

The British Sundial Society

BULLETIN



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GUIDELINES FOR CONTRIBUTORS

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 the text should not usually exceed 4500 words.

1. **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 via WeTransfer.com
2. **Figures:** Pictures should be sent as separate jpg or tiff files – do not embed them in Word files or in the body of the email. For email attachments, do not exceed 15 Mbytes per message. Alternatively, WeTransfer may be used for sending large numbers of files. 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.
3. **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.
4. **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.
5. **References:** Sources are referred to in the text by a superscript number. They are listed in numerical order under the heading ‘References’ (or ‘References and Notes’) at the end of the article. The *Bulletin*’s convention is as follows:

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)..

6. **Acknowledgements:** These should be as brief as is compatible with courtesy.
7. **Address:** The email address of the author should normally be given, right-aligned and in italics, at the end of the article unless the author, when submitting the article, expresses a wish that this should not be done. Authors may, if they wish, supply a very short biography and photograph (see previous editions of the *Bulletin* for examples).
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Front cover: *An exquisite dial near Perth decorated with thistles, gilding and coloured polished pebbles. The gnomon is pierced “1837 VR 1897” to commemorate Queen Victoria’s diamond jubilee. SRN 7965. Photo by Dennis Cowan.*

Back cover: *A complex multiple dial on the Firth of Clyde, created by Robert Weir in 1795. Many faces bear a single letter, suggesting that it may have been accompanied by a handbook. SRN 1497. Photo by Christine Northeast...*

BULLETIN

OF THE BRITISH SUNDIAL SOCIETY

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EDITORIAL

This issue of the *Bulletin* has again been assembled by your Chairman, Christine Northeast and Bill Visick. We are grateful to John Davis for his most helpful comments and advice especially when a new article arrives.

This issue is back to normal length and we have a handful of articles that are being held over until June. I am most grateful to all those who have contributed. Please keep them coming! On the inside front cover opposite, we have some slightly updated Guidelines for Contributors. It would be most helpful if these could be followed.

With this issue, you should find a copy of the Solar Data Card which is normally sent with the December *Bulletin*. We apologise for overlooking this last time.

On pages 26 and 27 you will notice a somewhat unusual version of the Society’s accounts. These are the final accounts of the ‘old’ Society and run to 8 August 2014. The first accounts of the ‘new’ Society run from 9 August to the year end and are still with Independent Examiners Ltd.

ERRATUM

In the article ‘The Slate Dials of Brittany’ (*BSS Bulletin*, 26(iv) December 2014), by Mike Cowham, the reference

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

Jean-Paul Cornec & Pierre Labat-Ségalen: *Cadrams Solaires de Bretagne*. Skol Vreizh (2010).

A MEDIEVAL SUNDIAL FROM LINDOS ON THE ISLAND OF RHODES

KARLHEINZ SCHALDACH

While undertaking research into Graeco-Roman sundials in Greece, I came across a medieval sundial that seems worth describing both because earlier accounts of it are unsatisfactory and because it is inaccessible to the public.

The Dial

The sundial (Fig. 1) lies in the apothiki (store-room) of the acropolis of Lindos on the Island of Rhodes. It is carved from a block of fine-grained white marble which is not

naturally occurring in Rhodes, though we do have white marble at Lindos from the Hellenistic and Roman times so it was probably reused stone. In the centre, there is a circular dial. Together, the sunrise and sunset time lines form the horizontal diameter of the enclosing circle. In the upper half of the circle, there is a vertical line (which corresponds to midnight) and on the right of this line there is a barely-readable Omega; the accompanying Alpha on the left is missing. In the centre of the circle, the remains of the gnomon are visible. In the lower half of the circle, three time lines divide the daylight period into four parts. The circle is surrounded by 12 'teeth'; the four at the extremities of the horizontal and vertical lines on the dial are angular and the others are rounded. The teeth are enclosed by an outer circle which, in turn, is within a square. Only the upper part of the square is well preserved and within the two upper corners there are leaf ornaments. The top part of the front of the stone as a whole has a smooth surface but the rest of the front is damaged. Part of the west

side is also smooth (Fig. 2) which could mean that this was a canted dial with the west side more exposed. The complete piece is 46 cm high, 29 cm wide and 21 cm thick.

