

The British Sundial Society

BULLETIN



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March 2018

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). 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 books: Author’s name; title of book in italics; name of publisher; place of publication; date in brackets.

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.
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Front cover: Detail of multiple horizontal with a central dial and six subsidiary dials (SRN 7021). It shows local solar time in the owner’s garden in Fife and in other places significant to him. Etched brass gnomons, electroplated in gold with inset crystal prisms to cast spectra into areas of shadow. Designed and made by Harriet James, gnomons by John Davis, 2010. Photo: Harriet James.

Back cover: The Tower of the Winds in Athens. Anthony Capon speculates on ‘The Riddle of the Tower’ on pages 22–25. Photo: Anthony Capon.

BULLETIN

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EDITORIAL

As has become customary since the Society became a Charitable Incorporated Organisation, the March issue of the *Bulletin* includes the Trustees' Annual Report (with an Annex containing additional reports) and the Accounts for the previous calendar year. Our Constitution requires members to have this material in their hands before the AGM.

By a much longer tradition, the March issue is also the occasion for publishing the annual Dial Dealings article by Mike Cowham. As always, this article contains many stunning photographs of elegant sundials.

This issue opens with a scholarly account by John Davis about a sundial he bought on the off-chance that it might be of interest and this certainly turned out to be the case.

A careful reader spotted an error in a citation in the December issue but instead of this being the subject of a short Erratum, there was some mission creep! The result is a short article which forms a postscript to the piece in the previous issue about the 2017 American eclipse of the sun.

An article about a sundial in Detroit records a remarkable coincidence. A Help-and-Advice query asked about a dial remembered from over 50 years ago. Just as this query came in, the editorial team were typesetting an article by Mike Isaacs which happened to include a detailed account of the very dial that the enquirer had remembered.

Frank King

A GAMBLE THAT PAID OFF

A horizontal dial by Chadburn Bros, Sheffield

JOHN DAVIS

This article is a version of a talk presented at the BSS Newbury Meeting, September 2017.

The dial plate shown in Fig. 1 was advertised quite cheaply – very little could be seen through the patination in a low-resolution photograph and the minimal description simply said it was “old and missing its pointer”. I thought I could see an Equation of Time ring and the general style struck me as 19th century. Also, the arched plaque at the southern edge looked to be a later addition and so I was intrigued to know whether it covered any original engraving – in particular, a maker’s signature. Thus, I took a chance and bought it.

The Motto

The plaque was quite well made and engraved but not very well soldered to the plate so it was not difficult to remove it (Fig. 2). It carries a three-line motto:

TIME FLIES LINES RISE AND SHADOWS FALL
LET IT PASS BY
LOVE REIGNS FOR EVER OVER ALL

This is not in Mrs Gatty but it can be found in Warrington Hogg¹ and, more fully, in Alice Morse Earle’s *Sun-dials and Roses of Yesterday*.² She explains that it is taken from a stanza by the English poet Francis Quarles’s (1592–1644; Fig. 3) book entitled *Emblems* and that these lines are an interpretation of a Bible quotation from Job.³ A likely source for its use as a sundial motto here is a later edition of *Emblems* (Edinburgh, 1857) which was embellished with new illustrations and which were then reproduced in the complete edition of Quarles’s work in 1874. Earle also points out that the motto was used on a dial by Lord Ronald Gower⁴ and that a Latin version is on the column dial at Old Place, Lindfield, Sussex.⁵ More recently, it was used on the monumental dial at Ahakista in County Cork,



Fig. 1. The dial plate as received (with the plaque

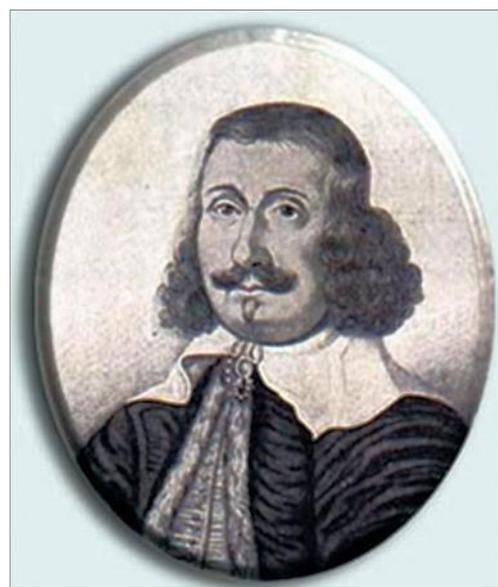


Fig. 3. Francis Quarles (1592–1644), original author of the motto on the plaque (Wikimedia Commons).



Fig. 2. The plaque after removal from the dial.



Fig. 4. The original makers' name revealed underneath the

Ireland, which serves as a memorial to the loss of lives on Air India Flight 182 in 1985. In this last instance the third word is "suns" rather than "lines".⁶

Chadburn Bros

What I was really interested in was what was underneath the plaque and the result, shown in Fig. 4 after removing the remnants of the solder, justified my purchase. It reads:

CHADBURN BROS
Opticians SHEFFIELD

A quick look in Jill Wilson's *Biographical Index*⁷ and in Gloria Clifton's *Directory*⁸ confirmed that the Chadburns were respected mathematical instrument makers from the North Midlands. However, whilst a small number of sundials by C.H. Chadburn of Liverpool are known, there were none previously recorded for the Sheffield branch of the family: the two groups are thought all to be brothers. An article in the *Bulletin* by Mike Shaw⁹ describes C.H. Chadburn and shows a sundial with his signature and in a style exactly matching my Chadburn Bros one. The signature is shown in Fig. 5 together with another dial which was sold at auction; the similarity with Fig. 4 is obvious. Clearly, a common design has been used and quite possibly all the dials have been made in the same workshop, if not by the same engraver.

The tradecard of Chadburn Bros (Sheffield) is shown in Fig. 6 and an image of the interior of their shop, which was drawn as part of the publicity for the Great Exhibition at Crystal Palace in 1851, is in Fig. 7. The wide range of items they sold is clear, as is the fact that they specialised in optical devices – not just spectacles (with a royal appointment to Prince Albert) and microscopes but also in the new-fangled field of photography. What is missing is any mention of sundials, leading to the suspicion that these were something they provided as a service to their customers but did not actually specialise in. The small print of the tradecard provides a possible explanation for this as it announces that they are "appointed as agents for WATKIN & HILL, Instrument Makers to Her Majesty". These London instrument makers are quite well known for their high-quality dials. However, a quick inspection of a couple of Watkin



Fig. 5. The similar maker's cartouche for a dial by C.H. Chadburn of Liverpool (courtesy of Douglas Bateman) and another example from an untraced auction.

CHADBURN BROTHERS,
Opticians, &c.
Albion Works, Nursery-street, and Nursery Steam Wheel, Johnson-st.
NEAR THE RAILWAY STATIONS,
SHEFFIELD,

MANUFACTURERS OF ALL KINDS OF
Spectacles, Telescopes, Microscopes, Opera Glasses, Optical Lenses, and every variety of Optical Instruments, Improved Garden Syringes, &c.; Pneumatical, Electrical, Magneto Electric, and all kinds of Philosophical Instruments, Working Models of Steam Engines, &c. to order. Also Improved Ship Deck and Berth or Side Illuminators or Ventilators, Air Valves, &c.

May be had, at the Establishment, a Catalogue of Prices, with or without copperplate engravings. The most liberal discount allowed to Merchants, Retailers, &c.

— 0 —

CHADBURN BROTHERS beg most respectfully to return their best thanks to their Friends and the Public for their very liberal patronage; and to acquaint the Nobility, Gentry, and the Public, that, in addition to their Wholesale Business, they have opened a SHOW ROOM, at their Manufactory in NURSERY-STREET, for the Retailing of Articles, where they have always on hand EVERY VARIETY OF SPECTACLES TO SUIT THE VARIOUS DEFECTS OF VISION, and for the preservation and protection of the perfect sight, on the most improved principles, in all kinds of Mounting; Levels, Theodolites, Mathematical Instruments, Barometers, Thermometers, &c. From the experience C. B.'s have had, they trust they are enabled to offer such Articles as will give entire satisfaction, both as regards price and quality, as to ensure future commands, which will at all times be their study to merit. They also wish to announce that they are appointed Agents for Messrs. WATKIN & HILL, Instrument Makers to her Majesty, and that any article may be obtained from them as in London; likewise for Messrs. NEWTON & SON, Globe Publishers, and they have always on hand a variety of their Globes, &c. Optical, Mathematical, Philosophical, Geodetical, Meteorological and other Instruments repaired.

N. B. Any article purchased of C. B.'s, if not approved of, may be exchanged.

Fig. 6. Chadburn Brothers' tradecard from the 1842 Grace's Guide.

Area	Cu	Zn	Sn	Pb	Ag	Ni	Fe	As	Sb	Bi	Comments/Others
Dial plate (back)	77.3	19.1	1.99	1.28	nd	0.03	0.18	0.09	0.05	nd	Mechanically cleaned
Dial plate (front)	77.5	19.1	1.60	1.29	nd	0.03	0.19	0.19	0.04	0.05	Uncleaned area at S
Plaque (back)	63.9	33.9	0.70	1.00	nd	0.17	0.06	0.23	0.01	nd	Mechanically cleaned

Table 1. Composition of the Chadburn Bros dial in wt% as measured by X-ray fluorescence (XRF). nd = not detected. (Details as per ref. 10.)

The engraving is quite fine, as shown by the division of the chapter ring to individual minutes, giving a line spacing of around 0.5 mm at the cramped ends of the scale (Fig. 9). This figure also illustrates the use of a half-shaded diamond for the half-hour markers – a simplifying development from the fleur-de-lys of earlier generations – and the transverse cross-hatching in the broad strokes of the Roman numerals.

A standard X-ray fluorescence analysis of the alloy (Table 1) did not reveal anything unusual but provided an extra data-point for the database of historical English copper-alloys. The presence of around 2% tin (Sn) means that in today's terminology the material would be called a naval brass which resists corrosion and dezincification quite well. The material was probably produced by cold-rolling, as indicated by the tightness of the thickness spread – this process was well-established by the mid-19th century. The absence of detectable silver (Ag) shows that a relatively advanced smelting process was in use too. The attached plaque, with its higher zinc concentration and very low iron content, points to a later material, as would be expected – how much later is difficult to judge but around 1900 or so seems reasonable.

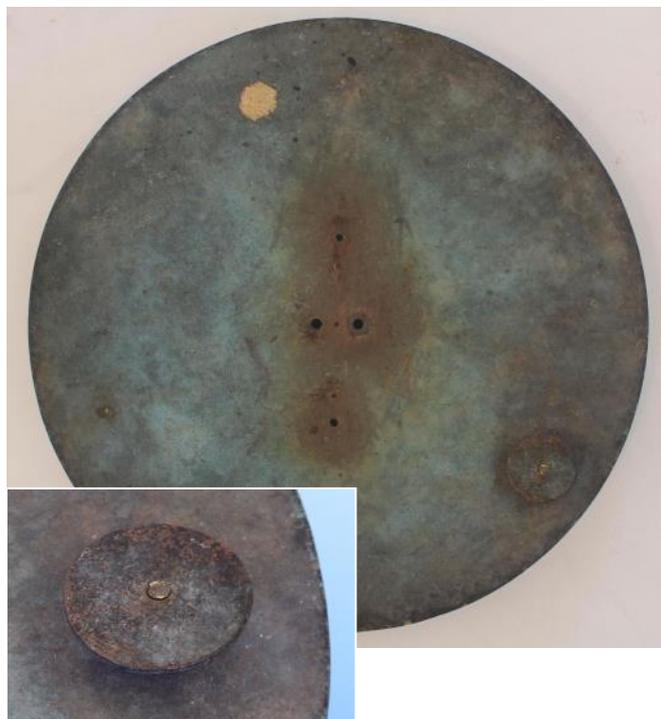


Fig. 10. The back of the dial plate showing the set of six holes for attaching and aligning the gnomon. The bright spot near the top is the area cleaned for XRF analysis. Inset: the structure for holding the dial on the pedestal.

The back of the dial (Fig. 10 and insert) shows that the gnomon would have been attached by four screws with a further two, smaller, holes being for tight-fitting alignment pins. Also shown is one remaining pedestal fixing (two others are sheared off) in the form of a large 'penny-washer' spaced from the dial by a threaded pillar around 15 mm tall. These would have required sinking into a large (at least 35 mm diameter) cement-filled hole in the top of the pedestal but, surprisingly, no remnants can be seen.

Conclusions

This dial plate fills a significant gap in our list of makers and suppliers of dials in the English regions during the Industrial Revolution.¹¹

ACKNOWLEDGEMENTS

I am grateful to Mike Shaw, Jill Wilson and John Foad for their help in researching this dial.

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1. Warrington Hogg: *A Book of Old Sundials and Their Mottoes*, T.N. Foulis (1914), p. 59.
2. Alice Rose Earle: *Sun-dials and Roses of Yesterday*, Macmillan (1902), pp. 275-6.
3. Francis Quarles: *Emblems* (1634). Emblem No. 13, Book III, is a sundial.
4. Lord Ronald Charles Sutherland-Leveson-Gower (2 August 1845 – 9 March 1916), known as Lord Ronald Gower, was a Scottish Liberal politician, sculptor and writer from the Leveson-Gower family. His work includes a statue of Hamlet in Stratford-upon-Avon.
5. The pillar dial at Old Place, Lindfield, W. Sussex is not in the BSS Register. It has appeared in *Country Life*, c. 1900, and in a 1955 Francis Frith photograph. It is based on the 'Pelican dial' in Oxford and was probably designed by the Victorian medievalist Charles Eamer Kempe.
6. See Michael J. Harley's website *Sundials Ireland* at <https://www.sundials-ireland.com/cork/ahakista.htm>.
7. J. Wilson: *Biographical Index of British Sundial Makers from the Seventh Century to 1920*, 2nd edition. BSS monograph No.2. BSS, Crowthorne (2007).
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9. J. Mike Shaw: 'A Sundial Search that Found a Toposcope', *BSS Bull.*, 28(iii), 8-10 (Sept. 2016).
10. J. Davis: 'Sundials by the Davis Dynasty' *BSS Bull.*, 28(iii), 2-6 (Sept. 2016).
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HOW ARE THE MIGHTY FALLEN

DAVID BROWN

South Somerset is well-endowed with monumental sundials. Near to my home are those at the National Trust property of Barrington Court, near Ilminster (Fig. 1), and a market cross sundial 5.5 metres high at Martock (Fig. 2).



