

The British Sundial Society  
**BULLETIN**



BSS Bulletin 26(iv)

December 2014



VOLUME 26(iv)  
December 2014

# BSS MERCHANDISE

*Just in time for Christmas, a selection of BSS merchandise of interest to diallists*

## BSS Publications

**BSS Bulletins:** back issues (more than 2 years old) can be purchased at £3.50 each or £7.00 for three issues. Please enquire for bulk orders or for posting abroad or for more recent issues.

**CD-ROM** - out of print issues (only) of BSS Bulletins £15.00  
**DVD-R** - all 82 issues from 1989 to September 2012 £25.00 (Members)  
£75.00 (Non-members)

**Binder for Bulletins.** Yellow with BSS emblem on spine. Holds up to 12 issues. £5.50

## BSS Monograph Series:

**Christopher Daniel:** *The Equation of Time: The Invention of the Analemma.* Monograph No. 1. £10.00

**Jill Wilson:** *Biographical Index of British Sundial Makers from the Seventh century to 1920.* Monograph No. 2. £14.00

**Allan Cook:** *Mass Dials in Yorkshire Churches.* Monograph No. 3. £6.50

**Mike Cowham:** *Altitude Dials.* Monograph No. 4. £12.50

**John Davis & Michael Lowne:** *The Double Horizontal Dial and associated instruments.* Monograph No. 5. £17.50

**Ian Butson, Jill Wilson & Tony Wood:** *Sundials in Museums in the British Isles.* Monograph No. 7. £8.00

**David Scott & Mike Cowham:** *Timekeeping in the Medieval World, a study of Anglo-Saxon and early Norman sundials.* Monograph No. 8. £17.50

**Mario Arnaldi:** *De Cursu Solis: Medieval Azimuthal Sundials.* Monograph No. 10. £10.00

## Other BSS Merchandise

**BSS Bow Tie:** dark blue with BSS emblem £7.00

**BSS Tie:** dark blue with BSS emblem £9.00

**BSS Ladies Scarf:** dark blue with BSS emblem and yellow line edging £16.00

**BSS Lapel Brooch** £3.50

Please note: Postage and packing will be charged separately. Please contact me directly for current rates.

BSS Sales: Elspeth Hill, 4 The Village, Stonegate, Wadhurst, E. Sussex, TN5 7EN

Tel: 01580 201720 (please leave message on answer phone if necessary)

E-mail: [sales@sundialsoc.org.uk](mailto:sales@sundialsoc.org.uk)

**Front cover:** *A fine photograph of Chris Daniel's famous Dolphin Dial outside the Royal Observatory, Greenwich (SRN 2157). Thanks to Ian Maddocks who took it during the Society's 25th Annual Conference held at Greenwich in April 2014.*

**Back cover:** *A replica of a universal equinoctial dial by Culpeper, the inspiration for the BSS emblem. Thanks to Mike Shaw for the photo.*

# BULLETIN

## OF THE BRITISH SUNDIAL SOCIETY

ISDN 0958-4315

VOLUME 26(iv) - December 2014

### CONTENTS

1. Editorial
2. An Exceptional Sundial – *Denis Savoie and Anthony Turner*
5. The Slate Dials of Brittany – *Mike Cowham*
8. Sundials on the Tropic of Capricorn – *Anthony Capon*
11. Readers' Letters – *Wood, Bateman*
12. In the Footsteps of Thomas Ross. Part 9: The Mercat Crosses of Scotland and their Sundials – *Dennis Cowan*
19. The Future of Dialling – *Tony Moss*
20. From Old to New – A Restoration Project—The Nazeing Church Sundial – *Ian Butson*
24. The Littlecote Dial – *J. Mike Shaw*
27. Newbury One-Day Meeting, 27 September 2014 – *Kevin Karney and Irene Brightmer*

### EDITORIAL

Members will immediately notice that this issue of the *Bulletin* is somewhat thinner than usual. Most unfortunately, our regular editor is suffering from what he describes as significant health problems which prevent him from sitting at a computer for more than the briefest periods of time. In consequence, he had to stop work on this issue when there was still much to do to bring it to a publishable state.

Three members have been holding the fort: your Chairman, Bill Visick and Christine Northeast. We have been fortunate to have Christine in the team since, for some years, she worked for Cambridge University Press.

All three of us have been getting to grips with the delights and intricacies of Microsoft Publisher. We have been on a very steep learning curve.

We must all be extraordinarily grateful to John Davis for the many issues that have passed through his hands. Over the years John has greatly expanded and improved the *Bulletin*. It is the Society's undisputed flagship. Moreover, John has edited numerous monographs.

It has become very clear that more than one pair of hands are now needed to deliver what is expected of the editorial role and the Trustees are busily considering how best to distribute the workload.

Meantime, please could intending authors continue to send their draft articles to [editor@sundialsoc.org.uk](mailto:editor@sundialsoc.org.uk).

### MERRY CHRISTMAS



Mike Shaw's photograph, *Frozen in Time*, was one of the winners of the BSS 2014 Photographic Competition.

It provides a seasonal illustration for the December issue of the *Bulletin*.

# AN EXCEPTIONAL SUNDIAL

DENIS SAVOIE and ANTHONY TURNER

“[Paid] to Mr Langlois, Engineer to the King for mathematical instruments, for minor expenses as for a Meridian [instrument] made and set up by him for Milord on the terrace of his château de la Roche-Guyon during the present month”, 21 June 1741, 262 livres 9 sols 6 deniers.<sup>1</sup>



Fig. 1

The price paid for a horizontal sundial to the Paris instrument-maker Claude Langlois (d. 1756) by Sebastian de la Place, *homme d'affaires* to Alexander, 5<sup>th</sup> duc de La Rochefoucauld (1690–1762) was high – over a third of the annual salary of Alexandre’s chief cook at the château. The dial, however, was exceptional. It still



Fig. 2

survives, mounted on a corner of the balustrade to the west terrace of the château<sup>2</sup> (see Figs 1–4). The circular stone hour table, 112 cm in diameter, is engraved with the hour lines IIII–XII and XII–VIII. The hour-scale engraved around the circumference has sections graduated to five minutes with longer segments for the quarter and half hours (see Fig 3). In the lower part of the dial is the inscription “Pour 49° 5<sup>m</sup>, Langlois A Paris, 1741”, 49° 5<sup>m</sup> being in effect the local latitude (modern value 49° 4' 51"). By transferring a section of the hour lines onto tracing paper it was possible to verify that it is accurately laid out. On a



Fig. 3

horizontal dial, the most pertinent lines for determining the latitude are those that bisect the sector 6–12h, or 12–18h or, in our latitudes, 8:30 and 15:30. This is the area in which a measurement error will perturb the least.<sup>3</sup>

The numeral XII is cut twice, on each side of the wide (14.5 cm) gnomon formed by a box of brass, 60 cm high and 71.5 cm long, of which the two edges (each 78 cm long) of the polar-oriented face act as gnomons for the dial table. The centre of this polar axis is traversed by a slit, 1 mm wide × 46.2 cm long, set with seven eyelets. The sunlight that enters the chamber thus has the form of a horizontal ray punctuated by circular spots. Two doors on the north side of the dial allow an observer access to the interior of the instrument. The polar face of the brass box also carries the maker’s name “Langlois Paris aux Galeries du Louvre”.

On seven centimetres of the northern edge of the box, lines for each minute from 11:30 to 12:30 are finely engraved, and beneath this, covering 16 cm, lines for every fifteen minutes. A desire to indicate the time very precisely in the proximity of midday is evident. The seven eyelets set along the slit in the polar axis are separated by the cadence:

Fig. 4



3.6 cm, 8.7 cm, 10.8 cm, 10.8 cm, 8.7 cm, 3.6 cm, with a zodiacal symbol opposite each opening, the highest corresponding with the summer solstice, the lowest with the winter solstice. It is therefore the spot of light given by the highest-placed eyelet that, on the day of the summer solstice, arrives on the edge of the hour-line diagram. It can be shown that the other spaces correspond with the upper extremities of fictional straight styles – that is, polar gnomons of various lengths – so that on notable dates (entry of the sun into each sign of the zodiac), the spot of light from an eyelet falls at true noon on the image of the sun at the summer solstice<sup>4</sup> (see Fig. 5). In other words, instead of having one eyelet and the seven customary diurnal arcs, there is a single diurnal arc (assimilated to a part of a straight line at around noon in summer<sup>5</sup>), and seven eyelets.

If  $k$  is the length of the shadow of a polar gnomon at true noon, here considered as a constant, the length of the corresponding gnomon is obtained from the formula

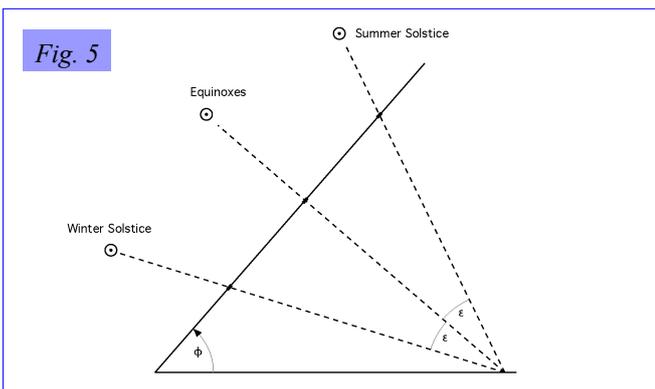
$$U_{\delta} = \frac{k \cos(\phi - \delta)}{\cos \delta}$$

$\phi$  being the latitude of the place and  $\delta$  the solar declination. At La Roche-Guyon,  $k$  equals 70.3 cm.

It should be noted that the ray of light coming through the slit has a certain thickness, particularly that coming from the highest part of the slit, the distance to the horizontal plane being greater, and a penumbral effect is noticeable. The time reading remains nonetheless very precise.

From the description and the illustrations given here, it can be seen that the dial at La Roche-Guyon is without parallel

Fig. 5



among known European sundials.<sup>6</sup> Simple in conception, materialising in effect the definition of a dial noon-line given by J.J. de la Lande in the *Encyclopédie*, as the “straight line determined by the intersection of the meridian of the place with the plane of the dial”,<sup>7</sup> it is highly sophisticated in execution. That it should have been created for the remote location of La Roche-Guyon cries out for explanation.

Such may be found in the career of the maker, Claude Langlois (d. 1756), and the character of his client, Alexandre de la Rochefoucauld. Langlois, a member of the Founders’ Corporation, made all kinds of mathematical instruments during his active career from c. 1720 until his death. In 1730 he received his first commission from the Crown, a 6ft radius mural quadrant for the Paris Observatory, and thenceforward became the quasi-official instrument-maker with accommodation and a workshop granted to him in the Louvre, and award of the (honorific) title ‘Ingénieur du Roi et de l’Académie Royale des Sciences’. Langlois was well known to members of the Academy, supplying several instruments for the important scientific expeditions it mounted during the second quarter of the century, and working with individual members on other projects.<sup>8</sup> One of these is particularly relevant. In 1729, when Jacques II Cassini laid out his large meridian on the first floor of the Paris Observatory, Langlois supplied for it thirty-two brass rules, thirty-one of which were each equal to a tenth of the height of the gnomon and were each a hundred times larger than its aperture. The thirty-second rule, set closest to the north wall, was shorter.<sup>9</sup>

Cassini conceived and had his meridian constructed shortly after the watch- and clock-maker Henry Sully (c. 1680–1728) died leaving the meridian he had begun in the church of St Sulpice unfinished. Sully had, however, drawn attention to the interest of meridians, which were both useful and attractive in public spaces. In 1738, when the Place au Change was created at the instance of Michel Etienne Turgot (1690–1751), Provost of the Merchants of Paris, one of the many improvements he instigated in the city, Cassini II was charged with designing for it what would become known as the ‘City meridian’. The instrument was composed of white marble slabs with the meridian-line, hours and the signs of the zodiac heightened in lead for visibility. “All that concerns this meridian, was executed by Langlois, the royal engineer for mathematical instruments, and the most skilful workman in all Europe in this trade.”<sup>10</sup>

Langlois was paid 518 livres for his work on the meridian, completed just three years before he set up his meridian dial at La Roche-Guyon. Two years after this was completed, in 1743/4, he would undertake an even more ambitious work, construction of the meridian designed by Le Monnier for the church of St Sulpice, laid out parallel with that begun by Henry Sully.<sup>11</sup> Langlois, then, during these six or seven years, was deeply engaged both in the construction of meridian-dials and with their designers. Following the inauguration of the meridian in the Place au Change, his inevita-

bly would be the name that would spring to mind for the construction of a precision sundial.