The Site where it was Found and its History

The acropolis of Lindos (Fig. 3) is worth visiting because of its spectacular location 100 m above the sea. It is also famous as a background for wedding photographs: 1000 British couples every year get married in front of St Paul's Chapel which is built at the foot of the acropolis on a spot where it is believed St Paul once visited on his journey to Rome.



Fig. 1. Front view of the dial.



Fig. 2. Smooth west face.



Fig. 3. The acropolis above the village of Lindos.

The site itself has a long history. It became famous in antiquity for the temple of Athena Lindia which was erected around 300 BC after a pre-temple was burned down. In the 12th/13th century, the church of Ayios Ioannis (Fig. 4) was



Fig. 4. The east front of Ayios Ioannis.

built alongside the temple, possibly on the site of an early Christian basilica of the 6th century. However, most of the columns and walls of Ayios Ioannis no longer exist as they were dismantled in the course of archaeological excavations in order to remove ancient stones built into the fabric.

The impressive fortifications, which follow the natural contours of the cliff, are the work of the Knights of the Hospitaller Order of St John of Jerusalem who captured the castle in October 1307. The headquarters of the commander were in the building at the top of today's stepped ascent which was probably built by Grand Master Foulques de Villaret who sought refuge in the citadel in 1317 after an internal dispute in the Order. The headquarters communicated with the church of Ayios Ioannis via a door in the wall of the narthex which suggests that the church was used for divine services by the Hospitaller. The Hospitaller fortress is built on the foundations of older Byzantine walls and was completed in the 15th century when Antoine de Fluvian (in 1421–37) and Pierre d'Aubusson (in 1476–1503) were Grand Masters.

With the capitulation of Rhodes in 1522, the Knights left Lindos and the fortress was occupied by a small Ottoman garrison that remained until 1844. In that period Ayios Ioannis was converted into a Muslim mosque.

A Short Survey of Sundials with Four Divisions

The earliest example of a sundial with five time lines seems to be that at Kilmalkedar in Ireland (Fig. 5); other early examples in Ireland are the dials at Inishcaltra, Kilcummin,

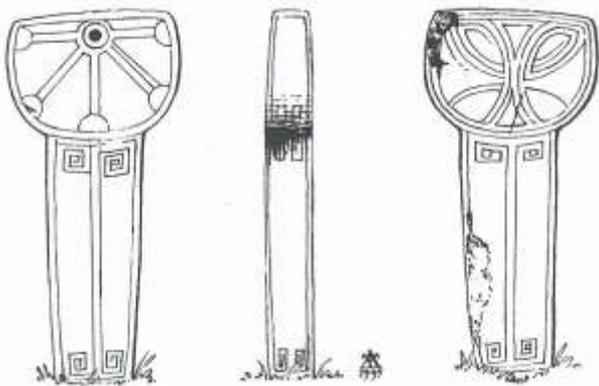


Fig. 5. Dial at Kilmalkedar (drawing by M. Arnaldi).

Monasterboice and Clogher.¹ Their exact dates are uncertain but they were probably constructed between the 7th and the 10th centuries.² The five lines indicate the times of the Christian Offices of Prime, Terce, Sext, None and Vespers.³ The gnomon would have been horizontal so the lines for Prime and Vespers are also horizontal since these Offices were at sunrise and sunset. It is worth noting that all early Irish dials are half-circles in form and are found atop a free-standing stone; no early Irish dial has been found in a wall and none have a full circle.

