Bulletin 00.1 English summary

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Contents of the January 2000 Bulletin, nr. 72

01 Account of the 18 September 1999 meeting — Secretariat

Wiel Coenen welcomes 19 members to an entertaining gathering. He reports a new large dial on the Texel beach, after a storm demolished the old one. In future the dial will be removed each autumn and replaced the next spring.
Fer de Vries calls for copy, asks members to report on their undertakings.
Jan Kragten, after his study of Greek and Roman cone sundials, is now working on Scaphes. He sees little or no real hollow spheres; most dials are shallower. Which were first, scaphes or cones? Jan asks members' assistance.
Ton Bron constructed a bigger, outdoor, solar driven sundial. Hans Sassenburg is testing it and reports.
Fer de Vries shows photos of a small chapel near a Limburg farm. There are plans to restore the old sundial.
Antoinette Hanekuyk shows a 'Sundial Wine' label and a photo series of the solar eclipse of 11 August 1999.
Gerrit Sasbrink reports the find of a slate fragment, apparently of a sundial, near St. Martin's monastery in IJsselmuiden, presumably pre-1580. He will enlist Theo v.d. Heiligenberg. - He also shows a universal ring dial on sale today.
Hans Sassenburg bought an aircraft solar compass at an E-auction. It works on the Oughtred principle.
Lidi Schoorel designed an equatorial sundial cut-out, suitable for children taking geography who have learned about earth rotation, time, and the seasons.
Eugene Roebroeck shows slides of the Groningen excursion and of a few other sundials.
Hans de Rijk puts everyone to work to produce a paper dial (see A Butterfly Sundial)
Fer de Vries reports that the Hour Plane Dial draws much attention after he has launched the idea in the United States. Through stateside contacts, a large dial of this type was realised in Tenerife (Canary Islands). Fer shows pictures of this dial and of others in the States.

02 Members; agenda annual meeting; 1999 chronicle — Secretariat

One new member, three resigned, one died. - Agenda - see text.
There were three meetings in 1999. - Martin Hugenholtz resigned as committee member and is succeeded by Hans Sassenburg. - The summer excursion in Groningen saw good weather. - Two members assisted in arranging an exhibit in Hardinxveld-Giessendam. - Member Peter Louwman received the Dr. J. Van der Bilt prize. He is secretary of the Moon and Planets study group of NVWS. His collection of historical telescopes is famous. - December counted 160 paying members. - Wiel Coenen reported on all mutations in the sundial files.

03 Meetings in 2000; astronomical data for 2000 — Secretariat

Meetings on 15 January, 18 March, 24 June (excursion), 23 September. All meetings in Vredenburg 19 Utrecht, 13:30 hours. Telephone +31 30 231 0068.

04 A Butterfly Sundial — J.A.F. de Rijk

The author was looking for a sundial that could be folded out of a strip of paper. As an aside, he shows how a regular pentagon may be made from a knot in a paper ribbon. A sundial however proved too difficult; the author resorted to using a postcard. A clever cut-and-fold procedure guarantees a gnomon normal to the dial face.

06 The Other Oughtred Sundial — F.J. de Vries

The last page of B99.2 showed a sundial described by Yvon Massé of France. This article goes into the design of this class of dials.
A normal Oughtred is a stereographic projection, from the nadir, of the hour and date circles on the celestial globe onto the horizontal dial face. The pattern is turned through 180 degrees because the shadow is opposed to the sun. – Instead of a projection from the nadir, we can use one from the zenith. Figure 2 shows the difference. It shows the celestial sphere in the meridian plane (ZP = South Pole). AB is a day arc for positive declination of the sun. Part BC is needed for the dial. Projected from nadir, this gives dashed arc DE, completely contained within the horizon circle. From zenith, we get drawn arc DE, completely without. – Figure 3 shows a different method to arrive at the extrahorizontal day arcs. They are extensions to an ordinary Oughtred's arcs (top right). The hour arcs are done basically the same way, but are too large to draw in their entirety.
(On the subject of projection, also note that a northern-hemisphere astrolabe is a projection from the south celestial pole onto the equator plane, while astronomical timepieces often used a projection from the North Pole)
The next step Yvon Massé takes is a different choice of gnomon directions. Using a gnomon that is no longer vertical causes new dial patterns to develop. Figure 4 shows the gnomon in the meridian plane and tilted 17 degrees north from vertical. Note that the footpoint is no longer the centre of the projected horizon circle. Figure 5 shows a gnomon in the equatorial plane pointing south. The equinox curve becomes a straight line.
Fer wrote a computer program using the information found on the indicated web pages.

