

SVEND SAXOV and GUSTAF LIND

THE ESTABLISHMENT  
OF A GRAVITY BASE NET  
IN BOHUSLÄN  
WITH ADJACENT AREAS



STOCKHOLM 1971

SVEND SAXOV and GUSTAF LIND

THE ESTABLISHMENT  
OF A GRAVITY BASE NET  
IN BOHUSLÄN  
WITH ADJACENT AREAS

STOCKHOLM 1971

Prof. Svend Saxov and lekt. Gustaf Lind,  
Laboratory of Applied Geophysics, Department of Geology, Aarhus University.

C. DAVIDSONS BOKTRYCKERI AB, VÄXJÖ

## SUMMARY

A gravity base net has been established in Bohuslän and adjacent areas with a view to function as fundamental basis for a regional gravimetric survey with the purpose of studying the granitic problem in relation to gravity.

## INTRODUCTION

The study of the granitic layer in the upper part of the Earth's crust has in recent years drawn geophysicists' attentions to application of geophysical methods, and in first line by means of gravimetric measurements, see e. g. Bott (1956), Garland (1965), and Smithson (1965). A preliminary study of the granitic problem in Bohuslän, Western Sweden, has been carried out in 1966 (Lind 1967); the results being based on the gravity information available at that time (Wideland 1946).

As it was found that the gravimetric material was not sufficient for a final interpretation it was decided to establish a much denser net of gravimeter stations in the area concerned, and the present paper presents data regarding the gravity base stations.

## THE GRAVIMETERS

It is very important when a gravimetric survey is planned to take place during more years and by means of different gravimeters then to keep a close check on the scale constants of the instruments employed. From various investigations it has been proved that Worden gravimeter scale constants vary with time, see e. g. Saxov (1959). From the very beginning of the present survey in Bohuslän measurements were thus carried out along the Norwegian base-line which is situated between the Oslo Fundamental Gravity Station at the Geological Museum, Tøyen, Oslo, and Tryvannshøgda. We list the results obtained in Table 1, the columns being Observer followed by Time and Gravimeter. Then comes the Readings in mGals by application of the scale constant value as presented by the manufacturers, and the last two columns contain the Corrected scale constant value and the Correction per thousand.

The gravity difference between Oslo (Tøyen) and Tryvannshøgda has been discussed by Saxov (1966 and 1967), and the value of 108.488 mGals has been accepted. An inspection of Table 1 reveals that the Worden gravimeter scale constant diminishes with time, confirming previous findings. As far as LaCoste and Romberg gravimeter type is concerned previous experience is confirmed (Saxov and Spellauge 1967).

