Bulletin 01.3 English summary
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Both are typical of this part of the country, but the spirits known as white wives are more usually seen floating over bog and turf, just after sundown for instance. Or so folklore has it.
We start the trip in Weerselo. The lines on this 14th century piece (restored in 1986 by Blokhuis and Bult) are homogenous, and do not fit a vertical sundial. The hour lines above the sixes are superfluous, of course. Also of interest here is an 18th century French tower clock.
Next, on to Ootmarsum, passing a small lake that will play a role later: it is home to some White Wives. Ootmarsum is, of course, seat of the Chronomium museum. Not all sundials in Ootmarsum are visited, because we already saw some before. They are in the nicely done colour handout, however.
Chronomium offers a lot of information on its limited premises, and is well worth a separate visit. The dials and clock on the building are described further on in this issue.
Over lunch, Bote Holman reads from a regional novel. Some White Wives threaten the main character, and the axe thrown at him barely misses him and lands in a barn door post. Bote claims to have found the very post, axe and all; at any rate, he now has an axe-handle solar compass on his wall.
In the afternoon, we visit the "Cosmos" Observatory in Lattrop, which has two sundials in its garden. One is an analemmatic with just half a date strip (the observatory is open during summer only), and the other a large semi-open armillary sphere with corrector - it reads civil time to the minute - by Mr. Gerard.
The War Memorial in Denekamp is next. Not a sundial, it is nevertheless an interesting construction. As the day progresses, the shadow moves across the various years.
The last two sundials are in the walls of St. Plechelmus Church in Oldenzaal. The first of these is a real puzzle, and the second is worse - it is so faint that it can hardly be seen at all.

Five new members, four address changes, and one resignation.

R.J. Vinck, in Bulletin 01.2, made some comments on De Rijk's article. De Rijk replies: "Vinck summarises what was long the common opinion on the Mercator Projection. My article meant to represent the newer view on the matter (see references). This view is based on the relation between the Mercator projection and Mercator's globes, improved insight in the relation between Gemma Frisius and Mercator, and improved insight into the limitations of common mathematicians in his age - not to be confused with the capacities of top mathematicians.

GRONINGEN, Eenrum E.L.H. Roebroeck
Wybe Westra, the artist featured in last Bulletin, received a Royal decoration. Mayor Mrs. Joan Stam of De Marne pointed out his merits in the field of practical gnomonics: Martini-tower afternoon dial, Verhildersum Estate globe dial, Eenrum Reformed Church double sundial, Polaris visor in the Eenrum church square.

Digital sundials for sale: a mention of the Scharstein dial, in a home version, for about € 95. More on: http://www.digitalsundial.com

Our member Frans Maes has redone his sundial website. Have a look at: http://www.biol.rug.nl/maes/sundials/

Fer de Vries temporarily observes the position of Treasurer. Soon, Thibaud Taudin Chabot will take over this task.

A new book from Israel: "The inequalities of Sundial Time", by Mrs. Eilon Soroka; featuring astronomical backgrounds, co-ordinate systems, sidereal time, equation of time etc. Approx. 260p; $135 plus p&p. Information on http://www.eilonsoroka.com

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The author starts with an explanation of what sidereal time is [because of precession, there is a difference between sidereal time and star time, but this is not important for the present article - rh]. He uses the idea of a mountain, one moment pointing to the Sun and a star simultaneously, and exactly one Earth rotation later pointing to the star, but not yet to the sun. It takes about four minutes before the Sun is overhead again, because of the Earth's revolution about the Sun. The difference adds up to exactly one extra rotation per revolution,

