Contents of Bulletin nr. 92, 06.3 R. Hooijenga

hour line pattern is in accordance); the other wire has the same shape as the desired equinox curve, and is fixed, turned 180 degrees, in a plane normal to the substyle.

The search for Delft 04 A. Schoorel-Goedhart 15
Mrs Schoorel went to look for Delft 04, accompanied by her 81 year old mother-in-law – both on bike. They found the armillary sphere behind gate #5, apparently in good state. The photograph was later taken through the gate on Van Marken, near Agneta park.

Bi-gnomon sundials, part 3 H.J. Hollander 16
One of the bi-gnomon articles that have already appeared describes a sundial with a cone gnomon. The idea is to read the left or right shadow boundary, depending on date. When the cone is positioned so as to have its axis parallel to the axis of the earth, the resulting hour lines look quite similar to those of an ordinary node dial. Our dial, however, reads legal time.
Fred Sawyer suggested a modification, resulting in the necessary shadow always intersecting the relevant date curve, making for an easier readout.
This cone dial may also be made as an equatorial dial. Again, it has straight hour lines, but reads legal time.
That the hour lines are practically straight is because the equation of time is very nearly symmetrical with respect to the declination of the sun. If earth perihelion were to coincident with the start of a season, the symmetry would be perfect. In fact, this situation existed around the year 1246.

Mean time sundial, mathematical background H.J. Hollander 20
The sundial is constructed numerically. For every solar longitude and for the two 'sides' of the cone gnomon, the shadows and their intersection are calculated for every moment. Varying the solar longitude, the resultant points will describe an hour line; varying the moment, the result is a date curve. A method for constructing the cone is also given. Please see also NASS *Compendium*, Volume 13, Number 3, September 2006.

Lectern dials: an update F.W. Maes 24
The term "block dial" describing the specific type of lectern dials considered, was earlier used by Rohr in *Die Sonnenuhr*. Before him, the Nuremburg scholar Conrad Tockler wrote an essay titled *Die Blocksonnenuhr* as early as 1509.
Bakkeveen: some restorer errors were fixed. The sphere on top is now gilded. The sandstone sundial is painted. Sandstone is not usually painted, but the removal of an inexpert paint job had also caused the loss of the natural hard skin that sandstone normally acquires after quarrying, necessitating a new coat of paint to prevent the stone from crumbling. *Wijtgaard not Dronrijp:* Mr. Van der Wal pointed out that the block dial he brought to the Franker Planetarium was found in Wijtgaard on a relative's farm. It was not in use as a doorpost support, but as a flowerpot (for violets, specifically…). Wezep: the call for help in last Bulletin proved successful. The new owner, who understandably wishes to remain anonymous, allowed the Wezep block dial to be photographed and described. It remains unknown what the function is of the hollow half-sphere in the top equatorial face.

Sphere gnomon sundial F.J. de Vries 26
In his article in NASS *Compendium*, Volume 12, Number 4, December 2005, Alessandro Gunella describes the use of a sphere as a gnomon and how to determine the hour and date curves. In a reaction, Rolf Wieland shows a horizontal example by Adolf Peitz of Germany. [The motto means: Gain time, gain much; lose time, lose much]
The dial is read by estimating which hour line is tangent to the ellipsoid shadow of the sphere. Before noon, one side of the shadow is used; in the afternoon, the other.
While in a pole style sundial the hour plane turns about the style, in the case of the sphere gnomon, the hour plane is chosen tangent to the sphere, the point of contact always on its equator. The hour lines each have the same direction as their counterpart

on an ordinary pole style sundial, but they are shifted somewhat in respect, and consequently do not all intersect in a single point.
Figure 1 shows the construction of hour points, through which the ordinary hour lines may be drawn. More elegantly, figure 2 shows how to find another hour point for each hour line. In figure 3, the necessary length of the lines is determined.
Date-curves for direct readout, using the poles of the sphere, are also possible and figures 4 through 6 show their construction.
Who will build the first *public* sphere gnomon sundial?

Double bifilar polar sundial F.J. de Vries 32
When the author found a picture of this bifilar sundial by Rouxel, he naturally wanted to work out how it worked. The horizontal hour lines are remarkable. The dial face is divided in *matin* (am) and *soir* (pm), and there are three gnomons.
Assuming that the sundial is polar and south-facing, the morning part could use the middle and right gnomon, and the afternoon part the middle and left ones.
Using software by Gianni Ferrari to draw bifilar sundials, Fer experimented with different gnomon arrangements until he arrived at parallel *and* horizontal hour lines. This happened when the projection of the second gnomon on the meridian plane was parallel to the first gnomon, itself in that plane. Fer then proceed to construct the hour lines.
Later, Fer contacted the maker Rouxel. This was Rouxel's answer:
1-the dial plane should contain a line D which is parallel to the axis of the earth.
2-the wires D1 and D2 should intersect the dial plane in two points of line D.
This will make the hourlines parallel to the line of intersection of the dial plane with a plane parallel to both D1 and D2.
These conditions hold for any polar sundial of this family, such as an east or west dial, and will always guarantee parallel hour lines. Depending on the particular execution, these need not be horizontal, however.

