.363	83.3030	336	83.361	83.362	60.187
65.50	88.6065	529	88.693	88.6210	672	88.692	88.692	65.517
71.22	94.4618	737	94.424	94.4572	683	94.422	94.423	71.248
76.83	100.0078	364	100.057	100.0610	913	100.061	100.059	76.884
82.74	105.9465	668	105.941	105.9503	707	105.941	105.941	82.766
87.34	110.5509	673	110.533	110.5908	1028	110.524	110.528	87.353
93.43	116.6810	1073	116.653	116.6958	1173	116.643	116.648	93.473
98.45	121.6911	1351	121.688	121.6620	1028	121.682	121.685	98.510
104.60	127.8958	1426	127.894	127.8960	1393	127.887	127.890	104.715
109.56	132.7669	1128	132.792	132.7083	537	132.791	132.792	109.617

TABLE no. 67

Testperson 5	DIVIDER AND PLOTTING SCALE							Fourth series
5.4	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	22.8847	908	22.812	22.8061	092	22.806	22.809	0.000
5.89	28.6435	983	28.710	28.6458	1089	28.726	28.718	5.909
10.17	33.0163	163	33.000	32.9772	1236	32.993	32.996	10.187
16.06	38.9720	720	38.900	38.9078	078	38.900	38.900	16.091
21.78	44.6223	430	44.641	44.6995	1181	44.637	44.639	21.830
27.92	50.7399	700	50.760	50.7594	893	50.760	50.760	27.951
31.38	54.2243	320	54.215	54.2395	437	54.208	54.212	31.403
38.69	61.5053	230	61.535	61.5608	741	61.527	61.531	38.722
43.01	65.8280	617	65.867	65.8292	695	65.881	65.874	43.065
49.27	72.1190	492	72.160	72.1632	937	72.161	72.160	49.351
54.91	77.7817	1148	77.766	77.7836	1108	77.754	77.760	54.951
60.15	83.0440	440	83.000	83.0644	672	83.006	83.003	60.194
65.50	88.4200	200	88.400	88.3821	1329	88.402	88.401	65.592
71.22	94.1389	491	94.120	94.1066	127	94.112	94.116	71.307
76.83	99.7697	997	99.760	99.7827	1168	99.768	99.764	76.955
82.74	105.6106	327	105.644	105.6128	362	105.647	105.646	82.837
87.34	110.2475	475	110.200	110.1448	968	110.204	110.202	87.393
93.43	116.3536	741	116.341	116.3932	1122	116.338	116.340	93.531
98.45	121.3836	1120	121.357	121.3096	416	121.364	121.360	98.551
104.60	127.5871	915	127.509	127.5512	565	127.511	127.510	104.701
109.56	132.4570	870	132.460	132.4560	825	132.453	132.457	109.648

TABLE no. 68

Testperson 5	DIVIDER AND PLOTTING SCALE							Fifth series
5.5	First measurement (Obs. Mr. Henkel)			Second measurement (Obs. Mr. Dijkstra)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	22.9534	937	22.981	22.9329	773	22.989	22.985	0.000
5.89	28.8502	872	28.874	28.8570	858	28.858	28.866	5.881
10.17	33.1918	1109	33.138	33.1220	263	33.109	33.124	10.139
16.06	39.0275	613	39.068	39.0755	1115	39.072	39.070	16.085
21.78	44.7148	518	44.774	44.7132	390	44.752	44.763	21.778
27.92	50.9237	324	50.917	50.9641	724	50.917	50.917	27.932
31.38	54.3205	587	54.376	54.3398	749	54.370	54.373	31.388
38.69	61.7230	358	61.726	61.7178	243	61.713	61.720	38.735
43.01	66.0629	902	66.055	66.0073	340	66.053	66.054	43.069
49.27	72.2506	922	72.283	72.2167	575	72.282	72.282	49.297
54.91	77.8156	634	77.896	77.8030	428	77.880	77.888	54.903
60.15	83.1990	1329	83.168	83.1119	394	83.155	83.162	60.177
65.50	88.5033	114	88.516	88.5789	800	88.502	88.509	65.524
71.22	94.2768	1008	94.248	94.2700	879	94.236	94.242	71.257
76.83	99.8316	708	99.878	99.8858	1200	99.868	99.873	76.888
82.74	105.7070	525	105.791	105.7064	539	105.795	105.793	82.808
87.34	110.3931	1367	110.387	110.3230	630	110.380	110.384	87.399
93.43	116.4901	1161	116.452	116.4347	530	116.437	116.444	93.459
98.45	121.5244	538	121.559	121.5510	723	121.543	121.551	98.566
104.60	127.6238	572	127.667	127.6893	1163	127.654	127.660	104.675
109.56	132.6598	759	132.632	132.6200	390	132.638	132.635	109.650

TABLE no. 69

Testperson 5	DIVIDER AND PLOTTING SCALE						Recap. tables 65-69				
Series					Mean (mm)	v (mm/100)				
1	2	3	4	5		1	2	3	4	5
0.00	00	00	00	00	0.00					
5.91	94	88	91	88	5.90	− 1	− 4	+ 2	− 1	+ 2
10.12	15	18	19	14	10.16	+ 4	+ 1	− 2	− 3	+ 2
16.07	03	10	09	08	16.07	0	+ 4	− 3	− 2	− 1
21.80	76	84	83	78	21.80	0	+ 4	− 4	− 3	+ 2
27.93	88	92	95	93	27.92	− 1	+ 4	0	− 3	− 1
31.37	41	37	40	39	31.39	+ 2	− 2	+ 2	− 1	0
38.69	68	68	72	74	38.70	+ 1	+ 2	+ 2	− 2	− 4
43.03	00	04	06	07	43.04	+ 1	+ 4	0	− 2	− 3
49.27	28	32	35	30	49.30	+ 3	+ 2	− 2	− 5	0
54.92	91	92	95	90	54.92	0	+ 1	0	− 3	+ 2
60.15	16	19	19	18	60.17	+ 2	+ 1	− 2	− 2	− 1
65.62	51	52	59	52	65.55	− 7	+ 4	+ 3	− 4	+ 3
71.22	21	25	31	26	71.25	+ 3	+ 4	0	− 6	− 1
76.91	85	88	96	89	76.90	− 1	+ 5	+ 2	− 6	+ 1
82.81	78	77	84	81	82.80	− 1	+ 2	+ 3	− 4	− 1
87.39	38	35	39	40	87.38	− 1	0	+ 3	− 1	− 2
93.46	46	47	53	46	93.48	+ 2	+ 2	+ 1	− 5	+ 2
98.57	48	51	55	57	98.54	− 3	+ 6	+ 3	− 1	− 3
104.66	65	72	70	68	104.68	+ 2	+ 3	− 4	− 2	0
109.62	66	62	65	65	109.64	+ 2	− 2	+ 2	− 1	− 1

$m^2 = \frac{[vv]}{80} = \frac{727}{80} = 9.1 \frac{mm^2}{10^4}$; m = 0.030 mm

TABLE no. 70

Testperson 1	TRACING POINT AND ENGINEER SCALE							First series
1.1	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	23.6107	150	23.609	23.6497	528	23.606	23.608	0.000
5.89	29.4155	400	29.449	29.4939	1169	29.446	29.448	5.840
10.17	33.8642	830	33.838	33.8121	362	33.848	33.843	10.235
16.06	39.6653	1114	39.692	39.6295	780	39.697	39.694	16.086
21.78	45.3280	319	45.308	45.3591	665	45.315	45.312	21.704
27.92	51.4428	791	51.473	51.4297	625	51.466	51.470	27.862
31.38	54.9022	345	54.965	54.9943	1294	54.970	54.968	31.360
38.69	62.3713	852	62.328	62.3287	425	62.328	62.328	38.720
43.01	66.6652	893	66.648	66.6278	497	66.644	66.646	43.038
49.27	72.9030	092	72.912	72.9767	887	72.924	72.918	49.310
54.91	78.5888	950	78.512	78.5610	671	78.512	78.512	54.904
60.15	83.7685	1033	83.770	83.7110	467	83.771	83.770	60.162
65.50	89.0130	480	89.070	89.0153	594	89.088	89.079	65.471
71.22	94.8815	815	94.800	94.8062	062	94.800	94.800	71.192
76.83	100.3085	437	100.370	100.3706	1072	100.373	100.372	76.764
82.74	106.3189	410	106.344	106.3962	1227	106.353	106.348	82.740
87.34	110.9302	448	110.929	110.9711	872	110.932	110.930	87.322
93.43	116.9924	1290	116.973	116.9052	461	116.982	116.978	93.370
98.45	122.1708	708	122.100	122.1327	327	122.100	122.100	98.492
104.60	128.1684	900	128.143	128.1115	327	128.142	128.142	104.534
109.56	133.1250	400	133.130	133.1948	1118	133.134	133.132	109.524

TABLE no. 71

Testperson 1	TRACING POINT AND ENGINEER SCALE							Second series
1.2	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	23.2062	270	23.242	23.2286	465	23.236	23.239	0.000
5.89	29.1581	623	29.108	29.1637	637	29.100	29.104	5.865
10.17	33.4225	410	33.437	33.4386	560	33.435	33.436	10.197
16.06	39.3192	426	39.347	39.3685	914	39.346	39.346	16.107
21.78	45.0508	791	45.057	45.0888	1197	45.062	45.060	21.821
27.92	51.1328	465	51.127	51.1658	808	51.130	51.128	27.889
31.38	54.6345	468	54.625	54.6978	1148	54.634	54.630	31.391
38.69	61.9349	349	61.900	61.9490	490	61.900	61.900	38.661
43.01	66.2098	098	66.200	66.2809	809	66.200	66.200	42.961
49.27	72.5622	780	72.532	72.5291	430	72.528	72.530	49.291
54.91	78.1545	710	78.133	78.1537	698	78.132	78.132	54.893
60.15	83.4800	855	83.411	83.4490	534	83.409	83.410	60.171
65.50	88.7682	1106	88.785	88.7173	576	88.781	88.783	65.544
71.22	94.4752	1210	94.492	94.4813	1274	94.492	94.492	71.253
76.83	100.0733	804	100.014	100.0213	278	100.013	100.014	76.775
82.74	105.9530	800	105.954	105.9434	714	105.956	105.955	82.716
87.34	110.5800	1008	110.542	110.5400	590	110.538	110.540	87.301
93.43	116.6983	983	116.600	116.6448	448	116.600	116.600	93.361
98.45	121.6547	665	121.624	121.6625	730	121.621	121.622	98.383
104.60	127.7780	825	127.709	127.7840	925	127.717	127.713	104.474
109.56	132.6898	1335	132.687	132.6470	919	132.690	132.688	109.449

TABLE no. 72

Testperson 1	TRACING POINT AND ENGINEER SCALE						Third series	
1.3	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	23.2430	817	23.277	23.2347	778	23.286	23.282	0.000
5.89	29.1862	1038	29.135	29.1722	904	29.136	29.136	5.854
10.17	33.5727	1135	33.582	33.5434	837	33.581	33.582	10.300
16.06	39.3360	690	39.366	39.3062	395	39.367	39.366	16.084
21.78	45.1845	1022	45.135	45.1132	316	45.137	45.136	21.854
27.92	51.1468	870	51.180	51.1990	1367	51.175	51.178	27.896
31.38	54.5287	718	54.586	54.5057	497	54.588	54.587	31.305
38.69	61.8323	669	61.869	61.8915	1285	61.874	61.872	38.590
43.01	66.2605	1015	66.282	66.2985	1381	66.279	66.280	42.998
49.27	72.5182	223	72.508	72.5846	872	72.505	72.506	49.224
54.91	78.1711	882	78.134	78.1208	378	78.134	78.134	54.852
60.15	83.4242	392	83.430	83.4069	227	83.432	83.431	60.149
65.50	88.8064	064	88.800	88.7890	1363	88.795	88.798	65.516
71.22	94.5805	805	94.500	94.4850	1334	94.497	94.498	71.216
76.83	100.0086	113	100.005	100.0918	976	100.012	100.008	76.726
82.74	106.0080	218	106.028	106.0229	370	106.028	106.028	82.746
87.34	110.6368	515	110.629	110.6262	460	110.640	110.634	87.352
93.43	116.6470	854	116.677	116.6178	573	116.679	116.678	93.396
98.45	121.7900	900	121.700	121.7257	308	121.710	121.705	98.423
104.60	127.7358	518	127.732	127.7272	432	127.732	127.732	104.450
109.56	132.6272	710	132.688	132.6417	878	132.692	132.690	109.408

TABLE no. 73

Testperson 1	TRACING POINT AND ENGINEER SCALE						Fourth series	
1.4	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	23.1355	355	23.100	23.0875	1351	23.095	23.098	0.000
5.89	28.9450	830	28.976	28.9843	1240	28.979	28.978	5.880
10.17	33.2530	952	33.284	33.2211	612	33.280	33.282	10.184
16.06	39.1899	1328	39.186	39.1657	1048	39.178	39.182	16.084
21.78	44.8010	422	44.882	44.8743	1090	44.869	44.876	21.778
27.92	50.9585	950	50.973	50.9347	732	50.977	50.975	27.877
31.38	54.3510	962	54.390	54.3676	1142	54.393	54.392	31.294
38.69	61.7222	270	61.710	61.7658	734	61.715	61.712	38.614
43.01	66.1372	600	66.146	66.1468	696	66.146	66.146	43.048
49.27	72.3160	290	72.326	72.3028	157	72.326	72.326	49.228
54.91	77.9150	379	77.946	77.9678	946	77.954	77.950	54.852
60.15	83.2520	960	83.288	83.2247	665	83.284	83.286	60.188
65.50	88.6578	600	88.604	88.6775	781	88.601	88.602	65.504
71.22	94.3710	768	94.312	94.3809	891	94.316	94.314	71.216
76.83	99.8688	1010	99.864	99.8750	1087	99.867	99.866	76.768
82.74	105.7799	1042	105.749	105.7120	390	105.754	105.752	82.654
87.34	110.4655	680	110.405	110.4457	457	110.400	110.402	87.304
93.43	116.4781	1214	116.487	116.4435	888	116.491	116.489	93.391
98.45	121.4157	470	121.463	121.4767	1088	121.464	121.464	98.366
104.60	127.6310	310	127.600	127.6576	576	127.600	127.600	104.502
109.56	132.5220	380	132.532	132.5498	648	132.530	132.531	109.433

TABLE no. 74

Testperson 1	TRACING POINT AND ENGINEER SCALE							Fifth series
1.5	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	23.4785	886	23.420	23.4016	113	23.419	23.420	0.000
5.89	29.2427	688	29.252	29.2985	1241	29.251	29.252	5.832
10.17	33.6340	561	33.644	33.6378	634	33.651	33.648	10.228
16.06	39.4358	606	39.450	39.4528	788	39.452	39.451	16.031
21.78	45.1084	144	45.112	45.1220	262	45.108	45.110	21.690
27.92	51.2548	716	51.234	51.2440	608	51.234	51.234	27.814
31.38	54.7789	1042	54.751	54.7985	1272	54.757	54.754	31.334
38.69	62.0769	1154	62.077	62.0321	667	62.069	62.073	38.653
43.01	66.4859	1231	66.474	66.4573	926	66.471	66.472	43.052
49.27	72.6848	1184	72.667	72.6289	591	72.660	72.664	49.244
54.91	78.3180	251	78.314	78.3920	1007	78.317	78.316	54.896
60.15	83.5149	149	83.500	83.5120	120	83.500	83.500	60.080
65.50	88.9326	326	88.900	88.8295	767	88.894	88.897	65.477
71.22	94.6333	429	94.619	94.6780	840	94.612	94.616	71.196
76.83	100.1119	235	100.123	100.1653	751	100.120	100.122	76.702
82.74	106.0898	1300	106.080	106.0299	654	106.071	106.076	82.656
87.34	110.6893	1049	110.631	110.6849	1005	110.631	110.631	87.211
93.43	116.8484	540	116.811	116.8704	763	116.812	116.812	93.392
98.45	121.8663	663	121.800	121.8420	445	121.805	121.802	98.382
104.60	127.8778	1175	127.879	127.8620	1050	127.886	127.882	104.462
109.56	132.8240	340	132.820	132.8707	818	132.822	132.821	109.401

TABLE no. 75

Testperson 1	TRACING POINT AND ENGINEER SCALE					Recap. tables 71-75				
Series					Mean (mm)	v (mm/100)				
1	2	3	4	5		1	2	3	4	5
0.00	00	00	00	00	0.00					
5.84	86	85	88	83	5.85	+ 1	− 1	0	− 3	+ 2
10.24	20	30	18	23	10.23	− 1	+ 3	− 7	+ 5	0
16.09	11	08	08	03	16.08	− 1	− 3	0	0	+ 5
21.70	82	85	78	69	21.77	+ 7	− 5	− 8	− 1	+ 8
27.86	89	90	88	81	27.87	+ 1	− 2	− 3	− 1	+ 6
31.36	39	30	29	33	31.33	− 3	− 6	+ 3	+ 4	0
38.72	66	59	61	65	38.65	− 7	− 1	+ 6	+ 4	0
43.04	2.96	00	05	05	43.02	− 2	+ 6	+ 2	− 3	− 3
49.31	29	22	23	24	49.26	− 5	− 3	+ 4	+ 3	+ 2
54.90	89	85	85	90	54.88	− 2	− 1	+ 3	+ 3	− 2
60.16	17	15	19	08	60.15	− 1	− 2	0	− 4	+ 7
65.47	54	52	50	48	65.50	+ 3	− 4	− 2	0	+ 2
71.19	25	22	22	20	71.22	+ 3	− 3	0	0	+ 2
76.76	78	73	77	70	76.75	− 1	− 3	+ 2	− 2	+ 5
82.74	72	75	65	66	82.70	− 4	− 2	− 5	+ 5	+ 4
87.32	30	35	30	21	87.30	− 2	0	− 5	0	+ 9
93.37	36	40	39	39	93.38	+ 1	+ 2	− 2	− 1	− 1
98.49	38	42	37	38	98.41	− 8	+ 3	− 1	+ 4	+ 3
104.53	47	45	50	46	104.48	− 5	+ 1	+ 3	− 2	+ 2
109.52	45	41	43	40	109.44	− 8	− 1	+ 3	+ 1	+ 4

$m^2 = \frac{[vv]}{80} = \frac{1320}{80} = 16.5 \frac{mm^2}{10^4}$; m = 0.041 mm

TABLE no. 76

Testperson 2	TRACING POINT AND ENGINEER SCALE							First series
2.1	First measurement (Obs. Mr. Henkel)			Second measurement (Obs. Mr. Dijkstra)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	35.8158	453	35.859	35.8498	789	35.858	35.858	0.000
5.89	41.6786	1160	41.675	41.6634	940	41.661	41.668	5.810
10.17	46.0865	1165	46.060	46.0598	912	46.063	46.062	10.204
16.06	51.9768	1131	51.973	51.9253	636	51.977	51.975	16.117
21.78	57.7447	495	57.710	57.7150	180	57.706	57.708	21.850
27.92	63.8190	591	63.880	63.8719	1120	63.880	63.880	28.022
31.38	67.3961	1402	67.388	67.3698	1149	67.390	67.389	31.531
38.69	74.6087	371	74.657	74.6443	688	74.649	74.653	38.795
43.01	78.9904	1067	78.933	78.9563	655	78.918	78.926	43.068
49.27	85.1463	849	85.177	85.1028	480	85.190	85.184	49.326
54.91	90.8229	250	90.804	90.8419	436	90.803	90.804	54.946
60.15	96.0220	289	96.014	96.0269	313	96.009	96.012	60.154
65.50	101.4590	833	101.449	101.4105	340	101.447	101.448	65.590
71.22	107.1108	587	107.196	107.1593	1080	107.197	107.196	71.338
76.83	112.7626	626	112.700	112.7797	797	112.700	112.700	76.842
82.74	118.5521	896	118.575	118.5480	860	118.576	118.576	82.718
87.34	123.2019	400	123.276	123.2067	441	123.275	123.276	87.418
93.43	129.3582	760	129.336	129.3315	477	129.332	129.334	93.476
98.45	134.2878	1368	134.298	134.3307	307	134.300	134.299	98.441
104.60	140.3284	578	140.359	140.3490	769	140.356	140.358	104.500
109.56	145.3257	567	145.362	145.3222	547	145.365	145.364	109.506

TABLE no. 77

Testperson 2	TRACING POINT AND ENGINEER SCALE							Second series
2.2	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	36.1843	1282	36.188	36.1733	1180	36.189	36.188	0.000
5.89	42.0052	427	42.075	42.0236	647	42.082	42.078	5.890
10.17	46.4444	444	46.400	46.4701	857	46.431	46.416	10.228
16.06	52.3426	426	52.300	52.3226	226	52.300	52.300	16.112
21.78	57.9771	1178	57.981	57.9521	875	57.971	57.976	21.788
27.92	64.1978	1224	64.149	64.1042	283	64.148	64.148	27.960
31.38	67.7859	859	67.700	67.7881	949	67.714	67.707	31.519
38.69	75.0593	593	75.000	75.0158	158	75.000	75.000	38.812
43.01	79.3491	491	79.300	79.2571	979	79.282	79.291	43.103
49.27	85.6422	648	85.645	85.6892	1102	85.642	85.644	49.456
54.91	91.2443	464	91.204	91.2798	798	91.200	91.202	55.014
60.15	96.5670	737	96.513	96.5485	552	96.513	96.513	60.325
65.50	101.7747	961	101.743	101.7840	1054	101.743	101.743	65.555
71.22	107.4560	881	107.464	107.4669	1059	107.478	107.471	71.283
76.83	112.9533	920	112.977	112.9402	791	112.978	112.978	76.790
82.74	118.9468	712	118.949	118.9864	1093	118.946	118.948	82.760
87.34	123.6500	672	123.634	123.6289	467	123.636	123.635	87.447
93.43	129.6508	904	129.679	129.6842	1263	129.684	129.682	93.494
98.45	134.7398	514	134.723	134.7025	178	134.731	134.727	98.539
104.60	140.7860	1303	140.789	140.7097	451	140.771	140.780	104.592
109.56	145.7200	593	145.779	145.7024	440	145.783	145.781	109.593

TABLE no. 78

Testperson 2	TRACING POINT AND ENGINEER SCALE							Third series
2.3	First measurement (Obs. Mr. Henkel)			Second measurement (Obs. Mr. Dijkstra)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	36.5116	231	36.523	36.5993	1119	36.525	36.524	0.000
5.89	42.4961	1130	42.434	42.4393	549	42.431	42.432	5.908
10.17	46.7182	408	46.745	46.7442	644	46.740	46.742	10.218
16.06	52.7299	376	52.715	52.7730	769	52.708	52.712	16.188
21.78	58.3095	482	58.377	58.3474	815	58.368	58.372	21.848
27.92	64.5011	395	64.577	64.5556	940	64.577	64.577	28.053
31.38	68.0043	264	68.044	68.0510	708	68.040	68.042	31.518
38.69	75.2168	582	75.283	75.2570	949	75.276	75.280	38.756
43.01	79.5705	1161	79.591	79.5620	1078	79.592	79.592	43.068
49.27	85.8436	806	85.874	85.8883	1230	85.869	85.872	49.348
54.91	91.4437	716	91.456	91.4420	710	91.458	91.457	54.933
60.15	96.6862	1169	96.661	96.6000	218	96.644	96.652	60.128
65.50	102.1316	500	102.137	102.1734	832	102.120	102.128	65.604
71.22	107.8510	782	107.854	107.8810	1044	107.847	107.850	71.326
76.83	113.3615	825	113.342	113.3115	355	113.348	113.345	76.821
82.74	119.3571	571	119.300	119.3416	416	119.300	119.300	82.776
87.34	123.9946	1040	123.919	123.9133	194	123.912	123.916	87.392
93.43	130.0456	728	130.054	130.0701	1002	130.060	130.057	93.533
98.45	135.0304	687	135.077	135.0343	712	135.074	135.076	98.552
104.60	141.0867	1238	141.074	141.0583	933	141.070	141.072	104.548
109.56	146.0412	841	146.086	146.0410	835	146.085	146.086	109.562

TABLE no. 79

Testperson 2	TRACING POINT AND ENGINEER SCALE							Fourth series
2.4	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	36.5488	488	36.500	36.5100	100	36.500	36.500	0.000
5.89	42.4117	547	42.486	42.4427	856	42.486	42.486	5.986
10.17	46.8492	492	46.800	46.8118	148	46.806	46.803	10.303
16.06	52.5078	439	52.572	52.5840	1211	52.574	52.573	16.073
21.78	58.3890	1254	58.373	58.3877	1259	58.376	58.374	21.874
27.92	64.4444	853	64.482	64.4982	1387	64.481	64.482	27.982
31.38	68.0035	083	68.010	68.0600	620	68.004	68.007	31.507
38.69	75.2910	1315	75.281	75.2328	759	75.286	75.284	38.784
43.01	79.5458	687	79.546	79.5827	1097	79.554	79.550	43.050
49.27	85.8717	906	85.838	85.8735	923	85.838	85.838	49.338
54.91	91.4696	1009	91.463	91.4084	358	91.455	91.459	54.959
60.15	96.7990	1410	96.784	96.7208	603	96.779	96.782	60.282
65.50	102.0374	374	102.000	102.0405	405	102.000	102.000	65.500
71.22	107.8473	883	107.882	107.8790	1238	107.890	107.886	71.386
76.83	113.2955	1070	113.223	113.2631	751	113.224	113.224	76.724
82.74	119.2954	1341	119.277	119.2867	1241	119.275	119.276	82.776
87.34	123.8172	564	123.878	123.8595	1025	123.886	123.882	87.382
93.43	130.0944	1348	130.081	130.0675	1122	130.089	130.085	93.585
98.45	135.0564	692	135.026	135.0605	823	135.044	135.035	98.535
104.60	141.0526	870	141.069	141.0839	1218	141.076	141.072	104.572
109.56	146.1296	390	146.119	146.1824	929	146.121	146.120	109.620

TABLE no. 80

Testperson 2	TRACING POINT AND ENGINEER SCALE							Fifth series
2.5	First measurement (Obs. Mr. Henkel)			Second measurement (Obs. Mr. Dijkstra)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	36.4206	308	36.420	36.4737	850	36.423	36.422	0.000
5.89	42.4264	397	42.427	42.4949	1089	42.428	42.428	6.006
10.17	46.7892	892	46.700	46.7459	459	46.700	46.700	10.278
16.06	52.5997	1453	52.591	52.6100	100	52.600	52.596	16.174
21.78	58.2605	666	58.212	58.2138	182	58.209	58.210	21.788
27.92	64.3072	372	64.360	64.3418	720	64.360	64.360	27.938
31.38	67.9415	460	67.909	67.9091	122	67.906	67.908	31.486
38.69	75.1496	806	75.162	75.1398	734	75.167	75.164	38.742
43.01	79.4581	892	79.462	79.4340	677	79.467	79.464	43.042
49.27	85.7570	1013	85.789	85.7460	902	85.788	85.788	49.366
54.91	91.3100	436	91.367	91.3584	917	91.367	91.367	54.945
60.15	96.6917	1240	96.665	96.6014	296	96.656	96.660	60.238
65.50	102.0261	560	102.060	102.0696	1044	102.070	102.065	65.643
71.22	107.7489	932	107.789	107.7782	1220	107.788	107.788	71.366
76.83	113.3822	822	113.300	113.3372	372	113.300	113.300	76.878
82.74	119.2420	874	119.291	119.2667	1052	119.277	119.284	82.862
87.34	123.8342	649	123.861	123.8777	1098	123.864	123.862	87.440
93.43	130.0527	742	130.043	130.0769	984	130.043	130.043	93.621
98.45	135.0993	1030	135.007	135.0209	265	135.011	135.009	98.587
104.60	141.1832	919	141.117	141.1215	277	141.112	141.114	104.692
109.56	146.0818	901	146.017	146.0818	900	146.016	146.016	109.594

TABLE no. 81

Testperson 2	TRACING POINT AND ENGINEER SCALE				Recap. tables 77-81					
Series					Mean (mm)	v (mm/100)				
1	2	3	4	5		1	2	3	4	5
0.00	00	00	00	00	0.00					
5.81	89	91	99	6.01	5.92	+11	+ 3	+ 1	− 7	− 9
10.20	23	22	30	28	10.25	+ 5	+ 2	+ 3	− 5	− 3
16.12	11	19	07	17	16.13	+ 1	+ 2	− 6	+ 6	− 4
21.85	79	85	87	79	21.83	− 2	+ 4	− 2	− 4	+ 4
28.02	7.96	05	7.98	7.94	27.99	− 3	+ 3	− 6	+ 1	+ 5
31.53	52	52	51	49	31.51	− 2	− 1	− 1	0	+ 2
38.80	81	76	78	74	38.78	− 2	− 3	+ 2	0	+ 4
43.07	10	07	05	04	43.07	0	− 3	0	+ 2	+ 3
49.33	46	35	34	37	49.37	+ 4	− 9	+ 2	+ 3	0
54.95	5.01	93	96	94	54.96	+ 1	− 5	+ 3	0	+ 2
60.15	32	13	28	24	60.22	+ 7	−10	+ 9	− 6	− 2
65.59	56	60	50	64	65.58	− 1	+ 2	− 2	+ 8	− 6
71.34	28	33	39	37	71.34	0	+ 6	+ 1	− 5	− 3
76.84	79	82	72	88	76.81	− 3	+ 2	− 1	+ 9	− 7
82.72	76	78	78	86	82.78	+ 6	+ 2	0	0	− 8
87.42	45	39	38	44	87.42	0	− 3	+ 3	+ 4	− 2
93.48	49	53	58	62	93.54	+ 6	+ 5	+ 1	− 4	− 8
98.44	54	55	54	59	98.53	+ 9	− 1	− 2	− 1	− 6
104.50	59	55	57	69	104.58	+ 8	− 1	+ 3	+ 1	−11
109.51	59	56	62	59	109.57	+ 6	− 2	+ 1	− 5	− 2

$m^2 = \frac{[vv]}{80} = \frac{2043}{80} = 25.5 \frac{mm^2}{10^4}$; m = 0.051 mm

TABLE no. 82

Testperson 3	TRACING POINT AND ENGINEER SCALE							First series
3.1	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	36.8513	734	36.844	36.8716	923	36.841	36.842	0.000
5.89	42.7791	990	42.740	42.7156	302	42.729	42.734	5.892
10.17	46.9671	950	46.956	46.9382	705	46.965	46.960	10.118
16.06	52.9952	971	52.904	52.9880	921	52.908	52.906	16.064
21.78	58.7053	053	58.700	58.7206	206	58.700	58.700	21.858
27.92	64.9684	684	64.900	64.9567	567	64.900	64.900	28.058
31.38	68.3415	490	68.315	68.3640	717	68.315	68.315	31.473
38.69	75.5838	1051	75.543	75.5652	876	75.545	75.544	38.702
43.01	79.9640	660	79.904	79.9346	346	79.900	79.902	43.060
49.27	86.1532	932	86.180	86.1378	724	86.169	86.174	49.332
54.91	91.9948	948	91.900	91.9994	994	91.900	91.900	55.058
60.15	97.0184	184	97.000	97.0664	708	97.009	97.004	60.162
65.50	102.4028	140	102.422	102.4055	204	102.430	102.426	65.584
71.22	108.0639	888	108.050	108.0414	645	108.046	108.048	71.206
76.83	113.8382	536	113.831	113.8475	593	113.824	113.828	76.986
82.74	119.7091	421	119.766	119.7100	326	119.745	119.756	82.914
87.34	124.2599	599	124.200	124.2266	266	124.200	124.200	87.358
93.43	130.3659	659	130.300	130.3257	257	130.300	130.300	93.458
98.45	135.3816	1000	135.337	135.3347	517	135.334	135.336	98.494
104.60	141.4010	010	141.400	141.4596	596	141.400	141.400	104.558
109.56	146.4406	592	146.437	146.4180	432	146.450	146.444	109.602

TABLE no. 83

Testperson 3	TRACING POINT AND ENGINEER SCALE							Second series
3.2	First measurement (Obs. Mr. Henkel)			Second measurement (Obs. Mr. Dijkstra)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	36.9029	325	36.959	36.9412	675	36.953	36.956	0.000
5.89	42.8078	144	42.813	42.8390	435	42.809	42.811	5.855
10.17	47.0834	862	47.006	47.0229	318	47.018	47.012	10.056
16.06	53.0162	249	53.017	53.0800	999	53.040	53.028	16.072
21.78	58.7086	283	58.739	58.7588	638	58.710	58.724	21.768
27.92	64.9000	136	64.927	64.9670	715	64.909	64.918	27.962
31.38	68.3470	941	68.394	68.3456	912	68.391	68.392	31.436
38.69	75.5898	1186	75.558	75.5550	830	75.556	75.557	38.601
43.01	79.9459	570	79.922	79.9516	728	79.942	79.932	42.976
49.27	86.2149	368	86.244	86.2918	1065	86.229	86.236	49.280
54.91	91.9548	926	91.976	91.9585	852	91.953	91.964	55.008
60.15	97.1221	590	97.174	97.1936	1280	97.169	97.172	60.216
65.50	102.5373	753	102.576	102.5370	662	102.558	102.567	65.611
71.22	108.4490	490	108.400	108.4041	041	108.400	108.400	71.444
76.83	113.9516	516	113.900	113.9205	205	113.900	113.900	76.944
82.74	119.8548	831	119.857	119.8068	350	119.856	119.856	82.900
87.34	124.4465	657	124.438	124.4727	980	124.451	124.444	87.488
93.43	130.4497	816	130.464	130.4720	971	130.450	130.457	93.501
98.45	135.4701	988	135.457	135.4889	1165	135.455	135.456	98.500
104.60	141.6328	590	141.652	141.6215	499	141.657	141.654	104.698
109.56	146.5959	959	146.500	146.5978	978	146.500	146.500	109.544

TABLE no. 84

Testperson 3	TRACING POINT AND ENGINEER SCALE						Third series	
3.3	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	37.0559	855	37.059	37.0851	1051	37.040	37.050	0.000
5.89	43.0637	895	43.052	43.0884	1126	43.048	43.050	6.000
10.17	47.2649	887	47.248	47.2686	974	47.258	47.253	10.203
16.06	53.2610	1070	53.292	53.3219	219	53.300	53.296	16.246
21.78	58.8132	497	58.873	58.8207	640	58.887	58.880	21.830
27.92	64.9878	998	64.924	64.9085	252	64.933	64.928	27.878
31.38	68.5604	768	68.533	68.5561	661	68.520	68.526	31.476
38.69	75.9083	083	75.900	75.9325	325	75.900	75.900	38.850
43.01	80.0898	1263	80.073	80.0848	1338	80.098	80.086	43.036
49.27	86.3088	140	86.310	86.3442	531	86.318	86.314	49.264
54.91	92.0186	186	92.000	92.0513	513	92.000	92.000	54.950
60.15	97.2837	970	97.227	97.2437	622	97.237	97.232	60.182
65.50	102.5392	818	102.585	102.5858	1272	102.583	102.584	65.534
71.22	108.3605	878	108.355	108.3368	632	108.353	108.354	71.304
76.83	113.9586	683	113.919	113.9939	1086	113.929	113.924	76.874
82.74	119.8646	774	119.826	119.8810	976	119.833	119.830	82.780
87.34	124.3650	1045	124.379	124.4230	230	124.400	124.390	87.340
93.43	130.4717	1030	130.463	130.4412	818	130.481	130.472	93.422
98.45	135.5956	956	135.500	135.5191	191	135.500	135.500	98.450
104.60	141.6979	979	141.600	141.5612	1066	141.591	141.596	104.546
109.56	146.6213	591	146.676	146.6203	584	146.676	146.676	109.626

TABLE no. 85

Testperson 3	TRACING POINT AND ENGINEER SCALE						Fourth series	
3.4	First measurement (Obs. Mr. Henkel)			Second measurement (Obs. Mr. Dijkstra)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	37.0313	438	37.025	37.0330	666	37.067	37.046	0.000
5.89	42.9572	936	42.973	42.9787	986	42.940	42.956	5.910
10.17	47.0690	1040	47.070	47.0622	900	47.056	47.063	10.017
16.06	53.0282	472	53.038	53.0671	893	53.044	53.041	15.995
21.78	58.9338	376	58.908	58.9278	278	58.900	58.904	21.858
27.92	65.0835	1182	65.069	65.0336	669	65.067	65.068	28.022
31.38	68.4012	210	68.440	68.4148	288	68.428	68.434	31.388
38.69	75.7670	849	75.736	75.7380	490	75.722	75.729	38.683
43.01	80.1105	282	80.135	80.1414	485	80.114	80.124	43.078
49.27	86.3618	913	86.359	86.3070	418	86.370	86.364	49.318
54.91	91.9749	1127	91.976	91.9470	944	91.995	91.986	54.940
60.15	97.1649	1013	97.173	97.1038	370	97.166	97.170	60.124
65.50	102.5923	1115	102.538	102.5799	971	102.534	102.536	65.490
71.22	108.2722	1119	108.279	108.2216	592	108.275	108.277	71.231
76.83	113.9761	1042	113.956	113.9944	1173	113.946	113.951	76.905
82.74	119.7243	677	119.787	119.7969	1321	119.770	119.778	82.732
87.34	124.2197	546	124.270	124.2071	469	124.280	124.275	87.229
93.43	130.5228	411	130.537	130.5120	209	130.518	130.528	93.482
98.45	135.5830	1151	135.564	135.5866	1200	135.567	135.566	98.520
104.60	141.6807	1136	141.666	141.6068	328	141.652	141.659	104.613
109.56	146.6057	497	146.688	146.6050	481	146.686	146.687	109.641

TABLE. no. 86

Testperson 3	TRACING POINT AND ENGINEER SCALE							Fifth series
3.5	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	37.4069	264	37.439	37.4552	808	37.451	37.445	0.000
5.89	43.3704	888	43.337	43.3907	1116	43.342	43.340	5.895
10.17	47.5684	1183	47.600	47.6894	894	47.600	47.600	10.155
16.06	53.5242	242	53.500	53.5588	588	53.500	53.500	16.055
21.78	59.2450	838	59.278	59.2623	1017	59.279	59.278	21.833
27.92	65.4700	830	65.426	65.4300	481	65.436	65.431	27.986
31.38	68.8714	830	68.823	68.8693	826	68.827	68.825	31.380
38.69	76.1122	122	76.100	76.1355	516	76.132	76.116	38.671
43.01	80.5856	979	80.525	80.5631	710	80.516	80.520	43.075
49.27	86.7790	1123	86.767	86.7089	449	86.772	86.770	49.325
54.91	92.4955	1290	92.467	92.4779	814	92.407	92.437	54.992
60.15	97.6903	1362	97.692	97.7326	326	97.700	97.696	60.251
65.50	103.0965	1252	103.057	103.0072	231	103.032	103.044	65.599
71.22	108.6230	722	108.698	108.7688	688	108.700	108.699	71.254
76.83	114.2289	430	114.228	114.2392	492	114.220	114.224	76.779
82.74	120.1996	1319	120.165	120.1891	1356	120.193	120.179	82.734
87.34	124.7613	1036	124.785	124.7110	521	124.782	124.784	87.339
93.43	130.9013	199	130.937	130.9642	849	130.941	130.939	93.494
98.45	135.9016	236	135.944	135.9431	674	135.949	135.946	98.501
104.60	142.0952	1405	142.091	142.0431	834	142.081	142.086	104.641
109.56	147.0150	436	147.057	147.0961	1218	147.051	147.054	109.609

TABLE no. 87

Testperson 3	TRACING POINT AND ENGINEER SCALE					Recap. tables 83-87				
Series					Mean (mm)	v (mm/100)				
1	2	3	4	5		1	2	3	4	5
0.00	00	00	00	00	0.00					
5.89	86	6.00	91	90	5.91	+ 2	+ 5	− 9	0	+ 1
10.12	06	20	02	16	10.11	− 1	+ 5	− 9	+ 9	− 5
16.06	07	25	00	06	16.09	+ 3	+ 2	−16	+ 9	+ 3
21.86	77	83	86	83	21.83	− 3	+ 6	0	− 3	0
28.06	7.96	7.88	02	7.99	27.98	− 8	+ 2	+10	− 4	− 1
31.47	44	48	39	38	31.43	− 4	− 1	− 5	+ 4	+ 5
38.70	60	85	68	67	38.70	0	+10	−15	+ 2	+ 3
43.06	2.98	04	08	08	43.05	− 1	+ 7	+ 1	− 3	− 3
49.33	28	26	32	32	49.30	− 3	+ 2	+ 4	− 2	− 2
55.06	01	4.95	4.94	4.99	54.99	− 7	− 2	+ 4	+ 5	0
60.16	22	18	12	25	60.19	+ 3	− 3	+ 1	+ 7	− 6
65.58	61	53	49	60	65.56	− 2	− 5	+ 3	+ 7	− 4
71.21	44	30	23	25	71.29	+ 8	−15	− 1	+ 6	+ 4
76.99	94	87	90	78	76.90	− 9	− 4	+ 3	0	+12
82.91	90	78	73	73	82.81	−10	− 9	+ 3	+ 8	+ 8
87.36	49	34	23	34	87.35	− 1	−14	+ 1	+12	+ 1
93.46	50	42	48	49	93.47	+ 1	− 3	+ 5	− 1	− 2
98.49	50	45	52	50	98.49	0	− 1	+ 4	− 3	− 1
104.56	70	55	61	64	104.61	+ 5	− 9	+ 6	0	− 3
109.60	54	63	64	61	109.60	0	+ 6	− 3	− 4	− 1

$m^2 = \frac{[v\,v]}{80} = \frac{3283}{80} = 41.0\ \frac{mm^2}{10^4}$; m = 0.064 mm

TABLE no. 88

Testperson 4	TRACING POINT AND ENGINEER SCALE							First series
4.1	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	28.8858	1077	28.844	28.8862	1143	28.856	28.850	0.000
5.89	34.7580	800	34.744	34.7039	239	34.740	34.742	5.892
10.17	39.1538	538	39.100	39.0032	498	39.093	39.096	10.246
16.06	45.0386	405	45.004	44.9090	540	44.990	44.997	16.147
21.78	50.6261	538	50.655	50.6048	330	50.656	50.656	21.806
27.92	56.7490	880	56.778	56.7693	1031	56.768	56.773	27.923
31.38	60.2451	632	60.236	60.2242	390	60.230	60.233	31.383
38.69	67.5723	1039	67.563	67.5872	1259	67.577	67.570	38.720
43.01	71.8859	1270	71.882	71.8392	837	71.889	71.886	43.036
49.27	78.2930	969	78.208	78.2706	706	78.200	78.204	49.354
54.91	83.8639	979	83.868	83.8689	1108	83.884	83.876	55.026
60.15	89.0392	810	89.084	89.0730	1182	89.090	89.087	60.237
65.50	94.4270	380	94.422	94.4094	248	94.431	94.426	65.576
71.22	100.1061	350	100.158	100.1570	898	100.166	100.162	71.312
76.83	105.7327	634	105.761	105.7418	790	105.774	105.768	76.918
82.74	111.5005	494	111.598	111.6535	555	111.604	111.601	82.751
87.34	116.2777	848	116.214	116.2252	351	116.220	116.217	87.367
93.43	122.2720	1132	122.282	122.3693	693	122.300	122.291	93.441
98.45	127.3181	370	127.338	127.3924	1137	127.343	127.340	98.490
104.60	133.5993	1193	133.540	133.5648	848	133.540	133.540	104.690
109.56	138.4103	311	138.442	138.4083	311	138.446	138.444	109.594

TABLE no. 89

Testperson 4	TRACING POINT AND ENGINEER SCALE							Second series
4.2	First measurement (Obs. Mr. Henkel)			Second measurement (Obs. Mr. Dijkstra)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	17.0476	553	17.015	17.0263	291	17.006	17.010	0.000
5.89	22.9525	538	22.903	22.9150	150	22.900	22.902	5.892
10.17	27.1002	266	27.153	27.1902	1143	27.148	27.150	10.140
16.06	33.0471	769	33.060	33.0121	389	33.054	33.057	16.047
21.78	38.7660	1013	38.771	38.7617	948	38.766	38.768	21.758
27.92	44.9408	582	44.935	44.9972	983	44.902	44.918	27.908
31.38	48.3840	1178	48.368	48.3238	551	48.363	48.366	31.356
38.69	55.6110	356	55.649	55.6600	716	55.623	55.636	38.626
43.01	59.9740	1046	59.961	59.9820	1110	59.958	59.960	42.950
49.27	66.3229	412	66.337	66.3980	1020	66.308	66.322	49.312
54.91	71.9682	1140	71.992	72.0281	281	72.000	71.996	54.986
60.15	77.2946	989	77.209	77.2200	263	77.213	77.211	60.201
65.50	82.5884	1210	82.565	82.5713	1013	82.560	82.562	65.552
71.22	88.2850	1290	88.288	88.2200	664	88.293	88.290	71.280
76.83	93.9111	136	93.905	93.9133	133	93.900	93.902	76.892
82.74	99.7972	1412	99.788	99.7786	1201	99.783	99.786	82.776
87.34	104.4440	548	104.422	104.4128	187	104.412	104.417	87.407
93.43	110.4538	917	110.476	110.4840	1120	110.456	110.466	93.456
98.45	115.5080	182	115.520	115.5496	577	115.516	115.518	98.508
104.60	121.6422	858	121.687	121.6727	1134	121.681	121.684	104.674
109.56	126.5768	1142	126.575	126.5333	659	126.565	126.570	109.560

TABLE no. 90

Testperson 4	TRACING POINT AND ENGINEER SCALE							Third series
4.3	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	17.6954	1402	17.690	17.6985	1471	17.697	17.694	0.000
5.89	23.6327	452	23.625	23.6893	1018	23.625	23.625	5.931
10.17	27.8440	835	27.879	27.8874	1281	27.881	27.880	10.186
16.06	33.8297	334	33.807	33.8915	958	33.809	33.808	16.114
21.78	39.5099	099	39.500	39.5182	182	39.500	39.500	21.806
27.92	45.6359	454	45.619	45.6900	1028	45.626	45.622	27.928
31.38	49.1216	350	49.127	49.1886	1104	49.144	49.136	31.442
38.69	56.3750	1148	56.380	56.3100	511	56.382	56.381	38.687
43.01	60.7227	629	60.780	60.7363	821	60.792	60.786	43.092
49.27	67.0933	1214	67.056	67.0360	635	67.055	67.056	49.362
54.91	72.7119	119	72.700	72.6476	941	72.693	72.696	55.002
60.15	77.9845	929	77.917	77.9218	342	77.925	77.921	60.227
65.50	83.2878	1084	83.241	83.2378	546	83.234	83.238	65.544
71.22	89.0908	950	89.008	89.0463	548	89.017	89.012	71.318
76.83	94.5325	740	94.583	94.5232	580	94.570	94.576	76.882
82.74	100.5158	158	100.500	100.4003	415	100.482	100.491	82.797
87.34	105.0961	1372	105.082	105.0910	1345	105.087	105.084	87.390
93.43	111.1530	721	111.138	111.1185	413	111.146	111.142	93.448
98.45	116.1149	356	116.141	116.1166	343	116.135	116.138	98.444
104.60	122.3357	557	122.340	122.3068	268	122.340	122.340	104.646
109.56	127.2512	709	127.239	127.2530	780	127.250	127.244	109.550

TABLE no. 91

Testperson 4	TRACING POINT AND ENGINEER SCALE							Fourth series
4.4	First measurement (Obs. Mr. Henkel)			Second measurement (Obs. Mr. Dijkstra)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	17.6419	680	17.652	17.6448	742	17.659	17.656	0.000
5.89	23.5938	1206	23.554	23.5970	1248	23.556	23.555	5.899
10.17	27.8986	1370	27.877	27.8050	423	27.875	27.876	10.220
16.06	33.7848	1306	33.792	33.7951	1432	33.796	33.794	16.138
21.78	39.4158	495	39.467	39.4054	392	39.468	39.468	21.812
27.92	45.5940	1108	45.534	45.5239	400	45.532	45.533	27.877
31.38	49.1828	933	49.121	49.1363	442	49.116	49.118	31.462
38.69	56.3251	463	56.342	56.3845	1070	56.345	56.344	38.688
43.01	60.6610	1053	60.689	60.6650	1102	60.690	60.690	43.034
49.27	66.9716	1032	66.963	66.9538	863	66.965	66.964	49.308
54.91	72.6615	806	72.638	72.6722	868	72.629	72.634	54.978
60.15	77.8244	632	77.878	77.8082	439	77.871	77.874	60.218
65.50	83.2214	403	83.238	83.2740	874	83.227	83.232	65.576
71.22	88.9488	915	88.985	88.9213	600	88.977	88.981	71.325
76.83	94.5507	746	94.548	94.5447	670	94.545	94.546	76.890
82.74	100.4359	489	100.426	100.4607	683	100.415	100.420	82.764
87.34	105.0330	479	105.030	105.0356	504	105.030	105.030	87.374
93.43	111.1512	709	111.139	111.1230	398	111.134	111.136	93.480
98.45	116.1208	565	116.171	116.1005	350	116.169	116.170	98.514
104.60	122.2398	872	122.295	122.2017	471	122.291	122.293	104.637
109.56	127.2685	960	127.255	127.2920	1169	127.250	127.252	109.596

