Bulletin 00.2 English summary

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Contents of the May 2000 Bulletin, nr. 73

01 Account of the 15 January 2000 gathering Secretariat

Fourteen members attended. The excursion is debated. It will be held together with a group of NIRIA members. Dik de Groot and Ton Bron will work things out - Fer de Vries wants copy for the Bulletin; his folder is empty. Please describe your gnomonic experiences! - A primary school requested some sundial lessons. Martin Hugenholtz and Lidi Schoorel have dedicated themselves to this - Photos by Jan Kragten of the Hardinxveld-Giessendam exhibit - A computer controlled mechanical Sunpointer in Amersfoort (see elsewhere) - Newspaper article on Qibla instruments (see elsewhere) - A new large half open armillosphere in Asten, made by the local blacksmith - An idea by Fred Sawyer: an analemmatic dial on an East or West wall has the hour points on a straight line, with the date strip at right angles to it. This is latitude independent, only the angle with the horizon changes. Put a series of them together and add the NASS logo (from their December 1999 publication) - Martin Brunold of Switzerland makes fine astrolabia; catalogue with prices - Dees Verschuuren advises IVN on sundials on a Nature path - Eugene Roebroeck's model demonstrating how the intersection of hour planes describes a sundial - Bowl sundial on a Korean millennium coin - Genk Sundial Park completed (see elsewhere) - A private hour plane dial in Tiel, consisting of flat stones - Dees Verschuuren will hold a talk on "Time" in the Asten observatory.

02 Accounts of the 18 March 2000 gathering and annual meeting Secretariat

Fifteen members attended. Dik de Groot says the excursion will be Sundial Society members only after all, and will take place in the province of South Holland. - New from the secretariat: Public observatory Bussloo organise an exhibit from 12 August to 3 September and has asked for our participation on the subject of sundials. Gerrit Sasbrink will help them - A letter of thanks from the Hardinxveld-Giessendam museum. Among the visitors, there had been two schools - Zelhem 2001 opportunity for sundial exposure - We received a copy of the Vocabulari Gnomònic Octolingue, an eight-language gnomonic dictionary, by Vallhonrat. Marinus Hagen and Fer de Vries have provided input for the book at the time.

We discussed the 25th anniversary of the Society, which will be in 2003. Ideas: an exhibit, publication of a new sundial book, realisation of a special sundial or a series of sundials. The board received the ideas gratefully but would like still more suggestions by more members. With that the Annual was closed, and the meeting turned to gnomonics proper. Fer de Vries and Wiel Coenen were at the unveiling of the recently established Sunpointer in Amersfoort (see photo, and elsewhere). Hans Sassenburg bought a compass on Internet. Advertised as a Sun compass, it wasn't- but still certainly worth the expense. Teun leGrand had several nice sundial photos, and so had other members.

04 Members Secretariat

Two resignations, four new members, and two changes of address.

04 Various notes

Correction 1: "Literature" numbering scheme: it went wrong in B00.1, please adjust it from p43, starting with 1356. The last in the list should become 1361. Apologies for the inconvenience caused.

Correction 2: EOT and Declination tables were missing from B00.1, please find them in an Annex to B00.2.

Omission: the smart booklet "Welcome to Groningen" that Eugene Roebroeck handed out on last year's excursion was not mentioned in the account of that trip. Mrs. Regina Terwisscha van Scheltinga designed it.

Update: "Voacabulari Gnomònic Octolingue" (B99.4) has gone up from €35,- to €47,22 including p&p.

Internet: A mention of the Sundial mailing list. Subscribe by sending email to `majordomo@rrz.uni-koeln.de` with nothing in the Subject and `subscribe sundial` in the body of the message.

Notice: *Zeeland Timepiecemakers since AD1400, and related instruments: orreries, sundials, astrolabes, quadrants, a tidal clock, a lunarium, an equatorium.* Member Jan Schepman (W. Klooslaan 8, 4383AT Vlissingen) has compiled a summary of Zeeland craftsmen, and instruments. Assisted by Mr. Van der Wijck and data by Mr. Hoitsma and of his own, he has extended the Morpurgo summary. The summary runs to thirty pages A4 with black-and-white figures. Copies are available for ƒ 7,- incl. postage within The Netherlands, or possibly approx. € 3,- plus postage outside.

Japan: A Japanese Sundial society was founded on 25 March 2000. President is Prof. Akio Gotoh, and Prof. Naosuke Sekiguchi is patron. We have already sent a copy of our Bulletin, along with a request for a copy of theirs when they have it.

