

Contents of Bulletin 97, May 2008

R. Hooijenga

Excursion: Sundials of De Waarden *D. de Groot, H.J. Hollander* *i*

This years trip, 21 June, is to the De Waarden district, east of Rotterdam.

Réunion de printemps *Soc. Astr. Française* *3*

This is an invitation to the Société Spring Meeting, in French and English.

Meeting, Utrecht, 22 September 2007 *Secretariat* *4*

Present: 24. Some Zonnewijzerkring-listed sundials appear to be missing, for example, after alterations to buildings, or new garden layouts. – Storage space to be rented for the Hagen legacy. – 2008 meeting dates fixed.

Roebroek resigns membership for health reasons, thanked for contributions, applause; Usquert project abandoned. – Spruyt discovered that the Le Tigre sundial is probably from around 1938. He also shows a replica of a Hans Troschel sundial. – Sasbrink shows a prototype sun sight using the coincidence of the sun reflections of two mirrors. He made a handout on gold-painting. Schaick remarks that Teolux material is particularly good and does not dissolve the paintwork. – Horikx donates a CD containing his sundial essays for the Zonnewijzerkring archive. This replaces any earlier versions. – Maes asks about wooden frames, a sundial in Louwersoog, Haarlem-6 (reported stolen), and about sundials in private physics collections. He advised on the correct placement of a Haarlem-type sundial in the Alkmaar town hall garden. Maes shows a photograph of a compound sundial consisting of 70 separate dials. – Verschuuren photographed many sundials in Poland. – De Vries talks on the connection between Horea Naturalis, Antique (unequal) Hours, and Planetary Hours, stating his belief that a 1450 text, identifying planetary hours with horea naturalis, is correct.

Meeting, Utrecht, 29 March 2008 *Secretariat* *8*

Present: 22. The Hagen collection is now stored in Amsterdam. – Chairman De Groot welcomes new member Flora Bouman. – Holman's presentation on his Italian award is postponed. – Secretary and treasurer reports approved. – Maes asks which sundials make it into the archive (unique sundials, not mass or batch produced). – Should the Bulletin's Literature section be continued? (some discussion, answer: yes). – Hollander says that 2009 is UN and IAU International Year of Astronomy, and that he is contact for the Dutch workgroup. – Pals measured the gnomon angle of the dial he brought last time. The angle agrees with the theory, held by some present, that it was from Portugal. Fockens studied the EOT and its causes in detail, and reports his findings. – Hooijenga went to Rupelmonde to witness the inauguration of two new sundials; one at a primary school, the other on the Flemish sundial society building. – He shows some photographs. – Sasbrink shows a photo of what could be the second oldest pole style sundial in The Netherlands. The dial is on the chimney of the Kampen town hall. Also in Kampen, Sasbrink found a headstone-shaped sundial showing Batavia (now Jakarta) time as well as Kampen local time. – vd Beld worked out a mathematical procedure for perspective rectifications. Maes shows an Excel application that uses it. Interestingly, the vd Beld equation has no solution for photographs where the subject is only up; it should be up and to the side when taking the photograph. – De Vries contacted Rouxel about the trifilar sundial. – Hollander shows a photo of Sonderegger's new cone gnomon sundial. For this principle, Hollander received the Sawyer Dialing Prize in 2006.

Perspective rectification of photographs *A.J.M. van den Beld* *13*

A vertical, rectangular sundial on wall ABE is photographed from point C. The camera is aimed at A. Figure 2 shows such a photo. V and H are the vanishing points: all real verticals go through V, all real horizontals through H.

In figure 1, we define angles α and β . Then, in figure 2, we measure the locations of the corner points with respect to A and determine those of the vanishing points. This in turn will give us the projection centre pc.

From the points in the photo (x', y', z') and α and β , we find the points in space (x, y, z), and, using pc , project these into the $z=0$ plane. We have now, scaled to the photograph size, the wall and the rectangle.

The found projection is valid not just for the measured rectangle, but for any point in the photograph. Actual calculations are on the next page.

Homogeneous Analemmatic Sundial

H.J. Hollander

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Homogeneous analemmatic sundial with vertical gnomon. The ellipse of an analemmatic sundial may be considered as constructed from two circles. See Figure 1. The hour points on the circles are evenly spaced. They are moved to the ellipse by a translation over A and parallel to the minor axis of the ellipse (the north-south line). Here, $A = C * \cos(t)$ where t is the hour angle, and $C^2 = A^2 + B^2$. It is easy to construct the cosine of an angle mechanically. See Figure 3. A rod K rotates around a centre p . A distance C away is a small plug q that moves through slit S . Rotating the bar will also cause centre p to move through another slit S . The result is that the grey disk moves with respect to the circle with the homogeneous hour scale. The grey disk contains the usual date scale that we know from the analemmatic sundial. See Figure 5.

Note that the distance between centre p and the intersection of the slots S is equal to $C * \cos(t)$, and therefore equals A .

If we place a vertical gnomon in position M on bar K , and if we make its shadow fall over the actual date on the disk, then the gnomon indicates the time on the homogeneous hour scale.