A special style and a paper sundial J.A.F. de Rijk 36
A folded paper 'tent' with small holes along its spine, when used as a gnomon on a horizontal sundial, provides time readout in two ways: around noon with a narrow line of light, projected through the holes; and earlier or later with its ordinary shadow.

Curved wires bifilar sundial F.J. de Vries 37
About 1980, our member Thijs de Vries invented the bifilar sundial with a curved wire. A novelty then, bifilar dials have evolved considerably. On the Italian internet mail list, Fer found this sundial using two catenaries – in this case, literally.

Complementary, supplementary or opposite? J. Borsje 38
When two vertical sundials have declinations that are 180 degrees apart, careful thought is needed to understand how their hour lines are related. They are really the same plane and nominally share a gnomon. A drawing explains. Borsje recommends dropping the use of 'complementary' or even 'supplementary', and using 'opposite' instead.

The large armillary sphere: Genk nr. 1 F.W. Maes 40
This is the last instalment of Frans' tour of the Genk Sundial Park. See also: http://www.fransmaes.nl/genk/
Its construction lends an undeniable elegance to this start of the Sundial Park walk, but is so light that it is damaged even by playing children. The hour hoop is numbered 6..18, although 4..20 would be suitable. An small equatorial dial on top is delineated every two hours. Surprisingly there is no southern counterpart.
Both the armillary and the dial on its North pole are called equatorial, the first considered derived from the last, the hour ring reminiscent of the rim of the circular dial disk. The author sees more similarity between equatorial dials and horizontal and vertical dials – all with the style through the dial face – on the one hand; and polar, cylindrical and armillary sphere dials – with the style parallel to the dial face – on the other.
The armillary sphere is really a model of the celestial sphere more than it is of the Earth. Ptolemy measured positions of stars and planets using an ecliptical armillary. Long

forgotten, the instrument resurfaced in the 14th century, during the Arab occupation of the Iberian Peninsula. Tycho Brahe (16th century), who was the last to use the instrument in anger, preferred the equatorial type. Fig. 6 lists the Latin names for the various hoops.
The largest armillary in The Netherlands, in The Hague, dates from 1933 and is 2m (6.5ft) in diameter. The world's largest may be that in Frankfurt's Nizza park; it has a diameter of 3.6m (12ft) and is from 1951.
There is a tendency to reduce the number and extent of the hoops because of the interfering shadows they cast. One example of this is the one by Leenders, 2000; another is the 1967 bronze sculpture by Henri Moore.

Oldest Dutch sun calendar? H.W. vd. Wyck 45
Excavations in the Ittersum marsh unearthed what may be interpreted as the remains of two Sun calenders, although critical reactions to this supposition have also been heard.

Sundials in The Netherlands A.G.M. Bron 46
During one two-day trip into the North, the author, together with F.W. Maes, visited as many as eighteen sundials, meanwhile brushing up his primary school geography. Groningen – **Appingedam 02**. East 56.6° decliner, height 1.27m (50in), width 95.5cm (38in). Base plate copper, remainder brass and stainless steel. Nodus shadow indicates time and begin of spring/autumn. Sliding equation-of-time calculator by Westra. Idea: Ruth Favarger. Design: Wim Zanstra. Realization: Roebroeck/Westra. See B85 p35. Zuidhorn 01 moved to become **Den Ham 01**, on the grounds of the 1633 Hamsterborg. The 104cm high, 34cm thick (41x13in) baluster pedestal has four dials for the four quarters. On top is an eight-pointed equatorial-plane star with hour lines on the sides, as well as a small dial with gnomon on top. Total height is 144cm (4ft 9in). Restoration supervision and new copper decorated style 'triangles': Roebroeck. Sculpture work: Mulder, Kauffmann. **Eenrum 02**. Once a children's sand pit, this 7.6m (25ft) monumental terrace dial is another creation by Roebroeck, Westra and De Vries; 2002. It is a horizontal dial with virtual gnomon, represented by a gilt ball. A split equation-of-time loop indicates civil noon for both standard and summer time. Roman numerals in concrete blocks show the hours of IX through II, apparent local time. Under the nodus ball, an iron pair of 'binoculars' is aimed at Polaris. **Groningen 15**. A gold fired iron equatorial sundial in true minimalist style, placed in 1976. It is placed in alignment with the factory building (which once housed Ebel Noorman printers), which makes it off south by 26 degrees west. The ring-fork-spanner-shaped hour ring of 63cm (25in) diameter is numbered VII through V (17). **Schiedam 02**. This sundial was designed by Hendrik Hollander. Unfortunately this fact was omitted in last *Sundials in The Netherlands*.

Sundial receives award B.P.U Holman 50
A proposal to use the Markelo television tower as a gnomon. The shadow would fall over a footpath, where time would be read.

Literature, 1547-1560 D. Verschuuren/L. Theunissen 51

Image processing Editors 62
An example showing how photographs, once in digital format, may be processed to point out specific features. In this case, the picture of a wall dial, taken from below, is distorted so that the dial is depicted with square corners. Also, the colour, which was quite blue because the only light came from the blue sky, was adjusted.