For it was this that Alexandre de la Rochefoucauld wanted as part of the embellishments he was making to his seat at La Roche-Guyon. Here, among other improvements, he had already constructed a new library which reflected his more than passing interest in the sciences; here in 1736 he had installed a large reflecting telescope, probably on the new terrace to the corner of which Langlois would attach his meridian-dial; for La Roche-Guyon in 1743, Alexandre would acquire a precision long-case regulator. For all these items, Alexandre spared no expense, partly because these were public, prestige objects which underlined his status, partly because high quality seems in itself to have been important to him, and partly because Alexandre was always attracted by the latest, most striking, novelty. Meridians, if they were not yet fashionable, were at this moment an object of public attention. Alexandre required a dial for La Roche-Guyon – it was inevitable therefore that the dial should incorporate a meridian and that it should have been made by Langlois already associated with this kind of object, and already known to Alexandre who had purchased a graphometer from him in 1738 and would subsequently continue to purchase instruments from him, the most notable being also a novelty – the new form of pantograph designed by Langlois' nephew Jacques Canivet.<sup>12</sup>

The meridian-dial at La Roche-Guyon is *sui generis* and highly sophisticated, but the technical context from which it derived can be partially discerned, as can something of the social context into which it was placed. How far the conception of the dial was original to Langlois, how far he responded to ideas or instructions from his client, and how far he received help in the design from Cassini or other academicians are questions that can probably not be answered. Nonetheless the remarkable object that he produced is testimony to the capacity of Paris instrument-makers in the mid-18<sup>th</sup> century to produce finely made and original items for their luxury domestic market.

## REFERENCES and NOTES

1. Archives de la Val d'Oise 10J 641 “à Mr Langlois Ingenieur du Roy pour les Instruments de Matematiques...pour menus dependes que pour un Meridien par lui fait et pose pour Monseigneur sur la Terrasse de son Chateau de la Roche Guyon dans le courant du present mois”. 21 juin 1741.
2. This is likely to be the original location of the dial. It is shown there in a late 18<sup>th</sup>-century watercolour view of the château (Musée de L'Île de France, Sceaux) by Louis Nicolas de Lespinnasse (1737–1808). Emile Rousse, *La Roche-Guyon, châteaux, château et bourg*, 1892 (reprinted 1962), 288 is affirmative, though without evidence cited, that this was the original location.
3. On this see Denis Savoie: *La Gnomonique*, Paris, 2007, 353–356.
4. In the mid-18<sup>th</sup> century the obliquity of the ecliptic was 23° 28'.
5. The difference of the extremities of the arc with a straight line is less than 2 millimetres.
6. With the exception of a dial employing a straight-line aperture-gnomon signed 'J. Sisson London' which, once held in the Time Museum, Rockford (Illinois), was sold at Sotheby's New York 14 October 2004 (Sotheby's, *Masterpieces from the Time Museum, part four, ii, chronometers and scientific instruments*, New York 2004, lot 779). This dial, although employing a bright-line of light on the dial surface in the same way as Langlois inside his box, is otherwise far less sophisticated, although it does incorporate an equation scale.
7. Méridienne d'un cadran: “c'est une droite qui se determine par l'intersection du méridien du lieu avec le plan du cadran”.
8. Biographical details concerning Langlois can be found in Charles Coulston Gillispie (ed): *Dictionary of Scientific Biography...*, viii New York 1973, 21–2 (although the references there given are largely incorrect), in Maurice Daumas, *Les Instruments Scientifiques aux XVIIe et XVIIIe siècles*, Paris 1953, 341–2; and in Denis Beaudouin, Paolo Brenni & Anthony Turner, *A Bio-bibliographical Dictionary of precision instrument-makers and related craftsmen in France, 1430–1960* (in preparation), from which latter the details given here are derived.
9. Andrée Gotteland & George Camus: *Cadrans solaires de Paris*, Paris 1993, 151.
10. “Tout ce qui regarde...cette méridienne, a été execute par le sieur Langlois, Ingénieur du Roi pour les instruments de Mathématique, & le plus habile ouvrier de toute Europe dans ce genre”. Jean-Alain Piganol de la Force, *Description historique de la Ville de Paris*, 1765, iii 880. Exactly the same text is found in Thiery, *Guide des amateurs et des étrangers voyageurs à Paris...*, Paris 1787, i 490–91. For an illustration and details of the meridian see Andrée Gotteland, *Les Cadrans solaires et méridiennes disparus de Paris*, Paris 2002, front cover and 75–7, but the text is at once confused and inaccurate with conception of the dial being attributed to Lalande who in 1738 was only 6 years old!
11. Gotteland & Camus (note 9), 100–106; G. Camus, P. de Divonne, A. Gotteland et B. Tailliez, ‘Les méridiennes de l'église Saint-Sulpice à Paris’, *L'Astronomie*, May 1990, 195–214; *Bulletin d'ANCAHA*, 61 1991, 5–28.
12. This paragraph is based on Anthony Turner: *Globes, lunettes et graphomètres: Alexandre de la Rochefoucauld et les sciences*, Paris 2014, which see for a more detailed discussion.

**Denis Savoie** is Scientific Director in the Palais de la Découverte, Paris and the Cité des Sciences at La Villette. He was president of the sundial commission of the Société Astronomique de France from 1990 to 2010. A research associate at the Paris Observatory, he has published numerous books and articles on the theory and history of gnomonics. He can be contacted at [Denis.SAVOIE@universcience.fr](mailto:Denis.SAVOIE@universcience.fr)

**Anthony Turner**, an independent historian, consultant and antiquarian bookseller, works on the social history of ideas during the *Ancien Régime* and on the history of scientific instruments, clocks, sundials and precision technology in general. Consultant to Sotheby's and to Bonhams for scientific instruments, he also acts as expert for horological sales at the Paris, Drouot, auction house. He is currently working on a bibliography of French scientific instrument-makers, a catalogue of the instruments contained in the collections of the Bibliothèque Nationale de France, and a study of practical mathematics and natural philosophy in the provincial culture of Early Modern France and Britain. He can be contacted at [anthonyturner@9online.fr](mailto:anthonyturner@9online.fr)

# THE SLATE DIALS OF BRITTANY

MIKE COWHAM

A recent trip to France led us to the north of Brittany where we hoped to see some of their churches and dials. The book *Cadrans Solaires de Bretagne*<sup>1</sup> was our main guide. What we found were mostly vertical dials in slate that were made between 1570 and 1750. During our week-long trip we saw 24 such dials. In this article some of the better ones are illustrated.

The Départments that we visited mainly were the north parts of Cotes-d'Armor [Département no. 22] and of Finistère [29]. Most of the dials found were due south vertical dials, carved in relief, of a round format with quite small diameters, estimated between about 50 and 100 cm. Apart from their relatively early dates, many were attractively decorated with various subjects, most still in quite good condition despite their age.



Fig. 1. The church at Kergrist-Moëlou, Cotes-d'Armor, having two round slate dials on its south wall.

The churches too were completely different from those in Britain and indeed in much of France. They were mostly rebuilt, or at least added to, in about the same period as the dials with quite elaborate decoration. Even their insides, which in France are generally quite plain, were often colourfully adorned. The church at Kergrist-Moëlou [22] is illustrated. It has two round slate dials on its south face, the one on the left dated 1650 being rather weathered and that on the right, also a little weathered, being from 1714. Virtually all of these dials have Arabic numerals but this one, rather strangely, has mostly Roman numerals except for the 9, 12 and 4! Notice that this dial, like several of the others shown, has the unusable 5 am and 7 pm lines included.

The dials that follow have been placed in date order.



Fig. 2. Easternmost dial at Kergrist-Moëlou, 1714.

The oldest dial that we found was at Saint Herbot, near Plounevez-du-Faou [29], mounted high on the south porch and is dated 1587. It has fairly simple decoration of six flower heads around its date label.



Fig. 3. Dial at Saint Herbot, dated 1587.

The next dial that I show is from Pleyben [29], mounted high on the tower buttress. This is a particularly well decorated dial with sun, moon, stars, St Germain in the centre, and an inscription on a small horizontal ribbon which reads



Fig. 4. Dial at Pleyben, 1619.

SANCTE GERMAIN 1619. This, like many of the dials that we found, was partially covered in some moss or lichens, probably encouraged by the rather damp climate of Brittany, the land being close to the Atlantic and at the mercy of the Gulf Stream. However, the climate, with its relative warmth, has probably helped to preserve many of these dials from damage by the more severe frosts of winter.



Fig. 5. Dial at Loc-Éguiner, 1640.

The dial at Loc-Éguiner [29] is mounted on the nave wall to the left of the porch. It is carved on a square piece of slate and has its two lower corners filled with decoration, with a simple border all round. Its motto reads PIERRE 16 40 ROGVES. It was restored in 2001.

At Irvillac [29], mounted high on a tall round turret next to the tower, is a round dial set into a stone frame. It shows two lions supporting a shield. Its inscription reads A MOÏSIEVR 1651 IRVILLAC. Like several of the dials shown, the letter N is carved in reverse.

Many of these dials had both the sun and moon on them, such as that at Dirinon [29], which is mounted high over a



Fig. 6. Dial at Irvillac, probably 1651.



Fig. 7. Dial at Dirinon, 1653.



Fig. 8. East-declining dial at Lannion, 1668.

south window. It is dated 1653. It also has the initials MH and GC placed either side of the central chalice.

The dial at the city of Lannion [22], mounted fairly low on a buttress, is dated 1668. Careful inspection shows that this



Fig. 9. Dial at Glomel, 1679.

is, unusually for these dials, an east-declining dial. Below the gnomon is the sun with initials IHS at its centre.

The dial at Glomel [22], is mounted on a building opposite the Mairie, presumably brought here from the church. It had been broken but is now restored. Its motto reads LOVE • SOIT • IESVS • AVTRES • SANCT • SA. At the top is a sun



Fig. 10. Dial at Saint Melar Church, Locmélar, 169x.

motif with IHS in its centre. At the bottom the dial is signed FRANCOIS ----ER.

The dial at Saint Melar Church at Locmélar [29] is mounted high to the left of a south transept window. It depicts two flying angels supporting a chalice. Its inscription, top left, is rather small to decipher, and is incomplete, the right-hand half being broken off.

The dial at Lanildut [29] is mounted on the tower at the height of the nave roof apex. Like the dial at Lanrivoaré, it has the crucifix and a ladder, the sun and moon, but inter-



Fig. 11. Dial at Lanildut, 1733.



Fig. 12. Dial at Lanrivoaré, probably 1745.

estingly also has three dice and some hands clutching at what appear to be coins. It is inscribed FAIT : PAR : IOSEPH : RIOVALLEI : EAI : LAI.