Fig. 1. Barrington Court, Ilminster, Somerset, SRN 0040. Photo: John Davis.



Fig. 2. Martock, Somerset, SRN 0053. Photo: Kevin Karney.

There is another, 7 metres high, in the centre of the small town of Ilchester (Fig. 3). Ilchester stands on the old Roman road known as The Fosse Way which links Exeter in the south-west to Lincoln in the north-east, covering a distance of 260 miles, never diverging more than 6 miles from a straight line.¹



Fig. 3. Ilchester, Somerset, SRN 0411. Photo: Kevin Karney.

The Ilchester sundial was viewed by Woody Sullivan and his wife during a trip to Somerset in 2014 (Fig. 4). It is a cubical dial on top of a Hamstone pillar some 7 metres high, with four direct vertical dials, and has stood there since 1795 but was rebuilt after it had been blown down (!) in 1990.

The Fosse Way runs straight through Ilchester, but the main road B3151 diverges from it just where the dial stands to accommodate a diversion to a wider road leading to Yeovil and the A303. This bend was the undoing last year of a very early-morning driver from the nearby Air Base RNAS Yeovilton who, rather the worse for wear after a night of revelry, drove too fast through the town, failed to take the bend, and buried his car in the base of the sundial plinth.



Fig. 4. Woody and Barbara Sullivan visiting the Ilchester sundial.



Fig. 5. The Ilchester sundial shortly after the collision in 2017.

The whole column was pole-axed (Figs 5 and 6). By sheer good fortune, the column fell clear of any person, including the driver, and has since been taken away.

I hope to report on its full restoration in the near future.

REFERENCE

1. https://en.wikipedia.org/wiki/Fosse_Way

david@davidbrownsundials.com



Fig. 6. A detail of the fallen sundial.

Andrew James

Master of the Worshipful Company of Clockmakers

A note in the December Newsletter mentioned that BSS member Andrew James was due to be elected Master of the Worshipful Company of Clockmakers at the Election Court on 28 September. Andrew was subsequently installed as Master at the Installation Court on 23 January.

The photograph shows Andrew with his three Wardens, the Deputy Master and the Honorary Chaplain. Astute readers may notice another BSS member, Joanna Migdal, standing on the extreme right. She was installed as Renter Warden of the Company.



Fig. 1. Andrew James (back centre) shortly after his installation as Master of the Worshipful Company of Clockmakers. With him are his three Wardens, the Deputy Master and the Honorary Chaplain of the Company. Photo: Clockmakers' Company.

Yet another BSS member, Keith Scobie-Youngs, is one of the Company's Court Assistants.

FHK

IN THE FOOTSTEPS OF THOMAS ROSS

Part 22: An Aberdonian Triad

DENNIS COWAN

In volume 5 of *The Castellated and Domestic Architecture of Scotland*,¹ Thomas Ross groups together three sundials from Aberdeen and the surrounding area. These sundials are from Ellon Castle Gardens, about seventeen miles to the north of Aberdeen, Pitmedden Garden, just a few miles to the west of Ellon, and the third in Duthie Park in Aberdeen itself.

Of the dial at Ellon Castle, Ross says:

“This extremely beautiful example [Fig. 1] is one of two sundials which stand in the castle garden. It differs, as will be seen, very considerably from the normal type, but as a graceful object of architectural design it will hold its own with the best examples of its class. The general contour of the dial corresponds with that of the obelisks, but is modified in all its details. Thus, the shaft, instead of rising abruptly from the platform, or resting on a pedestal, has a fine and boldly moulded base.

“The faces of the shaft are richly carved with well-executed ornaments of fruit and flowers hung from open-mouthed masks. A few simple mouldings with a double necking connect the shaft and capital, which contains hollows on all its twenty-four faces—an unusual arrangement, and found only on the Pitmedden dial, figured in the next illustration. The finial, with its neck-moulding and stone-ball termination, also resembles the same example, and it is not improbable that the design of the one influenced that of the other, although the Ellon dial is considerably richer and more delicate in its details. The finial of the dial in



Fig. 1. Ross's sketch of the Ellon Castle dial.

Duthie Park, Aberdeen, appears to have been modelled somewhat after the style of these two dials at Ellon and Pitmedden, indicative of a decided local peculiarity. The Aberdeen dial is dated 1707, but we incline to the opinion that the Ellon and Pitmedden dials belong to the previous century.

“The appearance of the Ellon dial is greatly enhanced by the fine and wide moulded steps on which it stands. The steps, each 7 inches high, measure respectively 8 feet square, 7 feet square, and 4 feet square. The dial itself to top of ball is 8 feet 6 inches high.”

My first visit to Ellon in 2014 didn't go well. I turned up at the castle only to find that the gates to the grounds were boarded up, and peeking through a gap I could see that the gardens were in a totally overgrown state. Further investigation, which I should have done before I set off for Ellon, revealed that the castle was in a ruinous condition. This didn't sound good for the sundials.

A couple of years later in 2016 I discovered by chance that a charitable group, Ellon Castle Gardens Board, had been set up to revitalise and conserve the gardens as a lasting



Fig. 2. The shaft of the Ellon dial still in its original position in the garden.

resource for the people of Ellon. This was good news indeed – but had the sundials survived?

Then, early in 2017, I managed to make contact with Elaine Cooper-Willox, the Board Member who is responsible for PR and Marketing at the gardens and she confirmed that both of the sundials mentioned by Ross were indeed still there. We made arrangements for my visit, as the gardens are open only for special occasions at this stage of their conservation.

When I arrived there I found that the shaft of the dial was still in its original position (Fig. 2) on the moulded steps in the garden, but without the capital and finial which had been stored for safekeeping. The carvings on the shaft described by Ross have survived well and can be seen in Fig. 3.

The capital, which was in an outbuilding, has not fared so well. It has serious cracks and is held together with a metal band (Fig. 4), so couldn't easily be moved to get a better view. All of the faces as far as I could see were circular, triangular and square sunken dials. The gnomons, which may have been replaced, appeared to be complete and the numerals that I could see were all Arabic. Unfortunately I wasn't able to see the finial which had been stored elsewhere.



Fig. 3. Detail of the carvings on the shaft of the Ellon dial.



Fig. 4. The capital of the Ellon dial held together with an iron band.

Ross suggests that this dial is very similar in outlook to the obelisk dials, but with differences as he describes above. The main obvious difference, in my opinion, is in the shaft where this example has carvings of masks, fruit and flowers rather than the dial faces to be seen on the typical obelisk shafts.

As Ross says above, there are two dials at Ellon, and although not intended to be part of this triad, it would make sense to include the other dial here. Surprisingly, Ross doesn't provide a sketch of this dial and only says that it is similar to a dial at Forgue (Fig. 5), some thirty miles to the north-east of Ellon. According to Somerville,² the Forgue dial originally came from Foveran which is less than five miles from Ellon. It is quite probable therefore that both of these dials were made by the same hand.

Fig. 5. Ross's sketch of the dial at Forgue which is very similar to the second Ellon dial.

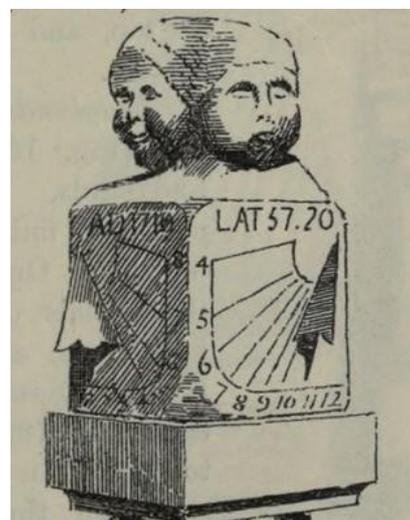




Fig. 6. The second Ellon dial's 'wee hoose' built to protect it from the elements.

This second dial was originally positioned just outside the castle, but today it has its own 'wee hoose' (Fig. 6) designed specifically to protect it from the elements for the time being. The roof was lifted off for me and I was able to see the dial and its granite pedestal (Fig. 7). Like the capital of the other dial, it hasn't fared well. The gnomons that I could see were bent and battered, and the numerals and hour lines were no longer visible. However, its similarities to the dial at Forgue were immediately apparent.

The dial, which is believed to date from around 1717, has four children's heads on top. It is said that it was erected in memory of Bailie Gordon's two sons who were murdered in Edinburgh in 1717 by their tutor, after they saw him take liberties with their mother's maid. Wikipedia wrongly attributes this story to the other dial at Ellon.

The good news is that the Trust intend to restore both dials at some stage in the future.

Situated a few miles to the west of Ellon, Pitmedden Garden is a National Trust for Scotland site and its design and maintenance give it its own unique charm: it must surely be one of Scotland's best gardens. It dates back to



Fig. 8. Some of the clipped box hedging at Pitmedden Garden.



Fig. 7. The second Ellon dial and its pedestal inside the 'wee hoose'. The similarities to the Forgue dial can be clearly seen.

1675 when it was originally laid out, but fell into neglect in the 19th century. The plans for the garden were lost when the original Pitmedden House was destroyed by fire in 1818 but the Trust re-created the garden in the 1950s based on the 17th-century plans for the gardens at the Palace of Holyroodhouse in Edinburgh. There are six miles of clipped box hedging, some of which can be seen in Fig. 8, and 30,000 annual bedding plants are used to make up the colourful designs in the parterres, which unfortunately were not in flower at the time of my visit.

Mr Robert Duthie of Pitmedden House provided Ross with details of this dial and Ross comments:

"In describing the [first] Ellon dial above, the peculiarities of this fine sundial [Fig. 9] are commented on. Its capital being placed on a slender stock or neck, unlike those of the type in general, has a more than usually striking

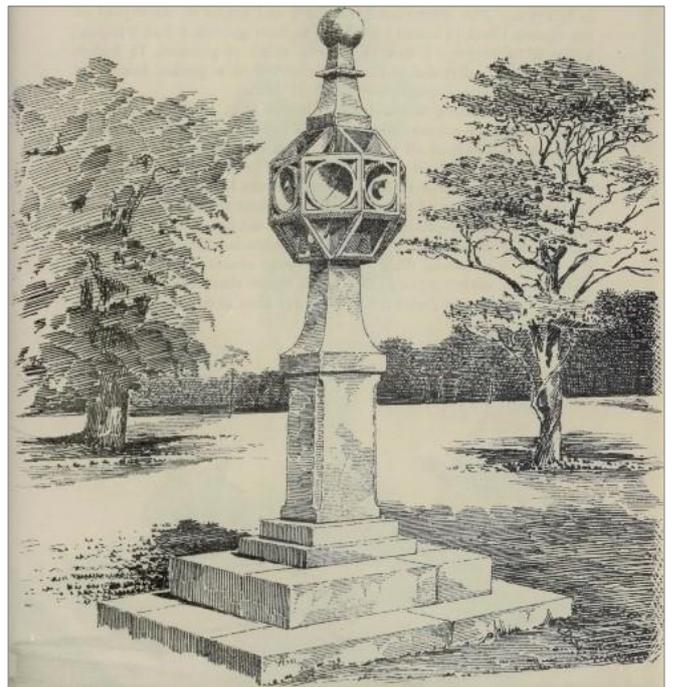


Fig. 9. Ross's sketch of the Pitmedden dial.



Fig. 10. The Pitmedden dial sitting within the parterres today.

appearance. Mr. Duthie believes the dial to have been made about 1675, about which time the garden walls at Duthie House were erected.³ We agree in thinking that it is certainly as old as this date. The dimensions are—width



Fig. 11. Detail of the Pitmedden dial.

and height of the capital on the square, 1 foot 11 inches; total height from ground, 8 feet 9 inches; width of lower step, 4 feet 11 inches; width of pedestal, 12 inches.”

The dial today (Fig. 10), which is now situated amongst the fine parterres, looks much as it did in Ross’s sketch and the similarities to the Ellon dial’s capital can be clearly seen in the detail photograph in Fig. 11 with the circular, triangular and square sunken dials. Like the Ellon dial, it has twenty-four dial faces.

An interesting feature in the parterres near to the dial incorporates the words *TEMPUS* and *FUGIT* (Figs 12 and 13) elegantly made out in box hedging.

Fig. 12. *Tempus...*



Fig. 13. ...*Fugit.*



Fig. 14. The west-facing dial described by Ross as having no special interest.



Fig. 15. The south- and east-facing dials with the wrongly positioned gnomon on the south face.

Ross goes on to say that:

“There are two other dials here on the corner of a garden house, but they have nothing of special interest about them.”

Both of these vertical dials are carved directly on to the quoins of the building. One is a single-faced west-facing dial (Fig. 14) and the other is a two-faced dial (Fig. 15): one a direct south face and the other east facing. Both have replacement gnomons, but the gnomon on the south face has been mounted too high. All have Arabic numerals.

Ross says above that these dials have nothing of special interest about them. I disagree and think that they have, but unfortunately not in a good way! Both of these dials appear

to have been carved on separate blocks of stone which can give the appearance of vertical cracks in the dials. The gnomon on the south face, apart from being too high, has been crudely held in place and it really is an example of how not to carry out a restoration.

The third dial of the Aberdonian Triad is in the Winter Gardens contained within Duthie Park in Aberdeen. These Winter Gardens were once the largest indoor gardens in the UK until the advent of the Eden Project in Cornwall, but are well worth a visit. Of the dial, Ross says:

“The dial [Fig. 16] belongs to the city, and stands in a property formerly called Arthur’s Seat, now absorbed in the Duthie Park, a public pleasure ground presented to Aberdeen by the late Miss Duthie of Ruthrieston.⁴ The dial-faces and the ball on the top are painted a light blue colour, and the lines and figures are gilt; there are shields on each of the four sides of the supporting baluster bearing respectively the initials C.G., G.B., the date 1707, and a representation of a mortar and pestle.”

This dial is situated today in an outdoor area of the gardens and the blue colour on the dial faces and the ball mentioned by Ross are still apparent. Unfortunately incorrect gnomons have been wrongly fitted to some of the faces as can be seen on the north-facing upper dial and the sunken dial below it in Fig. 17, and also on the south-facing sunken dial in Fig. 18.

