

Bulletin 04.3: English summary of the contents of the *September 2004 Bulletin*, nr. 86

- Members, dates, undial, Verschuuren book Secretariat 3
Two new members, one cancellation. - A sundial in Dubbeldam misses the point: the style origin is not in the dial centre. This is an undial: almost there. - A new book by Dees Verschuuren: *Astronomical and other instruments in the property of the Crosiers' St. Agatha monastery*, July 2003, 50 pages (Dutch). Among the 36 objects described are four sundials.
- Ordering anniversary books; responses Treasurer 5
Of the anniversary book by Hans de Rijk some copies are still available for € 19, p&p included; members pay only € 16.50. - Many members wrote 'thank you' notes; Ad Korpel had important extra information on the Heukelum dial (see the 2005.1 bulletin).
- The Brou Sundial Chris Horikx 6
When Chris checked the dial, he found it 3.5 minutes late, although he duly applied longitude and equation of time: he shows the calculations. The error, if such it is, amounts to almost 2 degrees in the N-S alignment of the dial. Has someone else tried this?
[The altitude of the sun was 65.5 degrees at the time, and if the gnomon were off the vertical by as little as 0.9 degrees, this would explain it. Any other ideas? RH]
- Armillary sphere in Vlissingen A. Schoorel 7
A cheerful red-white-and-blue painted armillary sphere, almost one meter in diameter. Apparent time. The address is in the article, the sundial is to the south of the school buildings, near the Prince Hendrik Rd. bus stop.
- Aduard, 'Under the lime tree' E.L.H. Roebroeck 8
This used to be another undial, oriented incorrectly. This has now been fixed and the fittings were improved. Motto: TERAR DUM PROSIM, May I Be Consumed in Service.
- Call: Delden Twickel 3 G. Sasbrink 9
A long shot for those having to read this (instead of Dutch): does anyone have a photo of the sundial, now stolen, of chateau Twickel (Delden Twickel 3)? Or perhaps someone knows where the sundial itself is?
- An answer for Dees Verschuuren F.J. de Vries 10
Dees wondered if the dial from "Double use of a sundial pattern" could also determine time and azimuth of sunrise and sunset. The answer is "no" for time, but slightly "yes" for azimuth. - In the horizontal position, the shadow of the index disappears into infinity at sunset and sunrise, and cannot measure the hour angle as it otherwise does. There is no azimuth scale, either. The other position will allow horizon events to be read, but the index shadow falls on the altitude scale only for a portion of autumn and winter.
- A Dial in your Poke*, review Jan De Graeve 11
The author included an English summary.
- 'Did you know?' continued A. Schoorel 12
Lidi proves the construction using a series of similar triangles, and then asks if there is an equivalent one for longitude-adjusted hour lines. Fer suggests projecting the intersections of the new hour lines with the diagonal in the originating square onto the diagonal in the rectangle, so that its hour lines may be drawn through them. This is actually the basis for dialling scales, of which more will appear in 2005 (see B05.1).
- Be your own sundial on the bank of the Linge F.W. Maes 14
Sculptress Beatrijs Schweitzer made an analemmatic sundial on the Linge bank. Round steel plates represent the hour points; a steel cow's head is noon.