The dial at Lanrivoaré [29], above a window on the south transept, has many objects in the upper section including a crucifix with a ladder, a sun, a moon, a house, a pillar and more. This dial too is well ‘decorated’ with lichens.

We intend to return someday to see many more of these fine slate dials that we know exist in Brittany; in the South of Finistère [29] and in Morbihan [56].

## REFERENCE

1. Jean-Paul Cornec & Pierre Labat-Ségan: *Cadrams Solaires de Bretagne*. Skol Vreizh (2001).

*mike@brownsover.orangehome.co.uk*

# SUNDIALS ON THE TROPIC OF CAPRICORN

ANTHONY CAPON

In April of 2014 I spent three weeks in Brazil, specifically in the city of Campinas, which is about 100 km to the north-west of Sao Paulo. It is a large city with a population of over 1 million. On the occasion of my last visit, about four years ago, I learned that the city has an astronomical observatory. Unfortunately I did not have time to visit the observatory on that occasion but this time round I was determined to do so.

The observatory is situated about 32 km from the centre of Campinas on the summit of Pico das Cabras (the mountain of goats) at an altitude of about 1100 m. It is approached by a dusty un-metalled road which twists and turns as it climbs to the top.

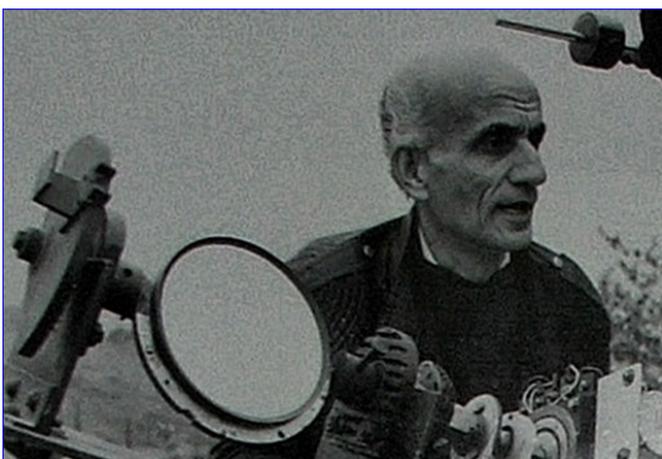


Fig. 1. Jean Nicolini.

The observatory was founded by the astronomer Jean Nicolini (Fig. 1). Nicolini was born in 1922; his parents were both French. He first established the observatory in Sao Paulo in 1948 and it was transferred to Campinas in 1976, officially opening there in 1977. It opens to the public each Sunday evening from 5pm to 9pm. Shown in Fig. 2, it is



Fig. 2. The main entrance to the observatory at Campinas.

now known officially as the Observatorio Municipal de Campinas “Jean Nicolini” (OMCJN). Jean Nicolini died in 1991.

The observatory buildings are contained inside a compound. On entering the compound, via the gate, a short driveway leads to a car park in front of the main building. This houses a museum cum exhibition of astronomy and space travel related exhibits and also a lecture theatre. In addition to the main building there is one other domed building and several smaller rectangular buildings, one of which houses the 500 mm Zeiss/Jena telescope. As dusk fell I and other members of the public were able to obtain splendid views of Jupiter and the moon through this instrument.



Fig. 3. The three dials: equatorial, vertical and, in the distance, horizontal.

Connecting the various buildings within the compound are a series of pathways and spaced along one of these, running on a north–south axis, are three sundials: one horizontal, one vertical and one equatorial (Fig. 3). Sadly, none of the three dials is in very good condition. The horizontal (Fig. 4) appears to be made of concrete which has weathered badly, even though the dial seems to date only from 1961 at the earliest. The vertical dial has no gnomon. The best of the three is the equatorial which is at least working as you can see in Fig. 3. According to the information plates attached to them, the vertical and equatorial dials were constructed in 1995 and 1994 respectively. Confusingly, the horizontal dial has two dates, 1961 on the dial face and 1994 on the plinth. Possibly the 1990s dates are restorations.



*Figs 4 & 5. The badly weathered surface of the horizontal dial and its detail.*

Note the latitude and longitude marked on the horizontal dial plinth (Fig. 4) with the latitude in degrees, minutes and seconds and the longitude in hours, minutes and seconds. The centre of the dial is shown in Fig. 5. The hour lines are set out in the normal way, and the equinox and solstice lines use the shadow of the tip of the gnomon. The panels to the left and right restate the latitude and longitude (this time in degs, mins and secs) and also contain tables to correct local apparent time back to the standard zone time. Oddly, the longitude stated in the panel to the right of the dial  $47^{\circ} 04' 00''$  W does not quite match the  $3\text{hrs } 7\text{mins } 19\text{secs W}$  on the plinth.

Finally, Fig. 6 shows the rather forlorn vertical dial now with no gnomon.



*Fig. 6. The vertical dial.*

I could find nothing to link the dials with the observatory's founder Jean Nicolini but I did discover that he was a keen solar observer and so one imagines that he would be pleased to know that sundials are still present and functioning (just) within the grounds of the observatory that he founded and where he worked for many years.



*Fig. 7. The horizontal dial at Parque Taquaral.*

### Two More Dials

Travelling around Campinas, I stumbled upon two more dials. Parque Taquaral is a large public park surrounding an extensive man-made lake. It is popular with the residents of the city as a place to walk, jog, cycle or just relax. Near one of the park's entrances and close to a building housing a planetarium I found the dial shown in Fig. 7. The dial is dated 1962. The solstice and equinox lines are laid out so as to allow the shadow of the gnomon's tip to indicate the season. Mounted on the side of the plinth (visible in the lower left of the photo) is an equation of time correction table that converts the dial time to the local standard time. The motto reads in Portuguese, "Nao ha noite tao longa que jamais encontre o dia" which in English is, "There is no night so long that it never meets the day".

At the 'Centro de lazer do trabalhador – Ayrton Senna' in Valinhos SP, I found the equatorial dial shown in Fig. 8. Valinhos is a small city now nearly swallowed up by the expansion of Campinas. The name of the park is, 'Leisure centre for working people – Ayrton Senna'. It is probably the most colourful and best preserved dial I have so far found in Brazil. The plate on the front left of the dial is an



*Fig. 8. The equatorial dial at Centro de lazer do trabalhador – Ayrton Senna.*

equation of time correction table correcting dial time to standard time.

### Americana Observatory Dials

In the course of researching the life of Jean Nicolini, I discovered that, having already founded one astronomical observatory in the city of Campinas, he went on to found another in the nearby city of Americana. A visit seemed in order. The city has a population of over 200,000 and is situated 124 km from Sao Paulo and 35 km from Campinas. Americana is so named because in the late 1860s a number of confederate refugees from the American Civil War settled in the area.



Fig. 9. The observatory at Americana.

Jean Nicolini founded the observatory there in 1985 and it is located in the Botanic Garden (Jardim Ipiranga) – see Fig. 9. He spent over 40 years of his life observing the sun as well as Mars and Venus. In the 1960s he was involved with observations of the moon in connection with the Apollo moon landings. His career sadly ended in Americana in 1991 when he was killed in a car crash aged 69. He wrote two books, ‘Mars, the planet of Mystery’ and a ‘Manual of Amateur Astronomy’.



Fig. 10 The sundials at Americana.



Fig. 11. The equatorial dial at Americana.

In the small garden which surrounds the observatory are two sundials (Fig. 10). The equatorial dial shown in Fig. 11 appears to be in good condition and fully functional. The other dial (Fig. 12), although labelled as a vertical dial, is actually set at an angle to the vertical as if it was an equatorial. The design of the dials is very similar to the ones I found in Campinas.

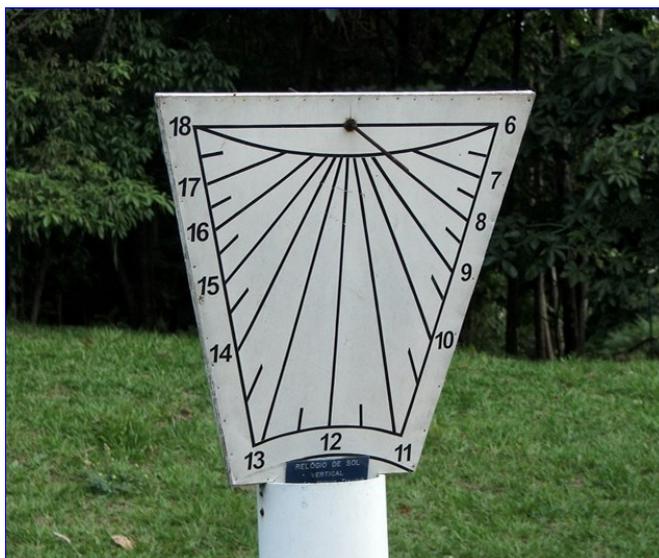


Fig. 12. The ‘vertical’ dial at Americana.

The observatory building itself was not open on the occasion of my visit but it does open once per week to the public on Friday nights when visitors can enter and see an astronomy-related exhibition. Also they may obtain views of the night sky through various telescopes.

*anthonycaapon@btinternet.com*

## READERS' LETTERS

### Letters on Mass Dials

In a recent article about Danish dials David Hawker asks if there are other canonical dials which indicate *Terce*, *Sext* and *Nona* against the appropriate hour lines. In France at Mérimindol the dial has across the top P•T•M•N• and above that OROLOGII. Compared with the Danish dial's T, S and N, there is the addition of P (*Prime* or sunrise), and M (*Midi* or *Meridies*) replaces the S of *Sext*. Fig. 1 shows the dial with a noon line and two lines each for *Terce* and *Nones*, possibly to allow for summer/winter variation.



Fig. 1

In Spain, however, there are indeed dials with the prayer hours marked against the hour lines, sometimes with the addition of V for Vespers or sunset. The function of mass dials now seems self-evident but prior to 1900 there was some debate with occult meanings suggested, so confirmation of their use to mark services was welcome if somewhat belated. The Spanish dial in Fig. 2 at Huesca on the church of San Miguel de Foces de Ibieca has the initials P T M N V against the five hour lines. The dial is carved over three stones and uses the vertical mortar joint for the noon line.



Fig. 2

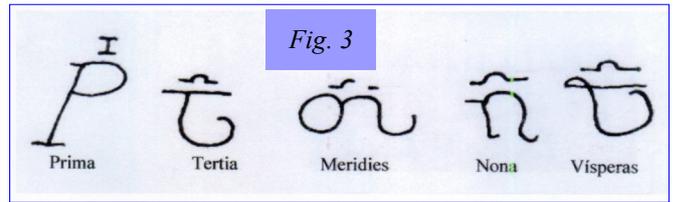


Fig. 3

The form of lettering used is drawn out in Fig. 3.

I suspect that there are further similar dials in Spain and probably in France; perhaps our members out there can find them.

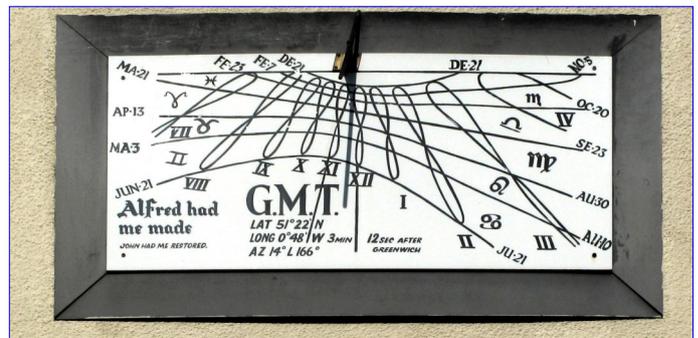
The only mass dial in Britain that I know of which has any letters round the edges is at All Saints Church, Sutton on Trent, Nottinghamshire, which has M (*Midi* or *Meridies*) in the 'Hours' of prayer and fits with records from Continental dials.