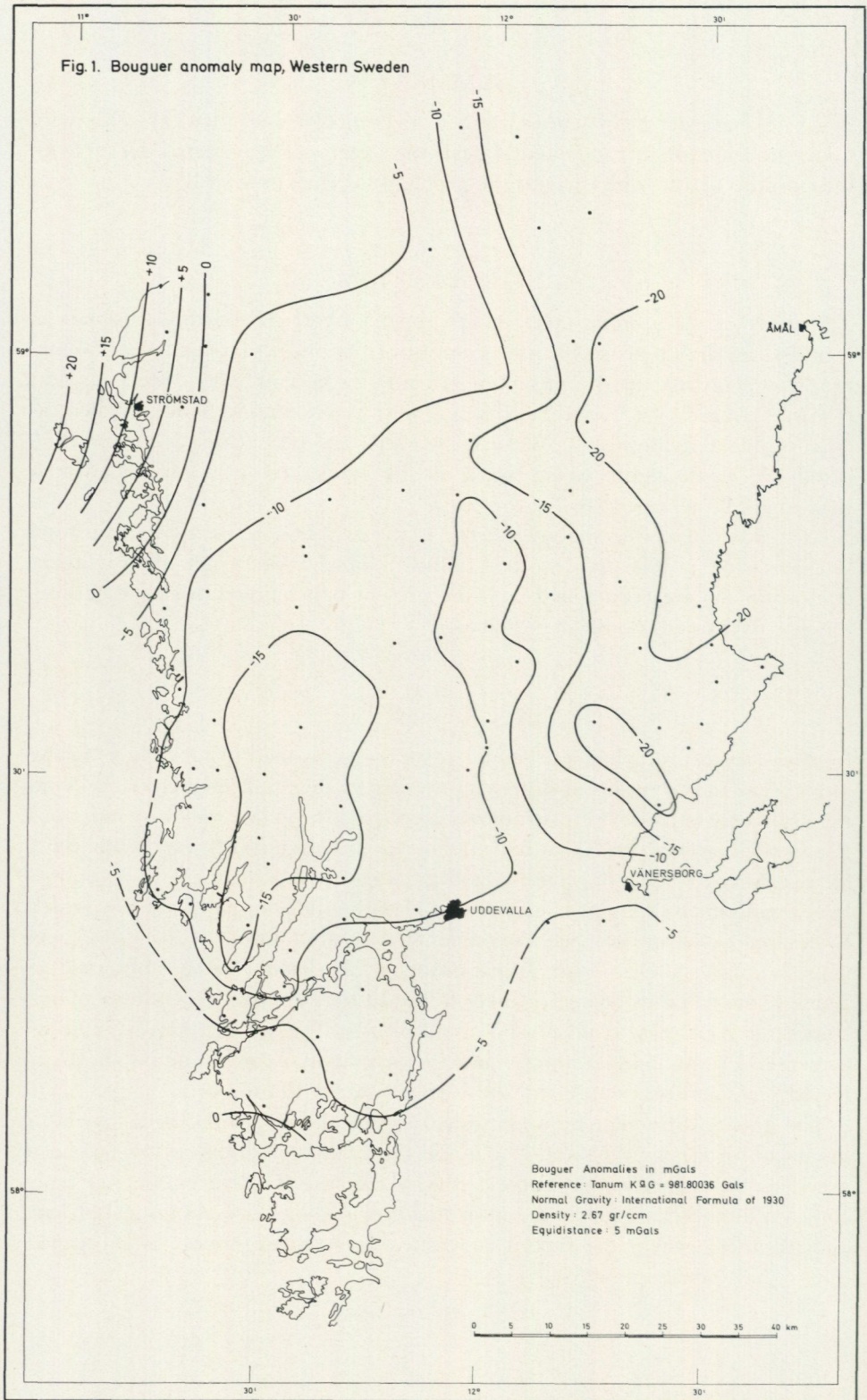


Table 1

Oslo Fundamental Gravity Station - Tryvannshøgda = 108.488mGals

Observer	Time	Gravimeter	Reading in mGals	Scale const.	Corr. scale constant	Correction in ‰
S. Saxov	August 1965	W. 142	108.533	0.10372	0.10368	-0.4
S. Saxov	July 1966	W. M. 779	108.656	0.08720	0.08706	-1.6
S. Saxov	July 1966	W. 142	108.540	0.10372	0.10367	-0.5
S. Saxov	July 1967	LCR. 54	108.442	1.04595	1.04599	+0.04
G. Lind	July 1967	W. M. 779	108.710	0.08720	0.08702	-2.4
I. Ramberg	July 1967	W. M. 653	108.683	0.10698	0.10679	-1.8
S. Saxov	July 1968	LCR. 54	108.443	1.04595	1.04599	+0.04
G. Lind	July 1968	W. M. 779	108.762	0.08720	0.08698	-2.5
H. Henkel	July 1968	W. M. 681	108.56	0.10038	0.10036	-0.2
I. Ramberg	July 1968	W. M. 653	108.73	0.1070	0.10675	-2.5
L. Laurén	May 1969	W. M. 779	108.646	0.09035	0.09021	-1.4
S. Saxov	July 1969	LCR. 54	108.458	1.04595	1.04598	+0.03
G. Lind	July 1969	W. M. 779	108.659	0.09035	0.09021	-1.4
L. Laurén	July 1969	W. M. 681	108.556	0.10038	0.10032	-0.6
G. Lind	July 1969	W. M. 653	108.792	0.1070	0.1067	+3

Another point of importance concerning gravimeters is whether the scale constant is a constant or in other words if linearity exists. This question has been investigated in the following way. Measurements have been undertaken at the German calibration base in the Harz between Bad Harzburg and Torfhaus in a similar way as described earlier (Saxov and Spellauge 1967). Also measurements between Bad Harzburg and selected stations at the German part of the European Gravimeter Calibration Line and the southernmost Danish station have been carried out. Actually, it is the same stations as reported by Saxov and Spellauge (1967). Table 2 summarizes the results. A detailed investigation of the scale constant figures listed in Tables 1 and 2 confirms the linearity of the two gravimeters concerned, W. M. 779 and LCR. 54.

In 1967 in connection with the measurements of the German calibration bases between Bad Harzburg and Torfhaus, and of the Norwegian calibration bases between Oslo (Tøyen) and Tryvannshøgda additional measurements were carried out between the two bases, stations being part of the European Gravimetric Calibration Line. The measurements also included a visit to the Danish calibration bases between Copenhagen and Hellebæk. It is not the intention to elaborate measurements of the Danish calibration bases (Kejlso 1958 and Saxov 1965), but only to report on the results along the calibration line. Table 3 gives the results obtained in 1967 together with other recent measurements.

When the detail field work in Bohuslän commenced in 1965 the purpose was to study the geological/geophysical relations of the Koster islands. In order to obtain information with regard to the regional gravimetric field a series of stations was established in the main land. Preliminary reports have been given by Lind (1967) and Saxov (1967). As reference station Tanum church was used, which is one of the stations at the European Gravimetric Calibration

Table 2

Gravimeter				LCR 79	LCR. 85	LCR. 85	LCR. 87	W. M. 779 (1967)	LCR. 54 (1967)	W. M. 779 (1969)
Reference/Observer		Kneissl 1956	Marzahn 1959	Saxov & Spellaugé 1967		Eberhard 1967		Saxov	Saxov	Laurén
From	To	Gravity difference in mGals								
Flensburg G	Stockelsdorf G	- 83.84	- 83.83	- 83.78	- 83.88	-83.80	-83.97	- 83.82	- 83.78	- 83.77
Stockelsdorf G	Harburg G	- 37.99	- 38.01	- 38.03	- 38.03	-38.07	-38.05	- 38.02	- 38.01	- 38.05
Harburg G	Hannover P	-102.00	-101.54	-101.39	-101.40			-101.40	-101.39	-101.43
Hannover P	Bad Harzburg P			- 97.11	- 97.17			- 97.14	- 97.13	- 97.15
Bad Harzburg P	Bad Harzburg G			- 0.24	- 0.25			- 0.25	- 0.25	- 0.26
Bad Harzburg G	Torfhaus G			- 84.16	- 84.19	-84.17	-84.15	- 84.19	- 84.17	- 84.18
Bad Harzburg P	Torfhaus P	- 85.44	- 85.55	- 85.45	- 85.51			- 85.49	- 85.48	- 85.52
Torfhaus P	Torfhaus G			+ 1.05	+ 1.07			+ 1.05	+ 1.06	+ 1.08

Table 3

Gravimeter Obs. & time or reference	LCR.54 Saxov 1967	W. M. 779 Saxov 1967	W. M. 779 Laurén 1969	W. 142 Saxov (1966)	Eber- hard (1967)	Petters- son (1967)	Gantar & Mo- relli (1962)	Gantar & Mo- relli (1965)
Station	Gravity difference in mGals							
Flensburg G	+73.78		+73.79					
Christiansfeld	+ 4.75	+ 4.70						
Middelfart	- 10.69	- 10.67			- 10.72			- 10.70
Ejby	- 14.10	- 14.08			- 14.14			
Hjulby	- 6.87	- 6.80			- 6.83			
Vemmelev	- 8.16	- 8.26			- 8.21			
Ringsted	+18.20	+18.21			+18.23			+18.21
Buddinge	+34.54	+34.47		+34.49	+34.52	+34.49	+34.49	+34.51
Helsingør	+32.59	+32.62		+32.66		+32.63	+32.64	
Hälsingborg	+46.65	+46.65		+46.66		+46.68	+46.64	
Veinge	+38.52	+38.48		+38.59		+38.51	+38.48	
Apelviksåsen	+32.20	+32.18		+32.19		+32.25	+32.26	
Göteborg	+25.12	+25.05		+25.08		+25.09	+25.10	
S Hogstorp	+33.42	+33.43		+33.42		+33.44	+33.42	
Tanum	+51.96	+51.86		+52.02		+52.07	+52.06	
Svinesund II	+74.92	+74.89		+74.84		+74.86	+74.86	
Oslo								