12 A Latitude-Independent Sundial R.J. Vinck

This easily constructed dial works in the Northern as well as the Southern Hemisphere, with no knowledge of latitude needed. It consists of a quadrant with hour circles and a cursor with an altitude scale. In use, the quadrant is held horizontal with one edge in the north-south direction. The cursor is rotated so that the shadow of a pin (see drawing) falls on the altitude scale. We note the altitude, and drop a perpendicular from here to point a, as in fig. 2. Then we turn the cursor to the angle equal to the altitude, and circle from a to b on the cursor. After this, we turn the cursor to the angle equal to the declination of the sun. Dropping a perpendicular from b to c on the cursor, we find the time on the corresponding hour circle.

The operation relies on the equation *sin* (hour angle) = *sin* (sun azimuth) *cos* (altitude) / *cos* (declination). The quadrant sides carry sine scales, of which the author explains the construction.

17 Sundial in Zeeland, Kamperland; supplement J.T.H.C. Schepman

Some more pictures of Stone Farm of Geersdijk, and more particulars about this farm in this article. Member Herman Janssen undertook to restore the sundial in 1988/1989, but did not live to see the realisation. The author investigated in 1990 and noted that the dial was in a bad state. The owner of the estate, an insurance company, agreed to a restoration, which was subsequently finished in 1991.

The first buildings of the farm would have been built around 1818. In 1842 one Servaas Tak bought the estate and built a three-story mansion and the large barn with the sundial. This could explain the date 1844 on the dial. Remarkably, the dial shows apparent time, mean time having been introduced around 1840. Possibly, the progressive Mr. Tak used an EOT table, but equally likely, in this remote place people still let the sun rule.

19 Response to: Earth's axis variable attitude H.W. v.d. Wijck

Mr. Sassenburg reported on a change in the Earth's axis direction some 700 million years ago. All good and well, but even today the poles are not fixed points, wobbling about by some 15 meters. "Only a minimal effect", the quoted newspaper says, but it does keep our sundials from telling exact time.

20 Analemmatic Sundial in Peize (Drente) F.W. Maes

The new, larger garden that came with the new, smaller, house definitely called for a sundial. An analemmatic one would just fit the bill, being as it is a large and low-maintenance surface, without a troublesome gnomon. The ellipse long axis is 7,0 meters, the short axis 5,6 meters (23 x 18 ft). The orientation was established using a topographical map and an electricity pylon. Cut red and yellow bricks indicate the months by their initials.

Readout accuracy appears to be five to ten minutes, after EOT correction. An EOT table would be a nice touch.

22 What is the Sundial's Location? M. Hugenholtz

We can obtain latitude and longitude of the sundial site from an atlas. Failing that, we can use the topographical maps 1:25000. Using interpolation, readings can be made into the arc seconds. – One degree of latitude equals one nautical mile, or 1853 meters. This makes one second 30,88 meters. For longitude, we must divide by the cosine of the latitude because meridians converge with increasing latitude. – The author then argues that such precision is not often needed, except when building large sundials of perhaps ten or more meters in size.

23 Antique Spherical Sundials - "Riddles of the Hollow Spheres" J. Kragten

The author, in B99.3, gave the results of the analysis of conical sundials. At least 60% of the objects was of Greek origin. By far the larger part satisfied gnomonic demands. Vitruvius in his "De Architectura" laid down the theoretical foundation. Hans De Rijk described Vitruvius' Analemma comprehensively in B87.3 p23-32.

The spherical sundial was typically a Roman affair. The Roman Empire counted many, Greece very few. The gnomonic quality was quite bad. Seneca (ca. AD50) complained that no two sundials showed the same time. Plinius (first century AD) was annoyed that Romans showed so little scientific interest. – It remains hard to discover what starting points the Romans used in the construction of their sundials. The Analemma does not seem to have come into the play at all.

The article describes an investigation into sixty sundials of the 'cut spherical' type. As one example of the striking facts found, the distance between summer arc and equator is not equal to that between winter arc and equator in 22 out of 28 cases. Instead, the winter arc distance is about ½ to ¾ of the summer arc distance, the same figures as ordinarily (and correctly, in those cases) found in conical dials.