**Acknowledgement:** the photos are from Pedro Novella (ed.): *Relojes de sol canonicos con numeracion*, Vol. V.12 (Catalonia).

Tony Wood

### Alfred Had Me Made

In his comprehensive report of the annual conference in the last issue, Jim Holland has inadvertently confused some names in the summary of my talk on the Greenwich time ball. During the talk I gave a brief review of my interests ranging from precision pendulum clocks to sundials, and



radio time signals. This was the preamble to the main topic of the history of the time ball. Jim credited John Hardcastle with the rebuild of the time ball, whereas Hardcastle designed a rare mean time dial, as shown, in 1904. It was the restoration of this dial in 1988 that inspired me to attend the inaugural meeting of the Society. For the time ball, the Royal Navy workshops made a new sturdier mast, and the well-known 19<sup>th</sup>–20<sup>th</sup> century clockmakers, E J Dent, made the much improved machinery during 1914–19, and which endures to this day. There is a whimsical remark in the Greenwich Observatory archives, where in correspondence, Dent refer to the latch mechanism that supports the raised ball, as the 'escapement' This is usually the delicate part that gives the ticking of a clock!

Doug Bateman

# IN THE FOOTSTEPS OF THOMAS ROSS

## Part 9: The Mercat Crosses of Scotland and their Sundials

DENNIS COWAN

A mercat cross, as a market cross is known in Scotland, signifies that the right to hold a regular market was granted by the monarch or a bishop. The cross was the place around which market stalls would be arranged and where merchants would gather to discuss business. It was also the spot where state and civic proclamations were publicly read. To this day, royal proclamations are still ceremonially read in public at the mercat cross in Edinburgh's Royal Mile, including the calling of a general election and succession of a new monarch.

The essential element of the market cross is not a cross, but a shaft often crowned with an appropriate heraldic or religious emblem. Heraldic beasts, armorial bearings and sundials are popular subjects for the capital and finial of market crosses. In many cases the cross is topped by a royal unicorn or lion, symbols of the Scottish monarchy.

There are somewhere between one hundred and one hundred and twenty-six such crosses in Scotland<sup>1</sup> and I have so far identified that seventeen have sundials incorporated into them. In *The Castellated and Domestic Architecture of Scotland*<sup>2</sup> Ross describes and sketches ten of them. He states that:

*"we are not surprised to find that many of the market-crosses erected during the seventeenth century have been adorned with dials; the sentiment peculiar to a dial is well fitted for such a symbolic structure"*.

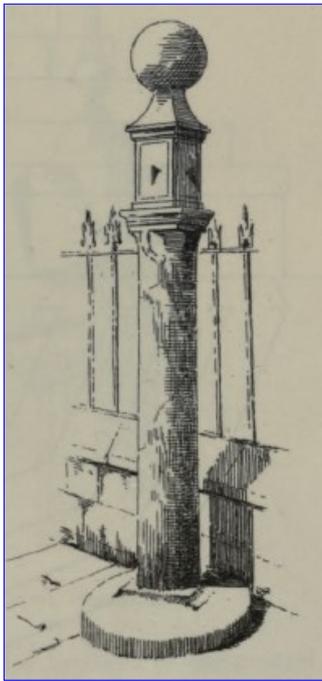
In the Scottish Borders, Ross describes the mercat cross in Peebles as follows:

*"The Peebles cross is an octagonal shaft about 12 feet high, and is dated 1699 [Fig. 1]. It has an iron vane on the top, with open figures of date 1662. The shaft rose from the top of an octagonal building about 10 feet high and 12 feet across, in which Dr Chambers, in his 'History of Peebles', says there was an inside stair which led up to the platform. But in a paper read before the Society in February 1861, Mr James Drummond asserts that there was no stair leading to the platform. This cross was taken down so as not to obstruct the traffic on the street of Peebles, and is now in the Chambers Museum."*

Despite Ross's comment that the cross is dated 1699, it is probably 15<sup>th</sup>-century and has had several sites in its history. The cube sundial was added in 1662 to mark the restoration of Charles II to the throne. In 1807, the Cross was in such a ruinous condition that the council ordered its removal but the town's people were opposed to the decision. Eventually, in 1858, it was placed in the quadrangle of the Chambers Institution. It was re-erected on its former site at the junction of Eastgate, Northgate and High Street in 1895 minus the octagonal building referred to by Ross, and was moved slightly to the east in 1965 where it remains today on a traffic island (Fig. 2). The four dial faces are octagonal with Arabic numerals and all gnomons are intact (Fig. 3).

Figs 1, 2 & 3.  
The Peebles cross. L to R:  
Thomas Ross's sketch; a general view and the north-west and south-west faces.





Figs 4 & 5. The Nairn Cross.

the square head is no longer recognisable as a sundial. The ball finial is missing, but some traces of decorative moulding remain on the cornice. It was removed from its original position in the centre of the High Street and re-erected on the pavement at the manse wall. In 1968 it was moved again and now stands once more on the High Street, on the pavement outside the Courthouse (Fig. 5).

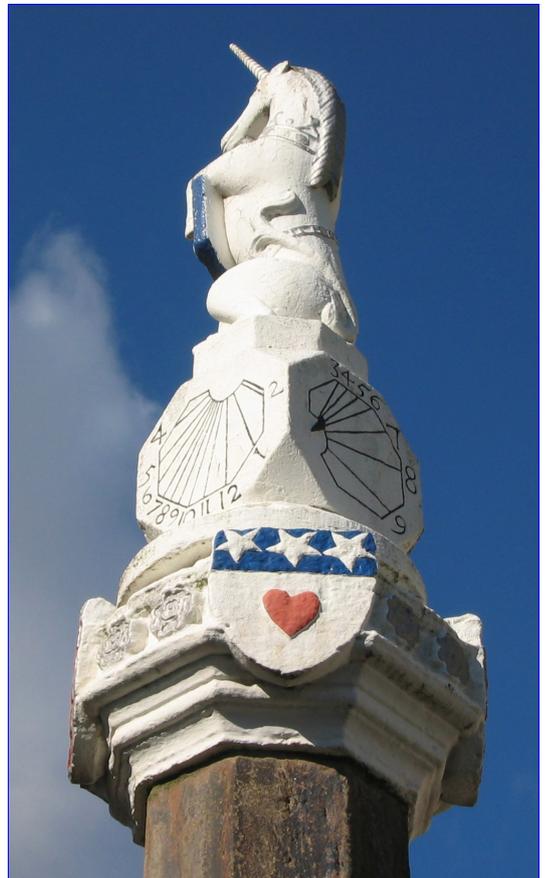
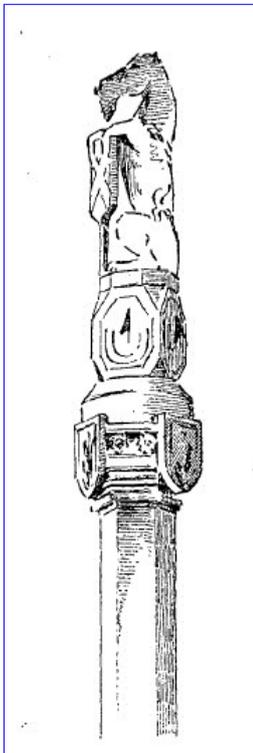
There is a fine mercat cross in Inverkeithing in Fife on the north side of the Firth of Forth. Ross tells us that:

*“this beautiful market cross [Fig. 6] was illustrated by Mr James Drummond and from the heraldry on the shields on the capital (The Royal and Drummond Arms Impaled – and of the Earl of Douglas) he connected the cross with Anabella Drummond, queen of Robert III, and says, ‘May not this cross have been a gift of the queen on the occasion of the marriage of her son, the Duke of Rothesay, with the daughter of the Earl of Douglas, in 1398, as the heraldry suggests?’ There is no reason for doubting Mr Drummond’s conclusion, and his suggestion is extremely probable, so far as regards the cross proper, with the unicorn on top, but in this case the dial is without doubt an addition of the seventeenth century. The height from the base of the pillar to the top of the unicorn is 14 feet 6 inches.”*

Ross says that the cross at Nairn in the Highlands is:

*“in a very dilapidated condition, and is entirely given over to the use of the billsticker, behind whose handiwork it can hardly be recognised. The top ball is broken away and the dials and capital are very much defaced. The height of the whole structure is about 7 feet 6 inches”* (Fig. 4).

If it was dilapidated in Ross’s day it is certainly more so now. It is dated 1757 and replaced an earlier mercat cross. It is on a circular shaft on a round base, but unfortunately



Figs 6, 7 & 8. The Inverkeithing Cross. Although Ross’s drawing seems to indicate a direct south face, the photograph shows the dials do not face the cardinal directions but decline significantly.

Despite some claims that the cross is from around 1400, it is probably 16<sup>th</sup>-century with the sundial and unicorn probably being added in 1688. Like many mercat crosses, this cross has moved around over the years. Originally standing in the High Street, it was moved a short distance to Townhall Street in 1799 before moving to its present position at the top of Bank Street in 1974 (Fig. 7). The cross underwent restoration in the second half of the 20<sup>th</sup> century with a replacement stone for the shaft, whilst the capital, sundial and unicorn have been recently re-painted. The sundial has four octagonal faces but only the north face has the remains of a gnomon; the others are all missing (Fig. 8).

The High Street of Airth near Falkirk is now bypassed by the main road a hundred yards or so to the east, so not many travellers see the mercat cross standing in the old town centre. Ross states that:

*“This fine market cross [Fig. 9] stands in the centre of the village. On the top of the shaft a square architectural composition, which resembles an old-fashioned eight-day clock, contains two sundials. Over one of them is the date 1697. On the other two faces there are first the Elphinstone arms and motto DOE WELL LET THEM SAY, and above are the initials C.E. On the other face are quartered the Elphinstone and Bruce arms, above are the initials, probably of Richard Elphinstone, eldest son of Sir Thomas Elphinstone of Calderhall; along with his initials are those of his wife, i.e., Jane Bruce, heiress of the estate of Airth.”*

This mercat cross seems to be still in its original position (Fig. 10). It consists of a stepped octagonal pedestal, an octagonal shaft with a splayed base, and a square head with a finial apparently representing an acorn. Its total height is just over seven feet. The SW and SE faces of the head bear shield-shaped sundials, the latter bearing the date 1697 (Fig. 11), and there are heraldic devices on the NE and NW faces as described by Ross.