Ross’s comment that the dial, in part, was painted raises an interesting question. I have always been of the opinion that Scottish stone dials were not originally painted but this is the first such dial that I have seen that has traces of paint on it, apart from the Mercat Cross at Inverkeithing which was painted white in only relatively recent times. Was the Duthie Park dial painted when new in 1707 or did it have a 19th-century paint job?

Fig. 16. Ross’s sketch of the Duthie Park dial.

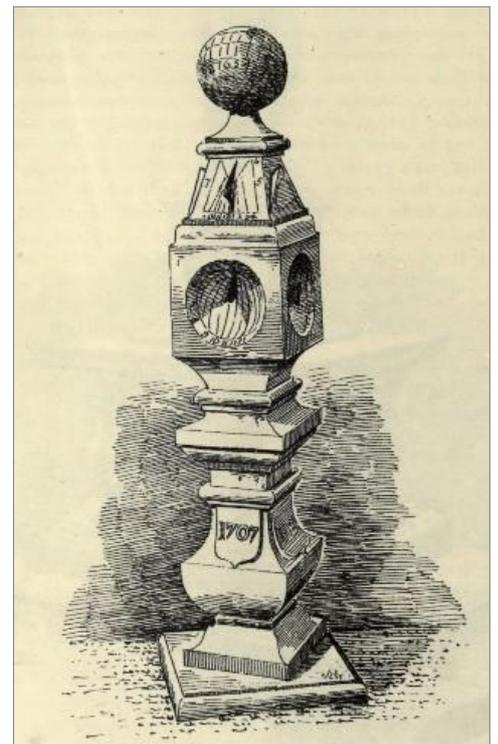




Fig. 17. The north faces of the Duthie Park dial with the wrong gnomons.



Fig. 18. The south face of the Duthie Park dial with the incorrect gnomon on the sunken dial face.

This whole question of whether these Scottish monumental stone dials were painted when new is something that I need to investigate at some point in the future.

ACKNOWLEDGEMENTS

Very many thanks to Elaine Cooper-Willox and particularly the staff at Ellon Castle Gardens who were so helpful and accommodating during my visit.

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1. D. MacGibbon and T. Ross: *The Castellated and Domestic Architecture of Scotland*, David Douglas, Edinburgh (1892).
2. Andrew R. Somerville: *The Ancient Sundials of Scotland*, Rogers Turner Books, London (1994).
3. I have attempted to ascertain if the house at Pitmedden was originally called Duthie House but to no avail. So did Ross make an error here and mistakenly name Pitmedden House as Duthie House? He says that the garden walls were erected in 1675 which was when the gardens at Pitmedden were laid out.
4. Miss Duthie of Ruthrieston was part of the wealthy Duthie family of shipbuilders in the north-east of Scotland, but there is no evidence that I can find that links her with Mr Duthie of Pitmedden.

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Joshua Springer Dial Sold



The horizontal dial described in the previous issue (J. Davis, 'A Quality Dial by Joshua Springer', *BSS Bulletin* 29(iv) December 2017, 2–5) was consigned by its owner to Bonhams' *The Gentleman's Library Sale* (lot 208) on 14 February 2018, where it made £1,375 including the buyer's premium. Within days, the Help-and-Advice service received a message from the purchaser, an associate professor of medicine at Cornell University, USA, requesting further information – it seems that it was bought 'blind', though the new owner wanted to know if it could be wedged to suit a New York latitude. Perhaps we shall find out more about it in the future!

JD

Photo courtesy of Bonhams.

INTRODUCING A NEW MASS DIAL

FRANK H. KING

Most readers will imagine that the market for mass dials pretty much dried up many centuries ago but, just occasionally, a new one is commissioned. The Cardozo Kindersley Workshop in Cambridge was asked last year to cut a mass dial on a headstone. Surviving mass dials show a wide variety of appearances but it was quickly decided to cut a five-line design. The finished mass dial is shown, in its setting, in Fig. 1.

A five-line design on a direct-south-facing wall of a church makes a certain amount of gnomonic sense provided it is equipped, at the centre, with a gnomon which is horizontal and aligned due north–south. Such a gnomon will be perpendicular to the dial and, in the absence of obstructions, its shadow will fall on the left-hand (west) horizontal line at sunrise and on the right-hand (east) horizontal line at sunset. The shadow will fall on the vertical central line at noon. A naïve user may imagine that the shadow falls on the two 45° lines halfway through the morning and afternoon respectively but this is the case only at the equator. In British latitudes these lines have almost no gnomonic significance.

Real mass dials are often found on stone faces that decline significantly from due south; the shadow of the perpendicular gnomon should still fall on the horizontal lines at sunrise and sunset but it will not fall on the vertical line at noon.

This new mass dial is an extreme case; it is cut in the west face of the headstone whose other face, following Christian



Fig. 1. The headstone with the new mass dial.

tradition, faces east. I like my mass dials to make at least token gnomonic sense and I feared that a direct-west-facing mass dial might be a challenge too far.



Fig. 2. The shadow of a knitting needle held horizontally in the meridian plane at 12 noon.



Fig. 3. Displacing the knitting needle does not appear to change the position of the shadow.

Fortunately, there was no need for too much concern. The rough alignment of the intended headstone could be determined from Google Maps simply by looking at existing neighbouring headstones. The proposed mass dial was going to face roughly 15° south of due west and that was good news. It meant that the sun could, in principle, shine on the dial from shortly before noon each day until sunset. When the headstone was firmly in place, the estimate was refined to about 14°.

The gnomons of all historic mass dials are now missing and no gnomon was supplied for this one. Even with the dial declining a long way from due south, the shadow of a perpendicular gnomon would theoretically fall on the sunset line. It is possible to improve performance by adapting the gnomon so that it is still horizontal but aligned due north–south. The shadow will then fall on the vertical line at noon. Many, many, historic mass dials have a vertical line and it seems hard to believe that no one thought of this improvement.

Fig. 2 shows a knitting needle being held approximately horizontally and aligned north–south and the photograph was taken at 12 noon. The shadow obligingly falls on the vertical line, or roughly so. The slight snaking of the shadow is a consequence of the stone having an uneven surface.

At sunset, the shadow of this gnomon should itself be horizontal and fall on the sunset line on the right. Unfortunately, there are many obstructions to the west and the headstone will always be in shadow at sunset. At some point each afternoon, the shadow should fall on the diagonal line on the right. By contrast, it will never fall on the sunrise line or the diagonal line on the left; the sun will always be on the other side of the stone at sunrise and for most of the morning.

Before taking the photograph in Fig. 2, my preliminary attempts suggested a problem. Seemingly, I had to hold the point of the knitting needle appreciably to the left of the centre of the dial to obtain a shadow that aligned with the noon line, as in Fig. 3.

Sliding the point so that it was at the centre of the dial, resulted in the shadow moving appreciably to the right of the noon line. It is offered as an exercise for the reader to determine why the shadows in the two photographs both roughly align with the noon line notwithstanding the different positions of the tip of the knitting needle.

At the time of going to press, the client has asked that the geographical position of the headstone should not be disclosed, beyond saying that it is somewhere in East Anglia.

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New Life for an Old Calendar

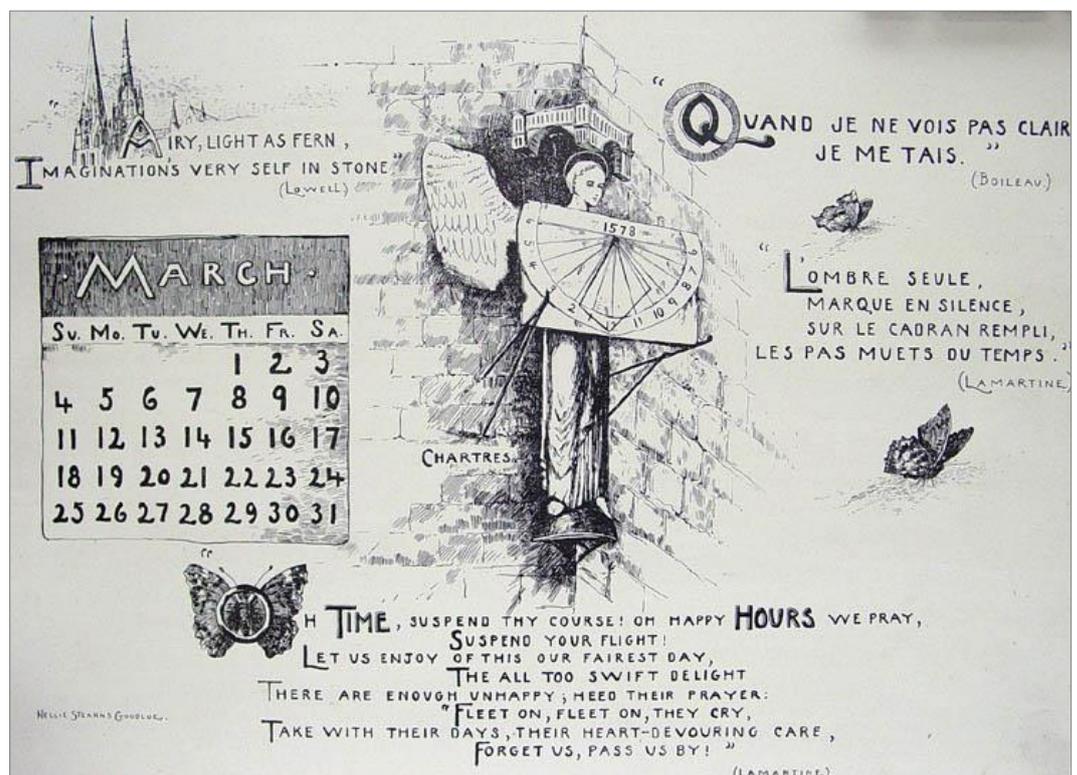
This is a page from *Sun-Dial Notes*, a short book by Nellie Stearns Goodloe (1861–1945), published in the form of a calendar for 1894. (It is also correct for 2018.)

Each page is illustrated with a sundial and some relevant texts. Most of the illustrations, like this one of the dial on Chartres Cathedral, are copied (with acknowledgement) from Gatty.

Nellie Goodloe was well known and widely exhibited as a keen outdoor sketcher and painter of landscapes and seascapes. She must have had an interest in sundials, but I cannot find that she published any other drawings or writings on them. She valued her birth as the great grand-daughter of Elias Stearns, who fought in the American War of Independence in 1776, and as such

she was a proud member of the Society of the Daughters of the Revolution.

John Foad



DIAL DEALINGS 2017

MIKE COWHAM



These are a few of the items related to dialling that have been sold at auction in the last year.

Prices shown generally include the buyer's premium but not VAT.

Bonhams, London, 4 April 2017

In this sale there was a fine inclining dial signed G. ADAMS LONDON, mid-18th century (Fig. 1). It was complete with its original wooden case. For levelling there are two spirit levels in the compass bowl and three levelling screws. The dial sold for £4,000 plus buyer's premium.



Fig. 1. Inclining dial by George Adams. © Bonhams, London.

Christie's, South Kensington, 27 April 2017

In this sale was a rather fine, but unsigned, standing universal equinoctial ring dial (Fig. 2). Its equinox dates are for the Julian calendar, making this prior to 1752. Its overall height was 420 mm. Such pieces are quite rare, and



Fig. 2. Standing universal equinoctial ring dial. © Christie's.

this one sold for £43,750. A similar dial of this type was shown in the September 2017 issue of the *Bulletin*.¹

Charles Miller Ltd, London, 2 May 2017

There were several portable dials in this sale, so I have picked just two for this article.



Fig. 3. Inclining dial by Dobson & Baker. © Charles Miller.

The first was an inclining dial by Dobson & Baker, 56 Chiswell Street, London, of c.1850 (Fig. 3). It also had spirit levels inside its compass bowl and levelling screws. It was sold for £1466.

The other dial in this sale was a noon cannon dial (Fig. 4), unsigned, but probably French. It was mounted on a 6¼" diameter marble base and its latitude, 46:50, was engraved on the base. It was sold for £1,220.



Fig. 4. Noon cannon dial. © Charles Miller.



Fig. 5. Garden dial by George Adams. © Bonhams, London.



Fig. 6. Signature of George Adams. © Bonhams, London.

Bonhams, London, 31 October 2017

There were three fine dials in this sale. The first was a horizontal dial by George Adams Senior, 15¾" (40 cm) diameter, complete with a scale around it showing the Equation of Time (Fig. 5). The part with his signature (Fig. 6) reads:

G·ADAMS at N° 60
Fleet Street LONDON
Instrument Maker to his
MAJESTY K·G·III^D

It may be dated to the late 18th century and was made for a latitude of 50° 33', possibly somewhere on or near to our South Coast, probably Devon or Cornwall. At its centre is a 32-point compass rose. It was sold for £6,250.

The second dial was a rather fine piece signed on its gnomon *R. Glynne Londini Fecit* (Fig. 7). It is made with gilt and silvered brass and dates from around 1720. Around its outside is a scale of 360°, and inside this there is one for the EoT. Each hour is divided into individual minutes and at its centre are several places showing their noon hours with respect to London. It appears that the dial will rotate



Fig. 7. Dial by Richard Glynne. © Bonhams, London.



Fig. 8. Cursor showing 46°. © Bonhams, London.

on its base thereby making it a declinatory for finding the precise angle of a wall (Fig. 8). It was sold for £27,500.

The next was a fine equatorial ring dial (Fig. 9), mounted on a stand. The dial is signed *W Hayes fecit* and was made in the last quarter of the 17th century. The ring dial could be lifted off the stand, by unscrewing the two wing nuts, for use as a normal ring dial; when attached to the stand, it could be used for surveying purposes as the dial, when correctly set, should line up exactly North–South. Its base plate, 17.5 cm diameter, is engraved with individual degrees, with 0° at N and S, and 90° at E and W. On its north side is a straight edge to align with any object. It is possible that the stand was made later, but this is not certain. Its vertical ring was also engraved with a 0°–90° scale for determining the sun's altitude by using the shadow of a pin inserted into a hole. It sold for £12,500 plus buyer's premium.

Charles Miller Ltd, London, 7 November 2017

In this sale there were several dials. These were five portable dials and six horizontal garden dials. I have selected one of each for this article.

The portable inclining dial signed *W. Watkins BRISTOL* may be dated to around 1820 (Fig. 10). This dial is built into its



Fig. 9. Dial by Walter Hayes. © Bonhams, London.

