Contents of Bulletin 100, May 2009 — R. Hooijenga

On the occasion of our 100th edition, I have decided to go the extra mile and compile summaries as material came in. This way, you can enjoy this extra-thick Bulletin even more without having to wait for the next issue.

Not only that, but now that the 'ordeal' of summarizing two issues in such short succession is over, I plan to make this the rule, so that each next issue will come with its up-to-date English summaries.

(See the original for footnotes) De Vries has been interested for years in planetary hours, and wrote two notes in our Bulletin as early as 1992. Over the years, other gnomonists joined in the work. In 2007, Arnaldi found some interesting literature, prompting De Vries to write a paper in the Bulletin and a note on the Zonnewijzerkring website. Until recently, a single figure in the 1925 Drecker book was the only known illustration planetary hours. That has changed since Severino found three illustrations in ancient literature.

Antique, temporal, or unequal hours correspond to one twelfth of the daylight period on any day. Sometimes, planet symbols would be on the dial, and frequently these hours would be called planetary. However, Drecker, referring to Sacrobosco (1230), defines a planetary hour as the period in which half a sign of the zodiac, comprising fifteen degrees of the ecliptic, rises above the horizon. Maurolicus (1575) and Agrippa (1533) also quote Sacrobosco.

Like temporal hours, there are twelve ecliptical planetary hours during the daylight period, and twelve during the dark. But unlike temporal hours, which change length over the year, planetary hours change length over the day. The figures explain using an astrolabe, and show a complete set of planetary hour lines.

Severino's first find, in a 1644 book by Lobkowitz, shows a horizontal sundial with one planetary hour line, for the sixth hour. The other curves are for hours that are multiples of one 'ordinary hour' earlier or later.
His other two discoveries are astrolabe tympanum designs with ecliptic planetary hours, one of unknown origin from around 1508-1520, the other by Finé, 1553.

Severino also found tables for the beginning of all ecliptical hours by Kretzschmayer, 1626. It is important to note that this author refers to these tables as tabulae horarum planetariarum, that is, tables of planetary hours.

De Vries concludes that, in addition to hours based on the solar diurnal arc, there definitely was a planetary hour system based the ecliptic. He thanks Nicola Severino for sharing his discoveries.

A closer look at the Prinsenhof *Plans* — *F.W. Maes* — *22*

The Prinsenhof dial is one of the best-known and most beautiful sundials. The vertical dial declines 28 degrees towards west. It is rather hard to read because of all the data it provides in a single display. A summary lists: local time (on the perimeter, using the style); Babylonian, Italian, reversed Italian hours; length of day, sunrise, sunset (using the nodus). There is a "manual" on the sides of the Gate, and the year 1731.

In 2003, it became clear the the Leeuwarden 'Tresoar' keeps the original 1730 plans for this sundial. For just a few Euros, Maes received a scan. The record consists of a single folded 40x32cm sheet. (The back shows two drawings of a polar dial.)

The drawing header mentions latitude, but not wall declination. The table enables one to calculate the declination, but that mentioned on the dial itself is half a degree greater. Fig. 6 shows de difference this would make to the hour lines – not negligible. Is the drawing correct? Maes projected it onto his calculation for the stated declination; it fits almost perfectly. He does not know how the lines were constructed; perhaps the polar dial drawings have something to do with it.

Unique analemmatic sundial in Culemborg — *F.W. Maes* — *30*

This is the first analemmatic in The Netherlands featuring a raised date strip. Without it, one's shadow would not reach far enough on a sundial of this size: the major axis of the hour point ellipse is 7 meters. Around the hour points is a yellow Hollander circle of 9 meters diameter, which effectively isolates the design from the northeast-southwest streets. Stone slabs in the circle indicate the cardinal points. The axes of the ellipse, likewise in Hollander, extend almost to the circle and end in a block of LED lights. Suggestive 'feet' show where to stand. The sundial indicates civil standard time, not summer time.

Mosaic sundial — *F.J. de Vries* — *33*

A painting of the sky with sun, moon and stars was the basis for an oblong, octagonal, horizontal sundial in mosaic. Borsje converted the idea into a working plan.

Astro Clock (part 2) — *B.P.U. Holman* — *34; 43*

This instalment describes the construction and operation of the clock. An important feature is that on its dial, the sun remains in each sign of the zodiac for as many days (from 29 to 32) as in reality. This makes it possible to include a calendar in the display, which shows the values of as many as ten variables, including the equation of time.

B2008.3, Equation of Time *calculation postscript* — *F.H. Fockens* — *42*

The original paper disregarded the influence of moon and planets. More importantly, the calculation was not yet quite precise. Jean Meeus provided a modification. – Finally, a correction to equation 11 is repeated here.

Largest vertical sundial in Brussels, Belgium — *W. Leenders* — *48*

This remarkable concave cylinder sundial was built in 2005, on the front of a new building. The dial face, on the middle part of the front, is 6,5m wide and 3,3m tall; it occupies the fifth and sixth floors. De Graeve made the first design and supplied

geographical data; Leenders calculated the pattern. Both are committee members of the Flemish Sundial Society.

While a cylinder sundial is relatively common (think of the shepherd's dial), a dial on the *inside* of the cylinder surface is quite rare. Leenders' calculations were cross-checked using a different method by De Vries, and later compared with one by Savoie for a full cylinder (cf. Hollander's Sundial Glass).