The earliest sundials with five time lines within a full circle are found in English churches. Examples include the dial at Warnford, Hampshire (Fig. 6), “the whole being carved on a square stone, the corners of which are decorated with an ornament resembling a fleur-de-lis”,⁴ which probably dates from the 12th century. The dial at Corhampton

(Hampshire) and the dial at Barnack (Northamptonshire), both with similar workmanship, date from the 11th century.⁵ Although similar dials exist in France, Germany, Italy and Spain, it is the English examples that have the strongest similarity to the Lindos dial. Too much should not be made of this point; we have to assume that the fine local workmanship was not copied from any particular example, but was based on various examples, especially from France where most of them were made.⁶ I am thereby suggesting a Frankish influence.

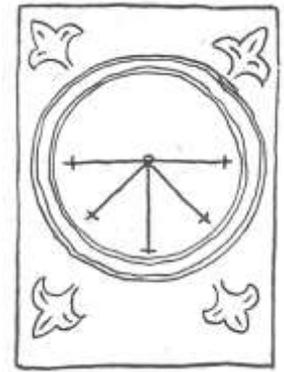


Fig. 6. Dial at Warnford (drawing by A.R. Green).

The Lindos Dial: Previous Accounts

Karl Frederik Kinch (1853–1921), the leader of the Danish Archaeological Mission from 1902 to 1905 which conducted excavations on the Acropolis, made some notes on the dial accompanied by a drawing by his wife Helvig Kinch (1872–1956) which shows the dial upside down (Fig. 7).

Ejnar Dyggve (1887–1961), in his study on Lindos published in 1960, writes that he was not able to find the sundial and therefore provides no photograph, only a hint of its existence as well as the Helvig Kinch drawing.⁷ His description shows that he was not familiar with this type of dial; he confuses Graeco-Roman and medieval dials by asserting that division into four or eight parts was more common than division into 12 parts. As an example he cites the dial at the Thrasyllus monument in Athens which is dated to the 2nd century BC and is divided into 12 parts. The reality is that no dials divided into four parts are known from Greek or Roman antiquity or even from Byzantine or Ottoman times, but solely from Latin Europe.⁸



Fig. 7. Drawing of the Lindos dial by Helvig Kinch.

Date and Location of the Dial

The Lindos dial was probably made in the 14th century under the Provençal Foulques de Villaret, but a later date from the 15th century until the regime of Pierre d'Aubusson is also possible. The history of such dials, however, makes the 14th century more likely.

As the dials in those centuries were exclusively made for the houses of God and no other church is known at the acropolis from that time, it must have been made for Ayios Ioannis which was connected to the headquarters building of the commander. Also the name of the patron saint of the church, St John the Baptist, hints at the Knights. Accordingly, we have a Byzantine church that was used by, and probably in parts remodelled by, the Hospitallers.

The dial should be direct south-facing ideally but the most suitable wall of Ayios Ioannis does not face due south, so the dial would have had to be canted at an angle of about 20° to the wall. In consequence, the west side of the dial would have had to protrude somewhat and this accords with the appearance of the stone (Fig. 2).

Other Examples of Frankish Time-measuring Instruments

In the middle ages, the term Frank was used in the East as a synonym for western European. Such western Europeans were Crusaders and also noblemen, and their families ruled in Greece and in Cyprus in the shadow of the Hospitallers. In Greece, between 1204 and 1430, the Franks lived predominantly in the Peloponnese.⁹ In Cyprus, a branch of the Lusignan family controlled the kingdom there from the end of the 12th century until 1489.

In my study of the Byzantine dials of Greece, I drew attention to the fact that some churches with Byzantine dials show Frankish influence.¹⁰ That influence, however, did not generally extend to the sundials: for example the dials at Agia Triada and at Moni Vlachernon look similar to other known Byzantine dials, i.e. they have 13 lines delimiting 12 sectors of one hour each.