Homogeneous analemmatic sundial with pole style. The ellipse of an analemmatic sundial is the result of the vertical projection of the equator onto the ground. See Figure 7. When we project along the polar axis, or the pole style, we get another ellipse. The ratio of the major and minor axes is the same for both ellipses. However, the major axis of the pole style ellipse is directed north-south. The moving centre disk of the homogeneous analemmatic sundial now moves east-west.

In Figure 8, we see a version of this sundial in plastic. The blue disk is turned such that the shadow of the pole style falls over the red dot, marked in the right photograph with a red circle. One then reads the time on the homogeneous hour scale on the spot marked with the red square. The inner yellow disk moves along an east-west line when the sundial is operated.

Self-aligning homogeneous analemmatic sundial. A combination of the vertical gnomon with the pole style yields a self-aligning sundial. We have to choose how the central disk moves. The north-south movement keeps the gnomon a little farther from the centre. The pole style dial must operate using a translation over B (see fig 2). With minor modifications, we arrive at fig. 9: set the dial so that the gnomon shadow falls over the actual date on the centre disk, while that of the style falls over the dot. When this is accomplished, the sundial will be aimed north-south.

Longitude adjustment. Because the sundial is homogeneous, its reading may be adjusted for longitude. To this end, the bottom shows all time zones (including some "summer time zones") and a longitude scale.

When the geographical longitude of the location of the sundial is turned opposite the correct time zone, the sundial indicates legal time.

The sundial does not correct for the equation of time.

Eisinga Planetarium extension inaugurated

F.W. Maes

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On 17 March 2008, Education Secretary Plasterk opened the "renewed" Franeker Planetarium. The 1781 planetarium is, of course, unchanged, but it secured the use of the adjacent, equally historical, premises. The extra room allows a more spacious entrance and more displays.

The Planetarium owns a surprising number of small sundials, as well as many other instruments.

Trifilar sundial by Bernard Rouxel

F.J. de Vries

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Designer Rouxel won the second prize in the Italian "Ombre del Tempo" contest with this original south polar sundial.

Parallel to the dial face run three wires; one east-west, the others making equal but opposite angles to it. Their shadows will usually form a triangle. During the day, this triangle will move and change. On local noon, it will shrink to a single shadow point. The combined noon shadow points over the year describe a noon line, which turns out to be straight. This dial, then, reads noon and date.

More is possible, however. It appears that this principle holds for horizontal sundials for any latitude, not just zero (which the Rouxel design equates to). The figure shows the situation for 52 degrees north. The noon line is now entirely to the right: the noon sun is always south.

Because *any* sundial is equivalent to a horizontal dial *somewhere*, the same principle must work on any inclining and declining plane. The example shown is for 52 degrees latitude, 70 degrees inclination (that is, 20 degrees from the vertical), and a declination of 31,23 degrees south to west.

This is equivalent to a southern hemisphere horizontal dial with a two-hour time adjustment. This trifilar dial will indicate not noon, but 1400 hours.

The appendix gives practical construction calculations. – The additional figure shows a cube with inscribed saddle surface, a hyperbolic paraboloid. The three lines represent the three wires of the trifilar sundial.

Double line-of-light sundial

F.J. de Vries

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Instead of a pole style shadow, a line of light may be used to read a sundial. The horizontal sundial shown here forms a line of light using the slit between two east-west aligned stone slabs. The slabs are inclined according to local latitude.

The thickness of the slabs reduces the duration of the visibility of the line of light, despite the bevelling used here. In this example, the useful readout of the sundial would be limited to the period between the hours of 8 and 16, local apparent time. A second sundial enables the user to read the other hours. Here, the slit between two vertical slabs, aligned north-south, forms the line of light. This sundial works during the early hours of 4 to 8, and during the late hours of 16 to 20 hours, local apparent time.

The figure shows the total hour line pattern. The readout is in local apparent time; one sundial uses Roman numerals, the other Arabic. A special date line works with an index fixed between the east-west slabs.

Idea and realisation: sculptor Liesbeth Crooijmans, Arnhem, 2007.

Pattern calculation: Fer de Vries. Material: black granite.

Dimensions: 600 mm x 800 mm (24 in x 31 in).

Sundial or sculpture?

F.W. Maes

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A remarkable undial, on offer for Mother's Day. Everything is moveable.

Nought but a postcard

J.A.F. de Rijk

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Prototyped using the Chinese takeaway bill, this dial is best constructed out of a postcard. It combines a horizontal dial pattern with a line of holes gnomon.

Work on De Haere sundial and folly

"De Stentor"/Sasbrink

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Not only will there be restoration work done on the sundial and on the folly tower, but there will also be constructed a very large garden sundial. The photograph gives an impression of its size: the gnomon is 7m (23') long.

Chronicles of 2007

Secretariat

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Fer de Vries resigned his board membership and was made honorary member.

Hendrik Hollander took office as secretary of De Zonnewijzerkring. – Bote Holman

received honours in the professionals section of the 10th Italian sundial makers contest. –

The three Utrecht meetings and the excursion were all well attended. –

On 31 December 2007, De Zonnewijzerkring had one hundred and thirty full members, as well as two honorary members: De Vries and De Rijk.