Line. In the preliminary reports a value of  $G = 981.80118$  Gals was employed even if it was mentioned by Saxov that this value apparently was incorrect and that it ought to be closer to 981.8005 Gals. That is confirmed by Pettersson (1967) who gives the Tanum Ka (church) value as 981.80036 Gals. In the present paper this value has been used.

According to Pettersson the principal facts for Tanum Ka are  $\varphi = 58^{\circ}42'.98$  N,  $\lambda = 11^{\circ}20'.03$  E,  $h = 45$  m and  $G = 981.80036$  Gals.

In 1967 a more systematical gravimetric survey of Bohuslän began. In order to facilitate the survey it was decided to establish a net of base stations and as points of observations churches were elected by preference. Table 4 lists the results obtained; the columns being Name of station, Name of observer, Time of observation, Gravimeter employed, and Gravity value obtained with respect to Tanum Ka. In the last column the mean value is also listed.

Table 4

Station	Observer	Date	Gravimeter	G-value in Gal
Askum	S. Saxov	July 1968	LCR 54	981.78071
	H. Henkel	July 1968	WM 681	78065
	G. Lind	July 1969	WM 779	78068
				mean 981.78068
Bengtstors	S. Saxov	July 1967	LCR 54	981.80544
	G. Lind	July 1967	WM 779	80544
				mean 981.80544
Billingsfors	S. Saxov	July 1967	LCR 54	981.80628
	G. Lind	July 1967	WM 779	80634
				mean 981.80631
Blomskog	S. Saxov	July 1967	LCR 54	981.82530
	G. Lind	July 1967	WM 779	82526
				mean 981.82528
Bokenäs	S. Saxov	July 1968	LCR 54	981.77098
	S. Saxov	July 1968	WM 681	77102
	H. Henkel	July 1968	WM 681	77094
				mean 981.77098
Bolstad	S. Saxov	July 1968	LCR 54	981.78500
	H. Henkel	July 1968	WM 681	78503
				mean 981.78502
Bottna	S. Saxov	July 1968	LCR 54	981.78503
	H. Henkel	July 1968	WM 681	78511
	L. Laurén	July 1969	WM 681	78508
				mean 981.78507
Bovallstrand	S. Saxov	July 1968	LCR 54	981.78896
	S. Saxov	July 1968	LCR 54	78894
	H. Henkel	July 1968	WM 681	78995
	H. Henkel	July 1968	WM 681	78892
				mean 981.78894
Brastad	S. Saxov	July 1968	LCR 54	981.77026
	H. Henkel	July 1968	WM 681	77026
				mean 981.77026
Bro	S. Saxov	July 1968	LCR 54	981.77950
	H. Henkel	July 1968	WM 681	77940
	G. Lind	July 1969	WM 779	77949
				mean 981.77946
Brålanda	S. Saxov	July 1968	LCR 54	981.78363
	H. Henkel	July 1968	WM 681	78371
				mean 981.78367
Bäcke	S. Saxov	July 1967	LCR 54	981.78441
	G. Lind	July 1967	WM 779	78444
	G. Lind	July 1969	WM 779	78446
				mean 981.78444
Bärfendal	S. Saxov	July 1968	LCR 54	981.78333
	H. Henkel	July 1968	WM 681	78332
				mean 981.78332

Station	Observer	Date	Gravimeter	G-value in Gal
Dals-Ed	S. Saxov	July 1967	LCR 54	981.79264
	G. Lind	July 1967	WM 779	79265
	S. Saxov	July 1968	LCR 54	79265
	H. Henkel	July 1968	WM 681	79253
	G. Lind	July 1969	WM 779	79259
	L. Laurén	July 1969	WM 681	79255
			mean	981.79260
Dalskog	S. Saxov	July 1968	LCR 54	981.77781
	H. Henkel	July 1968	WM 681	77774
	G. Lind	July 1969	WM 681	77777
			mean	981.77777
Dragsmark	S. Saxov	July 1968	LCR 54	981.77207
	H. Henkel	July 1968	WM 681	77209
	H. Henkel	July 1968	WM 681	77212
			mean	981.77209
Erikstad	S. Saxov	July 1968	LCR 54	981.78320
	H. Henkel	July 1968	WM 681	78320
	L. Laurén	July 1969	WM 681	78317
			mean	981.78319
Fagerhult	S. Saxov	July 1967	LCR 54	981.79012
	G. Lind	July 1967	WM 779	79022
			mean	981.79017
Fiskebäckskil	S. Saxov	July 1968	LCR 54	981.77177
	H. Henkel	July 1968	WM 681	77176
	H. Henkel	July 1968	WM 681	77189
			mean	981.77181
Fjällbacka	S. Saxov	July 1968	LCR 54	981.79813
	H. Henkel	July 1968	WM 681	79819
	L. Laurén	July 1969	WM 681	79812
			mean	981.79815
Foss	S. Saxov	July 1968	LCR 54	981.77364
	H. Henkel	July 1968	WM 681	77362
	H. Henkel	July 1968	WM 681	77363
	G. Lind	July 1969	WM 779	77364
			mean	981.77363
Frändefors	S. Saxov	July 1968	LCR 54	981.77692
	H. Henkel	July 1968	WM 681	77694
			mean	981.77693
Färgelanda	S. Saxov	July 1968	LCR 54	981.77938
	H. Henkel	July 1968	WM 681	77936
	L. Laurén	July 1969	WM 681	77939
			mean	981.77938
Gestad	S. Saxov	July 1968	LCR 54	981.78035
	H. Henkel	July 1968	WM 681	78049
			mean	981.78042
Gesäter	S. Saxov	July 1967	LCR 54	981.78606
	G. Lind	July 1967	WM 779	78608
			mean	981.78607