Sunpointer in Amersfoort: A radio time signal controls, via a computer program, this huge mechanical pointer so that it always points in the direction of the sun. The 3,84m long arrow, which is at times 12,00m above the pavement, can be found in the square in front of the railway station. The Sunpointer was commissioned on

Sunday 12 March 2000, XII hours apparent time. We will ask the member who was involved in the realisation of this project to write about it for the Bulletin.
Sundial Park, Gent: This was officially opened 19 March 2000. It is home of twelve large and magnificent sundials. It is a truly international sundial park, as artists from several countries designed the dials. We sincerely congratulate our Belgian friends with their achievement.

06 Financial report for 1999; estimate for 2000 Treasurer

07 What constitutes a sundial? Is it a question of principle, or of taste? J.A.F. de Rijk
This article was prompted by "A Latitude-Independent Sundial" by R.J. Vinck (B00.1 p12) and "Ptolemaic Co-ordinate based Sundials" by Fer de Vries (B99.1 p17). The author is of the opinion that these articles do not describe sundials. He proceeds to divide sundials into two groups: - direct sundials, which measure the hour angle of the sun directly: the pole style dials and the node dials ("point" dials). Node dials also measure the declination of the sun, and so indicate date as well as time; - and indirect sundials, which measure a quantity related to the time, such as the altitude of the sun, the azimuth, et cetera. The lines on the dial are so constructed that they show the hour angle of the sun after all.
The design of an indirect dial could be: measurement → equations (, graphs) → hour lines → an instrument with hour lines and indicator. An example would be the Lansbergen quadrant.
However, no such instrument is established in the two articles mentioned. There is a measurement and there are graphs that represent equations, but some additional graph calculation is needed. Schematically: measurement → equations (, graphs) → calculation of hour angle (using graphs).
If we define a sundial as "a device that uses the light of the Sun and an indicator to read time off a system of hour lines", then the author sees sufficient reason not to call these devices sundials, although he admits the right of everyone to do so nonetheless - in which case we need a different definition. What constitutes a sundial?

08 The Qibla and the distance to Mecca A.J.M. van den Beld
The NRC newspaper of 8 January 2000 had an article on instruments for Qibla determination. As it happened, two such instruments had turned up lately, one at Sotheby's, one at Christies. The author will call these instruments "Qiblacharts". The ones mentioned were brass, 9" plates with an engraved grid of parallels and meridians. The chart shows the locations of about a hundred cities. Mecca is in the middle, and the chart runs from 14 degrees south to 28 degrees north of Mecca, and from 48 west to 48 east of it; each in two degree steps. When rotated over the place of interest, the distance is shown on a scale on the pointer, and the other end of it shows the Qibla on the perimeter of the chart. It is measured in degrees westward from south.
The meridians are all vertical, and closer together the farther they are from Mecca. The parallels are engraved as circular arcs, which is an approximation of the ellipses they should be. It is unknown whether the makers knew this; if they did, the circles would still be the more practical solution, the error being quite small for the area.
In 2, the author calculates the grid, first for the correct Qibla reading. He then multiplies the found x and y co-ordinates by a common factor that gives the correct distance from Mecca, first noting that this makes the meridians straight vertical lines. In 3, the shape of the parallels is proven to be elliptical. Part 4 explains the distance scale on the pointer. Part 5 finally discusses the error that is caused by the use of circles for the parallels. The largest error is 0,3mm at latitude 35°; 0,43mm or 1/64 " on the original Qiblachart. With larger longitude ranges, the error grows rapidly. For λ_{max} = 48; 60; 72° the error is 0,3; 0,73; 1,55mm.

13 Antique Skaphes, some methods of analysis J. Kragten
Cut spherical dials - A continuation of the article in B00.1
Method 1: a perfect construction. *a* constant radius R, *b* date arcs in the correct position, so that declinations of summer and winter arcs are equal, *c* meridian measurements ES and WE equal, *d* gnomon tip in the centre of the sphere M. Many of the 28 for which Mrs. Gibbs does supply sufficient data do not comply.
Method 2: The equinox line through E is incorrectly placed. *a* and *b* remain, *c* is dropped. The hour line distance e' diminishes by some 4% for WE/ES=¾ , by 8% for WE/ES=½. It seems strange to have the gnomon tip in M and not in G.
Method 3: Shortened gnomon.
In that case, *d* is dropped as well. Mrs. Gibbs suggests this too. Fig. 2 shows the relation between gnomon factor (here 50%) and WE/ES (0.8). The character of the dial changes, the bowl is much more open. Meridian arc ST is shortened by 39%, the steepest part remaining. The summer arc diminishes from 111.9 to 86° per half arc. The circular part in the top face goes from 244 to 194°.
The shortened gnomon makes the spherical dial strongly related to the conical dial.
The author now moves on to a discussion of the errors in time reading caused by the short gnomon, using calculation as well as a model, and finds errors up to 30 minutes. The question remains if that was a problem at the time. For one thing, the accuracy could not be compared to anything else in practice.
Particulars related to gnomon shortening:

Hour lines: have to be longer, with solstice arc declinations more than 24°.
Front opening: on many photographs, it appears often to be no more than a half circle instead of ¾. Is this distortion in the picture, short gnomon effect, or just an opened out sphere?
Hour lines converging towards gnomon foot: this frequently happens, but could be on purpose. It would seem that this practice compensates largely for the errors caused by the short gnomon.
Now the author reviews two sundials, taking data from Gibbs. An error sensitivity discussion is next.
Annex 1, 2 and 3 to the article describe the mathematical calculations used for Methods 1, 2 and 3.

22 Polar movement G. Strang van Hees

The direction of the polar axis is not fixed in space. The author explains the movement caused by the axis of rotation and the main body axis of the Earth not being collinear (at the pole they are about 15m (50') apart). An unbalanced car wheel and unbalanced dryer load are two more examples. For Earth, the theoretical or Euler period is 305 days. Because the Earth is not quite rigid, the real or Chandler period is 437 days.
From a comparison with a wheel on the road, by curling up the "road" until it is within the "wheel", the author arrives at figure 2, which models the Earth's polar movement. The hoop is Earth, point R is the axis of rotation. The small circle is fixed in space and its centre gives the direction of impulse. As the Earth turns, R progresses along the hoop as seen from Earth, and along the small circle as seen from space. Because the radius of the hoop is 15m and it takes R 305 days (theoretically) to complete it, the radius of the small circle is 5cm (2"). This is related to the ellipticity of the Earth, which is also 1:300.
Finally, the author mentions a different movement of the axis, caused by the ellipticity of Earth and the axis tilt with respect to the Ecliptic. This movement is called precession. Its period is 25800 years, moving the celestial pole by 20 seconds of arc per annum.

24 A motorised Sundial (sequel to the article in B99.2) A.G.M. Bron

The author describes an outdoor version of his solar-powered sundial. While he was waiting for some parts of his design to be manufactured for him, he produced a series of three windowsill dials. The solar cells again came from a toy kit by Märklin, but are slightly bigger. The new dials work surprisingly accurately; when the sky is blue, the 24h shaft is corrected up to three times per minute.
The large outdoor model is 80cm tall (2'8") and mainly stainless steel. The "clock" is made of stainless steel and brass. The dial has solar cells on both sides of the panel, so that the next set takes over the next morning. This requires close alignment of the shadow plates, or the dial will be slow or fast every other day. The current supply has to go through a rotating joint. It is shown in the figure, "lager" = ballbearing, "etmaalas" = 24h shaft, "naar" = toward. Heavy rain might cause a short, but then no dial works in such weather. - The latitude adjustment can be done by loosening one inside hex screw.
The results are quite satisfactory. Corrections occur about once per minute. The author had the sundial placed on test in the garden of member Hans Sassenburg. The next day cell pair take-over was demonstrated successfully. It did become clear that the dial needs more open space then the windowsill version (and, of course, certainly more than an ordinary dial, which can be read even in sunrays through the foliage at least some of the time).
The difference is thought to be caused by the different solar cell top layers. The Märklin ones are clear, the Siemens SM6 cells that drive the outdoor dial, frosted.

28 Giessendam: what is wrong with that? J. Kragten

The Church accounts from before 1794 were lost, but the dial is mentioned again in 1821, when it was repainted for 25 guilders. "Sundials in The Netherlands", in 1984, thought that another new coat would not be a luxury.
Jan Kragten noted that the style shadow cuts through the hour lines. A photo by Fer de Vries shows it, too. Something is wrong here. The intersection of the style with the dial plate is to the left of the XII line.
Member Jacob Borsje was there when the dial was repainted; the style was removed. He offered his expert help, but this was declined because it would disturb the decorator. We will have to wait for the next coat..

29 Results of the Groningen photo contest E.L.H. Roebroeck

The winning photograph, by Mr. Bert Otten, shows a detail of the Martini Tower sundial. Visible are the gold dial centre with converging hour lines and the substyle with rivets.

30 Sundials in the Netherlands W. Coenen

Amersfoort 9 a detailed description of the Sunpointer. See photo on p.3. This is not a sundial but an arrow that is kept pointing in the direction of the sun. Arrow and associated display measure 4m (13') and their height above street level vary from 4,2 to 12m (13 to 39'). A receiver tuned to Frankfurt receives a complete time string every minute. A computer controls the pointer motors. The meridian was laid out by the Registry department and indicated with two copper marks 30m (100') apart in the pavement.
Jurgen Beij and Jan Konings designed the Pointer, the City of Amersfoort commissioned it. The black motor housing is a design by Suzanne van Remmen. Engineering was by Bruns, Westerhoven. R.J. Takens (M.Sc) and H.F. Henrichs (Ph.D) did the calculations and made the software.

