

The British Sundial Society

BULLETIN



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GUIDELINES FOR CONTRIBUTORS

1. The Editor welcomes contributions to the *Bulletin* on the subject of sundials and gnomonics and, by extension, of sun calendars, sun compasses and sun cannons. Contributions may be articles, photographs, drawings, designs, poems, stories, comments, notes, reports, reviews. Material which has already been published elsewhere in the English language, or which has been submitted for publication, will not normally be accepted. Articles may vary in length, but text should not usually exceed 4500 words.
2. **Format:** The preferred format for text is MS Word or text files, which should be sent by email to editor@sundialsoc.org.uk. Material may also be sent on CD or as a typescript.
3. **Figures:** Pictures should be sent as separate jpg (do not over-compress) or tif files – do not embed them in Word files. For email attachments, do not exceed 10 Mbytes per message. For photographs, colour or black-and-white prints should be as large as possible (up to A4). Slides and transparencies are also acceptable. Drawings and diagrams should be in clear, strong black lines on a white background. Each figure should be referred to in the text, and a list of captions for the figures should be included. Captions should be sufficiently informative to allow the reader to understand the figure without reference to the text.
4. **Mathematics:** Symbols used for the common dialling parameters should follow the conventions given in the Symbols section of the *BSS Glossary* (available at sundialsoc.org.uk/discussions/glossary-a-z/). Consult the Editor if in doubt or for help in laying out equations.
5. **Notes:** The *Bulletin* does not use footnotes. Where additional information is required, each note should be numbered as a reference with a superscript number. For very long notes, use an appendix.
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For papers and articles: Author’s name; title of article in single quotation marks; name of journal in italics (this may be abbreviated); volume number in Arabic numerals underlined; first and last page numbers; date in brackets.

Examples:

A.E. Waugh: *Sundials, Their Theory and Construction*, Dover, New York (1973).

J. Davis: ‘The Zutphen quadrant’, *BSS Bulletin*, 26(i), 36–42 (March 2014).

A.A. Mills: ‘Seasonal hour sundials’, *Antiquarian Horology*, 19, 142–170 (1990).

W.S. Maddux: ‘The meridian on the shortest day’, *NASS Compendium*, 4, 23–27 (1997).

7. **Acknowledgements:** These should be as brief as is compatible with courtesy.
8. **Address:** The email address of the author should normally be given, right-aligned and in italics, at the end of the article unless the author, when submitting the article, expresses a wish that this should not be done. Authors may, if they wish, supply a very short biography and photograph (see previous editions of the *Bulletin* for examples).
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editor@sundialsoc.org.uk

Front cover: *New sundial for the Planetarium in St Petersburg. Photo by Valery Dmitriev, who explains its design in his article on pages 10–11.*

Back cover: *One of the two obelisk dials at Kelburn Castle, North Ayrshire, described on pages 12–15. Photo: Dennis Cowan.*

BULLETIN

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CONTENTS

1. Editorial
2. The Restoration of a Horizontal Dial by Henry Sutton – *John Davis*
8. Delhi Sundial – *FHK*
10. Two New Dials of Saint Petersburg – *Valery Dmitriev*
11. Book Review – *Wood*
12. In the Footsteps of Thomas Ross. Part 18: The Kelburn Castle Obelisks – *Dennis Cowan*
15. A Birthday Dial – *JD*
16. Sundial Artist, Dorothy Hartley – *Mike Cowham*
20. The Sundials and Dialmakers of London's Moorfields – A Perambulation – *Graham Stapleton*
22. Book and Exhibition Review – *Mueller-Maerki*
24. Investigation of a John Bird Sundial – *Ian R. Butson*
28. New Dials: Lynton, Devon – *JD*
29. History on a Sundial – *Jackie Jones*
30. Three Sundials of Barcelona – *Anthony Capon*
32. Dial Dealings 2016 – *Mike Cowham*
36. Postcard Potpourri 38: A Comic Postcard – *Peter Ransom*
37. How Wrong Can You Be? – *Graham Stapleton*
40. Article Review – *Davis*
41. Readers' Letters – *Foad, Greenberg*
42. Trustees' Annual Report 2016–17
44. BSS Accounts for the Year Ended 31st December 2016

EDITORIAL

The annual cycle of issues of the *Bulletin* is now at equilibrium, having changed very slightly as a consequence of the Society becoming a Charitable Incorporated Organisation. The new Constitution requires us to provide members with the annual Trustees' Report and the audited Accounts in advance of the Society's AGM. Accordingly, the March issue each year includes the Trustees' Report and the Accounts for the previous calendar year.

The June issue each year includes a report of the annual conference and the AGM, and the December issue includes a report of the annual Newbury meeting. It is only the September issue that lacks a formal report.

In addition to our usual range of articles from regular and occasional authors, there are no fewer than three Reviews in this issue. One of these is a fascinating description by Fortunat Mueller-Maerki of an exhibition in New York: *Time and Cosmos in Greco-Roman Antiquity*. From this, I note that the Roman Portable sundial, which I was hoping to see while in Oxford for this year's conference, will still be in New York.

As always, the Editorial Team would like to encourage BSS members to submit articles or short items on sundial themes for publication in the *Bulletin*.

Frank King

THE RESTORATION OF A HORIZONTAL DIAL BY HENRY SUTTON

JOHN DAVIS

This article is a version of a talk given at the 2016 BSS Newbury meeting.

Henry Sutton (c. 1624–1665) was the leading English mathematical instrument maker in the middle of the 17th century. He is best-known for his instruments featuring stereoscopic projections (see Fig. 1 for an example) and other complicated features and, indeed, he is known to have worked out how to draw some of these instruments from only a basic description, so clearly he had a good understanding of the practical mathematics behind them.¹ As well as making double horizontal dials and various quadrants, he also produced the engraved plates used as illustrations in books by John Collins. This understanding of the printing process allowed him to develop the technique of ‘counterproofing’ whereby a wet print pulled from an engraved instrument is used as a printing plate (in mirror image) to make a second counterproof print mirrored back to the original appearance.² These counterproofs, stuck to a wooden core,



Fig. 2. Overall view of the unrestored dial.

were the basis of the industry of relatively cheap but serviceable paper instruments. Sutton also collaborated with workers in numerous associated fields developing novel versions of instruments as has been recently described.³

The quality of Sutton’s engraving, both in terms of neatness and accuracy, surpassed that of his contemporaries so that when he died in 1665 of the plague, the Secretary of the Royal Society bemoaned his loss and in 1758, long after his death, Edmund Stone paid him the following praise:

“Mr Sutton’s Quadrants, made above one hundred Years ago, are the finest divided Instruments in the World; and the Regularity and Exactness of the vast Number of Circles drawn upon them is highly delightful to behold.”⁴

Ordinary horizontal sundials by Henry Sutton – as opposed to the more complicated double horizontal dials or quadrants – are very rare so when a chance telephone call asked if I might be able to restore such a dial, it was an opportunity not to be missed. During my researches, I have been able to locate only one other similar dial (at Broughton, Bucks., SRN 1264) – no museum has one as far as I could establish, though a small windowsill dial is in private hands. The dial, shown in its unrestored state in Fig. 2, is around 8” in diameter and an eighth of an inch thick and had lost most of its gnomon. There had been an

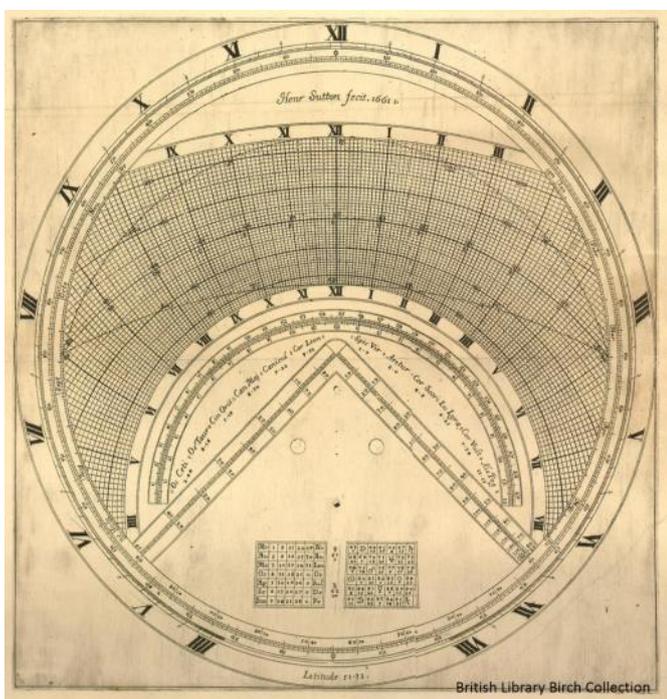


Fig. 1. A print (proof) taken from the plate of a double horizontal dial engraved by Henry Sutton. It has been electronically mirrored though actual examples exist which are ‘counterproofed’. Copyright British Library, Birch Collection.

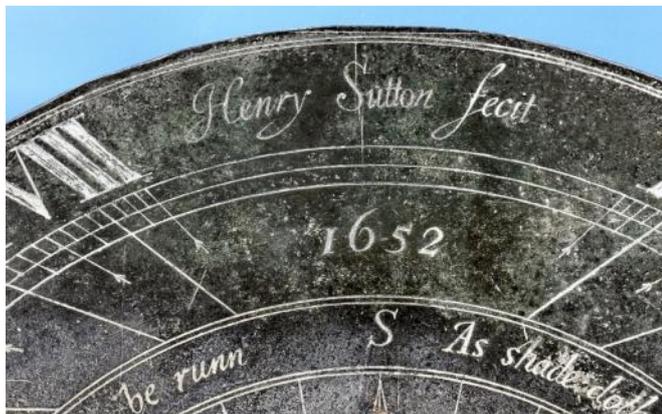


Fig. 3. Henry Sutton's signature on the dial.

earlier attempt to solder the broken (and now lost) part of the gnomon back on and the owner recalls watching a local handyman removing the excess lead solder by heating the plate with a blowlamp!

The dial is clearly signed "Henry Sutton fecit 1652" in his neat hand (Fig. 3). I was slightly surprised that the dial was circular as, at that date, it was more usual to see square or octagonal plates – cutting curves was difficult. On close inspection, though, it was possible to see straight tangential lines engraved around the circumference (Fig. 4) which indicated that it had originally been octagonal and then cut down later, most probably because screw-holes in the corners had been damaged. Whoever did the cutting was not as good a workman as Sutton as the edge is not perfectly circular.

The design of the dial is fairly standard, reading from 3:30 am to 8:30 pm with inward-facing numerals and divided to half-quarter ($7\frac{1}{2}$ minute) intervals. The two centres of delineation at the toe of the gnomon are indicated by holes penetrating the plate, just 0.5 mm in diameter, with another similar hole in the centre of the plate.



Fig. 4. Tangential line indicating the original octagonal outline.

The most interesting feature of the design is that it has a motto engraved in a beautiful script around a ring between the compass and the chapter ring (Fig. 5), reading:

"As shade doth pass from line to line
by motion of the sunn
So doth our age from time to time
untill our race be runn"



Fig. 5. The motto.

This motto is not in Gatty⁵ but similar lines are found on some compendia by Humphrey Cole in the late 16th century: it must have been rather old-fashioned by 1652 and one wonders whether it was put there at the request of the commissioner of the dial. The advantage of its uniqueness is that it allowed the provenance of the dial to be established as coming from Ropley House in Hampshire as it is described in a book of 1929⁶ with the motto (with a couple of transcription errors) although the current Hampshire Gardens Trust website⁷ adds "now lost" to its description.⁸ Ropley is only a couple of miles east of Bishop's Sutton (both had been under the control of the Bishop of Winchester in the medieval period) and this led to a possibility that the dial had been made as a gift for Henry Sutton's birthplace, which is currently unrecorded. There is certainly a precedent for this as Elias Allen made a dial for his birthplace of "Ashhurst" in Kent with an inscription to record the fact.⁹ However, the latitude of Ropley is $51^{\circ} 05' N$ and the dial was made for $51.6^{\circ} \pm 0.1^{\circ}$ (see below) so that cannot have been its original home.

Delineation

Given Sutton's reputation for the accuracy of his instruments, it was clearly of interest to determine just how well delineated the dial actually was. Thus, the angles of the hour and half-hour lines were carefully measured and

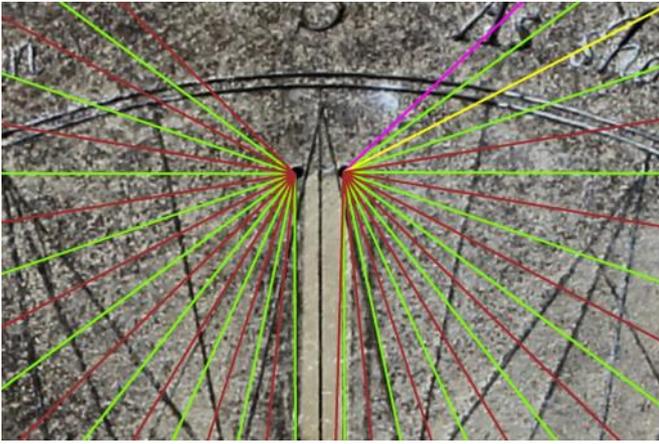


Fig. 6. Picture showing the wrong centres of delineation for the back-hours.

compared with the theoretical values for a dial with an optimised latitude. The measurement produced an unexpected result: the lines for the ‘back hours’ (before 6 am and after 6 pm) were drawn from the wrong centres of delineation! See Fig. 6. This is very much a beginner’s mistake¹⁰ and not one that an experienced diallist of Sutton’s standing could be expected to make. I am at a loss to understand it – Sutton must surely have known the proper method of delineation and the quality of the engraving makes it very unlikely that he delegated this task to an apprentice. Perhaps he was just in a hurry or having an off-day. With such a thin gnomon, it makes very little difference to the accuracy of time readings and it is not readily noticeable without extending the hour-lines. But it is perhaps comforting that even such a great craftsman as Sutton made mistakes. It is significant that the windowsill dial mentioned earlier, dated 1660 and divided to 5-minute intervals as well as to half-quarters despite its small size, does not show this error.

The error profile of the hour-lines is shown in Fig. 7 for an optimised latitude of 51.6° , almost certainly chosen for London. The back-hours delineation error does not affect the actual angles though these lines show slightly more variation than the fore-hours (for hour-angles between -90°

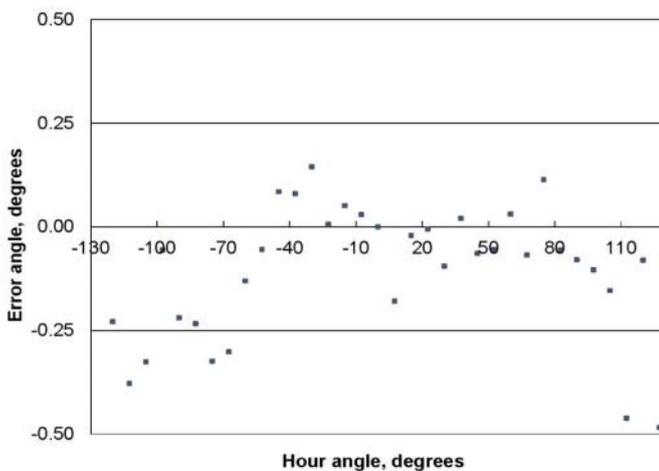


Fig. 7. Profile of errors of the hour-line angles, for an optimised design latitude of 51.6° .



Fig. 8. Two of the tenons on the back of the dial and (inset) a close-up of one of the tenon slots showing the chamfered edges.

and $+90^\circ$) as is almost always observed. The key point is that the overall spread of errors is extremely tight and the standard deviation is just 0.148° , the smallest that I have ever measured. When it is remembered that this figure includes my measurement errors, it demonstrates that Sutton deserves his reputation as “one of the finest artisans of his age”.

Construction and Metallurgy

The gnomon was attached to the dial plate by three, rather than the usual two, tenons – another indication of Sutton’s attention to detail. Only one remained in position and this had to be carefully removed to allow a new gnomon to be fitted. The end had been peened over as is usual but the result was virtually flush with the back of the dial, thus allowing it to sit on a pedestal without the need for a depression in the stonework. This was achieved by chamfering the back edges of the tenon slots (mortices) to provide a tapered hole in which the tenon expanded as a dovetail (Fig. 8). The effectiveness of this method is shown by the fact that the single remaining tenon had retained the broken part of the gnomon very firmly and it proved quite difficult to remove!

The thickness of the dial plate was measured at half-centimetre intervals in the N–S and E–W direction with a mechanical gauge, as shown in Fig. 9. The results are shown in Fig. 10 where it can be seen that the thickness is amazingly uniform across the whole plate (compare with the results in the articles on late 18th and early 19th century dials¹¹). The plate is thicker at around 3 mm than some other dials of the period, which often have thickness variations of $\pm 30\%$. If it had not been clear that this really

Area	Cu	Zn	Sn	Pb	Ag	Ni	Fe	As	Sb	In	Comments/Others
Dial plate (back)	74.8	21.7	1.2	1.4	0.09	0.15	0.56	0.03	0.06	tr	mechanically cleaned
Dial plate (front)	77.6	16.5	1.5	2.9	0.13	0.10	0.41	0.11	0.08	tr	after restoration and mild cleaning
Gnomon (average of E and W sides)	75.7	20.3	1.3	1.7	0.12	0.12	0.41	0.10	0.03	tr	mechanically cleaned

Table 1. Alloy compositions of the components of the dial (in wt%, rounded to one or two places of decimals) as measured by XRF by the author using a Thermo-Scientific Niton XL3t analyser with a 65 second sampling time, a 50 kV primary beam and a Silicon Drift Detector. The instrument was cross-calibrated against a set of CHARM (Cultural Heritage Alloy Reference Materials) test specimens with a representative range of trace elements in a copper-alloy matrix.¹² tr = trace.



Fig. 9. Method of measuring the thickness profile of a dial plate (a different dial in this case).

is a hand-hammered plate, there would be a suspicion that the sheet was modern cold-rolled material. If Sutton hammered it himself, he was remarkably good at it and if he delegated it to an apprentice (as is often thought to be the workshop practice of the time) then he was clearly a very demanding master.

The alloy compositions of the dial plate and the gnomon remnant were analysed by X-ray fluorescence.¹² The key results are shown in Table 1. They show a fairly typical 17th-century ‘leaded-brass’ comprising a medium concentration of zinc, Zn, with a small but significant tin, Sn, content.¹³ The minor components are also fairly typical.

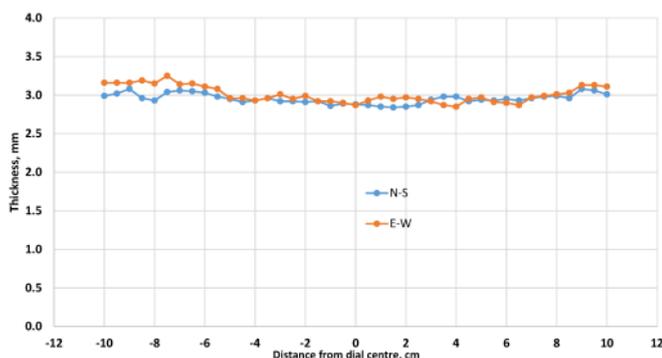


Fig. 10. Thickness profiles of the Sutton dial plate.

Despite the fact that the front of the dial has been partially cleaned of the patina/corrosion, there is still a marked degree of surface dezincification (and tin build-up) when compared to the back of the dial, which was cleaned more aggressively. One major finding is that the alloys of the dial plate and the gnomon are essentially the same, indicating that they have been produced from the same source – not necessarily from the same crucible of melt but at least in the same foundry. This contrasts with many dials where the dial plate has been produced from stock material but the gnomon is a casting with a separate alloy. Clearly, Sutton was working in close collaboration with the foundry and had planned ahead.