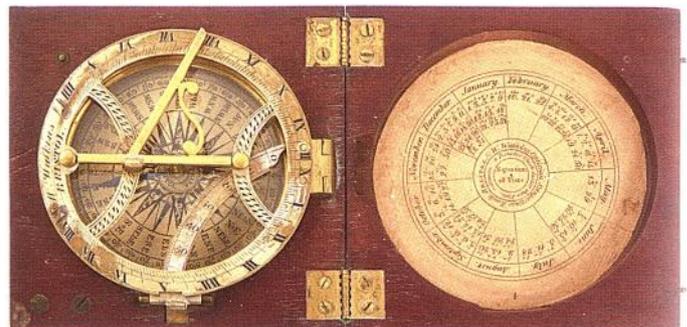


Fig. 10. Dial by William Watkins of Bristol. © Charles Miller.



Fig. 11. Dial by Negretti & Zambra. © Charles Miller.



Fig. 12. Dial by Chapotot, Paris. © Bonhams, New York.



Fig. 13. Latitude arc 0° to 53°. © Bonhams, New York.

own folding wooden case and in its lid is a paper chart showing the EoT. This dial sold for £496.

The brass garden dial shown in Fig. 11, signed NEGRETTI & ZAMBRA London, is 12" (30.5 cm) diameter and has a 45° gnomon, possibly for somewhere close to Como, in Italy, where Henry Negretti lived. It was made around 1860 and it carries an EoT scale showing WATCH FASTER and WATCH SLOWER in its centre. It sold for £930.

Bonhams, New York, 4 December 2017

They had an interesting silver inclining dial signed CHAPOTOT A PARIS (Figs 12 and 13). These dials usually have a latitude arc at one edge of the dial plate, but this one had the latitude scale upon its gnomon and a bird showing the latitude with its bill. In many ways the use of the bird's

beak makes it more like a standard Butterfield dial. It sold for \$5625 (£4176).

ACKNOWLEDGEMENTS

The illustrations used in this article are the copyright of the various auction houses mentioned and should not be reproduced without their permission.

Bonhams, London: Figs 1, 5, 6, 7, 8, 9.

Christie's, South Kensington: Fig. 2.

Charles Miller Ltd: Figs 3, 4, 10, 11.

Bonhams, New York: Figs 12 and 13.

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A Wine for Diallists?

Jackie Jones and Rob Stephenson



We were in a branch of a well-known supermarket and spotted this wine – it looked ideal for sundial enthusiasts. Until we read the label. 8% alcohol wasn't a big issue, but it is described as British wine made from imported grapes. As we thought, "grapes from every time zone". It also costs only £3 a bottle, so after taxes, profit and transport, there can't be much left for quality grapes or careful production. So we bought something else even though we liked the label.

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AN ILLUSTRATION OF SERENDIPITY

The Relocated Detroit Sundial

FRANK H. KING

The queries submitted to the BSS Help-and-Advice service come from many countries and we reply to all of them except any which come from Canada or the US. Those are passed to Art Paque (Vice-President of NASS) who runs an equivalent service. He always keeps the Help-and-Advice team copied in.

A typical such query arrived on 17 November 2017. The enquirer was Bill Loughner of Athens, Georgia, and Sue Manston (the BSS Help-and-Advice specialist) quickly forwarded the message to Art Paque. Meantime, somewhat at arm's length, I had seen the message and a few details caught my attention.

Bill Loughner explained that over 50 years ago he had many times looked a sundial which has since disappeared. He was fascinated by it then and would now like to learn more about it.

He gave no hint as to where he had seen this dial but he mentioned a key feature that he had not seen since. The description he gave in his opening message was thus:

It had a small peephole that the sun shone through, projecting a small bright dot onto an analemma. When the dot (and with it the entire mechanism) was moved onto the analemma corresponding to the current month, the sundial itself became extremely accurate. Or so I remember.

This sounds like some kind of heliochronometer and there are many candidate designs. Art's opening reply was to note that it might be a Schmoyer dial and he attached a photograph to illustrate this suggestion.

Schmoyer dials were undoubtedly around 50 years ago but they don't have anything that I would describe as a 'peephole'. That is more like a description of an aperture nodus.

By pure chance, just when this correspondence was in its early stages, I was asked to check a few points in the December *Bulletin*, which was almost ready to be sent off to the printers. One article prompted a thought...

This was the article by Mike Isaacs¹ about two sundials he had seen a few miles north-west of Detroit, Michigan, while visiting his son Richard. One of these dials was at the Cranbrook Institute of Science, and four photographs of it can be seen in the article. Two more of Mike Isaacs' photographs are shown in Figs 1 and 2.



Fig. 1. Mike Isaacs' son Richard standing by the A.N. Goddard sundial at the Cranbrook Institute of Science. Photo: Mike Isaacs.

In Fig. 1, the general arrangement is clear. There is a cast bronze C-shaped structure which can rotate about a polar axis. The upper extremity of the C incorporates an aperture nodus and the lower extremity serves as a finger which points to the time of day on a fixed chapter ring.

Fig. 2 shows a close-up of the analemma and the spot of light that is projected onto it from the nodus.



Fig. 2. Close-up of the analemma and the spot of light. Photo: Mike Isaacs.

There was no good reason to assume that this was the type of sundial that Bill Loughner had seen but it did seem to be a dial that more or less met his description. I was unable to resist the temptation to share my thoughts.

I sent a couple of Mike Isaacs's photographs to Art and copied in Bill Loughner. Immediately after sending the message, I noticed something curious about the support in Fig. 1. There seems to be wedge-shaped padding under the base which tips the entire instrument slightly southwards. Could this be to compensate for a northwards change in latitude? I sent an appropriate supplementary message.

Imagine my astonishment when Bill Loughner replied, "Wow. I think you nailed it."

He explained that Cranbrook was about 15 miles north of the dial that he had remembered and it now looked as though this was not merely the same type of sundial that he had in mind but the same dial in a new location!

He did some more research and was able to piece together a convincing story that confirmed that this was indeed the sundial he had seen all those years ago.

As a Wayne State University undergraduate he had worked at the Rouge Park golf course a few miles to the west of Detroit. Burt Road ran alongside this golf course and on the other side of this road was a factory. The sundial stood in front of the factory building.

A website² explains that this was the Goddard & Goddard factory. It was built in 1925 and had the address 12364 Burt Road and was near the corner of Capitol Avenue. It is not clear when Goddard & Goddard moved out but there is a note that Jack Borman's Foods used the building until 2009 and it seems that no one took it over. A quick look at Google Street View confirms that the building still exists but, judging by the photographs on the website, it is now in a very sorry condition.

The NASS Sundial Registry³ lists the dial (Sundial 770) and gives its new position without mentioning that it was once elsewhere. It adds that it sits on a marble pedestal engraved "The A.N. Goddard Sundial." There is also a link to a passage in a Cranbrook Institute of Science *News Letter* of 1966 which says:

THE A. N. GODDARD SUNDIAL

... The most recently acquired dial in the Cranbrook collections is now installed outdoors; it is one developed by Victor Edwards. This particular instrument was made for our late benefactor and Trustee, Archibald N. Goddard. It came as a gift in memory of Dr. Goddard and Mary G. Goddard his wife, from their children.

Bill Loughner left Detroit in 1965 not knowing that the sundial would shortly leave too. He notes that Cranbrook is about 15 miles to the north. This does merit a slight tilt to the base but Fig. 1 suggests that the tilt is a little too much. Moreover, the photograph in Fig. 2 was taken on 7 July and the spot of light is a little low for that date. Someone has over-compensated for the northward move!

The NASS Registry confirms Victor E. Edwards as the designer. No builder is given but there is a note that other similar dials by Victor E. Edwards are registered in Santa Barbara, California and Worcester, Massachusetts.

ACKNOWLEDGEMENTS

The information in this article is almost entirely due to Bill Loughner and Mike Isaacs and the websites noted below.

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2. detroit-ish.com/photos/goddard-goddard-company/
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New Sundial Unveiled

Michael J. Harley

I expected a party for my 80th birthday, but not a sundial. Despite my protests the vandals ate it – well, I helped as I can't resist chocolate cake.

By way of explanation: Daideo is Irish for grandad – the name stuck years ago to distinguish me from the other, English only, grandad.

Unknown maker, but I might get her to make another for the next BSS cake competition.

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THE RIDDLE OF THE TOWER

ANTHONY CAPON

As a sundial enthusiast, I have frequently come across references in the literature¹ to a beautiful and enigmatic building in Athens popularly known as The Tower of the Winds. It has long been my wish to pay it a visit one day, and on a recent trip to Greece I was able to make that wish come true. My visit was well-timed because the tower has been subjected to a major restoration which was begun in 2014 and completed in 2016 when the tower was re-opened to the public for the first time in 200 years.

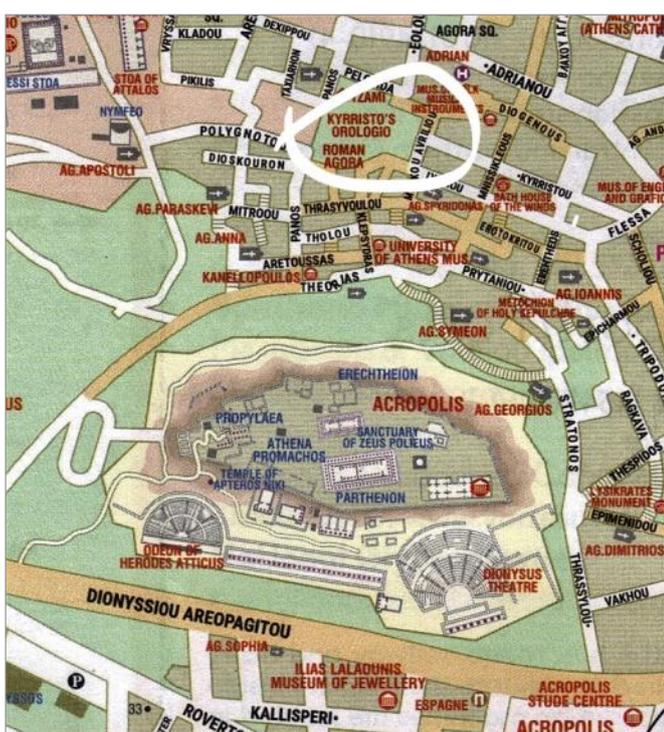


Fig. 1. Map showing the location of the Tower of the Winds relative to the Acropolis.

The Tower of the Winds, or Horologion of Kyrrhestos, is located just to the north of the Acropolis within an enclosed archaeological site known as the Roman Agora (market-place) (see Fig. 1). The tower (Fig. 2) was built by the astronomer Andronikos from Kyrrhos in Macedonia in the 1st century BC. It is octagonal with a conical roof once topped by a bronze weather vane for indicating the direction of the wind. At the top of each of the eight faces of the tower is a relief carving of a personification of one of the winds whose names are Boreas, Kaikias, Euros, Apeliotes, Notos, Lips, Zephyros, and Skiron (Fig. 3). Originally, there was a water clock inside the tower



Fig. 2. The Tower of the Winds.



Fig. 3. Carved personifications of the winds around the top of the tower. On the left is Skiron (the northwest wind) and on the right is Zephyros (the west wind).

operated by water running down from the Acropolis. The remains of a cylindrical cistern, which was once part of this clock, are still extant on the south side of the tower.

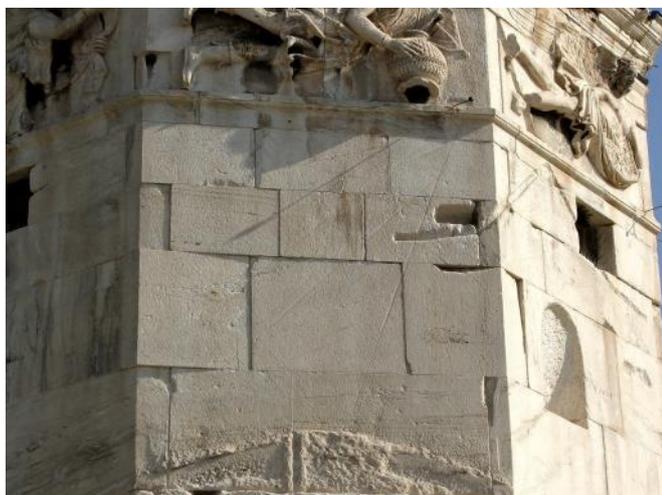


Fig. 4. The badly eroded hour lines of one of the dials.

However, from the diallist's point of view the most important features of the tower are the sundials delineated on each of its eight faces. The hour lines of these dials are now quite seriously eroded but are still just visible (Fig. 4). Theodossiou *et al.* show a diagram of the hour lines for all eight dials in their article on the tower in the December 2006 *NASS Compendium*.² The dials were repainted in the late 19th century, at which time Roman numerals were added, although they are not visible today, as far as I could see. The existence of a ninth dial delineated on the exterior of the cylindrical cistern on the south side of the tower has also been suggested.

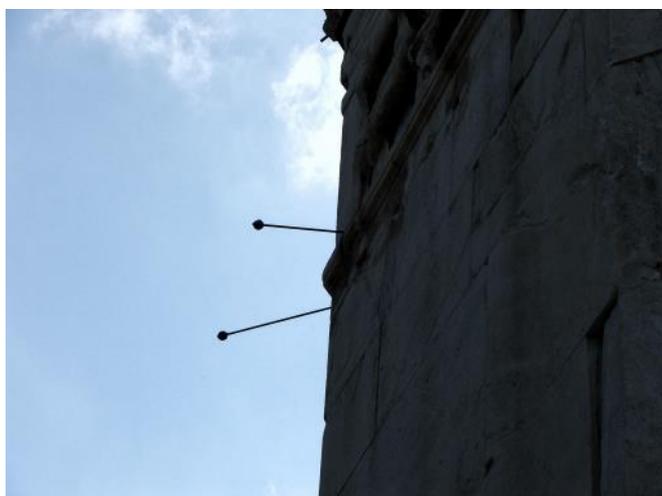


Fig. 5. Horizontally-projecting gnomons.

Each dial has a metal gnomon with a spherical tip (Fig. 5), projecting horizontally from the tower, which casts a shadow amongst the hour lines, enabling a time reading to be made. The gnomons present today are the result of restoration; the originals were probably bronze and of an elongated triangular or square pyramid form.