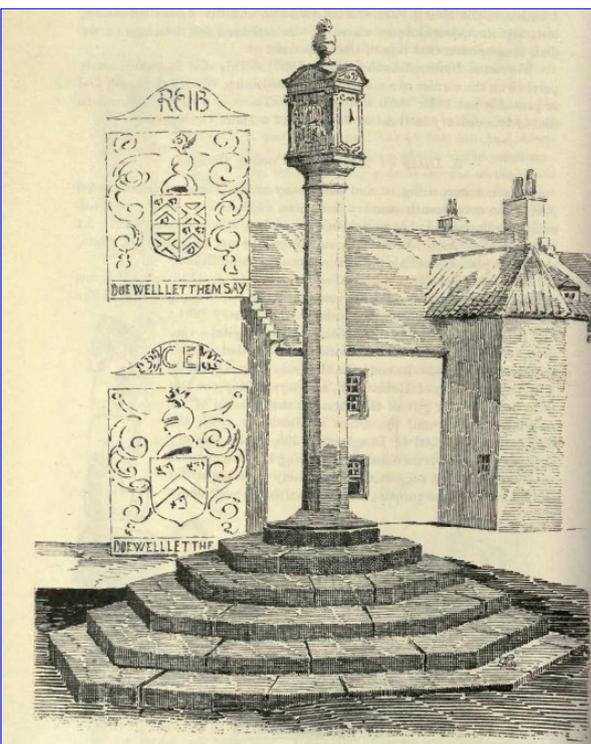


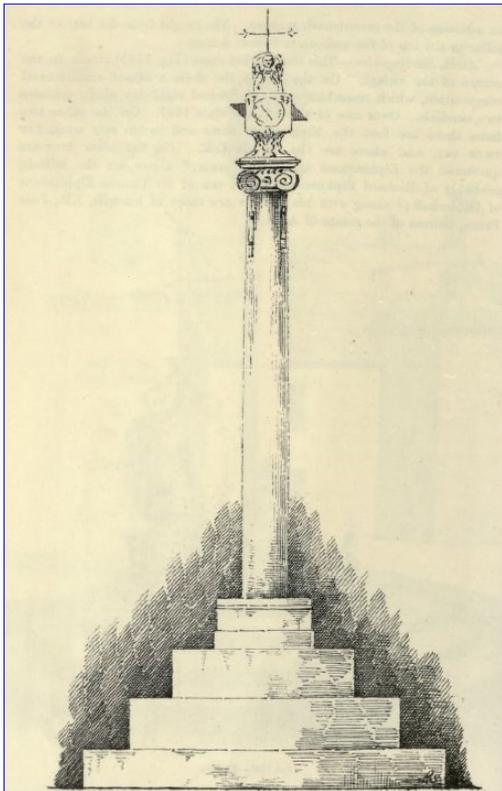
Fig. 11. The Airth Cross.

Back up north to the county of Moray, Ross describes the mercat cross in Elgin as:

*“this sundial [Fig. 12] surmounts what is known as the ‘Little Cross’. There is a dial on each of the four faces, and the north face bears the date 1733. The shaft and steps are supposed to be much older, and to have been erected at the expense of Alexander, third son of the Lord of the Isles, about 1402; but this date appears to be extremely doubtful. The steps and shaft are circular on plan. The height of the former measures 3 feet 8 inches, and to the top of the capital from the ground 12 feet 4 inches, the total height being about 15 feet.”*



Figs 9 & 10. The Airth Cross.

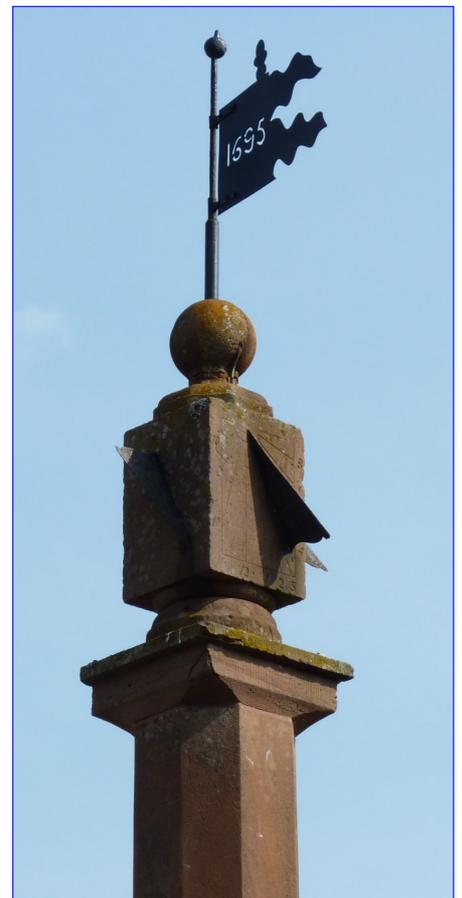
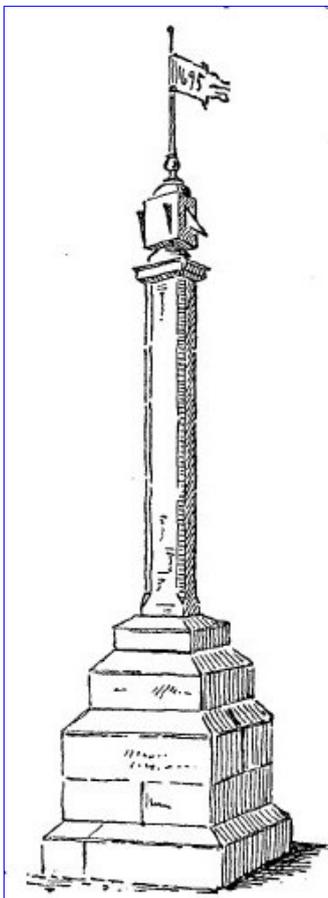


*Figs 12 & 13. The Little Cross at Elgin.*

This cross is known as the Little Cross as Ross says, as there is a larger mercat cross (without a sundial) called the Muckle Cross nearby, ‘muckle’ being Scots for ‘large’. The Little Cross stands in the High Street across the road from the Elgin Museum (Fig. 13). In its present form it consists of a tall column set on a flight of steps and capped by a sundial dated 1733, during which year the Cross was

probably re-built, but the copestone with carved figures is from an earlier structure. The original sundial and top of the column are now across the road in the museum having been copied and replaced in 1941.

Back in the Scottish Borders, Ross informs us that the upper part of the mercat cross at Galashiels (Fig. 14):



*Figs 14, 15 & 16. The Galashiels Cross.*

*“was brought to the ground by the foolish freak of a young man who climbed to the top and overbalanced the vane and sundial. They were, it appears, little damaged, and the youth escaped with a broken leg. When the cross was subsequently restored, it is supposed that the dial was renewed after the original pattern. The date on the vane is 1695.”*

The Galashiels cross does not stand in the town centre, but is a short distance away at the junction of Church Street and Scott Crescent (Fig. 15). Built in 1695, it was restored in 1887. It consists of an eight feet high octagonal shaft of red freestone set on a newer base. The capital is also newer but it supports the 17th century sundial surmounted by a spherical finial with a wrought-iron vane pierced with the date 1695 (Fig. 16). It has declining dials on all four faces, all with Arabic numerals, and is in excellent condition.

A fine mercat cross stands in Pencaitland in East Lothian and Ross states that:

*“this market cross [Fig. 17], surmounted by a dial, stands in the centre of the village. It is a good example of its kind, and is doubtless of late seventeenth century work.”*

This cross may date from 1695, when the village became a burgh, but to me it looks much older. It comprises of a tapering octagonal shaft with a cubic top bearing sundials on each of the four faces (Fig. 18) set on a tall square pedestal of much-weathered ashlar and a base of five shallow steps (Fig. 19). A plaque on the pedestal tells us that Pencaitland was one of the last places in Scotland where body snatching was attempted. A party of watchers caught two body snatchers in the very act and tied one of them to the cross where he received very rough treatment from a very angry crowd, many of whom were women.



*Fig. 18.  
The Pencaitland  
Cross in East  
Lothian.*

Ross describes the cross at Dryburgh Abbey in the Scottish Borders by saying:

*“This dial [Fig. 20], situated in the abbey grounds, is not unlike some of the market crosses just described, and more especially the one at Houston, the dial being the termination of an octagonal shaft. There are four faces. The one to the south has at the top of the dial the round face of the sun, with a goat above, and the motto WATCH WEEL. On the north side, in a position corresponding to the sun, is carved a rude figure, bearing a cross in one hand and something like a bell in the other, with the motto above FIDUCIA CONSTANTE. On another face are the Scott arms, with the initials T.H., and on another the Campbell arms first and fourth, girony; second and third, a galley, with the initials J.C.*

*Figs 17 & 19. The  
Pencaitland Cross  
in East Lothian.*



Figs 20, 21 & 22.  
The Abbotsford Cross.

Reading Ross's words again, although he describes it within his section on mercat crosses, he does not actually say that this dial was on a mercat cross, only that it is not unlike some of them described! He did like to make things difficult for me sometimes. Subsequent discussions with the curator at Abbotsford revealed that the dial had come to them from Drygrange near Melrose in 1989. Abbotsford and Melrose are only about three miles apart with Dryburgh Abbey a further ten miles distant. How and when it had made its way from Dryburgh Abbey to Drygrange is

not known. However, Andrew Somerville<sup>3</sup> identifies that it was taken from Dryburgh to Nenthorn House near Kelso in the 1920s so perhaps it made its way from there to Drygrange. The dial (Fig. 22) is much more weathered today and although the hour lines and numerals are clear enough, the mottoes and other depictions are difficult to decipher.

Interestingly, parts from Edinburgh's original mercat cross, demolished in 1756, are incorporated into the South Court garden wall at Abbotsford. The current mercat cross in Edinburgh is of Victorian origin, although it is understood that parts of the original stone shaft are embedded in its structure.

Houston is a lovely village to the west of Glasgow. Ross says only:

*"This is a simple village cross [Fig. 23] with a square block on the top having dial faces"*



*"As regards the conjunction of the Scott and Campbell arms on this sundial, the only circumstance known to us as at all likely to account for it is that Walter Scott, well known as "Beardie," the paternal great-grandfather of Sir Walter, married, in 1690, Mary Campbell, a niece of the Blythswood family. But as telling against the theory that this dial was set up by them we have to point out that the initials accompanying the arms on the dial do not correspond with theirs."*

This dial gave me a bit of bother to say the least. Other than Ross's words, I could find no record of a mercat cross at Dryburgh, a visit there was fruitless and the staff at the Abbey could not help either. Then in the summer of 2013, my wife and I visited the newly re-opened home of Sir Walter Scott at Abbotsford. This house has undergone a multi-million pound refurbishment and is well worth a visit, but even more so when I saw the totally unexpected cube dial in the South Court at the front of the house (Fig. 21). I immediately recognised it as the missing dial from Dryburgh Abbey although it was not on a mercat cross.

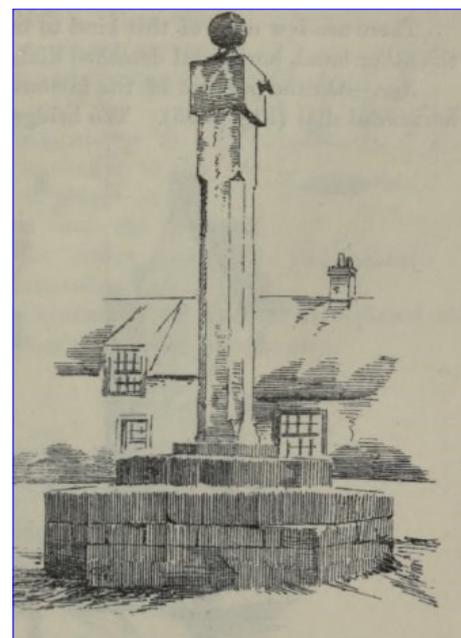


Fig. 23. The Houston Cross, sketched by Ross.



Fig. 24. The Houston Cross.

It can be seen that there is a ball on top and that the gnomons survive, but they are replacements. The south face has a ✠ for the noon mark (Fig. 24).