making a star day 1/366.25 of a year and not 1/365.25. Another difference is that every star rises and sets at the same star time, while the Sun does not rise and set at the same solar time.
The "starting point" for counting sidereal time is the intersection of the ecliptic and the equator, and is called the first of aries, or ♈. It is 0 hours sidereal when the Sun is on that point.
The second part of the article explains how we should view the movement of the ecliptic with the passage of time. Because the ecliptic is (for our purposes) fixed to the stars, its position is a measure of sidereal time.
In the third part, the author describes sidereal hour lines on an equatorial dial as tangents to the circle with radius g/(*tan* 23,5), where g is the height of the index over the dial face. As is the case with a "normal" equatorial dial, the hour lines pattern should be drawn on both sides. One drawback of this scheme is that around the equinoxes the index casts no shadow on the dial face.
Finally, the author transforms the hour line pattern for use on a horizontal sundial. Many practical problems accompany this construction. Large pieces of paper and utmost accuracy are necessary. The construction also works for south facing verticals and for vertical decliners, taking into account the usual provisos.
As a last question, the author asks himself how it is possible that sidereal and solar hour lines share intersections with the equator line on the dial face, if a sidereal hour is shorter than a solar hour. The answer is that the equator line itself is an idealisation. In reality, the declination of the Sun is zero only one instant, and not all day long.

12 Bifilar sundial with freely chooseable equinox line F.J. de Vries
Hugo Micknik invented the bifilar dial, which uses the intersection of the shadows of two wires, in the early 1920s. In his publication, one wire was north-south, the other east-west. Using a certain height ratio, the hourlines all intersect at 15°, so corrections for longitude or EOT are easily made.
In the late 1970s, curved wires are introduced, making parallel hour lines on any flat surface possible. A variation is the polar dial with parallel date lines.
Gianni Ferrari invented the freely chooseable equinox line. Fer de Vries develops it here. Starting points are: the wires are parallel to the dial face; one wire is over the line of steepest descent; the other wire makes with the first an angle determined by the desired equinox line position.
Four examples are printed, with the equations - without proof - in the appendix. Fer made the figures using Ferrari's computer program. In the final remarks he shows a double dial, a union of an a.m. and a p.m. dial.

16 Clock based on the Theory of Sets A. Zenkert
A description, in German, of the Binninger clock on Budapester Strasse in Berlin. Four rows of lights indicate the passage of time, in steps of 5 hours, one hour, 5 minutes and 1 minute. To read the time, add the contributions of each of the rows of lights. A top light blinks every two seconds.
[When the clock was new, and on Ku'damm, I was just finishing college and heavily into Set theory. I must admit that I nor any of my contemporaries spotted the relation between it and the Binninger clock. - rh]

17 A new latitude-independent sundial from Spain J.A.F. de Rijk
Luis Hidalgo and Manuel Maria Valdez published a new design for a φ-free sundial. Solutions were earlier found by Freeman and De Rijk, and the Spanish design borrows from the last (see also B XV, pp. 764-767).
The equation $\sin \tau \cos \delta = \sin Az \cos h$ means that on a given date (declination δ) we can calculate the time (hour angle τ) from azimuth Az and altitude h of the Sun. Because latitude φ is not in the equation, remarkably we do not need to know it.
Fig. 1 shows the sundial. A horizontal circle with north-south lines carries a vertical plate with a quarter-circular rim of the same radius. To read the dial, turn the plate so that the shadow of the vertical post falls on the rim, say at point E. From B, vertically below E, we follow a north-south line to arrive at G where we read the time on a the proper date circle of the combined time/date scale.
Proof: See Fig. 2. Assuming the radius of the circles to be 1, OB = *cos* h, from which OK = *sin* Az .OB = *sin* Az *cos* h. Now we need a network showing date and time in their relation $\sin \tau \cos \delta$.
The Spanish design has concentric circles of radius $\cos \delta$. The outermost has $\cos \delta = 1$, the innermost has $\cos \delta = 0.91$ (it follows that the used bandwidth is rather small, necessitating a rather large unity circle if we desire a circle for, say, every month). There are also hour lines, radii from O, every 15 degrees.
Fig. 3 shows a circle of radius $\cos \delta$. OG is an hour line. GP is perpendicular to the north-south line, hence PG = $\sin \tau \cos \delta$. Now, if the vertical plate is set up properly, PG from Fig. 3 equals OK from Fig. 2, and $\sin \tau \cos \delta = \sin Az \cos h$. This proves that the intersection at G does in fact show local time.

20 Observation on the Bulletin's more theoretical articles J.A.F. de Rijk
During the preparation of the paper on the Spanish φ-free dial, De Rijk found it difficult to comprehend even his own work in Bulletin XV. He needed to review it very carefully. This reminds him of a remark he has made often in lectures and articles: it is quite difficult to absorb complex knowledge from papers or books. Usually this is not the fault of the reader, who is neither dim-witted nor ignorant. The problem is rather with the text, written under a host of assumptions, by a brain containing a lot that is lacking in the readers'.