A Replacement Gnomon

A major part of the restoration was the manufacture of a new gnomon. It was extremely fortunate that good side-view photographs of the only recorded Sutton horizontal dial were available in the BSS Register of Fixed Dials – see Fig. 11. (Dial Recorders please note – always take such a

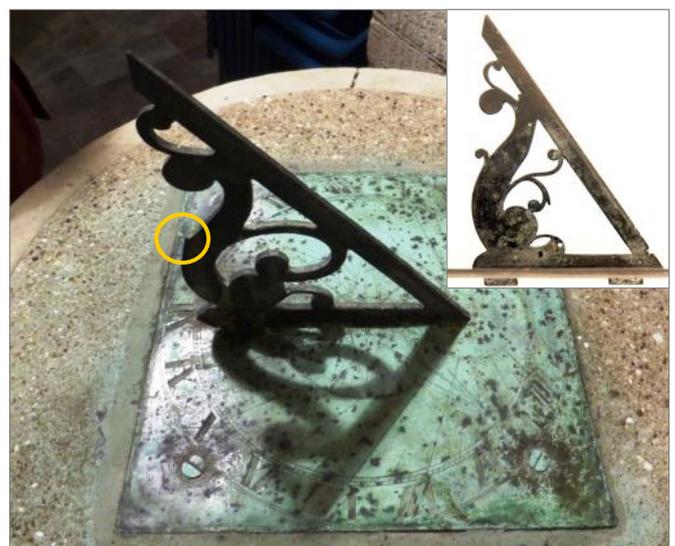


Fig. 11. The only other recorded horizontal dial by Sutton (SRN 1264) with a model gnomon. Note the broken-off spur (ringed) which is present (inset) on the gnomon from a nearly contemporary dial.



Fig. 12. An initial, unsuccessful, waterjet-cut gnomon. Inset: the wide kerf and over-cut sharp inner bend on the spur.

low-angle side view, level with the plate, when photographing a dial as you never know when it might be useful!) By carefully processing the picture, it could be made to represent a 51.5° gnomon and then imported into a CAD program and redrawn to suit the present case. The gnomon could be regarded as over-size as it is taller than is strictly necessary to ensure its shadow always reaches the chapter ring but this is a common feature on many 17th-century English dials and contributes to their characteristic and handsome appearance. It was noticed that the gnomon on the Broughton dial had a small spur broken off from the outside of the large S-supporter, a feature which is found on several contemporary dials (e.g., by Hilkieh Bedford), as is shown by the example in the inset of Fig. 11, so this was incorporated in the design for the replacement.

Once the gnomon design was completed it was output as a file in DXF format appropriate for a waterjet cutting machine. The original gnomon would have been made by casting but this is not now the preferred method except for very large gnomons. Modern diallists have the luxury of semi-hard cold-rolled brass sheet and luckily it is still available to model engineers in the $1/8''$ (approximately 3.2 mm) thickness required to match the original gnomon as well as the 3 mm industry standard. Waterjet cutting is a wonderful modern process which saves many hours of tedious work with a scrollsaw but it does have its limitations. The jet removes a kerf of 1 to 1.5 mm width and this limits the tightness of any curve that can be cut.

The speed of the jet is important around tight bends to avoid overcutting – Fig. 12 shows what can go wrong and why some operators are better than others.¹⁴ The cut also has a slight taper of around a degree or so as the jet widens as it passes through the material (though the most modern machines can tilt the jet under software control so that all the taper is on the waste side of the cut). Together with the fine granular structure of the cut edge (Fig. 13), these features mean that a waterjet-cut gnomon has a very 2D appearance with sharp edges and is very easily distinguished from an old cast item so would look most inappropriate. The solution is a lot of fettling work with fine burrs and needle files, cleaning up the edges and giving the intersections of the curves a more 3D shape (Fig. 14).

The new gnomon could have been fitted complete but that would have left the question of what to do with the small piece of the original which had been removed. The solution was to cut an equivalent section out of the replacement part, machine a 30° chamfer on the mating edges and to solder them together. The new section was signed and dated on the tenons so that future generations will know that it is not original. The whole structure was chemically treated to give it a light brown patina so that it was not so obviously new and then fitted in place with taper pins through the extended tenons. This method was preferred rather than trying to hammer over the tenons as was originally done as it allows the gnomon to be removed at will and does not cause any further damage to the dial plate.



Fig. 13. Macro photograph of the end view of the waterjet-cut tenon, showing the granular nature of the cut surface.



Fig. 14. Close-up of the second, successful, waterjet-cut gnomon showing the cleaned-up profile approximating to a cast shape and the splice to the original section on the right.



Fig. 15. The dial plate at an intermediate stage of the cleaning process.

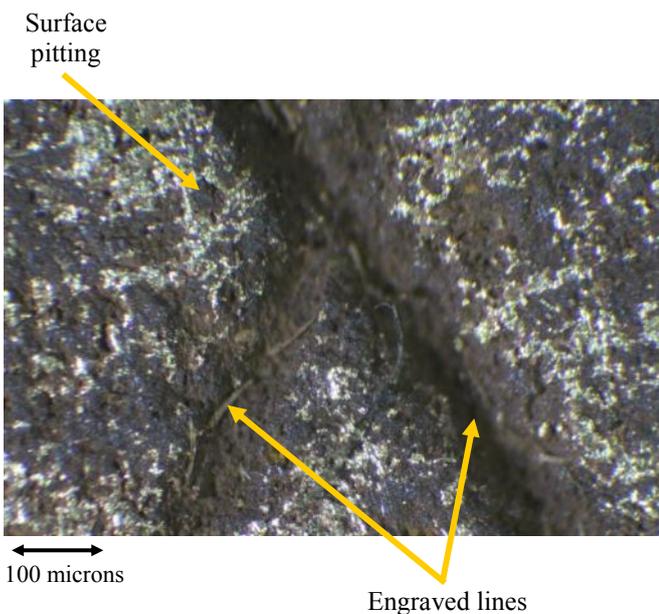


Fig. 16. Photomicrograph of the dial surface at an intermediate stage in the cleaning showing the finely pitted surface and two of the narrower engraved lines.

Restoring the Dial Plate

The first step to restoring the plate was to remove the remains of the lead solder from the earlier gnomon repair. This was achieved by a combination of careful scraping and chemical methods (using a proprietary solder remover, applied locally). This worked well though it did show that the surface of the plate was now shiny in that area and that the engraving there was slightly shallower.

The dark blotchy patina on the rest of the dial plate was then tackled, again using a combination of chemical¹⁵ and mechanical methods. This latter involved the use of small

abrasive rubber cones in a high-speed motor-tool. The tradeoff here was between achieving a shiny brass appearance (which was what the owner wanted) and not removing too much material and making the fine engraving shallower and less sharp. Fig. 15 shows an intermediate stage with half the dial partially cleaned. Fig. 16 is a micrograph which shows what is happening – the patina is actually a very fine pitting with the pits almost as deep as the fine engraved lines. Clearly, to remove all the pitting to reveal the underlying metallic surface would risk losing the finest engraving and so I decided to stop with a semi-matt surface. More material can always be removed but it cannot be put back! I am sure that a museum conservator would have removed less material whereas many old dials have been so over-polished that only the deep Roman numerals are still clear so there is never a definitive answer to this dichotomy.

I experimented with a wax fill for the engraving. Originally, the dial quite probably had a black wax fill. On the other hand, on polished dials the dried remnants of the polish (Brasso™ or the equivalent) is white and this can sometimes be quite attractive on dials with dark patinas as it provides contrast. I tried both black and white waxes, which could be quickly applied or removed by warming the plate up to around 70°C and melting the wax in, scraping off the excess as the plate cooled. The conclusion was that white worked better in this case. A final coating of microcrystalline wax was then applied over the whole dial to provide a barrier against oxidation: as the dial will be kept indoors, this will last for many years and is easy to reapply. The finished restoration is shown in Fig. 17.



Fig. 17. The completed restoration.

Conclusions

It is apparent that Henry Sutton does deserve his high reputation for scale accuracy and neat engraving. He was also a skilled metalworker and produced instruments superior to others of the period. Even he, though, was not immune to making mistakes.

ACKNOWLEDGEMENTS

I am grateful to the owner, Mrs R. Vernon, and to David Paradise for entrusting the Sutton dial to me and to John Foad for the pictures from the BSS Register.

REFERENCES and NOTES

1. For examples of the Sutton quadrant, the horizontal quadrant and a short biography, see: M. Lowne and J. Davis: 'A Horizontal Quadrant of 1658 by Henry Sutton' Part 1, *BSS Bull.*, 23(ii) 8–13 (June 2011), Part 2, *BSS Bull.*, 23(iii) 45–48 (September 2011); M. Lowne and J. Davis: 'The Stereographic Projection and Quadrant by Henry Sutton', *BSS Bull.*, 24(iii), 8–15 (September 2012). For a catalogue of his instruments with stereographic projections, see J. Davis and M. Lowne: *The Double Horizontal Dial – and associated instruments*, BSS Monograph No. 5. BSS, London (2009).
2. B. Jardine: 'Reverse-printed paper instruments (with a note on the first slide rule)', *SIS Bulletin*, no. 128, pp. 36–42 (March 2016).
3. B. Jardine: 'Henry Sutton's collaboration with John Reynolds (gauger, assayer and clerk at the Royal Mint)', *SIS Bulletin*, no. 130, pp. 4–7 (September 2016).
4. From the advertisement following the second title page of Edmund Stone's second edition of N. Bion, *The Construction and Principal Uses of Mathematical Instruments ...*, London (1758).
5. Mrs A. Gatty with H.K.F. Eden and E. Lloyd (eds): *The Book of Sun-Dials*, 4th edition, Bell & Sons, London (1900).
6. M.S. Hagen: *Annals of Old Ropley (Hampshire)*, Alton (1929), p.7 in which it says "As shade doth pass from line to line/ By motion of the sun/ So doth our age from time to time/ Until our race be run. The grass paths in the kitchen garden with the sun-dial in the centre have no doubt existed there for centuries." Marianna Hagen had lived in the house until 1907 and it was overhauled c. 1930. It was put up for sale in 1961 and again in 1971. The current house was built c. 1735 on the foundations of a Tudor one, c. 1530. It is Grade II* listed and not generally open to the public.
7. <http://research.hgt.org.uk/item/ropley-house/>
8. The owner of the dial, Mrs R. Vernon, was living in Ropley House over the period 1961–71 and discovered the dial, already in a damaged state, in a trunk there and took it with her when she moved. The pedestal had been lost before this time.
9. The Elias Allen dial was stolen in the early 2000s and has been replaced by an accurate replica by the current author.
10. The effect is explained in T. Moss: 'Sunrays change edges on sharp-edged gnomons', *BSS Bull.*, 28(i), 17 (March 2016).
11. See J. Davis: 'Sundials by the Davis dynasty', *BSS Bull.*, 28(iii), 2–6 (September 2016) and J. Davis: 'A mystery Welsh horizontal dial', *BSS Bull.*, 28(ii), 2–6 (June 2016).
12. The instrument used (a Thermo-Scientific Niton XL3t) was not the same as that used in previously-reported dial compositions by this author as it features improved resolution and sensitivity and hence can find trace elements at lower concentrations. However, it was calibrated against the same set of industry-standard certified reference materials and so the results for the primary constituents are comparable. See A. Heginbotham, J. Bassett, D. Bourgarit, C. Eveleigh, L. Glinsman, D. Hook, D. Smith, R.J. Speakman, A. Shugar and R. van Langh: 'The copper CHARM set: a new set of certified reference materials for the standardization of quantitative X-ray fluorescence analysis of heritage copper alloys', *Archaeometry*, doi: 10.1111/arcm.12117 (2014).
13. See the articles of note 11 and also J. Davis: 'Joshua Springer of Bristol – An eighteenth-century provincial dialmaker', *BSS Bull.*, 28(iv), 12–16 (December 2016); J. Davis: 'An Early English horizontal dial', *BSS Bull.*, 28(ii), 26–28 (June 2016); J. Davis: 'A disregarded seventeenth-century horizontal dial from Scotland', *BSS Bull.*, 27(iv), 35–37 (December 2015).
14. The successful gnomon was cut by Precision Waterjet Ltd of Lyme Regis.
15. Renaissance Metal De-corroder by Picreator Enterprises Ltd.

john.davis@btinternet.com

DELHI SUNDIAL



Philip Earis, our occasional India correspondent, has sent this photograph of a sundial in Delhi. It is in the middle of a complex of flyovers and, at the time of his visit, there was no straightforward access; he had to persuade his driver to park on the hard shoulder while he walked around the deserted site. His photograph illustrates why Delhi is noted for its poor air quality. This sundial rarely sees the sun! An article about the dial at:

www.hindustantimes.com/topic/DDAsundial

notes that "the sundial has been recently certified as one of

the largest scientifically accurate sundials in the world." There is also a report of a dispute over the ownership of the intellectual property.

Readers can get good views of this sundial from Google Earth. Key the coordinates +28.582888 +77.265734 into the search box, click 'search' and zoom in. It won't take very long before you will start to have doubts about the accuracy claim. If the parties to the dispute knew more about sundials, each would insist that the intellectual property belonged to the other.

FHK

Charles Miller
Advertisement
Replaces this
page

TWO NEW DIALS OF SAINT PETERSBURG

VALERY DMITRIEV

The first sundial has a more than 70-year history.

The Siege of Leningrad¹ during World War II – one of the most tragic pages in the history of the city. Starvation and cold in the first two winters made the life of the citizens an ordeal; about 1 million people died during the siege (8 September 1941 to 27 January 1944), a large part – of hunger. One of the dead from hunger was my grandfather Caesar Boutkevitch. In the time of shelling and bombing, street clocks were one of the first affected, they all froze, stopped, time has gone.

In the spring of 1943 in the city was an amazing event – on Vasilyevsky Island on the initiative of professor of astronomy Basil Pryanishnikov the sundial was installed (Fig. 1). Pryanishnikov developed the project; the sundial was made and installed with the help of the citizens and Red Army soldiers – defenders of the city.

Around it townspeople often gathered and discussed the news from the front with the hope of victory and a peaceful life. The sundial was made of boards and plywood; they stood up to the Victory Day and at the end of 1945 were dismantled.



Fig. 1. Leningrad during World War II. At the sundial on Vasilyevsky Island.²

Two years of searching in archives and libraries allowed me to reconstruct the history of the ‘blockade’ sundial, the biography of Basil Pryanishnikov, and most importantly – to find the historical picture of the sundial. In the spring of 2016, I developed the project of reconstructing the ‘blockade’ sundial in granite, and on 8 September 2016 the sundial, made by stone maker Nikolai Yashin, was set on the historic place (Fig. 2).

The second sundial was designed for the Saint Petersburg Planetarium (Fig. 3) and set on its astronomical platform.

Close to the Planetarium: Historic Centre of Saint Petersburg – Peter and Paul Fortress with the Cathedral of Saints Peter and Paul and the Neva River with the sea gulls



Fig. 2. The new granite ‘blockade’ sundial.



Fig. 3. The Planetarium, Saint Petersburg.



Fig. 4. The sundial on the astronomical platform of the Planetarium, Saint Petersburg.

were the basis of the design solution of the sundial (Fig. 4): a horizontal sundial built into the 'sphere', symbolizing the earthly and celestial spheres – the subject of study at the Planetarium.

REFERENCE and NOTE

1. The name of the city from 1924 to 1991.
2. Photochronicles LenTASS No. 39602. Leningrad, 20 September 1943. Photo: R. Mazelev.

sundials_spb@mail.ru

BOOK REVIEW

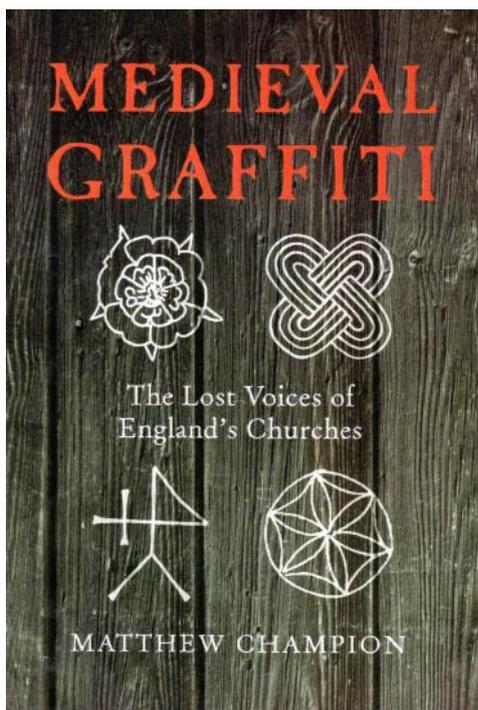
Medieval Graffiti: The Lost Voices of England's Churches by Matthew Champion. ISBN 978-0-091-96041-4. 144 × 206 × 28 mm hard covers, 272 pp. Published July 2015 by Ebury Press, London. RRP: £14.99.

There may be some who express surprise that there are medieval artefacts that can be studied whilst standing up. However, mass dials come firmly as medieval products and some three to four thousand are recorded on our church walls for all to see.

Matthew Champion deals with all types of graffiti on churches and points out that they provide a good historical record of events and persons from Saxon times to the present day.

One whole chapter of the book is devoted to mass dials and the Society's work in recording them is duly noted.

The problems of multiple dials and positioning on other than south walls are mentioned but Champion finds it difficult to believe that dials were moved as a result of rebuilding. He is also sceptical of their time-telling ability and consequent utility. However, their wide spread and largely uniform design indicate an accepted function from Saxon times to around the early 1600s, curiously long after the introduction of clocks, which would belong only to the wealthier parts of society (which included the Church).



Search for a particular carving described in the book as being at my local church (St Bartholomew, Churchdown, Gloucestershire) has so far been unsuccessful but it may be inside and the church is not often open.

Champion points out that many graffiti are at chest height, as might be expected – and indeed this is true for much of the British corpus of dials, whereas the extensive Spanish recording held by the BSS provides more mysteries, with many dials appearing well above 'chest height', and indeed quite high up on occasion – and quite useless for reading. If we consider *all* mass dials, there are still questions arising about their origins and use.

The section on ship graffiti is interesting and I have also wondered about them as I have searched the church walls. Not considered are the recently described 'erratic numerals' dials.¹

At least we don't often have to dig up our archaeological artefacts!

REFERENCE

1. Tony Wood: 'Erratic numerals', *BSS Bulletin* 25(ii), 42–43 (June 2013).

Tony Wood

IN THE FOOTSTEPS OF THOMAS ROSS

Part 18: The Kelburn Castle Obelisks

DENNIS COWAN

Kelburn Castle, the ancestral home of the Earls of Glasgow, has been in the family since the 13th century. It is in North Ayrshire on Scotland's west coast just a little south of the seaside town of Largs, and about 33 miles from Glasgow. Since 1977, the estate has been a Country Park open to the public.

In 2007 it was found that the harling which covers the walls of the castle was causing problems with the stonework

underneath and would have to be removed. But before that had to happen, the current Earl's children had the idea to give the harling a paint job. The Earl decided to bring in four graffiti artists from Brazil to carry out the work. As can be seen from Figs 1 and 2, the result was a little out of the ordinary!

But the reason for my visit, remarkable as the paint job was, was to see the two obelisk sundials which were in the grounds of the estate. Incidentally, Kelburn was the venue in September 1978 for BSS founder member Andrew Somerville's first foray into searching out Scotland's ancient sundials. It was an inauspicious start as it was pouring with rain. It apparently caused a great deal of laughter with the park wardens when Andrew said that he was there to see the sundials.¹

In volume 5 of *The Castellated and Domestic Architecture of Scotland*,² Thomas Ross had the following to say about Scotland's ancient obelisk sundials, of which only twenty-six complete examples are known to exist.

"This name, while it fairly describes the appearance of the dials of this class, has a further fitness from the circumstance that the Egyptian obelisks are believed, amongst other purposes, to have acted as gnomons.

"The constant parts of these dials are a square shaft, a bulged capital, and a tapering finial. Where the dial is of the normal type and unaltered, the shaft is divided on each side into five horizontal spaces by incised lines, thus presenting twenty compartments. These compartments are hollowed out with cup-shaped, heart-shaped, triangular, and other sinkings, which are generally lineated so as to mark the hours, and were without doubt always meant to be so. The sharp edge of the figure casts the shadow, which is especially distinct in the angular shapes and at the top of the heart sinkings, where there is often a certain amount of undercutting.

"Stone gnomons of various forms are frequently left in the cup hollows, and metal stiles are to be found in all the dials. Occasionally some of the spaces are left blank, and on the north side initials, dates, and arms sometimes occur.