TABLE no. 92

Testperson 4	TRACING POINT AND ENGINEER SCALE							Fifth series
4.5	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	17.9649	790	17.928	17.9370	563	17.939	17.934	0.000
5.89	23.8758	870	23.822	23.8492	626	23.827	23.824	5.890
10.17	28.1747	1019	28.154	28.1363	635	28.154	28.154	10.220
16.06	34.0577	907	34.066	34.0784	1110	34.065	34.066	16.132
21.78	39.7739	739	39.700	39.7132	132	39.700	39.700	21.766
27.92	45.8799	928	45.826	45.8768	893	45.825	45.826	27.892
31.38	49.3950	983	49.307	49.3518	518	49.300	49.304	31.370
38.69	56.6060	160	56.620	56.6947	1008	56.612	56.616	38.682
43.01	60.9861	1223	60.972	60.9648	1072	60.985	60.978	43.044
49.27	67.2250	600	67.270	67.2664	1060	67.279	67.274	49.340
54.91	72.9962	962	72.900	72.9772	791	72.904	72.902	54.968
60.15	78.1679	995	78.163	78.1820	1205	78.177	78.170	60.236
65.50	83.5090	260	83.534	83.5873	1113	83.548	83.541	65.607
71.22	89.2349	603	89.251	89.2000	268	89.254	89.252	71.318
76.83	94.8270	323	94.811	94.8387	446	94.812	94.812	76.878
82.74	100.7592	646	100.711	100.7768	858	100.718	100.714	82.780
87.34	105.3510	709	105.340	105.3862	1043	105.336	105.338	87.404
93.43	111.4569	768	111.440	111.4028	225	111.439	111.440	93.506
98.45	116.3460	902	116.388	116.4329	329	116.400	116.394	98.460
104.60	122.5582	1113	122.606	122.5340	898	122.612	122.609	104.675
109.56	127.5199	356	127.531	127.5222	423	127.540	127.536	109.602

TABLE no. 93

Testperson 4	TRACING POINT AND ENGINEER SCALE					Recap. tables 89-93				
Series					Mean (mm)	v (mm/100)				
1	2	3	4	5		1	2	3	4	5
0.00	00	00	00	00	0.00					
5.89	89	93	90	89	5.90	+ 1	+ 1	− 3	0	+ 1
10.25	14	19	22	22	10.20	− 5	+ 6	+ 1	− 2	− 2
16.15	05	11	14	13	16.12	− 3	+ 7	+ 1	− 2	− 1
21.81	76	81	81	77	21.79	− 2	+ 3	− 2	− 2	+ 2
27.92	91	93	88	89	27.91	− 1	0	− 2	+ 3	+ 2
31.38	36	44	46	37	31.40	+ 2	+ 4	− 4	− 6	+ 3
38.72	63	69	69	68	38.68	− 4	+ 5	− 1	− 1	0
43.04	2.95	09	03	04	43.03	− 1	+ 8	− 6	0	− 1
49.35	31	36	31	34	49.33	− 2	+ 2	− 3	+ 2	− 1
55.03	4.99	00	4.98	4.97	54.99	− 4	0	− 1	+ 1	+ 2
60.24	20	23	22	24	60.23	− 1	+ 3	0	+ 1	− 1
65.58	55	54	58	61	65.57	− 1	+ 2	+ 3	− 1	− 4
71.31	28	32	32	32	71.31	0	+ 3	− 1	− 1	− 1
76.92	89	88	89	88	76.89	− 3	0	+ 1	0	+ 1
82.75	78	80	76	78	82.77	+ 2	− 1	− 3	+ 1	− 1
87.37	41	39	37	40	87.39	+ 2	− 2	0	+ 2	− 1
93.44	46	45	48	51	93.47	+ 3	+ 1	+ 2	− 1	− 4
98.49	51	44	51	46	98.48	− 1	− 3	+ 4	− 3	+ 2
104.69	67	65	64	68	104.67	− 2	0	+ 2	+ 3	− 1
109.59	56	55	60	60	109.58	− 1	+ 2	+ 3	− 2	− 2

$m^2 = \frac{[vv]}{80} = \frac{664}{80} = 8.3 \frac{mm^2}{10^4}$; m = 0.029 mm

TABLE no. 94

Testperson 5	TRACING POINT AND ENGINEER SCALE							First series
5.1	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	22.5627	795	22.534	22.5564	764	22.540	22.537	0.000
5.89	28.4379	674	28.459	28.4665	1000	28.467	28.463	5.926
10.17	32.8772	772	32.800	32.8110	189	32.816	32.808	10.271
16.06	38.6659	920	38.652	38.6823	1127	38.661	38.656	16.119
21.78	44.3289	550	44.352	44.3810	1151	44.368	44.360	21.823
27.92	50.4147	160	50.403	50.4623	765	50.428	50.416	27.879
31.38	54.1902	979	54.115	54.0425	892	54.093	54.104	31.567
38.69	61.3969	1140	61.334	61.3546	738	61.338	61.336	38.799
43.01	65.5650	982	65.566	65.5590	939	65.570	65.568	43.031
49.27	71.9810	918	71.922	71.9196	334	71.928	71.925	49.388
54.91	77.4233	305	77.414	77.4170	218	77.410	77.412	54.875
60.15	82.7570	838	82.754	82.7972	1234	82.752	82.753	60.216
65.50	88.0527	865	88.068	88.0900	1336	88.087	88.078	65.541
71.22	93.8694	780	93.817	93.8072	169	93.819	93.818	71.281
76.83	99.4754	994	99.448	99.4080	295	99.443	99.446	76.909
82.74	105.3518	1020	105.400	105.4418	418	105.400	105.400	82.863
87.34	109.9889	969	109.916	109.9346	428	109.916	109.916	87.379
93.43	116.0960	960	116.000	116.0875	900	116.005	116.002	93.465
98.45	121.1305	432	121.125	121.1343	537	121.139	121.132	98.595
104.60	127.3720	720	127.300	127.3418	418	127.300	127.300	104.763
109.56	132.1413	634	132.144	132.1402	622	132.144	132.144	109.607

TABLE no. 95

Testperson 5	TRACING POINT AND ENGINEER SCALE							Second series
5.2	First measurement (Obs. Mr. Henkel)			Second measurement (Obs. Mr. Dijkstra)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	22.2872	980	22.222	22.2794	934	22.228	22.225	0.000
5.89	28.1853	853	28.100	28.1742	742	28.100	28.100	5.875
10.17	32.4212	401	32.438	32.4736	912	32.435	32.436	10.211
16.06	38.3650	836	38.337	38.3630	790	38.332	38.334	16.109
21.78	44.0598	837	44.048	44.0630	909	44.056	44.052	21.827
27.92	50.1601	1031	50.186	50.1653	974	50.164	50.175	27.950
31.38	53.7573	1040	53.793	53.7717	1164	53.789	53.791	31.566
38.69	60.8148	491	60.869	60.8400	764	60.873	60.871	38.646
43.01	65.2184	668	65.297	65.2100	563	65.293	65.295	43.070
49.27	71.6142	372	71.646	71.6069	267	71.640	71.643	49.418
54.91	77.1785	982	77.139	77.1709	850	77.128	77.134	54.909
60.15	82.5731	731	82.500	82.5261	261	82.500	82.500	60.275
65.50	87.8928	928	87.800	87.8030	061	87.806	87.803	65.578
71.22	93.5711	929	93.544	93.5512	698	93.537	93.540	71.315
76.83	99.0917	1110	99.039	99.0671	840	99.034	99.036	76.811
82.74	105.0560	612	105.010	105.0273	354	105.016	105.013	82.788
87.34	109.5570	840	109.554	109.5720	1036	109.563	109.558	87.333
93.43	115.8780	821	115.808	115.8591	591	115.800	115.804	93.579
98.45	120.7922	922	120.700	120.7909	909	120.700	120.700	98.475
104.60	126.8170	576	126.881	126.8730	1100	126.874	126.878	104.653
109.56	131.9136	442	131.961	131.9870	1116	131.949	131.955	109.730

TABLE no. 96

Testperson 5	TRACING POINT AND ENGINEER SCALE						Third series	
5.3	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	22.6150	464	22.663	22.6928	1260	22.666	22.664	0.000
5.89	28.4068	332	28.453	28.4362	622	28.452	28.452	5.788
10.17	32.8820	886	32.813	32.8220	264	32.809	32.811	10.147
16.06	38.7397	659	38.752	38.7853	1168	38.763	38.758	16.094
21.78	44.4891	1075	44.437	44.4809	1008	44.440	44.438	21.774
27.92	50.5680	1155	50.595	50.5398	872	50.595	50.595	27.931
31.38	54.0885	1232	54.069	54.0580	968	54.078	54.074	31.410
38.69	61.3929	1227	61.360	61.3604	949	61.369	61.364	38.700
43.01	65.7942	942	65.700	65.7970	970	65.700	65.700	43.036
49.27	72.0849	1037	72.038	72.0884	1016	72.026	72.032	49.368
54.91	77.5400	562	77.532	77.5000	182	77.536	77.534	54.870
60.15	82.8263	410	82.829	82.8037	231	82.839	82.834	60.170
65.50	88.2926	1213	88.257	88.2189	449	88.252	88.254	65.590
71.22	93.9238	260	93.904	93.9168	168	93.900	93.902	71.238
76.83	99.4031	196	99.433	99.4040	176	99.427	99.430	76.766
82.74	105.3291	724	105.387	105.3418	828	105.382	105.384	82.720
87.34	110.0563	894	110.066	110.0891	1171	110.056	110.061	87.397
93.43	116.1987	1317	116.166	116.1222	560	116.168	116.167	93.503
98.45	121.1339	698	121.172	121.1668	998	121.166	121.169	98.505
104.60	127.3244	573	127.366	127.3620	1073	127.391	127.378	104.714
109.56	132.3896	1150	132.351	132.3878	1135	132.351	132.351	109.687

TABLE no. 97

Testperson 5	TRACING POINT AND ENGINEER SCALE						Fourth series	
5.4	First measurement (Obs. Mr. Henkel)			Second measurement (Obs. Mr. Dijkstra)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	22.7338	750	22.782	22.7420	860	22.788	22.785	0.000
5.89	28.5398	398	28.500	28.5660	660	28.500	28.500	5.715
10.17	32.9654	751	32.919	32.9481	580	32.920	32.920	10.135
16.06	38.8442	674	38.846	38.8916	1190	38.855	38.850	16.065
21.78	44.5496	496	44.500	44.5860	860	44.500	44.500	21.715
27.92	50.5128	532	50.581	50.5162	510	50.570	50.576	27.791
31.38	54.1421	687	54.153	54.1632	870	54.148	54.150	31.365
38.69	61.5980	1026	61.509	61.5610	610	61.500	61.504	38.719
43.01	65.6444	833	65.678	65.6820	1200	65.676	65.677	42.892
49.27	72.0081	348	72.053	72.0281	578	72.059	72.056	49.271
54.91	77.6667	748	77.616	77.6382	382	77.600	77.608	54.823
60.15	82.8316	648	82.866	82.8338	627	82.858	82.862	60.077
65.50	88.2717	1203	88.297	88.3845	905	88.312	88.304	65.519
71.22	94.0882	1284	94.080	94.0370	732	94.072	94.076	71.291
76.83	99.5650	720	99.514	99.5721	760	99.508	99.511	76.726
82.74	105.5120	120	105.500	105.5225	225	105.500	105.500	82.715
87.34	110.2141	141	110.200	110.1564	813	110.150	110.175	87.390
93.43	116.2470	608	116.228	116.2404	466	116.212	116.220	93.435
98.45	121.3634	760	121.325	121.3240	384	121.329	121.327	98.542
104.60	127.3519	847	127.366	127.3665	981	127.363	127.364	104.579
109.56	132.3843	906	132.313	132.3844	844	132.300	132.306	109.521

TABLE no. 98

Testperson 5	TRACING POINT AND ENGINEER SCALE							Fifth series
5.5	First measurement (Obs. Mr. Dijkstra)			Second measurement (Obs. Mr. Henkel)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	22.5095	463	22.574	22.5758	1137	22.576	22.575	0.000
5.89	28.4751	1079	28.466	28.4910	1280	28.474	28.470	5.895
10.17	32.7283	738	32.791	32.7358	755	32.779	32.785	10.210
16.06	38.7135	479	38.769	38.7300	589	38.758	38.764	16.189
21.78	44.4819	862	44.409	44.4115	190	44.415	44.412	21.837
27.92	50.5580	830	50.550	50.5400	586	50.537	50.544	27.969
31.38	54.1826	1124	54.160	54.1720	954	54.147	54.154	31.579
38.69	61.2680	814	61.227	61.2337	466	61.226	61.226	38.651
43.01	65.5489	901	65.582	65.5807	1276	65.594	65.588	43.013
49.27	72.0755	975	72.044	72.0688	850	72.032	72.038	49.463
54.91	77.5014	014	77.500	77.4866	1290	77.485	77.492	54.917
60.15	82.8745	982	82.847	82.8572	837	82.853	82.850	60.275
65.50	88.2796	812	88.203	88.2532	602	88.214	88.208	65.633
71.22	93.9692	832	93.928	93.9910	999	93.918	93.923	71.348
76.83	99.4307	518	99.442	99.4573	694	99.424	99.433	76.858
82.74	105.3079	510	105.386	105.3370	745	105.375	105.380	82.805
87.34	110.0026	343	110.063	110.0284	616	110.066	110.064	87.489
93.43	116.0750	1186	116.087	116.0035	487	116.090	116.088	93.513
98.45	121.1393	524	121.126	121.1421	554	121.127	121.126	98.551
104.60	127.2080	274	127.239	127.2486	744	127.252	127.246	104.671
109.56	132.1994	1480	132.197	132.1505	962	132.191	132.194	109.619

TABLE no. 99

Testperson 5	TRACING POINT AND ENGINEER SCALE				Recap. tables 95-99					
Series					Mean (mm)	v (mm/100)				
1	2	3	4	5		1	2	3	4	5
0.00	00	00	00	00	0.00					
5.93	88	79	72	90	5.84	− 9	− 4	+ 5	+12	− 6
10.27	21	15	14	21	10.20	− 7	− 1	+ 5	+ 6	− 1
16.12	11	09	06	19	16.11	− 1	0	+ 2	+ 5	− 8
21.82	83	77	72	84	21.80	− 2	− 3	+ 3	+ 8	− 4
27.88	95	93	79	97	27.90	+ 2	− 5	− 3	+11	− 7
31.57	57	41	36	58	31.50	− 7	− 7	+ 9	+14	− 8
38.80	65	70	72	65	38.70	−10	+ 5	0	− 2	+ 5
43.03	07	04	2.89	01	43.01	− 2	− 6	− 3	+12	0
49.39	42	37	27	46	49.38	− 1	− 4	+ 1	+11	− 8
54.88	91	87	82	92	54.88	0	− 3	+ 1	+ 6	− 4
60.22	28	17	08	28	60.21	− 1	− 7	+ 4	+13	− 7
65.54	58	59	52	63	65.57	+ 3	− 1	− 2	+ 5	− 6
71.28	32	24	29	35	71.30	+ 2	− 2	+ 6	+ 1	− 5
76.91	81	77	73	86	76.82	− 9	+ 1	+ 5	+ 9	− 4
82.86	79	72	72	80	82.78	− 8	− 1	+ 6	+ 6	− 2
87.38	33	40	39	49	87.40	+ 2	+ 7	0	+ 1	− 9
93.46	58	50	44	51	93.50	+ 4	− 8	0	+ 6	− 1
98.60	48	50	54	55	98.53	− 7	+ 5	+ 3	− 1	− 2
104.76	65	71	58	67	104.67	− 9	+ 2	− 4	+ 9	0
109.61	73	69	52	62	109.63	+ 2	−10	− 6	+11	+ 1

$m^2 = \frac{[vv]}{80} = \frac{3427}{80} = 42.8 \frac{mm^2}{10^4}$; m = 0.065 mm

TABLE no. 100

Given distances (mm)	PLOTTED WITH DIVIDER AND PLOTTING SCALE										PLOTTED WITH TRACING POINT AND ENGINEER SCALE									
	Plotted by testperson					Given minus plotted distance (mm/100)					Plotted by testperson					Given minus plotted distance (mm/100)				
	1	2	3	4	5	v_1	v_2	v_3	v_4	v_5	1	2	3	4	5	v_1	v_2	v_3	v_4	v_5
5.89	5.88	5.88	5.85	5.94	5.90	+ 1	+ 1	+ 4	- 5	- 1	5.85	5.92	5.91	5.90	5.84	+ 4	- 3	- 2	- 1	+ 5
10.17	10.22	10.14	10.22	10.20	10.16	- 5	+ 3	- 5	- 3	+ 1	10.23	10.25	10.11	10.20	10.20	- 6	- 8	+ 6	- 3	- 3
16.06	16.09	—	16.08	16.15	16.07	- 3	—	- 2	- 9	- 1	16.08	16.13	16.09	16.12	16.11	- 2	- 7	- 3	- 6	- 5
21.78	21.78	21.79	21.79	21.83	21.80	0	- 1	- 1	- 5	- 2	21.77	21.83	21.83	21.79	21.80	+ 1	- 5	- 5	- 1	- 2
27.92	27.94	27.93	27.89	27.94	27.92	- 2	- 1	+ 3	- 2	0	27.87	27.99	27.98	27.91	27.90	+ 5	- 7	- 6	+ 1	+ 2
31.38	31.41	31.40	31.39	31.47	31.39	- 3	- 2	- 1	- 9	- 1	31.33	31.51	31.43	31.40	31.50	+ 5	-13	- 5	- 2	-12
38.69	38.71	38.68	38.68	38.72	38.70	- 2	+ 1	+ 1	- 3	- 1	38.65	38.78	38.70	38.68	38.70	+ 4	- 9	- 1	+ 1	- 1
43.01	43.06	43.00	43.05	43.11	43.04	- 5	+ 1	- 4	-10	- 3	43.02	43.07	43.05	43.03	43.01	- 1	- 6	- 4	- 2	0
49.27	49.31	49.26	49.26	49.34	49.30	- 4	+ 1	+ 1	- 7	- 3	49.26	49.37	49.30	49.33	49.38	+ 1	-10	- 3	- 6	-11
54.91	54.96	54.92	54.88	54.98	54.92	- 5	- 1	+ 3	- 7	- 1	54.88	54.96	54.99	54.99	54.88	+ 3	- 5	- 8	- 8	+ 3
60.15	60.23	60.15	60.21	60.29	60.17	- 8	0	- 6	-14	- 2	60.15	60.22	60.19	60.23	60.21	0	- 7	- 4	- 8	- 6
65.50	65.55	65.51	65.51	65.58	65.55	- 5	- 1	- 1	- 8	- 5	65.50	65.58	65.56	65.57	65.57	0	- 8	- 6	- 7	- 7
71.22	71.24	71.22	71.26	71.34	71.25	- 2	0	- 4	-12	- 3	71.22	71.34	71.29	71.31	71.30	0	-12	- 7	- 9	- 8
76.83	76.86	76.82	76.89	76.92	76.90	- 3	+ 1	- 6	- 9	- 7	76.75	76.81	76.90	76.89	76.82	+ 8	+ 2	- 7	- 6	+ 1
82.74	82.76	82.76	82.80	82.80	82.80	- 2	- 2	- 6	- 6	- 6	82.70	82.78	82.81	82.77	82.78	+ 4	- 4	- 7	- 3	- 4
87.34	87.38	87.36	87.41	87.41	87.38	- 4	- 2	- 7	- 7	- 4	87.30	87.42	87.35	87.39	87.40	+ 4	- 8	- 1	- 5	- 6
93.43	93.45	93.45	93.46	93.50	93.48	- 2	- 2	- 3	- 7	- 5	93.38	93.54	93.47	93.47	93.50	+ 5	-11	- 4	- 4	- 7
98.45	98.46	98.48	98.49	98.51	98.54	- 1	- 3	- 4	- 6	- 9	98.41	98.53	98.49	98.48	98.53	+ 4	- 8	- 4	- 3	- 8
104.60	104.61	104.61	104.58	104.69	104.68	- 1	- 1	+ 2	- 9	- 8	104.48	104.58	104.61	104.67	104.67	+12	+ 2	- 1	- 7	- 7
109.56	109.54	109.58	—	109.61	109.64	+ 2	- 2	—	- 5	- 8	109.44	109.57	109.60	109.58	109.63	+12	- 1	- 4	- 2	- 7
						-54	-10	-36	-143	-69						+63	-128	-76	-81	-83
Table	46	52	58	64	70						76	82	88	94	100					

TABLE no.101

Testperson 6	TRACING POINT AND PLEXIGLASS SCALE							First series
6.1	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	20.7983	1179	20.739	20.7866	1063	20.739	20.739	0.000
5.89	26.5323	734	26.582	26.5938	1346	26.582	26.582	5.843
10.17	30.9415	455	30.908	30.9437	470	30.907	30.908	10.169
16.06	36.7242	358	36.723	36.7201	306	36.721	36.722	15.983
21.78	42.4910	1340	42.486	42.4698	1137	42.488	42.487	21.748
27.92	48.5665	1041	48.575	48.5942	1312	48.574	48.574	27.835
31.38	52.1892	1158	52.153	52.1120	390	52.154	52.154	31.415
38.69	59.3566	951	59.377	59.3825	1262	59.387	59.382	38.643
43.01	63.6575	962	63.677	63.6007	395	63.678	63.678	42.939
49.27	70.0932	1263	70.066	70.0410	752	70.068	70.067	49.328
54.91	75.5895	1180	75.557	75.5142	446	75.561	75.559	54.820
60.15	80.8743	1084	80.868	80.8752	1108	80.871	80.870	60.131
65.50	86.1750	1070	86.164	86.1054	370	86.163	86.164	65.425
71.22	91.9122	410	91.958	91.9753	1038	91.957	91.958	71.219
76.83	97.4202	286	97.417	97.4855	932	97.415	97.416	76.677
82.74	103.4027	036	103.402	103.4263	280	103.403	103.402	82.663
87.34	108.0798	1240	108.088	108.0100	556	108.091	108.090	87.351
93.43	114.0327	756	114.086	114.0761	1196	114.087	114.086	93.347
98.45	119.2521	654	119.227	119.2142	286	119.229	119.228	98.489
104.60	125.2286	468	125.236	125.2590	773	125.237	125.236	104.497
109.56	130.3020	020	130.300	130.2980	1462	130.296	130.298	109.559

TABLE no. 102

Testperson 6	TRACING POINT AND PLEXIGLASS SCALE							Second series
6.2	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	20.5390	485	20.519	20.5569	670	20.520	20.520	0.000
5.89	26.4028	183	26.431	26.4670	822	26.430	26.430	5.910
10.17	30.8207	423	30.843	30.8038	245	30.841	30.842	10.322
16.06	36.6510	710	36.640	36.6765	965	36.640	36.640	16.120
21.78	42.3061	485	42.385	42.3830	1247	42.383	42.384	21.864
27.92	48.4892	1091	48.440	48.4326	520	48.439	48.440	27.920
31.38	52.0488	965	52.095	52.0182	640	52.092	52.094	31.574
38.69	59.2072	400	59.266	59.2880	1220	59.268	59.267	38.747
43.01	63.5830	1030	63.540	63.5679	880	63.540	63.540	43.020
49.27	69.9590	1022	69.986	69.9838	1270	69.986	69.986	49.466
54.91	75.3210	598	75.378	75.3758	1150	75.378	75.378	54.858
60.15	80.7562	1000	80.788	80.7355	788	80.787	80.788	60.268
65.50	86.0961	1268	86.061	86.0722	1035	86.063	86.062	65.542
71.22	91.8041	370	91.866	91.8621	949	91.866	91.866	71.346
76.83	97.3835	926	97.318	97.3010	100	97.318	97.318	76.798
82.74	103.2584	1090	103.301	103.2822	1326	103.301	103.301	82.781
87.34	107.9812	1084	107.954	107.9210	482	107.954	107.954	87.434
93.43	114.0040	221	114.036	114.0401	575	114.035	114.036	93.516
98.45	119.1848	892	119.109	119.1845	890	119.109	119.109	98.589
104.60	125.1858	1110	125.150	125.1830	1071	125.148	125.149	104.629
109.56	130.1735	880	130.129	130.1590	735	130.129	130.129	109.609

TABLE no. 103

Testperson 6	TRACING POINT AND PLEXIGLASS SCALE							Third series
6.3	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	21.1681	900	21.144	21.1010	220	21.142	21.143	0.000
5.89	27.0867	898	27.006	27.0732	770	27.008	27.007	5.864
10.17	31.3485	802	31.363	31.3440	760	31.364	31.364	10.221
16.06	37.2870	1171	37.260	37.2841	1128	37.257	37.258	16.115
21.78	42.9832	1250	42.984	42.9770	1194	42.985	42.984	21.841
27.92	48.9865	1072	48.941	48.9134	349	48.943	48.942	27.799
31.38	52.5583	846	52.553	52.5630	902	52.554	52.554	31.411
38.69	59.8405	583	59.836	59.8208	375	59.833	59.834	38.691
43.01	64.1121	308	64.137	64.1841	1025	64.137	64.137	42.994
49.27	70.4478	893	70.483	70.4628	1028	70.480	70.482	49.339
54.91	75.9693	1028	75.967	75.9710	1055	75.969	75.968	54.825
60.15	81.3110	336	81.345	81.3105	325	81.344	81.344	60.201
65.50	86.5385	1016	86.626	86.6855	974	86.624	86.625	65.482
71.22	92.3981	1400	92.384	92.3155	563	92.382	92.383	71.240
76.83	97.8862	1145	97.857	97.8650	940	97.858	97.858	76.715
82.74	103.7676	1087	103.782	103.7554	962	103.782	103.782	82.639
87.34	108.5618	831	108.543	108.5121	333	108.542	108.542	87.399
93.43	114.5767	934	114.533	114.5024	200	114.535	114.534	93.391
98.45	119.5455	875	119.584	119.5042	463	119.584	119.584	98.441
104.60	125.7220	302	125.716	125.7250	340	125.718	125.717	104.574
109.56	130.6267	620	130.671	130.6560	923	130.673	130.672	109.529

TABLE no. 104

Testperson 6	TRACING POINT AND PLEXIGLASS SCALE							Fourth series
6.4	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	21.4252	252	21.400	21.3970	1482	21.402	21.401	0.000
5.89	27.2887	1290	27.281	27.2868	1260	27.278	27.280	5.879
10.17	31.6128	508	31.676	31.6600	982	31.676	31.676	10.275
16.06	37.4291	760	37.494	37.4550	1004	37.491	37.492	16.091
21.78	43.2280	460	43.236	43.2060	234	43.235	43.236	21.835
27.92	49.3129	252	49.325	49.3464	578	49.323	49.324	27.923
31.38	52.9000	100	52.920	52.9945	1043	52.920	52.920	31.519
38.69	60.0850	1303	60.091	60.0629	1076	60.089	60.090	38.689
43.01	64.3348	860	64.402	64.3452	950	64.400	64.401	43.000
49.27	70.8725	814	70.818	70.8917	1020	70.821	70.820	49.419
54.91	76.2370	711	76.268	76.2811	1142	76.266	76.267	54.866
60.15	81.6718	766	81.610	81.6958	1005	81.609	81.610	60.209
65.50	86.9540	602	86.912	86.9900	954	86.911	86.912	65.511
71.22	92.6695	1124	92.686	92.6586	1010	92.685	92.686	71.285
76.83	98.1722	1178	98.191	98.1552	1012	98.192	98.192	76.791
82.74	104.0080	425	104.069	104.0170	520	104.070	104.070	82.669
87.34	108.8000	380	108.876	108.8438	803	108.873	108.874	87.473
93.43	114.8372	650	114.856	114.8056	345	114.858	114.857	93.456
98.45	119.8442	835	119.879	119.8248	645	119.879	119.879	98.478
104.60	126.0070	288	126.044	126.0028	257	126.046	126.045	104.644
109.56	131.0615	662	131.009	131.0955	1003	131.010	131.010	109.609

TABLE no. 105

Testperson 6	TRACING POINT AND PLEXIGLASS SCALE							Fifth series
6.5	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	17.8438	472	17.807	17.8978	1006	17.806	17.806	0.000
5.89	23.6257	500	23.649	23.6538	780	23.648	23.648	5.842
10.17	28.0916	1062	28.029	28.0650	800	28.030	28.030	10.224
16.06	33.8840	1100	33.852	33.8500	762	33.852	33.852	16.046
21.78	39.5460	895	39.587	39.5645	1092	39.589	39.588	21.782
27.92	45.6190	580	45.678	45.6800	1200	45.680	45.679	27.873
31.38	49.1985	1440	49.191	49.1650	1110	49.192	49.192	31.386
38.69	56.4419	862	56.489	56.4650	1079	56.486	56.488	38.682
43.01	60.7965	1410	60.789	60.7491	920	60.786	60.788	42.982
49.27	67.1022	490	67.194	67.1350	828	67.196	67.195	49.389
54.91	72.6350	580	72.646	72.6901	1131	72.646	72.646	54.840
60.15	78.0142	392	78.050	78.0840	1074	78.047	78.048	60.242
65.50	83.3925	1047	83.324	83.3880	1020	83.328	83.326	65.520
71.22	89.0112	448	89.067	89.0080	422	89.068	89.068	71.262
76.83	94.5800	1118	94.564	94.5565	885	94.564	94.564	76.758
82.74	100.5820	914	100.519	100.5762	844	100.516	100.518	82.712
87.34	105.2075	215	105.228	105.2957	1110	105.231	105.230	87.424
93.43	111.2697	1017	111.264	111.2970	1300	111.266	111.265	93.459
98.45	116.3812	1001	116.338	116.3355	545	116.338	116.338	98.532
104.60	122.4855	896	122.408	122.4108	151	122.409	122.408	104.602
109.56	127.3900	1340	127.388	127.3470	918	127.390	127.389	109.583

TABLE no. 106

Testperson 6	TRACING POINT AND PLEXIGLASS SCALE					Recap. tables 102-106				
Series					Mean (mm)	v (mm/100)				
1	2	3	4	5		1	2	3	4	5
0.00	00	00	00	00	0.00					
5.84	91	86	88	84	5.87	+ 3	− 4	+ 1	− 1	+ 3
10.17	32	22	28	22	10.24	+ 7	− 8	+ 2	− 4	+ 2
15.98	6.12	6.12	6.09	6.05	16.07	+ 9	− 5	− 5	− 2	+ 2
21.75	86	84	84	78	21.81	+ 6	− 5	− 3	− 3	+ 3
27.84	92	80	92	87	27.87	+ 3	− 5	+ 7	− 5	0
31.42	57	41	52	39	31.46	+ 4	−11	+ 5	− 6	+ 7
38.64	75	69	69	68	38.69	+ 5	− 6	0	0	+ 1
42.94	3.02	99	3.00	98	42.99	+ 5	− 3	0	− 1	+ 1
49.33	47	34	42	39	49.39	+ 6	− 8	+ 5	− 3	0
54.82	86	82	87	84	54.84	+ 2	− 2	+ 2	− 3	0
60.13	27	20	21	24	60.21	+ 8	− 6	+ 1	0	− 3
65.42	54	48	51	52	65.49	+ 7	− 5	+ 1	− 2	− 3
71.22	35	24	28	26	71.27	+ 5	− 8	+ 3	− 1	+ 1
76.68	80	72	79	76	76.75	+ 7	− 5	+ 3	− 4	− 1
82.66	78	64	67	71	82.69	+ 3	− 9	+ 5	+ 2	− 2
87.35	43	40	47	42	87.41	+ 6	− 2	+ 1	− 6	− 1
93.35	52	39	46	46	93.44	+ 9	− 8	+ 5	− 2	− 2
98.49	59	44	48	53	98.51	+ 2	− 8	+ 7	+ 3	− 2
104.50	63	57	64	60	104.59	+ 9	− 4	+ 2	− 5	− 1
109.56	61	53	61	58	109.58	+ 2	− 3	+ 5	− 3	0

$m^2 = \frac{[v\,v]}{80} = \frac{2089}{80} = 26.1\ \frac{mm^2}{10^4}$; m = 0.051 mm

TABLE no. 107

Testperson 7	TRACING POINT AND PLEXIGLASS SCALE							First series
7.1	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	22.3070	118	22.310	22.3938	983	22.309	22.310	0.000
5.89	28.1150	591	28.188	28.1890	1328	28.188	28.188	5.878
10.17	32.4406	740	32.467	32.4948	1260	32.462	32.464	10.154
16.06	38.3206	332	38.325	38.3048	180	38.326	38.326	16.016
21.78	44.0139	552	44.083	44.0648	1067	44.084	44.084	21.774
27.92	50.2131	187	50.211	50.2056	103	50.209	50.210	27.900
31.38	53.7241	294	53.711	53.7070	112	53.708	53.710	31.400
38.69	60.9465	490	60.905	60.9962	982	60.904	60.904	38.594
43.01	65.2440	785	65.269	65.2911	1249	65.268	65.268	42.958
49.27	71.7580	610	71.706	71.7110	138	71.706	71.706	49.396
54.91	77.1560	1018	77.192	77.1237	698	77.192	77.192	54.882
60.15	82.5018	230	82.542	82.5010	218	82.542	82.542	60.232
65.50	87.8563	1050	87.897	87.8730	1220	87.898	87.898	65.588
71.22	93.6880	1105	93.645	93.6650	879	93.646	93.646	71.336
76.83	99.1730	995	99.153	99.1385	650	99.153	99.153	76.843
82.74	105.0170	235	105.013	105.0445	500	105.011	105.012	82.702
87.34	109.7638	690	109.710	109.7240	295	109.711	109.710	87.400
93.43	115.7752	882	115.726	115.7125	270	115.729	115.728	93.418
98.45	120.7940	1374	120.787	120.7856	1298	120.788	120.788	98.478
104.60	126.8590	1008	126.884	126.8688	1110	126.884	126.884	104.574
109.56	131.8760	1228	131.894	131.8141	620	131.896	131.895	109.585

TABLE no. 108

Testperson 7	TRACING POINT AND PLEXIGLASS SCALE							Second series
7.2	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	21.7286	435	21.730	21.7482	626	21.729	21.730	0.000
5.89	27.5312	590	27.556	27.5885	1190	27.561	27.558	5.828
10.17	31.8630	1086	31.891	31.8623	1068	31.889	31.890	10.160
16.06	37.7785	1180	37.779	37.7782	1182	37.780	37.780	16.050
21.78	43.5851	918	43.513	43.5831	900	43.514	43.514	21.784
27.92	49.5538	941	49.581	49.5005	421	49.583	49.582	27.852
31.38	53.0382	760	53.076	53.0308	672	53.073	53.074	31.344
38.69	60.3066	402	60.367	60.3552	890	60.368	60.368	38.638
43.01	64.6275	864	64.718	64.6140	714	64.715	64.716	42.986
49.27	70.9052	452	70.980	70.9950	1342	70.978	70.979	49.249
54.91	76.6870	1030	76.632	76.6068	220	76.630	76.631	54.901
60.15	81.8442	815	81.875	81.8440	800	81.872	81.874	60.144
65.50	87.2555	760	87.241	87.2941	1132	87.238	87.240	65.510
71.22	92.9080	488	92.982	92.9586	995	92.982	92.982	71.252
76.83	98.4488	790	98.460	98.4944	1258	98.463	98.462	76.732
82.74	104.4790	1010	104.444	104.4331	542	104.442	104.443	82.713
87.34	109.1281	639	109.172	109.1540	910	109.174	109.173	87.443
93.43	115.1615	1189	115.215	115.1285	866	115.216	115.216	93.486
98.45	120.2920	1190	120.254	120.2321	600	120.256	120.255	98.525
104.60	126.2197	692	126.299	126.2251	752	126.300	126.300	104.570
109.56	131.3868	960	131.318	131.3177	260	131.317	131.318	109.588

TABLE no. 109

Testperson 7	TRACING POINT AND PLEXIGLASS SCALE						Third series	
7.3	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	21.6100	148	21.610	21.6308	344	21.607	21.608	0.000
5.89	27.4932	1339	27.481	27.4122	540	27.484	27.482	5.874
10.17	31.7020	272	31.750	31.7936	1173	31.747	31.748	10.140
16.06	37.6564	632	37.614	37.6097	180	37.617	37.616	16.008
21.78	43.3370	798	43.386	43.3672	1110	43.388	43.387	21.779
27.92	49.5584	601	49.503	49.5312	348	49.507	49.505	27.897
31.38	53.0299	339	53.008	53.0030	054	53.005	53.006	31.398
38.69	60.1788	1212	60.185	60.1762	1200	60.188	60.186	38.578
43.01	64.5072	225	64.531	64.5021	172	64.530	64.530	42.922
49.27	70.7680	1146	70.793	70.7948	1420	70.794	70.794	49.186
54.91	76.4202	560	76.472	76.4119	480	76.472	76.472	54.864
60.15	81.7229	328	81.720	81.7399	520	81.724	81.722	60.114
65.50	86.9780	1150	86.974	86.9955	1338	86.977	86.976	65.368
71.22	92.7822	1200	92.776	92.7012	396	92.777	92.776	71.168
76.83	98.4597	620	98.405	98.4060	094	98.407	98.406	76.798
82.74	104.3882	970	104.318	104.3132	212	104.316	104.317	82.709
87.34	108.9058	218	108.932	108.9230	378	108.930	108.931	87.323
93.43	114.9669	1029	114.972	114.9806	1176	114.974	114.973	93.365
98.45	120.0088	390	120.060	120.0121	402	120.056	120.058	98.450
104.60	126.1590	835	126.149	126.1508	730	126.144	126.146	104.538
109.56	131.1207	412	131.141	131.1118	300	131.136	131.138	109.530

TABLE no. 110

Testperson 7	TRACING POINT AND PLEXIGLASS SCALE						Fourth series	
7.4	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	21.9992	1420	21.986	21.9781	1220	21.988	21.987	0.000
5.89	27.8544	860	27.863	27.8919	1235	27.863	27.863	5.876
10.17	32.1103	278	32.135	32.1890	1069	32.136	32.136	10.149
16.06	37.9872	1170	37.960	37.9658	958	37.960	37.960	15.973
21.78	43.7822	1025	43.741	43.7858	1070	43.742	43.742	21.755
27.92	49.8038	305	49.853	49.8036	291	49.851	49.852	27.865
31.38	53.3311	446	53.327	53.3020	151	53.326	53.326	31.339
38.69	60.4155	512	60.471	60.4800	1151	60.470	60.470	38.483
43.01	64.9130	240	64.922	64.9960	1065	64.921	64.922	42.935
49.27	71.1505	675	71.134	71.1194	372	71.136	71.135	49.148
54.91	76.8620	826	76.841	76.8456	671	76.843	76.842	54.855
60.15	82.0055	160	82.021	82.0285	432	82.029	82.025	60.038
65.50	87.3971	1168	87.339	87.3060	270	87.342	87.340	65.353
71.22	93.0510	866	93.071	93.0882	1216	93.067	93.069	71.082
76.83	98.7568	568	98.700	98.7322	322	98.700	98.700	76.713
82.74	104.6590	948	104.672	104.6514	868	104.671	104.672	82.685
87.34	109.1076	490	109.183	109.1528	929	109.180	109.182	87.195
93.43	115.3051	430	115.376	115.3479	846	115.373	115.374	93.387
98.45	120.2790	1276	120.297	120.2964	1465	120.300	120.298	98.311
104.60	126.4332	708	126.475	126.4645	1008	126.473	126.474	104.487
109.56	131.4210	407	131.439	131.4950	1139	131.438	131.438	109.451

TABLE no. 111

Testperson 7	TRACING POINT AND PLEXIGLASS SCALE							Fifth series
7.5	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	21.9160	215	21.911	21.9300	358	21.912	21.912	0.000
5.89	27.7663	1121	27.792	27.7506	962	27.791	27.792	5.880
10.17	32.0005	140	32.027	32.0690	818	32.026	32.026	10.114
16.06	37.9893	1080	37.937	37.9050	235	37.937	37.937	16.025
21.78	43.7618	840	43.744	43.7621	843	43.744	43.744	21.832
27.92	49.7541	951	49.782	49.7058	458	49.780	49.781	27.869
31.38	53.2046	338	53.258	53.2022	300	53.256	53.257	31.345
38.69	60.4798	958	60.432	60.4541	706	60.433	60.432	38.520
43.01	64.8876	1320	64.889	64.8211	638	64.885	64.887	42.975
49.27	71.1232	475	71.149	71.1182	402	71.144	71.146	49.234
54.91	76.8760	1132	76.874	76.8715	1080	76.873	76.874	54.962
60.15	82.0254	355	82.020	82.0030	122	82.018	82.019	60.107
65.50	87.4093	121	87.406	87.4200	216	87.403	87.404	65.492
71.22	93.0762	1180	93.084	93.0624	1039	93.083	93.084	71.172
76.83	98.7679	748	98.714	98.7110	170	98.712	98.713	76.801
82.74	104.5413	740	104.565	104.5703	1032	104.566	104.566	82.654
87.34	109.1662	961	109.160	109.1516	812	109.159	109.160	87.248
93.43	115.2000	079	115.216	115.2178	240	115.212	115.214	93.302
98.45	120.2340	715	120.275	120.2340	706	120.273	120.274	98.362
104.60	126.4770	770	126.400	126.4182	182	126.400	126.400	104.488
109.56	131.3676	1000	131.365	131.3680	986	131.361	131.363	109.451

TABLE no. 112

Testperson 7	TRACING POINT AND PLEXIGLASS SCALE				Recap. tables 108-112					
Series					Mean (mm)	v (mm/100)				
1	2	3	4	5		1	2	3	4	5
0.00	00	00	00	00	0.00					
5.88	83	87	88	88	5.87	− 1	+ 4	0	− 1	− 1
10.15	16	14	15	11	10.14	− 1	− 2	0	− 1	+ 3
16.02	05	01	5.97	02	16.01	− 1	− 4	0	+ 4	− 1
21.77	78	78	76	83	21.78	+ 1	0	0	+ 2	− 5
27.90	85	90	86	87	27.88	− 2	+ 3	− 2	+ 2	+ 1
31.40	34	40	34	34	31.36	− 4	+ 2	− 4	+ 2	+ 2
38.59	64	58	48	52	38.56	− 3	− 8	− 2	+ 8	+ 4
42.96	99	92	94	98	42.96	0	− 3	+ 4	+ 2	− 2
49.40	25	19	15	23	49.24	−16	− 1	+ 5	+ 9	+ 1
54.88	90	86	86	96	54.89	+ 1	− 1	+ 3	+ 3	− 7
60.23	14	11	04	11	60.13	−10	− 1	+ 2	+ 9	+ 2
65.59	51	37	35	49	65.46	−13	− 5	+ 9	+11	− 3
71.34	25	17	08	17	71.20	−14	− 5	+ 3	+12	+ 3
76.84	73	80	71	80	76.78	− 6	+ 5	− 2	+ 7	− 2
82.70	71	71	68	65	82.69	− 1	− 2	− 2	+ 1	+ 4
87.40	44	32	20	25	87.32	− 8	−12	0	+12	+ 7
93.42	49	36	39	30	93.39	− 3	−10	+ 3	0	+ 9
98.48	52	45	31	36	98.42	− 6	−10	− 3	+11	+ 6
104.57	57	54	49	49	104.53	− 4	− 4	− 1	+ 4	+ 4
109.58	59	53	45	45	109.52	− 6	− 7	− 1	+ 7	+ 7

$m^2 = \frac{[v\,v]}{80} = \frac{3060}{80} = 38.2 \frac{mm^2}{10^4}$; m = 0.062 mm

TABLE no. 113

Testperson 8	TRACING POINT AND PLEXIGLASS SCALE							First series
8.1	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	22.2979	1213	22.247	22.2878	1105	22.245	22.246	0.000
5.89	28.0168	512	28.069	28.0648	974	28.065	28.067	5.821
10.17	32.5340	370	32.506	32.5053	074	32.504	32.505	10.259
16.06	38.2558	1010	38.290	38.2703	1138	38.287	38.288	16.042
21.78	43.9618	905	43.957	43.9576	870	43.959	43.958	21.712
27.92	49.9584	880	49.959	49.9872	1157	49.957	49.958	27.712
31.38	53.6401	809	53.682	53.6650	1051	53.680	53.681	31.435
38.69	60.8829	1163	60.867	60.8139	488	60.870	60.868	38.622
43.01	65.1435	908	65.195	65.1550	1010	65.192	65.194	42.948
49.27	71.6458	765	71.661	71.6013	328	71.663	71.662	49.416
54.91	77.0086	210	77.025	77.0110	226	77.023	77.024	54.778
60.15	82.4019	220	82.440	82.4278	488	82.442	82.441	60.195
65.50	87.7086	150	87.713	87.7101	168	87.713	87.713	65.467
71.22	93.5581	980	93.580	93.5076	488	93.582	93.581	71.335
76.83	98.9720	1131	98.982	98.9226	651	98.985	98.984	76.738
82.74	105.0102	212	105.022	105.0464	578	105.023	105.022	82.776
87.34	109.6862	1206	109.669	109.6948	1286	109.668	109.668	87.422
93.43	115.7903	1088	115.737	115.7390	590	115.740	115.738	93.492
98.45	120.8941	941	120.800	120.8160	160	120.800	120.800	98.554
104.60	126.8070	188	126.824	126.8350	475	126.825	126.824	104.578
109.56	131.8751	949	131.840	131.8908	1092	131.837	131.838	109.592

TABLE no. 114

Testperson 8	TRACING POINT AND PLEXIGLASS SCALE							Second series
8.2	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	21.0835	1260	21.085	21.0066	506	21.088	21.086	0.000
5.89	26.8735	1209	26.895	26.8618	1093	26.895	26.895	5.809
10.17	31.3455	630	31.335	31.3862	1050	31.338	31.336	10.250
16.06	37.2197	525	37.266	37.2920	1260	37.268	37.267	16.181
21.78	42.7172	491	42.764	42.7009	340	42.766	42.765	21.679
27.92	48.8951	1285	48.867	48.8005	350	48.869	48.868	27.782
31.38	52.5277	515	52.548	52.5966	1190	52.545	52.546	31.460
38.69	59.7070	232	59.732	59.7217	380	59.733	59.732	38.646
43.01	64.0433	966	64.107	64.1972	1006	64.107	64.107	43.021
49.27	70.4940	1535	70.519	70.5282	368	70.517	70.518	49.432
54.91	75.9170	322	75.930	75.9401	546	75.929	75.930	54.844
60.15	81.3482	752	81.354	81.3400	653	81.351	81.352	60.266
65.50	86.6290	344	86.611	86.6189	240	86.610	86.610	65.524
71.22	92.3934	1420	92.397	92.3061	540	92.396	92.396	71.310
76.83	97.7722	838	97.723	97.7889	1008	97.724	97.724	76.638
82.74	103.8661	850	103.838	103.8420	605	103.837	103.838	82.752
87.34	108.5607	686	108.516	108.5500	575	108.515	108.516	87.430
93.43	114.5601	1010	114.582	114.5180	598	114.584	114.583	93.497
98.45	119.5970	1368	119.580	119.5186	593	119.581	119.580	98.494
104.60	125.6030	520	125.698	125.6848	1322	125.695	125.696	104.610
109.56	130.6603	1018	130.683	130.6688	1101	130.683	130.683	109.597

TABLE no. 115

Testperson 8	TRACING POINT AND PLEXIGLASS SCALE						Third series	
8.3	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	28.1032	365	28.167	28.1035	358	28.165	28.166	0.000
5.89	33.9600	972	33.974	33.9190	578	33.978	33.976	5.810
10.17	38.3094	370	38.355	38.3125	380	38.351	38.353	10.187
16.06	44.1237	421	44.137	44.1955	1140	44.137	44.137	15.971
21.78	49.8901	1230	49.866	49.8775	1101	49.865	49.866	21.700
27.92	55.9190	250	55.912	55.9337	380	55.909	55.910	27.744
31.38	59.5150	571	59.584	59.5939	1352	59.583	59.584	31.418
38.69	66.7108	460	66.770	66.7980	1320	66.768	66.769	38.603
43.01	71.0012	592	71.116	71.1970	1035	71.113	71.114	42.948
49.27	77.5840	1152	77.562	77.5711	1007	77.559	77.560	49.394
54.91	82.9989	1281	82.958	82.9886	1161	82.955	82.956	54.790
60.15	88.2512	1000	88.298	88.2622	1116	88.299	88.298	60.132
65.50	93.6970	1138	93.634	93.6823	988	93.633	93.634	65.468
71.22	99.4191	210	99.404	99.4433	451	99.404	99.404	71.238
76.83	104.8680	968	104.858	104.8177	472	104.859	104.858	76.692
82.74	110.8968	1088	110.824	110.8805	929	110.825	110.824	82.658
87.34	115.6604	780	115.635	115.6790	970	115.636	115.636	87.470
93.43	121.5731	1308	121.615	121.6365	445	121.616	121.616	93.450
98.45	126.6815	1075	126.652	126.6130	402	126.654	126.653	98.487
104.60	132.7000	108	132.722	132.7452	578	132.725	132.724	104.558
109.56	137.7897	1170	137.755	137.7668	950	137.756	137.756	109.590