But, as with the Lindos dial on Rhodes, this is not the case with the only medieval sundial on Cyprus because its appearance is also western European. It is on the church of Santa Sophia in Nicosia (Fig. 8) which is the most impressive building by the Lusignans. The main construction of the church certainly dates from the archbishopric of Eustorgue of Montaigu (1217–50). The archbishop also added a chapel, opening from the second bay on the south side. It was later dedicated to St Thomas Aquinas because



Fig. 8. Sundial on the Selimiye Mosque, the former Santa Sophia Church.

of his *De Regno ad regem Cypru* which was probably written for Hugh II, King of Cyprus (1253–67).¹¹

Above the former chapel of St Thomas Aquinas, high up on one of the buttresses, a figure holds the dial in the form of a disc. The half circle below the gnomon is divided into six parts. The small holes that are to be seen on the disc are made by gunshots.

There is an unusual representation of a timepiece in the town of Rhodes. It is made of blue-greyish Rhodian marble and measures 72 cm × 52 cm and is probably the earliest known relief of a sand-clock (Fig. 9). It is now once again on the building where it was originally, namely on the Hospital of the Knights of the Order of St John. It bears the Latin inscription *PALITHARO* which, in the original Greek, is *πάλι θαρρῶ* and means “Again I summon up my courage” or, more colloquially, “I am always ready”. It can be understood as a motto which applies both to the sand-clock and to the Knights.



Fig. 9. Sand-clock from Rhodes.

The same motto can be found in a picture of St John the Baptist in the church of Sainte-Anne (once the cathedral) in Apt (Vaucluse).¹² There it is written in Greek letters beside the Royal arms of France with eight fleurs-de-lis. The picture was given to the church by Jacques, bâtard de Bourbon (1466–1537, buried in Paris in the church of Sainte-Marie Madeleine du Temple), who was Chevalier of the Knights of the Order of St John. He wrote the history of the siege of Rhodes¹³ where he was until the Knights had to leave the island in 1522. We may assume that he learnt of the motto when he was in Rhodes and that it was his idea to incorporate it in the picture. The sand-clock relief was probably not made much before the time that Jacques lived in Rhodes and can therefore be dated to the beginning of the 16th century.

Footnote: Did the Polar-oriented Style find its Way from the Arabs to Europe via the Crusaders?

René Rohr writes, “after the Crusades, sundials, with their styles directed towards the pole, i.e., parallel to the axis of the world, suddenly appeared over most of Europe. It is wholly probable that the contacts of the Crusaders with the Arabs accounted for this unheralded appearance.”¹⁴

The examples given above suggest that such speculative considerations must be rejected. The Crusaders’ sundials

show no Islamic influences but preserve the habitual Frankish customs and ideas.

Anthony Turner has provided a conclusive explanation noting that dials in Islam seem to have served mainly as religious objects: “Their place was in mosques and in the hand of *muwaqqits*.” In consequence, sundials were absent from the civic parts of Islamic towns and “remained in the province of the sacred, the preserve of the learned.”¹⁵

That means that if there was an Islamic influence, which cannot be excluded completely, then it might have been by a scholarly exchange that went on in parallel and was not advanced by the official politics of the Crusaders whose attitudes seem to have been more backward and conservative than open to new ideas.

ACKNOWLEDGEMENTS

My thanks are due to the 22th Ephorate of Prehistoric and Classical Antiquities in Rhodes and to Mrs Kaninia for permission to publish the dial, to Mrs Kasdagli (Rhodes) for pointing me to the article by Mrs Kefala and to Carl Ehrig-Eggert (Frankfurt a. M.) for their advice and comments. I am grateful to Mario Arnaldi (Ravenna) who generously gave me permission to use his drawing, to Denis Schneider for valuable hints and to Frank King for refining my English.

REFERENCES and NOTES

1. M. Arnaldi: *The Sundials of Ireland*, London (2004).
2. For example A. Turner: ‘A use for the Sun in the Early Middle Ages’, *Micrologus*, 12, 27–42 (2004), footnote 39.
3. There was a shifting of the prayer times in later centuries which should not concern us here.
4. A.R. Green: ‘Anglo-Saxon sundials’, *The Antiquaries Journal*, 8.4, 489–516 (1928), p. 497.