Ross identified and described one other mercat cross at Fettercairn in Aberdeenshire. He says:

*“This market cross [Fig. 25] is an octagonal shaft, surmounted with a capital having a sundial on its southern face. It bears the coroneted initials of John, first Earl of Middleton, and his arms (a lion rampant within a double tressure flowered and counter-flowered with fleur-de-luce, all countercharged), and on its north side is the date 1670. This cross stood originally in the now decayed village of Kincardine, which lost its prestige by the courts being removed to Stonehaven in the year 1600. It is probable that the shaft only was brought from Kincardine, and that the Earl had the present capital made for it then. On the shaft, as will be seen by the sketch, there is a representation on one side only of the standard Scotch ell, 3 feet 1½ inches long. This cross was noticed by the Queen in the ‘Leaves from the Journal of Our Life in the Highlands’.”*

Queen Victoria travelled widely in this area whilst staying at Balmoral, her Scottish Highland residence. The cross now stands on six octagonal steps (Fig. 26) as it did in Ross’s day, and the single dial face is now rather worn and has lost its gnomon (Fig. 27). A reminder of past times is the iron hasp with two links still attached. Those guilty of



Fig. 27. The south face of the Fettercairn Cross.

minor crimes were locked into an iron collar, ‘the joughs’ and chained to the cross.

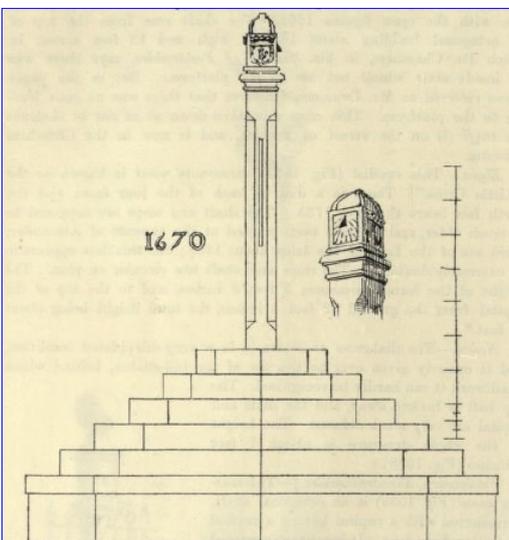
He also mentioned separately the mercat crosses at Leven and Lochgoilhead, but these are obelisks and will be described in a future article.

He noted, but did not provide a sketch or description, the cross at Doune in Stirlingshire (Fig. 28) which has a very eroded dial on one face.

There are also sundials on the mercat crosses at Duns (Fig. 29) – on a huge shelf and wrongly orientated; Lochmaben (Fig. 30); and Cumnock, which I have not yet visited, none of which Ross mentioned. Neither did he identify the cross at Melrose which also had a sundial. Restoration after 1986, when it was known that the sundial was present, appears to have replaced virtually the whole cross other than the base and



Above: Fig 28. The eroded mercat cross at Doune.



Left: Figs 25 & 26. The Fettercairn Cross.



Fig. 29. The Duns Cross.



Fig. 31. The clock face at Melrose.

Left: Fig. 30. The Lochmaben Cross.

the unicorn on top, and in doing so replaced the dial face with the numerals of a clock face (Fig. 31)!

You can't win them all.

#### REFERENCES and NOTES

1. Wikipedia identifies that there are 126 mercat crosses in Scotland, but only lists 100 of them. John W. Small identifies

106 mercat crosses in *Scottish Mercat Crosses*, Eneas MacKay, Stirling (1900).

2. D. MacGibbon and T. Ross: *The Castellated and Domestic Architecture of Scotland*, David Douglas, Edinburgh (1892).

3. Andrew R. Somerville: *The Ancient Sundials of Scotland*, Rogers Turner Books, London (1994).

dennis.cowan@btinternet.com

## The Future of Dialling

**O**n a recent family visit, a youngster called Stephen, having heard that I was a sundial maker, displayed a Plasticine dial he had made specially for me.



I was deeply touched by his genuine interest so in return I made a personalized phosphor bronze dial for his home location near Basingstoke. A printed paper version on MDF was included thereby taking the sundialling 'message' into school perhaps.

Simon, Stephen's ingenious father, has since become infected with the dialling 'bug' and recently sent me a jpeg of



his own creation, digitally engraved in MDF and water-proofed temporarily with lacquer. Apart from celebrating his newly-acquired delineation skills its purpose was to locate the best situation in the garden for Stephen's bronze version.

From small Plasticine 'seeds' new diallists grow!

Tony Moss [lindisun189@gmail.com](mailto:lindisun189@gmail.com)

# FROM OLD TO NEW – A RESTORATION PROJECT

## The Nazeing Church Sundial

IAN BUTSON

The church of All Saints, Nazeing is located to the south-west of Harlow, standing high on an exposed and windy ridge on the east side of the Lea Valley in Essex. As well as having a mass dial on the nave of the church, complete with an old iron gnomon, the tower of the church also has a large carved wooden sundial. This vertical dial is of some interest, but had become very badly worn over time, so restoration was suggested. It is mounted high up on the south face of the staircase to the bell chamber at the south-east corner of the tower, as shown in Fig. 1. Over the years, the surface of the dial had become worn and also the gnomon mounting holes had allowed the gnomon to become loose and to be blown sideways by the prevailing wind in this exposed location.

A benefactor had made funds available to restore a number of sundials, with this being on the list that he would like to have restored. Early in 2008, approaches were made to the local vicar and the church authorities, with the offer of restoration of the dial, and this was readily accepted towards the end of the year. With the acceptance of the restoration offer agreed, Barrie Winter, a chair-maker and wood-carver friend of the author, was contacted and agreed to make a new dial, if restoration of the original was not practical.

Before any work could commence, the old dial would need to be removed from the tower to inspect its condition and also for analysis of its unusual furniture. As the ground at the base of the tower slopes badly, the simple use of a ladder or even of a ‘cherry-picker’ type of hoist to reach the dial was thought unsuitable, but that scaffolding would be required to remove the dial in safety. In August 2009, scaffolding was erected and the dial was removed by Bryn Pateman, a friend of the benefactor (Fig. 3).

*Fig. 3. Removing the old dial from the tower.*



*Figs 1 & 2. The unrestored dial on the tower of Nazeing Church.*

Fig. 4. The construction of the back of the old dial.



On inspection, the dial was found to have been constructed of three pine boards, approximately 1" thick and carved in relief. Upon later inspection by experts, it was considered that the wood, as indicated by the date of 1765 shown on the dial, was almost certainly that of the original, but had undergone a number of repairs in the past. The carved woodwork of the dial had been mounted onto a support backing of tongue-and-groove boards, possibly typical of stock material used for railway carriage woodwork of the late 1800s or early 1900s period. The gnomon was in generally sound condition, but only just resting in the dial woodwork and also without its retaining pins to the rear of the body of the dial, thus allowing it to move loosely on the face of the dial.

On closer inspection and due to the overall poor condition of the dial, it was felt that a completely new dial would be the most appropriate choice in the restoration process.

#### Analysis of Dial Markings

The true latitude of Nazeing is  $51^{\circ} 45'$  whereas that shown on the original dial is  $51^{\circ} 32'$ , that being the value for London. When the dial was originally made it was likely that



Fig. 5. Glancing illumination to highlight the carving.

the latitude of only major locations would have been accurately known, but not for smaller towns, so the nearest major location values would have been used to delineate this dial.

Although some features of the markings on the dial could be identified with some certainty, it was not possible to fully identify them all. Side-lighting of the dial by means of an 'anglepoise' lamp proved to be particularly successful, especially so in a darkened room, as shown in Fig. 5.

Close inspection of the furniture fully confirmed the motto as "*Meridies Solarium*", the latitude details, declination lines for the equinoxes and solstices and the date of 1765.

A series of vertical lines, with adjacent lettering carved across the lower area of the dial, previously unidentified, proved to be solar azimuth lines with eight directions noted, from SE through South to SW being indicated.

A sheet of clear plastic ('Melinex', an ICI product) was fitted over the dial and the original furniture markings traced out with a marker pen to produce a better picture and gain a greater impression of the original markings on the dial plate (Fig. 6).

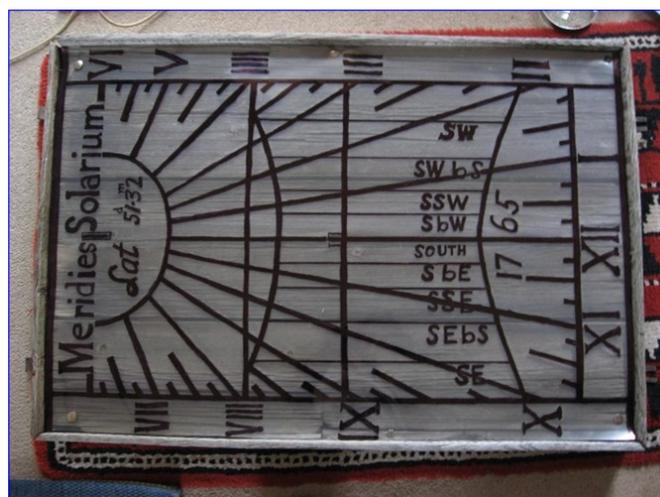


Fig. 6. The carving transferred onto a Melinex sheet.

#### Design and Construction of the New Dial

Full-size plans were produced with the aid of a PC-Sundial design program showing a possible new layout, but only including the four major azimuth lines and lettering to reduce overcrowding, but also to maintain elements of the original dial features incorporated into the new design. With all the other features to be retained from the original dial, a final design layout was decided upon.

The maker selected chestnut wood for the construction of the new dial as this is a very stable, long-lasting wood having excellent weathering characteristics which would suit the location of the dial in the exposed location on the church tower at Nazeing. Three pieces of the wood were used, being tongue-jointed and glued vertically, similar to the construction of the leaves of a dining-room table. A copy of the plan was pasted to the dial plate to allow the maker to work on the design on the wood with a routing

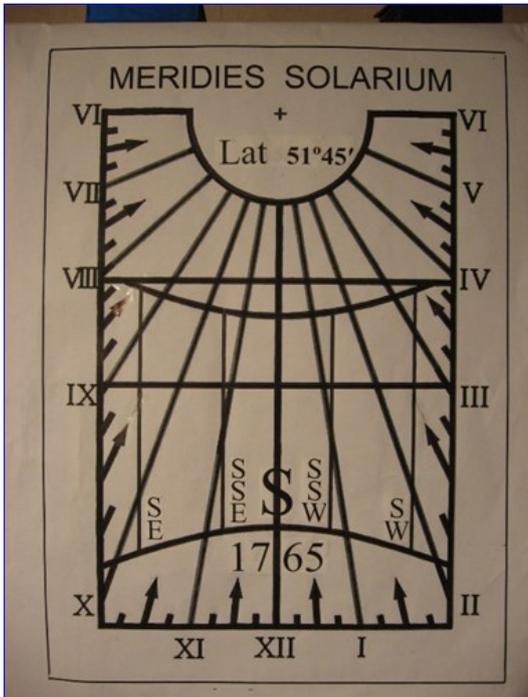


Fig. 7. Drawing for the new dial.

machine and also carve the more intricate details to plan. The restoration date of 2010 was also included on the new dial, with the maker also being persuaded to sign his work, "BW Fecit"

Figs 8 and 9 show the work in progress, and the maker Barrie Winter with the old and new dials.



Fig. 8. The new dial with some areas still to be removed by the router.



Fig. 9. Barrie Winter with his newly-completed dial and the original.

Following construction, a number of coats of linseed oil were applied to the dial to assist with its preservation. The linseed oil would allow the wood to 'breathe' but not seal the surface to trap in moisture and hasten any rotting, which a covering of paint or varnish might have caused.

There had been an earlier delay in the construction, due to illness, but by July 2010 all work on making the dial had been completed and the new dial was collected from Yorkshire.



Fig. 10. Close-up of the new dial, with linseed oil applied and showing the gnomon fixing and the brass nodus.