TABLE no. 116

Testperson 8	TRACING POINT AND PLEXIGLASS SCALE						Fourth series	
8.4	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	26.6030	088	26.612	26.6592	650	26.612	26.612	0.000
5.89	32.4721	962	32.448	32.4932	1162	32.446	32.447	5.835
10.17	36.9050	130	36.916	36.9069	156	36.917	36.916	10.304
16.06	42.7915	1231	42.763	42.7496	810	42.763	42.763	16.151
21.78	48.2347	619	48.254	48.2875	1159	48.257	48.256	21.644
27.92	54.3250	745	54.399	54.3918	1413	54.399	54.399	27.787
31.38	58.0675	1226	58.110	58.0720	1255	58.107	58.108	31.496
38.69	65.2410	620	65.242	65.2040	233	65.239	65.240	38.628
43.01	69.5692	1140	69.590	69.5600	1032	69.586	69.588	42.976
49.27	75.9695	980	75.957	75.9240	520	75.956	75.956	49.344
54.91	81.3592	909	81.363	81.3135	460	81.365	81.364	54.752
60.15	86.7111	443	86.766	86.7075	411	86.767	86.766	60.154
65.50	92.0109	730	92.124	92.1342	474	92.126	92.125	65.513
71.22	97.7632	894	97.752	97.7150	402	97.750	97.751	71.139
76.83	103.3536	830	103.359	103.3918	1195	103.355	103.357	76.745
82.74	109.3427	541	109.323	109.3370	470	109.320	109.322	82.710
87.34	114.0180	375	114.039	114.0273	476	114.041	114.040	87.428
93.43	120.1514	580	120.113	120.1338	395	120.111	120.112	93.500
98.45	125.1650	735	125.117	125.1250	344	125.119	125.118	98.506
104.60	131.1542	1000	131.192	131.1905	1373	131.194	131.193	104.581
109.56	136.2980	1320	136.268	136.2320	668	136.270	136.269	109.657

TABLE no. 117

Testperson 8	TRACING POINT AND PLEXIGLASS SCALE							Fifth series
8.5	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	27.5575	793	27.544	27.5850	1072	27.544	27.544	0.000
5.89	33.3046	196	33.330	33.3852	996	33.329	33.330	5.786
10.17	37.8801	1092	37.858	37.8888	1180	37.858	37.858	10.314
16.06	43.7920	1048	43.726	43.7939	1060	43.724	43.725	16.181
21.78	49.2860	1310	49.290	49.2370	812	49.288	49.289	21.745
27.92	55.3075	220	55.329	55.3850	983	55.327	55.328	27.784
31.38	59.0090	182	59.018	59.0874	970	59.019	59.018	31.474
38.69	66.1340	670	66.166	66.1368	700	66.166	66.166	38.622
43.01	70.5815	930	70.523	70.5500	618	70.524	70.524	42.980
49.27	76.9776	856	76.916	76.9455	540	76.917	76.916	49.372
54.91	82.3037	140	82.321	82.3492	593	82.320	82.320	54.776
60.15	87.6409	639	87.646	87.6222	460	87.648	87.647	60.103
65.50	93.0754	1002	93.050	93.0131	384	93.051	93.050	65.506
71.22	98.9645	650	98.901	98.9190	200	98.902	98.902	71.358
76.83	104.2280	630	104.270	104.2730	1069	104.268	104.269	76.725
82.74	110.2245	512	110.253	110.2962	1219	110.251	110.252	82.708
87.34	115.0261	430	115.034	115.0587	760	115.035	115.034	87.490
93.43	120.9858	1355	120.999	120.9895	1380	120.997	120.998	93.454
98.45	126.0852	1135	126.057	126.0945	1226	126.056	126.056	98.512
104.60	132.1435	679	132.149	132.1070	303	132.147	132.148	104.604
109.56	137.1742	1070	137.166	137.1980	1305	137.165	137.166	109.622

TABLE no. 118

Testperson 8	TRACING POINT AND PLEXIGLASS SCALE					Recap. tables 114-118				
Series					Mean (mm)	v (mm/100)				
1	2	3	4	5		1	2	3	4	5
0.00	00	00	00	00	0.00					
5.82	81	81	84	79	5.81	− 1	0	0	− 3	+ 2
10.26	25	19	30	31	10.26	0	+ 1	+ 7	− 4	− 5
16.04	18	5.97	15	18	16.10	+ 6	− 8	+13	− 5	− 8
21.71	68	70	64	74	21.69	− 2	+ 1	− 1	+ 5	− 5
27.71	78	74	79	78	27.76	+ 5	− 2	+ 2	− 3	− 2
31.44	46	42	50	47	31.46	+ 2	0	+ 4	− 4	− 1
38.62	65	60	63	62	38.62	0	− 3	+ 2	− 1	0
42.95	3.02	95	98	98	42.98	+ 3	− 4	+ 3	0	0
49.42	43	39	34	37	49.39	− 3	− 4	0	+ 5	+ 2
54.78	84	79	75	78	54.79	+ 1	− 5	0	+ 4	+ 1
60.20	27	13	15	10	60.17	− 3	−10	+ 4	+ 2	+ 7
65.47	52	47	51	51	65.50	+ 3	− 2	+ 3	− 1	− 1
71.34	31	24	14	36	71.28	− 6	− 3	+ 4	+14	− 8
76.74	64	69	74	72	76.71	− 3	+ 7	+ 2	− 3	− 1
82.78	75	66	71	71	82.72	− 6	− 3	+ 6	+ 1	+ 1
87.42	43	47	43	49	87.45	+ 3	+ 2	− 2	+ 2	− 4
93.49	50	45	50	45	93.48	− 1	− 2	+ 3	− 2	+ 3
98.55	49	49	51	51	98.51	− 4	+ 2	+ 2	0	0
104.58	61	56	58	60	104.59	+ 1	− 2	+ 3	+ 1	− 1
109.59	60	59	66	62	109.61	+ 2	+ 1	+ 2	− 5	− 1

$m^2 = \frac{[vv]}{80} = \frac{1564}{80} = 19.6 \frac{mm^2}{10^4}$; m = 0.044 mm

TABLE no. 119

Testperson 4	TRACING POINT AND PLEXIGLASS SCALE							First series
4.1	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	28.9550	630	28.916	28.9755	831	28.915	28.916	0.000
5.89	34.8838	838	34.800	34.8846	846	34.800	34.800	5.884
10.17	39.1311	550	39.148	39.1694	940	39.149	39.148	10.232
16.06	45.0646	962	45.063	45.0713	1010	45.059	45.061	16.145
21.78	50.7104	396	50.758	50.7200	483	50.757	50.758	21.842
27.92	56.8070	332	56.852	56.8254	506	56.850	56.851	27.935
31.38	60.3957	1234	60.355	60.3170	456	60.357	60.356	31.440
38.69	67.6234	570	67.667	67.6545	893	67.670	67.668	38.752
43.01	72.0637	690	72.011	72.0615	676	72.012	72.012	43.096
49.27	78.2804	1100	78.259	78.2685	980	78.259	78.259	49.343
54.91	83.8442	790	83.870	83.8183	516	83.867	83.868	54.952
60.15	89.1846	983	89.127	89.1320	462	89.128	89.128	60.212
65.50	94.5655	781	94.525	94.5539	652	94.523	94.524	65.608
71.22	100.2198	373	100.235	100.2180	351	100.234	100.234	71.318
76.83	105.7524	928	105.781	105.7410	815	105.781	105.781	76.865
82.74	111.7968	1079	111.722	111.7651	751	111.720	111.721	82.805
87.34	116.4285	315	116.406	116.4435	459	116.405	116.406	87.490
93.43	122.4201	382	122.436	122.4130	300	122.434	122.435	93.519
98.45	127.5262	412	127.530	127.5280	420	127.528	127.529	98.613
104.60	133.6336	631	133.659	133.6279	576	133.659	133.659	104.743
109.56	138.6376	442	138.613	138.6661	720	138.612	138.612	109.696

TABLE no. 120

Testperson 4	TRACING POINT AND PLEXIGLASS SCALE							Second series
4.2	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	19.8650	1045	19.879	19.8982	1372	19.878	19.878	0.000
5.89	25.7656	881	25.745	25.7585	809	25.745	25.745	5.867
10.17	30.1729	785	30.111	30.1820	878	30.112	30.112	10.234
16.06	35.9000	450	35.990	35.9791	1253	35.992	35.991	16.113
21.78	41.6900	1180	41.656	41.6717	1010	41.659	41.658	21.780
27.92	47.7415	872	47.791	47.7741	1190	47.790	47.790	27.912
31.38	51.2723	1140	51.283	51.2878	1290	51.282	51.282	31.404
38.69	58.5875	1319	58.589	58.5190	641	58.590	58.590	38.712
43.01	63.0319	325	63.001	63.0182	190	63.002	63.002	43.124
49.27	69.2003	192	69.238	69.2510	702	69.238	69.238	49.360
54.91	74.8401	558	74.831	74.8090	243	74.831	74.831	54.953
60.15	80.0084	330	80.049	80.0785	1032	80.049	80.049	60.171
65.50	85.4773	940	85.433	85.4765	922	85.431	85.432	65.554
71.22	91.1661	961	91.160	91.1950	1239	91.158	91.159	71.281
76.83	96.7730	816	96.717	96.7568	656	96.718	96.718	76.840
82.74	102.6904	960	102.611	102.6676	750	102.615	102.613	82.735
87.34	107.3134	134	107.300	107.3830	830	107.300	107.300	87.422
93.43	113.3236	519	113.357	113.3390	666	113.355	113.356	93.478
98.45	118.3620	1016	118.379	118.3222	622	118.380	118.380	98.502
104.60	124.6337	403	124.613	124.6993	1052	124.612	124.612	104.734
109.56	129.4021	360	129.468	129.4427	765	129.468	129.468	109.590

TABLE no. 121

Testperson 4	TRACING POINT AND PLEXIGLASS SCALE							Third series
4.3	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	21.6026	319	21.659	21.6960	1262	21.660	21.660	0.000
5.89	27.5215	328	27.523	27.5094	202	27.522	27.522	5.862
10.17	31.8520	942	31.884	31.8649	1068	31.884	31.884	10.224
16.06	37.7702	1125	37.785	37.7492	930	37.788	37.786	16.126
21.78	43.4206	238	43.406	43.4275	306	43.406	43.406	21.746
27.92	49.5800	1115	49.563	49.5000	327	49.565	49.564	27.904
31.38	53.1940	946	53.101	53.1860	870	53.102	53.102	31.442
38.69	60.3950	1397	60.389	60.3800	1236	60.387	60.388	38.728
43.01	64.7149	235	64.717	64.7762	850	64.718	64.718	43.058
49.27	71.0372	393	71.004	71.0833	868	71.007	71.006	49.346
54.91	76.6250	322	76.614	76.6925	982	76.611	76.612	54.952
60.15	81.8550	862	81.862	81.8329	650	81.864	81.863	60.203
65.50	87.1064	430	87.173	87.1870	1252	87.176	87.174	65.514
71.22	92.9179	472	92.959	92.9861	1142	92.956	92.958	71.298
76.83	98.5330	372	98.508	98.5110	146	98.507	98.508	76.848
82.74	104.4432	702	104.454	104.4100	378	104.456	104.455	82.795
87.34	109.0377	780	109.081	109.0278	684	109.081	109.081	87.421
93.43	115.1142	670	115.206	115.1822	1345	115.205	115.206	93.546
98.45	120.2045	109	120.213	120.2958	1019	120.212	120.212	98.552
104.60	126.3370	470	126.320	126.3949	1058	126.322	126.321	104.661
109.56	131.3098	290	131.338	131.3792	993	131.340	131.339	109.679

TABLE no. 122

Testperson 4	TRACING POINT AND PLEXIGLASS SCALE							Fourth series
4.4	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	19.8472	472	19.800	19.8485	485	19.800	19.800	0.000
5.89	25.6980	1241	25.652	25.6076	330	25.651	25.652	5.852
10.17	30.0875	910	30.007	30.0297	320	30.005	30.006	10.206
16.06	35.9680	788	35.922	35.9162	256	35.919	35.920	16.120
21.78	41.5820	1220	41.580	41.5797	1211	41.583	41.582	21.782
27.92	47.7929	940	47.702	47.7060	076	47.703	47.702	27.902
31.38	51.2881	928	51.209	51.2946	1000	51.211	51.210	31.410
38.69	58.4511	995	58.497	58.4088	585	58.499	58.498	38.698
43.01	62.8798	1208	62.882	62.8437	843	62.881	62.882	43.082
49.27	69.1172	350	69.136	69.1560	742	69.136	69.136	49.336
54.91	74.7621	741	74.724	74.7911	1025	74.723	74.724	54.924
60.15	80.0754	780	80.005	80.0974	992	80.004	80.004	60.204
65.50	85.3682	1035	85.371	85.3860	1220	85.372	85.372	65.572
71.22	91.1410	590	91.136	91.1176	358	91.136	91.136	71.336
76.83	96.6370	650	96.656	96.6211	487	96.655	96.656	76.856
82.74	102.6250	470	102.644	102.6156	363	102.641	102.642	82.842
87.34	107.1137	574	107.187	107.1211	651	107.188	107.188	87.388
93.43	113.3040	108	113.314	113.3558	605	113.309	113.312	93.512
98.45	118.3598	882	118.357	118.3123	400	118.355	118.356	98.556
104.60	124.5867	960	124.519	124.5140	230	124.518	124.518	104.718
109.56	129.4579	740	129.432	129.4274	430	129.431	129.432	109.632

TABLE no. 123

Testperson 4	TRACING POINT AND PLEXIGLASS SCALE							Fifth series
4.5	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	19.8488	711	19.845	19.8953	1172	19.844	19.844	0.000
5.89	25.6392	856	25.693	25.6862	1316	25.691	25.692	5.848
10.17	30.0541	781	30.048	30.0076	305	30.046	30.047	10.203
16.06	36.0860	870	36.002	36.0162	180	36.004	36.003	16.159
21.78	41.5870	1290	41.584	41.5525	950	41.585	41.584	21.740
27.92	47.7441	530	47.718	47.7040	140	47.720	47.719	27.875
31.38	51.2046	449	51.281	51.2096	480	51.277	51.279	31.435
38.69	58.5973	1372	58.580	58.5764	1151	58.577	58.578	38.734
43.01	62.9470	541	62.914	62.9862	931	62.914	62.914	43.070
49.27	69.1680	920	69.148	69.1892	1140	69.150	69.149	49.305
54.91	74.7231	658	74.785	74.7392	820	74.786	74.786	54.942
60.15	80.0756	1012	80.051	80.0403	657	80.051	80.051	60.207
65.50	85.3418	851	85.387	85.3380	814	85.387	85.387	65.543
71.22	91.2740	860	91.224	91.2500	621	91.224	91.224	71.380
76.83	96.6633	855	96.644	96.6333	562	96.646	96.645	76.801
82.74	102.7676	770	102.719	102.7380	450	102.714	102.716	82.872
87.34	107.2732	1048	107.263	107.2063	367	107.261	107.262	87.418
93.43	113.3940	1143	113.341	113.3765	963	113.340	113.340	93.496
98.45	118.3391	760	118.374	118.3762	1120	118.372	118.373	98.529
104.60	124.4998	1182	124.437	124.4631	814	124.437	124.437	104.593
109.56	129.4580	906	129.465	129.4750	1069	129.464	129.464	109.620

TABLE no. 124

Testperson 4	TRACING POINT AND PLEXIGLASS SCALE					Recap. tables 120-124					
Series						Mean (mm)	v (mm/100)				
1	2	3	4	5			1	2	3	4	5
0.00	00	00	00	00	0.00						
5.88	87	86	85	85	5.86	− 2	− 1	0	+ 1	+ 1
10.23	23	22	21	20	10.22	− 1	− 1	0	+ 1	+ 2
16.14	11	13	12	16	16.13	− 1	+ 2	0	+ 1	− 3
21.84	78	75	78	74	21.78	− 6	0	+ 3	0	+ 4
27.94	91	90	90	88	27.91	− 3	0	+ 1	+ 1	+ 3
31.44	40	44	41	44	31.43	− 1	+ 3	− 1	+ 2	− 1
38.75	71	73	70	73	38.72	− 3	+ 1	− 1	+ 2	− 1
43.10	12	06	08	07	43.09	− 1	− 3	+ 3	+ 1	+ 2
49.34	36	35	34	30	49.34	0	− 2	− 1	0	+ 4
54.95	95	95	92	94	54.94	− 1	− 1	− 1	+ 2	0
60.21	17	20	20	21	60.20	− 1	+ 3	0	0	− 1
65.61	55	51	57	54	65.56	− 5	+ 1	+ 5	− 1	+ 2
71.32	28	30	34	38	71.32	0	+ 4	+ 2	− 2	− 6
76.86	84	85	86	80	76.84	− 2	0	− 1	− 2	+ 4
82.80	74	80	84	87	82.81	+ 1	+ 7	+ 1	− 3	− 6
87.49	42	42	39	42	87.43	− 6	+ 1	+ 1	+ 4	+ 1
93.52	48	55	51	50	93.51	− 1	+ 3	− 4	0	+ 1
98.61	50	55	56	53	98.55	− 6	+ 5	0	− 1	+ 2
104.74	73	66	72	59	104.69	− 5	− 4	+ 3	− 3	+10
109.70	59	68	63	62	109.64	− 6	+ 5	− 4	+ 1	+ 2

$m^2 = \frac{[v\,v]}{80} = \frac{831}{80} = 10.4\ \frac{mm^2}{10^4}$; m = 0.032 mm

TABLE no. 125

Testperson 9	TRACING POINT AND PLEXIGLASS SCALE						First series	
9.1	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	19.6882	932	19.610	19.6331	389	19.612	19.611	0.000
5.89	25.3680	852	25.334	25.3300	480	25.336	25.335	5.724
10.17	29.7318	385	29.713	29.7074	147	29.715	29.714	10.103
16.06	35.6863	1350	35.697	35.6050	550	35.700	35.698	16.087
21.78	41.1052	525	41.195	41.1578	1041	41.193	41.194	21.583
27.92	47.3659	1085	47.385	47.3405	832	47.385	47.385	27.774
31.38	50.6438	898	50.692	50.6818	1265	50.689	50.690	31.079
38.69	58.0842	1227	58.077	58.0000	386	58.077	58.077	38.466
43.01	62.4430	630	62.440	62.4741	928	62.437	62.438	42.827
49.27	68.7314	386	68.714	68.7265	340	68.715	68.714	49.103
54.91	74.2476	730	74.251	74.2900	1144	74.249	74.250	54.639
60.15	79.7325	378	79.711	79.7392	439	79.709	79.710	60.099
65.50	84.8726	1160	84.887	84.8058	500	84.888	84.888	65.277
71.22	90.7372	708	90.767	90.7152	481	90.766	90.766	71.155
76.83	96.1230	692	96.192	96.1448	894	96.189	96.190	76.579
82.74	102.0659	1090	102.086	102.0331	760	102.086	102.086	82.475
87.34	106.8612	690	106.816	106.8733	810	106.815	106.816	87.205
93.43	112.9562	655	112.919	112.9682	781	112.920	112.920	93.309
98.45	117.9237	620	117.977	117.9650	1020	117.974	117.976	98.365
104.60	123.9190	590	123.980	123.9336	730	123.979	123.980	104.369
109.56	128.9910	923	128.903	128.9128	128	128.900	128.902	109.291

TABLE no. 126

Testperson 9	TRACING POINT AND PLEXIGLASS SCALE						Second series	
9.2	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	21.4760	770	21.402	21.4610	622	21.402	21.402	0.000
5.89	27.1770	1251	27.196	27.1528	998	27.194	27.195	5.793
10.17	31.5034	350	31.563	31.5606	921	31.563	31.563	10.161
16.06	37.3499	868	37.374	37.3620	997	37.375	37.374	15.972
21.78	43.1234	300	43.113	43.1430	503	43.115	43.114	21.712
27.92	49.1685	1100	49.183	49.1289	718	49.186	49.184	27.782
31.38	52.6459	560	52.620	52.6705	822	52.623	52.622	31.220
38.69	60.0601	850	60.050	60.0888	1140	60.050	60.050	38.648
43.01	64.2080	485	64.281	64.2711	1120	64.282	64.282	42.880
49.27	70.6274	590	70.663	70.6053	360	70.661	70.662	49.260
54.91	76.2858	1090	76.246	76.2070	315	76.249	76.248	54.846
60.15	81.5640	640	81.500	81.5856	856	81.500	81.500	60.098
65.50	86.8626	980	86.871	86.8866	1230	86.873	86.872	65.470
71.22	92.5412	661	92.550	92.5052	302	92.550	92.550	71.148
76.83	98.0590	854	98.053	98.0485	753	98.054	98.054	76.652
82.74	103.9440	475	103.907	103.9152	173	103.904	103.906	82.504
87.34	108.6851	944	108.619	108.6939	1021	108.616	108.618	87.216
93.43	114.7180	370	114.738	114.7095	276	114.736	114.737	93.335
98.45	119.7812	1150	119.768	119.7521	875	119.771	119.770	98.368
104.60	125.9252	381	125.926	125.9858	976	125.924	125.925	104.523
109.56	130.8738	1066	130.866	130.8970	1293	130.865	130.866	109.464

TABLE no. 127

Testperson 9	TRACING POINT AND PLEXIGLASS SCALE							Third series
9.3	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	21.4414	776	21.472	21.4080	434	21.471	21.472	0.000
5.89	27.2013	221	27.242	27.2470	675	27.241	27.242	5.770
10.17	31.6614	1040	31.685	31.6688	1100	31.682	31.684	10.212
16.06	37.5085	390	37.561	37.5660	977	37.563	37.562	16.090
21.78	43.1101	543	43.188	43.1500	940	43.188	43.188	21.716
27.92	49.3010	078	49.314	49.3074	136	49.312	49.313	27.841
31.38	52.7491	903	52.782	52.7670	1074	52.781	52.782	31.310
38.69	60.0747	975	60.046	60.0243	480	60.047	60.046	38.574
43.01	64.4712	905	64.439	64.4375	572	64.439	64.439	42.967
49.27	70.6044	209	70.633	70.6372	540	70.634	70.634	49.162
54.91	76.2772	882	76.222	76.2709	820	76.222	76.222	54.750
60.15	81.5902	920	81.504	81.5420	435	81.503	81.504	60.032
65.50	86.8471	825	86.871	86.8871	1231	86.872	86.872	65.400
71.22	92.5573	914	92.568	92.5320	673	92.571	92.570	71.098
76.83	98.1190	482	98.158	98.1380	682	98.160	98.159	76.687
82.74	104.0945	1170	104.045	104.0369	593	104.045	104.045	82.573
87.34	108.7097	330	108.747	108.7229	451	108.744	108.746	87.274
93.43	114.8068	248	114.836	114.8450	639	114.838	114.837	93.365
98.45	119.8100	215	119.823	119.8700	810	119.822	119.822	98.350
104.60	125.8217	545	125.866	125.8187	494	125.861	125.864	104.392
109.56	130.8280	763	130.897	130.8588	1078	130.898	130.898	109.426

TABLE no. 128

Testperson 9	TRACING POINT AND PLEXIGLASS SCALE							Fourth series
9.4	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	19.9348	550	19.940	19.9460	653	19.939	19.940	0.000
5.89	25.7598	930	25.766	25.7442	777	25.767	25.766	5.826
10.17	30.0217	745	30.106	30.0800	1319	30.104	30.105	10.165
16.06	36.0940	1106	36.033	36.0513	670	36.031	36.032	16.092
21.78	41.7275	275	41.700	41.7450	450	41.700	41.700	21.760
27.92	47.6236	706	47.694	47.6645	1104	47.692	47.693	27.753
31.38	51.3082	474	51.378	51.3210	610	51.380	51.379	31.439
38.69	58.4080	480	58.480	58.4260	660	58.480	58.480	38.540
43.01	62.8209	420	62.842	62.8850	1056	62.841	62.842	42.902
49.27	69.1435	762	69.165	69.1860	1183	69.165	69.165	49.225
54.91	74.7750	1032	74.756	74.7970	1260	74.758	74.757	54.817
60.15	80.0560	560	80.000	80.0402	402	80.000	80.000	60.060
65.50	85.3918	1050	85.326	85.3580	704	85.325	85.326	65.386
71.22	91.0140	220	91.016	91.0268	350	91.016	91.016	71.076
76.83	96.6375	505	96.626	96.6300	430	96.626	96.626	76.686
82.74	102.6663	864	102.640	102.6239	448	102.642	102.641	82.701
87.34	107.2820	1065	107.249	107.2220	461	107.248	107.248	87.308
93.43	113.2898	1205	113.261	113.2033	350	113.263	113.262	93.322
98.45	118.3018	235	118.343	118.3569	778	118.342	118.342	98.402
104.60	124.3720	860	124.328	124.3423	569	124.329	124.328	104.388
109.56	129.3928	1125	129.339	129.3960	1150	129.338	129.338	109.398

TABLE no. 129

Testperson 9	TRACING POINT AND PLEXIGLASS SCALE							Fifth series
9.5	First measurement (Obs. Mr. Breemans)			Second measurement (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Point	Stand. Meas.	Point	Point-S.M.	Stand. Meas.	Point	Point-S.M.		
0.00	21.9770	1195	21.985	21.9125	537	21.982	21.984	0.000
5.89	27.8633	800	27.833	27.8170	340	27.834	27.834	5.850
10.17	32.0578	941	32.073	32.0402	780	32.076	32.074	10.090
16.06	37.9132	408	37.955	37.9840	1098	37.952	37.954	15.970
21.78	43.7287	287	43.700	43.7983	990	43.701	43.700	21.716
27.92	49.7598	641	49.709	49.7935	992	49.711	49.710	27.726
31.38	53.2278	456	53.236	53.2205	395	53.238	53.237	31.253
38.69	60.6753	935	60.636	60.6441	626	60.637	60.636	38.652
43.01	64.9878	1050	64.934	64.9039	228	64.938	64.936	42.952
49.27	71.2200	390	71.238	71.2051	250	71.240	71.239	49.255
54.91	76.7097	343	76.749	76.7000	250	76.750	76.750	54.766
60.15	82.0301	668	82.073	82.0988	1367	82.076	82.074	60.090
65.50	87.3602	1081	87.396	87.3605	1072	87.393	87.394	65.410
71.22	93.1852	1149	93.159	93.1271	570	93.160	93.160	71.176
76.83	98.6603	1034	98.686	98.6910	1340	98.686	98.686	76.702
82.74	104.6112	396	104.657	104.6010	285	104.655	104.656	82.672
87.34	109.2213	570	109.271	109.2558	917	109.272	109.272	87.288
93.43	115.3561	736	115.335	115.3678	861	115.337	115.336	93.352
98.45	120.3941	1226	120.357	120.3662	952	120.358	120.358	98.374
104.60	126.4950	1050	126.420	126.4243	326	126.417	126.418	104.434
109.56	131.3850	1085	131.347	131.3920	1160	131.348	131.348	109.364

TABLE no. 130

Testperson 9	TRACING POINT AND PLEXIGLASS SCALE				Recap. tables 126-130					
Series					Mean (mm)	v (mm/100)				
1	2	3	4	5		1	2	3	4	5
0.00	00	00	00	00	0.00					
5.72	79	77	83	85	5.79	+ 7	0	+ 2	− 4	− 6
10.10	16	21	16	09	10.14	+ 4	− 2	− 7	− 2	+ 5
16.09	5.97	09	09	5.97	16.04	− 5	+ 7	− 5	− 5	+ 7
21.58	71	72	76	72	21.70	+12	− 1	− 2	− 6	− 2
27.77	78	84	75	73	27.77	0	− 1	− 7	+ 2	+ 4
31.08	22	31	44	25	31.26	+18	+ 4	− 5	−18	+ 1
38.47	65	57	54	65	38.58	+11	− 7	+ 1	+ 4	− 7
42.83	88	97	90	95	42.91	+ 8	+ 3	− 6	+ 1	− 4
49.10	26	16	22	26	49.20	+10	− 6	+ 4	− 2	− 6
54.64	85	75	82	77	54.77	+13	− 8	+ 2	− 5	0
60.10	10	03	06	09	60.08	− 2	− 2	+ 5	+ 2	− 1
65.28	47	40	39	41	65.39	+11	− 8	− 1	0	− 2
71.16	15	10	08	18	71.13	− 3	− 2	+ 3	+ 5	− 5
76.58	65	69	69	70	76.66	+ 8	+ 1	− 3	− 3	− 4
82.48	50	57	70	67	82.58	+10	+ 8	+ 1	−12	− 9
87.20	22	27	31	29	87.26	+ 6	+ 4	− 1	− 5	− 3
93.31	34	36	32	35	93.34	+ 3	0	− 2	+ 2	− 1
98.36	37	35	40	37	98.37	+ 1	0	+ 2	− 3	0
104.37	52	39	39	43	104.42	+ 5	−10	+ 3	+ 3	− 1
109.29	46	43	40	36	109.39	+10	− 7	− 4	− 1	+ 3

$m^2 = \frac{[v\,v]}{80} = \frac{3368}{80} = 42.1\ \frac{mm^2}{10^4}$; m = 0.065 mm

TABLE no. 131

Given distances (mm)	PLOTTED WITH TRACING POINT AND PLEXIGLASS SCALE									
	Plotted by testperson					Given minus plotted distance (mm/100)				
	6	7	8	4	9	v_6	v_7	v_8	v_4	v_9
5.89	5.87	5.87	5.81	5.86	5.79	+ 2	+ 2	+ 8	+ 3	+10
10.17	10.24	10.14	10.26	10.22	10.14	- 7	+ 3	- 9	- 5	+ 3
16.06	16.07	16.01	16.10	16.13	16.04	- 1	+ 5	- 4	- 7	+ 2
21.78	21.81	21.78	21.69	21.78	21.70	- 3	0	+ 9	0	+ 8
27.92	27.87	27.88	27.76	27.91	27.77	+ 5	+ 4	+16	+ 1	+15
31.38	31.46	31.36	31.46	31.43	31.26	- 8	+ 2	- 8	- 5	+12
38.69	38.69	38.56	38.62	38.72	38.58	0	+13	+ 7	- 3	+11
43.01	42.99	42.96	42.98	43.09	42.91	+ 2	+ 5	+ 3	- 8	+10
49.27	49.39	49.24	49.39	49.34	49.20	-12	+ 3	-12	- 7	+ 7
54.91	54.84	54.89	54.79	54.94	54.77	+ 7	+ 2	+12	- 3	+14
60.15	60.21	60.13	60.17	60.20	60.08	- 6	+ 2	- 2	- 5	+ 7
65.50	65.49	65.46	65.50	65.56	65.39	+ 1	+ 4	0	- 6	+11
71.22	71.27	71.20	71.28	71.32	71.13	- 5	+ 2	- 6	-10	+ 9
76.83	76.75	76.78	76.71	76.84	76.66	+ 8	+ 5	+12	- 1	+17
82.74	82.69	82.69	82.72	82.81	82.58	+ 5	+ 5	+ 2	- 7	+16
87.34	87.41	87.32	87.45	87.43	87.26	- 7	+ 2	-11	- 9	+ 8
93.43	93.44	93.39	93.48	93.51	93.34	- 1	+ 4	- 5	- 8	+ 9
98.45	98.51	98.42	98.51	98.55	98.37	- 6	+ 3	- 6	-10	+ 8
104.60	104.59	104.53	104.59	104.69	104.42	+ 1	+ 7	+ 1	- 9	+18
109.56	109.58	109.52	109.61	109.64	109.39	- 2	+ 4	- 5	- 8	+17
Table	107	113	119	125	131	-27	+77	+ 2	-107	+212

TABLE no.132

APPENDIX V

Determination of m_5

Tables 133-149

General Survey

instrument	test-person	table	s.e. (μ)	s.e. (mean) (μ)
plotting scale	4	133	11	24
" "	10	134	23	
" "	11	135	13	
" "	12	136	36	
" "	13	137	38	
engineer scale	4	144[60])	42	43
" "	3	145	45	
" "	14	146	50	
" "	2	147	44	
" "	15	148	33	
plexigl. scale	4	138[60])	33	36
" "	10	139	35	
" "	11	140	28	
" "	12	141	35	
" "	13	142	48	

Comparison of given and scaled-off distances

divider and plotting scale	table 143
engineer scale	table 149
plexiglass scale	table 143

60) Observations and v's in mm/20

SCALING OFF WITH DIVIDER AND PLOTTING SCALE
Testperson 4

Series					Mean	Differences v (mm/100)				
1	2	3	4	5	(mm)	1	2	3	4	5
5.45	45	44	43	44	5.44	-1	-1	0	+1	0
10.21	22	22	21	21	10.21	0	-1	-1	0	0
16.06	07	06	05	08	16.06	0	-1	0	+1	-2
21.68	66	65	66	66	21.66	-2	0	+1	0	0
27.87	86	86	86	86	27.86	-1	0	0	0	0
32.02	00	02	00	00	32.01	-1	+1	-1	+1	+1
38.94	94	94	94	97	38.95	+1	+1	+1	+1	-2
43.60	59	60	60	60	43.60	0	+1	0	0	0
49.55	55	54	54	55	49.55	0	0	+1	+1	0
54.28	27	27	26	26	54.27	-1	0	0	+1	+1
60.09	08	09	09	09	60.09	0	+1	0	0	0
65.86	86	86	84	85	65.85	-1	-1	-1	+1	0
71.52	48	48	49	48	71.49	-3	+1	+1	0	+1
76.16	15	15	15	16	76.15	-1	0	0	0	-1
82.92	96	94	93	92	82.93	+1	-3	-1	0	+1
87.60	59	63	59	60	87.60	0	+1	-3	+1	0
93.31	29	29	29	30	93.30	-1	+1	+1	+1	0
98.05	06	06	02	04	98.05	0	-1	-1	+3	+1
104.73	73	75	74	72	104.73	0	0	-2	-1	+1
109.44	45	44	44	42	109.44	0	-1	0	0	+2

$m^2 = \frac{[v\,v]}{80} = \frac{105}{80} = 1.31 \frac{mm^2}{10^4}$; $m = 0.011$ mm

TABLE no.133

SCALING OFF WITH DIVIDER AND PLOTTING SCALE
Testperson 10

Series					Mean	Differences v (mm/100)				
1	2	3	4	5	(mm)	1	2	3	4	5
5.45	44	46	47	45	5.45	0	+1	-1	-2	0
10.27	27	28	24	25	10.26	-1	-1	-2	+2	+1
16.12	13	12	16	12	16.13	+1	0	+1	-3	+1
21.62	64	65	66	63	21.64	+2	0	-1	-2	+1
27.92	85	90	88	89	27.89	-3	+4	-1	+1	0
32.14	14	13	12	13	32.13	-1	-1	0	+1	0
38.95	96	95	93	96	38.95	0	-1	0	+2	-1
43.62	62	61	58	63	43.61	-1	-1	0	+3	-2
49.49	48	50	55	52	49.51	+2	+3	+1	-4	-1
54.27	33	30	32	33	54.31	+4	-2	+1	-1	-2
60.12	11	11	13	12	60.12	0	+1	+1	-1	0
65.88	92	89	96	91	65.91	+3	-1	+2	-5	0
71.66	54	56	61	53	71.58	-8	+4	+2	-3	+5
76.17	22	20	23	20	76.20	+3	-2	0	-3	0
82.92	96	93	94	93	82.94	+2	-2	+1	0	+1
87.63	62	64	62	65	87.63	0	+1	-1	+1	-2
93.28	36	31	30	29	93.31	+3	-5	0	+1	+2
98.04	05	06	04	06	98.05	+1	0	-1	+1	-1
104.66	68	66	67	69	104.67	+1	-1	+1	0	-2
109.38	46	42	45	43	109.43	+5	-3	+1	-2	0

$m^2 = \frac{[v\,v]}{80} = \frac{435}{80} = 5.44 \frac{mm^2}{10^4}$; $m = 0.023$ mm

TABLE no.134

SCALING OFF WITH DIVIDER AND PLOTTING SCALE Testperson 11										
Series					Mean (mm)	Differences v (mm/100)				
1	2	3	4	5		1	2	3	4	5
5.47	46	45	46	46	5.46	-1	0	+1	0	0
10.20	22	20	22	20	10.21	+1	-1	+1	-1	+1
16.09	07	07	06	07	16.07	-2	0	0	+1	0
21.55	52	53	54	55	21.54	-1	+2	+1	0	-1
27.73	75	73	73	76	27.74	+1	-1	+1	+1	-2
32.03	01	00	02	03	32.02	-1	+1	+2	0	-1
38.75	74	73	75	76	38.75	0	+1	+2	0	-1
43.45	43	43	46	46	43.45	0	+2	+2	-1	-1
49.36	34	36	37	38	49.36	0	+2	0	-1	-2
54.18	18	20	22	22	54.20	+2	+2	0	-2	-2
60.00	02	00	02	02	60.01	+1	-1	+1	-1	-1
65.76	75	73	75	74	65.75	-1	0	+2	0	+1
71.39	36	36	38	39	71.38	-1	+2	+2	0	-1
76.05	05	05	07	08	76.06	+1	+1	+1	-1	-2
82.73	75	74	74	76	82.74	+1	-1	0	0	-2
87.44	43	46	45	47	87.45	+1	+2	-1	0	-2
93.10	10	12	11	10	93.11	+1	+1	-1	0	+1
97.93	94	94	93	93	97.93	0	-1	-1	0	0
104.55	53	52	53	52	104.53	-2	0	+1	0	+1
109.25	22	25	21	24	109.23	-2	+1	-2	+2	-1

$m^2 = \frac{[vv]}{80} = \frac{146}{80} = 1.82 \frac{mm^2}{10^4}$; $m = 0.013$ mm

TABLE no.135

SCALING OFF WITH DIVIDER AND PLOTTING SCALE Testperson 12										
Series					Mean (mm)	Differences v (mm/100)				
1	2	3	4	5		1	2	3	4	5
5.44	43	45	45	45	5.44	0	+1	-1	-1	-1
10.21	26	28	22	28	10.25	+4	-1	-3	+3	-3
16.12	10	15	10	15	16.12	0	+2	-3	+2	-3
21.69	62	66	64	65	21.65	-4	+3	-1	+1	0
27.77	82	83	82	85	27.82	+5	0	-1	0	-3
32.14	15	17	09	13	32.14	0	-1	-3	+5	+1
38.85	91	92	87	94	38.90	+5	-1	-2	+3	-4
43.60	59	48	50	55	43.54	-6	-5	+6	+4	-1
49.47	52	45	50	51	49.49	+2	-3	+4	-1	-2
54.36	29	32	37	35	54.34	-2	+5	+2	-3	-1
60.17	18	18	18	19	60.18	+1	0	0	0	-1
65.96	94	93	95	88	65.93	-3	-1	0	-2	+5
71.54	55	57	65	55	71.57	+3	+2	0	-8	+2
76.26	26	23	22	17	76.23	-3	-3	0	+1	+6
82.95	95	89	88	89	82.91	-4	-4	+2	+3	+2
87.62	54	62	58	65	87.60	-2	+6	-2	+2	-5
93.33	35	28	26	33	93.31	-2	-4	+3	+5	-2
98.06	04	00	05	05	98.04	-2	0	+4	-1	-1
104.68	63	72	77	75	104.71	+3	+8	-1	-6	-4
109.39	37	49	38	35	109.40	+1	+3	-9	+2	+5

$m^2 = \frac{[vv]}{80} = \frac{1043}{80} = 13.04 \frac{mm^2}{10^4}$; $m = 0.036$ mm

TABLE no.136

SCALING OFF WITH DIVIDER AND PLOTTING SCALE Testperson 13										
Series					Mean (mm)	Differences v (mm/100)				
1	2	3	4	5		1	2	3	4	5
5.52	57	43	53	58	5.53	+1	-4	+10	0	-5
10.35	32	32	26	34	10.32	-3	0	0	+6	-2
16.12	14	12	18	14	16.14	+2	0	+2	-4	0
21.66	73	64	66	67	21.67	+1	-6	+3	+1	0
27.88	89	86	87	84	27.87	-1	-2	+1	0	+3
32.12	07	10	12	14	32.11	-1	+4	+1	-1	-3
38.88	87	90	85	90	38.88	0	+1	-2	+3	-2
43.56	56	57	56	56	43.56	0	0	-1	0	0
49.42	48	46	48	44	49.46	+4	-2	0	-2	+2
54.32	26	32	33	36	54.32	0	+6	0	-1	-4
60.00	14	08	06	10	60.08	+8	-6	0	+2	-2
65.96	84	88	86	94	65.90	-6	+6	+2	+4	-4
71.55	53	53	62	57	71.56	+1	+3	+3	-6	-1
76.28	16	16	13	18	76.18	-10	+2	+2	+5	0
82.94	90	93	93	87	82.91	-3	+1	-2	-2	+4
87.57	63	57	60	54	87.58	+1	-5	+1	-2	+4
93.28	18	23	22	28	93.24	-4	+6	+1	+2	-4
98.06	02	00	08	12	98.06	0	+4	+6	-2	-6
104.68	68	58	64	67	104.65	-3	-3	+7	+1	-2
109.38	34	38	42	38	109.38	0	+4	0	-4	0

$m^2 = \frac{[v\,v]}{80} = \frac{1160}{80} = 14.5\ \frac{mm^2}{10^4}$; m = 0.038 mm

TABLE no.137

SCALING OFF WITH PLEXIGLASS SCALE Testperson 4										
Series					Mean (mm)	Differences v (mm/20)				
1	2	3	4	5		1	2	3	4	5
5.45	45	45	45	45	5.45	0	0	0	0	0
10.20	20	15	20	20	10.20	0	0	+1	0	0
16.15	10	10	10	15	16.10	-1	0	0	0	-1
21.75	65	65	70	65	21.70	-1	+1	+1	0	+1
27.90	90	85	85	85	27.85	-1	-1	0	0	0
32.05	10	05	05	05	32.05	0	-1	0	0	0
38.95	95	95	9.00	95	38.95	0	0	0	-1	0
43.65	60	60	65	60	43.60	-1	0	0	-1	0
49.55	55	55	55	50	49.55	0	0	0	0	+1
54.35	35	30	30	35	54.35	0	0	+1	+1	0
60.10	10	15	10	15	60.10	0	0	-1	0	-1
65.90	90	85	90	90	65.90	0	0	+1	0	0
71.55	50	50	55	60	71.55	0	+1	+1	0	-1
76.15	20	15	20	20	76.20	+1	0	+1	0	0
82.95	95	95	3.00	95	82.95	0	0	0	-1	0
87.60	65	60	65	60	87.60	0	-1	0	-1	0
93.30	35	30	30	35	93.30	0	-1	0	0	-1
98.05	10	10	05	10	98.10	+1	0	0	+1	0
104.75	75	70	75	70	104.75	0	0	+1	0	+1
109.45	40	45	50	45	109.45	0	+1	0	-1	0

$m^2 = \frac{[v\,v]}{80} = \frac{35}{80} = 0.44\ \frac{mm^2}{400}$; m = 0.66 x 0.05 mm = 0.033 mm

TABLE no.138

SCALING OFF WITH PLEXIGLASS SCALE
Testperson 10

Series					Mean	Differences v (mm/20)				
1	2	3	4	5	(mm)	1	2	3	4	5
5.50	45	45	50	45	5.45	- 1	0	0	- 1	0
10.30	35	35	35	30	10.35	+ 1	0	0	0	+ 1
16.20	20	20	15	20	16.20	0	0	0	+ 1	0
21.70	70	70	65	70	21.70	0	0	0	+ 1	0
27.85	80	85	80	80	27.80	- 1	0	- 1	0	0
32.15	20	20	15	20	32.20	+ 1	0	0	+ 1	0
38.95	85	90	90	85	38.90	- 1	+ 1	0	0	+ 1
43.65	65	60	55	60	43.60	- 1	- 1	0	+ 1	0
49.60	60	60	65	60	49.60	0	0	0	- 1	0
54.40	45	35	45	40	54.40	0	- 1	+ 1	- 1	0
60.20	20	20	20	20	60.20	0	0	0	0	0
65.85	90	80	85	80	65.85	0	- 1	+ 1	0	+ 1
71.60	60	55	60	60	71.60	0	0	+ 1	0	0
76.25	20	20	25	20	76.20	- 1	0	0	- 1	0
82.95	95	85	90	95	82.90	- 1	- 1	+ 1	0	- 1
87.65	60	65	65	65	87.65	0	+ 1	0	0	0
93.35	35	35	30	35	93.35	0	0	0	+ 1	0
98.15	10	10	20	15	98.15	0	+ 1	+ 1	- 1	0
104.75	70	70	65	70	104.70	- 1	0	0	+ 1	0
109.50	45	50	45	45	109.45	- 1	0	- 1	0	0

$m^2 = \frac{[v\,v]}{80} = \frac{39}{80} = 0.49\ \frac{mm^2}{400}$; m = 0.7 x 0.05 mm = 0.035 mm

TABLE no.139

SCALING OFF WITH PLEXIGLASS SCALE
Testperson 11

Series					Mean	Differences v (mm/20)				
1	2	3	4	5	(mm)	1	2	3	4	5
5.50	45	50	50	50	5.50	0	+ 1	0	0	0
10.30	30	35	30	30	10.30	0	0	- 1	0	0
16.20	15	15	15	15	16.15	- 1	0	0	0	0
21.65	60	60	65	60	21.60	- 1	0	0	- 1	0
27.75	80	80	80	80	27.80	+ 1	0	0	0	0
32.05	10	10	05	10	32.10	+ 1	0	0	+ 1	0
38.90	90	85	90	90	38.90	0	0	+ 1	0	0
43.55	50	55	50	55	43.55	0	+ 1	0	+ 1	0
49.45	40	45	40	45	49.45	0	+ 1	0	+ 1	0
54.30	30	30	35	30	54.30	0	0	0	- 1	0
60.05	10	05	05	05	60.05	0	- 1	0	0	0
65.85	85	90	85	85	65.85	0	0	- 1	0	0
71.45	50	45	45	50	71.45	0	- 1	0	0	- 1
76.15	10	15	15	15	76.15	0	+ 1	0	0	0
82.85	90	90	90	90	82.90	+ 1	0	0	0	0
87.50	50	55	50	50	87.50	0	0	- 1	0	0
93.30	30	30	30	30	93.30	0	0	0	0	0
98.05	00	05	05	05	98.05	0	+ 1	0	0	0
104.70	70	70	75	75	104.70	0	0	0	- 1	- 1
109.40	40	35	40	40	109.40	0	0	+ 1	0	0

$m^2 = \frac{[v\,v]}{80} = \frac{25}{80} = 0.31\ \frac{mm^2}{400}$; m = 0.56 x 0.05 mm = 0.028 mm

TABLE no.140

SCALING OFF WITH PLEXIGLASS SCALE

Testperson 12

Series					Mean	Differences v (mm/20)				
1	2	3	4	5	(mm)	1	2	3	4	5
5.45	45	45	45	45	5.45	0	0	0	0	0
10.35	35	30	35	30	10.35	0	0	+1	0	+1
16.25	25	15	20	20	16.20	-1	-1	+1	0	0
21.75	75	75	70	75	21.75	0	0	0	+1	0
27.80	85	85	80	85	27.85	+1	0	0	+1	0
32.20	15	15	15	20	32.15	-1	0	0	0	-1
38.85	85	85	85	85	38.85	0	0	0	0	0
43.55	55	55	55	55	43.55	0	0	0	0	0
49.55	50	50	50	55	49.50	-1	0	0	0	-1
54.35	35	40	35	45	54.40	+1	+1	0	+1	-1
60.15	20	15	15	15	60.15	0	-1	0	0	0
65.85	80	85	85	80	65.85	0	+1	0	0	+1
71.55	55	50	55	45	71.50	-1	-1	0	-1	+1
76.25	25	35	30	25	76.30	+1	+1	-1	0	+1
82.85	90	90	85	85	82.85	0	-1	-1	0	0
87.55	55	60	65	60	87.60	+1	+1	0	-1	0
93.30	25	30	30	30	93.30	0	+1	0	0	0
98.05	05	10	10	05	98.05	0	0	-1	-1	0
104.70	75	75	70	75	104.75	+1	0	0	+1	0
109.45	40	40	45	45	109.45	0	+1	+1	0	0

$m^2 = \frac{[vv]}{80} = \frac{39}{80} = 0.49 \frac{mm^2}{400}$; m = 0.7 x 0.05 mm = 0.035 mm

TABLE no.141

SCALING OFF WITH PLEXIGLASS SCALE

Testperson 13

Series					Mean	Differences v (mm/20)				
1	2	3	4	5	(mm)	1	2	3	4	5
5.55	40	55	50	50	5.50	-1	+2	-1	0	0
10.20	25	30	30	30	10.25	+1	0	-1	-1	-1
16.15	10	15	10	15	16.15	0	+1	0	+1	0
21.65	70	65	65	65	21.65	0	-1	0	0	0
27.95	95	90	85	85	27.90	-1	-1	0	+1	+1
32.15	15	10	15	20	32.15	0	0	+1	0	-1
38.95	95	90	95	95	38.95	0	0	+1	0	0
43.60	65	55	50	55	43.55	-1	-2	0	+1	0
49.45	50	60	45	45	49.50	+1	0	-2	+1	+1
54.30	35	35	30	25	54.30	0	-1	-1	0	+1
60.05	15	15	15	15	60.15	+2	0	0	0	0
65.95	95	90	95	90	65.95	0	0	+1	0	+1
71.55	55	65	40	45	71.50	-1	-1	-3	+2	+1
76.20	25	20	15	20	76.20	0	-1	0	+1	0
82.95	95	90	90	90	82.90	-1	-1	0	0	0
87.60	65	60	60	55	87.60	0	-1	0	0	+1
93.30	35	25	25	25	93.30	0	-1	+1	+1	+1
98.10	10	10	10	05	98.10	0	0	0	0	+1
104.75	75	65	70	70	104.70	-1	-1	+1	0	0
109.40	35	30	35	30	109.35	-1	0	+1	0	+1

$m^2 = \frac{[vv]}{80} = \frac{75}{80} = 0.94 \frac{mm^2}{400}$; m = 0.97 x 0.05 mm = 0.048 mm