5. David Scott, who wrote an excellent study of Anglo-Saxon examples, assigned both dials to the eighth century, see D. Scott: ‘Sundials in Anglo-Saxon England: Part 2, The Early Period – Escomb and Corhampton’, *BSS Bulletin*, 11, 83–87 (1999). I have doubts about this assumption, which considers only the English situation and overlooks the history of dials in other parts of Europe which suggests that the incorporation of dials into walls made its way from east to west and did not arrive in western Europe before the 10th century. Only the combination of a dial with a four-part division and being in a wall seems to be an English invention.
6. Most dials where the lower semi-circle has four divisions were probably found in France. Denis Schneider counted 187 examples on French churches from the 11th until the 14th century, see Ref. 1, p. 250.
7. Fig. VII, 26 on page 344 in E. Dyggve: *Lindos III*, 2, Berlin (1960).
8. To be exact, one should say that a Roman dial found at Bettwiller (Alsace) shows division into four parts, but – as with every Roman dial – also into 12 parts.
9. H.F. Tozer: ‘The Franks in the Peloponnese’, *Journal of Hellenic Studies*, 4, 165–236 (1883).
10. In my book *Die antiken Sonnenuhren Griechenlands I*, 41–52, Frankfurt am Main (2005).
11. J.-P. Torrell: *Saint Thomas Aquinas: the person and his work I*, Washington D.C. (2006), p. 169ff.
12. K. Kefala: ‘L’icône de saint Jean le Précurseur du chevalier Jacques de Bourbon à la cathédrale d’Apt’, *Cahiers archéologiques. Fin de l’antiquité et moyen-âge*, 53, 143–157 (2009).
13. Jacques de Bourbon: *L’oppugnation de la noble et chevaleureuse cité de Rhodes*, Paris (1525).
14. R.R. Rohr: *Sundials*, New York (1996), p. 16.
15. Ref. 2, p. 36.

For a portrait and CV of the author, see *Bulletin* 25(iii), September 2013. He can be contacted at karlheinz_schaldach@t-online.de



NEW DIAL

The Neuadd dial 2014

A friend in Wales wanted a dial to celebrate her husband’s 80th birthday. The site is the wall of a modern building facing nearly south. There is nothing symmetrical about the wall and I decided it needed an elliptical dial with the long axis pointing towards the roof apex. It was made of grey Burlington slate by Fergus Wessel (www.stoneletters.com).

Most vertical dials have a support for their gnomon and I wanted to avoid this. So I devised a solid gold-plated gnomon of phosphor bronze with a width of 8 mm flaring outwards near the base so as to fit one of the 24 kite shapes in the elliptical sun symbol from whose centre the top edge of the gnomon emerges. As with a pedestal dial the western edge of the gnomon gives readings until the sun moves over and the eastern edge is used. The tip of the gnomon strikes noon on the husband’s birthday.

Mark Lennox-Boyd marklennoxboyd@mac.com

A MYSTERY SUNDIAL BY GIRARD ET BARRÈRE OF PARIS

MARTIN JENKINS



Fig. 1. Complete dial set to tell the time and date.

At the 2014 Greenwich Conference, I gave a presentation about a small dial which I had purchased from Rogers Turner Books at the 2013 Newbury meeting. This supposedly simple little dial had turned out to be something of a mystery, as searches had revealed very little about its history or manufacture. What made the provenance even more intriguing was that it was manufactured, in the main, to a standard and design which indicated a significant production run and yet investigations failed to uncover more than a couple extant in France.