- 'Zonnewijzerkring' excursion 2004 H. Hollander 15
 The bus started in Heerenveen and, after coffee, the first sundial was found in Akkrum. It is an equatorial plane cross, motto: Post Nubila Lux – which worked, because in spite of the forecast, all sundials that day had sunlight. The second dial, in Jorwerd, consists of two vertical faces at right angles to each other. Normally on the corner of a building, this particular dial is in the middle of a wall. – Lunch was served in the 'Vijversburg' mansion on the spacious 'Bos en Ypeij' estate. There, Roebroek and Westra showed a stainless steel and brass sundial, while the local Scouting group had made a Spar dial. A splendid 1860 sundial from the Toutenburg mansion, a few kilometres east, was unveiled at Bos en Ypeij after having been restored in cooperation with De Zonnewijzerkring. – Hans Noordmans lectured in the Eise Eisinga Museum, showing software he used to calibrate the 18th century (and operating!) orrery there. Ton van den Beld's talk on altitude measuring sundials ran late, unfortunately; luckily he will do it again on one of the regular meetings. – The last two sundials, in Tzum and Bolsward, could just be photographed before the bus returned to the Heerenveen railway station.
- The analemmatic sundial: Genk 6 F.W. Maes 18
 Frans explains the operation of the analemmatic sundial, taking Genk 6 as an example. This type of dial has a vertical gnomon, often the user itself, and hour points instead of hour lines. It is a form of azimuth dial. The correct location of the gnomon depends on the declination, and a scale to stand it on is provided, usually marked with the months of the year. – Genk 6, with a major axis of just 2 meters, is really too small. As designed, it should have had a major axis of 4 meters. For adults using their own shadows, 7 meters appears about optimum. The analemmatic dial is a projection of an armillary sphere into the horizontal plane. That section of the pole style of which, in the course of the year, the shadow falls on the hour band, in projection becomes the date strip. When a gnomon is placed vertically over the correct date (declination), the point of it corresponding to the date will travel along the projection of the armillaris, marking time at the projected hour points. One often sees an equation-of-time loop on an analemmatic dial. This should only be used to read the correction, but sometimes the gnomon is erroneously placed on the loop's perimeter. – The split loops in Longwood Garden are the exception, and placing the gnomon on them *does* provide a direct-reading, but approximated, EOT correction. A Lambert circle connects the ellipse's foci, a date on the date strip, and its corresponding times of sunrise and sunset exactly. Of more practical value may be the Roger Bailey 'Seasonal marker': All lines between dates and their corresponding sunrise times intersect approximately in one 'Marker'. A second one exists for sunset.
- The sundial according to Copernicus F.J. de Vries 24
 An Introduction to Gnomonics, part 7 (End) F.J. de Vries 28
 I have to postpone the summary of both articles to the next issue.
- Stairwell Astronomy Tim Trachet 36
 The central staircase of the Lycée Stendhal, Grenoble, contains a *horologe solaire* – a sun clock. The stairs run north-south, and both (south looking) windows between the second and third floor have a small mirror on the outside ledge. The inside of the west wall catches the light in the morning; that of the east wall in the afternoon. The walls are painted with hour and declination lines. The west wall also shows the dates of several celebrations in honour of the Virgin Mary, this is the Calendarium Marianum. The east wall shows the Calendarium Regis or King's (Louis XIV!) Calendar.
- Literature, 1508 - 1511 D. Verschuuren 41
 Equation of Time and Declination tables 2005 T.J. de Vries 44

- Sundial Theory according to the Copernican World View F.J. de Vries 24
 Everyday sundial work still uses the geocentric worldview. It is quite practical even if we know it is not realistic. – In 1981, Hermann Bürger published a Copernican sundial theory, and as far as we know this is the first time this view is used in gnomonics. From first principles, Bürger derives equations for the hour lines and date lines, and finally arrives at the correct values for the equation of time and the shape of the EOT loop.
- An introduction to Gnomonics, Part 7 (Conclusion) F.J. de Vries 28
 Introduction to the point dial, which will indicate date as well as time. Fer derives the point dial by singling out one point of the pole style, but mentions that historically this is not what happened. Point dials existed long BC, while the first pole styles dials date from the 13th or 14th centuries. – Date lines are really declination lines. Depending on the style height, such a line may assume the shape of a hyperbola, a parabola, an ellipse, a circle, or a straight line. Often, only those for the solstices (two curves) and equinoxes (one shared straight line) are drawn. Seven lines suffice for the zodiacal calendar. A practical means of drawing date curves is the *trigon*, see fig. 44. – Equation-of-time loops are useful to read legal time, as opposed to apparent time. The difference is caused by the angle between equator and ecliptic, and by the fact that the orbit of the earth around the sun is an ellipse instead of a circle. – Now, different time systems are discussed. Apart from "normal" apparent solar time and legal time, there are, or were, other systems: *horae antiqua* (unequal hours), *Italian* (from sunset), *Babylonian* (from sunrise). *Sidereal* time could be loosely described as the hour angle of the First of Aries. '*Planetary hours*' is sometimes used for *horae antiqua*, but this is incorrect. One planetary hour is the time taken for 15 deg of the ecliptic to rise above the horizon. Planetary hours vary greatly in actual length over the day, but there are always twelve between sunrise and sunset. *Revolutionary hours*, used a short period after the French Revolution, are decimal. One day was ten hours of a hundred minutes each. – A sundial may show any of these systems. Many time systems, which are date dependent, need the shadow of a specific point. Such an index can measure still more variables, such as altitude and azimuth of the sun, Islamic prayer times, astrological houses, ascendant and descendant.