The best writers cost the least effort, but writers are often mediocre or less, leaving the reader to assume he is not bright enough to follow. This must be true for some of the Bulletin's articles.. including the φ-free dial paper.
Whenever he receives a new Bulletin, De Rijk first scans it briefly, then reads what looks interesting, without really studying. The time for study only comes when he wants to work on the problem himself.

21 Again: card dial for one specific hour F.W. Maes and W. Leenders

The question in last Bulletin was, "why this specific hour? A meal perhaps?" Maes' first thought was that it could stand for Jesus' death. It is occasionally seen on sundials, such as the one shown: besides the light blue equinox, it also shows a dark red line marked "Redemption", going from hour line 2 to 4, intersecting the equinox at 3 - on the equinoxes, antique hours equal modern ones.
However, the card dial text did not allude to this at all. Willy Leenders can read Latin, but was puzzled by the sentence "the time to say matins the previous day, according to the rule".
Silvio Magnani had heard the solution in an Italian discussion group. Apparently, the old and sick were allowed to say matins the previous afternoon, instead of at the (17th-century) proper time of from midnight to sometimes two in the morning.
The text on the card dial can be summarised as follows [from Latin to Dutch to English - caveat emptor]:
This card shows, by help of sunrays, the ninth planetary hour, time to say matins the previous day, according to the rule. I - in the afternoon, place the card horizontally in the sun. II - point the style straight upwards. III - Turn the card until the shadow points towards today's date. IV - if the shadow reaches the date, you may say matins, otherwise not. V - if the shadow is longer, you may pray more.

22 Timepiece and Sundial Chronomium (Ootmarsum) B.P.U Holman

A description of the hardware found on the Chronomium building.
1. The French church clock by Obey of Morez (around 1900) has a floral motif on its frame. The striking mechanism uses a "saw", and so always follows correctly. The late 1900s hands and face are by König of Hameln. The future will see an astronomical face, showing zodiac with sun and moon, node hand, and civil, apparent, sidereal etc. time. 2. Large sundial, vertical west decliner, showing local apparent time. 3. Auxiliary dials. a. Trade fair, week 1, 2 and 3 of Leo. b. Date and EOT correction dial. c. Arts fair, last full weekend of August, therefore Virgo. 4. Group of ceramic statuettes, by Do Bloemen - van Lith. a. Skeleton, striking the bell. b. Chronos, or the Astronomer, with cogwheel and telescope; two farmers, a beehive, and a small skeleton. c. Othmar, the legendary founder of Ootmarsum, with city key and municipal rights. d. Painter and easel. 5. Carillon (chimes) of five small bells, played by computer triggered by the church clock. A large carillon is within the building, played by drum, book or computer; or manually. 6. Motto: WHO DARES SAY THE SUN FAILS?
Design, calculations and realisation by Holman. Chronomium, Gasthuisstraat 16, Ootmarsum.

24 H(ora) Lüdovicus monument B.P.U Holman and H. Hansson

According to this very long story, one Lüdovicus, priest and cabinet-maker, was sent by Ludger to build a chapel at Salahem. Not knowing where that was, he travelled this way and that, asking directions where he went. One moonlit night he happened upon a gigantic oak tree, possibly dedicated to Wodan - it had to go. While trying to cut it down, a whirlwind stopped him and smashed him against the tree. After some time, St. Lambert came to him and told him to stand up and pull the axe from the tree-trunk. Then the holy man pointed out the acorns that had fallen off, saying, "Push them down as far as your staff will allow you; for 1200 years they will rest, after which they will bring good luck to people." He then added, "Follow the staff" and disappeared. Lüdovicus planted the acorns, and by next morning, three small leaves had grown from his staff. Since they kept pointing the same direction, Lüdovicus followed them and so found Salahem, were the leaves withered. He built the chapel, and when Ludger consecrated it, had it devoted to St. Lambert.
Having said that, the oak must have been cut down at *some* time. Today we see just the trunk, with in it an axe with handle pointing towards Polaris. Around it stands a circle of young oak trees. Needless to say, the name of Salahem has changed, in 1200 years, to Zelhem.