TABLE no.142

Plotted distances (mm)	SCALED OFF WITH DIVIDER AND PLOTTING SCALE										SCALED OFF WITH PLEXIGLASS SCALE									
	Scaled off by testperson					Plotted distance minus scaled off (mm/100)					Scaled off by testperson					Plotted distance minus scaled off (mm/100)				
	4	10	11	12	13	v_4	v_{10}	v_{11}	v_{12}	v_{13}	4	10	11	12	13	v_4	v_{10}	v_{11}	v_{12}	v_{13}
5.43	5.44	5.45	5.46	5.44	5.53	- 1	- 2	- 3	- 1	-10	5.45	5.45	5.50	5.45	5.50	- 2	- 2	- 7	- 2	- 7
10.22	10.21	10.26	10.21	10.25	10.32	+ 1	- 4	+ 1	- 3	-10	10.20	10.35	10.30	10.35	10.25	+ 2	-13	- 8	-13	- 3
16.11	16.06	16.13	16.07	16.12	16.14	+ 5	- 2	+ 4	- 1	- 3	16.10	16.20	16.15	16.20	16.15	+ 1	- 9	- 4	- 9	- 4
21.70	21.66	21.64	21.54	21.65	21.67	+ 4	+ 6	+16	+ 5	+ 3	21.70	21.70	21.60	21.75	21.65	0	0	+10	- 5	+ 5
27.89	27.86	27.89	27.74	27.82	27.87	+ 3	0	+15	+ 7	+ 2	27.85	27.80	27.80	27.85	27.90	+ 4	+ 9	+ 9	+ 4	- 1
32.08	32.01	32.13	32.02	32.14	32.11	+ 7	- 5	+ 6	- 6	- 3	32.05	32.20	32.10	32.15	32.15	+ 3	-12	- 2	- 7	- 7
38.97	38.95	38.95	38.75	38.90	38.88	+ 2	+ 2	+22	+ 7	+ 9	38.95	38.90	38.90	38.85	38.95	+ 2	+ 7	+ 7	+12	+ 2
43.66	43.60	43.61	43.45	43.54	43.56	+ 6	+ 5	+21	+12	+10	43.60	43.60	43.55	43.55	43.55	+ 6	+ 6	+11	+11	+11
49.55	49.55	49.51	49.36	49.49	49.46	0	+ 4	+19	+ 6	+ 9	49.55	49.60	49.45	49.50	49.50	0	- 5	+10	+ 5	+ 5
54.34	54.27	54.31	54.20	54.34	54.32	+ 7	+ 3	+14	0	+ 2	54.35	54.40	54.30	54.40	54.30	- 1	- 6	+ 4	- 6	+ 4
60.13	60.09	60.12	60.01	60.18	60.08	+ 4	+ 1	+12	- 5	+ 5	60.10	60.20	60.05	60.15	60.15	+ 3	- 7	+ 8	- 2	- 2
65.89	65.85	65.91	65.75	65.93	65.90	+ 4	- 2	+14	- 4	- 1	65.90	65.85	65.85	65.85	65.95	- 1	+ 4	+ 4	+ 4	- 6
71.57	71.49	71.58	71.38	71.57	71.56	+ 8	- 1	+19	0	+ 1	71.55	71.60	71.45	71.50	71.50	+ 2	- 3	+12	+ 7	+ 7
76.21	76.15	76.20	76.06	76.23	76.18	+ 6	+ 1	+15	- 2	+ 3	76.20	76.20	76.15	76.30	76.20	+ 1	+ 1	+ 6	- 9	+ 1
82.95	82.93	82.94	82.74	82.91	82.91	+ 2	+ 1	+21	+ 4	+ 4	82.95	82.90	82.90	82.85	82.90	0	+ 5	+ 5	+10	+ 5
87.64	87.60	87.63	87.45	87.60	87.58	+ 4	+ 1	+19	+ 4	+ 6	87.60	87.65	87.50	87.60	87.60	+ 4	- 1	+14	+ 4	+ 4
93.30	93.30	93.31	93.11	93.31	93.24	0	- 1	+19	- 1	+ 6	93.30	93.35	93.30	93.30	93.30	0	- 5	0	0	0
98.08	98.05	98.05	97.93	98.04	98.06	+ 3	+ 3	+15	+ 4	+ 2	98.10	98.15	98.05	98.05	98.10	- 2	- 7	+ 3	+ 3	- 2
104.72	104.73	104.67	104.53	104.71	104.65	- 1	+ 5	+19	+ 1	+ 7	104.75	104.70	104.70	104.75	104.70	- 3	+ 2	+ 2	- 3	+ 2
109.46	109.44	109.43	109.23	109.40	109.38	+ 2	+ 3	+23	+ 6	+ 8	109.45	109.45	109.40	109.45	109.35	+ 1	+ 1	+ 6	+ 1	+11
						+66	+18	+291	+33	+50						+20	-35	+90	+ 5	+25
Table	133	134	135	136	137						138	139	140	141	142					

TABLE no.143

SCALING OFF WITH ENGINEER SCALE

Testperson 4

Series					Mean (mm)	Differences v (mm/20)				
1	2	3	4	5		1	2	3	4	5
5.45	45	40	45	40	5.45	0	0	+1	0	+1
10.20	20	15	20	15	10.20	0	0	+1	0	+1
16.10	15	10	10	05	16.10	0	-1	0	0	+1
21.70	65	65	70	70	21.70	0	+1	+1	0	0
27.90	80	85	90	90	27.85	-1	+1	0	-1	-1
32.05	05	00	00	05	32.05	0	0	+1	+1	0
38.95	95	90	95	9.00	38.95	0	0	+1	0	-1
43.65	60	60	60	65	43.60	-1	0	0	0	-1
49.55	50	50	50	55	49.50	-1	0	0	0	-1
54.35	30	25	25	35	54.30	-1	0	+1	+1	-1
60.15	10	05	05	10	60.10	-1	0	+1	+1	0
65.85	90	80	80	85	65.85	0	-1	+1	+1	0
71.55	50	50	60	55	71.55	0	+1	+1	-1	0
76.15	15	15	20	10	76.15	0	0	0	-1	+1
82.85	90	95	95	90	82.90	+1	0	-1	-1	0
87.60	60	60	65	55	87.60	0	0	0	-1	+1
93.30	25	20	30	20	93.25	-1	0	+1	-1	+1
98.05	10	00	05	00	98.05	0	-1	+1	0	+1
104.75	75	65	65	65	104.70	-1	-1	+1	+1	+1
109.50	40	40	45	45	109.45	-1	+1	+1	0	0

$m^2 = \frac{[vv]}{80} = \frac{55}{80} = 0.69 \frac{mm^2}{400}$; m = 0.83 x 0.05 mm = 0.042 mm

TABLE no.144

SCALING OFF WITH ENGINEER SCALE

Testperson 3

Series					Mean (mm)	Differences v (mm/20)				
1	2	3	4	5		1	2	3	4	5
5.55	55	55	50	55	5.55	0	0	0	+1	0
10.20	20	20	20	20	10.20	0	0	0	0	0
16.20	20	15	10	15	16.15	-1	-1	0	+1	0
21.65	65	65	60	65	21.65	0	0	0	+1	0
27.85	80	80	80	80	27.80	-1	0	0	0	0
32.00	1.95	1.95	1.90	05	31.95	-1	0	0	+1	-2
38.85	85	80	85	85	38.85	0	0	+1	0	0
43.70	55	60	55	70	43.60	-2	+1	0	+1	-2
49.65	55	55	60	60	49.60	-1	+1	+1	0	0
54.35	30	30	30	30	54.30	-1	0	0	0	0
60.05	05	05	05	10	60.05	0	0	0	0	-1
65.85	85	85	80	80	65.85	0	0	0	+1	+1
71.45	45	55	45	45	71.45	0	0	-2	0	0
76.20	20	20	20	20	76.20	0	0	0	0	0
82.85	85	80	85	85	82.85	0	0	+1	0	0
87.65	60	55	65	60	87.60	-1	0	+1	-1	0
93.30	20	15	20	30	93.25	-1	+1	+2	+1	-1
97.95	8.05	8.05	90	8.05	98.00	+1	-1	-1	+2	-1
104.70	70	65	55	70	104.65	-1	-1	0	+2	-1
109.40	30	40	35	40	109.35	-1	+1	-1	0	-1

$m^2 = \frac{[vv]}{80} = \frac{65}{80} = 0.81 \frac{mm^2}{400}$; m = 0.9 x 0.05 mm = 0.045 mm

TABLE no.145

SCALING OFF WITH ENGINEER SCALE Testperson 14										
Series					Mean (mm)	Differences v (mm/20)				
1	2	3	4	5		1	2	3	4	5
5.55	55	60	50	55	5.55	0	0	-1	+1	0
10.30	25	30	20	20	10.25	-1	0	-1	+1	+1
16.15	20	25	20	10	16.20	+1	0	-1	0	+2
21.70	60	60	70	60	21.65	-1	+1	+1	-1	+1
27.80	80	80	80	70	27.80	0	0	0	0	+2
32.05	10	00	05	05	32.05	0	-1	+1	0	0
38.80	80	80	90	90	38.85	+1	+1	+1	-1	-1
43.70	60	70	70	55	43.65	-1	+1	-1	-1	+2
49.60	70	70	60	60	49.65	+1	-1	-1	+1	+1
54.40	40	40	40	30	54.40	0	0	0	0	+2
60.05	10	00	05	00	60.05	0	-1	+1	0	+1
65.95	90	90	90	90	65.90	-1	0	0	0	0
71.60	60	60	60	60	71.60	0	0	0	0	0
76.25	25	20	20	10	76.20	-1	-1	0	0	+2
82.80	90	95	95	90	82.90	+2	0	-1	-1	0
87.60	60	60	60	70	87.60	0	0	0	0	-2
93.20	25	25	20	25	93.25	+1	0	0	+1	0
98.05	10	10	05	05	98.05	0	-1	-1	0	0
104.70	60	60	60	75	104.65	-1	+1	+1	+1	-2
109.40	40	30	40	40	109.40	0	0	+2	0	0

$m^2 = \frac{[vv]}{80} = \frac{81}{80} = 1.01 \frac{mm^2}{400}$; m = 1.0 x 0.05 mm = 0.050 mm

TABLE no.146

SCALING OFF WITH ENGINEER SCALE Testperson 2										
Series					Mean (mm)	Differences v (mm/20)				
1	2	3	4	5		1	2	3	4	5
5.50	45	40	45	50	5.45	-1	0	+1	0	-1
10.20	15	15	15	15	10.15	-1	0	0	0	0
16.05	10	10	05	05	16.05	0	-1	-1	0	0
21.75	75	75	70	80	21.75	0	0	0	+1	-1
27.90	90	90	85	90	27.90	0	0	0	+1	0
32.15	15	10	15	15	32.15	0	0	+1	0	0
38.95	95	9.00	9.00	9.00	39.00	+1	+1	0	0	0
43.80	75	65	65	75	43.70	-2	-1	+1	+1	-1
49.70	70	75	70	65	49.70	0	0	-1	0	+1
54.45	35	45	45	40	54.40	-1	+1	-1	-1	0
60.20	15	15	15	10	60.15	-1	0	0	0	+1
65.90	95	90	90	90	65.90	0	-1	0	0	0
71.55	70	65	65	60	71.65	+2	-1	0	0	+1
76.20	15	20	20	15	76.20	0	+1	0	0	+1
83.00	05	05	2.90	2.95	83.00	0	-1	-1	+2	+1
87.85	75	75	70	70	87.75	-2	0	0	+1	+1
93.20	30	20	20	20	93.20	0	-2	0	0	0
98.10	10	05	10	10	98.10	0	0	+1	0	0
104.85	90	75	85	75	104.80	-1	-2	+1	-1	+1
109.50	50	55	50	50	109.50	0	0	-1	0	0

$m^2 = \frac{[vv]}{80} = \frac{64}{80} = 0.80 \frac{mm^2}{400}$; m = 0.89 x 0.05 mm = 0.044 mm

TABLE no.147

SCALING OFF WITH ENGINEER SCALE Testperson 15											Plotted distances (mm)	SCALED OFF WITH ENGINEER SCALE									
Series					Mean (mm)	Differences v (mm/20)						Scaled off by testperson					Plotted distance minus scaled off (mm/100)				
1	2	3	4	5		1	2	3	4	5		4	3	14	2	15	v_4	v_3	v_{14}	v_2	v_{15}
5.45	50	50	45	45	5.45	0	-1	-1	0	0	5.43	5.45	5.55	5.55	5.45	5.45	- 2	-12	-12	- 2	- 2
10.25	25	25	25	20	10.25	0	0	0	0	+1	10.22	10.20	10.20	10.25	10.15	10.25	+2	+ 2	- 3	+ 7	- 3
16.10	15	05	15	10	16.10	0	-1	+1	-1	0	16.11	16.10	16.15	16.20	16.05	16.10	+ 1	- 4	- 9	+ 6	+ 1
21.70	70	65	75	70	21.70	0	0	+1	-1	0	21.70	21.70	21.65	21.65	21.75	21.70	0	+ 5	+ 5	- 5	0
27.95	90	90	90	90	27.90	-1	0	0	0	0	27.89	27.85	27.80	27.80	27.90	27.90	+ 4	+ 9	+ 9	- 1	- 1
32.15	10	20	15	15	32.15	0	+1	-1	0	0	32.08	32.05	31.95	32.05	32.15	32.15	+ 3	+13	+ 3	- 7	- 7
39.00	8.95	00	8.95	8.95	38.95	-1	0	-1	0	0	38.97	38.95	38.85	38.85	39.00	38.95	+ 2	+12	+12	- 3	+ 2
43.60	60	65	65	70	43.65	+1	+1	0	0	-1	43.66	43.60	43.60	43.65	43.70	43.65	+ 6	+ 6	+ 1	- 4	+ 1
49.65	65	65	70	65	49.65	0	0	0	-1	0	49.55	49.50	49.60	49.65	49.70	49.65	+ 5	- 5	-10	-15	-10
54.45	40	45	40	40	54.40	-1	0	-1	0	0	54.34	54.30	54.30	54.40	54.40	54.40	+ 4	+ 4	- 6	- 6	- 6
60.15	15	15	15	15	60.15	0	0	0	0	0	60.13	60.10	60.05	60.05	60.15	60.15	+ 3	+ 8	+ 8	- 2	- 2
65.95	90	90	90	90	65.90	-1	0	0	0	0	65.89	65.85	65.85	65.90	65.90	65.90	+ 4	+ 4	- 1	- 1	- 1
71.55	60	60	60	60	71.60	+1	0	0	0	0	71.57	71.55	71.45	71.60	71.65	71.60	+ 2	+12	- 3	- 8	- 3
76.20	20	25	25	25	76.25	+1	+1	0	0	0	76.21	76.15	76.20	76.20	76.20	76.25	+ 6	+ 1	+ 1	+ 1	- 4
82.95	95	95	95	95	82.95	0	0	0	0	0	82.95	82.90	82.85	82.90	83.00	82.95	+ 5	+10	+ 5	- 5	0
87.65	65	65	70	70	87.65	0	0	0	-1	-1	87.64	87.60	87.60	87.60	87.75	87.65	+ 4	+ 4	+ 4	-11	- 1
93.35	25	35	30	30	93.30	-1	+1	-1	0	0	93.30	93.25	93.25	93.25	93.20	93.30	+ 5	+ 5	+ 5	+10	0
98.05	10	10	10	10	98.10	+1	0	0	0	0	98.08	98.05	98.00	98.05	98.10	98.10	+ 3	+ 8	+ 3	- 2	- 2
104.75	80	85	80	75	104.80	+1	0	-1	0	+1	104.72	104.70	104.65	104.65	104.80	104.80	+ 2	+ 7	+ 7	- 8	- 8
109.50	55	60	60	55	109.55	+1	0	-1	-1	0	109.46	109.45	109.35	109.40	109.50	109.55	+ 1	+11	+ 6	- 4	- 9
																	+60	+100	+25	-60	-55
$m^2 = \frac{[vv]}{80} = \frac{35}{80} = 0.44 \frac{mm^2}{400}$; m = 0.66 x 0.05 mm = 0.033 mm											Table	144	145	146	147	148					

TABLE no.148

TABLE no.149

APPENDIX VI

Determination of m_6

Tables 150-154

The determination of m_θ by the testpersons 9, 16, 4, 11 and 17 is combined with the determination of m_ϑ and m_{10}. The points V_i (i= 2→30) (fig. 8) plotted on an emulsified undeveloped photographic plate 30 x 30 cm with a coordinatograph Coradi - by testperson no.9 for instance - given in table 150, are the same as the corresponding points in table 210 for the same testperson. In table 150 they were used to determine m_θ; through these points no.9 drew pencil lines $V_iQ_iP_i$ perpendicular to AB. On these lines points P_i and Q_i were plotted with an opening of the divider of 10 and 5 cm respectively. The distances between the plotted points P_i and Q_i and the corresponding pencil lines were used to determine m_ϑ (for testperson no.9 tables 190 and 195). Finally the distances AV_i, DP_i and EQ_i between A, D and E and the pencil lines through points i were the bases for the determination of m_{10} (for no.9 tables 210 - 213).

As for the determination of m_θ in tables 150 - 154 it may be noted that the amounts f for 4 of the 5 testpersons are mostly negative, which means that the pencil lines were drawn through or along that part of the plotted point where the triangle was placed. The same tendency is shown in determining m_θ.[61] In the latter the mean systematic error $\frac{[f]}{n}$ is about - 50μ, in the former, where more observations were made - 7, - 42, - 22, + 6 and - 52μ respectively (mean about -24μ).

From $v_i = f_i - \frac{[f]}{n}$ m_θ was computed. The amounts m_θ = 46,54,25,33 and 58μ with a mean value of 42μ are also tabulated in table fig.9.

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[61] see fig.6 and the amounts f_1 and f_{16} by the points 1 and 16 in table 176.

9	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{29}$
No	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	200	135	+ 13 [1]	310	290	+ 4	+ 8	+ 15
3	505	470	+ 7	875	872	+ 1	+ 4	+ 11
4	778	770	+ 2	125	084	+ 8	+ 5	+ 12
5	748	725	+ 5	440	372	+ 14	+ 10	+ 17
6	991	991	0	636	601	+ 7	+ 4	+ 11
7	350	232	+ 24	560	393	+ 33	+ 28	+ 35
8	372	048	+ 65	582	206	+ 75	+ 70	+ 77
9	334	401	- 13	950	975	- 5	- 9	- 2
10	589	833	- 49	500	770	- 54	- 52	- 45
11	208	626	- 84	892	1335	- 89	- 86	- 79
12	110	626	-103	590	1082	- 98	-100	- 93
13	451	696	- 49	483	738	- 51	- 50	- 43
14	711	915	- 41	949	1219	- 54	- 48	- 41
15	263	122	+ 28	935	800	+ 27	+ 28	+ 35
16	598	560	+ 8	731	680	+ 10	+ 9	+ 16
17	708	907	- 40	238	392	- 31	- 36	- 29
18	1040	983	+ 11	090	070	+ 4	+ 8	+ 15
19	049	060	- 2	861	870	- 2	- 2	+ 5
20	960	818	+ 28	670	475	+ 39	+ 34	+ 41
21	1063	580	+ 97	846	362	+ 97	+ 97	+104
22	300	296	+ 1	356	361	- 1	0	+ 7
23	680	698	- 4	660	665	- 1	- 2	+ 5
24	105	170	- 13	390	410	- 4	- 8	- 1
25	508	470	+ 8	978	930	+ 10	+ 9	+ 16
26	801	719	+ 16	691	650	+ 8	+ 12	+ 19
27	1208	920	+ 58	1261	985	+ 55	+ 56	+ 63
28	255	293	- 8	013	066	- 11	- 10	- 3
29	530.	918	- 78	426	868	- 88	- 83	- 76
30	376	815	- 88	352	836	- 97	- 92	- 85
Testperson 9						[f] =	-196	
[vv] = 61243 $m^2 = 2112\mu^2$ $m = 46\mu$						$\frac{[f]}{29}$ =	- 7	

[1] $2\mu(20.0 - 13.5) = +13\mu$

TABLE no.150

16	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{29}$
No	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	078	557	- 96	880	1362	- 96	- 96	- 54
3	179	731	-110	720	1270	-110	-110	- 68
4	361	470	- 22	560	676	- 23	- 22	+ 20
5	109	652	-109	060	610	-110	-110	- 68
6	076	700	-125	970	1584	-123	-124	- 82
7	442	596	- 31	195	357	- 32	- 32	+ 10
8	230	850	-124	465	1133	-134	-129	- 87
9	350	475	- 25	320	462	- 28	- 26	+ 16
10	023	281	- 52	440	738	- 60	- 56	- 14
11	328	402	- 15	062	141	- 16	- 16	+ 26
12	180	763	-117	065	685	-124	-120	- 78
13	741	1338	-119	110	730	-124	-122	- 80
14	218	386	- 34	932	1120	- 38	- 36	+ 6
15	837	912	- 15	222	298	- 15	- 15	+ 27
16	570	622	- 10	195	239	- 9	- 10	+ 32
17	000	773	-155	100	890	-158	-156	-114
18	190	405	- 43	050	290	- 48	- 46	- 4
19	140	152	- 2	140	162	- 4	- 3	+ 39
20	208	210	0	330	330	0	0	+ 42
21	890	983	- 19	980	1098	- 24	- 22	+ 20
22	981	1145	- 33	000	170	- 34	- 34	+ 8
23	398	470	- 14	861	916	- 11	- 12	+ 30
24	293	243	+ 10	922	868	+ 11	+ 10	+ 52
25	401	350	+ 10	891	833	+ 12	+ 11	+ 53
26	253	031	+ 44	228	000	+ 46	+ 45	+ 87
27	1080	921	+ 32	1035	880	+ 31	+ 32	+ 74
28	270	152	+ 24	1125	996	+ 26	+ 25	+ 67
29	051	145	- 19	900	992	- 18	- 18	+ 24
30	170	242	- 14	373	440	- 13	- 14	+ 28
Testperson 16						$[f] =$	-1206	
$[vv] = 84426$ $m^2 = 2911\mu^2$ $m = 54\mu$						$\frac{[f]}{29} =$	- 42	

TABLE no.151

4	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{29}$
No	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	370	526	- 31	294	427	- 27	- 29	- 7
3	459	542	- 17	465	541	- 15	- 16	+ 6
4	420	768	- 70	220	530	- 62	- 66	- 44
5	959	1170	- 42	174	358	- 37	- 40	- 18
6	922	1038	- 23	563	678	- 23	- 23	- 1
7	861	1250	- 78	933	1340	- 81	- 80	- 58
8	768	184	+ 17	218	185	+ 7	+ 12	+ 34
9	168	196	- 6	478	520	- 8	- 7	+ 15
10	998	1212	- 43	366	580	- 43	- 43	- 21
11	072	175	- 21	347	496	- 30	- 26	- 4
12	286	395	- 22	420	539	- 24	- 23	- 1
13	330	246	+ 17	990	940	+ 10	+ 14	+ 36
14	860	901	- 8	389	485	- 19	- 14	+ 8
15	025	030	- 1	381	380	0	0	+ 22
16	970	983	- 3	818	832	- 3	- 3	+ 19
17	893	935	- 8	000	077	- 15	- 12	+ 10
18	942	1328	- 77	251	626	- 75	- 76	- 54
19	907	925	- 4	261	282	- 4	- 4	+ 18
20	012	185	- 35	439	645	- 41	- 38	- 16
21	076	047	+ 6	277	260	+ 3	+ 4	+ 26
22	166	161	+ 1	389	412	- 5	- 2	+ 20
23	110	228	- 24	408	541	- 27	- 26	- 4
24	200	130	+ 14	970	895	+ 15	+ 14	+ 36
25	811	988	- 35	210	393	- 37	- 36	- 14
26	100	105	- 1	270	280	- 2	- 2	+ 20
27	926	1110	- 37	175	382	- 41	- 39	- 17
28	998	1250	- 50	481	746	- 53	- 52	- 30
29	790	925	- 27	960	1105	- 29	- 28	- 6
30	771	815	- 9	462	492	- 6	- 8	+ 14
Testperson 4						$[f] =$	-649	
$[vv] = 17755$ $m^2 = 612\mu^2$ $m = 25\mu$						$\frac{[f]}{29} =$	- 22	

TABLE no.152

11	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{29}$
No	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	240	362	- 24	448	556	- 22	- 23	- 29
3	040	205	- 33	438	614	- 35	- 34	- 40
4	031	242	- 42	175	376	- 40	- 41	- 47
5	160	068	+ 18	230	142	+ 18	+ 18	+ 12
6	090	265	- 35	450	640	- 38	- 36	- 42
7	070	212	- 28	104	238	- 27	- 28	- 34
8	389	281	+ 22	1065	964	+ 20	+ 21	+ 15
9	402	540	- 28	810	952	- 28	- 28	- 34
10	320	470	- 30	526	661	- 27	- 28	- 34
11	556	738	- 36	330	520	- 38	- 37	- 43
12	312	418	- 21	063	176	- 23	- 22	- 28
13	410	221	+ 38	1053	870	+ 37	+ 38	+ 32
14	1145	980	+ 33	240	082	+ 32	+ 32	+ 26
15	1342	980	+ 72	528	174	+ 71	+ 72	+ 66
16	850	820	+ 6	350	324	+ 5	+ 6	0
17	592	592	0	128	130	0	0	- 6
18	464	440	+ 5	248	226	+ 4	+ 4	- 2
19	780	787	- 1	952	960	- 2	- 2	- 8
20	1100	930	+ 34	685	475	+ 42	+ 38	+ 32
21	1088	932	+ 31	223	070	+ 31	+ 31	+ 25
22	258	148	+ 22	240	142	+ 20	+ 21	+ 15
23	682	792	- 22	198	320	- 24	- 23	- 29
24	540	130	+ 82	625	208	+ 83	+ 82	+ 76
25	610	550	+ 12	703	590	+ 23	+ 18	+ 12
26	405	340	+ 13	582	468	+ 23	+ 18	+ 12
27	630	552	+ 16	1003	923	+ 16	+ 16	+ 10
28	950	1019	- 14	273	352	- 16	- 15	- 21
29	887	779	+ 22	432	241	+ 38	+ 30	+ 24
30	1143	860	+ 57	1100	835	+ 53	+ 55	+ 49
Testperson 11						$[f] =$	+183	
$[vv] = 31341$ $m^2 = 1081\mu^2$ $m = 33\mu$						$\frac{[f]}{29} =$	+ 6	

TABLE no.153

17	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{29}$
No	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	302	847	-109	911	1420	-102	-106	- 54
3	430	1005	-115	921	1470	-110	-112	- 60
4	956	1741	-157	836	1618	-156	-156	-104
5	833	1472	-128	065	690	-125	-126	- 74
6	321	870	-110	358	903	-109	-110	- 58
7	239	970	-146	389	1132	-149	-148	- 96
8	1098	710	+ 78	1083	693	+ 78	+ 78	+130
9	001	130	- 26	410	530	- 24	- 25	+ 27
10	262	410	- 30	534	665	- 26	- 28	+ 24
11	552	996	- 89	950	1370	- 84	- 86	- 34
12	413	825	- 82	970	1372	- 80	- 81	- 29
13	340	551	- 42	035	244	- 42	- 42	+ 10
14	120	324	- 41	239	436	- 39	- 40	+ 12
15	922	1064	- 28	231	360	- 26	- 27	+ 25
16	570	480	+ 18	1056	969	+ 17	+ 18	+ 70
17	581	720	- 28	157	282	- 25	- 26	+ 26
18	100	371	- 54	658	919	- 52	- 53	- 1
19	811	1047	- 47	290	510	- 44	- 46	+ 6
20	009	236	- 45	348	570	- 44	- 44	+ 8
21	032	410	- 76	128	510	- 76	- 76	- 24
22	640	630	+ 2	514	502	+ 2	+ 2	+ 54
23	445	321	+ 25	401	275	+ 25	+ 25	+ 77
24	381	526	- 29	309	461	- 30	- 30	+ 22
25	000	742	-148	880	1623	-149	-148	- 96
26	080	299	- 44	240	442	- 40	- 42	+ 10
27	838	1360	-104	298	826	-106	-105	- 53
28	618	343	+ 55	349	087	+ 52	+ 54	+106
29	310	460	- 30	333	476	- 29	- 30	+ 22
30	558	558	0	945	945	0	0	+ 52
Testperson 17						$[f] =$	-1510	
$[vv] = 98590$ $m^2 = 3400\mu^2$ $m = 58\mu$						$\frac{[f]}{29} =$	- 52	

TABLE no.154

APPENDIX VII

Determination of m_7

Tables 155-165

See also fig. 4 and 5.

Observations by 5 testpersons and computation of the amounts f_i in tables 155 - 164. Recapitulation in table 165 where the amounts $M = \frac{[f]}{n}$, $v_i = f_i - \frac{[f]}{n}$ and $m_7^2 = \frac{[vv]}{160}$ are computed. $m_7 = 42\mu$ is, for safety's sake, rounded off to 45μ.

See also Appendix IX.

Testperson 4													
I	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	652	562	1469	- 181[1]	- 163	- 18	156	068	954	- 177	- 160	- 17	- 18
2		190	1155	- 193	- 160	- 33		080	1049	- 194	- 157	- 37	- 35
3		085	1061	- 195	- 156	- 39		322	1280	- 192	- 154	- 38	- 38
4		811	1886	- 215	- 153	- 62		895	1947	- 210	- 151	- 59	- 60
5		620	1686	- 213	- 150	- 63		000	1080	- 216	- 148	- 68	- 66
6		520	1607	- 217	- 147	- 70		047	1150	- 221	- 145	- 76	- 73
7		240	1340	- 220	- 143	- 77		190	1307	- 223	- 142	- 81	- 79
8		150	1201	- 210	- 140	- 70		454	1514	- 212	- 139	- 73	- 72
9		012	1050	- 208	- 137	- 71		687	1729	- 208	- 135	- 73	- 72
10		800	1845	- 209	- 134	- 75		858	1886	- 206	- 132	- 74	- 74
11		400	1429	- 206	- 130	- 76		971	1990	- 204	- 129	- 75	- 76
12		176	1155	- 196	- 127	- 69		089	1070	- 196	- 126	- 70	- 70
13		976	1944	- 194	- 124	- 70		161	1110	- 190	- 123	- 67	- 68
14		839	1704	- 173	- 121	- 52		340	1189	- 170	- 120	- 50	- 51
15		478	1310	- 166	- 117	- 49		475	1293	- 164	- 117	- 47	- 48
16	211	042	782	- 148	- 114	- 34	795	627	1365	- 148	- 114	- 34	- 34

[1]) $2\mu(56.2 - 146.9) = -181\mu$

TABLE no.155

Testperson 4													
Li	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	565	850	1868	- 204	- 261	+ 57	550	848	1858	- 202	- 262	+ 60	+ 58
2		754	1799	- 209	- 258	+ 49		877	1905	- 206	- 259	+ 53	+ 51
3		904	1932	- 206	- 255	+ 49		950	1976	- 205	- 256	+ 51	+ 50
4		920	1972	- 210	- 252	+ 42		020	1041	- 204	- 253	+ 49	+ 46
5		110	1190	- 216	- 250	+ 34		878	1960	- 216	- 251	+ 35	+ 34
6		122	1182	- 212	- 247	+ 35		020	1105	- 217	- 248	+ 31	+ 33
7		092	1205	- 223	- 244	+ 21		039	1166	- 225	- 245	+ 20	+ 20
8		134	1265	- 226	- 241	+ 15		020	1180	- 232	- 242	+ 10	+ 12
9		252	1360	- 222	- 238	+ 16		022	1126	- 221	- 239	+ 18	+ 17
10		360	1411	- 210	- 235	+ 25		123	1200	- 215	- 236	+ 21	+ 23
11		404	1428	- 205	- 232	+ 27		159	1199	- 208	- 233	+ 25	+ 26
12		410	1425	- 203	- 229	+ 26		196	1231	- 207	- 230	+ 23	+ 24
13		513	1445	- 186	- 227	+ 41		298	1238	- 188	- 228	+ 40	+ 40
14		492	1450	- 192	- 224	+ 32		243	1220	- 195	- 225	+ 30	+ 31
15		075	905	- 166	- 221	+ 55		363	1202	- 168	- 222	+ 54	+ 54
16	750	981	1840	- 172	- 218	+ 46	955	1190	2052	- 172	- 219	+ 47	+ 46

TABLE no.156

Testperson 9													
III	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	112	003	1402	- 280	- 258	- 22	1070	958	2358	- 280	- 258	- 22	- 22
2		244	1671	- 285	- 255	- 30		971	2420	- 290	- 255	- 35	- 32
3		332	1731	- 280	- 252	- 28		990	2408	- 284	- 252	- 32	- 30
4		261	1663	- 280	- 249	- 31		060	1480	- 284	- 249	- 35	- 33
5		265	1720	- 291	- 246	- 45		077	1522	- 289	- 246	- 43	- 44
6		283	1718	- 287	- 243	- 44		200	1645	- 289	- 243	- 46	- 45
7		409	1775	- 273	- 240	- 33		300	1680	- 276	- 240	- 36	- 34
8		425	1786	- 272	- 237	- 35		448	1800	- 270	- 237	- 33	- 34
9		510	1850	- 268	- 233	- 35		090	1437	- 269	- 235	- 34	- 34
10		682	1939	- 251	- 230	- 21		237	1500	- 253	- 232	- 21	- 21
11		758	1965	- 241	- 227	- 14		310	1524	- 243	- 229	- 14	- 14
12		800	1952	- 230	- 224	- 6		420	1554	- 227	- 226	- 1	- 4
13		938	1960	- 204	- 221	+ 17		506	1550	- 209	- 223	+ 14	+ 16
14		015	974	- 192	- 218	+ 26		569	1538	- 194	- 220	+ 26	+ 26
15		996	1955	- 192	- 215	+ 23		542	1520	- 196	- 217	+ 21	+ 22
16	851	930	1910	- 196	- 212	+ 16	310	396	1379	- 197	- 214	+ 17	+ 16

TABLE no.157

Testperson 9													
IV	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	114	245	1460	- 243	- 269	+ 26	019	149	1372	- 245	- 271	+ 26	+ 26
2		122	1375	- 251	- 267	+ 16		186	1437	- 250	- 269	+ 19	+ 18
3		150	1436	- 257	- 266	+ 9		190	1490	- 260	- 267	+ 7	+ 8
4		110	1356	- 249	- 264	+ 15		235	1471	- 247	- 265	+ 18	+ 16
5		108	1349	- 248	- 262	+ 14		250	1480	- 246	- 264	+ 18	+ 16
6		132	1360	- 246	- 260	+ 14		390	1613	- 245	- 262	+ 17	+ 16
7		130	1350	- 244	- 259	+ 15		340	1552	- 242	- 260	+ 18	+ 16
8		163	1380	- 243	- 257	+ 14		470	1678	- 242	- 258	+ 16	+ 15
9		322	1440	- 224	- 255	+ 31		685	1790	- 221	- 256	+ 35	+ 33
10		410	1507	- 219	- 253	+ 34		771	1855	- 217	- 254	+ 37	+ 36
11		474	1540	- 213	- 252	+ 39		490	1570	- 216	- 252	+ 36	+ 38
12		437	1540	- 221	- 250	+ 29		038	1132	- 219	- 250	+ 31	+ 30
13		461	1542	- 216	- 248	+ 32		086	1154	- 214	- 249	+ 35	+ 34
14		446	1546	- 220	- 246	+ 26		019	1126	- 221	- 247	+ 26	+ 26
15		375	1526	- 230	- 245	+ 15		975	2113	- 228	- 245	+ 17	+ 16
16	276	238	1493	- 251	- 243	- 8	840	798	2055	- 251	- 243	- 8	- 8

TABLE no.158

Testperson 18													
V	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	1010	898	1757	- 172	- 149	- 23	356	238	1100	- 172	- 149	- 23	- 23
2		005	862	- 171	- 155	- 16		355	1228	- 175	- 154	- 21	- 18
3		115	1010	- 179	- 160	- 19		452	1360	- 182	- 160	- 22	- 20
4		153	1090	- 187	- 166	- 21		520	1475	- 191	- 165	- 26	- 24
5		197	1189	- 198	- 171	- 27		500	1500	- 200	- 170	- 30	- 28
6		258	1258	- 200	- 177	- 23		781	1789	- 202	- 176	- 26	- 24
7		461	1416	- 191	- 182	- 9		820	1799	- 196	- 181	- 15	- 12
8		366	1472	- 221	- 188	- 33		732	1830	- 220	- 186	- 34	- 34
9		571	1610	- 208	- 193	- 15		022	1087	- 213	- 192	- 21	- 18
10		656	1718	- 212	- 199	- 13		112	1185	- 215	- 197	- 18	- 16
11		910	1950	- 208	- 204	- 4		317	1348	- 206	- 202	- 4	- 4
12		955	2011	- 211	- 210	- 1		396	1471	- 215	- 208	- 7	- 4
13		912	2069	- 231	- 215	- 16		430	1608	- 236	- 213	- 23	- 20
14		950	2130	- 236	- 221	- 15		475	1683	- 242	- 218	- 24	- 20
15		913	2170	- 251	- 226	- 25		437	1689	- 250	- 224	- 26	- 26
16	1091	883	2250	- 273	- 232	- 41	665	460	1809	- 270	- 229	- 41	- 41

TABLE no.159

Testperson 18													
VI	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	963	820	1626	- 161	- 133	- 28	275	122	917	- 159	- 128	- 31	- 30
2		023	706	- 137	- 139	+ 2		370	1052	- 136	- 135	- 1	0
3		075	866	- 158	- 146	- 12		368	1160	- 158	- 141	- 17	- 14
4		040	940	- 180	- 152	- 28		361	1259	- 180	- 148	- 32	- 30
5		936	2051	- 223	- 159	- 64		170	1270	- 220	- 154	- 66	- 65
6		230	1600	- 274	- 165	- 109		051	1430	- 276	- 161	- 115	- 112
7		291	1721	- 286	- 171	- 115		120	1548	- 286	- 167	- 119	- 117
8		388	1762	- 275	- 178	- 97		257	1652	- 279	- 174	- 105	- 101
9		475	1919	- 289	- 184	- 105		350	1805	- 291	- 180	- 111	- 108
10		378	1996	- 324	- 191	- 133		252	1875	- 325	- 187	- 138	- 136
11		600	2105	- 301	- 197	- 104		484	1996	- 302	- 193	- 109	- 106
12		704	2170	- 293	- 203	- 90		552	2032	- 296	- 200	- 96	- 93
13		826	2242	- 283	- 210	- 73		666	2118	- 290	- 206	- 84	- 78
14		923	2326	- 281	- 216	- 65		763	2175	- 282	- 213	- 69	- 67
15		903	2396	- 299	- 223	- 76		698	2188	- 298	- 219	- 79	- 78
16	1300	993	2445	- 290	- 229	- 61	1076	763	2205	- 288	- 226	- 62	- 62

TABLE no.160

Testperson 7													
VII	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	540	812	1272	- 92	- 146	+ 54	917	1190	1671	- 96	- 151	+ 55	+ 54
2		908	1370	- 92	- 152	+ 60		320	780	- 92	- 157	+ 65	+ 62
3		890	1510	- 124	- 159	+ 35		185	818	- 127	- 163	+ 36	+ 36
4		842	1552	- 142	- 165	+ 23		242	988	- 149	- 169	+ 20	+ 22
5		905	1690	- 157	- 171	+ 14		212	1038	- 165	- 175	+ 10	+ 12
6		831	1777	- 189	- 178	- 11		248	1190	- 188	- 181	- 7	- 9
7		906	1918	- 202	- 184	- 18		300	1320	- 204	- 187	- 17	- 18
8		977	1981	- 201	- 190	- 11		420	1443	- 205	- 193	- 12	- 12
9		056	1130	- 215	- 197	- 18		478	1550	- 214	- 199	- 15	- 16
10		122	1251	- 226	- 203	- 23		535	1660	- 225	- 205	- 20	- 22
11		270	1364	- 219	- 209	- 10		632	1731	- 220	- 211	- 9	- 10
12		375	1430	- 211	- 216	+ 5		763	1826	- 213	- 217	+ 4	+ 4
13		450	1520	- 214	- 222	+ 8		790	1880	- 218	- 223	+ 5	+ 6
14		500	1580	- 216	- 228	+ 12		848	1947	- 220	- 229	+ 9	+ 10
15		570	1625	- 211	- 235	+ 24		880	1958	- 216	- 235	+ 19	+ 22
16	476	682	1681	- 200	- 241	+ 41	720	902	1923	- 204	- 241	+ 37	+ 39

TABLE no.161

Testperson 7													
VIII	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	715	678	1416	- 148	- 140	- 8	600	557	1321	- 153	- 144	- 9	- 8
2		855	1335	- 96	- 146	+ 50		972	1452	- 96	- 150	+ 54	+ 52
3		880	1470	- 118	- 152	+ 34		995	1565	- 114	- 156	+ 42	+ 38
4		990	1547	- 111	- 157	+ 46		080	654	- 115	- 161	+ 46	+ 46
5		025	655	- 126	- 163	+ 37		018	680	- 132	- 167	+ 35	+ 36
6		951	1743	- 158	- 169	+ 11		042	856	- 163	- 173	+ 10	+ 10
7		070	868	- 160	- 175	+ 15		192	990	- 160	- 179	+ 19	+ 17
8		148	960	- 162	- 181	+ 19		290	1110	- 164	- 185	+ 21	+ 20
9		348	1087	- 148	- 186	+ 38		430	1192	- 152	- 190	+ 38	+ 38
10		385	1221	- 167	- 192	+ 25		478	1315	- 167	- 196	+ 29	+ 27
11		318	1330	- 202	- 198	- 4		412	1423	- 202	- 202	0	- 2
12		312	1400	- 218	- 204	- 14		420	1505	- 217	- 208	- 9	- 12
13		350	1480	- 226	- 210	- 16		441	1570	- 226	- 214	- 12	- 14
14		322	1530	- 242	- 215	- 27		420	1635	- 243	- 219	- 24	- 26
15		355	1580	- 245	- 221	- 24		440	1685	- 249	- 225	- 24	- 24
16	495	528	1630	- 220	- 227	+ 7	497	530	1650	- 224	- 231	+ 7	+ 7

TABLE no.162

Testperson 6													
IX	First Series (Obs. Mr. Breemans)						Second Series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	$L_i-P_i = P_iL_i$	$A_i-P_i = P_iA_i$	$P_iL_i-P_iA_i = A_iL_i$	Point A_i	Line L_i	Plate P_i	$L_i-P_i = P_iL_i$	$A_i-P_i = P_iA_i$	$P_iL_i-P_iA_i = A_iL_i$	mean (μ)
1	370	582	1110	- 106	- 148	+ 42	985	1198	1736	- 108	- 150	+ 42	+ 42
2		755	1182	- 85	- 155	+ 70		432	870	- 88	- 157	+ 69	+ 70
3		848	1400	- 110	- 162	+ 52		360	910	- 110	- 164	+ 54	+ 53
4		750	1448	- 140	- 169	+ 29		386	1062	- 135	- 171	+ 36	+ 32
5		881	1567	- 137	- 176	+ 39		400	1085	- 137	- 179	+ 42	+ 40
6		918	1660	- 148	- 183	+ 35		515	1260	- 149	- 186	+ 37	+ 36
7		960	1812	- 170	- 190	+ 20		413	1278	- 173	- 193	+ 20	+ 20
8		030	880	- 170	- 197	+ 27		541	1391	- 170	- 200	+ 30	+ 28
9		091	1002	- 182	- 205	+ 23		736	1648	- 182	- 207	+ 25	+ 24
10		118	1120	- 200	- 212	+ 12		742	1750	- 202	- 214	+ 12	+ 12
11		188	1230	- 208	- 219	+ 11		818	1850	- 206	- 221	+ 15	+ 13
12		312	1306	- 199	- 226	+ 27		910	1920	- 202	- 228	+ 26	+ 26
13		423	1380	- 191	- 233	+ 42		025	976	- 190	- 236	+ 46	+ 44
14		692	1454	- 152	- 240	+ 88		270	1032	- 152	- 243	+ 91	+ 90
15		840	1530	- 138	- 247	+ 109		382	1102	- 144	- 250	+ 106	+ 108
16	300	798	1570	- 154	- 254	+ 100	820	1340	2103	- 153	- 257	+ 104	+ 102

TABLE no.163

Testperson 6													
X	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	$L_i-P_i = P_iL_i$	$A_i-P_i = P_iA_i$	$P_iL_i-P_iA_i = A_iL_i$	Point A_i	Line L_i	Plate P_i	$L_i-P_i = P_iL_i$	$A_i-P_i = P_iA_i$	$P_iL_i-P_iA_i = A_iL_i$	mean (μ)
1	024	243	1190	- 189	- 233	+ 44	113	332	1290	- 192	- 235	+ 43	+ 44
2		995	2103	- 222	- 239	+ 17		260	1366	- 221	- 241	+ 20	+ 18
3		030	1177	- 229	- 245	+ 16		242	1397	- 231	- 246	+ 15	+ 16
4		993	2194	- 240	- 251	+ 11		220	1442	- 244	- 252	+ 8	+ 10
5		920	2222	- 260	- 256	- 4		092	1400	- 262	- 258	- 4	- 4
6		880	2236	- 271	- 262	- 9		113	1500	- 277	- 263	- 14	- 12
7		938	2316	- 276	- 268	- 8		122	1552	- 286	- 269	- 17	- 12
8		961	2321	- 272	- 274	+ 2		248	1608	- 272	- 275	+ 3	+ 2
9		965	2380	- 283	- 280	- 3		195	1660	- 293	- 280	- 13	- 8
10		984	2448	- 293	- 286	- 7		151	1686	- 307	- 286	- 21	- 14
11		935	2502	- 313	- 292	- 21		148	1718	- 314	- 292	- 22	- 22
12		885	2495	- 322	- 298	- 24		151	1755	- 321	- 297	- 24	- 24
13		850	2508	- 332	- 303	- 29		118	1752	- 327	- 303	- 24	- 26
14		792	2511	- 344	- 309	- 35		040	1763	- 345	- 309	- 36	- 36
15		784	2500	- 343	- 315	- 28		014	1740	- 345	- 314	- 31	- 30
16	876	706	2483	- 355	- 321	- 34	1112	942	2710	- 354	- 320	- 34	- 34

TABLE no.164

DETERMINATION OF m_7 RECAPITULATION TABLES 155 - 164

Line	f_1	f_2	f_3	f_4	f_5	f_6	f_7	f_8	f_9	f_{10}	f_{11}	f_{12}	f_{13}	f_{14}	f_{15}	f_{16}
I	- 18	- 35	- 38	- 60	- 66	- 73	- 79	- 72	- 72	- 74	- 76	- 70	- 68	- 51	- 48	- 34
II	+ 58	+ 51	+ 50	+ 46	+ 34	+ 33	+ 20	+ 12	+ 17	+ 23	+ 26	+ 24	+ 40	+ 31	+ 54	+ 46
III	- 22	- 32	- 30	- 33	- 44	- 45	- 34	- 34	- 34	- 21	- 14	- 4	+ 16	+ 26	+ 22	+ 16
IV	+ 26	+ 18	+ 8	+ 16	+ 16	+ 16	+ 16	+ 15	+ 33	+ 36	+ 38	+ 30	+ 34	+ 26	+ 16	- 8
V	- 23	- 18	- 20	- 24	- 28	- 24	- 12	- 34	- 18	- 16	- 4	- 4	- 20	- 20	- 26	- 41
VI	- 30	0	- 14	- 30	- 65	-112	-117	-101	-108	-136	-106	- 93	- 78	- 67	- 78	- 62
VII	+ 54	+ 62	+ 36	+ 22	+ 12	- 9	- 18	- 12	- 16	- 22	- 10	+ 4	+ 6	+ 10	+ 22	+ 39
VIII	- 8	+ 52	+ 38	+ 46	+ 36	+ 10	+ 17	+ 20	+ 38	+ 27	- 2	- 12	- 14	- 26	- 24	+ 7
IX	+ 42	+ 70	+ 53	+ 32	+ 40	+ 36	+ 20	+ 28	+ 24	+ 12	+ 13	+ 26	+ 44	+ 90	+108	+102
X	+ 44	+ 18	+ 16	+ 10	- 4	- 12	- 12	+ 2	- 8	- 14	- 22	- 24	- 26	- 36	- 30	- 34
M	+ 12	+ 19	+ 10	+ 2	- 7	- 18	- 20	- 18	- 14	- 18	- 16	- 12	- 7	- 2	+ 2	+ 3
	v_1	v_2	v_3	v_4	v_5	v_6	v_7	v_8	v_9	v_{10}	v_{11}	v_{12}	v_{13}	v_{14}	v_{15}	v_{16}
I	- 30	- 54	- 48	- 62	- 59	- 55	- 59	- 54	- 58	- 56	- 60	- 58	- 61	- 49	- 50	- 37
II	+ 46	+ 32	+ 40	+ 44	+ 41	+ 51	+ 40	+ 30	+ 31	+ 41	+ 42	+ 36	+ 47	+ 33	+ 52	+ 43
III	- 34	- 51	- 40	- 35	- 37	- 27	- 14	- 16	- 20	- 3	+ 2	+ 8	+ 23	+ 28	+ 20	+ 13
IV	+ 14	- 1	- 2	+ 14	+ 23	+ 34	+ 36	+ 33	+ 47	+ 54	+ 54	+ 42	+ 41	+ 28	+ 14	- 11
V	- 35	- 37	- 30	- 26	- 21	- 6	+ 8	- 16	- 4	+ 2	+ 12	+ 8	- 13	- 18	- 28	- 44
VI	- 42	- 19	- 24	- 32	- 58	- 94	- 97	- 83	- 94	-118	- 90	- 81	- 71	- 65	- 80	- 65
VII	+ 42	+ 43	+ 26	+ 20	+ 19	+ 9	+ 2	+ 6	- 2	- 4	+ 6	+ 16	+ 13	+ 12	+ 20	+ 36
VIII	- 20	+ 33	+ 28	+ 44	+ 43	+ 28	+ 37	+ 38	+ 52	+ 45	+ 14	0	- 7	- 24	- 26	+ 4
IX	+ 30	+ 51	+ 43	+ 30	+ 47	+ 54	+ 40	+ 46	+ 38	+ 30	+ 29	+ 38	+ 51	+ 92	+106	+ 99
X	+ 32	- 1	+ 6	+ 8	+ 3	+ 6	+ 8	+ 20	+ 6	+ 4	- 6	- 12	- 19	- 34	- 32	- 37

$m^2 = \frac{[v\,v]}{160} = \frac{280808}{160} = 1755\mu^2$; $m = 42\mu$

TABLE no.165

APPENDIX VIII

Determination of m_8

Tables 166-176

See also fig. 6.

m_8 is determined in the same way as m_7. Tables 166 - 175 with the observations of the 5 x 2 pencil lines by 5 testpersons and the recapitulation in table 176 are arranged conformably to tables 155 - 165 (Appendix VII). For the deviations f in points 1 and 16 (table 176) see also Appendix VI, determination of m_6.

m_8, computed at 33μ, is, for safety's sake, rounded off to 40μ.