"The capital is always bulged out so as to form an octagon in the centre, with an upright facet on each of the eight sides, having a dial on each. Above and below each facet over the four sides of the shaft are sloping facets, with a reclining dial or a proclining dial on each the former being those dials whose faces slope towards the sky, and the



Figs 1 and 2. Kelburn Castle and its Brazilian graffiti paint job.

latter those whose faces slope towards the ground. The eight triangular pieces formed by the meeting of the square and octagon are cut out, and most effective shadows, from an artistic point of view, result from this arrangement, giving an air of dignity to the capital.

“The upright facets of the octagonal part have heart-shaped and cup-shaped sinkings, as in the shaft; but the proclining and reclining parts seldom have sinkings. Nor has the tapering finial, although usually covered with dials, ever any sinkings; like the shaft, this part is divided by horizontal incised lines, the number of spaces, for which there appears to have been no rule, varying according to the height of the finial.

“The obelisk-shaped dials are generally set on some kind of base, consisting either of steps or a pedestal; the former frequently alternate, being set square and diagonally as they ascend. The pedestals have a general resemblance to each other, being frequently ornamented with representations of the sun and moon.”

The first of the two obelisks at Kelburn sits on three steps and is in the private garden just west of the castle. Ross tells us that:

“These companion dials adorn the gardens which surround the fine old castle of Kelburn. They seem to be in their original positions, and they are in no way designed to balance or harmonise with each other, not being visible from any point at the same time. The shafts are set diagonally on a moulded base. The obelisk of one of these dials [Fig. 3] terminates with a wrought-iron vane of delicate design and workmanship, enclosing the entwined and coroneted monogram of the Earl of Glasgow and his wife, the whole being surmounted with a Scotch thistle



Fig. 4. The vane on top of the finial today.

[Fig. 4]. This is beautiful piece of wrought-iron work; it was loose and otherwise worn by time, but the Earl of Glasgow has just had it carefully restored.

“There is the date 1707, with the initials EDG and CLC. These stand for David Boyle of Kelburn, who was created Lord Boyle in 1699, and Earl of Glasgow in 1703, and his first wife, Margaret Lindsay Crawford, daughter of the house of Kilbirnie.

“The dimensions of the dial are height of shaft, 3 feet 8 inches; height of capital, 1 foot 8 inches; height of finial, 2 feet 5½ inches; height of moulded base, 9 inches; total, 8 feet 6½ inches. The moulded base is 2 feet 1½ inches square, and the breadth of the shaft is 9½ inches.”

This dial is still in the same location today and looks to be virtually the same although some gnomons appear to have been replaced (Fig. 5). As with all obelisk dials, there are

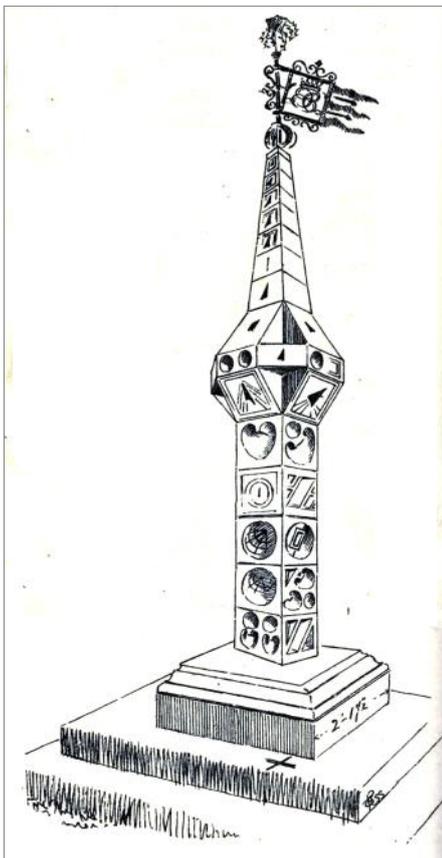


Fig. 3. Ross's sketch of the first obelisk.

Fig. 5. The first obelisk today viewed from the south-east.





Fig. 6. Close-up of the capital's east face.

many cup hollows and heart and geometric sinkings as well as reclining and proclining dials. A close-up of the east face of the obelisk capital is shown at Fig. 6.

Somerville obviously thought highly of this dial as he saw fit to use an illustration of it on the cover of his book, *The Ancient Sundials of Scotland*.³

The second obelisk is some distance away in what is now known as the New Zealand Garden, also private but occasionally open to the public. Ross says:

“The other dial [Fig. 7] is generally of the normal type, but certain deviations therefrom seem to show that it has been altered. The shaft has only four spaces, and there has been

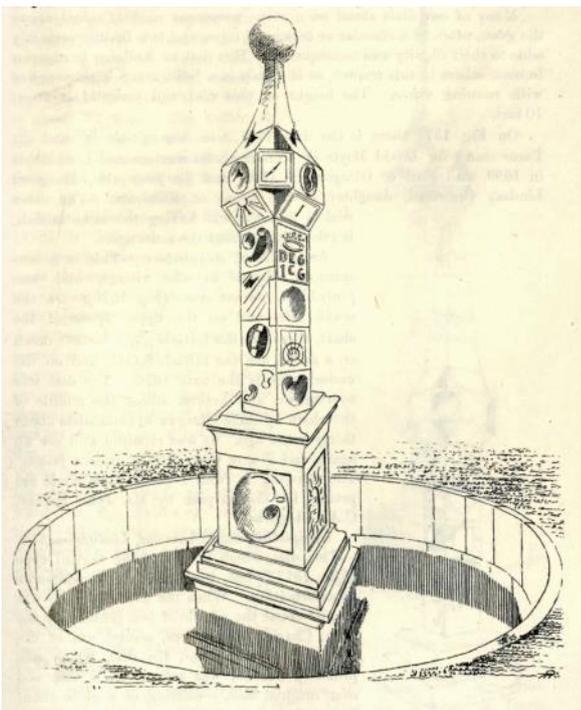


Fig. 7. Ross's sketch of the second obelisk.

mending done on it, and probably a space has been lost; and attention may be drawn to the unusual circumstance that the spaces on each face are not all of one size. The curved finial on the top and the ball termination are no doubt the result of a repair, like the altered finial at Craigiehall.⁴ The dial stands angle wise on a pedestal which resembles somewhat that of the Meggatland dial [now believed to be at the Burrell Collection in Glasgow]; on both there will be observed similar figures of the sun and moon.

“Many of our dials stand on a stone pavement slightly raised above the grass, often of a circular or octagonal form, and this feature certainly adds to their dignity and consequence. This dial at Kelburn is superior to most others in this respect, as it stands in a built stone basin supplied with running water. The height of this dial and pedestal is about 10 feet. This dial is undated, but having the same initials [as the other dial at Kelburn], is probably of about the same age.”

Unfortunately, this dial has not fared very well. It still stands in the same stone basin that it did when Ross saw it, but the water is very low in the basin and does not appear to be running. Worse than that, the capital and finial have broken off from the shaft (Fig. 8). After a bit of rummaging around, the capital was found to be lying in the undergrowth nearby (Fig. 9). The finial and ball were also lying nearby although they were in many pieces. As Ross says, however, they were probably not original and had no dials on them.



Fig. 8. The broken obelisk today.



Fig. 9. The capital lying in the undergrowth.

Looking at Fig. 8 and Somerville's photograph from 1978 (Fig. 10) which were both taken from approximately the same position, the surrounding vegetation seems to have changed somewhat! The obelisk though looked to be the same in 1978 as it had in Ross's day.

But what about the castle's graffiti paint job? The castle is a category A listed building, so planning permission had to be obtained to allow the work to be carried out. In 2007, Historic Scotland agreed to the project and planning permission was then approved on the basis that the graffiti



Fig. 10. The second obelisk in 1978 (Photo: Andrew Somerville).

would be removed when the castle was re-harled, with a three-year time limit stipulated.

In 2010 the Earl formally wrote to Historic Scotland asking permission to keep the graffiti as a permanent feature as it was now a major tourist attraction. In fact, it had been named as one of the world's top ten examples of street art on a par with that of Banksy's⁵ art in Los Angeles.

Historic Scotland visited the site in 2012 and discovered that the harling was indeed severely damaging the castle walls and urged the Earl to remove it. Despite conflicting reports in the press that it was or was not going to be removed, at the time of writing, some four years later (November 2016), it was still in place.

ACKNOWLEDGEMENTS

Many thanks to John Foad for providing a copy of Andrew and Anne Somerville's writings, and the photograph of the second Kelburn dial.

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2. D. MacGibbon and T. Ross: *The Castellated and Domestic Architecture of Scotland*, David Douglas, Edinburgh (1892).
3. A. Somerville: *The Ancient Sundials of Scotland*, Rogers Turner Books, London (1994).
4. D. Cowan: *In the Footsteps of Thomas Ross Part 2 – The Sundials at Craigiehall*, *BSS Bulletin* 24(iii), 16–18 (September 2012).
5. Banksy is a well-known graffiti artist.
See <https://en.wikipedia.org/wiki/Banksy>

dennis.cowan@btinternet.com

A BIRTHDAY DIAL

This birthday card in the form of a postcard was sent to a London address in 1926. It was printed by Raphael Tuck & Sons, 'Art Publishers to their Majesties'. One interesting feature of the poem is the use of the original word 'dial', at a time when most people were using the form 'sun-dial' or even the modern 'sundial'.



JD

SUNDIAL ARTIST, DOROTHY HARTLEY

MIKE COWHAM

Dorothy Hartley is known to diallists for her sundial sketches that appear in the books of T. Geoffrey W. Henslow. The first book with her sketches was probably *Verses for Sundials, Part 1*,¹ undated, but believed to have been published in 1912 (Fig. 1). It is not known if Part 2 or any other parts were ever published. This book is quite rare and she is better known for the fine illustrations in Henslow's *Ye Sundial Booke*,² whose first edition was in 1914. It seems that she did almost all of the drawings for both books, amounting to around 370 sketches of dials.

I was very fortunate some years ago to find an album containing a quantity of Dorothy Hartley's drawings. The album, in fact, contains almost all of the dials in *Verses for Sundials*. Her sketches are done in ink on thin sheets of card with slightly varying sizes but about 16 cm wide and 27 cm tall. The album was in a very poor state when acquired but the illustrations inside have survived quite well, albeit with a little staining on some.

Dorothy Rosaman Hartley was born on 4 October 1893 at Ermysted's Grammar School at Skipton in Yorkshire, being the daughter of a clergyman, the Rev. Edward Tomson Hartley. Her best-known book is *Food in England* which she published in 1954. However, at the age of 18 or 19 she was doing these fine sundial sketches for Geoffrey Henslow.

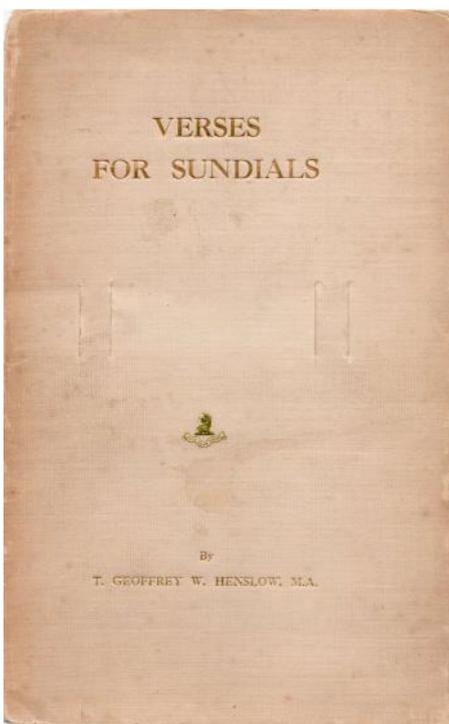


Fig. 1. Verses for Sundials by Geoffrey Henslow, c.1912.

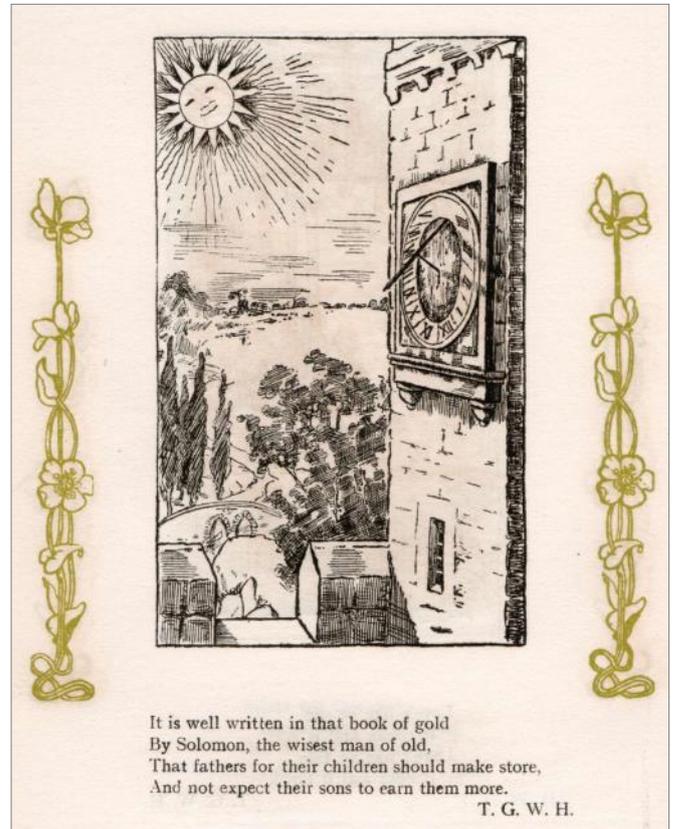


Fig. 3. Typical page from Verses for Sundials.

Most of her images were copied either from photographs of the dials or from the sketches published by other sundial artists. We can identify several of her drawings that were copied from Mrs Gatty's *The Book of Sun-Dials*.³ However, Geoffrey Henslow wanted all of these dials to be placed upon a new background because, as he says,

*"So many ancient dials are to-day continually changing hands and being placed in new surroundings, that although cognisant of the fact that it would be far more interesting to illustrate my work with sketches showing the dial in its original position, yet in the majority of cases I have proved this to be impossible."*⁴

Fig. 2. Signature on one of her earlier drawings, showing her initials and date 1911. Note also the stamp on the card for 'Goodall's Bristol Board'.



He therefore decided to show often totally different backgrounds for each of his dials.

The earlier book with her dial drawings uses 100 of her images; only the first of her drawings is signed 'D Hartley' with another initialled and dated (Fig. 2), but in the later book most of the additional pictures were signed and dated in the lower right corner.

The page layout in *Verses for Sundials* is attractively done with orange-coloured flower decoration either side of each image (Fig. 3). Henslow retained this page format for his later *Ye Sundial Booke*.

The earlier book itself has only a card cover with its title printed in gold, as shown in Fig. 1. At its centre is an interesting armorial showing a lion (Fig. 4) with its motto ESSE QUAM VIDERI, meaning "To be rather than to seem to be". The cover, both front and back, has been cut to allow a ribbon to be placed around the book. It was probably "a souvenir of the Great Royal International Horticultural Exhibition, London, 1912" as inscribed in ink in my copy by "The Author T. Geoffrey. W. Henslow." (Fig. 5).

The page from this book illustrated in Fig. 3 shows an oval vertical dial typical of those from the region around Rye, in Sussex, and below this is one of Henslow's verses. This is one of just two images of Dorothy's not used in Henslow's later *Ye Sundial Booke*.



Fig. 4. Lion on front cover.

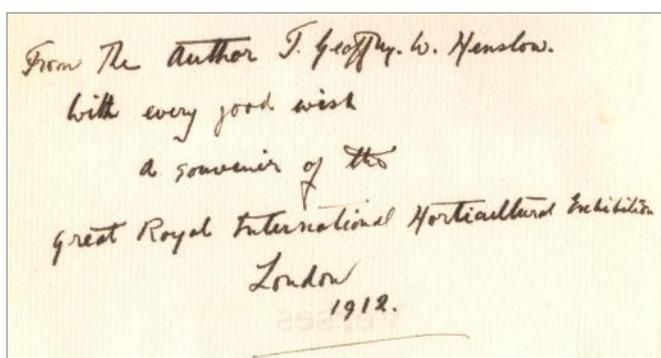


Fig. 5. Inscription by Geoffrey Henslow.

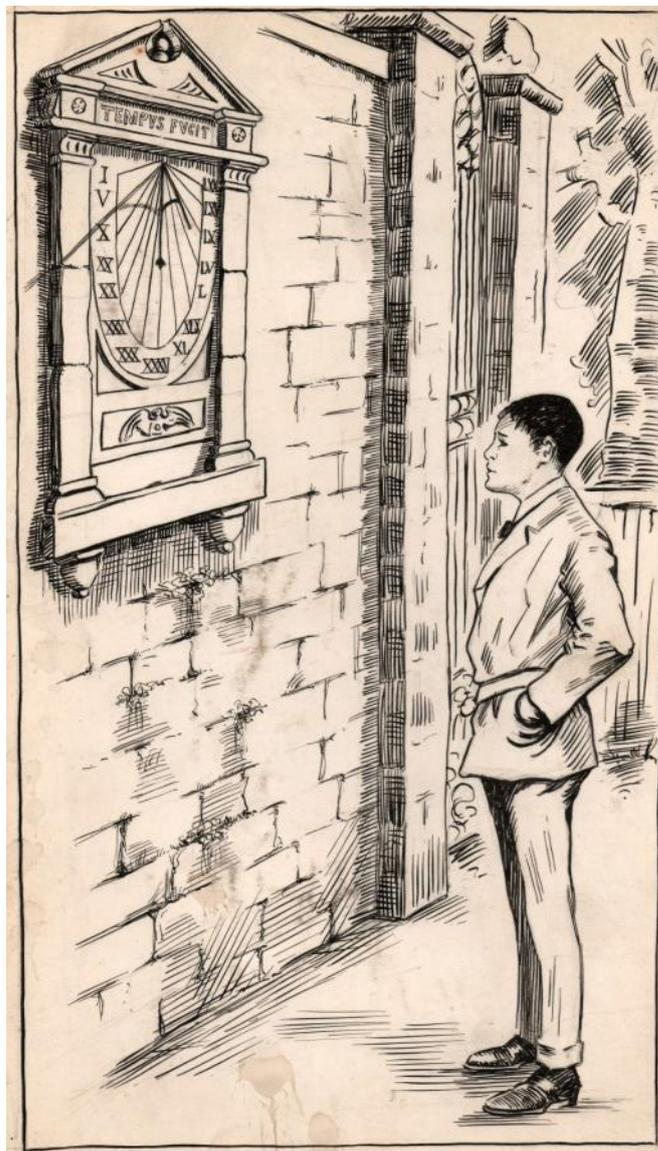


Fig. 6. Dial with strange hour numerals.

The other dial not in the later book is somewhat interesting. It shows a youth looking up at a dial that has very strange numerals (Fig. 6). Was this meant to be a puzzle? As you will see the numerals go from I to LXX (1 to 70) with some of the numerals being repeated. Also the L is missing its hour line and the 6 am to 6 pm lines are not horizontal. The verse below this dial may possibly give a clue:

Give thou thy bairns a start in life,
Feed, educate, and clothe.
Conversant thou in worldly strife,
Go, make their way more smooth.

T.G.W.H.

Although Dorothy Hartley was a fine artist she was still very young and it is obvious that she did not then have a technical knowledge of sundials. Several of her drawings show dials mounted on a pedestal where the shadow of the pedestal is in the wrong southerly direction, compared to the dial's gnomon, as in Fig. 7.