The hour line pattern is adjusted for longitude and daylight saving time (together 1h43m), so that in summer the dial reads civil time, except for the equation of time, which in summer hardly matters. There are three date lines for the seasons. The customer made the nodus ball rather larger than designed. Its shadow is now 35 minutes wide, and judging the centre is less precise than necessary.

The concave surface results in a relatively compact dial. A flat dial using the same nodus distance would have been 45 times as big.

Since recently, there is a comparable sundial in New Haven, CT, built with the help of F.W. Sawyer. This is a direct south, half cylinder; the Brussels sundial is a quarter declining towards SSW. And the nodus did get its optimum size, in contrast to the Belgian one. – Almost cylindrical is the 1987 Disney sundial in Buena Vista, FL by Isozaki. Its gnomon is extended to outside, and has a corresponding pattern on the outside of the building as well as on the inside.

Calculation of a sundial on a concave cylindrical surface *W. Leenders* *50*

The algorithm described outputs shadow coordinates for date and time fed into it. Phase one calculates coordinates on the vertical plane behind the cylinder using well-known equations. Phase two projects these onto the cylinder surface. Finally, in phase three, the cylinder is unrolled, producing measurements along its surface.

A century of synchronized clocks *NRC* *54*

Until 1909, each city or region in The Netherlands kept local time: that of the sundial that was used to set the church clock.
On 1 May 1909, all clocks were set to Amsterdam time, which was GMT plus 19 minutes and 32.14 seconds, corresponding to the longitude of the Westertoren. Holland was a participant in the Washington International Meridian Conference of 1884, but apparently could not decide whether to adopt the time of the London time zone, or that of the Berlin time zone. It was not until the German occupation in 1940 that Central European Time was introduced.

Kite sundial *J. de Rijk* *56*

This sundial, cut out of an A4 sheet of thick stock and folded into shape, is well suited to illustrate the relation between horizontal and vertical dials. It may be good to brace the construction with a strip of cardboard against the vertical back.

Incorrectly set up pole style sundials *H.J. Hollander* *58*

One frequently finds sundials that are not aligned well – or at all. Hollander presents an elegant method to determine the resulting errors over the day and year. To this end, he uses a "spider" dial, which is a round dial with a perpendicular gnomon. Normally, the gnomon is vertical, and one reads time at the intersection of the gnomon shadow with the actual date circle. In this case, and on our latitude, the hour lines are quite wavy and reminiscent of the legs of a spider.
When one aligns the spider dial gnomon in parallel with a correctly set up pole style, the

corresponding hour line pattern is that of an equatorial sundial. It is marked on the dial face. With the gnomon subsequently aligned in parallel to that of the erroneously placed sundial, the hour line pattern on the spider dial disk is, naturally, different.
It is now a simple matter to read the difference for any desired date and time by comparing the two patterns.
Figure 2 shows the errors in a dial for 52 degrees latitude used on 22 degrees, but still aimed north. Figure 4 is for a dial for 12 degrees west declination, used with 50 degrees east declination. This is the actual situation for the sundial in the figure 3.

Annual meeting, Utrecht 21 March 2009 *Secretariat* *60*

Twenty-four members were present. – The Zonnewijzerkring will be present on the large NEMO (Amsterdam) exhibition on IYA2009. New handouts were printed and flags made. – Appingendam Museum asked for sundials on loan for an exhibition on Time. – De Rijk has added the NWO (Netherlands Organisation for Scientific Research) prize to his trophy-cabinet. He will use the €12k5 prize money to have a Huygens telescope built (a 30m affair without tube), as well as a sun simulator for testing table top sundials. Vincent Icke is involved in the telescope venture; members Sasbrink, Vesters and Pals volunteer to help with the GHL sun simulator. – Holman proposes to have the summer field trip in Munster, Germany and to visit the astronomical clock and various sundials. – The Society may subsidize sundial projects in certain circumstances. – Chairman De Groot resigns according to schedule, and is re-elected.

Holman shows a presentation on his project “Art in Signs (of the Zodiac)” and his Italian prize, and one on his Astro Clock. – Maes has, through Mrs. Witte, some (pocket) sundials for sale. In Culemborg, he helped build an analemmatic sundial with a raised date strip. For the restoration of the Echten dials he is raising money. Maes is also guiding the correction of the Arnhem folk museum analemmatic. Finally, a Belgian sundial is very much like Maes’ design of the multiple-polar style dial. – De Vries is, with Severino, involved in investigations into the origin of Planetary Hours on sundials. Fer’s calculations and interpretations add much to the understanding of old text and graphics. See elsewhere in this Bulletin. – A number of sundials by v.d. Belt are on display in the Eindhoven Public Observatory. – Sasbrink mentions the Restoration Fair in Den Bosch.

At the conclusion of the meeting, chairman De Groot presents a bottle of Sundial Wine to Holman, for winning the Italian competition, and one to De Vries, for his contribution to knowledge about sundial history and the use of planetary hours.

Notes, 2008 statistics and 2009 estimates *Treasurer* *64*

The society celebrated its 30th birthday in 2008. Members received a sundial glass and a book listing all accessible sundials in the society’s database.
Printing costs have gone up slightly [mainly because of thicker Bulletins!].

The Zonnewijzerkring *Policy Plan* *Treasurer* *66*

A formal description of what the Society is and does. The four statutory goals are explained in more detail.

Literature *Vd Hoeven, Maes, Verschuuren* *68*

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