Rohr tells us that Vitruvius (Marcus Vitruvius Pollio, 1st century BC) mentions the tower but points out that he does not refer to any sundials on it.³ Rohr maintains that the origin of the dials is unknown but that they were studied by

Delambre (presumably the French astronomer Jean Baptiste Joseph Delambre (1749–1822)). Rohr concludes that the dials are "...considerably younger than the tower itself."

Between 1751 and 1753 two British architects, James Stuart and Nicholas Revett, visited Greece and prepared precise measured drawings of the ancient ruins, including the tower. Their drawings are now displayed on an information board adjacent to the tower (Figs 6 and 7).

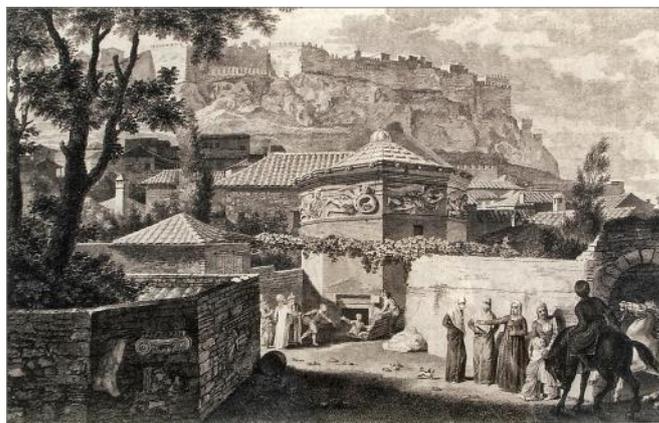


Fig. 6. Drawing of the tower as it was circa 1752 by Stuart and Revett.



Fig. 7. A reconstruction of the tower as it might have been when built, by Stuart and Revett.

These drawings clearly show the hour lines of dials on the faces of the building. They published their work between 1762 and 1816 in a book entitled *The Antiquities of Athens*.⁴ Their drawing (Fig. 6) also shows that the ground level around the tower had risen considerably since its construction – between ten and sixteen feet, they reported. They also checked the orientation of the tower with a compass and found it to be correctly aligned with the cardinal points. In their text, they mention the fact that Varro (Marcus Terentius Varro, 116–27 BC), whom they describe as an earlier writer than Vitruvius, makes reference to the tower, and that he describes it as a ‘Horologium’. They suggest that Varro’s use of this term indicates that he believed time-keeping to be the principal function of the tower although they concede that it is a general term that could refer to a construction designed to indicate the time either by sundials or by water clocks.

Stuart & Revett go on to make the point that as well as indicating the hour during the daytime while the sun was shining, the sundials would have been needed to regulate the water clock which was supposed to have been inside the tower, because they question the ability of such a device to keep accurate time over any extended period. Overall, the tone of their comments seems to me to suggest that they believed the sundials to be part of the original design and construction of the tower.

For the diallist, then, the riddle of the tower is the origin of the dials: were they part of the original design by Andronikos or were they added at some later date?

If the dials were present on the tower when it was built, I find it puzzling that Vitruvius did not mention them, because he seems to me to have been something of a dialling enthusiast. He writes at some length about dials and dialling in *De Architectura*,⁵ even going so far as to list the then-known types of dial and their supposed inventors.

On the other hand, Andronikos was certainly capable of creating dials for the tower because he had previously produced a dial for the Temple of Poseidon on the island of Tinos. This complex dial is now on display in the museum on the island. It comprises four independent dials, one hemispherical, one spheroidal and two vertical dials, one facing east and one west. The creation of this dial conferred considerable fame upon him and resulted in his being invited to Athens to build the Tower of the Winds.

If the dials were part of the original tower, then it seems highly likely that they indicated seasonal hours in line with other types of dial extant at that date, such as the hemispherium. At first glance, this might seem to be puzzling because a water clock in its most straightforward form would be expected to show equal hours, resulting in the sundials and water clock only agreeing at noon. However, Noble & de Solla Price⁶ describe in some detail more sophisticated water clock designs which, they suggest, would enable a water clock to show seasonal

hours, allowing for consistent time indication day and night.

Modern techniques, including the use of a multispectral camera, have revealed that the tower was once colourfully decorated in reds and blues both inside and out. It is also interesting to note that the tower could have ended its days in the UK because in 1799 Lord Elgin was planning its transfer here. The plan was blocked, however, because at that time the building was in use as a site of religious worship.⁷

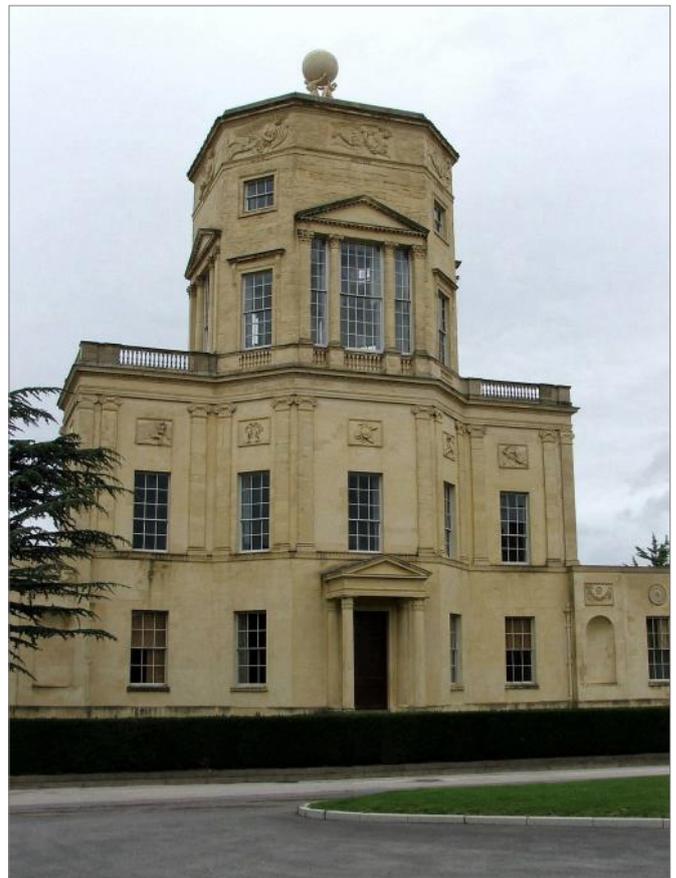


Fig. 8. The Radcliffe Observatory in Oxford. The upper tower was modelled on the Tower of the Winds in Athens.

Notwithstanding the riddle of the dials, the tower is a beautiful and well-preserved monument to the civilisation of ancient Greece. It has inspired many imitators, not the least of which is the tower of the Radcliffe Observatory in Oxford (Fig. 8), a building which I pass almost every day and which I can now appreciate even more, having visited and learned a little about the original tower upon which it was modelled.

ACKNOWLEDGEMENTS

I am deeply indebted to John Davis and Frank King for their many helpful suggestions in the creation of this article and for supplying me with relevant references and research material.

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Postcard Potpourri 42 – Amiens

Peter Ransom

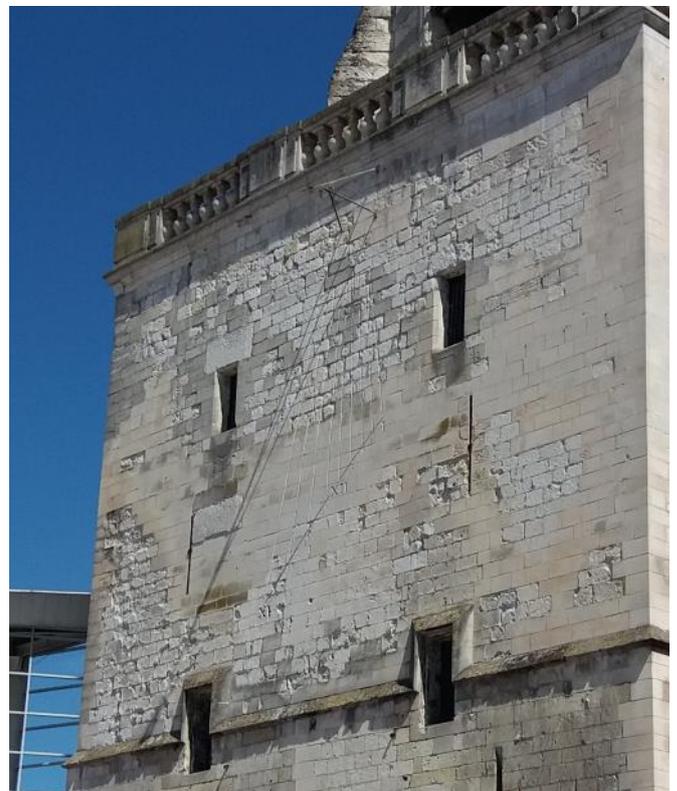


A short walk from Amiens cathedral (which has a superb sundial angel on it) you can visit the Belfry next to the market halls. On this postcard, you can just about make out the dial. The photograph on the right was taken when we visited it on 5 July 2017: we have a friend in Amiens

whom we visit each year, and we like to have a coffee while looking at the shadow creep across the face of this dial.

The dial dates from 1753 and was restored in 1990.

The card shown here has Neurdein et Cie on the reverse and there is a perforation on the top side, typical of the cards that were produced in booklets during the First World War. The Neurdein company was founded in 1875 and became the largest French publisher of postcards of the time.



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FOR VALOUR

DENNIS COWAN

The United Kingdom's highest award for gallantry in the face of the enemy is the Victoria Cross, first instituted in 1856 to award acts of valour during the Crimean War. The medal is a bronze cross pattée bearing the crown of Saint Edward, surmounted by a lion and includes the simple inscription FOR VALOUR.

Since its inception, 1,358 Victoria Crosses have been awarded, including only 15 since the end of the Second World War. Only three men have won the VC twice, two of whom were doctors in the Royal Army Medical Corps. The other was Charles Upham from New Zealand, an infantryman who won both his awards in the Second World War.

But what has this to do with sundials?

It all started a couple of years ago when I heard of a sundial at Moray Golf Club in Lossiemouth which was dedicated to

two soldiers of the Great War. My chance to see the sundial came in 2017 when I had a few days in Nairn, some 27 miles to the west of Lossiemouth.

The sundial (Fig. 1) is situated on the golf course overlooking the North Sea, between the 18th green and the clubhouse (Fig. 2) and can't be missed by anyone who plays golf on the course; it is also easily seen by anyone on the adjacent roadside. It is an octagonal bronze dial set on an octagonal table on a baluster pedestal, complete with a simple gnomon (Fig. 3). There are Roman numerals from 4 am to 8 pm read from the outside, with a 7½ minute time scale and a noon gap, with a motto of "Docet Umbra" meaning "the shadow teaches" (Fig. 4).

A plaque on the pedestal dedicates the sundial to Captain George Eric Edwards and Sergeant Alexander Edwards, both of the 1/6th Seaforth Highlanders, and who both 'carried' on the Moray Links when they were boys (Fig. 5).

So who were these two men and what was their story?

George Eric Edwards was born in Lossiemouth on 23 February 1889 and was a draper by trade. He joined the 1/6th Seaforth Highlanders as a private in September 1914 and was commissioned in the field in March 1916. Later that year he was awarded the DSO (Distinguished Service Order), before being 'Mentioned in Despatches' for his part in the Battle of Arras in 1917, but was killed during the



Fig. 1. The sundial overlooking the North Sea.



Fig. 2. The sundial near to the clubhouse.



Fig. 3. The sundial on its baluster column with some wooden memorial crosses at its base.



Fig. 4. Detail of the octagonal sundial.

Battle of Cambrai at the end of that year. He is buried in the Orival Wood Cemetery in Flesquières in France.

He was recommended for the Victoria Cross for his actions in capturing a German battalion headquarters and a large group of prisoners, but received the lesser award of the DSO instead.

The other man commemorated on the dial is Alexander Edwards who by a great co-incidence was George Edwards' cousin. Alexander was born on 4 November 1885 near Lossiemouth and was educated at Lossiemouth School. After leaving school, he became a cooper working in the herring fishery industry. At the outbreak of the war in July 1914, he immediately volunteered and joined the 1/6th (Morayshire) Battalion of the Seaforth Highlanders, part of the 51st Highland Division.

He won his Victoria Cross during an action in July 1917 north of Ypres for conspicuous bravery despite being badly wounded.

Alexander received his Victoria Cross from King George on the forecourt of Buckingham Palace on 26 September 1917. He returned to his unit, but one



Fig. 6. Photograph from the video of Alexander Edwards receiving his VC from the King.

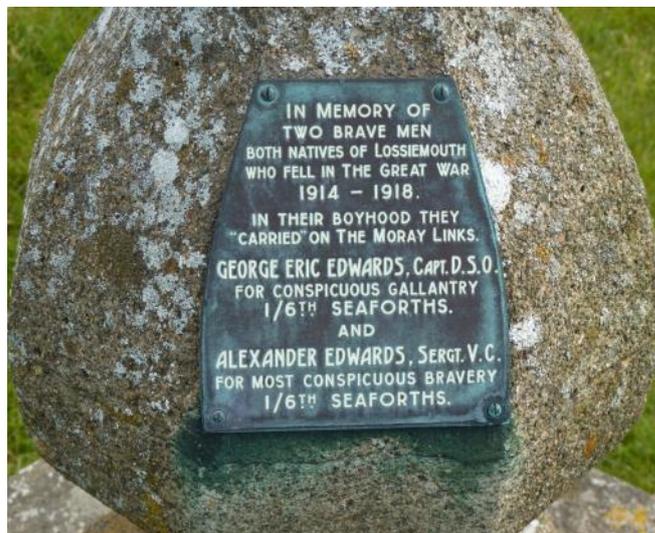


Fig. 5. The plaque on the sundial pedestal.

hundred years ago, on 24 March 1918 at Loupart Wood, east of Arras, Alexander Edwards was reported missing in action. His body was never found. He has no known grave and is commemorated on the Arras Memorial in Faubourg-d'Amiens Cemetery.

Alexander Edwards' Victoria Cross is on display at the Highlanders Museum, Fort George, near Inverness. Interestingly when I visited the museum, a video was being played as an introduction to the museum and to the Highlanders, into which the Seaforths were eventually integrated.