Station	Observer	Date	Gravimeter	G-value in Gal
Grebbe stad	G. Lind	July 1965	W 142	981.80822
	G. Lind	June 1966	WM 779	80822
	S. Saxov	June 1966	W 142	80829
	S. Saxov	August 1967	LCR 54	80828
	S. Saxov	August 1967	WM 779	80826
	G. Lind	July 1968	WP 148	(80840)
	L. Laurén	July 1969	WM 681	80822
			mean	981.80826
Grinstad	S. Saxov	July 1968	LCR 54	981.78510
	H. Henkel	July 1968	WM 681	78516
	L. Laurén	July 1969	WM 681	78516
			mean	981.78514
Grundsund	S. Saxov	July 1968	LCR 54	981.77362
	H. Henkel	July 1968	WM 681	77356
	H. Henkel	July 1968	WM 681	77373
			mean	981.77364
Gunnarsnäs	S. Saxov	July 1968	LCR 54	981.78667
	H. Henkel	July 1968	WM 681	78666
			mean	981.78666
Hamburgsund	S. Saxov	July 1968	LCR 54	981.79642
	H. Henkel	July 1968	WM 681	(79955)
	G. Lind	August 1969	WM 779	79633
			mean	981.79638
Havstenssund	S. Saxov	August 1967	LCR 54	981.82105
	S. Saxov	August 1967	WM 779	82107
	G. Lind	July 1968	WP 148	(82141)
			mean	981.82106
Hede	S. Saxov	July 1968	LCR 54	981.78072
	G. Lind	July 1968	WM 681	78075
	G. Lind	July 1969	WM 779	78074
			mean	981.78074
Herrestad	S. Saxov	July 1968	LCR 54	981.77177
	H. Henkel	July 1968	WM 681	77178
			mean	981.77178
Hogdal	G. Lind	June 1966	WM 779	981.84948
	S. Saxov	June 1966	W 142	84948
			mean	981.84948
Holm	S. Saxov	July 1968	LCR 54	981.78986
	H. Henkel	July 1968	WM 681	78992
			mean	981.78989
Hälleviksstrand	S. Saxov	July 1968	LCR 54	981.77122
	H. Henkel	July 1968	WM 681	77118
			mean	981.77120
Håbol	S. Saxov	July 1967	LCR 54	981.80197
	G. Lind	July 1967	WM 779	80198
	L. Laurén	July 1969	WM 681	80195
			mean	981.80197

Station	Observer	Date	Gravimeter	G-value in Gal
Håby	S. Saxov	July 1968	LCR 54	981.78078
	H. Henkel	July 1968	WM 681	78084
	H. Henkel	July 1968	WM 681	78091
				mean 981.78084
Högsäter	S. Saxov	July 1968	LCR 54	981.77946
	G. Lind	July 1968	WM 681	77946
				mean 981.77946
Högås	S. Saxov	July 1968	LCR 54	981.77039
	H. Henkel	July 1968	WM 681	77041
	H. Henkel	July 1968	WM 681	77049
				mean 981.77043
Järn	S. Saxov	July 1968	LCR 54	981.78582
	H. Henkel	July 1968	WM 681	78584
				mean 981.78583
Järbo	S. Saxov	August 1967	LCR 54	981.78248
	G. Lind	August 1967	WM 779	78246
				mean 981.78247
Klöveskog	S. Saxov	July 1968	LCR 54	981.78523
	H. Henkel	July 1968	WM 681	78523
				mean 981.78523
N. Koster	G. Lind	September 1965	W 142	981.85491
	G. Lind	September 1965	W 142	85515
	G. Lind	September 1965	W 142	85494
	G. Lind	August 1966	WM 779	85523
	G. Lind	August 1966	WM 779	85541
	G. Lind	August 1966	WM 779	85519
	G. Lind	August 1966	WM 779	85496
				mean 981.85511
Krokstad	S. Saxov	July 1968	LCR 54	981.78661
	H. Henkel	July 1968	WM 681	78656
	G. Lind	July 1968	WM 681	78660
	G. Lind	July 1969	WM 779	78663
				mean 981.78660
Krokstrand	S. Saxov	July 1967	LCR 54	981.81773
	G. Lind	July 1967	WM 779	81769
				mean 981.81771
Kungshamn	S. Saxov	July 1968	LCR 54	981.77852
	H. Henkel	July 1968	WM 681	77844
	G. Lind	July 1969	WM 779	77842
				mean 981.77846
Kville	S. Saxov	July 1968	LCR 54	981.79156
	H. Henkel	July 1968	WM 681	79161
	L. Laurén	July 1969	WM 681	79165
				mean 981.79161
Lane-Ryr	S. Saxov	July 1968	LCR 54	981.77293
	S. Saxov	July 1968	LCR 54	77288
	H. Henkel	July 1968	WM 681	77288
	H. Henkel	July 1968	WM 681	77292
				mean 981.77290