Leiden 14 An armillosphere, made by member G. Sasbrink.

Stiphout A public sundial at Lindenhof. Calculations by Fer de Vries. Metal hour marks (9 to 17) rise above the shrubs. The foundation of the 6m (20') orange style is too weak, so the dial is already under revision.

Bochholtz The dial formerly known as Horn, Raadhuisplein 2, is to be found here. The Horn entry is dropped. The style height was originally 40° (Spanish origin) but the shaft is bent to an angle of 51°.

Mesch The farm mentioned is B99.2 p39 is not from 1745 but of 1740.

Valkenburg 2 The cube sundial was moved from the court to inside the building. Unfortunate but perhaps necessary. See "Sundials in The Netherlands", p188; Driessen (picture), p98.

Valkenburg-Houthem St. Gerlach Castle. Driessen (1979) p99 shows the armillosphere and beautiful base. Afterwards is has disappeared. A new dial was placed there in 1999. It is a simple iron hoop with a copper hour belt. It is in the box garden left of the restaurant at the main gate.

30 DST...An Idea Before Its Time? NRC newspaper clipping

An Englishman named William Willett actively campaigned for it. However, Willett died before a law was enacted in Parliament. Willett, a master builder from Chislehurst, Kent, struck on the usefulness of a time manipulation as he was riding his horse early one summer morning in Petts Wood. During the ride he noticed many homes with their window shutters closed. 'What a waste of daylight!' he must have thought. He started to campaign for a bill in the British Parliament to get the clock adjusted. Simply putting all the clocks forward 80 minutes, in four increments of 20 minutes each, during the spring and summer months and then back in the autumn would have allowed people to have more daylight in the evening.

What finally persuaded the politicians to give in and adopt DST? They wanted to conserve fuel during World War I by reducing the need for artificial light! Other countries soon took up the idea for similar reasons. There is a monument in Petts Wood to William Willett. It is dedicated to "the untiring advocate of 'summer time'." The inscription beneath the sundial says: *"hours I count not, save they be summer [hours]."*

During the German occupation, the Dutch, who had used Amsterdam Time until then, had to put the clock forward by 40 minutes to MET, *plus* another hour for daylight saving time. After the war they dropped the hour, but kept MET. It was not before 3 April 1977 that DST was reinstated. In 1981, the start moved to the last Sunday of March, and the end was moved from the last Sunday of September, to that of October beginning 1996. Now, all fifteen member States of the EC have the time and same DST period, established until 2001 in the Eighth Directive. The exception is the UK, who apply DST to UTC instead of MET.

33 Literature 1362 - 1372 D. Verschuuren

1362 Cadrans solaires (Daniel Picon). A simple book on making sundials, with sound explanations and interesting examples and advice on different materials.

1363 Zonnetijdingen, periodical of the Flanders Sundial Society. **1363.4** A sundial route in Paris (E.Daled) **1363.6** The Adolphe Quetelet Noon mark. First astronomer royal of Brussel, Quetelet established ten monumental noon marks. [if memory serves me, he was also quite important in the history of statistics and invented "l'homme moyen" as well as the Normal Distribution]

1366 Lemma "Sundials" in the New Groningen Encyclopaedia 1999. A chauvinist approach of a global theme.

1368.2 Study of the oldest Egyptian sundials. Mrs. Bohmhard and M.M.Valdes were able to prove that these were altitude dials and not azimuth, as was hitherto believed. **1369.3** A new universal equatorial sundial with built-in longitude and EOT correction (Antonio Angulo), with picture. **1370.3** The EOT poem by Ted Dunne now translated into Catalan! (by Lli-Joan-Pi).

1372.1 Do not miss: in The Compendium of NASS, "Shadow plane sundials" (Maddux, Oglesby, DeVries). Also 1372.2 Shadow Plane Addendum (Sawyer).

Annex: Telling time on the sundial (folds into an A5 booklet) H.W. van der Wijck

An explanation in five short dialogues between a studious nephew and his omniscient uncle. Without technical terms or equations. Apparent time, aligning the dial, legal time hour lines, EOT, using a dial from a different latitude. With a copy of Hans de Rijk's cut-out butterfly dial.

Annex: English summary of articles in B00.1 R. Hooijenga
Annex: Equation of Time and Declination tables for 2000 Th.J. de Vries
Annex: Notice of the excursion of Saturday 24 June 2000 Secretariat

Targets are at least Leiden, The Hague and Delft, but certainly more.