A couple of minutes into the video, I couldn't believe it when I saw Edwards, who I recognised from a photo that I



Fig. 7. Alexander Edwards' Victoria Cross at the Highlanders Museum at Fort George.

had previously seen, being awarded with his Victoria Cross by the King. I just had to watch the video again, and when the relevant scene was being played, I took the photograph shown in Fig. 6. Both this and the photograph of Edwards' VC in Fig. 7 were taken with the knowledge of the Highlanders Museum and are reproduced with their permission.

The Moray Golf Club decided to honour these two brave soldiers by installing a sundial close to the 18th green, and eventually in August 1931 the sundial was unveiled in front of a large crowd including members of Alexander Edwards' family. It remains in the same position to this day.

Unfortunately, I have been unable to identify the maker of the sundial.

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A SECOND DIY GARDEN HELIOCHRONOMETER

BRIAN HUGGETT

Until the summer of 2016, I knew very little about sundials. In fact, dare I confess, I had never heard of the British Sundial Society. I thought, however, that it would be interesting to install a sundial in the garden, and I decided to try to construct it myself.

After researching the matter, I chose to build an equatorial heliochronometer. This subsequently provided the challenge of designing an instrument to take account of latitude, longitude, north-south orientation, the EoT, and the GMT/BST transitions. Remarkably, my heliochronometer (Fig. 1) worked reasonably well, and the outcome of that project was recorded in the September 2017 *Bulletin*.¹

The construction of Mark I was great fun. In part that was due to my introduction to the fascinating world of sundials, and in part it was due to the interest in finding solutions to the many minor engineering challenges that Mark I presented.

Although appearing to be an impressive beast, Mark I, in practice, had design weaknesses. This is, of course, the nature of research and development – one never knows



Fig. 2. Mark II.

how something is going to work until it is tested. Most of the issues were a consequence of the weight of the cantilevered dial plate.

At the outset, I had never intended to make a second sundial. Experimentation with Mark I during 2017, however, and involvement with the BSS, helped me to visualise how I could construct a heliochronometer that would resolve all the weaknesses of my first instrument – and do so in far more elegant ways.

Mark II would have the same size of timescale as Mark I, but it would be a smaller and more portable instrument that, with a few simple plans, could be replicated by others. Thus Mark II came into being (Fig. 2). Full details of the design and construction of Mark II can be seen at my webpage <http://bit.ly/huhe02>.

I will describe in this article the successful elements of Mark I that were transferred to Mark II, the major differences between the two heliochronometers, and the way that Mark II, in particular, deals with the Equation of Time, and the GMT/BST transitions. I will conclude with thoughts of Mark III.



Fig. 1. Mark I.

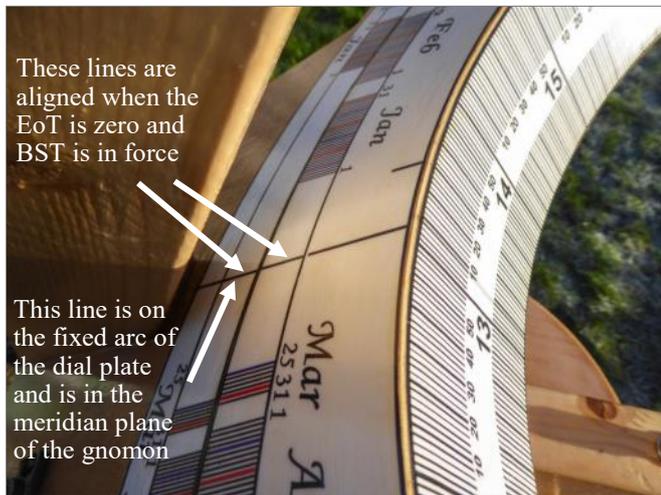


Fig. 3. The scales. Note that the upper element of the emphasised line-pair aligns with 13h 4.7m on the timescale.



Fig. 4. The timescale with the gnomon shadow at 13:07.

Successful Elements of Mark I Transferred to Mark II

I created all the scales from first principles, and they were commercially printed on self-adhesive vinyl for durability (Figs 3 and 4).

The gnomon is made from 0.8 mm stainless steel wire that is tensioned between its support points. This means that the gnomon can be both thin and totally straight (Fig. 5). A guitar machine head is used to tension the gnomon (Fig. 6).

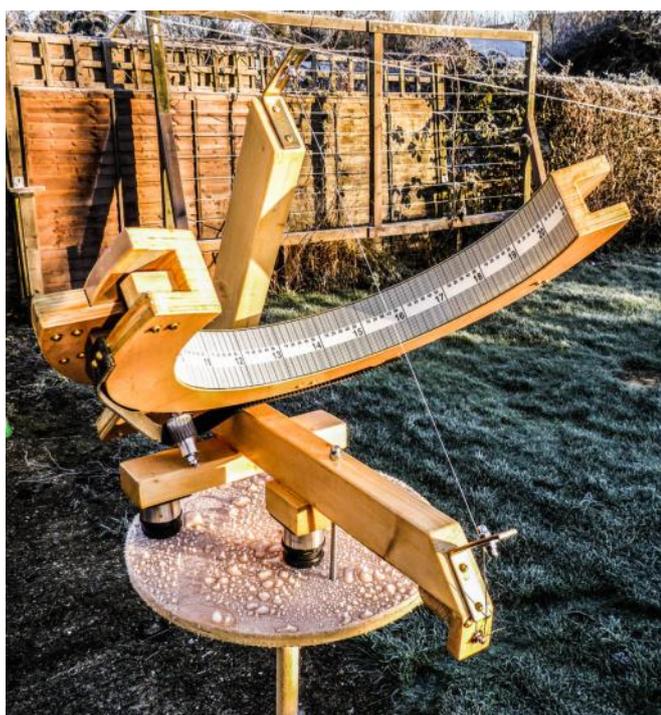


Fig. 5. Attachment of the gnomon wire.

The timescale is positioned at right angles to the plane of the dial plate. This allows it to be easily read throughout the year.

Major Differences between the Two Heliocronometers

The equinoxes

The EoT correction graph for Mark I was mounted on the southern section of a complete dial plate annulus (Fig. 1). This required the timescale be oversized so that the protruding sections would not be in the shadow of the dial plate annulus during the periods of the equinoxes.

In Mark II, the dial plate does not continue over the section that would represent the period from 21:00 to 06:00. This allows the whole surface of the timescale to be read from 9:00 to 18:00 on days close to an equinox – when the sun is aligned with the plane of the instrument's dial plate.

Rotation of the timescale arc

Mark I used ball bearings to facilitate the rotation of a very heavy dial plate. Its dial plate was rotated by hand which, despite riding on the ball bearings, caused difficulty in exactly aligning the pointer with the EoT graph.

In Mark II, all moving surfaces that are in contact with other surfaces are covered with Teflon² to avoid any adhesion as shown in Fig. 7.

In addition, a belt and pulley mechanism allows very easy and precise adjustment of the timescale arc of Mark II (Figs 8 and 9).



Fig. 6. Guitar machine head used to tension the gnomon.

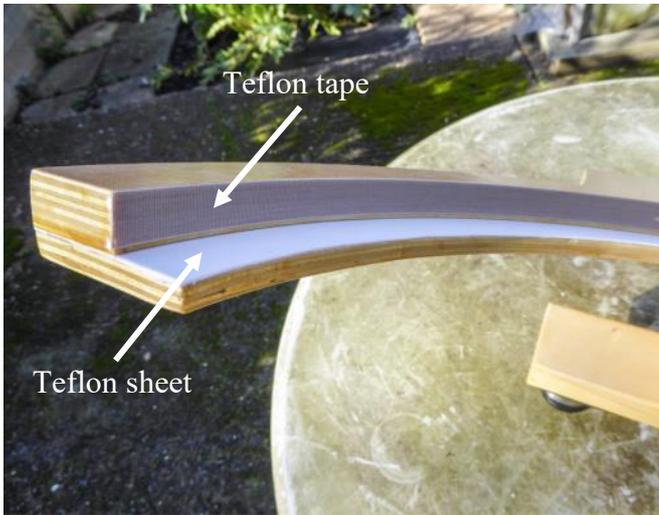


Fig. 7. Teflon tape and sheet covering moving surfaces.



Fig. 8. Mechanism that rotates the timescale arc.



Fig. 9. Setting the EoT correction for the day.

The positioning of the gnomon

The locating and checking of the gnomon position for Mark II is assisted by a gnomon adjustment tool: a wooden channel, shown in Fig. 10, provides alignment for the gnomon wire. The gnomon supports on Mark II also allow a wider range of adjustment for the ends of the gnomon wire than was the case on the earlier instrument.

The EoT correction

The EoT correction employed by Mark I used a pointer that was attached to the rotating section of the dial plate. This pointer was aligned with a graph of the EoT in order to effect the required rotation of the timescale (Fig. 11). As mentioned above, this was difficult to set with precision.

The method used by Mark II is derived from that used by the Pilkington Sol Horometer (Fig. 12). The Sol Horometer correction for the EoT, on a given day, is effected by the alignment of a pair of lines that are specific to that day. One line of the pair is located on the static section of the Sol Horometer dial plate, and one is located on the section that rotates. When the appropriate line-pair is aligned, the rotating section of the dial plate will be set for the day.

Fig. 13 shows, in close up, the graduations on the EoT scale of a Pilkington Sol Horometer. The EoT correction for 5 June would be effected by aligning the graduations indicated by the white arrows.

Fig. 10.
The gnomon
adjustment
tool.

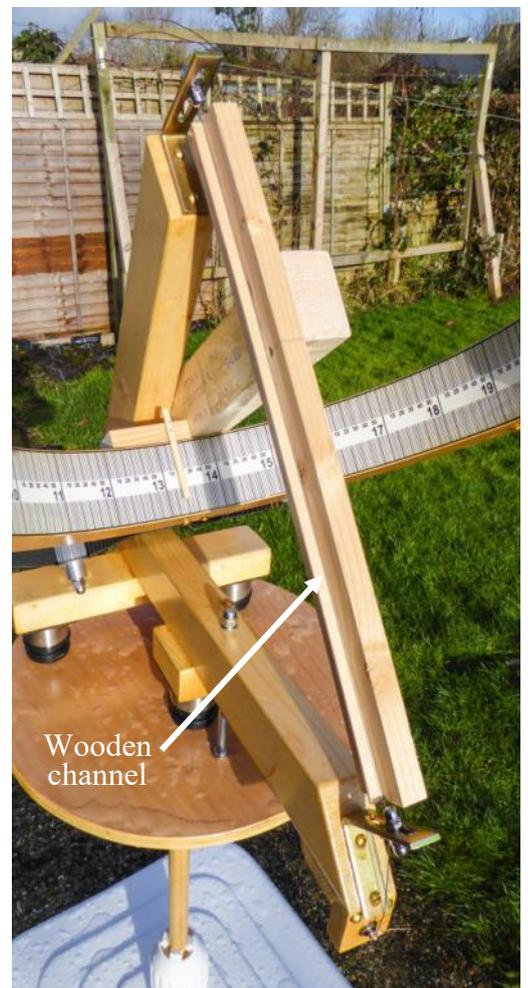




Fig. 11. The EoT correction mechanism of Mark I.

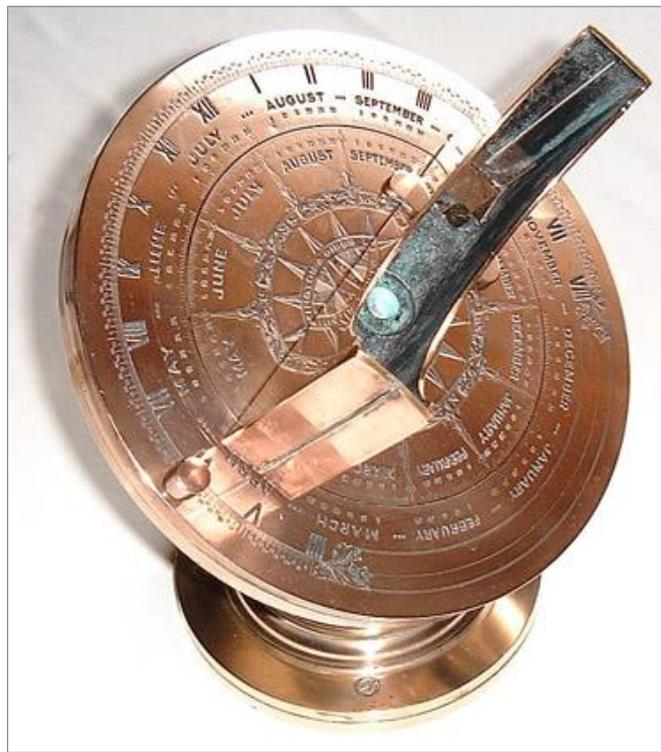


Fig. 12. A Pilkington Sol Horometer (photo: Steve Shaw).



Fig. 13. EoT scale on a Pilkington Sol Horometer (photo: Steve Shaw).

In transferring this idea to Mark II, I visualised a single line-pair, for a single day of the year, being attached to the dial plate. One would first set the instrument so that it was properly adjusted to read solar time (or solar time with a longitude correction). The line-pair would then be attached such that the two lines were at their correct angular displacement for that day's EoT correction – one line would be fixed to the static section of the dial plate and the other fixed to the rotating timescale arc. As in relation to the Sol Horometer, alignment of the line-pair would then cause the timescale arc to rotate by the angle required to effect that day's EoT correction. Fig.14 shows the Mark II scale set for 10 December.

I noted that in completing the above process of attaching a line-pair, it would not matter where on the circumference of the dial plate that line-pair was fixed. The EoT correction is

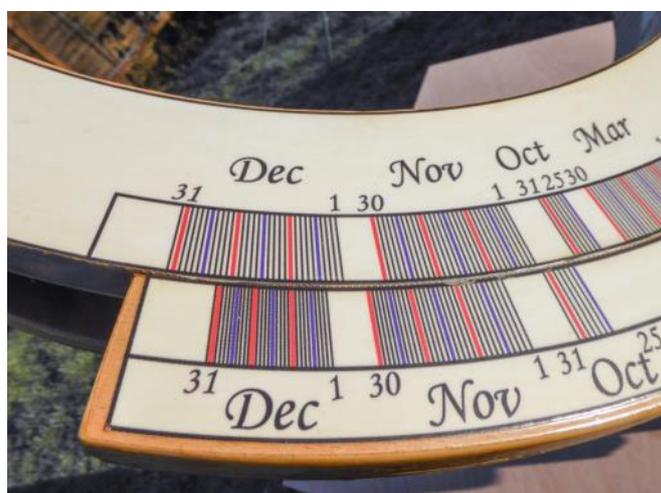


Fig. 14. The scale set for 10 December. Blue lines represent dates divisible by 5, and red lines are dates divisible by 10. The first and last dates of each month are numbered.