Station	Observer	Date	Gravimeter	G-value in Gal
Lerdal	S. Saxov	August 1967	LCR 54	981.79555
	G. Lind	August 1967	WM 779	79550
	G. Lind	July 1969	WM 779	79546
			mean	981.79550
Lommeländ	G. Lind	June 1966	WM 779	981.83268
	S. Saxov	June 1966	W 142	82373
			mean	981.83270
Lur	G. Lind	June 1966	WM 779	981.81217
	S. Saxov	June 1966	W 142	81220
	H. Henkel	July 1968	WM 681	81220
			mean	981.81219
Lyse	S. Saxov	July 1968	LCR 54	981.77157
	H. Henkel	July 1968	WM 681	77151
			mean	981.77154
Lysekil	S. Saxov	July 1968	LCR 54	981.76600
	H. Henkel	July 1968	WM 681	76603
			mean	981.76602
Längeländ	S. Saxov	July 1968	LCR 54	981.76434
	H. Henkel	July 1968	WM 681	76424
			mean	981.76429
Malmö	G. Lind	July 1969	WM 779	981.77846
Mo	S. Saxov	August 1967	LCR 54	981.79072
	G. Lind	August 1967	WM 779	79072
			mean	981.79072
Morländ	S. Saxov	July 1968	LCR 54	981.77132
	H. Henkel	July 1968	WM 681	77131
			mean	981.77132
Myckleby	S. Saxov	July 1969	LCR 54	981.76598
	H. Henkel	July 1969	WM 681	76592
			mean	981.76595
Naverstad	G. Lind	July 1965	W 142	981.79130
	G. Lind	June 1966	WM 779	79137
	S. Saxov	June 1966	W 142	79132
	S. Saxov	July 1967	LCR 54	79130
	G. Lind	July 1967	WM 779	79124
			mean	981.79131
Näsinge	G. Lind	June 1966	WM 779	981.83646
	S. Saxov	June 1966	W 142	83641
			mean	981.83644
Nössemark	S. Saxov	July 1967	LCR 54	981.82531
	G. Lind	July 1967	WM 779	82532
	G. Lind	July 1968	WP 148	(82554)
			mean	981.82532
Nösund	S. Saxov	July 1968	LCR 54	981.76620
	H. Henkel	July 1968	WM 681	76613
			mean	981.76616

Station	Observer	Date	Gravimeter	G-value in Gal
Rölanda	S. Saxov	July 1967	LCR 54	981.79344
	G. Lind	July 1967	WM 779	79339
				mean 981.79342
Rännelanda	S. Saxov	August 1967	LCR 54	981.78608
	G. Lind	August 1967	WM 779	78610
	G. Lind	July 1969	WM 779	78612
			mean 981.78610	
Röra	S. Saxov	July 1968	LCR 54	981.76611
	H. Henkel	July 1968	WM 681	76601
				mean 981.76606
Råggård	S. Saxov	August 1967	LCR 54	981.78521
	G. Lind	August 1967	WM 779	78521
	G. Lind	July 1969	WM 779	78521
			mean 981.78521	
Sanne	S. Saxov	July 1968	LCR 54	981.78405
	G. Lind	July 1968	WM 681	78407
	G. Lind	July 1969	WM 779	78405
			mean 981.78406	
Skee	G. Lind	June 1966	WM 779	981.83335
	S. Saxov	June 1966	W 142	83331
				mean 981.83333
Skredsvik	S. Saxov	July 1968	LCR 54	981.77699
	H. Henkel	July 1968	WM 681	77697
	H. Henkel	July 1968	WM 681	77701
			mean 981.77699	
Smögen	G. Lind	July 1969	WM 779	981.78388
Stala	S. Saxov	July 1968	LCR 54	981.76360
	H. Henkel	July 1968	WM 681	76352
				mean 981.76356
Steneby	S. Saxov	July 1967	LCR 54	981.79400
	G. Lind	July 1967	WM 779	79395
				mean 981.79398
Strömstad	G. Lind	July 1965	W 142	981.84591
	G. Lind	June 1966	WM 779	84580
	S. Saxov	June 1966	W 142	84579
			mean 981.84583	
Sundals-Ryr	S. Saxov	July 1968	LCR 54	981.77265
	H. Henkel	July 1968	WM 681	77269
	L. Laurén	July 1969	WM 681	77271
			mean 981.77268	
Svarteborg	S. Saxov	July 1968	LCR 54	981.77402
	H. Henkel	July 1968	WM 681	77401
	H. Henkel	July 1968	WM 681	77397
	G. Lind	July 1968	WP 148	77397
	G. Lind	July 1969	WM 779	77402
			mean 981.77400	
Svenneby	S. Saxov	July 1968	LCR 54	981.79130
	H. Henkel	July 1968	WM 681	79136
				mean 981.79133

Station	Observer	Date	Gravimeter	G-value in Gal
Tegneby	S. Saxov	July 1968	LCR 54	981.76740
	H. Henkel	July 1968	WM 681	76732
				mean 981.76736
Timmervik	S. Saxov	July 1968	LCR 54	981.77504
	H. Henkel	July 1968	WM 681	77502
				mean 981.77503
Tjärnö	G. Lind	June 1966	WM 779	981.83900
	S. Saxov	June 1966	W 142	83901
				mean 981.83900
Torp (Dalsland)	S. Saxov	July 1968	LCR 54	981.77681
	H. Henkel	July 1968	WM 681	77691
				mean 981.77686
Torp (Orust)	S. Saxov	July 1968	LCR 54	981.77032
	H. Henkel	July 1968	WM 681	77026
				mean 981.77029
Torrskog	S. Saxov	July 1967	LCR 54	981.81976
	G. Lind	July 1967	WM 779	81972
	L. Laurén	July 1969	WM 681	81965
				mean 981.81971
Tossene	S. Saxov	July 1968	LCR 54	981.77763
	H. Henkel	July 1968	WM 681	77762
	G. Lind	July 1969	WM 779	77771
				mean 981.77765
Trankil	S. Saxov	July 1967	LCR 54	981.83192
	G. Lind	July 1967	WM 779	83186
				mean 981.83189
Töftedal	S. Saxov	July 1967	LCR 54	981.79092
	G. Lind	July 1967	WM 779	79090
	H. Henkel	July 1968	WM 681	79084
				mean 981.79088
Uddevalla	S. Saxov	July 1968	LCR 54	981.78151
	H. Henkel	July 1968	WM 681	78154
				mean 981.78152
Valbo-Ryr	S. Saxov	July 1968	LCR 54	981.77192
	H. Henkel	July 1968	WM 681	77199
				mean 981.77196
Vassända-Naglum	S. Saxov	July 1968	LCR 54	981.77357
	H. Henkel	July 1968	WM 681	77350
				mean 981.77354
Väne-Ryr	S. Saxov	July 1968	LCR 54	981.77128
	H. Henkel	July 1968	WM 681	77118
				mean 981.77123
Vänersborg	S. Saxov	July 1968	LCR 54	981.77822
	H. Henkel	July 1968	WM 681	77824
				mean 981.77823
Värvik	S. Saxov	July 1967	LCR 54	981.82077
	G. Lind	July 1967	WM 779	82070
				mean 981.82074