See also Appendix IX.

Testperson 4													
I	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	451	382	1185	- 161 [1]	- 147	- 14	895	822	1630	- 162	- 147	- 15	- 14
2		482	1312	- 166	- 146	- 20		798	1635	- 167	- 146	- 21	- 20
3		359	1123	- 153	- 144	- 9		820	1584	- 153	- 145	- 8	- 8
4		365	1100	- 147	- 143	- 4		899	1638	- 148	- 143	- 5	- 4
5		396	1090	- 139	- 142	+ 3		957	1664	- 141	- 142	+ 1	+ 2
6		363	1080	- 143	- 141	- 2		862	1579	- 143	- 141	- 2	- 2
7		314	1050	- 147	- 139	- 8		832	1564	- 146	- 140	- 6	- 7
8		173	949	- 155	- 138	- 17		650	1430	- 156	- 139	- 17	- 17
9		260	964	- 141	- 137	- 4		782	1480	- 140	- 137	- 3	- 4
10		261	970	- 142	- 136	- 6		800	1499	- 140	- 136	- 4	- 5
11		235	962	- 145	- 134	- 11		750	1460	- 142	- 135	- 7	- 9
12		235	961	- 145	- 133	- 12		770	1505	- 147	- 134	- 13	- 12
13		122	905	- 157	- 132	- 25		680	1456	- 155	- 133	- 22	- 24
14		040	865	- 165	- 131	- 34		565	1390	- 165	- 131	- 34	- 34
15		970	1819	- 170	- 129	- 41		482	1322	- 168	- 130	- 38	- 40
16	1130	962	1770	- 162	- 128	- 34	638	483	1281	- 160	- 129	- 31	- 32

[1] 2μ (38.2 - 118.5) = - 161μ

TABLE no.166

Testperson 4													
II	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	963	660	2002	- 268	- 208	- 60	540	240	1578	- 268	- 208	- 60	- 60
2		733	2022	- 258	- 204	- 54		294	1590	- 259	- 204	- 55	- 54
3		730	2018	- 258	- 200	- 58		260	1540	- 256	- 200	- 56	- 57
4		782	2028	- 249	- 196	- 53		330	1575	- 249	- 196	- 53	- 53
5		894	2050	- 231	- 193	- 38		430	1593	- 233	- 192	- 41	- 40
6		014	1054	- 208	- 189	- 19		490	1538	- 210	- 188	- 22	- 20
7		024	1016	- 198	- 185	- 13		512	1513	- 200	- 184	- 16	- 14
8		012	986	- 195	- 181	- 14		501	1475	- 195	- 180	- 15	- 14
9		990	1970	- 196	- 177	- 19		488	1479	- 198	- 176	- 22	- 20
10		020	955	- 187	- 173	- 14		536	1480	- 189	- 172	- 17	- 16
11		062	972	- 182	- 169	- 13		562	1465	- 181	- 168	- 13	- 13
12		113	961	- 170	- 165	- 5		575	1439	- 173	- 164	- 9	- 7
13		050	910	- 172	- 162	- 10		526	1392	- 173	- 160	- 13	- 12
14		942	1860	- 184	- 158	- 26		394	1304	- 182	- 156	- 26	- 26
15		912	1810	- 180	- 154	- 26		370	1260	- 178	- 152	- 26	- 26
16	1053	904	1801	- 179	- 150	- 29	1256	1101	1998	- 179	- 148	- 31	- 30

TABLE no.167

Testperson 9													
III	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	310	146	855	- 142	- 109	- 33	1080	920	1623	- 141	- 109	- 32	- 32
2		130	881	- 150	- 114	- 36		938	1700	- 152	- 114	- 38	- 37
3		986	1835	- 170	- 119	- 51		850	1698	- 170	- 119	- 51	- 51
4		920	1831	- 182	- 124	- 58		872	1775	- 181	- 124	- 57	- 58
5		950	1857	- 181	- 130	- 51		915	1822	- 181	- 129	- 52	- 52
6		038	941	- 181	- 135	- 46		897	1802	- 181	- 134	- 47	- 46
7		000	909	- 182	- 140	- 42		920	1830	- 182	- 139	- 43	- 42
8		855	1814	- 192	- 145	- 47		780	1751	- 194	- 144	- 50	- 48
9		920	1800	- 176	- 150	- 26		028	880	- 170	- 149	- 21	- 24
10		962	1830	- 174	- 155	- 19		070	909	- 168	- 154	- 14	- 16
11		170	978	- 162	- 160	- 2		132	939	- 161	- 159	- 2	- 2
12		151	1000	- 170	- 165	- 5		098	960	- 172	- 164	- 8	- 6
13		112	972	- 172	- 171	- 1		094	958	- 173	- 169	- 4	- 2
14		120	980	- 172	- 176	+ 4		042	900	- 172	- 174	+ 2	+ 3
15		090	976	- 177	- 181	+ 4		942	1840	- 180	- 179	- 1	+ 2
16	050	070	980	- 182	- 186	+ 4	800	820	1720	- 180	- 184	+ 4	+ 4

TABLE no.168

Testperson 9													
IV	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	858	446	1392	- 189	- 107	- 82	1356	938	1900	- 192	- 109	- 83	- 82
2		378	1342	- 193	- 112	- 81		994	1960	- 193	- 114	- 79	- 80
3		286	1362	- 215	- 116	- 99		845	1906	- 212	- 119	- 93	- 96
4		375	1440	- 213	- 121	- 92		940	2003	- 213	- 123	- 90	- 91
5		420	1470	- 210	- 126	- 84		036	1089	- 211	- 128	- 83	- 84
6		507	1529	- 204	- 130	- 74		010	1032	- 204	- 133	- 71	- 72
7		462	1486	- 205	- 135	- 70		049	1090	- 208	- 138	- 70	- 70
8		410	1440	- 206	- 140	- 66		014	1053	- 208	- 143	- 65	- 66
9		520	1530	- 202	- 144	- 58		063	1086	- 205	- 147	- 58	- 58
10		530	1563	- 207	- 149	- 58		110	1135	- 205	- 152	- 53	- 56
11		542	1601	- 212	- 154	- 58		110	1162	- 210	- 157	- 53	- 56
12		620	1632	- 202	- 158	- 44		099	1110	- 202	- 162	- 40	- 42
13		505	1624	- 224	- 163	- 61		010	1141	- 226	- 167	- 59	- 60
14		525	1631	- 221	- 168	- 53		020	1120	- 220	- 171	- 49	- 51
15		430	1602	- 234	- 172	- 62		911	2082	- 234	- 176	- 58	- 60
16	720	420	1603	- 237	- 177	- 60	1026	733	1930	- 239	- 181	- 58	- 59

TABLE no.169

Testperson 18													
V	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	892	575	1376	- 160	- 97	- 63	773	452	1258	- 161	- 97	- 64	- 64
2		400	1420	- 204	- 103	- 101		336	1366	- 206	- 103	- 103	- 102
3		500	1456	- 191	- 108	- 83		376	1336	- 192	- 109	- 83	- 83
4		391	1437	- 209	- 114	- 95		430	1481	- 210	- 115	- 95	- 95
5		378	1505	- 225	- 120	- 105		410	1556	- 229	- 120	- 109	- 107
6		420	1530	- 222	- 125	- 97		440	1545	- 221	- 126	- 95	- 96
7		524	1560	- 207	- 131	- 76		496	1530	- 207	- 132	- 75	- 76
8		555	1551	- 199	- 137	- 62		460	1440	- 196	- 138	- 58	- 60
9		660	1623	- 193	- 142	- 51		572	1547	- 195	- 144	- 51	- 51
10		736	1692	- 191	- 148	- 43		630	1590	- 192	- 150	- 42	- 42
11		825	1753	- 186	- 154	- 32		671	1608	- 187	- 156	- 31	- 32
12		831	1780	- 190	- 159	- 31		702	1641	- 188	- 162	- 26	- 28
13		770	1781	- 202	- 165	- 37		650	1671	- 204	- 167	- 37	- 37
14		769	1791	- 204	- 171	- 33		623	1640	- 203	- 173	- 30	- 32
15		662	1813	- 230	- 176	- 54		449	1611	- 232	- 179	- 53	- 54
16	872	620	1784	- 233	- 182	- 51	522	278	1448	- 234	- 185	- 49	- 50

TABLE no.170

Testperson 18													
VI	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	714	612	1810	- 240	- 219	- 21	451	340	1550	- 242	- 220	- 22	- 22
2		600	1761	- 232	- 215	- 17		298	1470	- 234	- 216	- 18	- 18
3		611	1722	- 222	- 211	- 11		300	1420	- 224	- 212	- 12	- 12
4		597	1722	- 225	- 207	- 18		358	1480	- 224	- 208	- 16	- 17
5		570	1722	- 230	- 203	- 27		294	1450	- 231	- 204	- 27	- 27
6		545	1680	- 227	- 199	- 28		290	1409	- 224	- 200	- 24	- 26
7		492	1617	- 225	- 195	- 30		850	1960	- 222	- 196	- 26	- 28
8		513	1636	- 225	- 191	- 34		228	1364	- 227	- 192	- 35	- 34
9		520	1606	- 217	- 187	- 30		220	1316	- 219	- 188	- 31	- 30
10		491	1601	- 222	- 183	- 39		187	1294	- 221	- 184	- 37	- 38
11		268	1516	- 250	- 179	- 71		018	1266	- 250	- 180	- 70	- 70
12		320	1478	- 232	- 175	- 57		052	1221	- 234	- 176	- 58	- 58
13		160	1392	- 246	- 171	- 75		920	2142	- 244	- 172	- 72	- 74
14		045	1312	- 253	- 167	- 86		840	2093	- 251	- 168	- 83	- 84
15		030	1324	- 259	- 163	- 96		773	2052	- 256	- 164	- 92	- 94
16	520	090	1315	- 245	- 159	- 86	1114	692	1915	- 245	- 160	- 85	- 86

TABLE no.171

Testperson 7													
VII	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	$L_i-P_i = P_iL_i$	$A_i-P_i = P_iA_i$	$P_iL_i-P_iA_i = A_iL_i$	Point A_i	Line L_i	Plate P_i	$L_i-P_i = P_iL_i$	$A_i-P_i = P_iA_i$	$P_iL_i-P_iA_i = A_iL_i$	mean (μ)
1	950	408	1933	- 305	- 197	- 108	930	400	1922	- 304	- 198	- 106	- 107
2		531	1883	- 270	- 195	- 75		482	1835	- 271	- 196	- 75	- 75
3		505	1861	- 271	- 193	- 78		495	1877	- 276	- 194	- 82	- 80
4		540	1822	- 256	- 191	- 65		585	1876	- 258	- 192	- 66	- 66
5		520	1820	- 260	- 189	- 71		520	1820	- 260	- 190	- 70	- 70
6		426	1771	- 269	- 187	- 82		388	1750	- 272	- 188	- 84	- 83
7		304	1716	- 282	- 185	- 97		170	1575	- 281	- 186	- 95	- 96
8		210	1712	- 300	- 183	- 117		200	1700	- 300	- 184	- 116	- 116
9		220	1692	- 294	- 180	- 114		192	1670	- 296	- 181	- 115	- 114
10		250	1667	- 283	- 178	- 105		220	1636	- 283	- 179	- 104	- 104
11		317	1588	- 254	- 176	- 78		320	1585	- 253	- 177	- 76	- 77
12		250	1573	- 265	- 174	- 91		223	1552	- 266	- 175	- 91	- 91
13		134	1497	- 273	- 172	- 101		126	1490	- 273	- 173	- 100	- 100
14		040	1423	- 277	- 170	- 107		032	1422	- 278	- 171	- 107	- 107
15		957	2403	- 289	- 168	- 121		850	2290	- 288	- 169	- 119	- 120
16	589	162	1418	- 251	- 166	- 85	1399	975	2234	- 252	- 167	- 85	- 85

TABLE no.172

Testperson 7													
VIII	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	$L_i-P_i = P_iL_i$	$A_i-P_i = P_iA_i$	$P_iL_i-P_iA_i = A_iL_i$	Point A_i	Line L_i	Plate P_i	$L_i-P_i = P_iL_i$	$A_i-P_i = P_iA_i$	$P_iL_i-P_iA_i = A_iL_i$	mean (μ)
1	1156	888	2180	- 258	- 205	- 53	944	679	1965	- 257	- 204	- 53	- 53
2		920	2050	- 226	- 202	- 24		730	1866	- 227	- 201	- 26	- 25
3		025	1074	- 210	- 200	- 10		827	1868	- 208	- 199	- 9	- 10
4		917	2006	- 218	- 197	- 21		770	1859	- 218	- 196	- 22	- 22
5		911	1965	- 211	- 194	- 17		780	1845	- 213	- 194	- 19	- 18
6		940	1920	- 196	- 192	- 4		818	1810	- 198	- 191	- 7	- 6
7		941	1862	- 184	- 189	+ 5		750	1665	- 183	- 189	+ 6	+ 6
8		052	920	- 174	- 186	+ 12		872	1736	- 173	- 186	+ 13	+ 12
9		019	870	- 170	- 184	+ 14		820	1680	- 172	- 184	+ 12	+ 13
10		048	826	- 156	- 181	+ 25		864	1650	- 157	- 181	+ 24	+ 24
11		970	1756	- 157	- 178	+ 21		808	1603	- 159	- 179	+ 20	+ 20
12		798	1722	- 185	- 176	- 9		632	1562	- 186	- 176	- 10	- 10
13		790	1660	- 174	- 173	- 1		634	1492	- 172	- 174	+ 2	0
14		585	1590	- 201	- 170	- 31		452	1456	- 201	- 171	- 30	- 30
15		660	1591	- 186	- 168	- 18		445	1380	- 187	- 169	- 18	- 18
16	735	514	1559	- 209	- 165	- 44	378	156	1208	- 210	- 166	- 44	- 44

TABLE no.173

Testperson 6													
IX	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	825	338	1857	- 304	- 206	- 98	630	141	1666	- 305	- 207	- 98	- 98
2		350	1802	- 290	- 205	- 85		143	1604	- 292	- 206	- 86	- 86
3		449	1827	- 276	- 203	- 73		222	1618	- 279	- 204	- 75	- 74
4		525	1761	- 247	- 202	- 45		400	1636	- 247	- 203	- 44	- 44
5		598	1728	- 226	- 201	- 25		470	1609	- 228	- 201	- 27	- 26
6		649	1700	- 210	- 199	- 11		532	1595	- 213	- 200	- 13	- 12
7		633	1650	- 203	- 198	- 5		541	1551	- 202	- 199	- 3	- 4
8		594	1656	- 212	- 197	- 15		447	1520	- 215	- 197	- 18	- 16
9		640	1641	- 200	- 195	- 5		500	1491	- 198	- 196	- 2	- 4
10		656	1630	- 195	- 194	- 1		472	1441	- 194	- 194	0	0
11		614	1548	- 187	- 193	+ 6		448	1390	- 188	- 193	+ 5	+ 6
12		623	1510	- 177	- 191	+ 14		462	1351	- 178	- 192	+ 14	+ 14
13		522	1440	- 184	- 190	+ 6		408	1317	- 182	- 190	+ 8	+ 7
14		270	1354	- 217	- 189	- 28		230	1315	- 217	- 189	- 28	- 28
15		292	1371	- 216	- 187	- 29		195	1269	- 215	- 187	- 28	- 28
16	420	239	1351	- 222	- 186	- 36	1180	994	2110	- 223	- 186	- 37	- 36

TABLE no.174

Testperson 6													
X	First series (Obs. Mr. Breemans)						Second series (Obs. Mr. Breemans)						$A_iL_i = f_i$
i	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	Point A_i	Line L_i	Plate P_i	L_i-P_i $= P_iL_i$	A_i-P_i $= P_iA_i$	$P_iL_i-P_iA_i$ $= A_iL_i$	mean (μ)
1	670	585	2180	- 319	- 302	- 17	312	237	1826	- 318	- 303	- 15	- 16
2		565	2086	- 304	- 305	+ 1		230	1762	- 306	- 306	0	0
3		482	2020	- 308	- 309	+ 1		218	1750	- 306	- 310	+ 4	+ 2
4		480	2040	- 312	- 312	0		190	1750	- 312	- 313	+ 1	0
5		431	2020	- 318	- 315	- 3		111	1694	- 317	- 317	0	- 2
6		296	1973	- 335	- 319	- 16		000	1672	- 334	- 320	- 14	- 15
7		268	1940	- 334	- 322	- 12		852	2524	- 334	- 323	- 11	- 12
8		250	1943	- 339	- 325	- 14		880	2584	- 341	- 327	- 14	- 14
9		150	1929	- 356	- 329	- 27		772	2551	- 356	- 330	- 26	- 26
10		200	1896	- 339	- 332	- 7		766	2460	- 339	- 334	- 5	- 6
11		100	1850	- 350	- 335	- 15		741	2482	- 348	- 337	- 11	- 13
12		969	2790	- 364	- 339	- 25		600	2410	- 362	- 340	- 22	- 24
13		832	2730	- 380	- 342	- 38		434	2330	- 379	- 344	- 35	- 36
14		718	2633	- 383	- 345	- 38		346	2261	- 383	- 347	- 36	- 37
15		566	2645	- 416	- 349	- 67		180	2267	- 417	- 351	- 66	- 66
16	838	380	2597	- 443	- 352	- 91	1317	866	3087	- 444	- 354	- 90	- 90

TABLE no.175

DETERMINATION OF m_8 RECAPITULATION TABLES 166 - 175

Line	f_1	f_2	f_3	f_4	f_5	f_6	f_7	f_8	f_9	f_{10}	f_{11}	f_{12}	f_{13}	f_{14}	f_{15}	f_{16}
I	- 14	- 20	- 8	- 4	+ 2	- 2	- 7	- 17	- 4	- 5	- 9	- 12	- 24	- 34	- 40	- 32
II	- 60	- 54	- 57	- 53	- 40	- 20	- 14	- 14	- 20	- 16	- 13	- 7	- 12	- 26	- 26	- 30
III	- 32	- 37	- 51	- 58	- 52	- 46	- 42	- 48	- 24	- 16	- 2	- 6	- 2	+ 3	+ 2	+ 4
IV	- 82	- 80	- 96	- 91	- 84	- 72	- 70	- 66	- 58	- 56	- 56	- 42	- 60	- 51	- 60	- 59
V	- 64	-102	- 83	- 95	-107	- 96	- 76	- 60	- 51	- 42	- 32	- 28	- 37	- 32	- 54	- 50
VI	- 22	- 18	- 12	- 17	- 27	- 26	- 28	- 34	- 30	- 38	- 70	- 58	- 74	- 84	- 94	- 86
VII	-107	- 75	- 80	- 66	- 70	- 83	- 96	-116	-114	-104	- 77	- 91	-100	-107	-120	- 85
VIII	- 53	- 25	- 10	- 22	- 18	- 6	+ 6	+ 12	+ 13	+ 24	+ 20	- 10	0	- 30	- 18	- 44
IX	- 98	- 86	- 74	- 44	- 26	- 12	- 4	- 16	- 4	0	+ 6	+ 14	+ 7	- 28	- 28	- 36
X	- 16	0	+ 2	0	- 2	- 15	- 12	- 14	- 26	- 6	- 13	- 24	- 36	- 37	- 66	- 90
M	- 55	- 50	- 47	- 45	- 42	- 38	- 34	- 37	- 32	- 26	- 25	- 26	- 34	- 43	- 50	- 51
	v_1	v_2	v_3	v_4	v_5	v_6	v_7	v_8	v_9	v_{10}	v_{11}	v_{12}	v_{13}	v_{14}	v_{15}	v_{16}
I	+ 41	+ 30	+ 39	+ 41	+ 44	+ 36	+ 27	+ 20	+ 28	+ 21	+ 16	+ 14	+ 10	+ 9	+ 10	+ 19
II	- 5	- 4	- 10	- 8	+ 2	+ 18	+ 20	+ 23	+ 12	+ 10	+ 12	+ 19	+ 22	+ 17	+ 24	+ 21
III	+ 23	+ 13	- 4	- 13	- 10	- 8	- 8	- 11	+ 8	+ 10	+ 23	+ 20	+ 32	+ 46	+ 52	+ 55
IV	- 27	- 30	- 49	- 46	- 42	- 34	- 36	- 29	- 26	- 30	- 31	- 16	- 26	- 8	- 10	- 8
V	- 9	- 52	- 36	- 50	- 65	- 58	- 42	- 23	- 19	- 16	- 7	- 2	- 3	+ 11	- 4	+ 1
VI	+ 33	+ 32	+ 35	+ 28	+ 15	+ 12	+ 6	+ 3	+ 2	- 12	- 45	- 32	- 40	- 41	- 44	- 35
VII	- 52	- 25	- 33	- 21	- 28	- 45	- 62	- 79	- 82	- 78	- 52	- 65	- 66	- 64	- 70	- 34
VIII	+ 2	+ 25	+ 37	+ 23	+ 24	+ 32	+ 40	+ 49	+ 45	+ 50	+ 45	+ 16	+ 34	+ 13	+ 32	+ 7
IX	- 43	- 36	- 27	+ 1	+ 16	+ 26	+ 30	+ 21	+ 28	+ 26	+ 31	+ 40	+ 41	+ 15	+ 22	+ 15
X	+ 39	+ 50	+ 49	+ 45	+ 40	+ 23	+ 22	+ 23	+ 6	+ 20	+ 12	+ 2	- 2	+ 6	- 16	- 39

$m^2 = \frac{[vv]}{160} = \frac{170117}{160} = 1063\mu^2$; $m = 33\mu$

TABLE no.176

APPENDIX IX

Investigation whether the sides of triangles are true

Tables 178-188

In the standard errors m_7 and m_8 (see Appendix VII and VIII) the influence of the fact that the triangles used, were not true is included. In order to trace this influence ten different right angled triangles of helios and celluloid with a thickness between 1 and 2 mm and with the hypotenuse ranging from 16 to 32 cm were checked in the following way.

The triangle was laid in the comparator on a sheet of white paper, the hypotenuse in the longitudinal direction of the instrument.

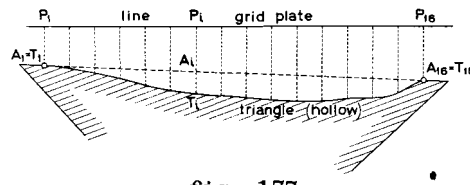

fig. 177

A gridplate, the etched side downward, was put on it so that one of the lines almost coincided with the hypotenuse of the triangle (fig. 177).

The distances P_iT_i ($i = 1 \rightarrow 16$) were measured with the comparator along 15 cm of the hypotenuse (at 16 points). From these observations (tables 178 - 187) the amounts $f_i = A_iT_i = P_iT_i - P_iA_i$ could be computed. For each of the triangles checked T_1T_{16} is chosen in the centre of the hypotenuse. The hypotenuse is hollow for f_i positive (e.g. nrs. IV and VI), bulging for f_i negative (e.g. nrs. VIII and X). The amounts f_i are recapitulated in table 188. From their mean value M it follows that the "mean" triangle is true. Triangles I - X and M are shown in fig. 7.

Triangle I (Obs. Mr. Breemans)
helios, 45°, 1mm, hyp. 23cm

i	P_i	T_i	$T_i - P_i = P_i T_i$	$P_i A_i$ (comp.)	$P_i T_i - P_i A_i = A_i T_i = f_i(\mu)$
1	233	656	+ 85 [1]	+ 85	0
2	582	1052	+ 94	+ 96	- 2
3	890	1390	+ 100	+ 107	- 7
4	232	795	+ 113	+ 119	- 6
5	562	1152	+ 118	+ 130	- 12
6	881	1484	+ 121	+ 141	- 20
7	176	828	+ 130	+ 152	- 22
8	532	1248	+ 143	+ 163	- 20
9	932	1780	+ 170	+ 175	- 5
10	161	1062	+ 180	+ 186	- 6
11	380	1321	+ 188	+ 197	- 9
12	730	1780	+ 210	+ 208	+ 2
13	908	2030	+ 224	+ 219	+ 5
14	192	1366	+ 235	+ 231	+ 4
15	472	1694	+ 244	+ 242	+ 2
16	820	2085	+ 253	+ 253	0

[1]) $2\mu(65.6 - 23.3) = +85\mu$

TABLE no.178

Triangle II (Obs. Mr. Breemans)
celluloid, 30°, 2mm, hyp. 32cm

i	P_i	T_i	$T_i - P_i = P_i T_i$	$P_i A_i$ (comp.)	$P_i T_i - P_i A_i = A_i T_i = f_i(\mu)$
1	540	1762	+ 244	+ 244	0
2	540	1720	+ 236	+ 232	+ 4
3	389	1450	+ 212	+ 220	- 8
4	440	1502	+ 212	+ 208	+ 4
5	432	1450	+ 204	+ 197	+ 7
6	411	1388	+ 195	+ 185	+ 10
7	366	1276	+ 182	+ 173	+ 9
8	410	1300	+ 178	+ 161	+ 17
9	348	1090	+ 148	+ 149	- 1
10	256	942	+ 137	+ 137	0
11	138	760	+ 124	+ 125	- 1
12	090	612	+ 104	+ 113	- 9
13	005	446	+ 88	+ 102	- 14
14	020	416	+ 79	+ 90	- 11
15	860	1175	+ 63	+ 78	- 15
16	860	1190	+ 66	+ 66	0

TABLE no.179

Triangle III (Obs. Mr. Breemans)
celluloid, 30°, 1mm, hyp. 20cm

1	868	1865	+ 199	+ 199	0
2	046	1160	+ 223	+ 203	+ 20
3	219	1448	+ 246	+ 208	+ 38
4	345	1667	+ 264	+ 212	+ 52
5	388	1428	+ 208	+ 216	- 8
6	584	1611	+ 205	+ 220	- 15
7	680	1715	+ 207	+ 225	- 18
8	812	1952	+ 228	+ 229	- 1
9	922	2127	+ 241	+ 233	+ 8
10	815	2082	+ 253	+ 237	+ 16
11	876	2175	+ 260	+ 242	+ 18
12	995	2252	+ 251	+ 246	+ 5
13	127	1440	+ 263	+ 250	+ 13
14	070	1374	+ 261	+ 254	+ 7
15	228	1566	+ 268	+ 259	+ 9
16	395	1711	+ 263	+ 263	0

TABLE no.180

Triangle IV (Obs. Mr. Breemans)
celluloid, 45°, 1mm, hyp. 17cm

1	813	1438	+ 125	+ 125	0
2	700	1372	+ 134	+ 121	+ 13
3	578	1295	+ 143	+ 117	+ 26
4	478	1196	+ 144	+ 113	+ 31
5	333	1131	+ 160	+ 109	+ 51
6	210	945	+ 147	+ 105	+ 42
7	072	730	+ 132	+ 101	+ 31
8	906	1518	+ 122	+ 97	+ 25
9	612	1144	+ 106	+ 93	+ 13
10	510	1032	+ 104	+ 89	+ 15
11	348	862	+ 103	+ 85	+ 18
12	180	685	+ 101	+ 81	+ 20
13	938	1416	+ 96	+ 77	+ 19
14	770	1196	+ 85	+ 73	+ 12
15	527	870	+ 69	+ 69	0
16	322	646	+ 65	+ 65	0

TABLE no.181

Triangle V (Obs. Mr. Breemans)
celluloid, 30°, 1mm, hyp. 26cm

i	P_i	T_i	$T_i - P_i = P_i T_i$	$P_i A_i$ (comp.)	$P_i T_i - P_i A_i = A_i T_i = f_i (\mu)$
1	358	1212	+171	+171	0
2	478	1422	+189	+179	+10
3	548	1372	+165	+187	-22
4	586	1427	+168	+195	-27
5	611	1545	+187	+204	-17
6	602	1575	+195	+212	-17
7	628	1644	+203	+220	-17
8	679	1705	+205	+228	-23
9	668	1741	+215	+236	-21
10	562	1750	+238	+244	- 6
11	585	1781	+239	+252	-13
12	586	1842	+251	+260	- 9
13	515	1850	+267	+269	- 2
14	491	1856	+273	+277	- 4
15	460	1845	+277	+285	- 8
16	470	1936	+293	+293	0

TABLE no.182

Triangle VI (Obs. Mr. Breemans)
celluloid, 30°, 1.5mm, hyp. 32cm

i	P_i	T_i	$T_i - P_i = P_i T_i$	$P_i A_i$ (comp.)	$P_i T_i - P_i A_i = A_i T_i = f_i (\mu)$
1	618	1078	+ 92	+ 92	0
2	719	1220	+100	+ 98	+ 2
3	792	1349	+111	+104	+ 7
4	882	1490	+122	+110	+12
5	961	1621	+132	+116	+16
6	070	737	+133	+122	+11
7	096	848	+150	+128	+22
8	088	886	+160	+134	+26
9	130	965	+167	+141	+26
10	111	965	+171	+147	+24
11	196	1070	+175	+153	+22
12	213	1097	+177	+159	+18
13	211	1111	+180	+165	+15
14	276	1182	+181	+171	+10
15	190	1100	+182	+177	+ 5
16	330	1245	+183	+183	0

TABLE no.183

Triangle VII (Obs. Mr. Breemans)
celluloid, 45°, 1.5mm, hyp. 31cm

1	858	1411	+111	+111	0
2	765	1306	+108	+111	- 3
3	798	1324	+105	+110	- 5
4	772	1267	+ 99	+110	-11
5	730	1201	+ 94	+110	-16
6	694	1198	+101	+109	- 8
7	649	1115	+ 93	+109	-16
8	622	1092	+ 94	+109	-15
9	470	971	+100	+108	- 8
10	384	901	+103	+108	- 5
11	348	850	+100	+108	- 8
12	212	750	+108	+107	+ 1
13	126	666	+108	+107	+ 1
14	101	637	+107	+107	0
15	564	1105	+108	+106	+ 2
16	943	1473	+106	+106	0

TABLE no.184

Triangle VIII (Obs. Mr. Breemans)
celluloid, 30°, 2mm, hyp. 32cm

1	147	982	+167	+167	0
2	975	1748	+155	+165	-10
3	800	1502	+140	+163	-23
4	636	1265	+126	+161	-35
5	540	1116	+115	+160	-45
6	409	1025	+123	+158	-35
7	222	845	+125	+156	-31
8	015	665	+130	+154	-24
9	873	1550	+135	+152	-17
10	572	1239	+133	+150	-17
11	402	1080	+136	+148	-12
12	231	915	+137	+146	- 9
13	100	789	+138	+145	- 7
14	842	1500	+132	+143	-11
15	696	1375	+136	+141	- 5
16	511	1206	+139	+139	0

TABLE no.185

Triangle IX (Obs. Mr. Breemans)
celluloid, 45°, 2mm, hyp. 16cm

i	P_i	T_i	$T_i - P_i = P_i T_i$	$P_i A_i$ (comp.)	$P_i T_i - P_i A_i = A_i T_i = f_i$ (μ)
1	650	2045	+ 279	+ 279	0
2	520	1906	+ 277	+ 283	- 6
3	338	1727	+ 278	+ 288	- 10
4	171	1610	+ 288	+ 292	- 4
5	047	1494	+ 289	+ 296	- 7
6	842	2301	+ 292	+ 301	- 9
7	700	2152	+ 290	+ 305	- 15
8	666	2160	+ 299	+ 309	- 10
9	448	1982	+ 307	+ 314	- 7
10	225	1782	+ 311	+ 318	- 7
11	004	1606	+ 320	+ 322	- 2
12	824	2423	+ 320	+ 327	- 7
13	535	2162	+ 325	+ 331	- 6
14	400	2080	+ 336	+ 335	+ 1
15	390	2086	+ 339	+ 340	- 1
16	025	1743	+ 344	+ 344	0

TABLE no.186

Triangle X (Obs. Mr. Breemans)
helios, 30°, 1mm, hyp. 24cm

i	P_i	T_i	$T_i - P_i = P_i T_i$	$P_i A_i$ (comp.)	$P_i T_i - P_i A_i = A_i T_i = f_i$ (μ)
1	735	1972	+ 247	+ 247	0
2	584	1772	+ 238	+ 251	- 13
3	415	1612	+ 239	+ 256	- 17
4	250	1478	+ 246	+ 260	- 14
5	089	1331	+ 248	+ 264	- 16
6	912	2130	+ 244	+ 268	- 24
7	776	2030	+ 251	+ 273	- 22
8	603	1915	+ 262	+ 277	- 15
9	369	1705	+ 267	+ 281	- 14
10	113	1505	+ 278	+ 285	- 7
11	896	2273	+ 275	+ 290	- 15
12	709	2122	+ 283	+ 294	- 11
13	404	1858	+ 291	+ 298	- 7
14	250	1758	+ 302	+ 302	0
15	076	1616	+ 308	+ 307	+ 1
16	016	1572	+ 311	+ 311	0

TABLE no.187

RECAPITULATION OF THE AMOUNTS f OF THE TABLES 178 - 187

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
I	0	- 2	- 7	- 6	- 12	- 20	- 22	- 20	- 5	- 6	- 9	+ 2	+ 5	+ 4	+ 2	0
II	0	+ 4	- 8	+ 4	+ 7	+ 10	+ 9	+ 17	- 1	0	- 1	- 9	- 14	- 11	- 15	0
III	0	+ 20	+ 38	+ 52	- 8	- 15	- 18	- 1	+ 8	+ 16	+ 18	+ 5	+ 13	+ 7	+ 9	0
IV	0	+ 13	+ 26	+ 31	+ 51	+ 42	+ 31	+ 25	+ 13	+ 15	+ 18	+ 20	+ 19	+ 12	0	0
V	0	+ 10	- 22	- 27	- 17	- 17	- 17	- 23	- 21	- 6	- 13	- 9	- 2	- 4	- 8	0
VI	0	+ 2	+ 7	+ 12	+ 16	+ 11	+ 22	+ 26	+ 26	+ 24	+ 22	+ 18	+ 15	+ 10	+ 5	0
VII	0	- 3	- 5	- 11	- 16	- 8	- 16	- 15	- 8	- 5	- 8	+ 1	+ 1	0	+ 2	0
VIII	0	- 10	- 23	- 35	- 45	- 35	- 31	- 24	- 17	- 17	- 12	- 9	- 7	- 11	- 5	0
IX	0	- 6	- 10	- 4	- 7	- 9	- 15	- 10	- 7	- 7	- 2	- 7	- 6	+ 1	- 1	0
X	0	- 13	- 17	- 14	- 16	- 24	- 22	- 15	- 14	- 7	- 15	- 11	- 7	0	+ 1	0
M	0	+ 2	- 2	0	- 5	- 6	- 8	- 4	- 3	+ 1	0	0	+ 2	+ 1	- 1	0

TABLE no.188

APPENDIX X

Determination of m_9

Tables 190-208

The determination of m_9 by the testpersons 9,16,4,11 and 17 is combined with the determination of m_8 and m_{10} (see the description in Appendix VI). The deviations f_i between the pencil lines $V_iQ_iP_i$ and the points P_i ($i = 2 \rightarrow 30$) (see fig. 8) plotted on them with an opening of the divider of 10 cm, are computed in tables 190-194, the differences near points Q_i (opening of the divider 5 cm) in tables 195 - 199.

The results of plotting points with a tracing point on a pencil line, with the engineer scale placed along that line, are mentioned in tables 200 - 208.

On a pencil line (I) the testpersons had to plot points at distances of about 20,42,56,68,97,114 and 117 mm (nrs. 1 - 7) from any begin point.

On a second (II) and a third line (III) the distances to be plotted were about 9,35,51,78 mm (nrs. 8 - 11) and about 10,26,46,52,90 and 125 mm respectively (nrs. 12 - 17).[62])

A recapitulation is given in table fig.189. A high negative amount for $\frac{[f]}{n}$ in the second method means that the draftsman tended to plot the points on the scale side of the pencil line.

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62) See the lines II - I, VI - I and IV - V in fig. 10.

test-person	table P_i	table Q_i	[f] : n (μ) P_i (10cm)	[f] : n (μ) Q_i (5cm)	m (P_i)	m (Q_i)	m (μ) (mean)
9	190	195	+ 14	- 30	41	27	34
16	191	196	- 8	+ 5	45	33	39
4	192	197	- 14	- 38	21	22	22
11	193	198	+ 8	+ 6	21	24	22
17	194	199	- 30	- 32	43	46	44
					34	30	32

test-person	table	[f] : n (μ) line I	line II	line III	—	m (μ)
4	200	+ 6	+ 18	+ 10		17
19	201	+ 28	- 9	- 10		21
20	202	+ 8	+ 10	+ 47		28
15	203	- 30	- 69	- 24		37
21	204	- 58	- 47	- 59		44
5	205	- 5	- 8	- 6		42
22	206	- 3	- 4	- 2		25
23	207	+ 11	- 9	+ 24		19
24	208	- 104	- 55	- 28		49
						32

Table fig. 189

m_θ (P_i) and m_θ (Q_i) are almost equal; their mean value (32μ) corresponds with the mean value for the method with tracing point and engineer scale.

Testperson 9								
Point P_i	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
i	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	102	080	+ 4 [1]	040	065	- 5	0	- 14
3	556	268	+ 58	300	003	+ 59	+ 58	+ 44
4	376	163	+ 43	1052	864	+ 38	+ 40	+ 26
5	168	180	- 2	600	670	- 14	- 8	- 22
6	590	566	+ 5	285	270	+ 3	+ 4	- 10
7	420	322	+ 20	365	281	+ 17	+ 18	+ 4
8	610	280	+ 66	512	160	+ 70	+ 68	+ 54
9	490	324	+ 33	236	050	+ 37	+ 35	+ 21
10	765	655	+ 22	362	235	+ 25	+ 24	+ 10
11	774	952	- 36	720	890	- 34	- 35	- 49
12	393	360	+ 7	637	600	+ 7	+ 7	- 7
13	582	1200	-124	476	1140	-133	-128	-142
14	658	344	+ 63	640	322	+ 64	+ 64	+ 50
15	403	355	+ 10	351	338	+ 3	+ 6	- 8
16	530	270	+ 52	808	554	+ 51	+ 52	+ 38
17	370	130	+ 48	616	420	+ 39	+ 44	+ 30
18	929	712	+ 43	570	370	+ 40	+ 42	+ 28
19	280	048	+ 46	334	105	+ 46	+ 46	+ 32
20	828	960	- 26	760	895	- 27	- 26	- 40
21	413	262	+ 30	583	475	+ 22	+ 26	+ 12
22	440	679	- 48	902	1134	- 46	- 47	- 61
23	822	958	- 27	303	445	- 28	- 28	- 42
24	—	868	—	—	415	—	—	—
25	840	862	- 4	966	978	- 2	- 3	- 17
26	1110	930	+ 36	880	690	+ 38	+ 37	+ 23
27	762	762	0	154	165	- 2	- 1	- 15
28	1005	911	+ 19	530	455	+ 15	+ 17	+ 3
29	558	226	+ 66	471	150	+ 64	+ 65	+ 51
30	441	380	+ 12	430	370	+ 12	+ 12	- 2
$m^2 = \frac{[vv]}{28} = \frac{47081}{28} = 1681\mu^2$; $m = 41\mu$						$\frac{[f]}{n} =$	+ 14	

[1]) $2\mu(10.2 - 8.0) = +4\mu$

TABLE no.190

Testperson 16								
Point P_i	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
i	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	210	285	- 15	186	248	- 12	- 14	- 6
3	960	1006	- 9	020	052	- 6	- 8	0
4	965	1366	- 80	061	466	- 81	- 80	- 72
5	101	115	- 3	107	120	- 3	- 3	+ 5
6	341	314	+ 5	260	228	+ 6	+ 6	+ 14
7	921	896	+ 5	402	381	+ 4	+ 4	+ 12
8	063	220	- 31	130	290	- 32	- 32	- 24
9	378	097	+ 56	668	386	+ 56	+ 56	+ 64
10	964	1172	- 42	890	1086	- 39	- 40	- 32
11	222	290	- 14	182	260	- 16	- 15	- 7
12	252	714	- 92	831	1300	- 94	- 93	- 85
13	094	099	- 1	168	160	+ 2	0	+ 8
14	099	066	+ 7	1030	998	+ 6	+ 6	+ 14
15	1123	972	+ 30	220	050	+ 34	+ 32	+ 40
16	648	050	+120	1414	811	+121	+120	+128
17	152	040	+ 22	1107	978	+ 26	+ 24	+ 32
18	666	701	- 7	755	790	- 7	- 7	+ 1
19	092	082	+ 2	375	359	+ 3	+ 2	+ 10
20	1080	980	+ 20	930	828	+ 20	+ 20	+ 28
21	145	335	- 38	428	603	- 35	- 36	- 28
22	098	098	0	938	934	+ 1	0	+ 8
23	1163	931	+ 46	994	768	+ 45	+ 46	+ 54
24	100	348	- 50	898	1148	- 50	- 50	- 42
25	278	278	0	060	066	- 1	0	+ 8
26	240	392	- 30	886	1040	- 31	- 30	- 22
27	972	1343	- 74	910	1276	- 73	- 74	- 66
28	670	738	- 14	056	120	- 13	- 14	- 6
29	997	836	+ 32	320	160	+ 32	+ 32	+ 40
30	763	1237	- 95	940	1400	- 92	- 94	- 86
$m^2 = \frac{[vv]}{29} = \frac{58172}{29} = 2006\mu^2$; $m = 45\mu$						$\frac{[f]}{n} =$	- 8	

TABLE no.191

Testperson 4								
Point P_i	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
i	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	148	300	- 30	801	980	- 36	- 33	- 19
3	312	420	- 22	126	250	- 25	- 24	- 10
4	075	142	- 13	462	537	- 15	- 14	0
5	114	030	+ 17	614	544	+ 14	+ 16	+ 30
6	161	178	- 3	375	400	- 5	- 4	+ 10
7	083	228	- 29	395	542	- 29	- 29	- 15
8	013	013	0	448	448	0	0	+ 14
9	813	934	- 24	300	423	- 25	- 24	- 10
10	353	566	- 43	461	689	- 46	- 44	- 30
11	742	856	- 23	966	1121	- 31	- 27	- 13
12	027	212	- 37	200	420	- 44	- 40	- 26
13	450	435	+ 3	461	468	- 1	+ 1	+ 15
14	405	355	+ 10	038	010	+ 6	+ 8	+ 22
15	300	339	- 8	152	208	- 11	- 10	+ 4
16	053	090	- 7	250	310	- 12	- 10	+ 4
17	215	438	- 45	953	1230	- 55	- 50	- 36
18	530	620	- 18	056	190	- 27	- 22	- 8
19	070	073	- 1	326	370	- 9	- 5	+ 9
20	180	404	- 45	310	582	- 54	- 50	- 36
21	658	680	- 4	264	329	- 13	- 8	+ 6
22	990	1150	- 32	482	656	- 35	- 34	- 20
23	082	001	+ 16	325	282	+ 9	+ 12	+ 26
24	342	195	+ 29	130	020	+ 22	+ 26	+ 40
25	073	014	+ 12	944	900	+ 9	+ 10	+ 24
26	219	398	- 36	933	1130	- 39	- 38	- 24
27	182	100	+ 16	378	308	+ 14	+ 15	+ 29
28	146	090	+ 11	472	445	+ 5	+ 8	+ 22
29	060	050	+ 2	612	585	+ 5	+ 4	+ 18
30	279	458	- 36	142	288	- 29	- 32	- 18
$m^2 = \frac{[vv]}{29} = \frac{13042}{29} = 450\mu^2$; $m = 21\mu$						$\frac{[f]}{n} =$	- 14	

TABLE no.192

Testperson 11								
Point P_i	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
i	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	420	400	+ 4	581	570	+ 2	+ 3	- 5
3	260	260	0	492	500	- 2	- 1	- 9
4	310	195	+ 23	320	201	+ 24	+ 24	+ 16
5	513	483	+ 6	780	743	+ 7	+ 6	- 2
6	780	912	- 26	470	595	- 25	- 26	- 34
7	1132	932	+ 40	968	758	+ 42	+ 41	+ 33
8	486	408	+ 16	345	250	+ 19	+ 18	+ 10
9	682	790	- 22	730	836	- 21	- 22	- 30
10	638	680	- 8	470	493	- 5	- 6	- 14
11	707	582	+ 25	1110	955	+ 31	+ 28	+ 20
12	663	510	+ 31	950	794	+ 31	+ 31	+ 23
13	560	518	+ 8	050	000	+ 10	+ 9	+ 1
14	1120	990	+ 26	284	146	+ 28	+ 27	+ 19
15	810	652	+ 32	720	576	+ 29	+ 30	+ 22
16	116	040	+ 15	1020	918	+ 20	+ 18	+ 10
17	750	710	+ 8	855	810	+ 9	+ 8	0
18	404	377	+ 5	760	738	+ 4	+ 4	- 4
19	942	1132	- 38	951	1148	- 39	- 38	- 46
20	391	474	- 17	280	356	- 15	- 16	- 24
21	782	715	+ 13	1000	938	+ 12	+ 12	+ 4
22	423	462	- 8	316	353	- 7	- 8	- 16
23	102	062	+ 8	990	940	+ 10	+ 9	+ 1
24	305	416	- 22	510	611	- 20	- 21	- 29
25	551	522	+ 6	368	355	+ 3	+ 4	- 4
26	332	220	+ 22	1000	864	+ 27	+ 24	+ 16
27	738	720	+ 4	896	860	+ 7	+ 6	- 2
28	668	566	+ 20	335	236	+ 20	+ 20	+ 12
29	226	266	- 8	090	131	- 8	- 8	- 16
30	1207	890	+ 63	1123	796	+ 65	+ 64	+ 56
$m^2 = \frac{[vv]}{29} = \frac{13316}{29} = 459\mu^2$; $m = 21\mu$						$\frac{[f]}{n} =$	+ 8	

TABLE no.193

Testperson 17								
Point P_i	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
i	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	181	172	+ 2	252	247	+ 1	+ 2	+ 32
3	482	185	+ 59	720	420	+ 60	+ 60	+ 90
4	868	990	- 24	700	822	- 24	- 24	+ 6
5	148	430	- 56	675	965	- 58	- 57	- 27
6	868	1396	-106	916	1428	-102	-104	- 74
7	515	386	+ 26	740	625	+ 23	+ 24	+ 54
8	212	600	- 78	470	835	- 73	- 76	- 46
9	628	579	+ 10	940	884	+ 11	+ 10	+ 40
10	940	660	+ 56	994	732	+ 52	+ 54	+ 84
11	631	721	- 18	820	910	- 18	- 18	+ 12
12	412	854	- 88	200	650	- 90	- 89	- 59
13	610	548	+ 12	112	036	+ 15	+ 14	+ 44
14	610	872	- 52	124	382	- 52	- 52	- 22
15	930	925	+ 1	398	415	- 3	- 1	+ 29
16	660	678	- 4	630	656	- 5	- 4	+ 26
17	072	370	- 60	851	1138	- 57	- 58	- 28
18	250	329	- 16	595	669	- 15	- 16	+ 14
19	140	472	- 66	526	871	- 69	- 68	- 38
20	522	1061	-108	638	1196	-112	-110	- 80
21	440	806	- 73	828	1218	- 78	- 76	- 46
22	932	1140	- 42	527	734	- 41	- 42	- 12
23	400	818	- 84	268	711	- 89	- 86	- 56
24	679	749	- 14	941	1032	- 18	- 16	+ 14
25	780	720	+ 12	660	635	+ 5	+ 8	+ 38
26	481	800	- 64	268	578	- 62	- 63	- 33
27	270	447	- 35	146	318	- 34	- 34	- 4
28	432	502	- 14	918	995	- 15	- 14	+ 16
29	923	1013	- 18	998	1081	- 17	- 18	+ 12
30	296	400	- 21	168	267	- 20	- 20	+ 10
$m^2 = \frac{[vv]}{29} = \frac{54080}{29} = 1865\mu^2$; $m = 43\mu$						$\frac{[f]}{n} =$	- 30	