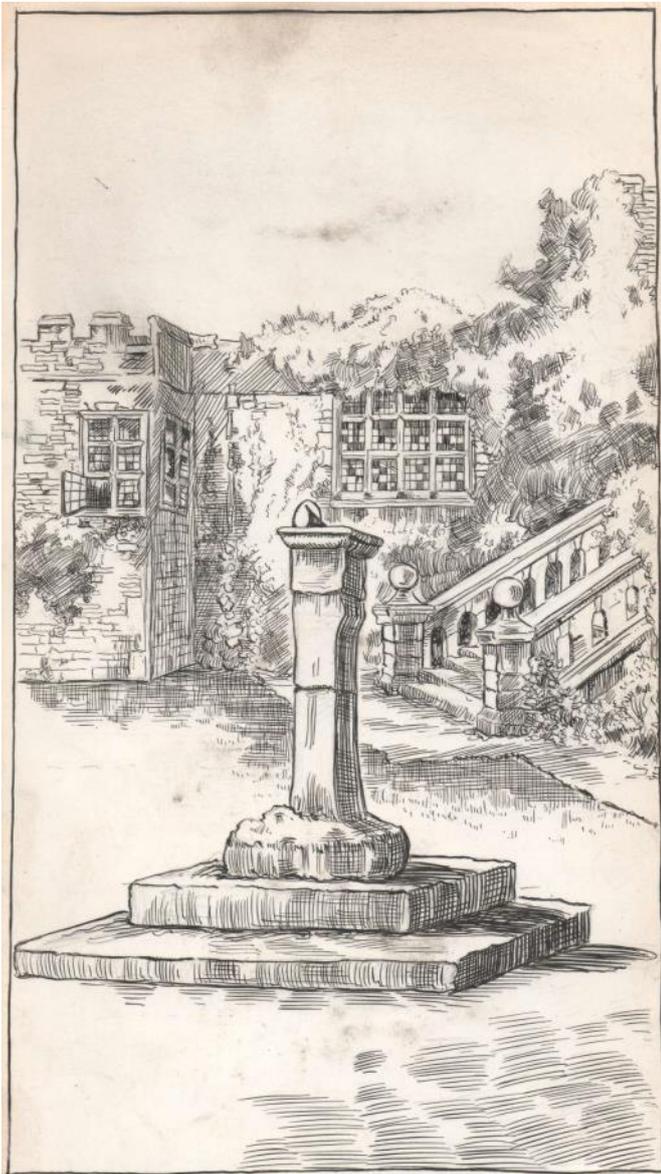
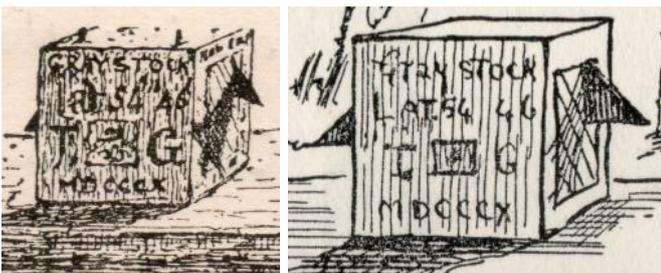


Fig. 7. A dial illuminated from the north.

Another shows a cube dial, this one obviously copied from the book of Mrs Gatty, where the east and west gnomons are triangular and are set vertically, at the wrong angle for such dials (Figs 8 and 9).

A final oddity that I am showing here is a double dial (Fig. 10) that is probably based on a self-aligning horizontal double dial where one of the dials has a fixed polar-oriented gnomon and the other is an analemmatic dial with a



Figs 8 and 9. Detail of a cube dial in Greystock churchyard from Gatty (left) and from Hartley (right).

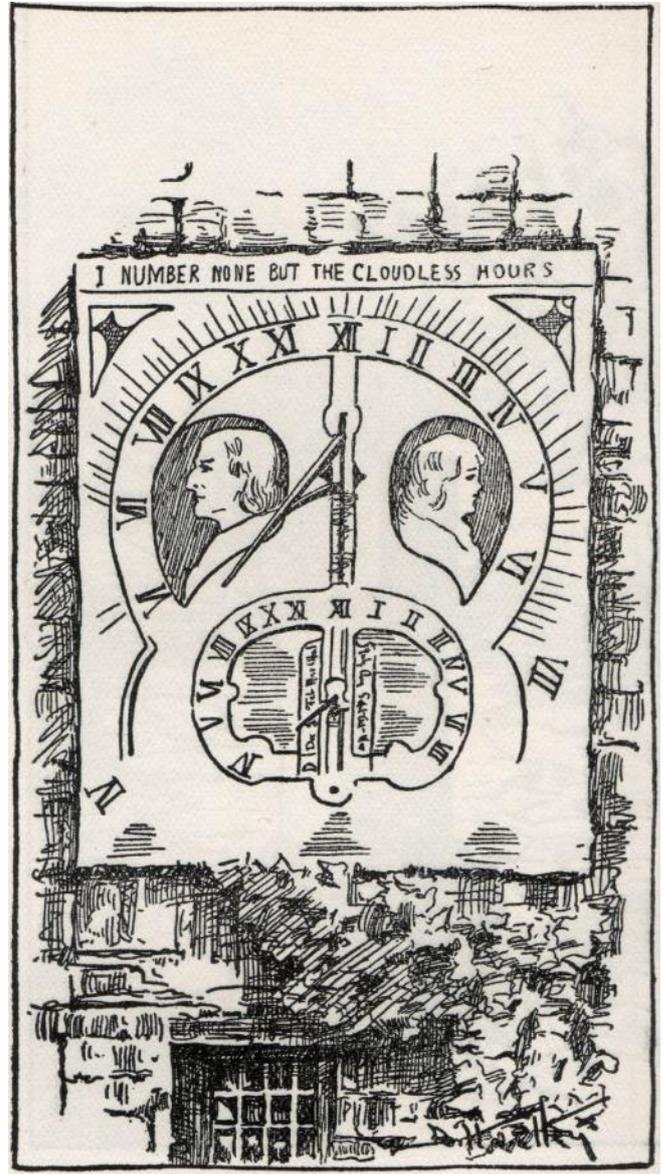


Fig. 10. Drawing of an analemmatic double dial at Sag Harbour, Long Island, mounted on a wall and incorporating several errors.

moveable vertical gnomon, but she shows a corrupted version of such a dial mounted on the side of a building! As you will see, the hour numerals go clockwise and the hour lines are inverted. The upper gnomon has been reversed, it now being a vertical dial, and the VI-VI line is not straight. Also, the numerals IV and VIII are not opposite each other. The numerals on the lower analemmatic dial also do not match each other between morning and afternoon. The picture shows a total misunderstanding of how the dial operates, even if it were placed horizontally, and it is surprising that Henslow allowed it to be published as he must have been aware of its problems. However, it still appears in his later *Ye Sundial Booke*.

In spite of all of these problems I believe that Dorothy Hartley did an excellent job for Henslow. Many of her drawings in *Ye Sundial Booke*, as for example the dial at Lydney (Fig. 11), later appeared on Fry's Chocolate trade cards, in their 1924 series of "Ancient Sundials".



Fig. 11. Drawing of a cube dial at Lydney (SRN 0505), later coloured and used as no.27 in Fry's *Chocolate Ancient Dials* series of trade cards.

Dorothy Hartley had a very productive life and eventually died on 22 October 1985 at the good old age of 92.

A Horizontal Dial

As well as Dorothy Hartley's images, the earlier book *Verses for Sundials* includes a print of a horizontal dial plate (Fig. 12). This has chapter rings showing the times at London, Cape Town, Montreal and Melbourne with their latitudes, longitudes and time differences with regards to Greenwich (Fig. 13). This may be a dial from Francis Barker of Clerkenwell who wrote a chapter on 'The Setting of the Sundial' in Henslow's later book. Below this picture is this verse of Henslow's:

Whilst the sun smiles
 You can't beat sundials,
 For your watch it may stop,
 Or, still worse, be in pop.

T.G.W.H.

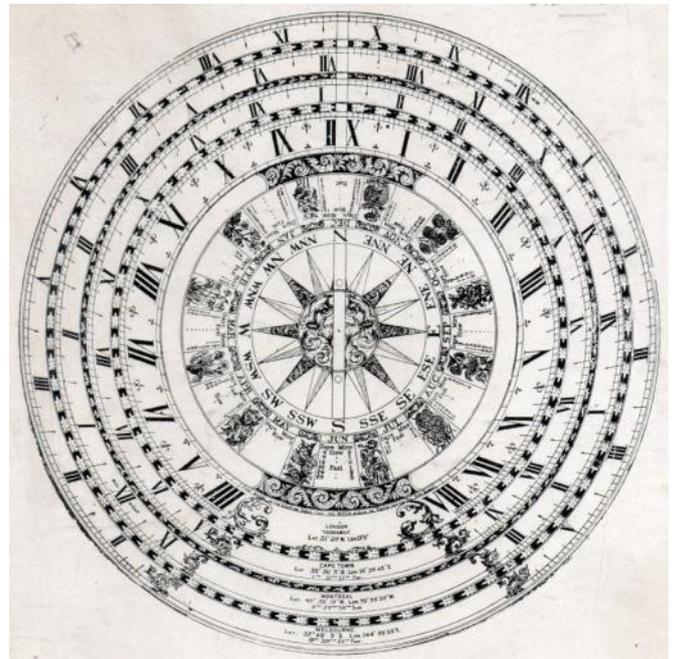


Fig. 12. Hand-drawn engineering drawing of a horizontal dial included in *Verses for Sundials*.

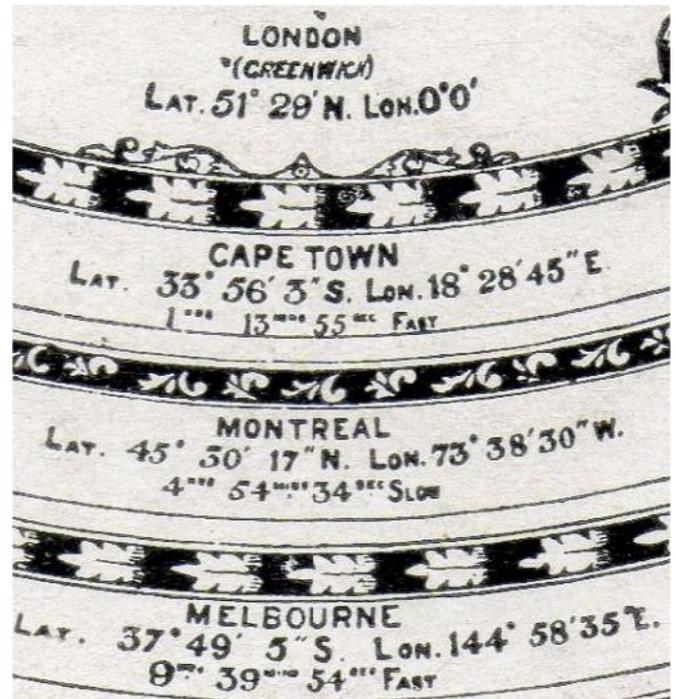


Fig. 13. Details of the scales on the horizontal dial.

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4. Henslow (see ref. 1).

mike@brownsover.orangehome.co.uk

THE SUNDIALS AND DIALMAKERS OF LONDON'S MOORFIELDS – A PERAMBULATION

GRAHAM STAPLETON

The Moorfields district of London is located immediately north of the line of the city wall and west of Liverpool Street station. The area is defined by the modern-day Finsbury Circus and Finsbury Square and is generally called Moorgate. Originally being both marshy and outside the city wall, very little building took place on it until the later 17th century, essentially prompted by the rebuilding after the 1666 Great Fire.

An Idle Enquiry

I have a modern reproduction of Ogilby and Morgan's 1676 City of London Map,¹ with a very thorough index that allows it to be used much like a contemporary A to Z map. In a moment of leisure I decided to look through this index for any references to 'dial', 'dyal' or 'sundial'. To my surprise, there is only one – Sun Dial Court – where I would have expected at least a handful of references. This set me off on a series of Internet searches for information about it, in the course of which I discovered that there is considerable dialling interest in this area.

A portion of the 1676 map is reproduced in Fig. 1 and five sites, described in the following sections, are highlighted in red.

Sun Dial Court, Lower Moorfields (Site 1)

I found that Sun Dial Court, the first site, not only featured on my 1676 map, but was also listed in street directories of 1732² and 1735,³ and again – albeit now demoted to an alley – listed in 1761⁴ and 1783.⁵ However, by Horwood's map of 1799,⁶ the site had been rebuilt and was called Queen Square; today, it is covered by the Broadgate Centre.

Beyond this, no details have emerged. The earlier map shows the court as having a narrow entry between buildings or, more probably, through an archway. Many of London's courts were inn-yards, or named after an adjacent inn; so while it has to be surmised, there is the distinct possibility that there was a Sun Dial Inn on the site, assumedly sporting a sundial.

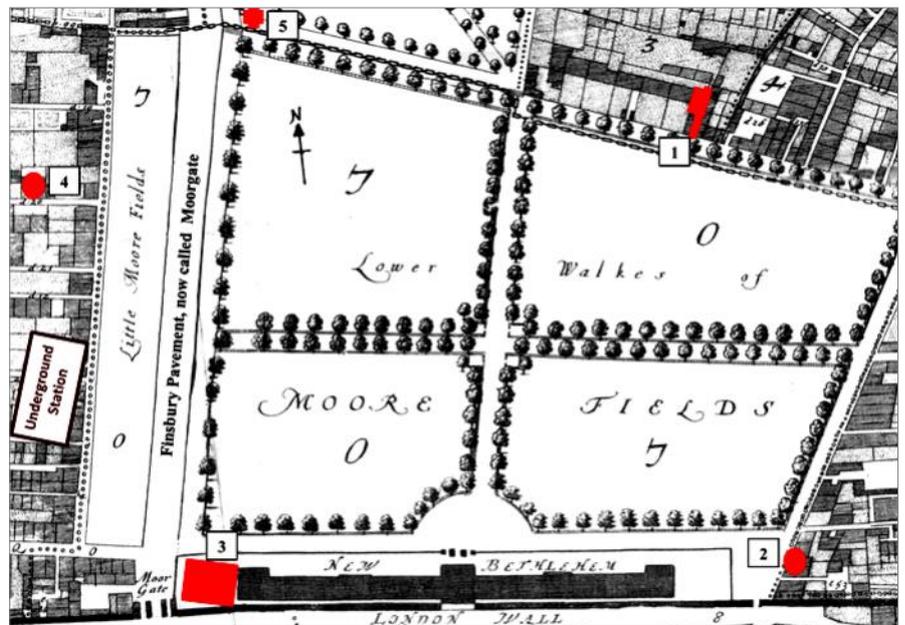


Fig. 1. Excerpt from Ogilby and Morgan's 1676 City of London Map, showing Moorfields.

Walter Hayes' Shop, Lower Moorfields (Site 2)

Between 1648 and 1685, had we walked clockwise down to the southeast corner and looked about for the sign of "the Cross-daggers in Moor-fields near Bethem-gate", "next dore to the Popes head Taverne" we would find the shop of mathematical instrument maker Walter Hayes.⁷ Apart from examining his stock, we might have the good fortune to find that William Leybourn had called in. Failing that, we could leave word for him there, as advertised in his *Platform for Purchasers* of 1668 and 1685.⁸ Though no longer residing in London, he may be engaged for instruction in the mathematical sciences, surveys of buildings or land, and making any kind of sundial.

The Albion Chapel, Moorgate (Site 3)

Passing through Bethlem Gate and walking westward along London Wall to just before the site of the actual Moor Gate and also forward in time to 1815, we find the newly-opened Albion Chapel (short-lived, since it closed in 1879). A magnifier is required to see it in the various engravings made of it, but there is a vertical dial – either direct south, or declining – over the vestry door at the southeast corner of the building (Fig. 2). These images do not remotely do it

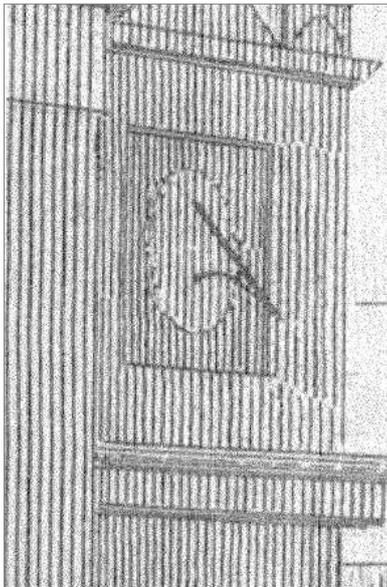


Fig. 2. Detail of the sundial above the vestry door, Albion Chapel. Engraving by Thomas Hosmer Shepherd, 1828 (enlargement from the author's original).

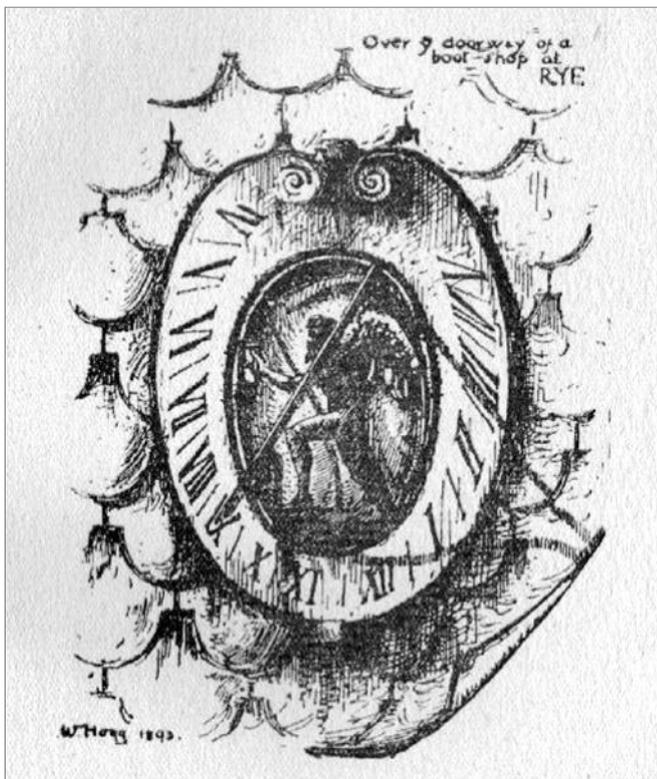


Fig. 3. Sundial over a Rye shop, from *A Book of Old Sundials and Their Mottoes* by Launcelot Cross.¹⁰

justice, since more than one publication remarks on the dial as “with this appropriate motto, ‘Dum spectans fugio,’ placed over a figure of Time.”⁹ Possibly it resembled the dial that survives on Rye’s High Street (SRN 3927), best seen in the drawing in Launcelot Cross’s book (Fig. 3).¹⁰

The Astrological Physician’s House, Little Moorfields (Site 4)

Returning to the 17th century, if we walk diagonally across Little Moorfields and turn left into Tenter Lane, another dial awaits us, at the sign of Luke the Physician “at the lowermost garden-house, on the right hand, with a sun-dial on the side of the house”.¹¹ That this house is mentioned in

several books, both fiction and antiquarian, suggests that it may well have existed. As to the dial, it seems to have been sufficiently memorable to be mentioned instead of, or together with, the house sign. The description of the house does suggest an east-facing dial, which might be less shadowed by other buildings than a south dial in a narrow street. It is very tempting to envisage that it had lines of declination and astrological symbols or images. The medicine practised might not have owed much to the old apothecaries, but such zodiac imagery would still have been popularly associated with medicine. In the absence of more evidence, a counterpart of the Fellows’ Quad dial at Merton College, Oxford (SRN 0582) suggests itself as a model (Fig. 4).

The Cross Dial, Moorfield Upper Walks (Site 5)

Retracing our steps and continuing north to the nearest corner of Moorfield’s Upper Walks, we reach the culmination of the tour with a dial of both importance and some mystery. The first mention of it I have found is in 1737,¹² apparently quoting directly from Leadbetter’s *Mechanick Dialling*:

“To these are added plain and easy rules for making of reflective, refractive, and globe dials; as likewise another sort in form of a cross; in respect of which last our author has been especially full and particular, because of its singularity; there not being (as he knows of) any of the sort in England beside one situate in Moor-Fields: He has not therefore only informed us after what manner of dial of this figure is to be made, but has moreover exhibited to the eye several necessary views or positions of it.”