Figs 11 & 12.  
Back and  
front of the  
finished dial.



### Preparing the New Dial for Installation

Due to the difficulty in working on the dial *in situ* at the church site having the uneven ground at the base of the tower, which had required the use of scaffolding, it was decided that for future maintenance purposes, the gnomon assembly should be directly accessible from the front of the dial plate and not fixed through to the rear of the plate. This would enable it to be removed without having to remove the whole dial from the tower of the church. To this end, a small upper fixing plate was welded to the gnomon at the correct angle and side-support brackets were also fitted to the gnomon's support strut, thus allowing the assembly to be simply attached directly to the front of the dial using brass woodscrews. This arrangement would allow the gnomon to be more easily removed for any necessary minor work, without needing to remove the whole dial plate from the brickwork of the tower.

A nodus for the gnomon was also provided to enable the dial furniture to be fully utilized. This nodus, constructed in the form of a crossbar, was formed from the 'earth pins' of two redundant '3 pin, 5 amp' electric mains plugs. Both pins were tapped to enable a short length of threaded stud- ding to join the two together through a newly-drilled hole at the correct position on the style edge of the gnomon.

The two original fixing straps were fixed to the rear of the dial with brass woodscrews, and additional galvanised metal strips were fitted horizontally to provide further reinforcing for the woodwork of the dial.

### Erection of the New Dial

In August 2010 scaffolding was re-provided to enable the new dial to be installed on the church tower. Installation of the new sundial by Bryn Pateman went fully to plan, with it subsequently being blessed by the church vicar, the Rev. Catherine Pennington. The whole operation was also over- seen to the satisfaction of the benefactor.

A further visit was made to Nazeing Church to photograph the replacement dial following the removal of the scaffold- ing and, as past experience would suggest, on arrival the sun was hidden behind the clouds! However, after about an hour's wait, the clouds parted for a few moments, with the sun briefly emerging through hazy skies. The shadows produced on its newly-carved surface indicated that the restored dial really was working. The sun then vanished behind the clouds again!

*ian@tipsdial.orangehome.co.uk*



Fig. 13. The newly-installed dial.

# THE LITTLECOTE DIAL

J. MIKE SHAW



Fig. 1. Littlecote House.

Littlecote House (Fig. 1) is located near to Hungerford in Berkshire. It is actually three houses in one. The medieval manor dates back to 1250 but a Tudor manor was later added by the Darrell family. The house was acquired by the Pophams in 1589 and they then added a further Elizabethan manor. The first Popham to own the manor was Judge John Popham who was Speaker of the House of Commons from 1580 to 1583, Attorney General in 1581 and 1592, and Lord Chief Justice of England from 1592 to 1607. He presided over a number of famous trials, notably of Sir Walter Raleigh (1603) and the conspirators of the Gunpowder Plot, including Guy Fawkes (1606). He was also involved in the trial, at Fotheringay, of Mary, Queen of Scots (1587) which resulted in her execution.



Fig. 2. Littlecote sundial pillar.

My wife and I recently went on a guided tour of the house and, at the conclusion, I asked the tour guide about the sundial that I had noticed outside the main entrance (Fig. 2). He had never even noticed that there was one there, so I went and had a look at it.

It was quite difficult to get close to the dial. The gardeners had surrounded it with a wide circular box hedge and had planted many lavender plants all around the dial pillar. However, I persevered and was eventually able to get a good look at it.

The maker's mark was clearly visible (Fig. 3) and reads:

Made by G. ADAMS  
at TYCHO BRAHE'S HEAD  
the corner of Raquet Court  
FLEET STREET  
LONDON



Fig. 3. Maker's mark.

I contacted John Foad, the BSS Registrar, who said that, while the dial was recorded (SRN 2114), there were few details and he could do with a better photograph. I next emailed Jill Wilson, the BSS biographical contact, who kindly sent me Adams' known history. George Adams Snr (1704–1773) was a prolific dial maker who was appointed Scientific Instrument maker to George III. Jill also informed me that he moved to the Racquet Court address (mis-spelled on the dial) in 1738, so the dial can be dated to after that date.

The dial has numerous city names engraved around the dial plate, giving their respective times of solar noon. The name "Littlecot" (no 'e') was engraved in the dial's noon gap, indicating that the dial was made for its current location. This was confirmed as also engraved was the latitude of 51° 28', correct to 2 minutes of arc according to the GPS on my mobile phone.



Fig. 4. EoT adjustment for August.

There was an “Æquation of Natural Days” on the dial, giving the adjustment, to the nearest minute, required to convert dial time to watch time. In the 1700s this would give local mean time, of course. The four dates on which the adjustment was zero were all early by a consistent 11 days compared with this year’s Equation of Time for Greenwich, hence the dial was made before 1752 when we changed from the Julian to the Gregorian calendar. So we can date the dial to within a 14-year period. The zero adjustment date for 20 August is shown in Fig. 4.

At the south side of the dial is a coat of arms. This was difficult to decipher, so a quick visit to a local pharmacy was made to acquire some talcum powder. A liberal sprinkling followed by a wipe-over revealed a halved shield (Fig. 5).

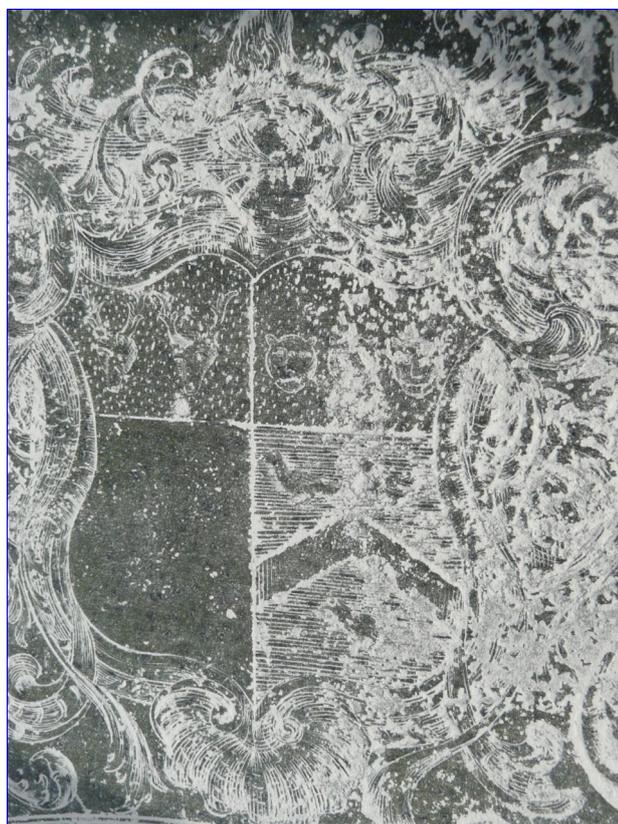


Fig. 5. Coat of arms.

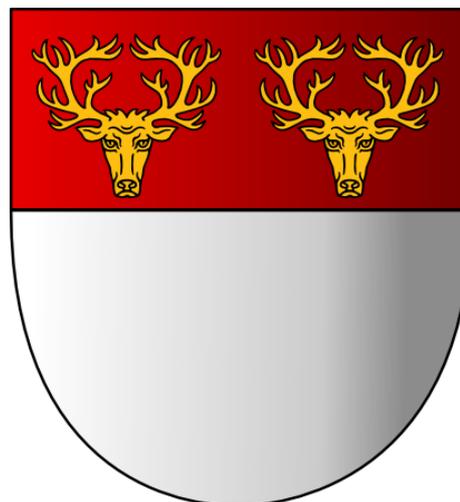


Fig. 6. Popham coat of arms, courtesy of Pauline Mobey.<sup>1</sup>

The left (*dexter*, in heraldic terminology) side showed two stags’ heads on a dotted (*or*, gold) background above a blank (*argent*, silver) shield. This is the Popham family coat of arms (Fig. 6). The right (*sinister*) side has what I took to be three leopards’ heads on a gold background above and a chevron with vertical hatching (denoting the colour *gules*, *i.e.*, red) between three birds below. The birds’ section is engraved with horizontal hatching denoting *azure* (blue). If this is representative of water, the birds could be water fowl of some description. I have been unable to identify the family associated with this emblem.

I managed to contact and meet with local genealogist, Pauline Mobey, who has been researching the house ownership. She showed me her copy of the Popham family tree,<sup>1</sup> and the most likely family member to have installed the dial is Edward Popham (1712–1772), MP for Wiltshire, who was married to Rebecca Huddon (1709–1742).

It’s always as well to keep your eyes peeled when on holiday – who knows what you might find.

#### ACKNOWLEDGEMENTS

Thanks to Jill Wilson for the biography of George Adams. The information about Littlecote House, the Popham family history and permission to reproduce their coat of arms was kindly provided by Pauline Mobey ([www.people-and-places.info](http://www.people-and-places.info)) who has also given much helpful information and advice.

#### REFERENCE

1. Pauline Mobey: *Littlecote Lives and Legends – The Story of a Great Estate and Its Famous Families* (2011).

[jmikeshaw@ntlworld.com](mailto:jmikeshaw@ntlworld.com)

# THE SAD STORY OF A SUNDIAL

PIERS NICHOLSON

This is a story of a sundial commission which started out full of promise, but has ended up as a sundial which has never had a chance to tell the time, and which now never sees the sun.

In the early 1990s, the cycle charity Sustrans was making great headway with its proposal for a national network of 6,500 miles of cycle routes, and called for volunteers to do some Trailblazing rides. The purpose of the rides was to get local authorities along the proposed routes interested in the project. In 1996, I rode from Holyhead across the whole of Wales to Chepstow. The ride was notable for the almost continuous rain and for the two or three civic receptions each day where we got a sausage roll, some orange juice, and a speech from the Mayor in Welsh and in English. One mayor, when he moved into English, said "I am sorry about the weather, but without the rain, we would all have been English 500 years ago!"



*Fig. 1. Picture of the sundial a year or two after the opening. Note cycle skid marks.*

The following year, Sustrans decided they had done enough of the Trailblazing rides, and that they would switch to work camps. Did any of their volunteers have any special skills? I naturally said that I would be happy to make a sundial for them. They were interested in this idea, and said that they had a 15 ft cast-iron wheel from a canal pump house – would that be suitable? Of course, it turned out to be hopelessly impracticable, but I did then design an equatorial sundial with 24 spokes reminiscent of a cycle wheel. We had some discussions about this, but it was going to be quite expensive, and there would be difficulty getting it under motorway bridges, so that idea did not work out either.

I eventually suggested that we could make a very simple horizontal sundial, using a stainless steel tube 6 m in length, surrounded by a horseshoe-shaped bench with the hour-lines marked on it. This basic design was accepted.

That year, they held six, two-week long, practical construction camps to build the Network – Aberfoyle, Lincoln, Leicester, Chippenham, Sirhowy Valley and Heligan. The Lincoln and Chippenham sites were both planned to have new sundials, and a railway sleeper was put down in the soil at each location. In fact, only the Lincoln sundial was built, and it stands on the cycle path on the south bank of the River Witham, about one mile from Lincoln. The cycle route has since been extended beyond Washingborough, to Barden and beyond that to the town of Boston, and is now known as the Water Rail Way.

The project was dogged by misfortune from the start. The selection of the site was particularly unfortunate, because it was subject to floods almost every winter. The week selected for building the sundial was almost completely overcast (which made it difficult to check the meridian line as the sundial was erected), and much of the time it was raining (which the volunteers found discouraging). And when we came to dig the large hole for the concrete slab to keep the gnomon in place (a 4-foot cube), there was a deluge overnight, and it was full of water in the morning, so we could not pour the concrete!