Station	Observer	Date	Gravimeter	G-value in Gal
Ärtemark	S. Saxov	July 1967	LCR 54	981.80678
	G. Lind	July 1967	WM 779	80672
				mean 981.80675
Ödeborg	S. Saxov	July 1968	LCR 54	981.77661
	H. Henkel	July 1968	WM 681	77659
				mean 981.77660
Ödskölt	S. Saxov	August 1967	LCR 54	981.78216
	G. Lind	August 1967	WM 779	78216
				mean 981.78216
Ör	S. Saxov	July 1968	LCR 54	981.78516
	H. Henkel	July 1968	WM 681	78522
				mean 981.78519
Östad	S. Saxov	July/August 1967	LCR 54	981.79656
	S. Saxov	July/August 1967	LCR 54	79656
	S. Saxov	July/August 1967	LCR 54	79653
	S. Saxov	July/August 1967	LCR 54	79654
	S. Saxov	July/August 1967	LCR 54	79656
	S. Saxov	July/August 1967	LCR 54	79652
	S. Saxov	July/August 1967	LCR 54	79654
	S. Saxov	July/August 1967	LCR 54	79652
				mean 981.79654
	G. Lind	July/August 1967	WM 779	981.79655
	G. Lind	July/August 1967	WM 779	79654
	G. Lind	July/August 1967	WM 779	79653
	G. Lind	July/August 1967	WM 779	79656
	G. Lind	July/August 1967	WM 779	79652
				mean 981.79654
	S. Saxov	July 1968	LCR 54	981.79653
	S. Saxov	July 1968	LCR 54	79655
	S. Saxov	July 1968	LCR 54	79654
				mean 981.79654
	H. Henkel	July 1968	WM 681	981.79653
	G. Lind	July 1969	WM 779	79655
	L. Laurén	July 1969	WM 681	79653
			Östad mean-value 981.79654	

Wideland (1946) has some 40 gravity stations in Bohuslän. In order to obtain elevation values he in general established his stations along railroads and accordingly there are only very few stations at other localities. As far as can be seen from the Wideland list we have four stations, only, in common. That is Uddevalla, Grinstad, Gunnarsnäs, and Järn. Wideland has based his values on Stockholm RAK 1 which is the Stockholm pendulum station using a value of 981.8470 Gals, while Pettersson (1967) gives the recent value of 981.84609 Gals. Thus we have to add a correction of  $-0.9$  mGal to the original Wideland values.

Station	Wideland	Wideland corrected	Our Table 4	Wideland-Table 4
146 Uddevalla Ka	981.7822 Gals	981.7813 Gals	981.78152 Gals	-0.2 mGal
189 Grinstad Ka	7856	7847	78514	-0.4
190 Järn Ka	7862	7853	78583	-0.5
191 Gunnarsnäs Ka	7876	7867	78666	0

The values agree very well, also considering that Wideland gives the St. D. as  $\pm 0.38$  mGal for a main station (Uddevalla) and  $\pm 0.53$  for a detail station.

A closer inspection of Table 4 reveals that there is no systematic difference between the results obtained by means of the four gravimeters, LCR. 54, W. M. 681, W. M. 779 and W. 142. Gravimeter W. P. 148 has not been included as far as Grebbestad, Havstenssund, and Nössemark are concerned, and only the measurement at Svarteborg is incorporated in the mean value. Likewise the reading at Hamburgsund and one of the readings at Bovallstrand by means of W. M. 681 are not included in the mean values.

In general the values agree very well. The only exception is N. Koster. The explanation may be that usually there is a time interval of several days and weeks between the to and fro connections from N. Koster to Strömstad which will cause a greater uncertainty in the drift value. Due to this the divergencies from the mean Koster value have not been included in the following table.

An analysis of the divergencies from the mean values gives the following picture:

Deviation in mGal	Gravimeter			
	LCR. 54	W. M. 779 number	W. M. 681	W. 142
+0.09			1	
+0.08			1	1
+0.07			2	
+0.06	1	1	1	
+0.05	6	2	1	
+0.04	7		5	
+0.03	9	3	6	2
+0.02	14	6	6	1
+0.01	10	8	11	1
0.00	16	16	13	1
-0.01	12	5	5	1
-0.02	12	4	9	2
-0.03	6	5	9	1
-0.04	6	3	7	2
-0.05	3	1	6	
-0.06	1	1	2	
-0.07	1	1	1	
-0.08			1	
Total number	104	56	87	12
Standard deviation	0.028 mGal	0.027 mGal	0.035 mGal	0.038 mGal

Table 5 lists the principal facts of the base stations. For the main part of the stations the elevation values have been obtained by means of an ordinary spirit levelling. The geographic coordinates have been taken from the topographic sheet in the scale of 1:50 000 Normal gravity has been taken from a table by Andersen (1956).

The Bouguer anomalies by employing the density value of  $2.67 \text{ gr/cm}^3$  are plot on the accompanying map in the scale of 1:1 000 000 and anomaly contours with an equidistance of 5 mGals are drawn.

Sketches of the base stations are filed at the Laboratory of Applied eGo-physics and copies are available from there.