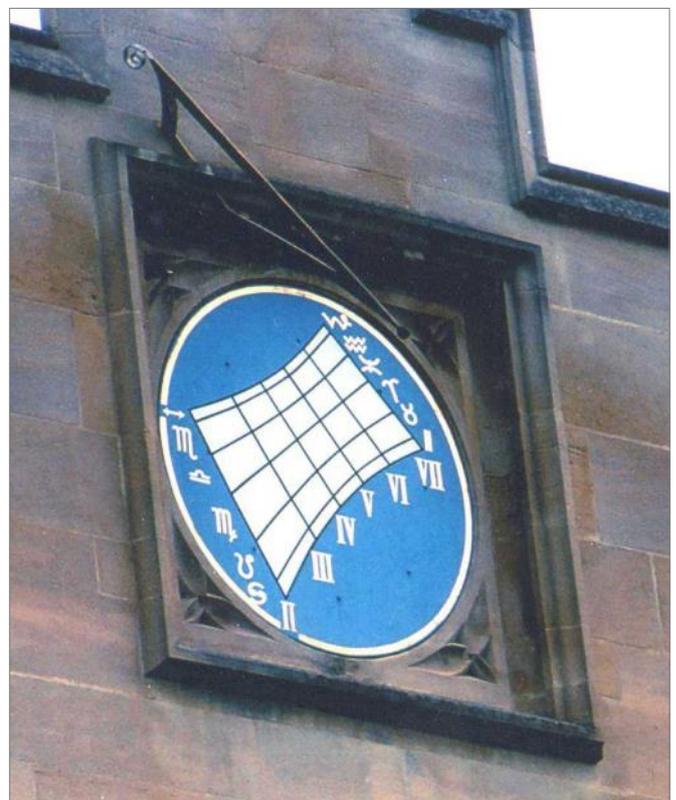


Fig. 4. Sundial in the Fellows’ Quad, Merton College, Oxford. Photo: John Foad.

Leadbetter's transcript of the dial's inscription appears to be the most complete information we have. Erected to commemorate the events of 1706, by the time of his writing, the dial had been in existence for three decades and had seemingly received very little maintenance. It is questionable that by the date of the second edition – if still standing – there were any meaningful marks to be seen at all. The illustration (reproduced in Cousins)¹³ suggests a solid structure, suited to the robust street conditions of its position (Fig. 5). Its precise location, and indeed much else about its commission and manufacture, is to be the subject of a future article.

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manaesus2000@yahoo.co.uk

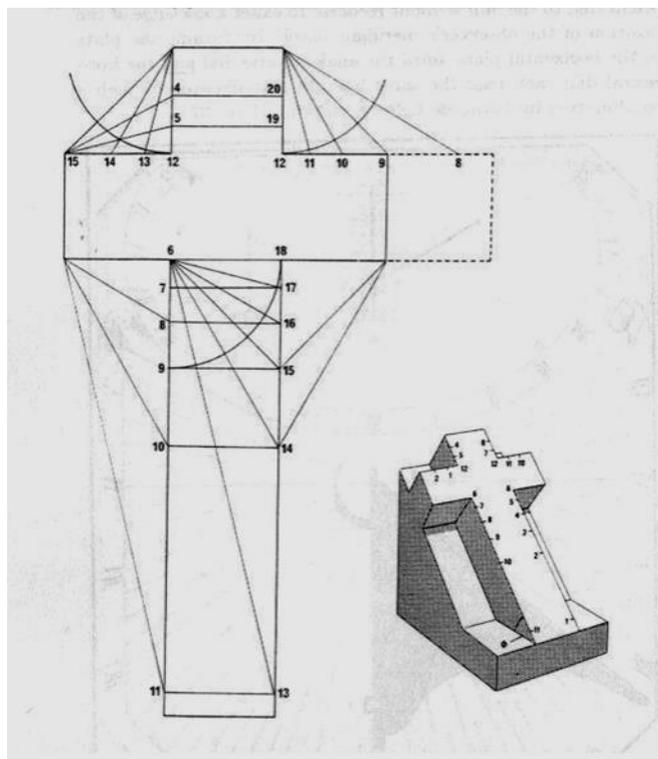


Fig. 5. Cross dial, copied from Chandler's engraving in Leadbetter.

BOOK AND EXHIBITION REVIEW

Time and Cosmos in Greco-Roman Antiquity by Alexander R. Jones [Editor and Exhibit Curator] and Jennifer Y. Chi [Exhibition Director], with contributions by John Steele, Karlheinz Schaldach, Daryn Lehoux, Stephan Heilen, Dorian Gieseler Greenbaum, James Evans, Bernhard Weisser; with a foreword by Roger S. Bagnall. ISBN 978-0-691-17440-2. 28 × 24 cm hard covers, 206 pp, copiously illustrated, majority of images in full colour. Includes an exhibition check-list (103 objects borrowed from over 20 museums), 43 footnotes, and bibliography with 237 entries. Published 2016 by Princeton University Press, Princeton NJ and the Institute for the Study of the Ancient World (New York University), New York



NY. Available through www.amazon.co.uk for the pre-publication price of £40.95, postage free.

While most students of horological history are vaguely aware that measuring time in human societies started a long time ago by non-mechanical means like sundials, water clocks, etc, there were hereto – to the best of this reviewer's knowledge – virtually no recent serious scholarly monographs on the subject. The book under review fills this gap.

The book is the result of an initiative of the





Time and Cosmos in Greco-Roman Antiquity, installation view. Institute for the Study of the Ancient World, NYU Photos: Andrea Brizzi.

‘Institute for the Study of the Ancient World’, a semi-autonomous affiliate of New York University located a block from the Metropolitan Museum in Manhattan, which – besides academic research – includes an attractive gallery space which between 19 October 2016 and 23 April 2017 has mounted a world-class exhibition on the subject. The exhibition includes 103 world-class objects (or groups of objects) borrowed from over 20 famous museums from around the globe (ranging from the Louvre and the British Museum, the Getty to the Metropolitan Museum), as well as including major pieces from the Middle East and from Greece and Rome.



This book, however, goes way beyond being a glossy exhibition catalogue with pretty pictures. Its core is a series of six scholarly papers concerning the subject of time in antiquity:

- Introduction (really an overview of the whole subject) by Alexander Jones (NYC), 25 pp, 19 images
- Near East Relations: Mesopotamia and Egypt by John Steele (USA), 18 pp, 15 images
- Measuring the hours: Sundials, Water Clocks and Portable Sundials by Karlheinz Schaldach (Germany), 28 pp, 26 images
- Days, Months, Years and other Time Cycles by Daryn Lehoux (Canada), 28 pp, 30 images
- Astrology in the Greco-Roman World by Stephan Heilen (Germany) and Dorian Gieseler Greenbaum (UK), 20 pp, 18 images
- Images of Time and Cosmic Connection by James Evans (USA), 28 pp, 25 images
- Roman Imperial Imagery of Time and Cosmos by Bernhard Weissner (Germany), 12 pp, 32 images

These essays are followed by a ‘checklist’ of the 103 items that make up the exhibition, providing such data as material, dimensions, geographic provenance, age of object, as well as which museum owns the item and its catalogue registry number. A bibliography with over 250 entries, and detailed image credits for all illustrations conclude the book.

In the opinion of this reviewer the bibliography alone is worth the purchase price to any serious enthusiast of time-keeping history.

The New York University Institute for the Study of the Ancient World and Professor Alexander Jones deserve the gratitude of the global community of enthusiasts and scholars who deeply care for the history of time-keeping for not only having staged this unique exhibition, but also having gone the extra mile by publishing its permanent record in a publication that is destined to become the core reference source on the subject of ‘Time and Cosmos in Greco-Roman Antiquity’.



Fortunat Mueller-Maerki

INVESTIGATION OF A JOHN BIRD SUNDIAL

IAN R. BUTSON

The first part of this article is based on a talk given at the 2016 BSS Newbury Meeting.

On my recent dialling travels, an interesting sundial was located in the churchyard of St Nicholas Church at Haxey in Lincolnshire (Fig. 1).

Haxey is a small town on the Isle of Axholme, at the extreme NW of the county. Although Haxey itself is in a very rural and agricultural part of the country, the large industrial areas of the East Midlands are close-by to the west, and to the north there are major power stations in Yorkshire. As well as these, the Lincolnshire steelworks at Flixborough and Scunthorpe are just a few miles away to the east. Perhaps industrial atmospheric fall-out from these industrial sites in the past has contributed to the heavy corrosion now found on the dial (Figs 2 and 3).

Description of the Dial

This large horizontal dial is mounted on a pedestal which itself is set upon a five-stepped base.

It has a circular brass dial plate 13 inches in diameter with a quadrant-shaped edging. At the centre of the plate an eight-point compass rose is engraved, with a surrounding band showing the eight major directions. A narrow dividing band with a pointed-leaf motif then follows to separate it from the Equation of Time scale.

At the outer edge of the dial plate the hours are indicated in Roman numerals, these being viewed from the outside, and



Fig. 1. View of St Nicholas Church, Haxey.

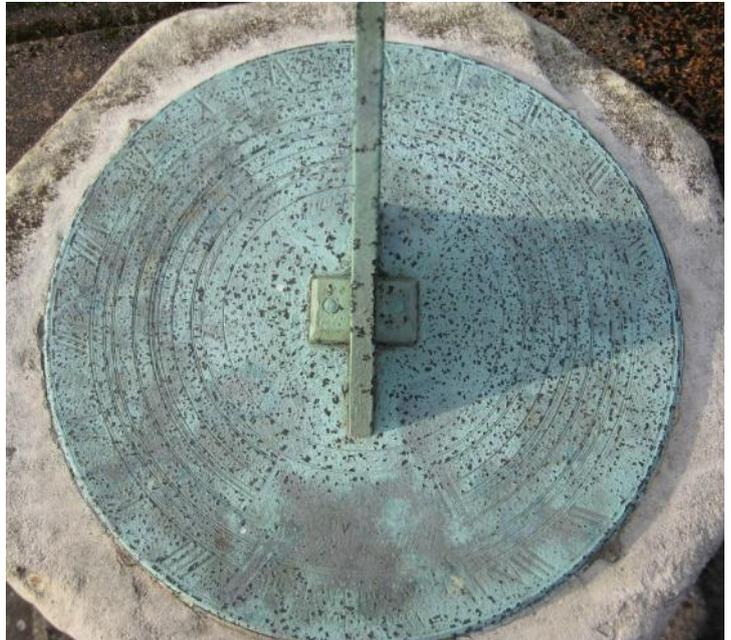


Fig. 2. Dial by John Bird at Haxey.

each hour is sub-divided into 30-, 10- and 2-minute markings.

Although not measured accurately at the time of the visit, the gnomon angle lies between 53° and 54° degrees; the actual latitude of Haxey is 53.49° N.

The dial is heavily oxidised, but the markings of the EoT correction bands are visible, although none of the details are discernible for the minutes/days/months or clock faster/clock slower bands.



Fig. 3. General view of the heavily-corroded dial and gnomon.



Fig. 4. Maker's name, "J Bird", by the heel of the gnomon.



Fig. 6. Inscription and engraved name between the edge of the dial and the toe point of the gnomon.

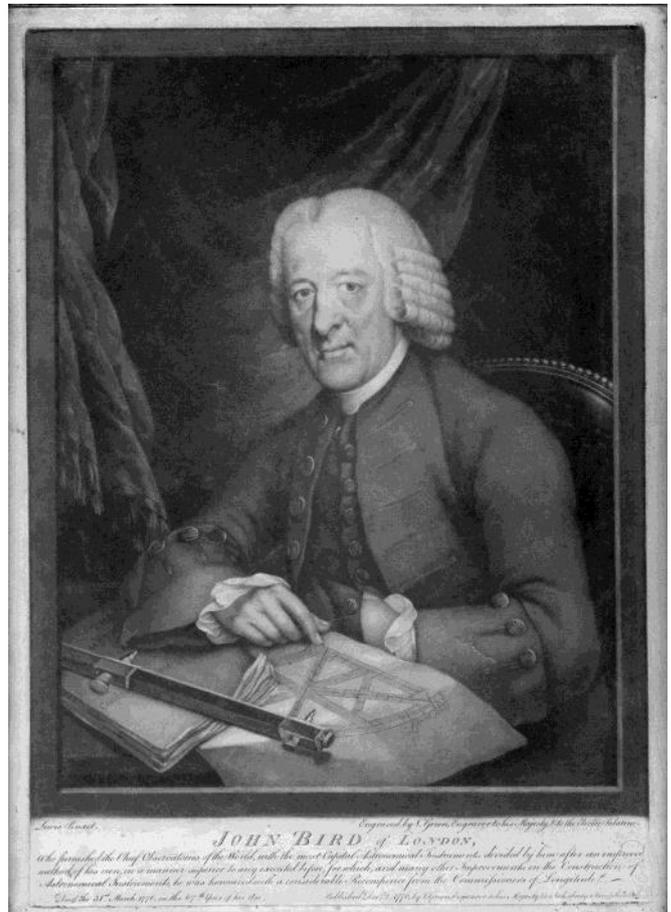


Fig. 5. John Bird, precision instrument maker. Engraving by N. Green (1776).¹

By the heel of the gnomon, the maker's name, "J Bird London" (Fig. 4), can be detected. John Bird (c. 1709–1776) was an important mathematical instrument maker (Fig. 5), working in London from 1745 and renowned for providing instruments of the highest precision to the Royal Greenwich Observatory.²

Also discernible is the inscription, "Watch for ye know not the hour", and part of a name by the toe point of the gnomon (Fig. 6). This appears to read "William Calton" (or "Cotton") with, below that, the word "Vicar". A display board in the church with the names of the past vicars indicates that a Dr William Cotton was the vicar from 1754 to 1762 (Fig. 7); perhaps this is the same person as named on the sundial, the dial being a parting gift. William Cotton later became a canon at Lichfield Cathedral.³

Pre- or Post-1752?

Considering that John Bird would have been working over the period of the change from the Julian to the Gregorian calendar in 1752, my investigation focused on attempting to establish whether the EoT markings were applicable to the pre-1752 era, or to that following the change to the Gregorian calendar.

In the 'minutes of correction' band no numerals are identifiable, and only a few traces of lettering are visible in

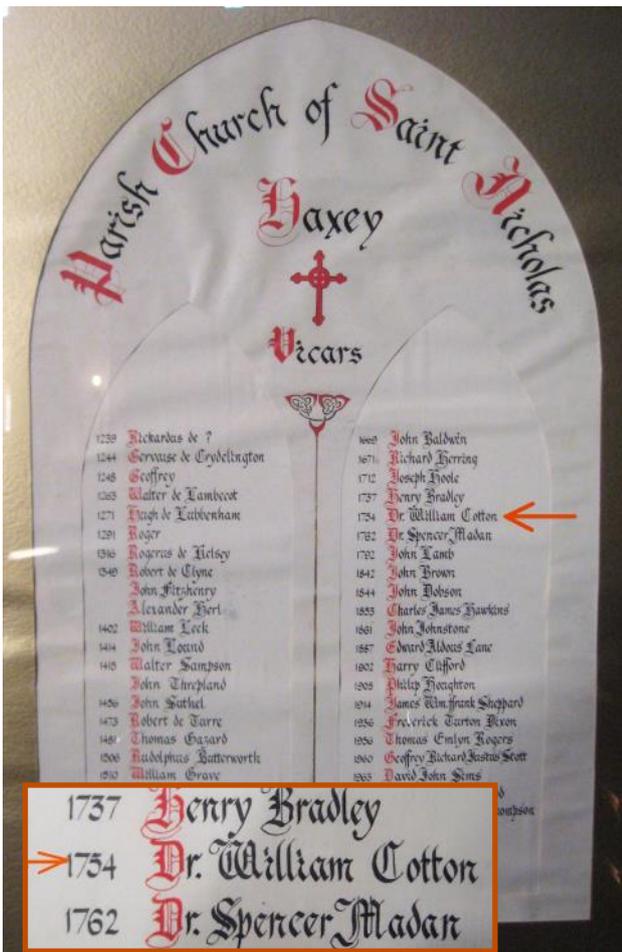


Fig. 7. Display board within the church, showing names of past vicars with, inset, 1754 Dr William Cotton indicated.

the clock faster/clock slower band, so it was necessary to make inferences from the division markers.

Using current EoT correction values, a basic template for post-1752 was constructed, showing typical relationships for the clock faster/clock slower bands as found on similar dials, with division markers for month/date/minutes of correction that could be compared with those found on the Haxey dial.



Fig. 8. Close-up image of EoT markings.

Close-up images, moving in sequence around the dial-plate, had been taken and by examining the photographs showing the various dividing lines in detail visible on the bands of the dial (as, for example, in Fig. 8), and then highlighting them, it was possible to fit these markings against those typified on my EoT template for the post-1752 era.

Fig. 9 shows enhanced highlighting of dividing lines, with the months and numbered days shown around the 15 April 'cross-over point' of zero minutes of correction.

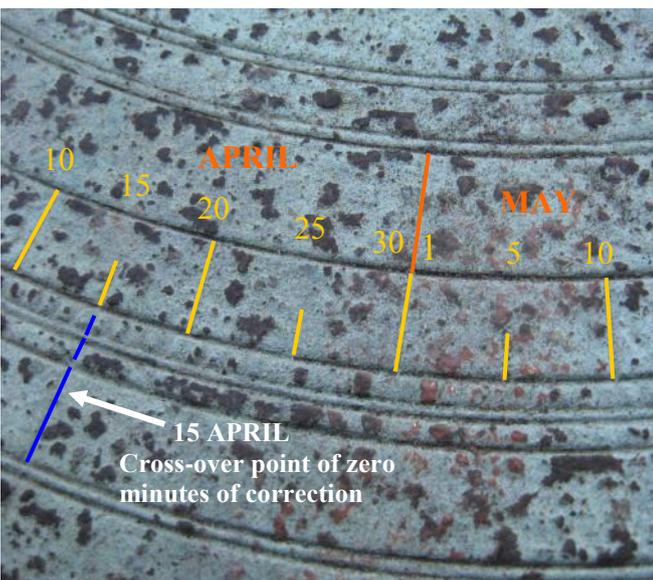


Fig. 9. Enhanced highlighting of dividing lines, with the 15 April cross-over point of zero correction indicated.



Fig. 10. The whole dial plate annotated with colour-coded EoT division lines. Yellow: days of each month. Red: month separators. Blue lines: 0 minutes "cross-over" division lines at 15 April, 12 June, 1 September and 24 December. Blue crosses: "maximum value points" at 10 February, 15 May, 26 July and 3 November.

Fig. 10 illustrates the whole dial with the division points highlighted and suggested possible lettering in the clock faster/clock slower band.



Fig. 11. John Bird sundial at Tapeley Park, Devon. Photo: John Foad.

To date, only one other sundial by John Bird has been recorded by the BSS, that being at Tapeley Park, Westleigh, Devon (SRN 0561, Fig. 11), and described in detail by Christopher Daniel.⁴ Another sundial by Bird is noted as being in Madrid.⁵



Figs 12 and 13. John Bird sundial, offered for sale by auction at Exeter. Photos courtesy of Bearnes, Hampton and Littlewood (Auctioneers), Exeter, Devon.

On the day following the Newbury presentation it was discovered via the Internet that a John Bird sundial was being offered for sale by auction at Exeter, Devon (Fig. 12). Its provenance was given by the auctioneers as King's Nympton Park, Devon; it was subsequently sold in October 2016 for £2300.

This dial, similar in general construction to the Haxey dial, also has a quadrant-shaped edging, but is slightly larger at 16 inches in diameter and rather more elaborate. It also bears striking similarities in the style of the markings, as there is an eight-point compass rose at the centre and there are EoT scale bands: some of the dial's markings are shown in detail in Fig. 13.

At the outer edge of the dial plate the hours are indicated in Roman numerals, again being viewed from the outside, but in this case each hour is sub-divided into half- and quarter-hours, and there are also 10- and 1-minute markings.

Although there is some surface wear to the dial, it has a fine green patina and most of the markings are discernible from the images, enabling it to be placed in the post-1752 EoT era.

The maximum value points (in May, July and November) and the zero value 'cross-over' point at 15 April that can be seen on the image fully agree with those as found on the Haxey dial. The divisions on the King's Nympton dial are shown as "Clock before the Sun" and "Clock after the Sun". On this basis, perhaps the bands on the Haxey dial might also be inscribed similarly to indicate the clock faster/clock slower bands, as originally suggested.



Fig. 14. James Buller (1717–65), portrait by Sir Joshua Reynolds, collection of trustees of Antony House, Cornwall. Wikimedia Commons.