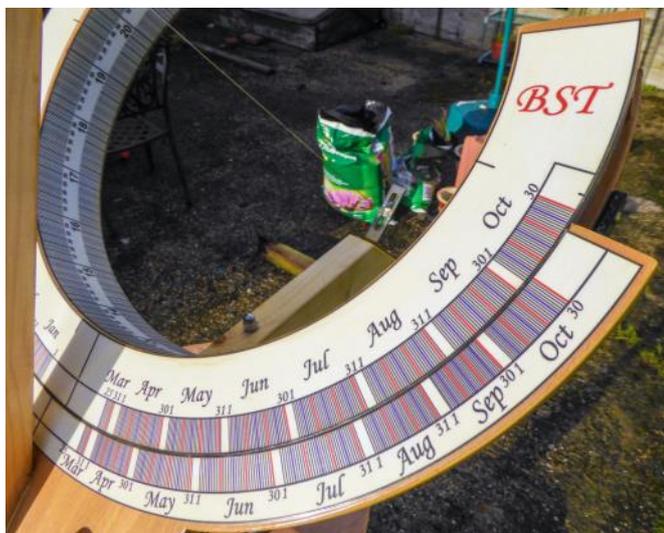


Fig. 15. The BST section of the EoT scale.

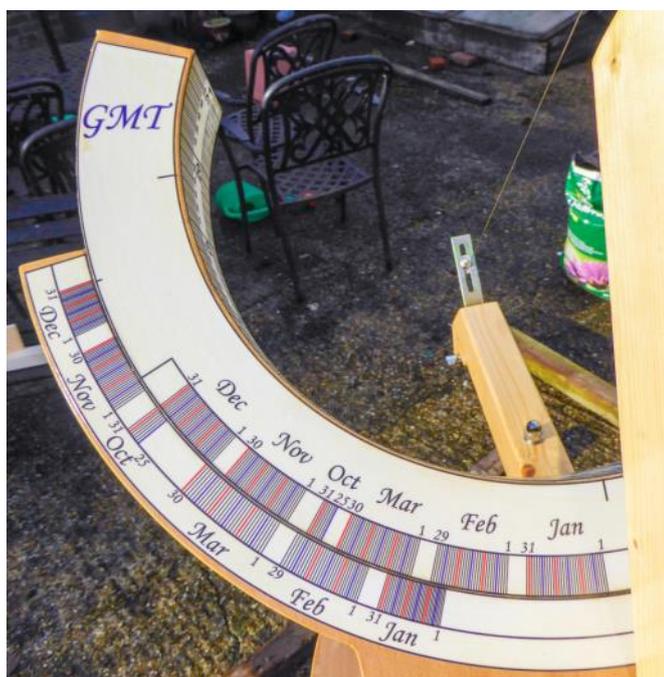


Fig. 16. The GMT section of the EoT scale.

effected by the angle of rotation required to align a line-pair. It is thus the relative positions of the two related lines that is important, not where the line-pair, as a unit, is placed.

The location of one line-pair in relation to any other line-pair is also irrelevant as long as the final configuration does not make the scale hard to read.

These facts allowed me to place line-pairs for each day of the year in the configuration shown in Figs 15 and 16.

The transitions between GMT and BST

In relation to Mark I, the transitions between GMT and BST were achieved by having two separate EoT graphs that were set 15 degrees, or one hour, apart.

These transitions on Mark II employ a similar idea, but utilise the independence of each line-pair on the EoT scale, as described above.

Months marked on the scale of the Sol Horometer are contiguous (Figs 12 and 13) and, taken together, occupy the entire circumference of the circle on which the outer and inner scales meet. As previously mentioned, this arrangement is not a logical necessity because the location of one line-pair has no bearing, other than aesthetically, on the location of any other. This fact allowed me to group all GMT dates on the east side of the sundial's longitudinal axis, and all BST dates on the west side. The graduations simply occupied as much of the remaining dial plate annulus as was available.

For purely aesthetic reasons, the sequence of GMT dates runs clockwise and the sequence of BST dates runs anticlockwise.

Each pair of EoT correction lines for GMT dates is displaced by 15 degrees, or one hour, relative to the BST dates to reflect the one hour difference between BST and GMT. This grouping is slightly complicated by the fact that the transitions between GMT and BST do not occur on the same dates each year. GMT changes to BST on the last Sunday in March, and BST changes to GMT on the last Sunday in October. This means that dates between 25 March and 30 March inclusive, and also dates between 25 and 30 October inclusive, might, depending on the year, fall within either the period of BST or the period of GMT. These dates, therefore, appear both on the BST and on the GMT sections of the scale.

There is no line-pair for 31 October on the BST section of the scale as 31 October must always fall within GMT. Similarly, there is no line-pair for 31 March on the GMT section of the scale as 31 March must always fall within BST.

Might there be a Mark III?

At the time of writing, I am observing how Mark II functions and, in particular, how it copes with the weather. I believe, however, that the basic design is sound. When I am certain of this, it may be the time to consider an instrument that can be used at other latitudes and longitudes and that includes a scale for determining the time of year.

REFERENCE and NOTE

1. B. Huggett: 'A DIY garden heliochronometer', *BSS Bulletin* 29(iii), 36–40 (September 2017). Further details are described at <http://bit.ly/huhe01>.
2. Teflon is a registered trademark of the Chemours company (formerly DuPont). The material is generically known as PTFE or polytetrafluoroethylene.

For a portrait and CV of the author, see *Bulletin* 29(iii), September 2017. He can be contacted at brian.huggett@gmail.com

THE 2017 AMERICAN ECLIPSE – POSTSCRIPT

FRANK H. KING

The article on the 2017 American Eclipse which was published in the December issue of the *Bulletin*¹ prompted some unexpected email traffic.

Fig. 4 showed a photograph of Roger Bailey standing by what the caption described as “his solar observatory”, and the first message that I received was from Roger himself. He explained that this was not his instrument; it had in fact been made by Don Snyder who refers to it as a projector. I replied with an apology and said that I would ensure that an Erratum was published in the March *Bulletin* and that this would credit the instrument correctly.

I copied the message to Don who replied that, although he had made the projector, he couldn't accept credit for the design since he had copied this from a book by Michael Bakich: *Your Guide to the 2017 Total Solar Eclipse*.² Much of the material in this book applies to any solar eclipse but it seems not to be a best-seller; Amazon is now offering used copies for 1p.



Don kindly supplied an illustrated note about his version of the projector; Fig. 1 shows it when newly made, and Fig. 2 shows it in use during the eclipse itself.

At the heart of the instrument is a Meade 8 × 50 finderscope³ whose normal use is as an auxiliary telescope attached to a much larger astronomical telescope. The finderscope protrudes through a simple light shield and the projected image falls on a small platform about 30" away.

It is, of course, essential to align the telescope with the sun and a short peg mounted perpendicular to the upper surface of the light shield serves as a rather unusual gnomon. The whole assembly is manoeuvred until this gnomon casts no shadow. This peg shows up clearly against the sky in Fig. 2 and, in some sense, acts as a finderscope for the finderscope!

Fig. 1. The newly-made projector (photo: Don Snyder).



Fig. 2. The projector in use during the 2017 eclipse. The implicit solar altitude is higher than British users are accustomed to!

Although it is designed for use during solar eclipses, this projector can be used for the safe study of the sun and sun spots at any time the sun is shining.

ACKNOWLEDGEMENTS

The information in this article is almost entirely due to Roger Bailey and Don Snyder and the references noted below.

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2. Michael E. Bakich: *Your Guide to the 2017 Total Solar Eclipse*, Springer (2016), pp. 205–210. This book is one of a number in the Patrick Moore Practical Astronomy series.
3. www.rothervalleyoptics.co.uk/meade-8-x-50-finderscope-rear-focus.html

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STRING GNOMON DIALS

MIKE COWHAM

We are all familiar with dials that have a gnomon gap at noon, such that the time is read from one side of the shadow in the morning and the other in the afternoon. Even some portable dials have the same gap at noon, as in Fig. 1.



Fig. 1. Portable dial in silver by J & W Watkins of Charing Cross, London, with gnomon gap at XII.

One way to avoid having to think about such a gap is to make a portable dial with a string gnomon. The string is quite thin so all that is necessary is to read the time from the centre of the string's shadow.

In studying some ivory dials from Dieppe made around 1660, I noticed that a few had the 6 to 6 lines with a small step in the middle (Figs 2, 3 and 4). Why was this? From a further look at these dials it seemed to me that the difference in position between morning and afternoon was about the same as the gnomon string's thickness. Was this just a small error in doing the layout? I then looked at the other numerals and these too seemed to be shifted by about this string's thickness. A check was then made on the 12 noon mark by drawing a vertical line from the gnomon root and this point was also found to be moved by this same amount.

Another such dial is shown by Jacques Senecal of Dieppe (Figs 5 and 6).

It therefore appears that these makers allowed for the string thickness in their calibrations. Because there was no



Fig. 2. Unsigned French string gnomon dial.

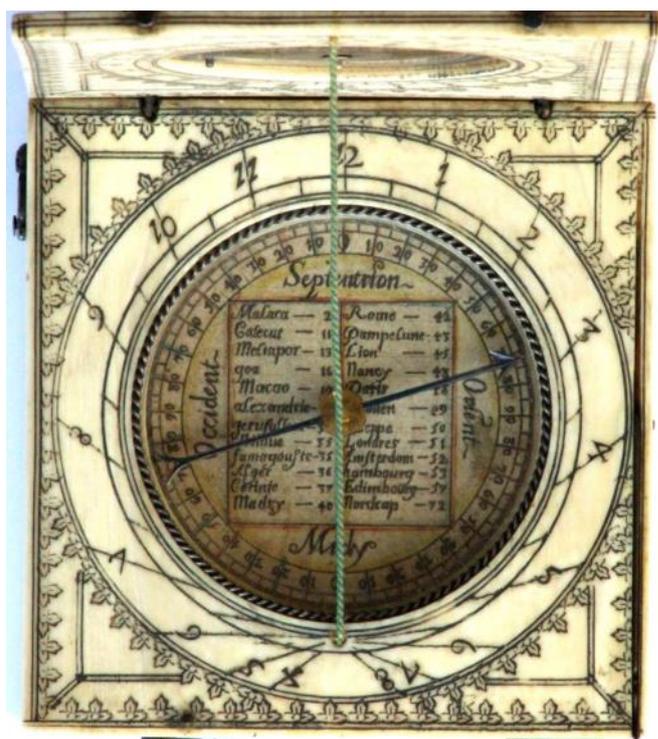


Fig. 3. Horizontal string gnomon dial from Fig. 2.



Fig. 4. Detail of stepped 6-6 hour line.

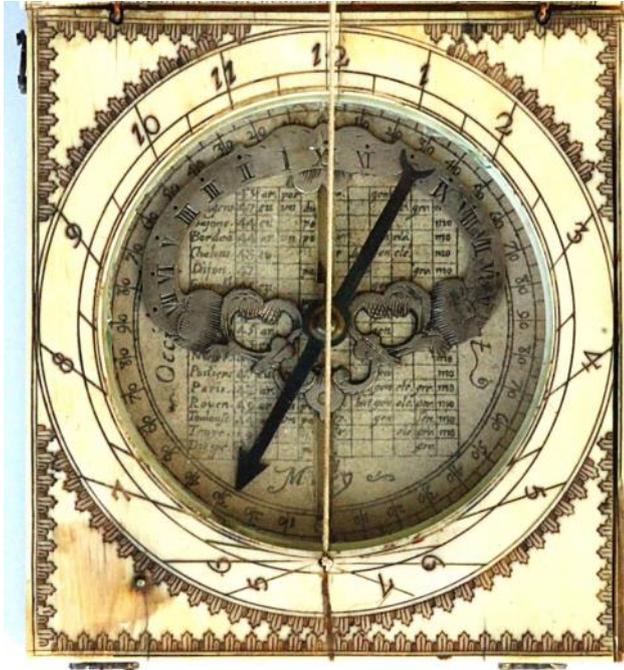


Fig. 5. Dieppe dial by Jacques Senecal.



Fig. 6. Senecal dial 6-6 line.

gnomon gap, it was necessary to read the time from the leading edge of the gnomon's shadow.

Did this happen only to Dieppe dials? A check was made of a number of string gnomon dials and these were found to have the VI-VI lines set straight in-line. However, one French dial in silver with a string gnomon had a similar feature (Figs 7 and 8). In this case the lines VI-VI were moved in the opposite direction so that the time should then be read from the trailing edge of the gnomon shadow. The XII was also moved slightly in the same direction.

Further checks were made on many other string gnomon dials and another feature was commonly seen. This is that the lower gnomon fixing hole was normally set fractionally north or south of the VI-VI line. The string would function as an overslung gnomon or an underslung gnomon respectively. In both cases there is a changeover at noon. Strictly, a noon gap is required for an overslung gnomon



Fig. 7. Unsigned oval French dial in silver.



Fig. 8. Alignment of VI-VI on silver dial compared with an added blue line.



Fig. 9. French ivory dial by R F with the gnomon fixing hole past the VI-VI line, also with a small step in the line.

and there is the well-known difficulty of delineating noon with an underslung gnomon.

The hour lines will be displaced slightly from the positions they would occupy if time were read from the centre of the shadow. The displacements diminish from VI am to noon and then increase again towards VI pm. The offsetting of the lower fixing hole was probably unintentional. An example is shown in Fig. 9 where the hole is fractionally displaced to the south.

Checks were then made on several dials using thin pin gnomons, but no alignment differences were found with the VI-VI lines.

It would be interesting to know whether any BSS Members know of any similar dials, with a string or even a pin gnomon, where the VI-VI lines are stepped like these shown above.