Table 5

Station	N. Latitude	Longitude E. of Grw.	Elevation in metres	Gravity in Gal	Bouguer anomaly in mGal
Askum	58°24'56"	11°20'25"	21.14	981.78068	- 12.51
Bengtssfors	59 01 58	12 14 00	102.3	80544	- 21.30
Billingsfors	58 59 15	12 15 24	77.4	80631	- 22.10
Blomskog	59 16 29	12 01 51	112.94	82528	- 18.90
Bokenäs	58 17 42	11 34 22	29.21	77098	- 11.01
Bolstad	58 34 33	12 29 11	51.71	78502	- 15.27
Bottna	58 30 17	11 22 56	30.10	78507	- 13.89
Bovallstrand	58 28 30	11 19 44	11.56	78894	- 11.16
Brastad	58 23 45	11 30 11	48.43	77026	- 16.06
Bro	58 25 32	11 29 03	8.06	77946	- 17.33
Brålanda	58 34 10	12 22 58	56.6	78367	- 15.35
Bäcke	58 47 42	12 10 01	147.68	78444	- 14.49
Bärfendal	58 30 14	11 29 33	13.47	78332	- 18.88
Dals-Ed	58 54 22	11 56 27	148.58	79260	- 15.23
Dalskog	58 44 47	12 17 32	141.0	77777	- 18.53
Dragsmark	58 15 10	11 33 15	6.73	77209	- 11.19
Erikstad	58 36 36	12 24 12	66.42	78319	- 16.93
Fagerhult	58 49 35	11 37 03	147.71	79017	- 11.33
Fiskebäckskil	58 14 41	11 27 43	9.6	77181	- 9.97
Fjällbacka	58 35 00	11 17 12	20.05	79815	- 9.27
Foss	58 28 04	11 39 48	66.41	77363	- 15.32
Frändefors	58 29 49	11 16 54	61.09	77693	- 15.02
Färgelanda	58 34 24	11 59 36	118.29	77938	- 7.68
Gestad	58 33 00	12 27 12	61.79	78042	- 16.10
Gesäter	58 47 11	11 50 24	138.26	78607	- 14.29
Grebbestad	58 41 48	11 19 00	21.03	80826	- 7.65
Grinstad	58 37 24	12 30 48	54.4	78514	- 18.53
Grundsund	58 12 42	11 25 16	3.4 (9)	77364	- 6.68
Gunnarsnäs	58 43 24	12 23 12	78.34	78666	- 20.32
Hamburgsund	58 33 14	11 16 06	12.71	79638	- 10.00
Havstenssund	58 44 57	11 11 30	7.74	82106	- 1.61
Hede	58 36 19	11 45 33	88.30	78074	- 14.84
Herrestad	58 20 44	11 50 29	42.52	77178	- 11.66
Hogdal	59 01 36	11 13 48	18.04	84948	+ 6.44
Holm	58 42 47	12 28 20	48.98	78989	- 21.85
Hälleviksstrand	58 07 48	11 27 01	5.4 (1)	77120	- 2.05
Häbol	58 58 19	12 01 33	151.3	80197	- 10.62
Häby	58 29 33	11 37 16	37.57	78084	- 15.52
Högsäter	58 38 49	12 03 35	150.63	77946	- 6.94
Högås	58 19 54	11 40 51	45	77043	- 11.27

Station	N. Latitude	Longitude E. of Grw.	Elevation in metres	Bouguer anomaly	in mGal Gravity in Gal
Järbo	58 43 42	12 08 28	140.2	78247	- 12.58
Järn	58 39 58	12 30 03	61.5	78583	- 19.57
Klöveskog	58 38 42	12 37 06	65.44	78523	- 17.85
N. Koster	58 54 15	11 05 19	3.4	85511	+ 18.79
Krokstad	58 39 41	11 46 36	87.79	78660	- 13.40
Krokstrand	58 59 11	11 26 32	84.18	81771	- 9.30
Kungshamn	58 21 33	11 15 23	8.30	77846	- 12.91
Kville	58 34 00	11 22 12	17.65	79161	- 14.94
Lane-Ryr	58 23 41	12 03 50	65.97	77290	- 9.91
Lerdal	58 45 32	11 53 43	96.87	79550	- 10.62
Lommeländ	59 04 12	11 19 24	86.25	83270	- 0.58
Lur	58 49 12	11 21 42	59.20	81219	- 6.42
Lyse	58 19 16	11 27 56	15.37	77154	- 15.51
Lysekil	58 16 20	11 26 13	21.5	76602	- 15.84
Längelanda	58 09 12	11 47 30	27.77	76429	- 6.78
Malmön	58 20 55	11 20 23	9.39	77846	- 11.65
Mo	58 42 13	11 33 33	81.9	79072	- 14.07
Morlanda	58 11 42	11 31 03	14.5	77132	- 5.46
Myckleby	58 12 33	11 46 15	37.33	76595	- 7.57
Naverstad	58 45 54	11 34 06	102.33	79131	- 14.03
Näsinge	59 00 48	11 19 42	43.22	83644	- 0.47
Nössemark	59 07 58	11 50 17	119.19	82532	- 6.07
Nösund	58 06 48	11 31 38	30.38	76616	- 0.82
Rölanda	58 50 33	11 55 01	141.22	79342	- 10.66
Rännelanda	58 41 26	11 59 47	126.08	78610	- 8.83
Röra	58 11 28	11 37 26	38.32	76606	- 5.84
Råggård	58 45 45	12 02 08	163.36	78521	- 7.99
Sanne	58 40 26	11 52 46	126.45	78406	- 9.47
Skee	58 56 06	11 16 48	43.73	83332	+ 2.41
Skredsvik	58 22 46	11 40 24	10.8	77699	- 15.40
Smögen	58 21 23	11 13 41	11.15	78388	- 6.79
Stala	58 08 18	11 39 54	30.54	76356	- 5.69
Steneby	58 56 02	12 12 35	119.33	79398	- 22.00
Strömstad	58 56 12	11 10 36	14.34	84583	+ 9.04
Sundals-Ryr	58 34 26	12 14 16	74.23	77268	- 23.08
Svarteberg	58 33 27	11 34 00	90.99	77400	- 17.13
Svenneby	58 30 30	11 19 38	12.25	79133	- 11.33
Tegneby	58 09 03	11 35 24	26.06	76736	- 3.92
Timmervik	58 29 10	12 23 30	37.20	77503	- 21.10
Tjärnö	58 52 24	11 09 24	12.25	83900	+ 6.97
Torp (Dalsland)	58 31 00	11 57 08	92.1	77686	- 11.02
Torp (Orust)	58 14 54	11 43 28	30.30	77029	- 7.59
Torrskog	59 10 13	12 05 01	98.54	81971	- 19.13
Tossene	58 26 46	11 22 38	46.15	77765	- 13.17
Trankil	59 16 55	11 54 25	107.2	83189	- 13.76
Töftedal	58 50 47	11 47 20	140.92	79088	- 13.45
Uddevalla	58 21 57	11 56 27	13.2	78152	- 9.20
Valbo-Ryr	58 29 36	11 49 04	92.17	77196	- 13.69
Vassända-Naglum	58 20 04	12 16 13	69.2	77354	- 4.10
Väne-Ryr	58 19 58	12 08 26	74.96	77123	- 4.62
Vänersborg	58 22 50	12 19 44	50.51	77823	- 6.40
Värvik	59 11 04	12 12 47	98.0	82074	- 19.41
Ärtemark	59 01 41	12 10 36	104.13	80675	- 19.40
Ödeborg	58 32 41	11 59 58	108.5	77660	- 10.00
Ödskölt	58 51 11	12 09 49	167.5	78216	- 17.78
Ör	58 39 55	12 20 36	65.16	78519	- 19.46
Östad	58 46 24	11 33 45	81.07	79654	- 13.92