The dial is signed "John Bird London" and bears a coat of arms for the Buller family. James Buller (1717–65) was MP for East Looe, 1741–47 and for Cornwall, 1748–65 (Fig. 14). His first wife Elizabeth Gould (d. 1742) was the heiress of the estate of Downes near Crediton in Devon which became at some time the principal seat of the Buller family. In 1744 he married Lady Jane Bathurst (d. 1794). It appears she did not wish to live in the house of her husband's first wife, or else had a liking for the new Palladian fashion in architecture, as James built a new house for her at King's Nympton. He demolished the previous medieval manor house there and built in its place, between 1746 and 1749, the fine Palladian mansion which was then known as 'New Place' and which survives today as 'King's Nympton Park'.⁶

With its coat of arms, was this sundial then one of the most up-to-date 'must-have' prestige items by a London maker, required to further enhance the estate at the recently built 'New Place'?

ACKNOWLEDGEMENTS

My thanks go to John Davis for discovering and sharing details of the auction of the King's Nympton dial, and for his help in explaining the intricacies and interpretation when analysing the detailed values for EoT correction scales.

Images of the King's Nympton dial are supplied courtesy of Bearnas, Hampton and Littlewood (Auctioneers), Exeter, Devon.

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ian@tipsdial.orangehome.co.uk

NEW DIALS

Lynton, Devon

To celebrate the fortieth anniversary of the Lynton Art and Craft Group, a new sundial was unveiled in July 2015. It is in the garden of the Lyn Valley Arts and Crafts Centre¹ which is in a converted Methodist church in Lee Road, Lynton. It is called the Exmoor Sundial and Starclock because, most unusually, the armillary sundial also has a nocturnal mounted on its meridian ring. It is arranged so that it is parallel to the equatorial plane and the North Star, Polaris, can be sighted through its central hole. Having set the volvelle to the correct date, the arm is rotated to align with the two stars in the constellation of Ursa Major, the Great Bear: Merak (β UMa) and Dubhe (α UMa). The arm will then indicate the time.² Dubhe is engraved as Dubke on the nocturnal and these 'guide stars' are identified as members of the seven-star asterism known in the UK as The Plough. It is believed that the stainless steel sundial is a modified version of the 'Jupiter' armillary from John Close Sundials.³



Fig. 2. Nocturnal on the meridian ring. Photo courtesy of Edmund Knight.



Fig. 1. Exmoor Sundial and Starclock at Lynton. Photo courtesy of Edmund Knight.

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JD

HISTORY ON A SUNDIAL

JACKIE JONES

I have frequently found that sundials have plaques on them with a few details about a person or event which make you want to find out more. I was recently in Bosham, West Sussex and spotted this dial in the churchyard (SRN 2965; Figs 1 and 2).



Fig. 1. Dial plate of the memorial sundial.

The inscription reads:

EUGEN
GERALD MARCUSE
RADIO PIONEER G2NM
WAS THE FIRST TO
TRANSMIT SHORT WAVE
BROADCAST PROGRAMMES
TO THE COMMONWEALTH
IN 1927 FROM HIS
STATION G2NM IN
CATERHAM
SURREY
MADE THE FIRST
RADIO TELEGRAPH
CONTACTS BETWEEN
GREAT BRITAIN AND
BRAZIL AND CALIFORNIA
AND THE FIRST
RADIO TELEPHONE CONTACT
WITH NEW ZEALAND

JUNE 4TH
1886

APRIL 6TH
1961



Fig. 2. The dial and pedestal.

Around the edge of the dial plate are arrows indicating the direction and distance to the places mentioned.

I then wondered why there is a memorial to him in Bosham, so I endeavoured to find out a bit more about his life. He was the founder of Empire Broadcasting and was granted a licence in June 1927 for a regular 2 hours a day shortwave service of speech and music; this continued until August 1928. He was well known for promoting amateur radio and in 1929 was elected President of the Radio Society of Great Britain. G2NM was his British amateur experimental call sign.

In 1937 he bought a holiday home in Selsey, West Sussex and then in 1944 moved to nearby Bosham. Here he became involved in the village life; he organised the fire brigade and was later elected as the representative for Bosham on the council. He died suddenly aged 74; his funeral was at Bosham church, where the dial now is. If you want to know more about him, you may see the majority of his equipment and documents; these were donated by his wife Irene to the Amberley Museum and Heritage Centre in West Sussex.

jackie@waitrose.com

THREE SUNDIALS OF BARCELONA

ANTHONY CAPON

During the late summer of 2016 I spent a few days in Barcelona. Whilst there I was able to visit two fine dials on a tower that played a small part in the determination of the length of the metre, the basis of the metric system of measurement.

In 1792 the French astronomer, Pierre François André Méchain, arrived in Barcelona. He was part of a French mission to establish the metre as one ten-millionth of the distance from the North Pole to the equator. To do this he and his fellow astronomer, Jean Baptiste Joseph Delambre, were measuring, by triangulation, the length of the meridian that passes through Dunkerque, Paris and Barcelona. Responsible for measuring the southern section of the meridian, Méchain also needed to determine, as accurately as possible, the latitude of Barcelona and one of the places he chose from which to make his latitude observations was Montjuïc.

Located to the south of the city centre, the 600ft high Montjuïc commands spectacular views of the city and the hills and mountains inland.

For long the site of a lighthouse, in the seventeenth century the summit of Montjuïc was fortified. This initial fortification was modified to plans drawn up by Juan Martin Cermeño in 1751, with the work being carried out



Fig. 1. The fortress of Montjuïc.

between 1753 and 1779. It was to this fortress then that Méchain came to make his observations, and it is little changed to this day (Fig. 1).

The fortress is unusual for its period in having a tower: defensive architecture of the time is characterised by buildings with low elevation. However, there was a signal tower on the summit as early as 1073 and this was rebuilt and remodelled into later structures several times. For this reason Cermeño included a new signal tower in his plans (Fig. 2).

His tower, though, was not suitably aligned for the calculation of solar time, so two vertical declining sundials were incorporated into its design, one declining 32 degrees east to give time in the morning and one declining 58 degrees west to give time in the afternoon (Figs 3 and 4).

For his astronomical observations to determine the latitude, Méchain built an observatory beside the fortress tower and set up his Borda repeating circle to measure the altitude of stars as they crossed his meridian.

Invented by Jean-Charles de Borda, the repeating circle bearing his name was, at the time, the state of the art instrument for angular measurement in surveying and also had applications in astronomy. A detailed description of the instrument and how it was used may be found in Ken Alder's excellent book, *The Measure of All Things*.¹

Today there is a visitor information notice on the tower pointing out that for his triangulation work, to measure the length of the Dunkerque to Barcelona meridian, Méchain used the tower as a trig point.



Fig. 2. The tower of the fortress.



Fig. 3. The east-declining dial on the tower.

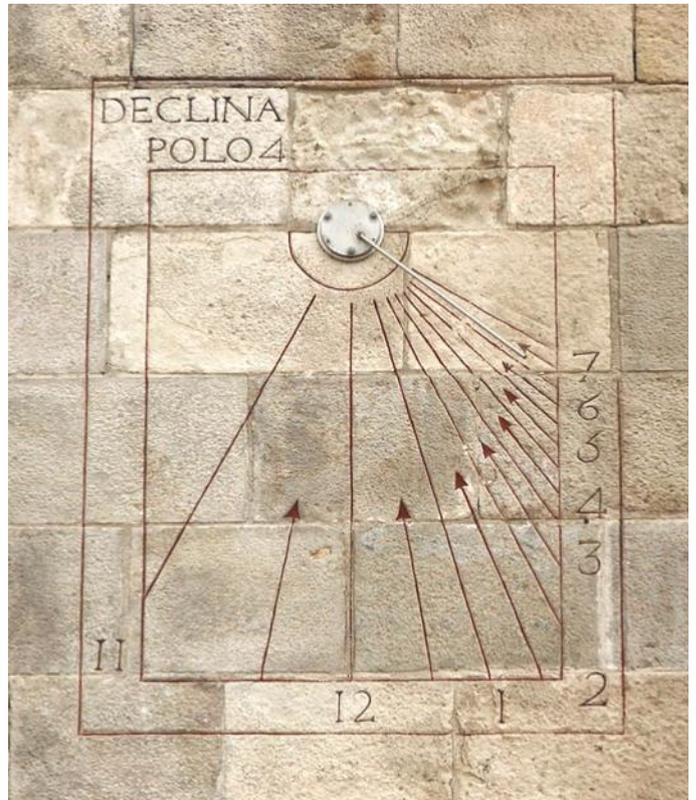


Fig. 4. The west-declining dial on the tower.

It seems unlikely that Méchain made any practical use of the dials on the tower but it is fascinating to think that he must have viewed the tower through the telescopic sights of his repeating circle many times as he triangulated onto it from various points around the city.

Outside the fortress, near the start of one of the many footpaths which now criss-cross the Parc de Montjuïc, I found the dial shown in Fig. 5. Clearly of recent origin, it appears to be made of concrete and has lost its gnomon. Seasonal declination lines are marked on the dial face; in addition, around the top of the cylinder which forms the pedestal, 16 points of the compass are marked and labelled (Fig. 6).



Fig. 6. Detail of the modern dial.



Fig. 5. A modern dial outside the fortress.

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anthonycapon@btinternet.com

DIAL DEALINGS 2016

MIKE COWHAM



This is my selection of some of the dials sold at auction in 2016. Prices shown generally include premiums but not VAT.

Christies, South Kensington. Travel, Science and Natural History. 21 April 2016

The dial that really attracted bidders to this sale was an ivory diptych dial which included a silver nocturnal (Figs 1 and 2). Its size was 2¾" or 7 cm from front to back. It is believed to be of Flemish origin and it was dated below the lunar volvelle on its vertical leaf, 1590. In many ways it looks like a diptych dial from Nuremberg, but with



Fig. 2. Nocturnal on the lid of the ivory Flemish dial.



Fig. 1. Ivory diptych dial.

various differences. Apparently another similar dial, thought to be by this same unknown maker, is in the British Museum collection. The present instrument is just a horizontal dial operating from a string gnomon, now broken, but it is the nocturnal on its lid that is particularly interesting. Its arm is marked *URSA MAIOR* and tells the time on the disc beneath. It sold for a remarkable £17,500.

In the same sale was a rather interesting gilt brass equinoctial ring dial, German of the 17th century (Fig. 3). This dial is not suspended as usual, but mounted on a stand. The dial is engraved with 38 towns and cities; it may be set to any latitude, the small pointer at the top of the main ring indicating the latitude figure. On the very top is mounted a compass. It was quite a small dial, being 5½" (14 cm) high. It sold for just £1,500.

An unsigned Dieppe ivory diptych dial was also sold (Fig. 4). It was of the usual magnetic azimuth type with a moving chapter ring in the compass bowl. It was 2½" (6.5 cm) long and sold for £1,500.



Fig. 3. Standing ring dial.



Fig. 4. Dieppe ivory diptych dial.

Charles Miller, London. Maritime and Scientific Models, Instruments and Art. 10 May 2016

There were several dials in this sale but I have selected just the following four.

The first was a fine inclining dial by Benjamin Martin (Fig. 5). It has a 3¼" (8.25 cm) diameter dial and is housed

in a later leather case. Its estimate was £500 to £800; it sold for £960.

The second item was a fine noon gun with a white marble base (Fig. 6). It was relatively small for such a dial with a diameter of just 6½" (16.5 cm). It was estimated at £1,000 to £1,500 and sold for £2,040.



Fig. 5. Inclining dial by Benjamin Martin.



Fig. 6. Noon gun.



Fig. 7. Compass dial by T. Gaunt.

original case. Its condition was therefore quite nice. Its outer ring was brass, possibly gilt, and the inner ring was silvered. It was 8" (20 cm) high. In its case were a set of instructions for its use by Francis West. It sold for £2,400.

Bonhams, Knightsbridge. Instruments of Science and Mechanical Music. 18 May 2016

In this sale was an early circular ivory diptych dial, thought to be from Nuremberg in the 17th century (Fig. 9). It was just 1¾" (4.5 cm) across. It had a string gnomon (now missing), indicating the hours on two faces, the vertical one with Roman numerals and the horizontal with Arabic numerals. This dial sold for £1,500.



Fig. 9. Early ivory diptych dial.



Fig. 8. Universal equinoctial ring dial.

I have included a fairly standard-looking compass dial by T. Gaunt of Melbourne, ca. 1890 (Fig. 7), because dials like this for the southern hemisphere are quite uncommon, and this was actually made there. Inside its lid was a printed paper chart for the Equation of Time. Thomas Gaunt was born in London in 1829 and went to Australia in 1852. Its diameter was 3¾" (9.5 cm). This dial sold for £360.

Another interesting piece was a universal equinoctial ring dial, by Troughton & Simms (Fig. 8), ca. 1840, still in its



Fig. 10. Silver Butterfield dial.

This sale also had a silver Butterfield dial signed by *André Noël à Paris*, ca. 1805 (Fig. 10). Its length was 3" (8 cm). He is not someone of whom I had heard before and I did not find his name in any books. On its reverse was a figure of Napoleon seated upon a horse, with a patriotic slogan, *Liberté Fraternité Egalité*. This dial sold for just £375, well below its estimate of £500 to £800.

Also in the sale was an unsigned ivory diptych dial from Nuremberg dated 1729 (Fig. 11); its size was 3¾" × 2¼" (9.5 × 5.8 cm). It was basically a horizontal dial, its string gnomon having five different latitude fixing points on its lid. It also had a short vertical gnomon, in front of its compass, for Italian and Babylonian hours. It sold for £2,500.



Fig. 11. Nuremberg ivory diptych dial.

Christies, South Kensington. Travel, Science and Natural History. 19 October 2016

This sale included a noon gun signed by K. Berent, mid 19th century (Fig. 12). All parts were brass except for the round base in marble, being only 7" diameter. Its wooden stand was later. Although estimated £1,000 to £1,500 it was sold for just £875. (This dial was unsold in their previous sale of 28 April.)

An ivory diptych dial in this sale is believed to have been made in Nuremberg and is dated on its lid, 1607 (Fig. 13). However, several other dials with similar features are known and have been attributed to a French manufacturer, as yet untraced. The size of this dial was 2.7" × 2.3"



Fig. 12. Noon gun by K. Berent, mid 19th century.

(6.8 × 5.8 cm). Its most attractive feature was a painting on the inside of its lid of the Crucifixion showing Christ on the cross with Mary on the left and two disciples(?) looking on. On its lid was a rather complex lunar scale applicable for the whole year. Above this was a scale of high tides. It sold for £4,550.



Fig. 13. Ivory compass dial.



Fig. 14. Equatorial dial.

Charles Miller, London. Maritime and Scientific Models, Instruments and Art. 8 November 2016

This sale included an equatorial dial by A.C. Fraser & Son, London, ca. 1850 (Fig. 14). Its chapter ring was 2 1/4" (5.7 cm) diameter and was silvered. The dial had three screw feet and spirit levels around the compass and was marked underneath with a Government broad arrow. The dial was housed in a wooden box. It sold for £635.

ACKNOWLEDGEMENTS

The illustrations used in this article are the copyright of the various auction houses and must not be reproduced without their permission. Christies: Figs 1, 2, 3, 4, 12, 13. Charles Miller: Figs 5, 6, 7, 8, 14. Bonhams, Figs 9, 10, 11.

mike@brownsover.orangehome.co.uk

**Postcard Potpourri 38
A Comic Postcard**

Peter Ransom



Well, these two (or is it four?) dials are definitely not in the Register! Clearly the couple with linked arms have spent rather a lot of time in the sun evidenced by the colour of their 'dials'. Donald McGill was perhaps the most prolific illustrator of comic postcards, with an estimated 12,000 designs.

The card shown here is not signed so the artist is unknown. There is no publisher listed on the reverse, just the number 4513.

pransom@btinternet.com

HOW WRONG CAN YOU BE?

GRAHAM STAPLETON

When applied to most of the sundials readily available to buy, this question can very easily be a rhetorical one. Any search of the Internet, mail-order catalogues, or a visit to a garden centre, will bring to light alleged sundials whose only similarity to the real thing is the possession of an element that casts a shadow. Worse still are the dishonest replicas being offered through online auction sites, which are not unmasked until arrival.

The illustrated examples have a reasonably smooth finish to the wood. Their hinges and the cirlet holding the compass cover glass in place are fashioned from brass wire. Also in brass are the hooks and pins to hold the leaves shut when not in use. The dials take the form of printed paper plates, pasted to the inner faces of the tablets and then coloured by hand. The gnomon consists of a length of thread stretched between the two leaves, secured in a pinhole through each. A brief study of these dials suggests that they were manufactured to sell at a lower price than, for example, an Augsburg dial, but were nonetheless intended to work adequately. The potential for introducing errors through these manufacturing processes would be material enough for a separate essay. That is even before we consider the possibilities for errors arising out of the user's handling of the sundial. However, what I wish to concentrate on is the



Fig. 1. A typical wooden diptych dial.

In this article, I am thinking only of the small, wooden diptych sundials that were made in some quantity in the last quarter of the eighteenth century and perhaps a little into the nineteenth. The heyday of the diptych between 1500 and 1750 produced the ivory dials of Nuremberg. The wooden dials come later and originate in Southern Germany, particularly Bavaria (Fig. 1). Not all are signed, although they would appear to be made either by David Beringer or by his followers, the Stockerts.¹

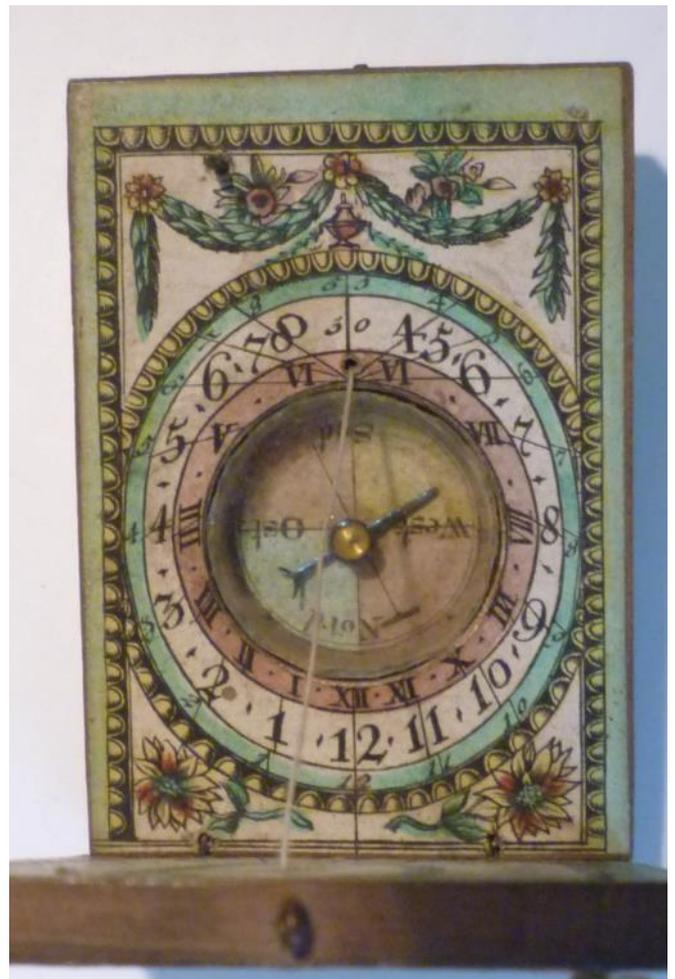


Fig. 2. Close-up of a horizontal dial with rings delineated for 55°, 50°, and an unlabelled value.

ostensible capability of these dials to be used at different latitudes.

These diptychs frequently carry an additional paper on the uppermost face, giving a list of European and American cities, accompanied by whole-degree values for their latitude. The horizontal dial may have up to three concentric rings for different latitudes (Fig. 2). The ‘home’ latitude is usually 50°, with a supplementary scale, typically 55° and sometimes also 45°, or 42°. The single vertical dial is also of the home latitude, but bears a vertical series of points on the meridian; a span of 22° between latitudes 34° and 56° would appear to be popular. If required for use at another latitude, the user would bore a pinhole at the required point and re-thread the gnomon to set it at the required angle. From the study of a very limited sample, I suggest that such an operation was not always carried out. This is more likely a result of people not travelling, rather than a lack of concern for accuracy. Extra features of questionable value on gadgets are clearly nothing new.