29 New booklet: "Basic Math for the Sundial" H.W. van der Wijck

An advert for a new booklet by Van der Wijck. Aimed at the interested layman, it should provide a theoretical foundation to the more practically oriented "ABC of the Sundial". 28 pages A5; € 3.40 plus p&p.

30 Sundials in The Netherlands W. Coenen

OVERIJSSEL: **Dedemsvaart 2**. Member Sasbrink constructed this vertical dial out of Trespa (www.trespa.com). The left, angular part is delineated 8..15 and the right crescent bears the lines 16..19. The numerals are computer-cut and the material should last ten years or more. **Ootmarsum 12**. Chronomium. This dial by member Holman is described elsewhere in this issue.
GELDERLAND: **Lochem 10**. Nursing home "De Hoge Weide" ('high meadows'). A vertical dial, unveiled 2 June 1999 by the mayor, exactly five years after Princess Margriet opened the home. The design is based upon the oxeye daisy ("margriet"). This flower (24c gilded brass, white ceramic petals) is the style. The hour markers are

bronze numerals on ceramic blocks, ranging in colour from red, over yellow and green, to dark blue, diminishing in size as the day goes by. There is a declination line for 2 June and an equinox line. Design: B. Holman; ceramics by Do Bloemen-van Lith. **Zelhem**. An oak circle and an axe's handle form a horizontal dial. This dial is described elsewhere in this issue. Design B. Holman, for the Zelhem "Turf Henry" Foundation, at the 1200th anniversary of Zelhem.
UTRECHT: **Waarder**. A large, wrought iron, south facing vertical dial. Double semicircle, gold-coloured Arabic numerals, 6..18, in pear-shaped medallions. Stylised rooster and owl on the sides. The occupant told member Van der Wijck that the dial is as old as the house is (30 years), but reads wrong. A further inspection reveals that the style is fitted too high, while the 6 and 18 lines are too low on the semicircle. The line pattern fits an easterly declination, the style on the other hand, westerly. Moreover, the local meridian is over 12:15.

32 Literature 1406..1418 D. Verschuuren

Analema 1406.9: Once upon a time, there were... three points. How to determine a path in space from three points, with three solutions. 1407.1,2: Use of linear algebra in sundial calculations, ch. 7 azimuth and altitude of the sun, and ch. 8, duration of sunlight on a plane. 1407.4: Universal horizontal dial, see the article on this φ-free dial elsewhere in this issue. 1409.5: Speed of the meridian passage. Vertically and horizontally, in cm/min (on the dial face, no doubt). This should be interesting for estimating error contributions. *La Busca de Paper* 1410.3: A description of twenty-four sundials on Mallorca. *Gnomonica...* 1411.6 On the design of the Aquileia Dial; various ways to determine the design latitude of a horizontal sundial. *Zonnetijdingen* 1412.1 Eise Eisinga, the dialist (besides being the builder of the famous planetarium). Four are known, author mentions some others in the museum. See also B92.4. *Gnomonica societas Austriaca* 1415.5 The skylight and window sundial: sunlight, coming through a slit in the south side of a bus shelter roof, illuminates MET analemmas and Italian hour lines on the north inside. Design for the Reutte International Sundial Contest. Finally,1418: A hand guide to astronomical observatory of Jaipur. Aimed at the tourist, it is still a useful description of every instrument built here from 1727 on.

41 A new postcard dial J.A.F. de Rijk

One of the difficulties in getting someone to make a sundial is the placement of the style, whether it is finding the correct pole style angle, or fixing a style triangle at right angles to the dial face. Designing postcard dials, with folding and cutting lines printed on, is one of the author's passions. His latest invention is the plank dial, or gangway dial. It needs only three folds and two incisions. The two sides of the plank are styles. In addition, a small hole is used as an index to read the date; this is done around apparent noon.

'English' summaries - an old joke goes, "how do pineapples grow? On pine trees." Of course pineapples were not used to point out the hour markers on the Besançon analemmatic. I meant pine cones. And current intelligence has it that they were really fir cones. RH