TABLE no.194

Testperson 9								
Point Q_i	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
i	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	492	800	- 62	530	810	- 56	- 59	- 29
3	249	251	0	840	840	0	0	+ 30
4	600	660	- 12	968	1061	- 19	- 16	+ 14
5	926	960	- 7	086	128	- 8	- 8	+ 22
6	320	482	- 32	630	795	- 33	- 32	- 2
7	180	534	- 71	830	1220	- 78	- 74	- 44
8	255	254	0	799	782	+ 3	+ 2	+ 32
9	623	895	- 54	371	610	- 48	- 51	- 21
10	837	1127	- 58	110	411	- 60	- 59	- 29
11	483	530	- 9	000	066	- 13	- 11	+ 19
12	106	424	- 64	005	329	- 65	- 64	- 34
13	964	1387	- 85	995	1340	- 69	- 77	- 47
14	030	265	- 47	610	860	- 50	- 48	- 18
15	118	218	- 20	648	780	- 26	- 23	+ 7
16	775	668	+ 21	510	420	+ 18	+ 20	+ 50
17	780	1043	- 53	539	806	- 53	- 53	- 23
18	608	601	+ 1	172	208	- 7	- 3	+ 27
19	722	918	- 39	443	651	- 42	- 40	- 10
20	380	487	- 21	266	372	- 21	- 21	+ 9
21	398	650	- 50	676	900	- 45	- 48	- 18
22	253	340	- 17	330	420	- 18	- 18	+ 12
23	170	208	- 8	038	115	- 15	- 12	+ 18
24	480	610	- 26	998	1136	- 28	- 27	+ 3
25	054	120	- 13	898	961	- 13	- 13	+ 17
26	985	1230	- 49	000	188	- 38	- 44	- 14
27	021	320	- 60	525	806	- 56	- 58	- 28
28	652	554	+ 20	982	850	+ 26	+ 23	+ 53
29	100	100	0	630	628	0	0	+ 30
30	277	488	- 42	047	253	- 41	- 42	- 12
$m^2 = \frac{[vv]}{29} = \frac{20628}{29} = 711\mu^2$; $m = 27\mu$						$\frac{[f]}{n} =$	- 30	

TABLE no.195

Testperson 16								
Point Q_i	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
i	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	050	094	- 9	941	982	- 8	- 8	- 13
3	021	040	- 4	365	386	- 4	- 4	- 9
4	110	350	- 48	257	498	- 48	- 48	- 53
5	130	176	- 9	993	1055	- 12	- 10	- 15
6	165	491	- 65	218	534	- 63	- 64	- 69
7	367	177	+ 38	290	092	+ 40	+ 39	+ 34
8	191	196	- 1	280	294	- 3	- 2	- 7
9	320	428	- 22	921	1032	- 22	- 22	- 27
10	372	423	- 10	990	1058	- 14	- 12	- 17
11	341	080	+ 52	522	270	+ 50	+ 51	+ 46
12	314	282	+ 6	172	132	+ 8	+ 7	+ 2
13	108	220	- 22	032	150	- 24	- 23	- 28
14	540	466	+ 15	264	185	+ 16	+ 16	+ 11
15	690	181	+102	652	151	+100	+101	+ 96
16	372	195	+ 35	460	309	+ 30	+ 32	+ 27
17	246	120	+ 25	178	054	+ 25	+ 25	+ 20
18	292	338	- 9	248	290	- 8	- 8	- 13
19	336	218	+ 24	748	635	+ 23	+ 24	+ 19
20	210	210	0	672	650	+ 4	+ 2	- 3
21	000	210	- 42	213	423	- 42	- 42	- 47
22	392	400	- 2	115	113	0	- 1	- 6
23	790	682	+ 22	632	520	+ 22	+ 22	+ 17
24	222	275	- 11	024	082	- 12	- 12	- 17
25	208	302	- 19	207	315	- 22	- 20	- 25
26	443	246	+ 39	700	502	+ 40	+ 40	+ 35
27	172	048	+ 25	549	430	+ 24	+ 24	+ 19
28	362	208	+ 31	538	383	+ 31	+ 31	+ 26
29	950	1030	- 16	101	180	- 16	- 16	- 21
30	374	193	+ 36	270	110	+ 32	+ 34	+ 29
$m^2 = \frac{[vv]}{29} = \frac{31169}{29} = 1075\mu^2$; $m = 33\mu$						$\frac{[f]}{n} =$	+ 5	

TABLE no.196

Testperson 4								
Point Q_i	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
i	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	948	1250	- 60	568	870	- 60	- 60	- 22
3	176	500	- 65	625	948	- 65	- 65	- 27
4	361	506	- 29	473	600	- 25	- 27	+ 11
5	360	600	- 48	027	250	- 45	- 46	- 8
6	110	419	- 62	664	946	- 56	- 59	- 21
7	276	440	- 33	241	390	- 30	- 32	+ 6
8	181	438	- 51	570	795	- 45	- 48	- 10
9	985	1120	- 27	160	280	- 24	- 26	+ 12
10	141	360	- 44	850	1108	- 52	- 48	- 10
11	070	424	- 71	045	371	- 65	- 68	- 30
12	951	1249	- 60	320	560	- 48	- 54	- 16
13	662	800	- 28	256	362	- 21	- 24	+ 14
14	181	378	- 39	125	301	- 35	- 37	+ 1
15	231	431	- 40	954	1150	- 39	- 40	- 2
16	289	610	- 64	021	350	- 66	- 65	- 27
17	059	289	- 46	069	282	- 43	- 44	- 6
18	130	511	- 76	042	412	- 74	- 75	- 37
19	686	1040	- 71	953	1300	- 69	- 70	- 32
20	721	702	+ 4	760	748	+ 2	+ 3	+ 41
21	377	548	- 34	904	1042	- 28	- 31	+ 7
22	940	1098	- 32	715	848	- 27	- 30	+ 8
23	556	708	- 30	000	152	- 30	- 30	+ 8
24	596	672	- 15	298	340	- 8	- 12	+ 26
25	340	452	- 22	839	921	- 16	- 19	+ 19
26	033	005	+ 6	182	151	+ 6	+ 6	+ 44
27	113	330	- 43	144	325	- 36	- 40	- 2
28	123	158	- 7	294	345	- 10	- 8	+ 30
29	884	1078	- 39	367	585	- 44	- 42	- 4
30	955	996	- 8	468	495	- 5	- 6	+ 32
$m^2 = \frac{[vv]}{29} = \frac{13509}{29} = 466\mu^2$; $m = 22\mu$						$\frac{[f]}{n} =$	- 38	

TABLE no.197

Testperson 11								
Point Q_i	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
i	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	670	760	- 18	670	780	- 22	- 20	- 26
3	632	615	+ 3	491	452	+ 8	+ 6	0
4	360	521	- 32	710	862	- 30	- 31	- 37
5	200	018	+ 36	605	443	+ 32	+ 34	+ 28
6	1050	820	+ 46	258	018	+ 48	+ 47	+ 41
7	1043	870	+ 35	228	070	+ 32	+ 34	+ 28
8	595	470	+ 25	570	458	+ 22	+ 24	+ 18
9	870	952	- 16	212	297	- 17	- 16	- 22
10	931	928	+ 1	460	452	+ 2	+ 2	- 4
11	195	272	- 15	120	192	- 14	- 14	- 20
12	288	030	+ 52	530	260	+ 54	+ 53	+ 47
13	295	266	+ 6	245	210	+ 7	+ 6	0
14	652	597	+ 11	213	161	+ 10	+ 10	+ 4
15	080	160	- 16	860	928	- 14	- 15	- 21
16	238	420	- 36	170	356	- 37	- 36	- 42
17	340	329	+ 2	022	017	+ 1	+ 2	- 4
18	555	653	- 20	626	718	- 18	- 19	- 25
19	210	210	0	312	321	- 2	- 1	- 7
20	540	510	+ 6	484	442	+ 8	+ 7	+ 1
21	792	760	+ 6	902	855	+ 9	+ 8	+ 2
22	709	568	+ 28	212	054	+ 32	+ 30	+ 24
23	660	485	+ 35	1098	918	+ 36	+ 36	+ 30
24	148	234	- 17	324	420	- 19	- 18	- 24
25	912	1020	- 22	076	166	- 18	- 20	- 26
26	752	870	- 24	232	362	- 26	- 25	- 31
27	440	364	+ 15	516	429	+ 17	+ 16	+ 10
28	570	362	+ 42	230	029	+ 40	+ 41	+ 35
29	993	930	+ 13	846	774	+ 14	+ 14	+ 8
30	377	258	+ 24	873	780	+ 19	+ 22	+ 16
$m^2 = \frac{[vv]}{29} = \frac{16977}{29} = 585\mu^2$; $m = 24\mu$						$\frac{[f]}{n} =$	+ 6	

TABLE no.198

Testperson 17								
Point Q_i	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
i	Point	Line	Point - Line	Point	Line	Point - Line	(μ)	(μ)
2	395	586	- 38	265	436	- 34	- 36	- 4
3	191	537	- 69	022	336	- 63	- 66	- 34
4	853	1343	- 98	540	1074	-107	-102	- 70
5	653	583	+ 14	748	616	+ 26	+ 20	+ 52
6	128	306	- 36	788	890	- 20	- 28	+ 4
7	580	1053	- 95	660	1126	- 93	- 94	- 62
8	536	472	+ 13	940	880	+ 12	+ 12	+ 44
9	998	1305	- 61	950	1180	- 46	- 54	- 22
10	558	1695	-227	525	1698	-235	-231	
11	310	342	- 6	015	032	- 3	- 4	+ 28
12	755	1410	-131	692	1290	-120	-126	- 94
13	843	1300	- 91	913	1320	- 81	- 86	- 54
14	600	762	- 32	358	580	- 44	- 38	- 6
15	890	738	+ 30	730	562	+ 34	+ 32	+ 64
16	585	980	- 79	305	714	- 82	- 80	- 48
17	134	170	- 7	082	175	- 19	- 13	+ 19
18	500	950	- 90	315	815	-100	- 95	- 63
19	556	320	+ 47	835	628	+ 41	+ 44	+ 76
20	290	235	+ 11	752	736	+ 3	+ 7	+ 39
21	272	283	- 2	425	432	- 1	- 2	+ 30
22	880	954	- 15	485	547	- 12	- 14	+ 18
23	898	1170	- 54	442	703	- 52	- 53	- 21
24	578	932	- 71	660	1016	- 71	- 71	- 39
25	867	818	+ 10	600	550	+ 10	+ 10	+ 42
26	433	670	- 47	150	418	- 54	- 50	- 18
27	300	140	+ 32	780	640	+ 28	+ 30	+ 62
28	542	808	- 53	789	1018	- 46	- 50	- 18
29	820	836	- 3	441	460	- 4	- 4	+ 28
30	850	782	+ 14	850	752	+ 20	+ 17	+ 49
$m^2 = \frac{[vv]}{28} = \frac{58282}{28} = 2082\mu^2$; $m = 46\mu$						$\frac{[f]}{n} =$	- 32	

TABLE no.199

Testperson 4										
Line	Point	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
		Line	Point	Line - Point	Line	Point	Line - Point	(μ)	(μ)
I	1	654	610	+ 9 [1]	225	176	+ 10	+ 10	+ 4
	2	686	586	+ 20	1101	992	+ 22	+ 21	+ 15
	3	956	724	+ 46	948	720	+ 46	+ 46	+ 40
	4	528	564	- 7	803	846	- 9	- 8	- 14
	5	220	221	0	478	492	- 3	- 2	- 8
	6	753	808	- 11	340	380	- 8	- 10	- 16
	7	156	222	- 13	682	740	- 12	- 12	- 18
							$\frac{[f]}{n}$	+ 6	
II	8	618	438	+ 36	1123	942	+ 36	+ 36	+ 18
	9	460	331	+ 26	860	716	+ 29	+ 28	+ 10
	10	454	342	+ 22	830	718	+ 22	+ 22	+ 4
	11	968	1036	- 14	426	492	- 13	- 14	- 32
							$\frac{[f]}{n}$	+ 18	
III	12	861	820	+ 8	492	460	+ 6	+ 7	- 3
	13	917	920	- 1	112	116	- 1	- 1	- 11
	14	340	325	+ 3	664	658	+ 1	+ 2	- 8
	15	715	670	+ 9	968	910	+ 12	+ 10	0
	16	650	486	+ 33	600	470	+ 26	+ 30	+ 20
	17	186	124	+ 12	420	344	+ 15	+ 14	+ 4
$m^2 = \frac{[v\,v]}{17} = \frac{4755}{17} = 280\mu^2$; $m = 17\mu$							$\frac{[f]}{n}$	+ 10	

[1] $2\mu(65.4 - 61.0) = +9\mu$

TABLE no.200

Testperson 19										
Line	Point	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
		Line	Point	Line - Point	Line	Point	Line - Point	(μ)	(μ)
I	1	087	041	+ 9	050	002	+ 10	+ 10	- 18
	2	1270	805	+ 93	645	210	+ 87	+ 90	+ 62
	3	777	745	+ 6	142	092	+ 10	+ 8	- 20
	4	061	008	+ 11	888	860	+ 6	+ 8	- 20
	5	913	878	+ 7	459	412	+ 9	+ 8	- 20
	6	465	251	+ 43	370	146	+ 45	+ 44	+ 16
	7	492	388	+ 21	1084	915	+ 34	+ 28	0
							$\frac{[f]}{n}$	+ 28	
II	8	004	110	- 21	272	379	- 21	- 21	- 12
	9	370	490	- 24	990	1089	- 20	- 22	- 13
	10	451	457	- 1	210	190	+ 4	+ 2	+ 11
	11	148	122	+ 5	323	310	+ 3	+ 4	+ 13
							$\frac{[f]}{n}$	- 9	
III	12	626	750	- 25	312	419	- 21	- 23	- 13
	13	330	256	+ 15	110	045	+ 13	+ 14	+ 24
	14	177	271	- 19	553	654	- 20	- 20	- 10
	15	665	741	- 15	890	948	- 12	- 14	- 4
	16	775	805	- 6	390	414	- 5	- 6	+ 4
	17	441	491	- 10	745	792	- 9	- 10	0
$m^2 = \frac{[v\,v]}{17} = \frac{7104}{17} = 418\mu^2$; $m = 21\mu$							$\frac{[f]}{n}$	- 10	

TABLE no.201

Testperson 20										
Line	Point	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	v = $f - \frac{[f]}{n}$
		Line	Point	Line - Point	Line	Point	Line - Point	(μ)	(μ)
I	1	703	648	+ 11	372	306	+ 13	+ 12	+ 4
	2	890	734	+ 31	402	231	+ 34	+ 32	+ 24
	3	554	240	+ 63	1166	845	+ 64	+ 64	+ 56
	4	330	168	+ 32	220	054	+ 33	+ 32	+ 24
	5	360	430	- 14	902	970	- 14	- 14	- 22
	6	100	148	- 10	550	595	- 9	- 10	- 18
	7	503	823	- 64	075	385	- 62	- 63	- 71
							$\frac{[f]}{n}$	+ 8	
II	8	162	100	+ 12	872	807	+ 13	+ 12	+ 2
	9	040	066	- 5	532	550	- 4	- 4	- 14
	10	715	609	+ 21	192	080	+ 22	+ 22	+ 12
	11	400	331	+ 14	128	071	+ 11	+ 12	+ 2
							$\frac{[f]}{n}$	+ 10	
III	12	1108	958	+ 30	482	310	+ 34	+ 32	- 15
	13	431	262	+ 34	938	780	+ 32	+ 33	- 14
	14	850	474	+ 75	1138	780	+ 72	+ 74	+ 27
	15	156	010	+ 29	878	730	+ 30	+ 30	- 17
	16	440	087	+ 71	861	500	+ 72	+ 72	+ 25
	17	312	109	+ 41	655	443	+ 42	+ 42	- 5
$m^2 = \frac{[vv]}{17} = \frac{12590}{17} = 741\mu^2$; $m = 28\mu$							$\frac{[f]}{n}$	+ 47	

TABLE no.202

Testperson 15										
Line	Point	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	v = $f - \frac{[f]}{n}$
		Line	Point	Line - Point	Line	Point	Line - Point	(μ)	(μ)
I	1	900	1090	- 38	158	360	- 40	- 39	- 9
	2	898	960	- 12	272	320	- 10	- 11	+ 19
	3	920	1180	- 52	198	441	- 49	- 50	- 20
	4	488	510	- 4	235	258	- 5	- 4	+ 26
	5	120	280	- 32	311	460	- 30	- 31	- 1
	6	000	113	- 23	188	306	- 24	- 24	+ 6
	7	354	593	- 48	121	370	- 50	- 49	- 19
							$\frac{[f]}{n}$	- 30	
II	8	922	1481	-112	748	1316	-114	-113	- 44
	9	320	880	-112	262	790	-106	-109	- 40
	10	400	517	- 23	822	950	- 26	- 24	+ 45
	11	475	628	- 31	712	855	- 29	- 30	+ 39
							$\frac{[f]}{n}$	- 69	
III	12	834	1281	- 89	162	622	- 92	- 90	- 66
	13	508	196	+ 62	402	100	+ 60	+ 61	+ 85
	14	855	1033	- 36	342	510	- 34	- 35	- 11
	15	538	786	- 50	748	1013	- 53	- 52	- 28
	16	295	218	+ 15	1020	960	+ 12	+ 14	+ 38
	17	382	600	- 44	300	511	- 42	- 43	- 19
$m^2 = \frac{[vv]}{17} = \frac{23289}{17} = 1370\mu^2$; $m = 37\mu$							$\frac{[f]}{n}$	- 24	

TABLE no.203

Testperson 21										
Line	Point	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
		Line	Point	Line - Point	Line	Point	Line - Point	(μ)	(μ)
I	1	736	900	- 33	319	477	- 32	- 32	+ 26
	2	603	1218	-123	760	1388	-126	-124	- 66
	3	905	1271	- 73	280	650	- 74	- 74	- 16
	4	392	501	- 22	170	288	- 24	- 23	+ 35
	5	149	105	+ 9	932	877	+ 11	+ 10	+ 68
	6	115	523	- 82	077	473	- 79	- 80	- 22
	7	075	478	- 81	850	1260	- 82	- 82	- 24
							$\frac{[f]}{n}$	- 58	
II	8	581	1163	-116	192	762	-114	-115	- 68
	9	463	655	- 38	091	280	- 38	- 38	+ 9
	10	320	214	+ 21	1003	892	+ 22	+ 22	+ 69
	11	114	403	- 58	463	750	- 57	- 58	- 11
							$\frac{[f]}{n}$	- 47	
III	12	126	550	- 85	430	852	- 84	- 84	- 25
	13	168	810	-128	409	1031	-124	-126	- 67
	14	838	815	+ 5	122	110	+ 2	+ 4	+ 63
	15	282	540	- 52	966	1241	- 55	- 54	+ 5
	16	671	988	- 63	292	604	- 62	- 62	- 3
	17	968	1122	- 31	442	592	- 30	- 30	+ 29
$m^2 = \frac{[v\,v]}{17} = \frac{31742}{17} = 1867\mu^2$; $m = 44\mu$							$\frac{[f]}{n}$	- 59	

TABLE no.204

Testperson 5										
Line	Point	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f	$v = f - \frac{[f]}{n}$
		Line	Point	Line - Point	Line	Point	Line - Point	(μ)	(μ)
I	1	010	030	- 4	432	468	- 7	- 6	- 1
	2	990	890	+ 20	986	915	+ 14	+ 17	+ 22
	3	422	1005	-117	704	1306	-120	-118	-113
	4	996	1086	- 18	613	720	- 21	- 20	- 15
	5	936	850	+ 17	088	012	+ 15	+ 16	+ 21
	6	528	411	+ 23	881	770	+ 22	+ 22	+ 27
	7	923	645	+ 56	636	364	+ 54	+ 55	+ 60
							$\frac{[f]}{n}$	- 5	
II	8	344	360	- 3	856	865	- 2	- 2	+ 6
	9	596	750	- 31	580	725	- 29	- 30	- 22
	10	860	940	- 16	170	230	- 12	- 14	- 6
	11	804	726	+ 16	405	325	+ 16	+ 16	+ 24
							$\frac{[f]}{n}$	- 8	
III	12	755	1210	- 91	149	612	- 93	- 92	- 86
	13	422	386	+ 7	840	811	+ 6	+ 6	+ 12
	14	1033	912	+ 24	432	300	+ 26	+ 25	+ 31
	15	512	480	+ 6	040	013	+ 5	+ 6	+ 12
	16	400	210	+ 38	483	310	+ 35	+ 36	+ 42
	17	692	791	- 20	179	281	- 20	- 20	- 14
$m^2 = \frac{[v\,v]}{17} = \frac{29986}{17} = 1764\mu^2$; $m = 42\mu$							$\frac{[f]}{n}$	- 6	

TABLE no.205

Testperson 22									
Line	Point	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f (μ)	v = $f - \frac{[f]}{n}$ (μ)
		Line	Point	Line - Point	Line	Point	Line - Point		
I	1	830	916	- 17	105	189	- 17	- 17	- 14
	2	310	149	+ 32	773	586	+ 37	+ 34	+ 37
	3	942	940	0	367	373	- 1	0	+ 3
	4	452	654	- 40	890	1088	- 40	- 40	- 37
	5	270	276	- 1	090	080	+ 2	0	+ 3
	6	232	301	- 14	622	690	- 14	- 14	- 11
	7	686	582	+ 21	298	221	+ 15	+ 18	+ 21
							$\frac{[f]}{n}$	- 3	
II	8	494	478	+ 3	968	940	+ 6	+ 4	+ 8
	9	1138	993	+ 29	1110	983	+ 25	+ 27	+ 31
	10	636	869	- 47	303	540	- 47	- 47	- 43
	11	176	176	0	978	989	- 2	- 1	+ 3
							$\frac{[f]}{n}$	- 4	
III	12	398	561	- 33	996	1180	- 37	- 35	- 33
	13	258	211	+ 9	762	698	+ 13	+ 11	+ 13
	14	1052	983	+ 14	515	450	+ 13	+ 14	+ 16
	15	572	650	- 16	981	1063	- 16	- 16	- 14
	16	168	290	- 24	340	461	- 24	- 24	- 22
	17	613	440	+ 35	181	006	+ 35	+ 35	+ 37
	$m^2 = \frac{[vv]}{17} = \frac{9960}{17} = 586\mu^2$; m = 25$\mu$						$\frac{[f]}{n}$	- 2	

TABLE no.206

Testperson 23									
Line	Point	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f (μ)	v = $f - \frac{[f]}{n}$ (μ)
		Line	Point	Line - Point	Line	Point	Line - Point		
I	1	424	172	+ 50	501	257	+ 49	+ 50	+ 39
	2	905	806	+ 20	260	145	+ 23	+ 22	+ 11
	3	460	485	- 5	728	749	- 4	- 4	- 15
	4	882	800	+ 16	254	180	+ 15	+ 16	+ 5
	5	688	788	- 20	261	360	- 20	- 20	- 31
	6	521	494	+ 5	039	016	+ 5	+ 5	- 6
	7	197	164	+ 7	140	100	+ 8	+ 8	- 3
							$\frac{[f]}{n}$	+ 11	
II	8	123	186	- 13	820	893	- 15	- 14	- 5
	9	015	226	- 42	172	393	- 44	- 43	- 34
	10	232	194	+ 8	470	432	+ 8	+ 8	+ 17
	11	271	204	+ 13	756	705	+ 10	+ 12	+ 21
							$\frac{[f]}{n}$	- 9	
III	12	895	792	+ 21	1072	973	+ 20	+ 20	- 4
	13	995	870	+ 25	350	228	+ 24	+ 24	0
	14	370	143	+ 45	759	538	+ 44	+ 44	+ 20
	15	606	510	+ 19	324	212	+ 22	+ 20	- 4
	16	875	866	+ 2	318	294	+ 5	+ 4	- 20
	17	1022	867	+ 31	586	428	+ 32	+ 32	+ 8
	$m^2 = \frac{[vv]}{17} = \frac{5705}{17} = 336\mu^2$; m = 19$\mu$						$\frac{[f]}{n}$	+ 24	

TABLE no.207

Testperson 24									
Line	Point	First Series (Obs. Mr. Breemans)			Second Series (Obs. Mr. Breemans)			Mean f (μ)	$v = f - \frac{[f]}{n}$ (μ)
		Line	Point	Line - Point	Line	Point	Line - Point		
I	1	332	490	- 32	112	270	- 32	- 32	+ 72
	2	401	800	- 80	032	420	- 78	- 79	+ 25
	3	256	578	- 64	664	990	- 65	- 64	+ 40
	4	527	1333	-161	940	1730	-158	-160	- 56
	5	234	1195	-192	820	1782	-192	-192	- 88
	6	549	1248	-140	948	1631	-137	-138	- 34
	7	041	368	- 65	028	340	- 62	- 64	+ 40
							$\frac{[f]}{n}$	-104	
II	8	622	1025	- 81	159	548	- 78	- 80	- 25
	9	131	660	-106	150	678	-106	-106	- 51
	10	349	469	- 24	052	142	- 18	- 21	+ 34
	11	790	865	- 15	768	830	- 12	- 14	+ 41
							$\frac{[f]}{n}$	- 55	
III	12	155	080	+ 15	155	079	+ 15	+ 15	+ 43
	13	971	1480	-102	000	490	- 98	-100	- 72
	14	511	270	+ 48	1138	922	+ 43	+ 46	+ 74
	15	700	920	- 44	898	1126	- 46	- 45	- 17
	16	652	920	- 54	860	1118	- 52	- 53	- 25
	17	970	1102	- 26	082	227	- 29	- 28	0
$m^2 = \frac{[vv]}{17} = \frac{40531}{17} = 2384\mu^2$; $m = 49\mu$							$\frac{[f]}{n}$	- 28	

TABLE no.208

APPENDIX XI

Determination of m_{10}

Tables 209-229

See fig. 8 and the description of the investigation on pages 18 - 19. As already said in Appendix VI the determination of m_{10} was combined with that of m_θ and m_ϑ.

General Survey

test-person	A_iV_i table	D_iP_i table	E_iQ_i table	recap. table	m_{10} (μ)	$\frac{1}{2}m_{10}$ (μ)
9	210	211	212	213	163	93
16	214	215	216	217	135	96
4	218	219	220	221	97	46
11	222	223	224	225	115	59
17	226	227	228	229	209	113
$m_{10}^2 = 20000\mu^2$					144	81

The observations necessary for checking the basic figures ABCD and ABFE (fig.8) are mentioned in table 209. Their deviations from the rectangular form can be neglected.

Point	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
	Stand. Meas.	Point	Point - S. M.	Stand. Meas.	Point	Point - S. M.		
A	11.1575	890	11.163 [1]	11.1998	1320	11.164	11.164	0.000
B	161.1470	787	161.163	161.1820	1140	161.164	161.164	150.000
D	10.7820	890	10.714	10.7066	152	10.717	10.716	0.000
C	160.7355	428	160.715	160.7135	225	160.718	160.716	150.000
E	13.6777	1124	13.669	13.6340	692	13.670	13.670	0.000
F	163.6520	863	163.669	163.6830	1180	163.670	163.670	150.000
A	103.1578	970	103.178	103.1408	798	103.178	103.178	0.000
E	53.1442	849	53.181	53.1300	708	53.182	53.182	49.996
D	3.1692	1096	3.181	3.1920	1330	3.182	3.182	99.996
B	6.6375	498	6.625	6.6259	377	6.624	6.624	0.000
F	56.6760	892	56.626	56.6953	1075	56.624	56.625	50.001
C	106.6968	1085	106.623	106.6274	393	106.624	106.624	100.000
A	184.3081	426	184.369	184.3606	958	184.370	184.370	0.000
C	4.0555	1008	4.091	4.0134	593	4.092	4.092	180.278
A	184.4273	500	184.445	184.4022	250	184.446	184.446	0.000
F	26.3528	680	26.330	26.3020	172	26.330	26.330	158.116
B	8.3490	980	8.398	8.3807	1300	8.399	8.398	0.000
D	188.6541	902	188.672	188.6919	1273	188.671	188.672	180.274
B	9.7512	807	9.759	9.7408	714	9.761	9.760	0.000
E	167.8793	1148	167.871	167.8990	1350	167.872	167.872	158.112

[1] 11.1 mm + 2μ(89.0 - 57.5) = 11.163 mm

TABLE no.209

9	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line V_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
A = 1	11.1575	890	[1]11.163	11.1998	1320	11.164	11.164	0.000
2	16.1840	1135	16.159	16.1970	1290	16.164	16.162	4.998
3	21.1104	470	21.173	21.1475	872	21.179	21.176	10.012
4	26.1446	770	26.165	26.1788	1084	26.159	26.162	14.998
5	31.1438	725	31.157	31.1095	372	31.155	31.156	19.992
6	36.1660	991	36.166	36.1300	601	36.160	36.163	24.999
7	41.1988	1232	41.149	41.1182	393	41.142	41.146	29.982
8	46.0561	1048	46.097	46.0760	1206	46.089	46.093	34.929
9	51.1032	401	51.174	51.1636	975	51.168	51.171	40.007
10	56.1339	833	56.199	56.1228	770	56.208	56.204	45.040
11	61.1855	1626	61.254	61.1536	1335	61.260	61.257	50.093
12	66.1770	1626	66.271	66.1255	1082	66.265	66.268	55.104
13	71.1213	696	71.197	71.1235	738	71.201	71.199	60.035
14	76.1424	915	76.198	76.1690	1219	76.206	76.202	65.038
15	81.1922	1122	81.140	81.1596	800	81.141	81.140	69.976
16	86.1303	560	86.151	86.1427	680	86.151	86.151	74.987
17	91.1420	907	91.197	91.1935	1392	91.191	91.194	80.030
18	96.1703	983	96.156	96.1759	1070	96.162	96.159	84.995
19	101.1650	1060	101.182	101.1478	870	101.178	101.180	90.016
20	106.1690	818	106.126	106.1376	475	106.120	106.123	94.959
21	111.0219	580	111.072	111.0013	362	111.070	111.071	99.907
22	116.1005	296	116.158	116.1058	361	116.161	116.160	104.996
23	121.1320	698	121.176	121.1296	665	121.174	121.175	110.011
24	126.1788	1170	126.176	126.1049	410	126.172	126.174	115.010
25	131.1160	470	131.162	131.1649	930	131.156	131.159	119.995
26	136.1450	719	136.154	136.1324	650	136.165	136.160	124.996
27	141.1830	920	141.118	141.1909	985	141.115	141.116	129.952
28	146.1928	1293	146.173	146.1682	1066	146.177	146.175	135.011
29	151.1150	918	151.254	151.1071	868	151.259	151.256	140.092
30	156.1070	815	156.249	156.1054	836	156.256	156.252	145.088
B = 31	161.1470	787	161.163	161.1820	1140	161.164	161.164	150.000

[1]) 11.1 mm + 2μ(89.0 - 57.5) = 11.163 mm

TABLE no.210

9	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line P_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
D	10.7820	890	10.714	10.7066	152	10.717	10.716	0.000
2	15.7840	1080	15.748	15.7763	1065	15.760	15.754	5.038
3	20.8085	268	20.837	20.8814	1003	20.838	20.838	10.122
4	25.7888	1163	25.755	25.7586	864	25.756	25.756	15.040
5	30.3705	1180	30.395	30.3159	670	30.402	30.398	19.682
6	35.6416	566	35.630	35.6113	270	35.631	35.630	24.914
7	40.4135	322	40.437	40.4080	281	40.440	40.438	29.722
8	45.6975	1280	45.661	45.6857	1160	45.661	45.661	34.945
9	50.6312	324	50.602	50.6040	050	50.602	50.602	39.886
10	55.9380	655	55.955	55.9975	1235	55.952	55.954	45.238
11	60.5643	952	60.562	60.5580	890	60.562	60.562	49.846
12	65.8925	1360	65.887	65.8161	600	65.888	65.888	55.172
13	70.4300	1200	70.580	70.4202	1140	70.588	70.584	59.868
14	75.7299	344	75.709	75.7272	322	75.710	75.710	64.994
15	80.6290	355	80.613	80.6259	338	80.616	80.614	69.898
16	85.5182	270	85.518	85.5454	554	85.520	85.519	74.803
17	90.4741	1130	90.478	90.4016	420	90.481	90.480	79.764
18	95.4298	712	95.483	95.4939	1370	95.486	95.484	84.768
19	101.6923	1048	101.625	101.6960	1105	101.629	101.627	90.911
20	105.9602	960	105.972	105.9540	895	105.971	105.972	95.256
21	110.4184	262	110.416	110.4364	475	110.422	110.419	99.703
22	115.5082	679	115.619	115.5532	1134	115.620	115.620	104.904
23	120.8703	958	120.851	120.8178	445	120.853	120.852	110.136
24	125.8455	868	125.883	125.8990	1415	125.885	125.884	115.168
25	130.4380	862	130.496	130.4498	978	130.496	130.496	119.780
26	135.5912	930	135.504	135.4195	690	135.499	135.502	124.786
27	140.7638	762	140.725	140.7028	165	140.727	140.726	130.010
28	145.8612	911	145.860	145.8140	455	145.863	145.862	135.146
29	150.7934	1226	150.758	150.7874	1150	150.755	150.756	140.040
30	155.9255	380	155.925	155.9250	370	155.924	155.924	145.208
C	160.7355	428	160.715	160.7135	225	160.718	160.716	150.000

TABLE no.211

9	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line Q_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
E	13.6777	1124	13.669	13.6340	692	13.670	13.670	0.000
2	18.6144	800	18.731	18.6170	810	18.728	18.730	5.060
3	23.7020	251	23.746	23.7634	840	23.741	23.744	10.074
4	28.6362	660	28.660	28.6720	1061	28.668	28.664	14.994
5	33.4578	960	33.476	33.4754	1128	33.475	33.476	19.806
6	38.5195	482	38.557	38.5520	795	38.555	38.556	24.886
7	43.4006	534	43.506	43.4682	1220	43.508	43.507	29.837
8	48.6128	254	48.625	48.6680	782	48.620	48.622	34.952
9	53.5300	895	53.619	53.5022	610	53.618	53.618	39.948
10	58.7524	1127	58.821	58.7816	1411	58.819	58.820	45.150
11	63.5175	530	63.571	63.5682	1066	63.577	63.574	49.904
12	68.7993	1424	68.786	68.7906	1329	68.785	68.786	55.116
13	73.5735	1387	73.630	73.5825	1340	73.603	73.616	59.946
14	78.6808	1265	78.691	78.6425	860	78.687	78.689	65.019
15	83.5906	1218	83.562	83.5455	780	83.565	83.564	69.894
16	88.5650	668	88.504	88.5395	420	88.505	88.504	74.834
17	93.4400	1043	93.529	93.4180	806	93.525	93.527	79.857
18	98.5392	601	98.542	98.5010	208	98.540	98.541	84.871
19	104.1660	918	104.152	104.1378	651	104.155	104.154	90.484
20	108.7127	487	108.772	108.7018	372	108.771	108.772	95.102
21	113.4398	650	113.450	113.4676	900	113.445	113.448	99.778
22	118.5800	1340	118.608	118.5860	1420	118.612	118.610	104.940
23	123.7027	208	123.736	123.7885	1115	123.746	123.741	110.071
24	128.7248	610	128.772	128.7740	1136	128.779	128.776	115.106
25	133.6048	120	133.614	133.6890	961	133.614	133.614	119.944
26	138.5736	1230	138.599	138.5740	1188	138.590	138.594	124.924
27	143.5594	1320	143.645	143.5082	806	143.645	143.645	129.975
28	148.7380	554	148.735	148.7690	850	148.732	148.734	135.064
29	153.7100	100	153.700	153.7625	628	153.701	153.700	140.030
30	158.7901	1488	158.817	158.7665	1253	158.818	158.818	145.148
F	163.6520	863	163.669	163.6830	1180	163.670	163.670	150.000

TABLE no.212

TESTPERSON 9 RECAPITULATION TABLES 210 - 212

i	AV_i (mm)	DP_i (mm)	$AV_i - DP_i = f_{P_i}$ (mm/100)	$v_{P_i} = f_{P_i} - \frac{[f_P]}{n}$ (mm/100)	EQ_i (mm)	$AV_i - EQ_i = f_{Q_i}$ (mm/100)	$v_{Q_i} = f_{Q_i} - \frac{[f_Q]}{n}$ (mm/100)
2	4.998	5.038	- 4	- 9	5.060	- 6	- 10
3	10.012	10.122	- 11	- 16	10.074	- 6	- 10
4	14.998	15.040	- 4	- 9	14.994	0	- 4
5	19.992	19.682	+ 31	+ 26	19.806	+ 19	+ 15
6	24.999	24.914	+ 8	+ 3	24.886	+ 11	+ 7
7	29.982	29.722	+ 26	+ 21	29.837	+ 14	+ 10
8	34.929	34.945	- 2	- 7	34.952	- 2	- 6
9	40.007	39.886	+ 12	+ 7	39.948	+ 6	+ 2
10	45.040	45.238	- 20	- 25	45.150	- 11	- 15
11	50.093	49.846	+ 25	+ 20	49.904	+ 19	+ 15
12	55.104	55.172	- 7	- 12	55.116	- 1	- 5
13	60.035	59.868	+ 17	+ 12	59.946	+ 9	+ 5
14	65.038	64.994	+ 4	- 1	65.019	+ 2	- 2
15	69.976	69.898	+ 8	+ 3	69.894	+ 8	+ 4
16	74.987	74.803	+ 18	+ 13	74.834	+ 15	+ 11
17	80.030	79.764	+ 27	+ 22	79.857	+ 17	+ 13
18	84.995	84.768	+ 23	+ 18	84.871	+ 12	+ 8
19	90.016	90.911	- 90		90.484	- 47	
20	94.959	95.256	- 30	- 35	95.102	- 14	- 18
21	99.907	99.703	+ 20	+ 15	99.778	+ 13	+ 9
22	104.996	104.904	+ 9	+ 4	104.940	+ 6	+ 2
23	110.011	110.136	- 12	- 17	110.071	- 6	- 10
24	115.010	115.168	- 16	- 21	115.106	- 10	- 14
25	119.995	119.780	+ 22	+ 17	119.944	+ 5	+ 1
26	124.996	124.786	+ 21	+ 16	124.924	+ 7	+ 3
27	129.952	130.010	- 6	- 11	129.975	- 2	- 6
28	135.011	135.146	- 14	- 19	135.064	- 5	- 9
29	140.092	140.040	+ 5	0	140.030	+ 6	+ 2
30	145.088	145.208	- 12	- 17	145.148	- 6	- 10
		$\frac{[f_P]}{n}$	+ 5		$\frac{[f_Q]}{n}$	+ 4	

$m^2 = \frac{[v_P v_P]}{28} = \frac{7454}{28} = 266.2 \frac{mm^2}{10^4}$; $m = 163\mu$ $\quad [v_Q v_Q] = 2440 \frac{mm^2}{10^4}$; $m = 93\mu$

TABLE no.213

16	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line V_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
A = 1	16.6966	1287	16.664	16.6677	990	16.663	16.664	0.000
2	21.6734	1557	21.765	21.6548	1362	21.763	21.764	5.100
3	26.6920	1731	26.762	26.6453	1270	26.763	26.762	10.098
4	31.6996	1470	31.695	31.6210	676	31.693	31.694	15.030
5	36.6816	1652	36.767	36.6788	1610	36.764	36.766	20.102
6	41.6815	1700	41.777	41.6715	1584	41.774	41.776	25.112
7	46.6111	596	46.697	46.6875	1357	46.696	46.696	30.032
8	51.6960	1850	51.778	51.6210	1133	51.785	51.782	35.118
9	56.6140	475	56.667	56.6107	462	56.671	56.669	40.005
10	61.6753	1281	61.706	61.6204	738	61.707	61.706	45.042
11	66.6088	402	66.663	66.6820	1141	66.664	66.664	50.000
12	71.6950	1763	71.763	71.6865	1685	71.764	71.764	55.100
13	76.6422	1338	76.783	76.6850	1730	76.776	76.780	60.116
14	81.6950	1386	81.687	81.6690	1120	81.686	81.686	65.022
15	86.6560	912	86.670	86.6950	1298	86.670	86.670	70.006
16	91.6400	622	91.644	91.6030	239	91.642	91.643	74.979
17	96.6737	1773	96.807	96.6825	1890	96.813	96.810	80.146
18	101.6930	1405	101.695	101.6805	1290	101.697	101.696	85.032
19	106.6920	1152	106.646	106.6930	1162	106.646	106.646	89.982
20	111.6015	210	111.639	111.6124	330	111.641	111.640	94.976
21	116.6598	983	116.677	116.6700	1098	116.680	116.678	100.014
22	121.6753	1145	121.678	121.6780	1170	121.678	121.678	105.014
23	126.6171	470	126.660	126.6615	916	126.660	126.660	109.996
24	131.6077	243	131.633	131.6712	868	131.631	131.632	114.968
25	136.6132	350	136.644	136.6632	833	136.640	136.642	119.978
26	141.6973	1031	141.612	141.6935	1000	141.613	141.612	124.948
27	146.6850	921	146.614	146.6808	880	146.614	146.614	129.950
28	151.6062	152	151.618	151.6919	996	151.615	151.616	134.952
29	156.6810	1145	156.667	156.6651	992	156.668	156.668	140.004
30	161.6968	1242	161.655	161.6172	440	161.654	161.654	144.990
B = 31	166.6064	266	166.640	166.6730	926	166.639	166.640	149.976

TABLE no.214

16	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line P_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
D	15.3760	943	15.337	15.3702	903	15.340	15.338	0.000
2	20.2176	285	20.222	20.2150	248	20.220	20.221	4.883
3	25.2841	1006	25.233	25.2902	1052	25.230	25.232	9.894
4	30.1919	1366	30.189	30.1016	466	30.190	30.190	14.852
5	35.6026	115	35.618	35.6033	120	35.617	35.618	20.280
6	40.5831	1314	40.597	40.5739	1228	40.598	40.598	25.260
7	45.5872	896	45.505	45.5350	381	45.506	45.506	30.168
8	50.6940	1220	50.656	50.6986	1290	50.661	50.658	35.320
9	55.5888	1097	55.542	55.5171	386	55.543	55.542	40.204
10	60.6815	1172	60.671	60.6740	1086	60.669	60.670	45.332
11	65.4973	1290	65.463	65.4958	1260	65.460	65.462	50.124
12	70.4932	1714	70.556	70.4519	1300	70.556	70.556	55.218
13	75.5874	1099	75.545	75.5966	1160	75.539	75.542	60.204
14	80.5726	1066	80.568	80.5670	998	80.566	80.567	65.229
15	85.4597	972	85.475	85.4681	1050	85.474	85.474	70.136
16	90.5696	1050	90.571	90.5955	1311	90.571	90.571	75.233
17	95.5610	1040	95.586	95.5545	978	95.587	95.586	80.248
18	100.5432	701	100.554	100.5528	790	100.552	100.553	85.215
19	105.4738	1082	105.469	105.4020	359	105.468	105.468	90.130
20	110.4873	980	110.421	110.4736	828	110.418	110.420	95.082
21	115.4145	335	115.438	115.4420	603	115.437	115.438	100.100
22	120.4838	1098	120.452	120.4680	934	120.451	120.452	105.114
23	125.2536	931	125.279	125.2363	768	125.281	125.280	109.942
24	130.2925	1348	130.285	130.2732	1148	130.283	130.284	114.946
25	135.4148	278	135.426	135.4952	1066	135.423	135.424	120.086
26	140.2926	1392	140.293	140.2585	1040	140.291	140.292	124.954
27	145.2535	1343	145.362	145.2466	1276	145.362	145.362	130.024
28	150.1452	738	150.157	150.1832	1120	150.158	150.158	134.820
29	155.2586	836	155.250	155.2920	1160	155.248	155.249	139.911
30	160.1541	1237	160.239	160.1711	1400	160.238	160.238	144.900
C	165.2404	972	165.314	165.3454	532	165.316	165.315	149.977

TABLE no.215

16	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line Q_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
E	15.4972	1197	15.445	15.4702	926	15.445	15.445	0.000
2	20.4869	1094	20.445	20.4750	982	20.446	20.446	5.001
3	25.4812	1040	25.446	25.4160	386	25.445	25.446	10.001
4	30.3709	1350	30.428	30.3870	1498	30.426	30.427	14.982
5	35.6786	1176	35.678	35.6662	1055	35.679	35.678	20.233
6	40.5752	1491	40.648	40.5796	1534	40.648	40.648	25.203
7	45.5895	1177	45.556	45.5802	1092	45.558	45.557	30.112
8	50.7171	196	50.705	50.7274	294	50.704	50.704	35.259
9	55.5116	428	55.562	55.5716	1032	55.563	55.562	40.117
10	60.6955	1423	60.694	60.6589	1058	60.694	60.694	45.249
11	65.5922	1080	65.532	65.5108	270	65.532	65.532	50.087
12	70.6262	282	70.604	70.6109	132	70.605	70.604	55.159
13	75.5661	1220	75.612	75.5588	1150	75.612	75.612	60.167
14	80.6310	466	80.631	80.6026	185	80.632	80.632	65.187
15	85.5000	181	85.536	85.5974	1151	85.535	85.536	70.091
16	90.6125	195	90.614	90.6234	309	90.615	90.614	75.169
17	95.6870	1120	95.650	95.6811	1054	95.649	95.650	80.205
18	100.6228	338	100.622	100.6172	290	100.624	100.623	85.178
19	105.5987	1218	105.546	105.5408	635	105.545	105.546	90.101
20	110.4836	1210	110.475	110.4290	650	110.472	110.474	95.029
21	115.4598	1210	115.522	115.4811	1423	115.522	115.522	100.077
22	120.5134	400	120.553	120.5853	1113	120.552	120.552	105.107
23	125.4329	682	125.471	125.4180	520	125.468	125.470	110.025
24	130.4838	1275	130.487	130.4643	1082	130.488	130.488	115.043
25	135.6082	302	135.644	135.6100	315	135.643	135.644	120.199
26	140.3909	1246	140.367	140.3155	502	140.369	140.368	124.923
27	145.4886	1048	145.432	145.4280	430	145.430	145.431	129.986
28	150.3205	208	150.301	150.3383	383	150.300	150.300	134.855
29	155.3950	1030	155.316	155.3103	180	155.315	155.316	139.871
30	160.3074	193	160.324	160.3982	1110	160.326	160.325	144.880
F	165.4519	630	165.422	165.4431	535	165.421	165.422	149.977

TABLE no.216

TESTPERSON 16 RECAPITULATION TABLES 214 - 216

i	AV_i (mm)	DP_i (mm)	$AV_i - DP_i = f_{P_i}$ (mm/100)	$v_{P_i} = f_{P_i} - \frac{[f_P]}{n}$ (mm/100)	EQ_i (mm)	$AV_i - EQ_i = f_{Q_i}$ (mm/100)	$v_{Q_i} = f_{Q_i} - \frac{[f_Q]}{n}$ (mm/100)
2	5.100	4.883	+ 22	+ 29	5.001	+ 10	+ 16
3	10.098	9.894	+ 20	+ 27	10.001	+ 10	+ 16
4	15.030	14.852	+ 18	+ 25	14.982	+ 5	+ 11
5	20.102	20.280	- 18	- 11	20.233	- 13	- 7
6	25.112	25.260	- 15	- 8	25.203	- 9	- 3
7	30.032	30.168	- 14	- 7	30.112	- 8	- 2
8	35.118	35.320	- 20	- 13	35.259	- 14	- 8
9	40.005	40.204	- 20	- 13	40.117	- 11	- 5
10	45.042	45.332	- 29	- 22	45.249	- 21	- 15
11	50.000	50.124	- 12	- 5	50.087	- 9	- 3
12	55.100	55.218	- 12	- 5	55.159	- 6	0
13	60.116	60.204	- 9	- 2	60.167	- 5	+ 1
14	65.022	65.229	- 21	- 14	65.187	- 16	- 10
15	70.006	70.136	- 13	- 6	70.091	- 8	- 2
16	74.979	75.233	- 25	- 18	75.169	- 19	- 13
17	80.146	80.248	- 10	- 3	80.205	- 6	0
18	85.032	85.215	- 18	- 11	85.178	- 15	- 9
19	89.982	90.130	- 15	- 8	90.101	- 12	- 6
20	94.976	95.082	- 11	- 4	95.029	- 5	+ 1
21	100.014	100.100	- 9	- 2	100.077	- 6	0
22	105.014	105.114	- 10	- 3	105.107	- 9	- 3
23	109.996	109.942	+ 5	+ 12	110.025	- 3	+ 3
24	114.968	114.946	+ 2	+ 9	115.043	- 8	- 2
25	119.978	120.086	- 11	- 4	120.199	- 22	- 16
26	124.948	124.954	- 1	+ 6	124.923	+ 2	+ 8
27	129.950	130.024	- 7	0	129.986	- 4	+ 2
28	134.952	134.820	+ 13	+ 20	134.855	+ 10	+ 16
29	140.004	139.911	+ 9	+ 16	139.871	+ 13	+ 19
30	144.990	144.900	+ 9	+ 16	144.880	+ 11	+ 17
		$\frac{[f_P]}{n}$	- 7		$\frac{[f_Q]}{n}$	- 6	

$m^2 = \frac{[v_P v_P]}{29} = \frac{5273}{29} = 181.8 \frac{mm^2}{10^4}$; $m = 135\mu$ $\quad [v_Q v_Q] = 2662 \frac{mm^2}{10^4}$; $m = 96\mu$