So, blithely assuming everything else to be perfect, how badly will the sundial perform when it is taken to a new latitude and its gnomon is set for that latitude but the *only* delineated hour lines are for the home latitude of 50°?

Notwithstanding the absence of hour lines for other latitudes, I first calculated the hour-line angles (HLAs) for horizontal dials at 40°, 50° and 54° (Table 1).

Latitude	Hour Angle				
	15	30	45	60	75
40°	9.77	20.36	32.73	48.07	67.37
50°	11.60	23.86	37.45	53.00	70.72
54°	12.23	25.04	38.97	54.49	71.67

Table 1. Hour-line angles (HLAs) for horizontal dials at latitudes 40°, 50° and 54°.

Then, by inverse calculation, I determined the hour angles at which the shadow would cover the hour lines delineated for 50° when at distant latitudes (Table 2).

For example, at latitude 50°, with the gnomon set to 50°, the shadow falls on hour line XI at hour angle 15°. Hour line XI is offset by 11.60° from the noon hour line and, at latitude 40° with the gnomon set to 40°, the shadow falls on

this same hour line at hour angle 17.71°. This is nearly 11 minutes *early*. At latitude 54° it is about 3 minutes *late*.

The formula and its inverse are:

$$X = \arctan(\tan h_h \cdot \sin \phi_h)$$

$$h_d = \arctan(\tan X / \sin \phi_d)$$

Where:

X = angle of hour line from the meridian

h_h = hour angle at home latitude

h_d = hour angle at distant latitude

ϕ_h = dial home latitude

ϕ_d = distant latitude

Thus the intrepid traveller who has gone from Frankfurt am Main (Hessen, 50° N) to Philadelphia (Pennsylvania, 40° N) would find his dial reading anything up to 20 minutes out. Similarly, whilst sojourning in Malbork (Pomerania, 54° N), it would be up to 6 minutes out, a little more manageable. By modern standards, these errors are noticeable, but we should judge by the expectations of the era. The dial is small and would be known to be not of the best quality; therefore an accurate reading would not be expected.

What may not be instantly realised about these values is that the time difference has to be either added or subtracted. This depends on whether it is before or after noon, and whether the distant latitude is greater or less than the home latitude that the dial is delineated for. Taking the example of just one hour either side of noon demonstrates how the difference is applied...

It was noted in the hour line XI example above that, when the gnomon is strung for a lower latitude than its delineation, the dial will be fast in the morning and when strung for a higher latitude it will be slow in the morning. Hour line I has the same offset from the noon hour line but on the other side and we can see that at a lower latitude now the dial will be slow in the afternoon and at a higher latitude it will be fast in the morning.

With the gnomon strung for a distant latitude, its shadow traverses the hour lines differently from the way it does at home. Table 3 gives the hour-angle values for the moment when the shadow traverses the marked hour line, or the line that would be marked if the dial had further chapter rings for other latitudes.

HLA at Latitude 50°	Latitude 40°			Latitude 50° Hour Angle at HLA50	Latitude 54°		
	Hour Angle at HLA50	Hour angle difference	Time difference		Hour Angle at HLA50	Hour angle difference	Time difference
11.60	17.71	2.71	10m 50s	15°	14.24	0.76	3m 03s
23.86	34.53	4.53	18m 07s	30°	28.66	1.34	5m 20s
37.45	50.00	5.00	20m 00s	45°	43.44	1.56	6m 15s
53.00	64.15	4.15	16m 36s	60°	58.63	1.37	5m 29s
70.72	77.33	2.33	09m 19s	75°	74.20	0.80	3m 12s

Table 2. Time differences arising from using a sundial at a latitude different from the home latitude of 50°.

HLA	Latitude		
	40°	50°	54°
9.77	15.00	12.67	12.02
11.60	17.71	15.00	14.24
12.23	18.64	15.80	15.00

Table 3. Hour Angles at different latitudes at which the shadow falls on three sets of XI and I hour lines.

The middle row of values in this table are taken from the first row of values in Table 2. When delineated for latitude 50°, both hour line XI and hour line I are offset 11.60° from the noon hour line and, at this latitude, the shadow falls on these lines at hour angles 15° before and after noon. At latitudes 40° and 54° degrees the shadow falls on these lines at hour angles 17.71° and 14.24° either side of noon respectively.

The bottom row assumes that the only chapter ring available is delineated for 54° where hour lines XI and I are offset 12.23° from the noon line (from Table 1). When the sundial is at latitude 54°, the shadow falls on these hour lines at hour angles 15° either side of noon. At latitudes 40° and 50° degrees the shadow falls on these lines at hour angles 18.64° and 15.80° either side of noon respectively.

The entries in Table 3 are duplicated and rearranged in Table 4. This is intended to be a schematic arrangement where one imagines studying the shadow sweeping across a dial which looks very much like that in Fig. 2. The only difference is that the three chapter rings are delineated for 40° (innermost), 50° (middle) and 54° (outermost).

We assume that the dial's owner has aligned the instrument so that the gnomon and the noon line are in the meridian plane. When viewed as in Fig. 2, the shadow will sweep across the noon line from right to left, this direction of travel being maintained for well over an hour before noon and well over an hour after noon. During this period, the shadow will fall on the three 11 o'clock tick marks in turn (first that on the 54° ring, then that on the 50° ring and then on that on the 40° ring). About an hour later it will fall on the 12 o'clock line which is common to all three rings. Then, another hour or so later, it will cross the three 1 o'clock tick marks (this time beginning with that on the 40° ring).

If the owner is at 40° and has set the gnomon to 40°, then the times (shown as hour angles) at which the shadow falls



Fig. 3. Close-up of a vertical dial with latitude setting points but delineated for 50° only.

on the three 11 o'clock tick marks can be read right to left by looking at the entries in the first row of numbers. The times are 18.64°, 17.71° and 15.00° respectively. The last is of course correct because the 40° ring is the appropriate one to use. The shadow falls on the 12 o'clock tick mark at hour angle 0.00° and then, later, crosses the three 1 o'clock tick marks.

Other rows in Table 4 show how the times change when the same observations are made at latitudes 50° and 54°.

Examining the vertical dial (Fig. 3), it is instantly obvious that while it is a diptych in form, it certainly is not in function away from its delineated latitude.

There is only one dial centre, and that is for the home latitude. Once strung for another latitude, it ceases to function. Being the larger of the two dials, it is clearly the one intended for dominant use on home ground.

Latitude	Time I			Time XII All Rings	Time XI		
	Ring 54	Ring 50	Ring 40		Ring 40	Ring 50	Ring 54
40°	18.64	17.71	15.00	0.00	15.00	17.71	18.64
50°	15.80	15.00	12.67	0.00	12.67	15.00	15.80
54°	15.00	14.24	12.02	0.00	12.02	14.24	15.00

Table 4. Schematic diagram showing, for three different latitudes, the hour angles at which the shadow falls on the three 11 o'clock tick marks, the single 12 o'clock tick mark, and the three 1 o'clock tick marks.

The capacity for this kind of dial to be adjustable is limited, so while the occasional traveller could have compromised, the busy merchant would have done best to buy several single-latitude dials (for example, Fig. 4) for the range of his travels.



Fig. 4. A useful single-latitude dial. Note the plumb-bob to assist holding it vertically.

Used in a time when both the reliability of transport and safe conduct in the street could be unpredictable, a wise person might prefer to have an adequate approximation of the hour and carry one of these, rather than an heirloom piece. By their nature, these dials were intended to have a working life of only a few years, so the survival of any is the fortunate result of chance. They are not quality pieces, but I assert they are important in that they are what the majority of people would own – the man who would not lose a better piece, and the man who could afford no better.

Both would have known that dials could give the time accurately, but had the fortune to live in times that had less need of it.

REFERENCE

1. H. Highton *et al.*: *Sundials at Greenwich*, Oxford University Press, Oxford (2002), p. 262.

manaesus2000@yahoo.co.uk

ARTICLE REVIEW

‘Isaack Symmes and the Ridlington Sundial’ by Robert Ovens, in *Rutland Record*, 36, pp. 239–252 (2016).

The *Rutland Record* is the annual journal of the Rutland Local History and Record Society¹ and its recent edition has a most impressive 14-page article on a sundial made for the church in Ridlington, Rutland, by Isaack Symmes (c.1580–1622). The author Robert Ovens, who lives locally, was a co-author of *Time in Rutland*² and so is well positioned to write on the subject. Symmes was an important member of the Goldsmiths’ Company in London who made watches and sundials. Two of his dials and a brief biography have appeared in the *Bulletin*³ but the Ridlington dial has not been fully published before and the version of Symmes’ biography here is considerably extended.

The Ridlington dial was originally commissioned in 1614 for the church by the MP Sir William Bulstrode, whose name appears on it. It was almost certainly made to regulate the tower clock (now lost) but later moved to the nearby rectory where it was positioned on an extraordinary pedestal consisting of a piece of reclaimed ecclesiastical masonry until it was removed for safekeeping. It is a small (nominally 6” square) horizontal dial which now has a very dark patina – the article, though, includes an accurate drawing of its details. The design would have been old-fashioned even in 1614: the centre of delineation is in the plate centre and it would have had the same knife-edge gnomon without a noon gap that features on Symmes’ other dials. (The existing gnomon is a rather inappropriate replacement which is too thin, the wrong angle and has no knife-edge.) The design is delineated only to quarter-hours and features a smiling face in the centre, much beloved of 20th-century reproduction but here in a suitably naïve style. The most important feature, though, is the back of the dial which is literally covered in trial engraving with words including “Ridlington” and “Church” in several different styles as well as doodles such as a man’s head smoking a pipe.

The biography of Symmes shows that from a simple apprentice he became quite prosperous during his short life, as evidenced by his will which is transcribed in full. We are lucky that, as well as a handful of dials, several of his watches also survive (and are nicely illustrated here).

NOTES and REFERENCES

1. www.rutlandhistory.org. Issues of the *Record* can be ordered from www.genfair.co.uk at £4.50 + p&p.
2. Robert Ovens & Sheila Sleath: *Time in Rutland: A History and Gazetteer of the Bells, Scratch Dials, Sundials and Clocks of Rutland*, Rutland Local Hist. Soc. (2002).
3. M. Lowne & J. Davis: ‘Lines of Declination and Two Seventeenth Century Dials’, *BSS Bull.*, 19(iii), pp.128–134, (June 2007).

John Davis

READERS' LETTERS

Greek Motto

In the Newsletter for March 2016, I asked if anyone could supply a translation for the motto 'ΖΩΗ ΑΤΜΗ ΣΚΙΗ' seen on a dial at the now-disused Old Trinity railway station in North Edinburgh, and reported by John Allen.



Old Trinity railway station dial, North Edinburgh.
Photo: John Allen.

The motto is not noted on any of the dials in the Register, and I could not find it in Gatty. My thanks to several of you who replied, particularly this from Sue Manston:

ΖΩΗ = Zoe = life, existence/living (as in making a living)/alive/you live /It lives (but not "I live" as the ending is wrong) – as in zoology

ΑΤΜΗ = Atme = Vapour (steam) – as in atmosphere

ΣΚΙΗ = skie = shadow

The consensus seemed to be that it is a slightly cryptic comment on the evanescence of life generally, expressed suitably for the environment of a sundial on a steam railway station!

The other day, by chance, I found that the motto had an earlier life, on a dial that once stood at Ballakilley in the Isle of Man, recorded in the 1900 Gatty, on page 392, though not indexed. The main inscription, around the hour circle, was a Latin verse of four lines, and the four corners each carried a motto. One was our Greek line, and it was said to have been rendered below on the dial (with comments from Gatty) as :

*Life is the Spectator (query Spectre?) of a Shadow,
instead of Life (is) smoke, shadow, which is the literal translation.*

It was a square horizontal dial of black slate, and was also inscribed :

Rich^d Watterson's Dial, Kentraigh [Kentraugh] Mill, in the Isle of Man. Lat. 54 20 N; Long. 4 30 W. MDCCCXXX

An item in the journal of the Isle of Man Natural History and Antiquarian Society, Vol. 1 No. 2, pp.38–41 (1889), says that the dial "lately stood at Ballakilley in Rushen, and is the property of Mrs Clucas, Thornhill". The coordinates on the dial point to a location some 8 km west of Ramsey in the north of the island. They do not match either Kentraugh Mill or Ballakilley particularly closely, the former being in the far south west, and the latter some 4 km south-east of Ramsey. I wonder if the dial is still to be found?

John Foad
registrar@sundialsoc.org.uk

A Return to Sundial Construction

Over forty years ago I attended a further education college in east London and found in the library, Rohr's book about sundials. I was the only person who ever took it out and I could never understand why this college should have such a book in its stock. Having scanned through the book I proceeded to make a couple of sundials out of scrap Dural and old scientific instruments, but pressure of work brought these activities to a halt.

In my ignorance I thought that I had grasped the theory behind sundials and promised myself that at a later date I would take up sun dialling seriously. In the meantime I started to collect bits of old teak bench top and scrap brass/aluminium for future use.

The years have passed and I now have a little more free time and I decided to join the BSS. After revisiting a couple of my reference books, I realised that my grasp of the subject was minimal and that there was a need to go back to basics. The problem is that reading the *Bulletin* and looking at the various websites shows that there is much more to learn that is currently way above me! I have started to construct simple dials again using my reclaimed materials and gaining great satisfaction from these activities. I am now able to make simple dials at home using simple machine tools, but engraving letters is beyond me.

Julian Greenberg
g4zod@btinternet.com

TRUSTEES' ANNUAL REPORT 2016–17

During the past year the Society maintained its established programme of core activities and events. Membership was broadly flat, though with a small decline. We continue to cover operating costs, this year's surplus reversing the previous year's deficit, and the balance sheet can support the Society's activities for the foreseeable future.

The past year again witnessed another four quality editions of the *Bulletin*. Both 2016's annual conference (held in Liverpool) and the annual Newbury meeting again presented well-received and varied programmes. Members continue to indefatigably record and add to the Society's sundial registers.

Increasingly the website continues to be the Society's window on the world and to the public at large. It is the avenue by which most new members find us. It is by far the most efficient method of spreading 'the word'.

The Help and Advice Service, which is an extension of the former Restoration and Conservation Service, has now been running for several years and is accessible from the home page. It allows members of the public to address specific queries to the Society.

The entirety of the Society's activities are undertaken on a voluntary basis by members. Thanks continue to be due to all who make the Society what it is – authors, recorders, specialists, trustees, and those who help on an *ad hoc* basis. We are particularly grateful to those who responded to the previous trustees' report by volunteering.

Although we continue, just about, to manage ongoing activities, we are constrained when it comes to investing in the future. The Society is, like that of the rest of the world, becoming increasingly digital. There is much more we could do to share our knowledge — that is, educate the public in the science and art of gnomonics — on the website. Similarly, beyond the *Bulletin* our in-house editing capacity for publications is constrained. If you feel able to help in any way, we would love to hear from you.

More detailed information is annexed below.

*David Brown, Jackie Jones, Frank King,
Graham Stapleton, Bill Visick and Chris Williams*

ANNEXE

The Bulletin

The *Bulletin* operation continued much as in recent years. The principal novelty was that, for the first time in a considerable while, there were advertisements in the December *Bulletin*.

John Davis acknowledged every new article that was submitted and made the initial response to authors. Most of

the subsequent processing was undertaken by Christine Northeast with Frank King advising on gnomonic niceties. Fiona Vincent proofread every issue and we are most grateful to her for her eagle eye and for the considerable care that she takes. Bill Visick undertook all the liaison with the printers.

We additionally acknowledge the help provided by David Brown who has carried out some of the typesetting. Finally, we are most grateful to all those who submitted articles, fillers, and miscellaneous items for publication. We would very much like to encourage even more members to contribute to the *Bulletin*.

The Bulletin Team

Website

The website continues to be a popular resource with steady growth in the number of UK visitors in the past year. It is a good shop window for the Society and is the main source of new joiners. I am pleased to report that after the problems we had with unreliable service from our hosting company last year, we are now back to a good level of service with no noticeable interruptions.

As ever, there is a long backlog of material that we would like to add to the website. Volunteers are always welcome and there is a range of activities requiring different levels of technical skill so there is something for all – please contact the webmaster if you are able to assist.

Finally, besides the growth in UK numbers there has been a very noticeable swing in overseas visitors: a significant drop in visitors from the US and a broadly similar increase in those from Russia. Non-political explanations are welcome!

Bill Visick

Help and Advice

Sue Manston has volunteered, and now attends to the majority of enquiries, with Frank King continuing to answer queries occasionally.

One enquirer not only joined the Society but gave a talk at the Newbury meeting. This reinforces the view that the Help and Advice service is a valuable part of the BSS mission.

While the majority of enquiries are from the UK, there continue to be several from around the world. A few are from the US. Frank has been in touch with Art Paque, the NASS Vice-President, with a view to there being a corresponding service in North America.

Sue and Frank continue to call on the expertise of other members, particularly John Davis, Mike Cowham, and

John Foad. Few enquirers will appreciate what a fount of knowledge they are tapping into!

Sue Manston and Frank King

Conference

The change to organising conferences on a team basis has worked very well. The core team comprises Doug Bateman, Bill Visick, Liz and Chris Williams. We need help in finding venues. Mike Shaw found the venue for Liverpool and was part of the 2016 team. David Payne has found a venue in Norwich and will join the 2018 team.

Anyone wishing to help, including finding or suggesting future conference venues, would be very welcome.

The Conference Team

Registrar

This was a quiet year apart from the steady flow from members of new reports, updates and queries. The Register now has nearly 7,400 dials of which 88% have one or more photographs.

A major initiative was made by Ian Maddocks, scanning the web for unrecorded British dials on sites such as Twitter and Instagram, many of them of considerable interest. They now need to be followed up by members, to obtain photographs and details that we can use in the Register. Ian has provided details of his lists in the Newsletter and on the Sundial Mailing List, supplying a very valuable resource.

John Foad

Schools Outreach

During the year David & Jen Brown and Chris & Liz Williams again visited Cheney School, Oxford. The School hosts a couple of major day or half-day events featuring all aspects of the classical world. The Society has become an established participant. The events generate significant foot traffic as they are open to neighbouring schools. In addition to a stall featuring models, photographs, and demonstrator stone replicas of classical dials, there is also the opportunity for pupils, with supervised assistance, to make working dials of classical design out of card.

Such events involve considerable effort – preparation and delivery. Volunteers are welcome to help spread the load.

The Schools Team

Library

This year we received two contributions:

- *Methode Nouvelle et générale pour tracer facilement des Cadrans Solaires* by M de la Prise, published in Caen in 1781. This important work was donated by Chris Daniel, along with a copy of the Horniman Museum Sundial Trail.
- Copies of the North American Sundial Society *Compendium*, volumes 18–22, bound in binders with gold lettering.

In addition, the Library received our own *Bulletin*, volumes 23–27, similarly bound and lettered, the Society's new *The Sundial Register 2015 (Abridged)* and three volumes of *The Sundial Register 1–10, 11–20, and 21–30*.

The Library is really bursting at the seams now and we need to negotiate with the Bromley House staff for some additional shelf space.

The Society's Library is in excellent hands at Bromley House. One of the librarians, Nicola Rae, takes an interest in us and has been a great help. To access the catalogue go to www.bromleyhouse.org, then click on the 'Library Catalogue' button and enter 'sundials' in the search box.

John Wilson

Membership

We now have 335 members, of whom 241 are in the UK. There are 49 elsewhere in Europe and in the rest of the world there are 45, the majority being in North America.

The Trustees have discussed how potential new members might be targeted. New members occasionally come to us via the Help and Advice service and it also is thought that there are dial makers and museum staff who are not already members and who might be approached.

Jackie Jones

Treasurer

The Society's 2016 Accounts begin overleaf.

Graham Stapleton

BSS ACCOUNTS FOR THE YEAR

THE BRITISH SUNDIAL SOCIETY (CHARITABLE INCORPORATED ORGANISATION)

LEGAL AND ADMINISTRATIVE INFORMATION

CHARITY NUMBER	1155688
LEGAL FORM	Charitable Incorporated Organisation formed under the Charities Act 2011.
START OF FINANCIAL YEAR	1st January 2016
END OF FINANCIAL YEAR	31st December 2016

TRUSTEES AT 31ST DECEMBER 2016

Dr F King - Chairman	G Stapleton - Treasurer
C Williams - Secretary	B Visick - Webmaster
J Jones - Membership Secretary	D Brown

GOVERNING INSTRUMENT Constitution as incorporated 7th February 2014.