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TRUSTEES' ANNUAL REPORT 2017–18

As the Society enters its thirtieth year it is a more than opportune time to review in greater depth and detail than usual how we meet the Society's object – 'the advancement of the education of the public in the science and art of gnomonics'.

The range of activities undertaken by members in fulfilment of our object is truly staggering: lectures and more participatory activities for all age groups across the length and breadth of the realm; advice and technical support for individual projects and to professional bodies; as well as research. A list illustrating the range and scope of such activities during the last year is included in the Annex.

The Society's website contains a huge amount of information – theoretical, practical, and contacts. The website has become the main way people find out about the Society, access our knowledge, contact us, and become new members.

Our Help and Advice Service is advertised on the home page of our website. Anyone can ask any question about sundials and quickly receive a personal reply and advice, drawing on our knowledge base and experts. This service

has proved a most fruitful way of delivering a response tailored to the individual.

Underpinning all this the Society continues to publish its research and investigations in its quarterly *Bulletin*, and to maintain and expand its databases of sundials, the latter constituting *the* national database. Other elements of the Society's infrastructure – annual conferences, Newbury Meetings, library, and quarterly newsletters – continue to be as good as ever.

The Society's finances remain healthy and capable of supporting current activities for the foreseeable future.

The entirety of the Society's many and varied activities, including front and back office, are undertaken on a voluntary basis by members. Thanks continue to be due to all volunteers – both long serving and the newly started. As always, there is more we could do. 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*

ANNEX

Illustrative Individual Activities

The listing below, by no means exhaustive, exemplifies the many and varied ways members contribute to the Society's object – educating the public:

- Sundial advice to The Cardozo Kindersley Workshop; Queens' College, Cambridge; Buckingham Palace; St Catharine's College, Cambridge; The Stephen Perse Foundation; Didsbury Old Parsonage.
- A sequence of talks to The Wokingham Mathematics Group.
- An illustrated talk, *Sundials: an on-going craft*, to the Melton Mowbray Women's Institute.
- A sundial-making day at Britannia Village Primary School, Newham, London for three classes of 20 Year 5 (age about 9 years); around 70 individual card sundials were made.
- An educational grass sundial, with supporting resources, was provided to Wroxton village school, Oxfordshire.
- During June a 'Sundial of the Day' outreach was run on Facebook, presenting images and information on the diversity of sundials and how they work. It generated a good response and a lot of questions.
- Research on a particular local sundial was shared with its community in Haxey, Lincolnshire; Bosham, West Sussex; Hastings, East Sussex; Newstead, Nottinghamshire; Barwick, West Yorkshire; multiple locations in Scotland.
- Advice to a group promoting an education project relating to the i360, Brighton, East Sussex.
- Practical assistance with a replica replacement sundial for Mentmore Church, Buckinghamshire.

- Detailed advice to The Royal Observatory, Greenwich regarding its proposed sculptured sundials in the public domain.
- Historical and metallurgic research undertaken on scientific instruments in the collections of public museums in Oxford, Edinburgh and London.
- At the Livery Schools Link Showcase Event at the Guildhall, London, attended by 950 young people and their teachers, it was explained how sundials worked; paper dials, workable when made, were distributed.

Website

The website continues to offer a wide range of material for members and the general public alike. One of the significant enhancements this year has been the publication of *Old Sundial Books: A Survey* by Mike Cowham and Fred Sawyer, which provides a comprehensive and fascinating overview of authors and publications from the seventeenth century onwards.

Another new development in 2017 has been the addition of the Members' Forum, providing a space for members to discuss and make suggestions on how the Society might develop. So far there has been limited uptake and I hope members will use this more in the future.

A range of further developments are in hand so, as ever, volunteers are welcome. 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.

Bill Visick

Help and Advice

This service continues to attract numerous enquiries with approximately 30% coming from overseas. We respond to all except those from Canada and the US which we pass to the North American Sundial Society who run an equivalent service.

The service not only directly benefits those who make use of it but also continues to lead to articles in the *Bulletin* (for example pages 20–21 of the March 2018 issue) and to talks at conferences and Newbury meetings. Moreover, on occasion, an enquirer turns into a welcome new member.

The expert advice of many members is called upon to support the service, in particular Mike Cowham, John Davis, John Foad, Frank King and Jill Wilson. Grateful thanks are extended to all of them.

Sue Manston

The Bulletin

The four quarterly copies of the *Bulletin* were published as usual during 2017 and it is hoped that there were articles to please all dialling tastes.

The procedure that is followed for most articles is that an author sends text and figures to editor@sundialsoc.org.uk and John Davis sends an initial acknowledgement, often adding some comments and suggestions.

Almost all subsequent processing is undertaken by Christine Northeast or, sometimes, David Brown, who checks the text and typesets the article, ensuring the layout conforms to the *Bulletin* style. Sometimes additional technical advice is requested and Frank King can usually provide this; if not, then wider expertise is consulted.

John Davis sees all the typeset articles and the final draft is checked by Fiona Vincent who provides an extraordinarily skilled extra pair of eyes.

Bill Visick makes a considerable contribution to the *Bulletin*. He attends to the production of the cover, using his well-honed photo editing skills, and undertakes all liaison with the printers, monitoring the quality of their work. He also provides valuable technical advice to the team.

We are, as always, indebted to our authors without whom there would be no *Bulletin*. Please continue to send us your contributions.

The Editorial Team

Conference

The Oxford (2017) conference again met the high standards of programme content to which we have become accustomed. With some 60 delegate bookings, the Oxford conference was the best attended in recent years. For many delegates the high point was the visit to Convocation House with its two painted glass sundials, arranged and expertly guided, from both dialling and historic perspectives, by Frank King.

The move to a team approach to organising our conferences has been most successful both in efficiently delivering conferences and spreading a heavy overall workload. The core conference team comprises Doug Bateman (lecture programme), Bill Visick (IT), plus Liz and Chris Williams (who, between them, do everything else). The permanent team requires, for each conference, a temporary local member to help find the venue and arrange the Saturday afternoon.

David Payne kindly volunteered to join the team for Norwich (2018), and David Brown for Bath (2019).

Looking further ahead, 2020 and beyond, we are in the market for local volunteers. The role is not onerous, and you would not be, repeat you would not be, in any way responsible for *the* Conference. Now is not too early to be planning for 2020. If you think you could help, please contact us.

The Conference Team

Registrar

This has been another quiet year, with only a small number of new reports (nevertheless including some venerable dials in surprisingly good condition). Leicestershire has proved to be a fruitful hunting ground. Some changes have been made to the Access recording database, including a useful link of the Reports folder to the input screens.

John Foad

Library

This year, the Library received only one donation:

Anoma Jayasinghe et al.: *An Investigation of the Sundial at Abhayagiri Monastery in Anuradhapura, Sri Lanka*, Colombo, The Contemporary Art and Crafts Association of Sri Lanka (2016).

The Library continues to be in good hands at Bromley House Library in Nottingham, where it is based in its own section in the Thornton Room. My wife and I are members of Bromley House Library and are able to oversee the Society's Library whenever we visit Bromley House.

John Wilson

Membership

The decline in membership has long been a cause of continuing concern to us all – not least your trustees.

Put simply, the change in the size of the membership is the balance of those leaving versus those joining. For a long time, the majority of our leavers, many of very long standing, have reluctantly and sadly succumbed to the effects of age. As our membership's age distribution was heavily skewed towards the upper end the Society has been suffering an increased rate of leaving. Joiners, on the other hand, have been far more constant. Our declining membership has in effect been driven by 'involuntary' leavers.

Turning to the future, there is nothing we can do about the 'demographic' that is working its way through the leavers side of the equation. That said, arithmetically, it can be expected to abate. However, joiners, as explained in the June 2017 Newsletter, are something we can and are trying to influence.

Current membership stands at 324. It is welcome news that last year witnessed a smaller level of net leavers than hitherto.

Jackie Jones

Treasurer

The Society's 2017 accounts begin on the next page.

Graham Stapleton

**THE BRITISH SUNDIAL
SOCIETY**

(CHARITABLE INCORPORATED ORGANISATION)

**REPORT AND
FINANCIAL STATEMENTS
FOR THE YEAR ENDED
31ST DECEMBER 2017**

CHARITY REGISTRATION No: 1155688

Independent Examiners Ltd
Sovereign Centre
Poplars
Yapton Lane
Walberton
West Sussex
BN18 0AS

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 2017
END OF FINANCIAL YEAR	31st December 2017
TRUSTEES AT 31ST DECEMBER 2017	
	Dr F King - Chairman C Williams - Secretary J Jones - Membership Secretary
	G Stapleton - Treasurer B Visick - Webmaster 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	<p>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).</p> <p>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.</p>
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

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 2017 which have been set out on pages 42 to 48.

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 Act have 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: 6th March 2018.

THE BRITISH SUNDIAL SOCIETY
(CHARITABLE INCORPORATED ORGANISATION)

STATEMENT OF FINANCIAL ACTIVITIES
FOR THE YEAR ENDED 31ST DECEMBER 2017

	Notes	Unrestricted Funds £	Restricted Funds £	Total 2017 £	Total 2016
INCOME					
Donations and legacies	3a	1,820	0	1,820	1,351
Investments	3b	132	0	132	240
Charitable activities	3c	31,020	0	31,020	34,639
TOTAL INCOME		32,972	0	32,972	36,230
EXPENDITURE					
Charitable Activities	4a	26,723	411	27,134	25,407
Other	4b	3,646	0	3,646	3,320
TOTAL EXPENDITURE		30,369	411	30,780	28,727
NET INCOMING/ (OUTGOING) RESOURCES		2,603	(411)	2,192	7,503
Total Funds Brought Forward		79,376	7,982	87,358	79,855
TOTAL FUNDS CARRIED FORWARD		81,979	7,571	89,550	87,358

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

The notes on pages 44 to 48 form part of these financial statements.

THE BRITISH SUNDIAL SOCIETY
(CHARITABLE INCORPORATED ORGANISATION)

BALANCE SHEET
AS AT 31ST DECEMBER 2017

	Notes	Unrestricted Funds £	Restricted Funds £	31-Dec-17 Total £	31-Dec-16 Total £
Fixed Assets					
Tangible assets	2	17,228	0	17,228	17,228
Current Assets					
Debtors	8	3,578	0	3,578	0
Cash at bank and in hand	7	68,481	7,571	76,052	77,654
Total Current Assets		72,059	7,571	79,630	77,654
Creditors: amounts falling due within one year	9	7,308	0	7,308	7,524
NET CURRENT ASSETS		64,751	7,571	72,322	70,130
NET ASSETS		81,979	7,571	89,550	87,358
Funds of the Charity					
General Funds		81,979	0	81,979	79,376
Restricted Funds	6	0	7,571	7,571	7,982
Total Funds		81,979	7,571	89,550	87,358

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 2-3-18 and signed on their behalf by:

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

Signed G. Stapleton G. Stapleton, Treasurer.

THE BRITISH SUNDIAL SOCIETY
(CHARITABLE INCORPORATED ORGANISATION)

NOTES TO THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 31ST DECEMBER 2017

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 2017

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-16	17,228	0	17,228
Revaluation		0	0	0
Cost at	31-Dec-17	<u>17,228</u>	<u>0</u>	<u>17,228</u>
Depreciation	31-Dec-16	0	0	0
Charge		0	0	0
Depreciation at	31-Dec-17	<u>0</u>	<u>0</u>	<u>0</u>
Net Book Value	31-Dec-17	<u>17,228</u>	<u>0</u>	<u>17,228</u>
Net Book Value	31-Dec-16	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 2017

Notes	Unrestricted Funds £	Restricted Funds £	Total 2017 £	Total 2016 £
3. INCOME				
a) Donations and legacies				
Bequests & Legacies	616		616	0
Donations and Gift Aid	1,204		1,204	1,351
	1,820	0	1,820	1,351
b) Investments				
Interest	132		132	240
	132	0	132	240
c) Charitable Activities				
Advertising			0	805
Conference Auction			0	325
Day Meetings	340		340	310
Events	18,527		18,527	19,636
Publications			0	1,558
Sales	932		932	789
Subscriptions	11,221		11,221	11,216
	31,020	0	31,020	34,639
4. EXPENDITURE				
a) Charitable Activities				
Bulletin / Publications	8,480		8,480	6,695
Day Meetings	180		180	164
Education		246	246	268
Events	15,897		15,897	16,909
Independent Examiners Fees	614		614	555
Professional Fees	725		725	35
Sales	100		100	40
Somerville Lecturer		165	165	259
Travel	727		727	482
	26,723	411	27,134	25,407
b) Other				
Administration	492		492	494
Banking / Insurance	1,407		1,407	1,320
Library	208		208	208
Miscellaneous	0		0	6
Storage	1,539		1,539	1,292
	3,646	0	3,646	3,320

THE BRITISH SUNDIAL SOCIETY
(CHARITABLE INCORPORATED ORGANISATION)

NOTES TO THE FINANCIAL STATEMENTS (continued)
FOR THE YEAR ENDED 31ST DECEMBER 2017

5. EVENTS

	Balance 31-Dec-16 £	Income £	Expenditure £	Balance 31-Dec-17 £
Liverpool Conference (2016)	2,727	0	13	2,714
Oxford Conference (2017)	0	18,527	15,884	2,643
		18,527	15,897	

6. RESTRICTED FUNDS

	Balance 31-Dec-16 £	Income £	Expenditure £	Balance 31-Dec-17 £
Andrew Somerville Memorial Fund	6,834	0	411	6,423
St Katherine Cree Restoration Fund	1,148	0	0	1,148
	7,982	0	411	7,571

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-17 £	Total 31-Dec-16 £
Current Account	19,392		19,392	21,125
Charities Office Investment Fund	49,089	7,571	56,660	56,529
	68,481	7,571	76,052	77,654

8. DEBTORS AND PREPAYMENTS

	Unrestricted Funds £	Restricted Funds £	Total 31-Dec-17 £	Total 31-Dec-16 £
Bath Conference (2019)	3,578		3,578	0
	3,578	0	3,578	0

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

	Unrestricted Funds £	Restricted Funds £	Total 31-Dec-17 £	Total 31-Dec-16 £
Independent Examiners Fees	614		614	555
Fee for HMRC Submission	270		270	0
Norwich Conference (2018)	6,424		6,424	6,969
	7,308	0	7,308	7,524

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 2017

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

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



www.sundialsoc.org.uk