TABLE no.217

4	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line V_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
A = 1	1.6158	292	1.627	1.6279	413	1.627	1.627	0.000
2	6.6192	526	6.667	6.6963	1327	6.673	6.670	5.043
3	11.6197	542	11.669	11.6096	441	11.669	11.669	10.042
4	16.6115	768	16.731	16.6788	1430	16.728	16.730	15.103
5	21.6845	1170	21.665	21.6880	1258	21.676	21.670	20.043
6	26.6762	1038	26.655	26.6279	578	26.660	26.658	25.031
7	31.6650	1250	31.720	31.6600	1240	31.728	31.724	30.097
8	36.6964	1184	36.644	36.6832	1085	36.651	36.648	35.021
9	41.6034	196	41.632	41.6202	420	41.644	41.638	40.011
10	46.6762	1212	46.690	46.6976	1480	46.701	46.696	45.069
11	51.6815	1175	51.672	51.6956	1396	51.688	51.680	50.053
12	56.6038	395	56.671	56.6062	439	56.675	56.673	55.046
13	61.6147	246	61.620	61.6679	840	61.632	61.626	59.999
14	66.6652	901	66.650	66.6049	385	66.667	66.658	65.031
15	71.6800	1030	71.646	71.6024	280	71.651	71.648	70.021
16	76.6792	983	76.638	76.6469	732	76.653	76.646	75.019
17	81.6778	935	81.631	81.6765	977	81.642	81.636	80.009
18	86.6865	1328	86.693	86.6994	1526	86.706	86.700	85.073
19	91.6751	925	91.635	91.6952	1182	91.646	91.640	90.013
20	96.6768	1185	96.683	96.6050	545	96.699	96.691	95.064
21	101.6876	1047	101.634	101.6956	1160	101.641	101.638	100.011
22	106.6042	161	106.624	106.6134	312	106.636	106.630	105.003
23	111.6867	1228	111.672	111.6025	441	111.683	111.678	110.051
24	116.6025	130	116.621	116.6651	795	116.629	116.625	114.998
25	121.6680	988	121.662	121.6948	1293	121.669	121.666	120.039
26	126.6935	1105	126.634	126.6949	1180	126.646	126.640	125.013
27	131.6684	1110	131.685	131.6787	1282	131.699	131.692	130.065
28	136.6830	1250	136.684	136.6145	646	136.700	136.692	135.065
29	141.6680	925	141.649	141.6711	1005	141.659	141.654	140.027
30	146.6644	815	146.634	146.6162	392	146.646	146.640	145.013
B = 31	151.6900	1108	151.642	151.6040	240	151.640	151.641	150.014

TABLE no.218

4	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line P_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
D	1.3170	449	1.356	1.3786	1050	1.353	1.354	0.000
2	6.3837	1300	6.393	6.3483	980	6.399	6.396	5.042
3	11.3920	1420	11.400	11.3738	1250	11.402	11.401	10.047
4	16.6970	1142	16.634	16.6353	537	16.637	16.636	15.282
5	21.4830	1030	21.440	21.4340	544	21.441	21.440	20.086
6	26.5751	1178	26.585	26.5975	1400	26.585	26.585	25.231
7	31.6895	1228	31.667	31.6213	542	31.666	31.666	30.312
8	36.3613	1013	36.380	36.3051	448	36.379	36.380	35.026
9	41.3488	934	41.389	41.3976	1423	41.389	41.389	40.035
10	46.3863	1566	46.441	46.3971	1689	46.444	46.442	45.088
11	51.5453	856	51.581	51.5700	1121	51.584	51.582	50.228
12	56.5578	1212	56.627	56.5773	1420	56.629	56.628	55.274
13	61.3950	1435	61.397	61.3965	1468	61.401	61.399	60.045
14	66.5286	355	66.514	66.5952	1010	66.512	66.513	65.159
15	71.5038	339	71.560	71.5908	1208	71.560	71.560	70.206
16	76.4910	1090	76.436	76.4082	310	76.446	76.441	75.087
17	81.2901	1438	81.307	81.2642	1230	81.318	81.312	79.958
18	86.6129	620	86.698	86.6681	1190	86.702	86.700	85.346
19	91.3880	1073	91.339	91.3158	370	91.342	91.340	89.986
20	96.3053	404	96.370	96.3215	582	96.373	96.372	95.018
21	101.2462	680	101.244	101.2086	329	101.249	101.246	99.892
22	106.3555	1150	106.419	106.3060	656	106.419	106.419	105.065
23	111.3516	1001	111.397	111.3796	1282	111.397	111.397	110.043
24	116.4102	195	116.419	116.4896	1020	116.425	116.422	115.068
25	121.3688	1014	121.365	121.3582	900	121.364	121.364	120.010
26	126.3050	398	126.370	126.3780	1130	126.370	126.370	125.016
27	131.5922	1100	131.536	131.5090	308	131.544	131.540	130.186
28	136.5815	1090	136.555	136.5162	445	136.557	136.556	135.202
29	141.4705	1050	141.469	141.4241	585	141.469	141.469	140.115
30	146.3825	1458	146.427	146.3667	1288	146.424	146.426	145.072
C	151.3269	608	151.368	151.3625	974	151.370	151.369	150.015

TABLE no.219

4	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line Q_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
E	6.2365	690	6.265	6.2627	958	6.266	6.266	0.000
2	11.2820	1250	11.286	11.2403	870	11.293	11.290	5.024
3	16.2911	1500	16.318	16.2361	948	16.317	16.318	10.052
4	21.4143	506	21.473	21.4251	600	21.470	21.472	15.206
5	26.3325	600	26.355	26.3987	1250	26.353	26.354	20.088
6	31.3911	1419	31.402	31.3460	946	31.397	31.400	25.134
7	36.4203	440	36.447	36.4162	390	36.446	36.446	30.180
8	41.2981	1438	41.291	41.2364	795	41.286	41.288	35.022
9	46.2755	1120	46.273	46.2922	1280	46.272	46.272	40.006
10	51.2670	1360	51.338	51.3877	1108	51.346	51.342	45.076
11	56.3003	424	56.384	56.3932	1371	56.388	56.386	50.120
12	61.3613	1249	61.427	61.3946	1560	61.423	61.425	55.159
13	66.2182	800	66.324	66.3256	362	66.321	66.322	60.056
14	71.3038	378	71.368	71.3956	1301	71.369	71.368	65.102
15	76.3120	431	76.362	76.3856	1150	76.359	76.360	70.094
16	81.2939	1610	81.334	81.2670	1350	81.336	81.335	75.069
17	86.2840	1289	86.290	86.2833	1282	86.290	86.290	80.024
18	91.3626	1511	91.477	91.4042	412	91.474	91.476	85.210
19	96.2629	1040	96.282	96.2911	1300	96.278	96.280	90.014
20	101.2277	702	101.285	101.2319	748	101.286	101.286	95.020
21	106.2366	548	106.236	106.2900	1042	106.228	106.232	99.966
22	111.2606	1098	111.298	111.2372	848	111.295	111.296	105.030
23	116.2346	708	116.272	116.2786	1152	116.273	116.272	110.006
24	121.2085	672	121.317	121.2798	1340	121.308	121.312	115.046
25	126.2963	1452	126.298	126.2470	921	126.290	126.294	120.028
26	131.3952	1005	131.311	131.3130	151	131.304	131.308	125.042
27	136.3876	1330	136.391	136.3887	1325	136.388	136.390	130.124
28	141.4114	158	141.409	141.4288	345	141.411	141.410	135.144
29	146.2495	1078	146.317	146.2973	1585	146.322	146.320	140.054
30	151.3857	996	151.328	151.3384	495	151.322	151.325	145.059
F	156.2990	1390	156.280	156.2970	1372	156.280	156.280	150.014

TABLE no.220

TESTPERSON 4 RECAPITULATION TABLES 218 - 220

i	AV_i (mm)	DP_i (mm)	$AV_i - DP_i = f_{P_i}$ (mm/100)	$v_{P_i} = f_{P_i} - \frac{[f_P]}{n}$ (mm/100)	EQ_i (mm)	$AV_i - EQ_i = f_{Q_i}$ (mm/100)	$v_{Q_i} = f_{Q_i} - \frac{[f_Q]}{n}$ (mm/100)
2	5.043	5.042	0	+ 7	5.024	+ 2	+ 6
3	10.042	10.047	0	+ 7	10.052	- 1	+ 3
4	15.103	15.282	- 18	- 11	15.206	- 10	- 6
5	20.043	20.086	- 4	+ 3	20.088	- 4	0
6	25.031	25.231	- 20	- 13	25.134	- 10	- 6
7	30.097	30.312	- 22	- 15	30.180	- 8	- 4
8	35.021	35.026	0	+ 7	35.022	0	+ 4
9	40.011	40.035	- 2	+ 5	40.006	0	+ 4
10	45.069	45.088	- 2	+ 5	45.076	- 1	+ 3
11	50.053	50.228	- 18	- 11	50.120	- 7	- 3
12	55:046	55.274	- 23	- 16	55.159	- 11	- 7
13	59.999	60.045	- 5	+ 2	60.056	- 6	- 2
14	65.031	65.159	- 13	- 6	65.102	- 7	- 3
15	70.021	70.206	- 18	- 11	70.094	- 7	- 3
16	75.019	75.087	- 7	0	75.069	- 5	- 1
17	80.009	79.958	+ 5	+ 12	80.024	- 2	+ 2
18	85.073	85.346	- 27	- 20	85.210	- 14	- 10
19	90.013	89.986	+ 3	+ 10	90.014	0	+ 4
20	95.064	95.018	+ 5	+ 12	95.020	+ 4	+ 8
21	100.011	99.892	+ 12	+ 19	99.966	+ 4	+ 8
22	105.003	105.065	- 6	+ 1	105.030	- 3	+ 1
23	110.051	110.043	+ 1	+ 8	110.006	+ 4	+ 8
24	114.998	115.068	- 7	0	115.046	- 5	- 1
25	120.039	120.010	+ 3	+ 10	120.028	+ 1	+ 5
26	125.013	125.016	0	+ 7	125.042	- 3	+ 1
27	130.065	130.186	- 12	- 5	130.124	- 6	- 2
28	135.065	135.202	- 14	- 7	135.144	- 8	- 4
29	140.027	140.115	- 9	- 2	140.054	- 3	+ 1
30	145.013	145.072	- 6	+ 1	145.059	- 5	- 1
		$\frac{[f_P]}{n}$	- 7		$\frac{[f_Q]}{n}$	- 4	

$m^2 = \frac{[v_P v_P]}{29} = \frac{2701}{29} = 93.1 \frac{mm^2}{10^4}$; m=97μ $\quad [v_Q v_Q] = 617 \frac{mm^2}{10^4}$; m=46μ

TABLE no.221

11	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line V_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
A = 1	22.7172	265	22.719	22.7484	588	22.721	22.720	0.000
2	27.7170	362	27.738	27.7362	556	27.739	27.738	5.018
3	32.6572	1205	32.727	32.6955	1614	32.732	32.730	10.010
4	37.6652	1242	37.718	37.6776	1376	37.720	37.719	14.999
5	42.6640	1068	42.686	42.6700	1142	42.688	42.687	19.967
6	47.6632	1265	47.727	47.6992	1640	47.730	47.728	25.008
7	52.6580	1212	52.726	52.6685	1238	52.711	52.718	29.998
8	57.6005	281	57.655	57.6670	964	57.659	57.657	34.937
9	62.6032	540	62.702	62.6420	952	62.706	62.704	39.984
10	67.6914	1470	67.711	67.6102	661	67.712	67.712	44.992
11	72.6118	738	72.724	72.6879	1520	72.728	72.726	50.006
12	77.6931	1418	77.697	77.6660	1176	77.703	77.700	54.980
13	82.6060	221	82.632	82.6678	870	82.638	82.635	59.915
14	87.6750	980	87.646	87.6830	1082	87.650	87.648	64.928
15	92.6901	980	92.616	92.6081	174	92.619	92.618	69.898
16	97.6437	820	97.677	97.6940	1324	97.677	97.677	74.957
17	102.6262	592	102.666	102.6784	1130	102.669	102.668	79.948
18	107.6090	440	107.670	107.6865	1226	107.672	107.671	84.951
19	112.6359	787	112.686	112.6518	960	112.688	112.687	89.967
20	117.6669	930	117.652	117.6262	475	117.643	117.648	94.928
21	122.6736	932	122.639	122.6877	1070	122.639	122.639	99.919
22	127.6910	1148	127.648	127.6880	1142	127.652	127.650	104.930
23	132.6273	792	132.704	132.6813	1320	132.701	132.702	109.982
24	137.5654	1130	137.595	137.5720	1208	137.598	137.596	114.876
25	142.6264	550	142.657	142.6340	590	142.650	142.654	119.934
26	147.6028	340	147.662	147.6196	468	147.654	147.658	124.938
27	152.6235	552	152.663	152.6600	923	152.665	152.664	129.944
28	157.6567	1019	157.690	157.6892	1352	157.692	157.691	134.971
29	162.6559	779	162.644	162.6022	241	162.644	162.644	139.924
30	167.6705	860	167.631	167.6662	835	167.635	167.633	144.913
B = 31	172.6843	1335	172.698	172.6500	990	172.698	172.698	149.978

TABLE no.222

11	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line P_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
D	45.3868	925	45.311	45.3881	940	45.312	45.312	0.000
2	50.4940	1400	50.492	50.4110	570	50.492	50.492	5.180
3	55.3955	1260	55.361	55.3201	500	55.360	55.360	10.048
4	60.3988	1195	60.341	60.3003	201	60.340	60.340	15.028
5	65.4254	483	65.446	65.4530	743	65.443	65.444	20.132
6	70.2655	912	70.251	70.2361	595	70.247	70.249	24.937
7	75.3920	932	75.302	75.3750	758	75.302	75.302	29.990
8	80.5386	408	80.504	80.5236	250	80.503	80.504	35.192
9	85.2414	790	85.275	85.2455	836	85.276	85.276	39.964
10	90.2468	680	90.242	90.2300	493	90.239	90.240	44.928
11	95.1405	582	95.135	95.1800	955	95.131	95.133	49.821
12	100.2226	510	100.257	100.2510	794	100.257	100.257	54.945
13	105.1970	1518	105.210	105.1463	1000	105.207	105.208	59.896
14	110.3761	990	110.346	110.3937	1146	110.342	110.344	65.032
15	115.4290	652	115.472	115.4221	576	115.471	115.472	70.160
16	120.2563	1040	120.295	120.2484	918	120.287	120.291	74.979
17	125.3680	710	125.306	125.3796	810	125.303	125.304	79.992
18	130.4245	377	130.426	130.4609	738	130.426	130.426	85.114
19	135.5700	1132	135.586	135.5710	1148	135.588	135.587	90.275
20	140.1230	474	140.149	140.1115	356	140.148	140.148	94.836
21	145.1416	715	145.160	145.1625	938	145.163	145.162	99.850
22	150.3395	462	150.313	150.3291	353	150.312	150.312	105.000
23	155.3980	1062	155.316	155.3858	940	155.316	155.316	110.004
24	160.2285	416	160.226	160.2490	611	160.224	160.225	114.913
25	165.2068	522	165.291	165.2888	1355	165.293	165.292	119.980
26	170.2086	220	170.227	170.2718	864	170.229	170.228	124.916
27	175.2551	720	175.234	175.2723	860	175.227	175.230	129.918
28	180.2353	566	180.243	180.2015	236	180.244	180.244	134.932
29	185.0822	1266	185.089	185.0668	1131	185.093	185.091	139.779
30	190.2025	390	190.273	190.2437	796	190.272	190.272	144.960
C	195.3040	040	195.300	195.3576	576	195.300	195.300	149.988

TABLE no. 223

11	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line Q_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
E	3.1482	902	3.184	3.1370	786	3.183	3.184	0.000
2	8.2323	760	8.287	8.2333	780	8.289	8.288	5.104
3	13.2378	615	13.247	13.2231	452	13.244	13.246	10.062
4	18.2273	521	18.250	18.2616	862	18.249	18.250	15.066
5	23.2890	1018	23.226	23.2308	443	23.227	23.226	20.042
6	28.1951	1320	28.174	28.1160	518	28.172	28.173	24.989
7	33.1382	870	33.198	33.1072	570	33.200	33.199	30.015
8	38.2284	470	38.237	38.2258	458	38.240	38.238	35.054
9	43.1437	952	43.203	43.1783	1297	43.203	43.203	40.019
10	48.1468	928	48.192	48.1980	1452	48.194	48.193	45.009
11	53.1070	272	53.140	53.1993	1192	53.140	53.140	49.956
12	58.1100	530	58.186	58.1336	760	58.185	58.186	55.002
13	63.0836	1266	63.086	63.0786	1210	63.085	63.086	59.902
14	68.1168	597	68.186	68.1740	1161	68.184	68.185	65.001
15	73.2080	160	73.216	73.2848	928	73.216	73.216	70.032
16	78.1994	1420	78.185	78.1928	1356	78.186	78.186	75.002
17	83.1092	329	83.147	83.1770	1017	83.149	83.148	79.964
18	88.2491	653	88.232	88.2558	718	88.232	88.232	85.048
19	93.3035	210	93.335	93.3140	321	93.336	93.336	90.152
20	98.0433	510	98.015	98.0372	442	98.014	98.014	94.830
21	103.0431	760	103.066	103.0539	855	103.063	103.064	99.880
22	108.1350	568	108.144	108.1847	1054	108.141	108.142	104.958
23	113.1130	485	113.171	113.1561	918	113.171	113.171	109.987
24	118.1962	1234	118.154	118.1150	420	118.154	118.154	114.970
25	123.1655	1020	123.173	123.1823	1166	123.169	123.171	119.987
26	128.1530	870	128.168	128.1010	362	128.170	128.169	124.985
27	133.0394	864	133.094	133.0464	929	133.093	133.094	129.910
28	138.1194	362	138.134	138.1862	1029	138.133	138.134	134.950
29	143.0493	930	143.087	143.0846	1274	143.086	143.086	139.902
30	148.1055	258	148.141	148.1553	780	148.145	148.143	144.959
F	153.1815	1209	153.179	153.1148	537	153.178	153.178	149.994

TABLE no.224

TESTPERSON 11 RECAPITULATION TABLES 222 - 224

i	AV_i (mm)	DP_i (mm)	$AV_i - DP_i = f_{P_i}$ (mm/100)	$v_{P_i} = f_{P_i} - \frac{[f_P]}{n}$ (mm/100)	EQ_i (mm)	$AV_i - EQ_i = f_{Q_i}$ (mm/100)	$v_{Q_i} = f_{Q_i} - \frac{[f_Q]}{n}$ (mm/100)
2	5.018	5.180	- 16	- 13	5.104	- 9	- 5
3	10.010	10.048	- 4	- 1	10.062	- 5	- 1
4	14.999	15.028	- 3	0	15.066	- 7	- 3
5	19.967	20.132	- 16	- 13	20.042	- 8	- 4
6	25.008	24.937	+ 7	+ 10	24.989	+ 2	+ 6
7	29.998	29.990	+ 1	+ 4	30.015	- 2	+ 2
8	34.937	35.192	- 26	- 23	35.054	- 12	- 8
9	39.984	39.964	+ 2	+ 5	40.019	- 4	0
10	44.992	44.928	+ 6	+ 9	45.009	- 2	+ 2
11	50.006	49.821	+ 18	+ 21	49.956	+ 5	+ 9
12	54.980	54.945	+ 4	+ 7	55.002	- 2	+ 2
13	59.915	59.896	+ 2	+ 5	59.902	+ 1	+ 5
14	64.928	65.032	- 10	- 7	65.001	- 7	- 3
15	69.898	70.160	- 26	- 23	70.032	- 13	- 9
16	74.957	74.979	- 2	+ 1	75.002	- 4	0
17	79.948	79.992	- 4	- 1	79.964	- 2	+ 2
18	84.951	85.114	- 16	- 13	85.048	- 10	- 6
19	89.967	90.275	- 31	- 28	90.152	- 18	- 14
20	94.928	94.836	+ 9	+ 12	94.830	+ 10	+ 14
21	99.919	99.850	+ 7	+ 10	99.880	+ 4	+ 8
22	104.930	105.000	- 7	- 4	104.958	- 3	+ 1
23	109.982	110.004	- 2	+ 1	109.987	0	+ 4
24	114.876	114.913	- 4	- 1	114.970	- 9	- 5
25	119.934	119.980	- 5	- 2	119.987	- 5	- 1
26	124.938	124.916	+ 2	+ 5	124.985	- 5	- 1
27	129.944	129.918	+ 3	+ 6	129.910	+ 3	+ 7
28	134.971	134.932	+ 4	+ 7	134.950	+ 2	+ 6
29	139.924	139.779	+ 14	+ 17	139.902	+ 2	+ 6
30	144.913	144.960	- 5	- 2	144.959	- 5	- 1
		$\frac{[f_P]}{n}$	- 3		$\frac{[f_Q]}{n}$	- 4	

$m^2 = \frac{[v_P v_P]}{29} = \frac{3807}{29} = 131.3 \frac{mm^2}{10^4}$; $m = 115\mu$ $[v_Q v_Q] = 1021 \frac{mm^2}{10^4}$; $m = 59\mu$

TABLE no.225

17	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line V_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
A = 1	9.4015	173	9.432	9.4645	837	9.438	9.435	0.000
2	14.4173	847	14.535	14.4765	1420	14.531	14.533	5.098
3	19.4335	1005	19.534	19.4818	1470	19.530	19.532	10.097
4	24.4871	1741	24.574	24.4760	1618	24.572	24.573	15.138
5	29.4690	1472	29.556	29.4904	1690	29.557	29.556	20.121
6	34.4161	870	34.542	34.4202	903	34.540	34.541	25.106
7	39.4136	970	39.567	39.4293	1132	39.568	39.568	30.133
8	44.3982	1210	44.346	44.3470	693	44.345	44.346	34.911
9	49.4855	1130	49.455	49.4251	530	49.456	49.456	40.021
10	54.4136	410	54.455	54.4420	665	54.449	54.452	45.017
11	59.4449	996	59.509	59.4831	1370	59.508	59.508	50.073
12	64.4291	825	64.507	64.4850	1372	64.504	64.506	55.071
13	69.4190	551	69.472	69.4882	1244	69.472	69.472	60.037
14	74.4042	324	74.456	74.4158	436	74.456	74.456	65.021
15	79.4886	1064	79.436	79.4185	360	79.435	79.436	70.001
16	84.3504	980	84.395	84.3487	969	84.396	84.396	74.961
17	89.3460	1220	89.452	89.4047	282	89.447	89.450	80.015
18	94.4990	1371	94.476	94.4540	919	94.476	94.476	85.041
19	99.4742	1047	99.461	99.4205	510	99.461	99.461	90.026
20	104.4952	1236	104.457	104.4289	570	104.456	104.456	95.021
21	109.4978	1410	109.486	109.4081	510	109.486	109.486	100.051
22	114.4572	630	114.412	114.4446	502	114.411	114.412	104.977
23	119.3380	821	119.388	119.3330	775	119.389	119.388	109.953
24	124.3258	1026	124.454	124.4189	461	124.454	124.454	115.019
25	129.4864	1742	129.576	129.4749	1623	129.575	129.576	120.141
26	134.4005	299	134.459	134.4161	442	134.456	134.458	125.023
27	139.4780	1360	139.516	139.4248	826	139.516	139.516	130.081
28	144.3567	843	144.355	144.3299	587	144.358	144.356	134.921
29	149.4190	460	149.454	149.4210	476	149.453	149.454	140.019
30	154.4429	558	154.426	154.4819	945	154.425	154.426	144.991
B = 31	159.4936	1026	159.418	159.4834	925	159.418	159.418	149.983

TABLE no.226

17	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line P_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
D	12.1872	1084	12.142	12.1252	470	12.144	12.143	0.000
2	16.9081	172	16.918	16.9164	247	16.917	16.918	4.775
3	22.1213	685	22.194	22.1938	1420	22.196	22.195	10.052
4	27.2534	990	27.291	27.2375	822	27.289	27.290	15.147
5	32.1700	1430	32.246	32.1240	965	32.245	32.246	20.103
6	36.9760	1396	37.027	36.9805	1428	37.025	37.026	24.883
7	42.0142	386	42.049	42.0366	625	42.052	42.050	29.907
8	46.9192	600	46.982	46.9440	835	46.979	46.980	34.837
9	52.1539	579	52.108	52.1855	884	52.106	52.107	39.964
10	57.0345	660	57.063	57.0416	732	57.063	57.063	44.920
11	62.1348	721	62.175	62.1545	910	62.173	62.174	50.031
12	67.0218	854	67.127	67.0006	650	67.129	67.128	54.985
13	72.1502	548	72.109	72.1995	1036	72.108	72.108	59.965
14	76.8438	872	76.887	76.8964	1382	76.884	76.886	64.743
15	81.8482	925	81.889	81.8956	1415	81.892	81.890	69.747
16	87.0660	678	87.004	87.0630	656	87.005	87.004	74.861
17	91.7672	1370	91.840	91.7458	1138	91.836	91.838	79.695
18	97.0188	329	97.028	97.0528	669	97.028	97.028	84.885
19	101.8838	1472	101.927	101.8221	871	101.930	101.928	89.785
20	106.9500	1061	107.012	106.9611	1196	107.017	107.014	94.871
21	112.1205	806	112.220	112.1598	1218	112.224	112.222	100.079
22	117.1750	1140	117.178	117.1332	734	117.180	117.179	105.036
23	121.8195	818	121.925	121.8080	711	121.926	121.926	109.783
24	127.2580	749	127.234	127.2852	1032	127.236	127.235	115.092
25	132.7393	720	132.765	132.7278	635	132.771	132.768	120.625
26	137.2433	800	137.273	137.2218	578	137.272	137.272	125.129
27	141.8250	447	141.839	141.8120	318	141.840	141.840	129.697
28	146.9390	502	146.922	146.9880	995	146.923	146.922	134.779
29	151.5843	1013	151.534	151.5921	1081	151.532	151.533	139.390
30	156.5172	400	156.546	156.5032	267	156.547	156.546	144.403
C	162.1060	201	162.128	162.1568	710	162.128	162.128	149.985

TABLE no.227

17	First series (Obs. Mr. Breemans)			Second series (Obs. Mr. Breemans)			Mean (mm)	Reduced to a zero initial (mm)
Line Q_i	Stand. Meas.	Line	Line - S. M.	Stand. Meas.	Line	Line - S. M.		
E	5.2416	870	5.291	5.2835	1262	5.285	5.288	0.000
2	10.2310	586	10.255	10.2161	436	10.255	10.255	4.967
3	15.2822	1537	15.343	15.2654	1336	15.336	15.340	10.052
4	20.3580	1343	20.453	20.3270	1074	20.461	20.457	15.169
5	25.4514	583	25.414	25.4512	616	25.421	25.418	20.130
6	30.3120	306	30.337	30.3690	890	30.340	30.338	25.050
7	35.1065	1053	35.298	35.1148	1126	35.296	35.297	30.009
8	40.1980	1472	40.198	40.1400	880	40.196	40.197	34.909
9	45.2508	1305	45.359	45.2396	1180	45.357	45.358	40.070
10	49.9172	1695	50.205	49.9172	1698	50.205	50.205	44.917
11	55.3000	342	55.368	55.3726	1032	55.361	55.364	50.076
12	60.1390	1410	60.304	60.1333	1290	60.291	60.298	55.010
13	65.3828	1300	65.394	65.3830	1320	65.398	65.396	60.108
14	70.1373	762	70.178	70.1154	580	70.185	70.182	64.894
15	75.1413	738	75.165	75.1246	562	75.163	75.164	69.876
16	80.1496	980	80.197	80.1205	714	80.202	80.200	74.912
17	85.1926	1170	85.149	85.1960	1175	85.143	85.146	79.858
18	90.2240	950	90.342	90.2084	815	90.346	90.344	85.056
19	95.1082	320	95.148	95.1380	628	95.150	95.149	89.861
20	100.2075	235	100.232	100.2562	736	100.235	100.234	94.946
21	105.3103	283	105.336	105.3236	432	105.339	105.338	100.050
22	110.2530	954	110.285	110.2116	547	110.286	110.286	104.998
23	115.1840	1170	115.166	115.1350	703	115.171	115.168	109.880
24	120.2160	932	120.354	120.2250	1016	120.353	120.354	115.066
25	125.6330	818	125.698	125.6070	550	125.696	125.697	120.409
26	130.2085	670	130.317	130.2822	1418	130.319	130.318	125.030
27	135.2858	1140	135.256	135.2348	640	135.258	135.257	129.969
28	140.1140	808	140.234	140.1405	1018	140.223	140.228	134.940
29	144.9672	836	144.933	144.9274	460	144.937	144.935	139.647
30	150.0606	782	150.035	150.0605	752	150.029	150.032	144.744
F	155.2055	430	155.275	155.2296	678	155.276	155.276	149.988

TABLE no.228

TESTPERSON 17 RECAPITULATION TABLES 226 - 228

i	AV_i (mm)	DP_i (mm)	$AV_i - DP_i = f_{P_i}$ (mm/100)	$v_{P_i} = f_{P_i} - \frac{[f_P]}{n}$ (mm/100)	EQ_i (mm)	$AV_i - EQ_i = f_{Q_i}$ (mm/100)	$v_{Q_i} = f_{Q_i} - \frac{[f_Q]}{n}$ (mm/100)
2	5.098	4.775	+ 32	+ 19	4.967	+ 13	+ 8
3	10.097	10.052	+ 4	- 9	10.052	+ 4	- 1
4	15.138	15.147	- 1	- 14	15.169	- 3	- 8
5	20.121	20.103	+ 2	- 11	20.130	- 1	- 6
6	25.106	24.883	+ 22	+ 9	25.050	+ 6	+ 1
7	30.133	29.907	+ 23	+ 10	30.009	+ 12	+ 7
8	34.911	34.837	+ 7	- 6	34.909	0	- 5
9	40.021	39.964	+ 6	- 7	40.070	- 5	- 10
10	45.017	44.920	+ 10	- 3	44.917	+ 10	+ 5
11	50.073	50.031	+ 4	- 9	50.076	0	- 5
12	55.071	54.985	+ 9	- 4	55.010	+ 6	+ 1
13	60.037	59.965	+ 7	- 6	60.108	- 7	- 12
14	65.021	64.743	+ 28	+ 15	64.894	+ 13	+ 8
15	70.001	69.747	+ 25	+ 12	69.876	+ 12	+ 7
16	74.961	74.861	+ 10	- 3	74.912	+ 5	0
17	80.015	79.695	+ 32	+ 19	79.858	+ 16	+ 11
18	85.041	84.885	+ 16	+ 3	85.056	- 2	- 7
19	90.026	89.785	+ 24	+ 11	89.861	+ 16	+ 11
20	95.021	94.871	+ 15	+ 2	94.946	+ 8	+ 3
21	100.051	100.079	- 3	- 16	100.050	0	- 5
22	104.977	105.036	- 6	- 19	104.998	- 2	- 7
23	109.953	109.783	+ 17	+ 4	109.880	+ 7	+ 2
24	115.019	115.092	- 7	- 20	115.066	- 5	- 10
25	120.141	120.625	- 48	- 61	120.409	- 27	- 32
26	125.023	125.129	- 11	- 24	125.030	- 1	- 6
27	130.081	129.697	+ 38	+ 25	129.969	+ 11	+ 6
28	134.921	134.779	+ 14	+ 1	134.940	- 2	- 7
29	140.019	139.390	+ 63	+ 50	139.647	+ 37	+ 32
30	144.991	144.403	+ 59	+ 46	144.744	+ 25	+ 20
		$\frac{[f_P]}{n}$	+ 13		$\frac{[f_Q]}{n}$	+ 5	

$m^2 = \frac{[v_P v_P]}{29} = \frac{12612}{29} = 434.9 \frac{mm^2}{10^4}$; m = 209μ $\quad [v_Q v_Q] = 3695 \frac{mm^2}{10^4}$; m = 113μ

TABLE no.229

APPENDIX XII

Comparison of theoretical and practical results

See pages 28-40

Tables 231-246

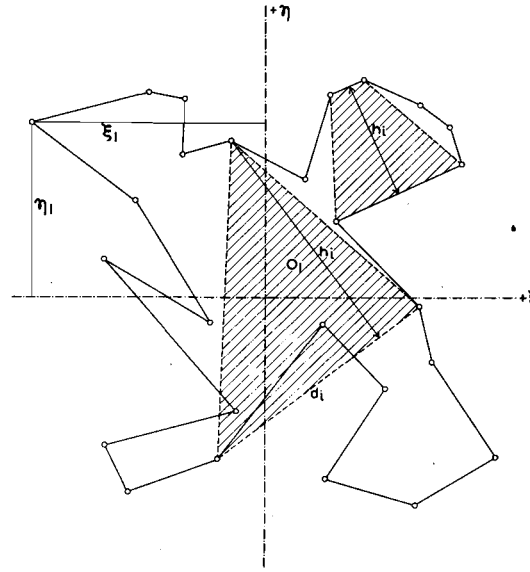

fig. 230

(See also figures 10 and 11)

General Survey

computed theoretic. checked practically		method	text pages	formulae	tables
ξ_I, η_I	fig. 230 (see also fig. 10, 11)	divider and plotting scale	28 - 32	(5), (7)	231,232;fig.13,14
d_i			32 - 35	(9), (11)	235,236; fig.16
h_i (triangle)			35 - 40	(13)	239,240; fig.22
h_i (trapezium)			35 - 40	(15)	243,244; fig.23
O_I			40	(16)	table fig.24
ξ_I, η_I		tracing point and engineer scale	28 - 32	(6), (8)	233,234;fig.13,14
d_i			32 - 35	(10), (12)	237,238; fig.16
h_i (triangle)			35 - 40	(14)	241,242; fig.22
h_i (trapezium)			35 - 40	(15)	245,246; fig.23
O_I			40	(16)	table fig.24

Points I	Comp. coord. (mm) ξ_I η_I	Observations $p_i^I q_i^I$ of the abscissae ξ^I and the ordinates η^I of the points I by the testpersons i (mm) DIVIDER AND PLOTTING SCALE												$[p_i^A] \rightarrow [p_i^Z]$ $[q_i^A] \rightarrow [q_i^Z]$	Adjust. coord. (mm) ξ^I η^I
		p_4^I q_4^I	p_2^I q_2^I	p_{25}^I q_{25}^I	p_{11}^I q_{11}^I	p_{26}^I q_{26}^I	p_1^I q_1^I	p_3^I q_3^I	p_{14}^I q_{14}^I	p_{16}^I q_{16}^I	p_{27}^I q_{27}^I	p_{28}^I q_{28}^I	p_{24}^I q_{24}^I		
A	92.98	92.96	92.89	93.22	93.00	93.00	92.88	92.84	92.96	92.75	92.88	93.04	92.82	1022.02	92.96
B	46.60	46.56	46.45	46.57	46.25	46.74	46.51	46.48	46.68	46.55	46.40	46.58	46.56	511.76	46.57
C	32.52	32.50	32.48	32.53	32.23	32.70	32.53	32.52	32.53	32.55	32.28	32.47	32.15	356.94	32.49
D	33.36	33.35	33.37	33.34	33.28	33.43	33.26	33.28	33.44	33.23	33.13	33.35	33.25	366.37	33.35
E	13.78	13.76	13.73	13.87	13.60	13.95	13.74	13.66	13.87	13.72	13.72	13.73	13.86	151.34	13.80
F	15.75	15.73	15.69	15.88	15.55	15.70	15.61	15.81	15.76	15.85	15.76	15.80	15.54	172.80	15.75
G	25.79	25.72	25.92	25.92	25.52	25.88	25.64	25.76	25.70	25.58	25.78	25.81	25.64	282.95	25.77
H	39.01	38.98	39.13	38.98	38.80	39.04	38.86	38.87	38.85	38.80	38.98	39.13	38.90	428.34	38.98
I	61.76	61.70	61.91	61.75	61.63	61.90	61.61	61.54	61.65	61.65	61.57	61.75	61.64	678.55	61.73
J	73.52	73.49	73.64	73.52	73.10	73.71	73.46	73.30	73.45	73.38	73.54	73.72	73.51	808.30	73.53
K	78.26	78.26	78.28	78.22	78.00	78.43	78.12	78.13	78.13	78.37	78.39	78.30	78.22	860.63	78.28
L	24.58	24.52	24.53	24.42	24.18	24.70	24.48	24.53	24.46	24.68	24.67	24.62	24.47	269.84	24.58
M	61.31	61.30	61.33	61.35	61.00	61.47	61.19	61.16	61.34	61.18	61.33	61.40	61.17	673.87	61.31
N	66.70	66.66	66.72	66.66	66.28	66.85	66.76	66.74	66.76	66.52	66.86	66.69	66.64	733.48	66.72
O	92.11	92.10	92.13	91.98	91.86	92.07	92.12	92.16	92.17	92.28	92.16	92.07	92.05	1013.17	92.15
P	60.09	60.04	60.07	60.22	59.90	60.10	60.00	59.73	59.97	60.05	60.21	59.92	60.00	659.99	60.04
Q	24.39	24.30	24.30	24.28	24.12	24.60	24.24	24.18	24.30	24.40	24.32	24.36	24.24	267.36	24.35
R	47.78	47.79	47.63	47.47	47.50	47.99	47.67	47.42	47.63	47.42	47.83	47.77	47.73	524.38	47.72
S	22.98	22.95	22.93	22.58	22.85	23.28	22.96	22.72	22.85	22.70	22.84	23.00	22.78	251.86	22.94
T	18.64	18.63	18.68	18.78	18.64	18.91	18.48	18.68	18.72	18.58	18.62	18.60	18.62	205.16	18.70
U	54.55	54.55	54.49	54.76	54.56	54.70	54.55	54.56	54.72	54.55	54.48	54.40	54.66	600.22	54.61
V	64.18	64.14	64.16	63.96	63.98	64.22	63.96	64.04	64.13	64.02	63.97	64.20	64.28	705.10	64.14
W	11.46	11.45	11.37	11.38	11.33	11.65	11.33	11.24	11.22	11.32	11.27	11.52	11.49	125.19	11.43
X	64.40	64.38	64.38	64.48	64.08	64.46	64.40	64.20	64.40	64.33	64.23	64.40	64.30	707.56	64.37
Y	21.84	21.85	21.72	21.78	21.64	21.97	21.72	21.78	21.76	21.75	21.77	21.81	21.95	239.72	21.84
Z	51.96	51.90	52.03	51.96	51.63	52.04	51.92	51.77	51.92	51.72	51.67	51.99	52.00	570.59	51.92

A	69.49	69.48	69.48	69.65	69.48	69.50	69.39	69.46	69.36	69.38	69.42	69.37	69.32	763.64	69.47			
B	81.34	81.38	81.34	81.75	81.16	81.43	81.32	81.22	81.25	81.20	81.28	81.30	81.08	893.96	81.31			
C	79.20	79.22	79.22	79.42	79.00	79.27	79.07	79.13	79.14	79.20	79.35	79.14	79.18	870.92	79.22			
D	56.72	56.70	56.76	56.87	56.38	56.98	56.69	56.53	56.68	56.61	56.79	56.80	56.60	623.52	56.73			
E	62.26	62.20	62.19	62.33	62.00	62.42	62.21	62.06	62.04	62.00	62.37	62.28	62.05	683.82	62.21			
F	46.94	46.89	46.94	47.06	46.67	47.18	46.90	46.75	46.84	46.88	47.00	47.01	46.73	515.79	46.93			
G	80.66	80.58	80.64	80.56	80.30	80.76	80.57	80.44	80.62	80.52	80.66	80.78	80.51	886.38	80.62			
H	86.68	86.65	86.61	86.74	86.43	86.84	86.65	86.53	86.52	86.72	86.57	86.71	86.48	952.71	86.65			
I	76.56	76.54	76.48	76.72	76.27	76.73	76.40	76.23	76.45	76.62	76.30	76.54	76.37	840.93	76.49			
J	67.69	67.70	67.72	67.74	67.53	67.81	67.52	67.52	67.63	67.82	67.71	67.53	67.58	744.07	67.69			
K	52.97	52.96	52.96	52.95	52.98	52.97	52.87	52.85	52.86	53.02	52.98	52.88	52.84	582.17	52.97			
L	28.54	28.60	28.63	28.25	28.48	28.71	28.46	28.30	28.46	28.65	28.65	28.48	28.42	313.84	28.58			
M	3.48	3.40	3.59	3.52	3.33	3.48	3.48	3.53	3.57	3.33	3.53	3.60	3.50	38.34	3.53			
N	25.70	25.68	25.75	25.67	25.45	25.73	25.66	25.72	25.85	25.42	25.75	25.80	26.02	282.83	25.76			
O	63.42	63.33	63.40	63.56	63.19	63.59	63.35	63.41	63.34	63.32	63.48	63.46	63.40	697.27	63.43			
P	82.68	82.58	82.73	82.82	82.40	82.76	82.66	82.64	82.82	82.62	82.65	82.91	82.68	909.45	82.72			
Q	72.28	72.23	72.34	72.13	72.03	72.44	72.22	72.32	72.42	72.25	72.12	72.44	72.52	795.33	72.35			
R	36.24	36.20	36.26	36.16	35.98	36.40	36.10	36.12	36.37	36.15	36.23	36.33	36.42	398.56	36.28			
S	10.74	10.72	10.80	10.74	10.50	10.85	10.69	10.82	10.90	10.62	10.58	10.94	10.76	118.18	10.79			
T	64.34	64.30	64.23	64.22	64.07	64.42	64.32	64.28	64.42	64.42	64.08	64.52	64.38	707.44	64.36			
U	77.26	77.22	77.24	77.22	77.03	77.30	77.10	77.22	77.25	77.22	77.03	77.37	77.17	849.15	77.24			
V	58.98	58.95	59.04	58.74	59.00	59.07	58.95	58.98	59.12	59.05	58.83	59.02	59.07	649.08	59.05			
W	45.57	45.50	45.56	45.35	45.52	45.90	45.48	45.34	45.68	45.35	45.47	45.78	45.60	501.18	45.61			
X	14.80	14.84	14.78	14.92	14.63	15.00	14.78	14.87	14.65	14.70	14.85	14.92	14.73	162.75	14.84			
Y	10.45	10.38	10.44	10.00	10.22	10.57	10.43	10.36	10.58	10.15	10.22	10.60	10.56	114.51	10.45			
Z	38.34	38.38	38.38	38.39	38.05	38.43	38.35	38.56	38.15	38.20	38.37	38.25	38.24	421.36	38.35			
	2593.63	2592.18	2593.47	2593.34	2582.59	2600.03	2589.62	2588.29	2592.34	2589.35	2590.93	2595.19	2590.68	28504.67	2593.66			
	personal errors X_i		+0.03	0.00	+0.01	+0.21	-0.12	+0.08	+0.10	+0.03	+0.08	+0.05	-0.03	+0.06	+0.49			

TABLE no.231

Points I	Adjust. coord. (mm) ξ^I / η^I	Computation of $v_i^I = \xi^I - (p_i^I + X_i)$ and $w_i^I = \eta^I - (q_i^I + X_i)$ (mm/100) DIVIDER AND PLOTTING SCALE												$[v_i^A v_i^A] \rightarrow [v_i^Z v_i^Z]$ / $[w_i^A w_i^A] \rightarrow [w_i^Z w_i^Z]$	m_ξ^2 / m_η^2 $\left(\frac{mm^2}{10^4}\right)$	m_ξ / m_η (μ)
		v_4^I / w_4^I	v_2^I / w_2^I	v_{25}^I / w_{25}^I	v_{11}^I / w_{11}^I	v_{26}^I / w_{26}^I	v_1^I / w_1^I	v_3^I / w_3^I	v_{14}^1 / w_{14}^I	v_{16}^1 / w_{16}^I	v_{27}^1 / w_{27}^I	v_{28}^I / w_{28}^I	v_{24}^I / w_{24}^1			
A	92.96	- 3	+ 7	- 27	- 25	+ 8	0	+ 2	- 3	+ 13	+ 3	- 5	+ 8	1027	102.7	101
B	46.57	- 2	+ 12	- 1	+ 11	- 5	- 2	- 1	- 14	- 6	+ 12	+ 2	- 5	704	70.4	84
C	32.49	- 4	+ 1	- 5	+ 5	- 9	- 12	- 13	- 7	- 14	+ 16	+ 5	+ 28	1746	174.6	132
D	33.35	- 3	- 2	0	- 14	+ 4	+ 1	- 3	- 12	+ 4	+ 17	+ 3	+ 4	709	70.9	84
E	13.80	+ 1	+ 7	- 8	- 1	- 3	- 2	+ 4	- 10	0	+ 3	+ 10	- 12	433	43.3	66
F	15.75	- 1	+ 6	- 14	- 1	+ 17	+ 6	- 16	- 4	- 18	- 6	- 2	+ 15	1224	122.4	111
G	25.77	+ 2	- 15	- 16	+ 4	+ 1	+ 5	- 9	+ 4	+ 11	- 6	- 1	+ 7	575	57.5	76
H	38.98	- 3	- 15	- 1	- 3	+ 6	+ 4	+ 1	+ 10	+ 10	- 5	- 12	+ 2	669	66.9	82
I	61.73	0	- 18	- 3	- 11	- 5	+ 4	+ 9	+ 5	0	+ 11	+ 1	+ 3	723	72.3	85
J	73.53	+ 1	- 11	0	+ 22	- 6	- 1	+ 13	+ 5	+ 7	- 6	- 16	- 4	1194	119.4	109
K	78.28	- 1	0	+ 5	+ 7	- 3	+ 8	+ 5	+ 12	- 17	- 16	+ 1	0	838	83.8	92
L	24.58	+ 3	+ 5	+ 15	+ 19	0	+ 2	- 5	+ 9	- 18	- 14	- 1	+ 5	1051	105.1	103
M	61.31	- 2	- 2	- 5	+ 10	- 4	+ 4	+ 5	- 6	+ 5	- 7	- 6	+ 8	375	37.5	61
N	66.72	+ 3	0	+ 5	+ 23	- 1	- 12	- 12	- 7	+ 12	- 19	+ 6	+ 2	1421	142.1	119
O	92.15	+ 2	+ 2	+ 16	+ 8	+ 20	- 5	- 11	- 5	- 21	- 6	+ 11	+ 4	1257	125.7	112
P	60.04	- 3	- 3	- 19	- 7	+ 6	- 4	+ 21	+ 4	- 9	- 22	+ 15	- 2	1370	137.0	117
Q	24.35	+ 2	+ 5	+ 6	+ 2	- 13	+ 3	+ 7	+ 2	- 13	- 2	+ 2	+ 5	466	46.6	68
R	47.72	- 10	+ 9	+ 24	+ 1	- 15	- 3	+ 20	+ 6	+ 22	- 16	- 2	- 7	1645	164.5	128
S	22.94	- 4	+ 1	+ 35	- 12	- 22	- 10	+ 12	+ 6	+ 16	+ 5	- 3	+ 10	1315	131.5	115
T	18.70	+ 4	+ 2	- 9	- 15	- 9	+ 14	- 8	- 5	+ 4	+ 3	+ 13	+ 2	809	80.9	90
U	54.61	+ 3	+ 12	- 16	- 16	+ 3	- 2	- 5	- 14	- 2	+ 8	+ 24	- 11	1408	140.8	119
V	64.14	- 3	- 2	+ 17	- 5	+ 4	+ 10	0	- 2	+ 4	+ 12	- 3	- 20	727	72.7	85
W	11.43	- 5	+ 6	+ 4	- 11	- 10	+ 2	+ 9	+ 18	+ 3	+ 11	- 6	- 12	1001	100.1	100
X	64.37	- 4	- 1	- 12	+ 8	+ 3	- 11	+ 7	- 6	- 4	+ 9	0	+ 1	394	39.4	63
Y	21.84	- 4	+ 12	+ 5	- 1	- 1	+ 4	- 4	+ 5	+ 1	+ 2	+ 6	- 17	549	54.9	74
Z	51.92	- 1	- 11	- 5	+ 8	0	- 8	+ 5	- 3	+ 12	+ 20	- 4	- 14	1040	104.0	102