OBJECTS The advancement of the education of the public in the science and art of gnomonics.

CONVERSION TO CIO The members of the unincorporated charity British Sundial Society (former registered charity number 1032530) agreed at the April 2014 AGM that the Society become a Charitable Incorporated Organisation (CIO).

The British Sundial Society (CIO) was formed and registered as a charity on the 7th February 2014 (registered charity number 1155688) and took over all the activities of the former British Sundial Society from the 8th August 2014.

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

PRIMARY BANKERS The Co-operative Bank plc
PO Box 101
1 Balloon Street
Manchester
M60 4EP

INDEPENDENT EXAMINER M J Easton BSc (Hons) MBA
Independent Examiners Ltd
Sovereign Centre
Poplars
Yapton Lane
Walberton
West Sussex
BN18 0AS

ENDED 31ST DECEMBER 2016

INDEPENDENT EXAMINER'S REPORT ON THE ACCOUNTS

Report to the trustees/members of The British Sundial Society on the accounts for the year ended 31st December 2016 which have been set out on pages 46 to 52.

Respective responsibilities of trustees and examiner

The organisation's trustees are responsible for the preparation of the accounts. The organisation's trustees consider that an audit is not required for this period (under section 144(2) of the Charities Act 2011 (the Act)), and that an independent examination is needed.

It is my responsibility to:

- examine the accounts (under section 145 of the Act);
- follow the procedures laid down in the General Directions given by the Charity Commissioners (under section 145(5)(b) of the Act); and
- state whether particular matters have come to my attention.

Basis of independent examiner's statement

My examination was carried out in accordance with General Directions given by the Charity Commissioners. An examination includes a review of the accounting records kept by the organisation and a comparison of the accounts presented with those records. It also includes consideration of any unusual items or disclosures in the accounts, and seeking explanations from the trustees concerning any such matters. The procedures undertaken do not provide all the evidence that would be required in an audit, and consequently no opinion is given as to whether the accounts present a 'true and fair view' and the report is limited to those matters set out in the statement below.

Independent examiner's statement

In connection with my examination, no matter has come to my attention:

- (1) which gives me reasonable cause to believe that in any material respect the requirements:
 - to keep accounting records in accordance with section 130 of the 2011 Act as amended; and
 - to prepare accounts which accord with the accounting records and comply with the accounting requirements of the Acthave not been met; or
- (2) to which, in my opinion, attention should be drawn in order to enable a proper understanding of the accounts to be reached.

M J Easton BSc (Hons) MBA
Independent Examiners Ltd
Sovereign Centre
Poplars
Yapton Lane
Walberton
West Sussex
BN18 0AS



Dated: 23rd February 2017.

THE BRITISH SUNDIAL SOCIETY
(CHARITABLE INCORPORATED ORGANISATION)

STATEMENT OF FINANCIAL ACTIVITIES
FOR THE YEAR ENDED 31ST DECEMBER 2016

	Notes	Unrestricted Funds £	Restricted Funds £	Total 2016 £	Total 2015
INCOME					
Donations and legacies	3a	1,351	0	1,351	376
Investments	3b	240	0	240	263
Charitable activities	3c	34,639	0	34,639	29,798
TOTAL INCOME		36,230	0	36,230	30,437
EXPENDITURE					
Charitable Activities	4a	24,880	527	25,407	30,375
Other	4b	3,320	0	3,320	4,504
TOTAL EXPENDITURE		28,200	527	28,727	34,879
NET INCOMING/ (OUTGOING) RESOURCES		8,030	(527)	7,503	(4,442)
Total Funds Brought Forward		71,346	8,509	79,855	84,297
TOTAL FUNDS CARRIED FORWARD		79,376	7,982	87,358	79,855

Movements on all reserves and all recognised gains and losses are shown above.

The notes on pages 48 to 52 form part of these financial statements.

THE BRITISH SUNDIAL SOCIETY
(CHARITABLE INCORPORATED ORGANISATION)

BALANCE SHEET
AS AT 31ST DECEMBER 2016

	Notes	Unrestricted Funds £	Restricted Funds £	31-Dec-16 Total £	31-Dec-15 Total £
Fixed Assets					
Tangible assets	2	17,228	0	17,228	17,228
Current Assets					
Debtors	8	0	0	0	0
Cash at bank and in hand	7	69,672	7,982	77,654	72,208
Total Current Assets		69,672	7,982	77,654	72,208
Creditors: amounts falling due within one year	9	7,524	0	7,524	9,581
NET CURRENT ASSETS		62,148	7,982	70,130	62,627
NET ASSETS		79,376	7,982	87,358	79,855
Funds of the Charity					
General Funds		79,376	0	79,376	71,346
Restricted Funds	6	0	7,982	7,982	8,509
Total Funds		79,376	7,982	87,358	79,855

Trustees' Responsibilities

The Charities Act 2011 requires the trustees to prepare financial statements for each financial period which give a true and fair view of the state of affairs of the trust and of the surplus or deficit of the trust for that period. In preparing those financial statements the trustees are required to:

- select suitable accounting policies and apply them consistently;
- make judgements and estimates that are reasonable and prudent;
- prepare financial statements on the going concern basis unless it is inappropriate to presume that the trust will continue in existence;
- state whether applicable accounting standards and statements of recommended practice have been followed, subject to any material departures disclosed and explained in the financial statements.

The trustees are responsible for keeping proper accounting records, which disclose with reasonable accuracy at any time the financial position of the trust. They are also responsible for safeguarding the assets of the trust and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

These accounts were approved by the Trustees of the CIO on the 16th February 2017 and signed on their behalf by:

Signed Frank H. King, Dr. F. King, Chairman.

Signed [Signature], G. Stapleton, Treasurer.

THE BRITISH SUNDIAL SOCIETY
(CHARITABLE INCORPORATED ORGANISATION)

NOTES TO THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 31ST DECEMBER 2016

1. ACCOUNTING POLICIES

Incoming Resources

Recognition of Incoming Resources

These are included in the Statement of Financial Activities (SOFA) when:

- the charity becomes entitled to the resources;
- the trustees are virtually certain they will receive the resources; and
- the monetary value can be measured with sufficient reliability.

Incoming Resources with Related Expenditure

Where incoming resources have related expenditure (as with fundraising or contract income) the incoming resource and related expenditure are reported gross in the SOFA.

Grants and Donations

Grants and Donations are only included in the SOFA when the charity has unconditional entitlement to the resources.

Tax reclaims on Donations and Gifts

Incoming resources from tax reclaims are included in the SOFA during the same period as the gift to which they relate.

Contractual Income and Performance Related Grants

This is only included in the SOFA once the related goods or services has been delivered.

Gifts in Kind

Gifts in kind are accounted for at a reasonable estimate of their value to the charity or the amount actually realised. Gifts in kind for sale or distribution are included in the accounts as gifts only when sold or distributed by the charity. Gifts in kind for use by the charity are included in the SOFA as incoming resources when receivable.

Donated Services and Facilities

These are only included in incoming resources (with an equivalent amount in resources expended) where the benefit to the charity is reasonably quantifiable, measurable and material. The value placed on these resources is the estimated value to the charity of the service or facility received.

Volunteer Help

The value of any voluntary help received is not included in the accounts but is described in the trustees' report.

Investment Income

This is included in the accounts when receivable.

Investment Gains and Losses

This includes any gain or loss on the sale of investments and any gain or loss resulting from revaluing investments to market value at the end of the period.

Expenditure and Liabilities

Liability Recognition

Liabilities are recognised as soon as there is a legal or constructive obligation committing the charity to pay out resources.

THE BRITISH SUNDIAL SOCIETY
(CHARITABLE INCORPORATED ORGANISATION)

NOTES TO THE FINANCIAL STATEMENTS (continued)
FOR THE YEAR ENDED 31ST DECEMBER 2016

Expenditure and Liabilities (continued)

Governance Costs

Include costs of the preparation and examination of statutory accounts, the costs of the trustees' meetings and cost of any legal advice to trustees on governance or constitutional matters.

Changes in Accounting Policies

There have been no changes to the accounting policies since last year or to policies used by the former charity British Sundial Society (registered charity number 1032536).

Annual Commitments

There are no annual commitments under non-cancelling operating leases and no capital commitments.

Assets

Tangible fixed assets for use by the charity:

The British Sundial Society Library is stated at valuation based on the 2014 value calculated by Rogers Turner Books.

Investments

Investments quoted on a recognised stock exchange are valued at market value at the period end. Other investment assets are included at trustees' best estimate of market value.

Basis of preparation:

The financial statements have been prepared on the historical cost basis of accounting in accordance with the Charities Act 2011 and in accordance with applicable accounting standards. The financial statements have been prepared in accordance with Accounting and Reporting by Charities: Statement of Recommended Practice - "Accounting and Reporting by Charities" (SORP 2015). The accounts have been prepared on an ongoing concern basis. The charity meets the definition of a public benefit entity under FRS102. No restatement was required in making the transition to FRS102.

2. TANGIBLE FIXED ASSETS

		Unrestricted Funds £	Restricted Funds £	Total £
Library				
Opening	31-Dec-15	17,228	0	17,228
Revaluation		0	0	0
Cost at	31-Dec-16	<u>17,228</u>	<u>0</u>	<u>17,228</u>
Depreciation	31-Dec-15	0	0	0
Charge		0	0	0
Depreciation at	31-Dec-16	<u>0</u>	<u>0</u>	<u>0</u>
Net Book Value	31-Dec-16	<u>17,228</u>	<u>0</u>	<u>17,228</u>
Net Book Value	31-Dec-15	17,228	0	17,228

The British Sundial Society (CIO) had the Library revalued by Rogers Turner Books for its opening 2014 accounts. The replacement cost valuation was £17,228.

THE BRITISH SUNDIAL SOCIETY
(CHARITABLE INCORPORATED ORGANISATION)

NOTES TO THE FINANCIAL STATEMENTS (continued)
FOR THE YEAR ENDED 31ST DECEMBER 2016

	Notes	Unrestricted Funds £	Restricted Funds £	Total 2016 £	Total 2015 £
3. INCOME					
a) Donations and legacies					
Donations and Gift Aid		1,351		1,351	376
		1,351	0	1,351	376
b) Investments					
Interest		240		240	263
		240	0	240	263
c) Charitable Activities					
Advertising		805		805	0
Conference Auction		325		325	0
Day Meetings		310		310	0
Events	5	19,636		19,636	16,572
Publications		1,558		1,558	0
Sales		789		789	1,428
Subscriptions		11,216		11,216	11,798
		34,639	0	34,639	29,798
4. EXPENDITURE					
a) Charitable Activities					
Bulletin		6,347		6,347	9,419
Celebrations				0	368
Day Meetings		164		164	0
Education			268	268	503
Events	5	16,909		16,909	17,592
Independent Examiners Fees		555		555	525
Professional Fees		35		35	35
Publications		348		348	959
Sales		40		40	206
Somerville Lecturer			259	259	0
Travel		482		482	768
		24,880	527	25,407	30,375
b) Other					
Administration		494		494	1,498
Banking / Insurance		1,320		1,320	1,342
Library		208		208	179
Miscellaneous		6		6	248
Storage		1,292		1,292	1,237
		3,320	0	3,320	4,504

THE BRITISH SUNDIAL SOCIETY
(CHARITABLE INCORPORATED ORGANISATION)

NOTES TO THE FINANCIAL STATEMENTS (continued)
FOR THE YEAR ENDED 31ST DECEMBER 2016

5. EVENTS

	Balance 31-Dec-15 £	Income £	Expenditure £	Balance 31-Dec-16 £
Nottingham Conference (2015)	-1,091	0	0	-1,091
Liverpool Conference (2016)	0	19,636	16,909	2,727
		19,636	16,909	

6. RESTRICTED FUNDS

	Balance 31-Dec-15 £	Adjustment £	Income £	Expenditure £	Balance 31-Dec-16 £
Andrew Somerville Memorial Fund	7,815	-454		527	6,834
St Katherine Cree Restoration Fund	1,148				1,148
	8,963	-454	0	527	7,982

The Andrew Somerville Memorial Fund has been reviewed and corrected in the accounts to match the internal The British Sundial reports, this is an accounting change only and has been agreed with the trustees.

The restricted funds are wholly represented by cash reserves of the charity.

7. CASH AT BANK AND IN HAND

	Unrestricted Funds £	Restricted Funds £	Total 31-Dec-16 £	Total 31-Dec-15 £
Current Account	21,125		21,125	15,919
Charities Office Investment Fund	48,547	7,982	56,529	56,289
	69,672	7,982	77,654	72,208

8. DEBTORS AND PREPAYMENTS

There are no Debtors or Payments in Advance at the end of the financial period.

9. CREDITORS, ACCRUALS AND DEFERRED INCOME: AMOUNTS FALLING DUE WITHIN ONE YEAR

	Unrestricted Funds £	Restricted Funds £	Total 31-Dec-16 £	Total 31-Dec-15 £
Independent Examiners Fees	555		555	525
Conferences	6,969		6,969	9,056
	7,524	0	7,524	9,581

10. TRUSTEES AND OTHER RELATED PARTIES

No payments were made to trustees or any persons connected with them during this financial period. No material transaction took place between the organisation and a trustee or any person connected with them.

11. RISK ASSESSMENT

The trustees actively review the major risks which the charity faces on a regular basis and believe that maintaining the free reserves stated, combined with the yearly review of the controls over key financial systems carried out on an annual basis will provide sufficient resources in the event of adverse conditions. The trustees have also examined other operational and business risks which they face and confirm that they have established systems to mitigate the significant risks.

THE BRITISH SUNDIAL SOCIETY
(CHARITABLE INCORPORATED ORGANISATION)

NOTES TO THE FINANCIAL STATEMENTS (continued)
FOR THE YEAR ENDED 31ST DECEMBER 2016

12. RESERVES POLICY

The trustees have considered the level of reserves they wish to retain appropriate to the charity's needs. This is based on the charity's size and the level of financial commitments held. The trustees aim to ensure the charity will be able to continue to fulfil its charitable objectives even if there is a temporary shortfall in income or unexpected expenditure. The trustees will endeavour not to set aside funds unnecessarily.

13. PUBLIC BENEFIT

The charity acknowledges its requirement to demonstrate clearly that it must have charitable purposes or 'aims' that are for the public benefit. Details of how the charity has achieved this are provided in the Trustees' report. The trustees confirm that they have paid due regard to the Charity Commission guidance on public benefit before deciding what activities the charity should undertake.

14. CHARITABLE INCORPORATED ORGANISATION (CIO)

At the 2014 AGM the members of the British Sundial Society decided to become a Charitable Incorporated Organisation (Charity Registration Number 1155688).

All assets and liabilities of the British Sundial Society (1032530) were transferred on the 8th August 2014 to The British Sundial Society CIO (1155688).

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

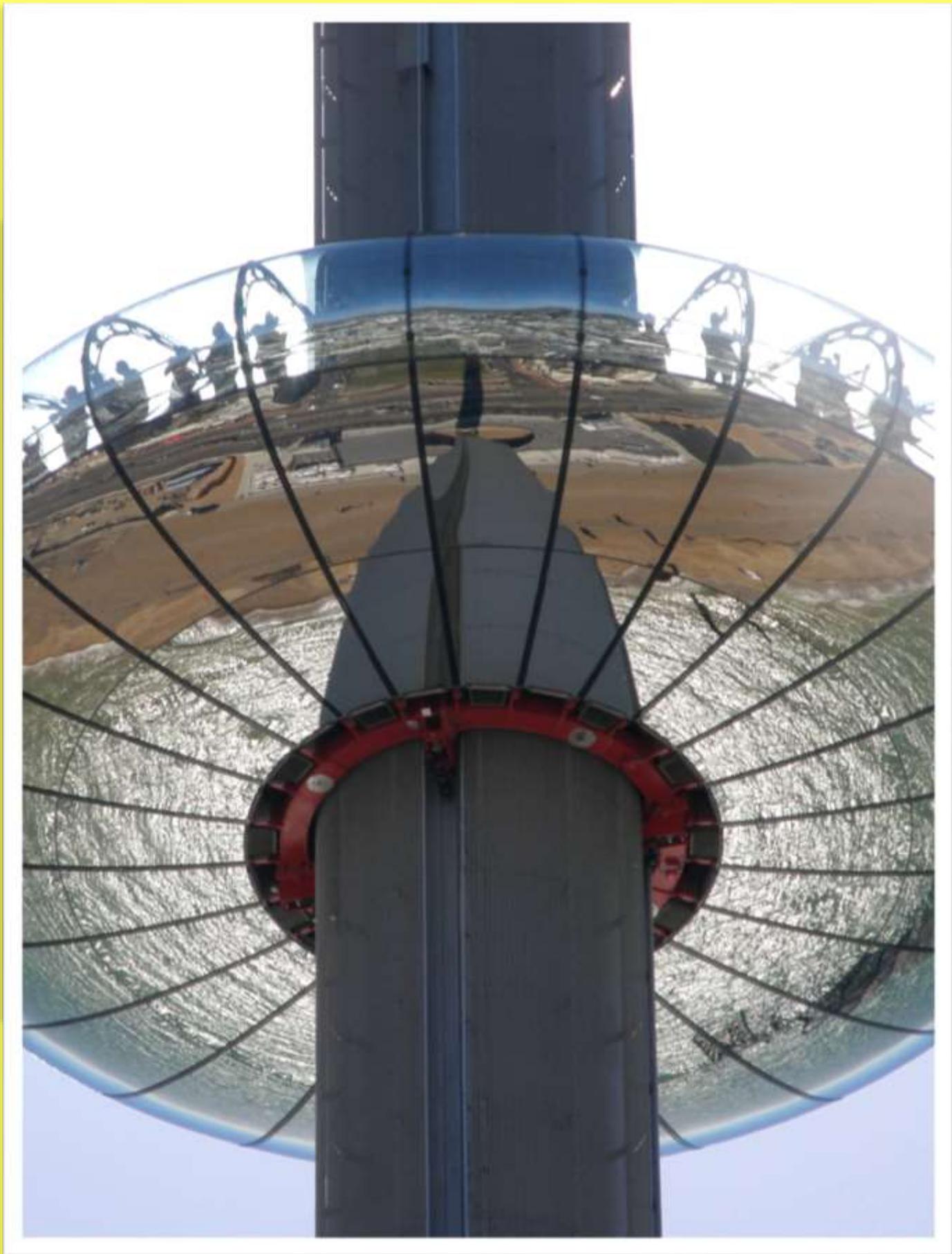
Dr Frank King 12 Victoria St CAMBRIDGE CB1 1JP	(Chairman) Tel: 07766 756997 chairman@sundialsoc.org.uk	Mr Chris H K Williams c/o The Royal Astronomical Society Burlington House London W1J 0BQ	(Secretary) Tel: 01438 871057 secretary@sundialsoc.org.uk
Mr Bill Visick Kites Nest Cottage Kites Nest Lane BOURTON 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 David Brown Gibbs Orchard, Sutton Rd SOMERTON Somerset, TA11 6QP	Tel: 01458 274841 david@davidbrownsundials.com

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 John Foad Greenfields Crumps Lane ULCOMBE Kent, ME17 1EX	(Registrar) Tel: 01622 858853 registrar@sundialsoc.org.uk	Mr J Mike Shaw 3 Millwood Higher Bebington WIRRAL, CH63 8RQ	(Newsletter Editor) Tel: 0151 608 8610 newsletter@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	Mrs Elspeth Hill 4 The Village Stonegate Nr WADHURST East Sussex, TN5 7EN	(Sales) Tel: 01580 201720 sales@sundialsoc.org.uk
Mr John Wilson 38 Stuart Close ARNOLD Notts., NG5 8AE	(Librarian) Tel: 0115 926 6175 librarian@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
Conference Team	conference@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
Help and Advice	HelpAndAdvice@sundialsoc.org.uk		
Mass Dials	MassDials@sundialsoc.org.uk		

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

The Society's website is at www.sundialsoc.org.uk
The British Sundial Society is Registered Charity No. 1155688



www.sundialsoc.org.uk