The original plan had been to cast the horseshoe in fine-grained concrete to make a bench of a foot or so off the ground, and the hour lines would then be marked by pressing a small piece of wood on edge into the wet concrete. But the plan was changed at the last minute, either by accident or design. The horseshoe was reduced to ground level, and the concrete was standard ready-mix, so it was not possible to get a very satisfactory line in the concrete.

Anyway, with all these vicissitudes, the sundial was finished, the inside of the horseshoe was filled with gravel, and we all stood round to admire the result. The official opening had been arranged for a few weeks later, but we all admired the inscription on the gnomon which records,

"This sundial was designed by Piers Nicholson for the opening of the Witham cycle path on 4th July 1997 with the support of the Washingborough Parish Council, the Lincoln City Council, and the North Kesteven District Council, and was built by Sustrans."

But there was a snag even with that – when the 4th July arrived, John Prescott was unable to attend, so the opening ceremony was cancelled!

The real difficulties for the sundial then started. First, the local youth discovered that the gravel circle made a marvellous skid-pan for bicycles, and the gravel got to look very



Figs 2 and 3.  
The sundial in  
summer 2013.



unappealing. And then the next winter, the River Witham came over its banks and washed an inch or more of mud over the gravel and the horseshoe, so it was no longer possible to read the sundial.

Even worse was to come as the years passed. Each winter, the river deposited a bit more mud over the sundial, and each summer the vegetation grew up on the originally completely open site. So when I visited the sundial last year, we could not actually find the sundial at all! We asked several people, and eventually one of them said “It’s in that clump of trees over there”. We had not thought of looking for it in

the middle of a wood, but there indeed it was, with the gnomon as good as new, but no possibility of it casting a shadow at any time of day, or of reading the time if it did.

It would not actually take much to rescue this sundial. All it would need would be to fell the trees to allow an open aspect to the east and the west, and to reinstate the original design for a raised bench of fine concrete with incised hour lines. So let’s hope that Sustrans or the local council will be able to find the very modest resources needed to make this possible.

*piersnicholson@hotmail.com*

## NEWBURY ONE-DAY MEETING 27 September 2014

KEVIN KARNEY and IRENE BRIGHTMER

This year’s meeting at Newbury was once again a most agreeable occasion. Not only did we enjoy the customary mix of excellent talks, exhibits and the sales corner but there were some novelties as well.

One new feature was that John Davis demonstrated his X-ray equipment. Those who had brought along metallic parts of sundials offered them to John for a free analysis. Some brass was found to have a copper content of over 90%. David Brown spoke, in his usual dry and witty fashion, of the many pitfalls that real-life sundial projects bring. These are generally not from the fault of the gnomonist – but the efforts of well-meaning but un-informed planners, architects and contractors. Some examples followed. The Olympic Park dial surrounded by beautiful young trees – which will soon grow to shadow the dial. A dial in

Walthamstow, where planners could not understand that the style needed to be parallel to the earth’s axis. Getting the client to move from a south-facing but overshadowed dial to a west-facing wall, where the target audience (the boy scouts who play football in the afternoon) might actually see the dial working; then making the style strong and replaceable to allow for the flying football.

Kevin Karney, who accepts that most will be content with a common-hours dial, thinks that gnomonists should attempt to bridge the gap between solar and national mean time. This is so that our youth are not frustrated by their inability to match the sundial to their phone clocks. Accordingly, an equation of time table or some other device should be *de rigueur*. One such device

would be a double-plate design with curved hour lines – one plate for winter and spring, the other for summer and autumn. However, Kevin showed an example from Australia of a single-plate mean time dial using concentric month rings, each ring having hour lines cutting obliquely across the ring that reflected the latitude-adjusted equation of time for that month. Kevin has prepared the detailed graphics for such a dial. Certain design parameters were discussed – where to place the labelling hour numbers, and whether to assign January to the inner or outer ring.

Mike Shaw has found a handsome dial in Littlecote House – where Judge Sir John Popham lived. (He presided over the trials of Sir Walter Raleigh and Guy Fawkes and was involved in the trial of

Mary Queen of Scots which resulted in her execution.) By analysis of the Equation of Days table on the dial (pre-Gregorian calendar change) and other evidence from advertisements by the maker (a Mr Adams), Mike was able to date the dial between 1738 and 1752. Mike also sought advice on preservation of the Port Sunlight Sphinx Cross Dial which was set up to commemorate the Relief of Mafeking. As an initial repair, Mike had made a (cheap) wooden cross to replace the broken stone one. Many, many years later, his oak cross (which he exhibited) needs further preservation.

Peter Ransom – echoing the talk by David Brown – spoke of a dial commission for a very wealthy Hampstead Heath house conversion – where architects' plans were directionally wanting. There were demands for a symmetrical dial on a wall that was not south- but more west-facing. The need to make a full-size maquette of any proposed dial was emphasised, to convince and educate both architects and clients.

Frank King – in his Sherlockian manner – described investigations into three dials at the Bodleian Library in Oxford. One is seen only in tiny form in a highly detailed 1675 engraving. This microscopic image still has the detail to show that the dial was correctly delineated. There is no evidence of this dial today. The engraving also shows the south window of Convocation House (where Charles I presided over the House of Lords when chased out of London). The engraving shows a diamond-paned window – but no sundials. Today, in the south- and west-windows, there are identically-sized painted glass dials. However, while both are easily seen, only the west one is mentioned by Gatty and Gunther. Frank (a staunch Cambridge man) opined that Gatty and Gunther had noted that the west dial was the wrong way round and thus could not be mentioned for fear of embarrassing those crusty Oxford dons. His detailed research suggests that the dial was originally correctly orientated but, during some period of restoration work, was put back in the window reversed. See the September issue of the *BSS Bulletin* for the full story.

#### Afternoon

The lunch break provided members with the opportunity to enjoy the fascinating variety of exhibits, collections and

work in progress brought along by fellow members. For many of us this is always a highlight of the day. Society publications were also on sale, so we have to remember our chequebooks or cash!

After lunch there was a departure from our usual September programme, with an outside visit. David Pawley had arranged for us to see the Druid helical mean-time dial installed in the garden of the nearby Bayford House Care Home. This dial was designed and built by John and Barrie Singleton and was placed under the window of the room in which John died in 2009. For details, see the December 2013 issue of the *BSS Bulletin*.



*The Singleton sundial proved to be a magnet for photographers.*

Back to our seats for the afternoon session to hear another contribution from our chair for the day, Peter Ransom, describing two horizontal sundials made in Bristol, which he had brought along. Neither of their makers is in the *BSS Biographical Index*. Henry Edgeworth worked in the 18<sup>th</sup> century and had signed the nine-inch diameter dial. He also made octants and was listed in the Bristol Trade Directory (further information from the *Scientific Instrument Society Bulletin*, June 1999). Thomas Blinman's dial is eleven and a half inches in diameter. He was described as a

'Coppersmith and Brazier' and a 'Brass Founder and Clock Manufacturer' until he became bankrupt in 1831. Can anyone add to these biographies?

Tony Wood's contribution was enigmatically entitled 'ITS', otherwise 'An Introduction to Sundials'! Tony had assembled a PowerPoint presentation to describe and explain sundials, consisting of images of a huge variety of dials with short captions. What a good idea of something to do with our favourite dial images – to share with friends, or for a general talk to a local group, or just for ourselves! Tony also showed us illustrations of a new 2013

dial in Gloucestershire made by Ben Jones for the Nature in Art Museum. Tony was greatly involved in the concept and commissioning of this dial, so it was a delight for us to see the successful result.

The day ended all too soon. Peter Ransom thanked everyone for their contributions, and their attendance. Special thanks were given to the organiser, our local man on the ground, David Pawley of Newbury, and to his colleague, Wendy from Hungerford, for cheerfully plying us with ample drinks and snacks throughout the day.

# HONORARY OFFICIALS OF THE BRITISH SUNDIAL SOCIETY

*Patron:* The Hon. Sir Mark Lennox-Boyd

*President:* Christopher St J H Daniel MBE

*Vice-Presidents:* Mr David A Young & Mr Frederick W Sawyer III

## TRUSTEES

Dr Frank King 12 Victoria St CAMBRIDGE CB1 1JP	(Chairman) Tel: 07766 756997 chairman@sundialsoc.org.uk	Mr Chris H K Williams c/o The Royal Astronomical Society Burlington House Piccadilly London W1J 0BQ	(Secretary) Tel: 01233 712550 secretary@sundialsoc.org.uk
Mr Bill Visick Kites Nest Cottage Kites Nest Lane BOURTON Dorset SP8 5AZ	(Webmaster) Tel: 07901 954568 webmaster@sundialsoc.org.uk	Mr Graham Stapleton 50 Woodberry Avenue NORTH HARROW Middlesex, HA2 6AX	(Treasurer) Tel: 020 8863 3281 treasurer@sundialsoc.org.uk
Ms Jackie Jones 51 Upper Lewes Rd BRIGHTON East Sussex, BN2 3FH	(Membership Secretary) Tel: 01273 673511 membership@sundialsoc.org.uk	Mr Chris Lusby Taylor 32 Turnpike Rd NEWBURY Berks, RG14 2NB	(Conference Organiser) Tel: 01635 33270 conferences@sundialsoc.org.uk
Mr David Brown Gibbs Orchard, Sutton Rd SOMERTON Somerset, TA11 6QP	(Help and Advice Coordinator) Tel: 01458 274841 HelpAndAdvice@sundialsoc.org.uk		

## OTHER SPECIALISTS

Dr John Davis Orchard View, Tye Lane FLOWTON Suffolk, IP8 4LD	(Editor) Tel: 01473 658646 editor@sundialsoc.org.uk	Mr Peter Ransom 29 Rufus Close Rownhams SOUTHAMPTON Hampshire SO16 8LR	(Education) Tel: 023 8073 0547 education@sundialsoc.org.uk
Mr A O (Tony) Wood 5 Leacey Court CHURCHDOWN Gloucester, GL3 1LA	(Mass Dials) Tel: 01452 712953 massdials@sundialsoc.org.uk	Mr J Mike Shaw 3 Millwood Higher Bebington WIRRAL, CH63 8RQ	(Newsletter Editor) Tel: 0151 608 8610 newsletter@sundialsoc.org.uk
Mr John Foad Greenfields Crumps Lane ULCOMBE Kent, ME17 1EX	(Registrar) Tel: 01622 858853 registrar@sundialsoc.org.uk	Mrs Elspeth Hill 4 The Village Stonegate Nr WADHURST East Sussex, TN5 7EN	(Sales) Tel: 01580 201720 sales@sundialsoc.org.uk
Miss R (Jill) Wilson Hart Croft 14 Pear Tree Close CHIPPING CAMPDEN Gloucs., GL55 6DB	(Biographical Projects) Tel: 01386 841007 biographical@sundialsoc.org.uk	Mr David Pawley 8 Rosemary Terrace Enborne Place NEWBURY Berks., RG14 6BB	(Newbury Meeting Organiser) Tel: 01635 33519 newbury@sundialsoc.org.uk
Mr Nick Orders 14 Gordon Rd Burton Joyce NOTTINGHAM NG14 5GN	(Librarian) Tel: 0115 931 4313 librarian@sundialsoc.org.uk	Mr Ian R Butson 60 Churnwood Rd Parsons Heath COLCHESTER Essex, CO4 3EY	(Photographic Competition) Tel: 01206 860724 photos@sundialsoc.org.uk

The British Sundial Society  
c/o The Royal Astronomical Society  
Burlington House  
Piccadilly  
London, W1J 0BQ