Other questions are, Is the cone older than the sphere, or is it the other way round? And is it really more difficult to sculpt a sphere than it is to sculpt a cone? Sculptor and member Verschuuren thinks not.

The author concludes that not a single spherical object really is a mathematical hollow sphere; there seems to be a strong relation to cones; Mrs. Gibbs' analysis does not provide sufficient data for a qualitative judgement; further investigation is needed.

32 Polaris Sights in Groningen E.L.H. Roebroeck

The Hoogezand Polaris Sight is one the works of art embellishing De Dreven residential area. Twelve sails are suspended from stainless steel wires. Holes in the sails are displaced around a common centre, the look through

it resembling a shutter of a photo camera. The sight is aimed at Polaris. The construction is in water and meant to be used from the shore using a mirror.
The polar star sight on Eenrum tower was not meant to find Polaris, but rather to demonstrate its movement. From the observer's position the tower's West dial "Castor" points to the polar star. The diurnal arc of Polaris just brushes the tower wall. Its diameter is about the width of a thumbnail when held at arm's length.

34 The Oldest Solar Compass? M. Hugenholtz
After an introduction in which the author distinguishes stationary from mobile solar compasses and explains why an equatorial sun compass works better in the lower latitudes, he describes an early 19th century solar compass. It was made by William Austin Hurt, who called it Burt's Solar Compass. This compass, invented to circumvent problems with his magnetic compass caused by iron ore layers on his property, was patented in 1836.
An equatorial disk, adjusted for latitude, carries a rotatable arm that can be tilted for declination. Latitude is determined once at local noon, declination taken from tables. At any time, the arm is rotated to match it. The compass is now rotated about its vertical axis until sunlight from the lens at the top of the arm falls on a graticule at the bottom. This fixes the local meridian. Magnetic variation can now be determined.
In 1849, Burt's Solar Compass was required equipment in Indiana, Michigan and Ohio. It has since been replaced by the Solar Transit, a refinement of Burt's invention. – Check also the indicated Web links.

36 Sundials in The Netherlands W. Coenen
Grijpskerk: an analemmatic sundial painted in the schoolyard. Member J. Borsje corrected the drawings. *Sneek:* a half-open cylindrical dial in a private garden. *Peize*: analemmatic dial by member Frans Maes; see the article elsewhere. *Veenendaal*: A terrace forms a horizontal dial; the gnomon is planted in a flowerbed. Private. *Texel*: the large beach dial was destroyed by storm. A new one was constructed. The Forestry Commission supplied the gnomon and the hour marks. The meridian was laid out by the Directorate-General for public works and water management. They agree to remove the dial every September and rebuild it next May or June. *Amsterdam*: The polyhedron in the Van Loon museum inner court is placed incorrectly. Member Chr. Doomernik has interested the management in a correction.

37 International Sundial Congresses: see text.

38 Literature, 1351--1353 D. Verschuuren and A. v.d. Hoeven
The numbering has gone wrong in this section. I repeat numbers as they appear, in the order they appear.
1351. Relazioni e Formule (..) per Gianni Ferrari. 244 pages single sided computer print, glued. Pages are loose already. Reviewers studied chapters 5, 6 and 10 even more carefully than the remainder, and find this is an amazingly complete dial book.
1354.2 Severino, The oldest equal hours vertical sundial. One found in the Aosta valley could very well be the oldest.
1354.3 Nordio, A sun compass. Built by the author, it will find the meridian or the declination of any wall at any time, as long as the sun is out.
1354.4 Arnaldi, Unequal hours from ancient time up to the Middle Ages. In general, we assume that time was measured quite roughly in the past. While partly true, it was not the case for those who studied the concept of time with scientific ardour.
1355.2 Vitruvius, De Architectura. A Catalan adaptation on Vitruvius' thoughts on dialling.
1355. Deutsche Gesellschaft für Chronometrie, Jahresschrift 1999, Band 38. Contains 29 articles, of which ten are on sundials. Modern techniques and materials are highlighted, such are "Sundials with remote readout", and "Glass sundials". Good math in "Dials and math", "Self orienting dials" and "Date curves on horizontal and inclining dials". Nice sundial descriptions in "Sundial of Gerbert of Aurrilac" (10th century) and "The nocturlabe".
1353 Het uurwerk; tijdmeters door de eeuwen heen. From Gabriele Mandel, L'orologio. Storia della misura del tempo. Glossy paper, 158 pages with 230 photographs. Interesting for artistic as well as scientific content.