A	69.47	- 4	- 1	- 19	- 22	+ 9	0	- 9	+ 8	+ 1	0	+ 13	+ 9	978	97.8	99
B	81.31	- 10	- 3	- 45	- 6	0	- 9	- 1	+ 3	+ 3	- 2	+ 4	+ 17	554	55.4	74
C	79.22	- 3	0	- 21	+ 1	+ 7	+ 7	- 1	+ 5	- 6	- 18	+ 11	- 2	619	61.9	79
D	56.73	0	- 3	- 15	+ 14	- 13	- 4	+ 10	+ 2	+ 4	- 11	- 4	+ 7	696	69.6	83
E	62.21	- 2	+ 2	- 13	0	- 9	- 8	+ 5	+ 14	+ 13	- 21	- 4	+ 10	1100	110.0	105
F	46.93	+ 1	- 1	- 14	+ 5	- 13	- 5	+ 8	+ 6	- 3	- 12	- 5	+ 14	695	69.5	83
G	80.62	+ 1	- 2	+ 5	+ 11	- 2	- 3	+ 8	- 3	+ 2	- 9	- 13	+ 5	491	49.1	70
H	86.65	- 3	+ 4	- 10	+ 1	- 7	- 8	+ 2	+ 10	- 15	+ 3	- 3	+ 11	607	60.7	78
I	76.49	- 8	+ 1	- 24	+ 1	- 12	+ 1	+ 16	+ 1	- 21	+ 14	- 2	+ 6	1145	114.5	107
J	67.69	- 4	- 3	- 6	- 5	0	+ 9	+ 7	+ 3	- 21	- 7	+ 19	+ 5	1065	106.5	103
K	52.97	- 2	+ 1	+ 1	- 22	+ 12	+ 2	+ 2	+ 8	- 13	- 6	+ 12	+ 7	1103	110.3	105
L	28.58	- 5	- 5	+ 32	- 11	- 1	+ 4	+ 18	+ 9	- 15	- 12	+ 13	+ 10	1231	123.1	111
M	3.53	+ 10	- 6	0	- 1	+ 17	- 3	- 10	- 7	+ 12	- 5	- 4	- 3	778	77.8	88
N	25.76	+ 5	+ 1	+ 8	+ 10	+ 15	+ 2	- 6	- 12	+ 26	- 4	- 1	- 32	2252	225.2	150
O	63.43	+ 7	+ 3	- 14	+ 3	- 4	0	- 8	+ 6	+ 3	- 10	0	- 3	301	30.1	55
P	82.72	+ 11	- 1	- 11	+ 11	+ 8	- 2	- 2	- 13	+ 2	+ 2	- 16	- 2	752	75.2	87
Q	72.35	+ 9	+ 1	+ 21	+ 11	+ 3	+ 5	- 7	- 10	+ 2	+ 18	- 6	- 23	1279	127.9	113
R	36.28	+ 5	+ 2	+ 11	+ 9	0	+ 10	+ 6	- 12	+ 5	0	- 2	- 20	819	81.9	90
S	10.79	+ 4	- 1	+ 4	+ 8	+ 6	+ 2	- 13	- 14	+ 9	+ 16	- 12	- 3	976	97.6	99
T	64.36	+ 3	+ 13	+ 13	+ 8	+ 6	- 4	- 2	- 9	- 14	+ 23	- 13	- 8	1337	133.7	116
U	77.24	- 1	0	+ 1	0	+ 6	+ 6	- 8	- 4	- 6	+ 16	- 10	+ 1	546	54.6	74
V	59.05	+ 7	+ 1	+ 30	- 16	+ 10	+ 2	- 3	- 10	- 8	+ 17	+ 6	- 8	972	97.2	99
W	45.61	+ 8	+ 5	+ 25	- 12	- 17	+ 5	+ 17	- 10	+ 18	+ 9	- 14	- 5	1562	156.2	125
X	14.84	- 3	+ 6	- 9	0	- 4	- 2	- 13	+ 16	+ 6	- 6	- 5	+ 5	612	61.2	78
Y	10.45	+ 4	+ 1	+ 44	+ 2	0	- 6	- 1	- 16	+ 22	+ 18	- 12	- 17	1555	155.5	125
Z	38.35	- 6	- 3	- 5	+ 9	+ 4	- 8	- 31	+ 17	+ 7	- 7	+ 13	+ 5	1748	174.8	132
[v v]+[w w]		1152	2155	14746	6197	4161	1880	5349	4260	7307	7289	4363	6330	50443		

TABLE no.232

Points	Comp. coord. (mm)	Observations $p_i^I q_i^1$ of the abscissae ξ^1 and the ordinates η^I of the points I by the testpersons i (mm) TRACING POINT AND ENGINEER SCALE												$[p_i^A] \rightarrow [p_i^Z] \rightarrow [q_i^A] \rightarrow [q_i^Z] \rightarrow$	Adjust coord. (mm)
I	ξ_I η_I	p_4^I q_4^1	p_{19}^I q_{19}^I	p_{25}^I q_{25}^I	p_{11}^I q_{11}^I	p_{20}^I q_{20}^1	p_{15}^I q_{15}^I	p_{21}^I q_{21}^I	p_5^I q_5^I	p_{16}^I q_{16}^I	p_{22}^I q_{22}^I	p_{23}^I q_{23}^I	p_{24}^I q_{24}^I		ξ^I η^I
A	92.98	93.00	92.90	93.30	92.90	92.90	92.90	92.80	92.95	93.05	92.95	93.05	92.90	1022.30	92.96
B	46.60	46.45	46.75	46.80	46.40	46.60	46.40	46.50	46.45	46.70	46.70	46.60	46.70	512.25	46.60
C	32.52	32.40	32.80	32.90	32.25	32.30	32.40	32.50	32.60	32.55	32.35	32.35	32.60	357.10	32.49
D	33.36	33.30	33.55	33.65	33.30	33.25	33.35	33.40	33.30	33.60	33.20	33.25	33.20	366.70	33.36
E	13.78	13.60	13.95	13.70	13.60	13.80	13.70	13.80	13.85	13.80	13.55	13.75	13.70	151.10	13.76
F	15.75	15.60	15.65	15.50	15.60	15.75	15.60	15.60	15.70	15.70	15.85	15.60	15.80	172.45	15.70
G	25.79	25.80	25.85	25.60	25.60	25.80	25.75	25.80	25.80	25.60	25.75	25.85	25.80	283.40	25.79
H	39.01	39.10	38.90	38.60	39.00	39.20	39.20	38.80	38.85	38.90	39.00	39.10	39.10	429.15	39.04
I	61.76	61.60	61.65	61.40	61.70	61.95	61.80	61.65	61,70	61.55	61.60	61.80	61.90	678.90	61.75
J	73.52	73.50	73.45	73.40	73.15	73.75	73.60	73.40	73.40	73.40	73.50	73.50	73.70	808.35	73.51
K	78.26	78.10	78.25	78.20	78.10	78.40	78.35	78.20	78.10	78.50	78.25	78.20	78.40	860.85	78.29
L	24.58	24.50	24.60	24.60	24.20	24.55	24.60	24.50	24.45	24.60	24.50	24.55	24.80	269.85	24.56
M	61.31	61.30	61.15	60.90	61.05	61.40	61.30	61.20	61.15	61.50	61.30	61.25	61.20	673.80	61.28
N	66.70	66.55	66.85	66.60	66.35	66.75	66.60	66.80	66.65	66.95	66.70	66.65	66.85	733.70	66.73
O	92.11	92.15	92.25	92.10	91.95	92.10	91.90	92.20	92.10	92.10	92.15	92.20	92.10	1013.20	92.14
P	60.09	60.00	60.10	59.90	59.80	60.10	59.90	60.30	60.05	60.20	60.10	60.00	60.15	660.70	60.09
Q	24.39	24.50	24.30	24.20	24.15	24.55	24.30	24.60	24.40	24.60	24.20	24.10	24.20	267.90	24.38
R	47.78	47.75	47.95	47.90	47.65	47.80	47.80	47.20	47.80	48.00	47.80	47.70	47.90	525.35	47.79
S	22.98	23.05	22.85	22.70	22.90	23.00	22.80	23.40	23.05	23.00	23.00	22.75	22.80	252.60	22.99
T	18.64	18.55	18.35	18.60	18.75	18.65	18.60	18.50	18.65	18.65	18.60	18.60	18.75	204.65	18.63
U	54.55	54.50	54.40	54.60	54.55	54.45	54.60	54.50	54.50	54.50	54.45	54.45	54.50	599.40	54.52
V	64.18	64.10	64.15	64.50	64.10	64.25	64.10	64.00	64.10	64.10	64.25	64.05	64.15	705.35	64.15
W	11.46	11.25	11.45	11.20	11.45	11.50	11.35	11.35	11.35	11.50	11.45	11.30	11.35	125.30	11.42
X	64.40	64.35	64.45	64.50	64.15	64.35	64.40	64.50	64.50	64.40	64.30	64.35	64.20	707.95	64.39
Y	21.84	21.60	21.80	21.80	21.60	21.85	21.80	21.80	21.60	22.00	21.90	21.65	21.80	239.40	21.79
Z	51.96	51.75	51.90	52.30	51.65	52.00	51.80	51.90	51.80	52.05	51.95	51.80	51.90	570.50	51.89

A	69.49	69.50	69.75	69.40	69.50	69.60	69.30	69.50	69.40	69.50	69.40	69.60	69.45	764.50	69.53
B	81.34	81.25	81.65	81.30	81.15	81.40	81.35	81.20	81.45	81.35	81.40	81.20	81.20	894.60	81.35
C	79.20	78.95	79.05	79.10	79.05	79.15	79.25	79.10	79.20	79.20	79.10	78.95	79.30	870.30	79.15
D	56.72	56.55	56.65	56.70	56.50	56.80	56.70	56.65	56.65	56.80	56.60	56.55	56.80	623.25	56.69
E	62.26	62.15	62.20	62.50	62.00	62.35	62.20	62.20	62.25	62.40	62.25	62.15	62.20	684.35	62.24
F	46.94	46.85	47.05	46.90	46.70	46.95	46.85	46.80	46.95	47.05	47.10	46.65	47.05	516.00	46.94
G	80.66	80.50	80.75	80.70	80.45	80.60	80.65	80.50	80.65	80.70	80.75	80.25	80.60	886.40	80.61
H	86.68	86.55	86.75	86.70	86.40	86.60	86.60	86.70	86.60	86.55	86.70	86.55	86.80	952.80	86.65
I	76.56	76.45	76.80	76.70	76.30	76.70	76.35	76.40	76.35	76.80	76.65	76.20	76.70	841.70	76.55
J	67.69	67.55	67.90	67.70	67.55	67.75	67.70	67.60	67.70	67.90	67.70	67.50	67.80	744.65	67.72
K	52.97	53.00	53.15	53.10	52.95	53.00	52.75	53.00	53.00	53.25	53.05	52.90	53.10	583.15	53.04
L	28.54	28.50	28.85	28.60	28.60	28.60	28.60	28.70	28.60	28.90	28.50	28.80	28.55	315.20	28.68
M	3.48	3.40	3.55	3.30	3.45	3.50	3.45	3.50	3.50	3.30	3.40	3.40	3.65	38.10	3.49
N	25.70	25.55	25.75	25.60	25.60	25.80	25.75	25.65	25.60	25.65	25.60	25.80	25.85	282.60	25.72
O	63.42	63.40	63.25	63.20	63.25	63.40	63.30	63.60	63.45	63.20	63.45	63.40	63.35	697.05	63.40
P	82.68	82.50	82.75	82.40	82.60	82.80	82.80	82.70	82.50	82.80	82.70	82.80	82.75	909.70	82.73
Q	72.28	72.35	72.25	72.20	72.10	72.30	72.25	72.30	72.25	72.50	72.25	72.15	72.30	795.00	72.30
R	36.24	36.15	36.40	36.20	36.10	36.35	36.25	36.25	36.05	36.25	36.30	36.25	36.15	398.50	36.25
S	10.74	10.80	10.75	10.80	10.60	10.80	10.60	10.70	10.80	10.95	10.70	10.50	10.80	118.00	10.75
T	64.34	64.40	64.40	64.60	64.25	64.35	64.40	64.20	64.15	64.45	64.30	64.35	64.25	707.50	64.35
U	77.26	77.10	77.20	77.20	77.10	77.15	76.95	77.20	77.10	77.80	77.20	77.20	77.20	849.20	77.23
V	58.98	58.90	58.95	58.60	58.90	59.10	58.90	59.00	58.75	59.00	58.80	58.80	59.05	648.15	58.95
W	45.57	45.60	45.70	45.60	45.55	45.60	45.55	45.80	45.40	45.65	45.25	45.40	45.60	501.10	45.58
X	14.80	14.65	15.00	14.60	14.95	15.00	14.80	14.70	14.85	15.00	14.70	14.65	14.90	163.20	14.86
Y	10.45	10.40	10.35	10.40	10.35	10.55	10.40	10.50	10.30	10.60	10.25	10.50	10.70	114.90	10.47
Z	38.34	38.25	38.55	37.90	38.20	38,50	38.35	38.40	38.65	38.50	38.35	38.30	38.20	422.25	38.41
	2593.63	2589.60	2595.65	2591.45	2586.05	2595.70	2590.95	2592.05	2591.00	2597.55	2591.80	2589.25	2594.75	28514.35	2593.64
personal errors X_i		+0.08	-0.04	+0.04	+0.15	-0.04	+0.05	+0.03	+0.05	-0.08	+0.04	+0.08	-0.02	+0.30	

TABLE no. 233

Points I	Adjust. coord. (mm) ξ^I / η^I	Computation of $v_i^I = \xi^I - (p_i^I + X_i)$ and $w_i^I = \eta^I - (q_i^I + X_i)$ (mm/100) TRACING POINT AND ENGINEER SCALE											$\left[v_i^A\ v_i^A\right] \rightarrow \left[v_i^Z\ v_i^Z\right]$ / $\left[w_i^A\ w_i^A\right] \rightarrow \left[w_i^Z\ w_i^Z\right]$	m_ξ^2 / m_η^2 $\left(\frac{mm^2}{10^4}\right)$	m_ξ / m_η (μ)
		v_4^1 / w_4^I	v_{19}^I / w_{19}^1	v_{25}^I / w_{25}^I	v_{11}^I / w_{11}^1	v_{20}^1 / w_{20}^I	v_{15}^1 / w_{15}^I	v_{21}^I / w_{21}^1	v_5^I / w_5^I	v_{16}^I / w_{16}^I	v_{22}^I / w_{22}^I	v_{23}^I / w_{23}^1	v_{24}^1 / w_{24}^1			
A	92.96	- 12	+ 10	- 38	- 9	+ 10	+ 1	+ 13	- 4	- 1	- 3	- 17	+ 8	974	97.4	99
B	46.60	+ 7	- 11	- 24	+ 5	+ 4	+ 15	+ 7	+ 10	- 2	- 14	- 8	- 8	913	91.3	96
C	32.49	+ 1	- 27	- 45	+ 9	+ 23	+ 4	- 4	- 16	+ 2	+ 10	+ 6	- 9	1849	184.9	136
D	33.36	- 2	- 15	- 33	- 9	+ 15	- 4	- 7	+ 1	- 16	+ 12	+ 3	+ 18	1334	133.4	115
E	13.76	+ 8	- 15	+ 2	+ 1	0	+ 1	- 7	- 14	+ 4	+ 17	- 7	+ 8	954	95.4	98
F	15.70	+ 2	+ 9	+ 16	- 5	- 1	+ 5	+ 7	- 5	+ 8	- 19	+ 2	- 8	703	70.3	84
G	25.79	- 9	- 2	+ 15	+ 4	+ 3	- 1	- 4	- 6	+ 27	0	- 14	+ 1	1089	108.9	104
H	39.04	- 14	+ 18	+ 40	- 11	- 12	- 21	+ 21	+ 14	+ 22	0	- 14	- 4	2559	255.9	160
I	61.75	+ 7	+ 14	+ 31	- 10	- 16	- 10	+ 7	0	+ 28	+ 11	- 13	- 13	1993	199.3	141
J	73.51	- 7	+ 10	+ 7	+ 21	- 20	- 14	+ 8	+ 6	+ 19	- 3	- 7	- 17	1994	199.4	141
K	78.29	+ 11	+ 8	+ 5	+ 4	- 7	- 11	+ 6	+ 14	- 13	0	+ 1	- 9	854	85.4	92
L	24.56	- 2	0	- 8	+ 21	+ 5	- 9	+ 3	+ 6	+ 4	+ 2	- 7	- 22	1149	114.9	107
M	61.28	- 10	+ 17	+ 34	+ 8	- 8	- 7	+ 5	+ 8	- 14	- 6	- 5	+ 10	1012	101.2	101
N	66.73	+ 10	- 8	+ 9	+ 23	+ 2	+ 8	- 10	+ 3	- 14	- 1	0	- 10	1167	116.7	108
O	92.14	- 9	- 7	0	+ 4	+ 8	+ 19	- 9	- 1	+ 12	- 5	- 14	+ 6	1054	105.4	103
P	60.09	+ 1	+ 3	+ 15	+ 14	+ 3	+ 14	- 24	- 1	- 3	- 5	+ 1	- 4	1039	103.9	102
Q	24.38	- 20	+ 12	+ 14	+ 8	- 13	+ 3	- 25	- 7	- 14	+ 14	+ 20	+ 20	2652	265.2	163
R	47.79	- 4	- 12	- 15	- 1	+ 3	- 6	+ 56	- 6	- 13	- 5	+ 1	- 9	3654	365.4	191
S	22.99	- 14	+ 18	+ 25	- 6	+ 3	+ 14	- 44	- 11	+ 7	- 5	+ 16	+ 21	3589	358.9	189
T	18.63	0	+ 32	- 1	- 27	+ 2	- 2	+ 10	- 7	+ 6	- 1	- 5	- 10	2072	207.2	144
U	54.52	- 6	+ 16	- 12	- 18	+ 11	- 13	- 1	- 3	+ 10	+ 3	- 1	+ 4	1042	104.2	102
V	64.15	- 3	+ 4	- 39	- 10	- 6	0	+ 12	0	+ 13	- 14	+ 2	+ 2	678	67.8	82
W	11.42	+ 9	+ 1	+ 18	- 18	- 4	+ 2	+ 4	+ 2	0	- 7	+ 4	+ 9	592	59.2	77
X	64.39	- 4	- 2	- 15	+ 9	+ 8	- 6	- 14	- 16	+ 7	+ 5	- 4	+ 21	1184	118.4	109
Y	21.79	+ 11	+ 3	- 5	+ 4	- 2	- 6	- 4	+ 14	- 13	- 15	+ 6	+ 1	829	82.9	91
Z	51.89	+ 6	+ 3	- 45	+ 9	- 7	+ 4	- 4	+ 4	- 8	- 10	+ 1	+ 1	389	38.9	62

A	69.53	- 5	- 18	+ 9	- 12	- 3	+ 18	0	+ 8	+ 11	+ 9	- 15	+ 10	1417	141.7	119
B	81.35	+ 2	- 26	+ 1	+ 5	- 1	- 5	+ 12	- 15	+ 8	- 9	+ 7	+ 17	1583	158.3	126
C	79.15	+ 12	+ 14	+ 1	- 5	+ 4	- 15	+ 2	- 10	+ 3	+ 1	+ 12	- 13	1033	103.3	102
D	56.69	+ 6	+ 8	- 5	+ 4	- 7	- 6	+ 1	- 1	- 3	+ 5	+ 6	- 9	354	35.4	59
E	62.24	+ 1	+ 8	- 30	+ 9	- 7	- 1	+ 1	- 6	- 8	- 5	+ 1	+ 6	359	35.9	60
F	46.94	+ 1	- 7	0	+ 9	+ 3	+ 4	+ 11	- 6	- 3	- 20	+ 21	- 9	1244	124.4	112
G	80.61	+ 3	- 10	- 13	+ 1	+ 5	- 9	+ 8	- 9	- 1	- 18	+ 28	+ 3	1479	147.9	122
H	86.65	+ 2	- 6	- 9	+ 10	+ 9	0	- 8	0	+ 18	- 9	+ 2	- 13	863	86.3	93
I	76.55	+ 2	- 21	- 19	+ 10	- 11	+ 15	+ 12	+ 15	- 17	- 14	+ 27	- 13	2643	264.3	163
J	67.72	+ 9	- 14	- 2	+ 2	+ 1	- 3	+ 9	- 3	- 10	- 2	+ 14	- 6	717	71.7	85
K	53.04	- 4	- 7	- 10	- 6	+ 8	+ 24	+ 1	- 1	- 13	- 5	+ 6	- 4	989	98.9	99
L	28.68	+ 10	- 13	+ 4	- 7	+ 12	+ 3	- 5	+ 3	- 14	+ 14	- 20	+ 15	1522	152.2	123
M	3.49	+ 1	- 2	+ 15	- 11	+ 3	- 1	- 4	- 6	+ 27	+ 5	+ 1	- 14	1139	113.9	107
N	25.72	+ 9	+ 1	+ 8	- 3	- 4	- 8	+ 4	+ 7	+ 15	+ 8	- 16	- 11	902	90.2	95
O	63.40	- 8	+ 19	+ 16	0	+ 4	+ 5	- 23	- 10	+ 28	- 9	- 8	+ 7	2073	207.3	144
P	82.73	+ 15	+ 2	+ 29	- 2	- 3	- 12	0	+ 18	+ 1	- 1	- 15	0	937	93.7	97
Q	72.30	- 13	+ 9	+ 6	+ 5	+ 4	0	- 3	0	- 12	+ 1	+ 7	+ 2	498	49.8	71
R	36.25	+ 2	- 11	+ 1	0	- 6	- 5	- 3	+ 15	+ 8	- 9	- 8	+ 12	773	77.3	88
S	10.75	- 13	+ 4	- 9	0	- 1	+ 10	+ 2	- 10	- 12	+ 1	+ 17	- 3	833	83.3	91
T	64.35	- 13	- 1	- 29	- 5	+ 4	- 10	+ 12	+ 15	- 2	+ 1	- 8	+ 12	893	89.3	94
U	77.23	+ 5	+ 7	- 1	- 2	+ 12	+ 23	0	+ 8	- 49	- 1	- 5	+ 5	3267	326.7	181
V	58.95	- 3	+ 4	+ 31	- 10	- 11	0	- 8	+ 15	+ 3	+ 11	+ 7	- 8	778	77.8	88
W	45.58	- 10	- 8	- 6	- 12	+ 2	- 2	- 25	+ 13	+ 1	+ 29	+ 10	0	2052	205.2	143
X	14.86	+ 13	- 10	+ 22	- 24	- 10	+ 1	+ 13	- 4	- 6	+ 12	+ 13	- 2	1484	148.4	122
Y	10.47	- 1	+ 16	+ 3	- 3	- 4	+ 2	- 6	+ 12	- 5	+ 18	- 11	- 21	1377	137.7	117
Z	38.41	+ 8	- 10	+ 47	+ 6	- 5	+ 1	- 2	- 29	- 1	+ 2	+ 3	+ 23	1614	161.4	127
[vv]+[ww]		3634	8049	22875	5705	3474	4925	10239	5210	10357	5300	6619	6629	70141		

TABLE no.234

Distances I	Comput. dist. d_I (mm)	Observations p_i^I of the distances d^I by the testpersons i (mm) DIVIDER AND PLOTTING SCALE												$[p_i PM] \rightarrow [p_i AV] \rightarrow$	Adjust. dist. d^I (mm)
		p_4^I	p_2^I	p_{25}^I	p_{11}^I	p_{26}^I	p_1^I	p_3^I	p_{14}^I	p_{16}^I	p_{27}^I	p_{28}^I	p_{24}^I		
PM	79.22	9.22	9.15	9.33	9.07	9.37	9.19	9.04	9.28	9.45	9.13	9.20	9.16	871.26	79.23
YC	90.28	0.25	0.39	0.14	0.00	0.45	0.30	0.12	0.25	0.11	0.16	0.33	0.36	992.72	90.27
UZ	115.62	5.66	5.64	5.65	5.30	5.66	5.58	5.97	5.62	5.62	5.35	5.78	5.45	1271.63	115.63
NI	102.38	2.34	2.43	2.38	2.10	2.46	2.37	2.23	2.42	2.28	2.17	2.42	2.60	1125.82	102.37
LQ	100.82	0.85	0.92	0.48	0.60	1.02	0.76	0.71	0.86	0.88	0.84	0.95	0.98	1109.37	100.88
DK	111.68	1.63	1.78	1.72	1.50	1.82	1.57	1.64	1.64	1.62	1.71	1.80	1.66	1228.37	111.70
TO	110.76	0.80	0.83	0.92	0.67	0.93	0.60	0.86	0.93	0.87	0.96	0.89	0.82	1219.16	110.86
BG	72.39	2.20	2.42	2.43	2.00	2.57	2.30	2.32	2.43	2.22	2.21	2.46	2.28	795.41	72.34
YS	44.82	4.76	4.66	4.32	4.68	5.09	4.69	4.45	4.62	4.47	4.48	4.80	4.73	491.43	44.70
ZL	77.16	7.00	7.24	7.06	6.54	7.33	7.04	6.91	7.02	7.02	7.08	7.23	7.12	847.53	77.07
MT	100.48	0.53	0.57	0.74	0.30	0.89	0.27	0.52	0.55	0.58	0.58	0.63	0.37	1105.79	100.55
CJ	106.68	6.68	6.74	6.72	6.20	6.94	6.63	6.76	6.63	6.62	6.57	6.77	6.40	1172.94	106.66
FW	96.43	6.25	6.33	6.36	6.28	6.80	6.22	6.14	6.45	6.22	6.47	6.68	6.39	1060.23	96.41
DU	135.64	5.63	5.68	5.83	5.32	5.85	5.53	5.57	5.68	5.61	5.48	5.97	5.55	1491.87	135.65
AV	131.66	1.65	1.81	1.72	1.80	1.84	1.61	1.63	1.75	1.63	1.48	1.70	1.62	1448.52	131.71
	1476.02	75.45	76.59	75.80	72.36	79.02	74.66	74.87	76.13	75.20	74.67	77.61	75.49	16232.05	1476.03
personal errors X_i		+0.04	-0.04		+0.24	-0.20	+0.09	+0.08	-0.01	+0.06	+0.09	-0.11	+0.04	+0.28	

TABLE no.235

Distances I	Adjust. dist. d^I (mm)	Computation of $v_i^I = d^I - (p_i^I + X_i)$ (mm/100) DIVIDER AND PLOTTING SCALE												$[vv]$ $\left(\frac{mm^2}{10^4}\right)$	m^2_d $\left(\frac{mm^2}{10^4}\right)$	m_d (μ)
		v_4^I	v_2^I	v_{25}^I	v_{11}^I	v_{26}^I	v_1^I	v_3^I	v_{14}^I	v_{16}^I	v_{27}^I	v_{28}^I	v_{24}^I			
PM	79.23	- 3	+ 12		- 8	+ 6	- 5	+ 11	- 4	- 28	+ 1	+ 14	+ 3	1405	140.5	119
YC	90.27	- 2	- 8		+ 3	+ 2	- 12	+ 7	+ 3	+ 10	+ 2	+ 5	- 13	581	58.1	76
UZ	115.63	- 7	+ 3		+ 9	+ 17	- 4	- 42	+ 2	- 5	+ 19	- 4	+ 14	2810	281.0	168
NI	102.37	- 1	- 2		+ 3	+ 11	- 9	+ 6	- 4	+ 3	+ 11	+ 6	- 27	1163	116.3	108
LQ	100.88	- 1	0		+ 4	+ 6	+ 3	+ 9	+ 3	- 6	- 5	+ 4	- 14	425	42.5	65
DK	111.70	+ 3	- 4		- 4	+ 8	+ 4	- 2	+ 7	+ 2	- 10	+ 1	0	279	27.9	53
TO	110.86	+ 2	+ 7		- 5	+ 13	+ 17	- 8	- 6	- 7	- 19	+ 8	0	1110	111.0	105
BG	72.34	+ 10	- 4		+ 10	- 3	- 5	- 6	- 8	+ 6	+ 4	- 1	+ 2	407	40.7	64
YS	44.70	- 10	+ 8		- 22	- 19	- 8	+ 17	+ 9	+ 17	+ 13	+ 1	- 7	1951	195.1	140
ZL	77.07	+ 3	- 13		+ 29	- 6	- 6	+ 8	+ 6	- 1	- 10	- 5	- 9	1398	139.8	118
MT	100.55	- 2	+ 2		+ 1	- 14	+ 19	- 5	+ 1	- 9	- 12	+ 3	+ 14	1022	102.2	101
CJ	106.66	- 6	- 4		+ 22	- 8	- 6	- 18	+ 4	- 2	0	0	+ 22	1464	146.4	121
FW	96.41	+ 12	+ 12		- 11	- 19	+ 10	+ 19	- 3	+ 13	- 15	- 16	- 2	1894	189.4	138
DU	135.65	- 2	+ 1		+ 9	0	+ 3	0	- 2	- 2	+ 8	- 21	+ 6	644	64.4	80
AV	131.71	+ 2	- 6		- 33	+ 7	+ 1	0	- 3	+ 2	+ 14	+ 12	+ 5	1557	155.7	125
$[v_i^I v_i^I]$		478	736		3421	1795	1212	3218	359	1595	1887	1231	2178	18110		

TABLE no.236

Distances I	Comput. dist. d_I (mm)	Observations P_i^I of the distances d^I by the testpersons i (mm) TRACING POINT AND ENGINEER SCALE												$[p_i^{PM}] \rightarrow [p_i^{AV}]$	Adjust. dist. d^I (mm)
		P_4^I	P_{19}^I	P_{25}^I	P_{11}^I	P_{20}^I	P_{15}^I	P_{21}^I	P_5^I	P_{16}^I	P_{22}^I	P_{23}^I	P_{24}^I		
PM	79.22	9.05	9.05	9.30	9.15	9.35	9.35	9.20	8.90	9.25	9.25	9.15	9.20	870.90	79.22
YC	90.28	0.10	0.20	0.25	0.15	0.25	0.30	0.60	0.10	0.40	0.10	0.20	0.75	993.15	90.33
UZ	115.62	5.40	5.75	4.80	5.50	5.75	5.60	5.50	5.60	5.75	5.70	5.45	5.45	1271.45	115.63
NI	102.38	2.20	2.45	2.40	2.30	2.50	2.20	2.20	2.10	2.50	2.30	2.10	2.30	1125.15	102.33
LQ	100.82	0.80	1.20	0.90	0.80	0.90	0.65	1.00	0.85	1.20	0.70	1.10	0.90	1110.10	100.96
DK	111.68	1.45	1.85	1.75	1.50	1.70	1.60	1.80	1.55	2.00	1.50	1.60	1.80	1228.35	111.71
TO	110.76	0.65	0.70	0.75	0.80	0.80	0.65	0.70	0.70	0.90	0.75	0.80	0.85	1218.30	110.80
BG	72.39	2.30	2.55	2.20	2.10	2.45	2.35	2.30	2.25	2.40	2.55	2.20	2.60	796.05	72.41
YS	44.82	4.65	4.60	4.70	4.60	4.90	4.65	5.00	4.65	5.00	4.90	4.40	4.60	491.95	44.77
ZL	77.16	6.90	6.95	7.40	6.60	7.20	7.30	7.00	6.95	7.20	7.20	7.00	7.10	847.40	77.08
MT	100.48	0.40	0.20	0.30	0.60	0.60	0.30	0.25	0.35	0.75	0.45	0.40	0.40	1104.70	100.47
CJ	106.68	6.40	6.90	6.80	6.30	6.50	6.65	6.50	6.65	6.50	6.70	6.50	6.80	1172.40	106.63
FW	96.43	6.45	6.35	6.35	6.20	6.40	6.35	6.50	6.15	6.40	6.30	6.15	6.60	1059.85	96.40
DU	135.64	5.45	5.50	5.40	5.40	5.65	5.55	5.70	5.35	5.80	5.45	5.40	5.70	1490.95	135.59
AV	131.66	1.55	1.75	1.25	1.70	1.80	1.70	1.50	1.60	1.60	1.50	1.40	1.80	1447.90	131.67
	1476.02	73.75	76.00	74.55	73.70	76.75	75.20	75.75	73.75	77.65	75.35	73.85	76.85	16228.60	1476.00
personal errors X_i		+0.15	0.00		+0.15	-0.05	+0.05	+0.02	+0.15	-0.11	+0.04	+0.14	-0.06	+0.51	

TABLE no.237

Distances I	Adjust. dist. d^I (mm)	Computation of $v_i^I = d^I - (p_i^I + X_i)$ (mm/100) TRACING POINT AND ENGINEER SCALE												$[vv]$ $\left(\frac{mm^2}{10^4}\right)$	m^2_d $\left(\frac{mm^2}{10^4}\right)$	m_d (μ)
		v_4^I	v_{19}^I	v_{25}^I	v_{11}^I	v_{20}^I	v_{15}^I	v_{21}^I	v_5^I	v_{16}^I	v_{22}^I	v_{23}^I	v_{24}^I			
PM	79.22	+ 2	+ 17		- 8	- 8	- 18	0	+ 17	+ 8	- 7	- 7	+ 8	1260	126.0	112
YC	90.33	+ 8	+ 13		+ 3	+ 13	- 2	- 29	+ 8	+ 4	+ 19	- 1	- 36	2994	299.4	173
UZ	115.63	+ 8	- 12		- 2	- 7	- 2	+ 11	- 12	- 1	- 11	+ 4	+ 24	1244	124.4	112
NI	102.33	- 2	- 12		- 12	- 12	+ 8	+ 11	+ 8	- 6	- 1	+ 9	+ 9	884	88.4	94
LQ	100.96	+ 1	- 24		+ 1	+ 11	+ 26	- 6	- 4	- 13	+ 22	- 28	+ 12	3008	300.8	173
DK	111.71	+ 11	- 14		+ 6	+ 6	+ 6	- 11	+ 1	- 18	+ 17	- 3	- 3	1178	117.8	109
TO	110.80	0	+ 10		- 15	+ 5	+ 10	+ 8	- 5	+ 1	+ 1	- 14	+ 1	738	73.8	86
BG	72.41	- 4	- 14		+ 16	+ 1	+ 1	+ 9	+ 1	+ 12	- 18	+ 7	- 13	1238	123.8	111
YS	44.77	- 3	+ 17		+ 2	- 8	+ 7	- 25	- 3	- 12	- 17	+ 23	+ 23	2540	254.0	159
ZL	77.08	+ 3	+ 13		+ 33	- 7	- 27	+ 6	- 2	- 1	- 16	- 6	+ 4	2394	239.4	155
MT	100.47	- 8	+ 27		- 28	- 8	+ 12	+ 20	- 3	- 17	- 2	- 7	+ 13	2705	270.5	164
CJ	106.63	+ 8	- 27		+ 18	+ 18	- 7	+ 11	- 17	+ 24	- 11	- 1	- 11	2719	271.9	165
FW	96.40	- 20	+ 5		+ 5	+ 5	0	- 12	+ 10	+ 11	+ 6	+ 11	- 14	1193	119.3	109
DU	135.59	- 1	+ 9		+ 4	- 1	- 1	- 13	+ 9	- 10	+ 10	+ 5	- 5	600	60.0	77
AV	131.67	- 3	- 8		- 18	- 8	- 8	+ 15	- 8	+ 18	+ 13	+ 13	- 7	1525	152.5	123
$[v_i^I v_i^I]$		830	3900		3305	1200	2245	3105	1160	2310	2605	2115	3445	26220		

TABLE no.238

Triangles I	Comput. heights h_I (mm)	Observations p_i^I of the heights h^I by the testpersons i (mm) DIVIDER AND PLOTTING SCALE												$[p_i^{MTE}] \rightarrow [p_i^{AVX}]$	Adjust. heights h^I (mm)
		p_4^I	p_2^I	p_{25}^I	p_{11}^I	p_{26}^I	p_1^I	p_3^I	p_{14}^I	p_{16}^I	p_{27}^I	p_{28}^I	p_{24}^I		
MTE	97.79	7.72	7.90	7.98	7.38	7.88	7.66	7.52	7.75	7.72	7.88	7.88	7.64	1074.93	97.73
CJS	83.41	3.40	3.37	3.66	3.15	3.53	3.46	3.34	3.43	3.41	3.25	3.55	3.40	917.29	83.40
FWO	104.40	4.40	4.31	4.44	4.25	4.46	4.22	4.24	4.25	4.52	4.34	4.36	4.50	1147.85	104.36
DUY	21.87	1.90	1.85	2.16	1.90	1.99	1.88	1.98	2.07	2.00	1.85	1.85	1.77	241.04	21.92
AVX	15.92	6.00	5.88	5.92	6.00	6.09	5.78	6.06	5.85	6.02	5.94	5.93	6.15	175.70	15.98
	323.39	23.42	23.31	24.16	22.68	23.95	23.00	23.14	23.35	23.67	23.26	23.57	23.46	3556.81	323.39
personal errors X_i		-0.01	+0.02		+0.14	-0.11	+0.08	+0.05	+0.01	-0.06	+0.03	-0.04	-0.01	+0.10	

TABLE no.239

Triangles I	Adjust. heights h^I (mm)	Computation of $v_i^I = h^I - (p_i^I + X_i)$ (mm/100) DIVIDER AND PLOTTING SCALE												$[vv]$ $\left(\frac{mm^2}{10^4}\right)$	$m^2{}_h$ $\left(\frac{mm^2}{10^4}\right)$	m_h (μ)
		v_4^I	v_2^I	v_{25}^I	v_{11}^I	v_{26}^I	v_1^I	v_3^I	v_{14}^I	v_{16}^I	v_{27}^I	v_{28}^I	v_{24}^I			
MTE	97.73	+ 2	- 19		+ 21	- 4	- 1	+ 16	- 3	+ 7	- 18	- 11	+ 10	1682	168.2	130
CJS	83.40	+ 1	+ 1		+ 11	- 2	- 14	+ 1	- 4	+ 5	+ 12	- 11	+ 1	631	63.1	79
FWO	104.36	- 3	+ 3		- 3	+ 1	+ 6	+ 7	+ 10	- 10	- 1	+ 4	- 13	499	49.9	71
DUY	21.92	+ 3	+ 5		- 12	+ 4	- 4	- 11	- 16	- 2	+ 4	+ 11	+ 16	984	98.4	99
AVX	15.98	- 1	+ 8		- 16	0	+ 12	- 13	+ 12	+ 2	+ 1	+ 9	- 16	1120	112.0	106
$[v_i^I v_i^I]$		24	460		971	37	393	596	525	182	486	460	782	4916		

TABLE no.240

Triangles I	Comput. heights h_I (mm)	Observations p_i^I of the heights h^I by the testpersons i (mm) TRACING POINT AND ENGINEER SCALE												$[p_i^{MTE}] \rightarrow [p_i^{AVX}]$	Adjust. heights h^I (mm)
		p_4^I	p_{19}^I	p_{25}^I	p_{11}^I	p_{20}^I	p_{15}^I	p_{21}^I	p_5^I	p_{16}^I	p_{22}^I	p_{23}^I	p_{24}^I		
MTE	97.79	7.65	7.80	7.60	7.50	7.80	7.60	7.85	7.60	7.90	7.70	7.60	7.80	1074.80	97.71
CJS	83.41	3.35	3.60	3.30	3.25	3.50	3.30	3.25	3.40	3.60	3.35	3.30	3.50	917.40	83.40
FWO	104.40	4.40	4.50	4.15	4.30	4.40	4.35	4.30	4.35	4.30	4.40	4.30	4.40	1148.00	104.36
DUY	21.87	2.00	1.95	1.90	2.00	1.75	1.90	2.00	2.00	2.00	1.70	2.10	2.10	241.50	21.95
AVX	15.92	5.95	6.00	6.15	5.95	6.00	5.95	5.75	5.90	6.10	6.00	6.00	6.10	175.70	15.97
	323.39	23.35	23.85	23.10	23.00	23.45	23.10	23.15	23.25	23.90	23.15	23.30	23.90	3557.40	323.39
personal errors X_i		+0.01	-0.09		+0.08	-0.01	+0.06	+0.05	+0.03	-0.10	+0.05	+0.02	-0.10	-0.02	

TABLE no.241

Triangles I	Adjust. heights h^I (mm)	Computation of $v_i^I = h^I - (p_i^I + X_i)$ (mm/100) TRACING POINT AND ENGINEER SCALE												$[vv]$ $\left(\frac{mm^2}{10^4}\right)$	$m^2{}_h$ $\left(\frac{mm^2}{10^4}\right)$	m_h (μ)
		v_4^I	v_{19}^I	v_{25}^I	v_{11}^I	v_{20}^I	v_{15}^I	v_{21}^I	v_5^I	v_{16}^I	v_{22}^I	v_{23}^I	v_{24}^I			
MTE	97.71	+ 5	0		+ 13	- 8	+ 5	- 19	+ 8	- 9	- 4	+ 9	+ 1	887	88.7	94
CJS	83.40	+ 4	- 11		+ 7	- 9	+ 4	+ 10	- 3	- 10	0	+ 8	0	556	55.6	75
FWO	104.36	- 5	- 5		- 2	- 3	- 5	+ 1	- 2	+ 16	- 9	+ 4	+ 6	482	48.2	69
DUY	21.95	- 6	+ 9		- 13	+ 21	- 1	- 10	- 8	+ 5	+ 20	- 17	- 5	1631	163.1	128
AVX	15.97	+ 1	+ 6		- 6	- 2	- 4	+ 17	+ 4	- 3	- 8	- 5	- 3	505	50.5	71
$[v_i^I v_i^I]$		103	263		427	599	83	851	157	471	561	475	71	4061		

TABLE no.242

Trapezia I	Comput. heights h_I (mm)	Observations p_i^I of the heights h^I by the testpersons i (mm) DIVIDER AND PLOTTING SCALE												$[p_i^{CS-ZY}] \rightarrow [p_i^{NY-WO}] \rightarrow$	Adjust. heights h^I (mm)
		p_4^I	p_2^I	p_{25}^I	p_{11}^I	p_{26}^I	p_1^I	p_3^I	p_{14}^I	p_{16}^I	p_{27}^I	p_{28}^I	p_{24}^I		
CS-ZY	37.99	7.96	7.95	7.72	7.62	8.16	7.92	7.55	7.83	7.72	7.86	8.00	8.06	416.63	37.90
AB-VW	131.64	1.66	1.54	1.12	1.73	1.96	1.41	1.55	1.65	1.33	1.58	1.60	1.63	1447.64	131.63
LK-HG	46.93	6.87	6.85	6.93	6.83	7.10	6.80	6.90	6.98	6.91	6.78	7.02	6.82	515.86	46.92
NY-WO	32.85	2.93	2.87	2.97	2.96	3.16	2.74	2.88	2.95	3.14	2.92	3.05	2.75	362.35	32.96
	249.41	49.42	49.21	48.74	49.14	50.38	48.87	48.88	49.41	49.10	49.14	49.67	49.26	2742.48	249.41
personal errors X_i		0.00	+0.05		+0.07	-0.24	+0.13	+0.13	0.00	+0.08	+0.07	-0.07	+0.04	+0.26	

TABLE no.243

Trapezia I	Adjust. heights h^I (mm)	Computation of $v_i^I = h^I - (p_i^I + X_i)$ (mm/100) DIVIDER AND PLOTTING SCALE												$[vv]$ $\left(\frac{mm^2}{10^4}\right)$	$m^2{}_h$ $\left(\frac{mm^2}{10^4}\right)$	m_h (μ)
		v_4^I	v_2^I	v_{25}^I	v_{11}^I	v_{26}^I	v_1^I	v_3^I	v_{14}^I	v_{16}^I	v_{27}^I	v_{28}^I	v_{24}^I			
CS-ZY	37.90	- 6	- 10		+ 21	- 2	- 15	+ 22	+ 7	+ 10	- 3	- 3	- 20	1857	185.7	136
AB-VW	131.63	- 3	+ 4		- 17	- 9	+ 9	- 5	- 2	+ 22	- 2	+ 10	- 4	1109	110.9	105
LK-HG	46.92	+ 5	+ 2		+ 2	+ 6	- 1	- 11	- 6	- 7	+ 7	- 3	+ 6	370	37.0	61
NY-WO	32.96	+ 3	+ 4		- 7	+ 4	+ 9	- 5	+ 1	- 26	- 3	- 2	+ 17	1175	117.5	108
$[v_i^I v_i^I]$		79	136		783	137	388	655	90	1309	71	122	741	4511		

TABLE no.244

Trapezia I	Comput. heights h_I (mm)	Observations p_i^I of the heights h^I by the testpersons i (mm) TRACING POINT AND ENGINEER SCALE												$[p_i^{CS-ZY}] \rightarrow [p_i^{NY-WO}] \rightarrow$	Adjust. heights h^I (mm)
		p_4^I	p_{19}^I	p_{25}^I	p_{11}^I	p_{20}^I	p_{15}^I	p_{21}^I	p_5^I	p_{16}^I	p_{22}^I	p_{23}^I	p_{24}^I		
CS-ZY	37.99	7.85	7.75	8.15	7.75	8.25	7.80	8.00	7.60	8.10	7.95	8.00	8.00	417.05	37.97
AB-VW	131.64	1.60	1.80	1.40	1.70	1.80	1.60	1.70	1.35	1.60	1.50	1.35	1.80	1447.80	131.67
LK-HG	46.93	6.75	6.80	7.00	6.75	6.90	6.90	6.75	6.75	6.75	7.00	6.65	6.90	514.90	46.86
NY-WO	32.85	2.90	2.85	2.80	2.90	2.85	2.75	3.00	2.65	3.00	2.95	2.75	2.80	361.40	32.91
	249.41	49.10	49.20	49.35	49.10	49.80	49.05	49.45	48.35	49.45	49.40	48.75	49.50	2741.15	249.41
personal errors X_i		+0.08	+0.05		+0.08	-0.10	+0.09	-0.01	+0.26	-0.01	0.00	+0.17	-0.02	+0.59	

TABLE no.245

Trapezia I	Adjust. heights h^I (mm)	Computation of $v_i^I = h^I - (p_i^I + X_i)$ (mm/100) TRACING POINT AND ENGINEER SCALE												$[vv]$ $\left(\frac{mm^2}{10^4}\right)$	$m^2{}_h$ $\left(\frac{mm^2}{10^4}\right)$	m_h (μ)
		v_4^I	v_{19}^I	v_{25}^I	v_{11}^I	v_{20}^I	v_{15}^I	v_{21}^I	v_5^I	v_{16}^I	v_{22}^I	v_{23}^I	v_{24}^I			
CS-ZY	37.97	+ 4	+ 17		+ 14	- 18	+ 8	- 2	+ 11	- 12	+ 2	- 20	- 1	1563	156.3	125
AB-VW	131.67	- 1	- 18		- 11	- 3	- 2	- 2	+ 6	+ 8	+ 17	+ 15	- 11	1198	119.8	109
LK-HG	46.86	+ 3	+ 1		+ 3	+ 6	- 13	+ 12	- 15	+ 12	- 14	+ 4	- 2	953	95.3	98
NY-WO	32.91	- 7	+ 1		- 7	+ 16	+ 7	- 8	0	- 8	- 4	- 1	+ 13	718	71.8	85
$[v_i^I v_i^I]$		75	615		375	625	286	216	382	416	505	642	295	4432		

TABLE no.246

APPEN

Numbers of the testpersons co-operating

parts of the investigation / Test-persons	Appendix I stand. meas.	Appendix II m_1	Appendix III m_2 and m_3	Appendix IV m_4	Appendix V m_5	Appendix VI m_6	Appendix VII m_7
1	table no. 25	tables nrs. 28-31	tables nrs. 32-40	41-46, 71-76, 101			
2				47-52, 77-82, 101	147,149		
3				53-58, 83-88, 101	145,149		
4				59-64, 89-94, 101, 120-125, 132	133,138,143, 144,149	152	155,156,165
5				65-70, 95-100, 101			
6				102-107, 132			163,164,165
7				108-113, 132			161,162,165
8				114-119, 132			
9				126-131, 132		150	157,158,165
10					134,139,143		
11					135,140,143	153	
12					136,141,143		
13					137,142,143		
14					146,149		
15					148,149		
16						151	
17						154	
18							159,160,165
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							

DIX XIII

in the various parts of the investigation

Appendix VIII m_8	Appendix IX Triangles	Appendix X m_8	Appendix XI m_{10}	Appendix XII Results	parts of the investigation / Test-persons
	tables nrs. 178-188			231,232,235,236,239,240,243,244	1
				231,232,235,236,239,240,243,244	2
				231,232,235,236,239,240,243,244	3
166,167,176		192,197,200	218-221	231-246	4
		205		233,234,237,238,241,242,245,246	5
174,175,176					6
172,173,176					7
					8
168,169,176		190,195	210-213		9
					10
		193,198	222-225	231-246	11
					12
					13
				231,232,235,236,239,240,243,244	14
		203		233,234,237,238,241,242,245,246	15
		191,196	214-217	231-246	16
		194,199	226-229		17
170,171,176					18
		201		233,234,237,238,241,242,245,246	19
		202		233,234,237,238,241,242,245,246	20
		204		233,234,237,238,241,242,245,246	21
		206		233,234,237,238,241,242,245,246	22
		207		233,234,237,238,241,242,245,246	23
		208		231-246	24
				231-246	25
				231,232,235,236,239,240,243,244	26
				231,232,235,236,239,240,243,244	27
				231,232,235,236,239,240,243,244	28

APPENDIX XIV

Names of the co-operators

The following list gives the names of the 28 co-operators in the research in alphabetic order. This order is not the same as that of Appendix XIII.

Amsterdam, H.J. van	Cadastre [63]	Amsterdam
Bart, A. van	Railways [64]	Utrecht
Batterman, Miss J.C.	Cadastre [63]	The Hague
Beek, J.F.M. van	Cadastre [63]	Breda
Berg, B.J. van den	Cadastre [63]	The Hague
Best, Miss C.A.C.	C.T.O. [65]	The Hague
Beurs-Koorn, Mrs.G. de	G.L.D. [66]	Amsterdam
Bongaerts, J.H.H.	C.T.O. [65]	The Hague
Bosch, J.M. van den	"Waterstaat" [67]	Delft
Breemans, M.C.	Geodetic institute	Delft
Bruin, F.	Cadastre [63]	Amsterdam
Buyl, F.	G.L.D. [66]	Rotterdam
Clausen, J.H.	Realotment [68]	Utrecht
Dubbelt, W.	C.T.O. [65]	The Hague
Eppinga, K.	G.L.D. [66]	Rotterdam
Faay, J.	"Waterstaat" [67]	Delft
Helm, C. van der	"Waterstaat" [67]	Delft
Horst, L.W. van der	G.L.D. [66]	Amsterdam
Kaat, D.F. te	Railways [64]	Utrecht
Koeman, ir C.	Geodetic institute	Delft
Lensen, B.J.	C.T.O. [65]	The Hague
Lingen, C. van	"Waterstaat" [67]	Delft
Rietman, J.	Cadastre [63]	Rotterdam
Schuurman, G.	B.L.W. [69]	Groningen
Snellink, A.J.	Realotment [68]	Utrecht
Teven, G.	"Waterstaat" [67]	Delft
Vaandrager, C.W.	Cadastre [63]	Rotterdam
Vries, D. de	C.T.O. [65]	The Hague

[63] Landsurveying department of the Netherlands' Cadastre.
[64] Landsurveying department of the Netherlands' Railways.
[65] Training centre for Draftsmen.
[66] Municipal landsurveying department.
[67] Surveying department Ministery of "Waterstaat".
[68] Realotment department.
[69] Landsurveying department for special projects.