## ACKNOWLEDGEMENTS

The authors want to thank I. Ramberg, H. Henkel, and L. Laurén who during their employment at the Laboratory of Applied Geophysics, Aarhus University, contributed to the survey. Also the technical personal at the laboratory assisted very ably in the preparation of the manuscript.

Thanks are due to Dr. Einar Andersen, Director of the Danish Geodetic Institut and Professor of Geodesy, Copenhagen University; Dr. Eric Tengström, Institute of Physical Geodesy, Uppsala University; Professor, Dr. F. Barth, Geological Museum, Oslo University; Director Inge Aalstad, Geological Survey of Norway, Trondheim, who have put gravimeters at the authors' disposal. Without their cooperation the survey would not have been possible.

The field work was supported in  
1967 by Chalmers Tekniska Högskola (Göteborg) and Aarhus University  
1968 by Aarhus Universitets Forskningsfond  
1969 by Statens naturvidenskabelige Forskningsråd (Copenhagen).

## REFERENCES

- ANDERSEN, EINAR, 1956: Geodetic Tables. Geodætisk Instituts Skrifter, 3. Række, Bd. 24, Copenhagen.
- BOTT, M. H. P., 1956: A Geophysical Study of the Granite Problem. Quaterly Journal, Geological Society of London, No. 445, pp. 45-62, London.
- EBERHARD, OSKAR, 1967: Gravimetermessungen 1965 auf der Europäischen Gravimetreichlinie - Gravimetrische Anschlussmessung Bad Harzburg-Potsdam. Deutsche Geodätische Kommission bei der Bayrischen Akademie der Wissenschaften, Reihe B, Heft Nr. 152, Munich.
- GANTAR, C. and MORELLI, C., 1962: Measurements with Gravity-Meters along the Northern Part of the European Calibration Line; Bad Harzburg-Bodö. Bollettino di Geofisica Teorica ed Applicata 4, pp. 183-228, Trieste.
- 1965: Detail Gravimeter Measurements over the European Calibration Line in 1963 (O.G.S.T. and U.S.N.O.O.), Bollettino di Geofisica Teorica ed Applicata 7, pp. 298-321, Trieste.
- GARLAND, G. D., 1965: The Earth's Shape and Gravity. Pergamon Press, London.
- KEJLSØ, ELVIN, 1958: The European Gravimetric Calibration Line. Danish Part. Geodætisk Institut Meddelelse No. 37, Copenhagen.
- KNEISL, M., 1956: Der deutsche Anteil an der europäischen Gravimetreichbasis Hammerfest-Rom. Bayrische Akademie der Wissenschaften, math.-naturwiss. Kl., Abh. N. F. 78, Munich.
- LIND, GUSTAF, 1967: Gravity Measurements over the Bohus Granite in Sweden. Geologiska Föreningens i Stockholm Förhandlingar 88, pp. 542-548, Stockholm.
- MARZAHN, K., 1959: Ausgleichung des Deutschen Schweregrundnetzes (Gravimeter- und Pendelmessungen). Deutsche Geodätische Kommission bei der Bayrischen Akademie der Wissenschaften, Reihe C, Heft Nr. 59, Munich.
- PETTERSSON, LENNART, 1967: The Swedish First Order Gravity Network. Rikets Allmänna Kartverk, Meddelande Nr. A 35, Stockholm.
- SAXOV, SVEND, 1959: Variation of the Worden Gravimeter Small Dial Scale Factor with Time. Geophysical Prospecting, 7, pp. 146-157.
- 1965: Some Gravity Measurements in Sønderjylland. Geodætisk Instituts Skrifter 3. Række, Bd. 36, Copenhagen.
- 1966: A Gravity Meter Calibration Survey along the Northern Part of the European Calibration Line, Buddinge-Oslo. Bollettino di Geofisica Teorica ed Applicata 7, pp. 77-80, Trieste.
- 1967: Establishment of a Gravimetric Basic System and Gravity Meter Scale Constants in Bohuslän. Teknik och Natur, pp. 385-391, Göteborg.
- SAXOV, SVEND and SPELLAUGE, R., 1967: Gravity Ties Denmark - The Faroes - Iceland. Bollettino di Geofisica Teorica ed Applicata 9, pp. 66-84, Trieste.
- SMITHSON, S. B., 1965: The Nature of the "Granitic" Layer of the Crust in the Southern Norwegian Precambrian. Norsk Geologisk Tidsskrift 45, pp. 113-133, Oslo.
- WIDELAND, BROR, 1946: Relative Schweremessungen in Süd- und Mittelschweden in den Jahren 1943-1944. Rikets Allmänna Kartverk. Meddelande Nr. 6, Stockholm.

PRISKLASS D

Distribution  
SVENSKA REPRODUKTIONS AB  
FACK VÄLLINGBY 1

Växjö 1971 C. Davidsons Boktryckeri AB

Printed in Sweden