The Dial

As can be seen in Fig. 1, the main components of the dial are manufactured from aluminium alloy. The dial is 190 mm in overall height, the hour disc being 150 mm in diameter. The dial consists primarily of two intersecting discs, the hour disc and the latitude disc, the latter allowing the location latitude to be set. This arrangement makes it of the equatorial universal dial type. The gnomon plate is graduated such that the month of the year can be determined but the wide nature of the gnomon does introduce a limitation to the dial's use as a comprehensive time-indicating device.¹

The base of the dial is equipped with a small compass to allow the dial to be set for south if the local magnetic variation is known. Of course this needs a regular update as magnetic variation isogonals are constantly changing. (Incidentally, a good source of up-to-date magnetic variation values are given on aviation charts which are updated every year for the purpose of accurate flight navigation.)

The dial can be levelled by use of four adjustable feet and an inbuilt orbital spirit level. The use of four feet is rather an odd feature as levelling and stability are best achieved by the use of three feet; this feature suggests to me that the designer of the dial was not very familiar with kinematics. Apart from the magnetic variation adjustment guide lines, which are machined into the base, and 'made in France' in English stamped into the base end, all other dial furniture is lithographic printed onto the aluminium alloy, the alloy itself having been anodized. At the centre of the latitude plate each side carries a device in the centre. One side has the Girard et Barrère logo, the other side the name of the designer T.H. DE LANGE and CADRAN SOLAIRE UNIVERSEL (Fig. 2). All of these features tend to indicate that the dial had been part of a significant batch production necessary to have justified the tooling and production costs, so why are the dials not more commonly found?

The dial came 'flat packed' for self-assembly with an additional single sheet of typed instructions in French and English, in a box which seems to be 'inside out' (Fig. 3).

The use of anodized aluminium alloy in its construction suggested to me initially that manufacture was probably in the 1950s.



Fig. 2. The device of T.H de Lange (left) and of Girard et Barrère (right).



Fig. 3. The box interior illustrating the dial when assembled and brief operational instructions.

The Investigation

As the dial displayed mass-production characteristics, I thought that uncovering some information about it would be easy! Type ‘Girard et Barrère’ into the Internet and all would be revealed. Not so. What I wanted to know was who were Girard et Barrère, who was T.H. de Lange, when was it made, who made it, where was it made, and how many were made? The Internet search did reveal that Girard et Barrère no longer existed but had been a publishing house at 17 Rue de Buci and at 17 Rue de l’Ancienne-Comédie, Paris. The company had been listed as globe



Fig. 4. Advertisement for Forest Globes in conjunction with Girard et Barrère.

suppliers and cartographers. The geographical publishing firm Girard et Barrère had obtained the globe manufacture from J. Forest sometime in the early 20th century (some sources say around the Second World War), and during the mid-20th century the firm had produced globes and geographical publications as Girard, Barrère & Thomas (this may have been a merger or partnership with the Paris globe maker G. Thomas) (see Fig. 4).

So I was a little further along the way with uncovering the origins of the dial but clearly needed help. My first contact was Fred Sawyer. Fred found similarity between the dial and the Pardie’s universal dial illustrated in the *Britannica* 1st edition but could not help with information regarding Girard et Barrère, or with the origins of the dial. However, BSS member Mike Faraday located information about a wooden Polish dial dating from 1937 which is in the Przyrkowski Museum in Jedrzejow, Poland. It was designed by Feliks Przyrkowski (1872–1951) and is based on the same principle as the mystery Girard and Barrère dial (Fig. 5).



Fig. 5. Felix Przyrkowski (1872–1951) dial dating from 1937, Przyrkowski Museum, Jedrzejowie, Poland. Photo: Mike Faraday.

In February 2014, French BSS member Alain Ferreira very kindly searched through issues of the *Bulletin de la Société astronomique de France* from 1910 to 1934 and from 1948 to 1951 without any luck. There was nothing about anyone with the name T.H. de Lange, or even just Lange. There was some information about a Joseph Barrère, a lawyer in Bordeaux and a member of the SAF (Société astronomique de France) from 1900, who presented a paper to the society on 3rd May 1922 entitled ‘The visibility with the naked eye of the crescent Venus’. In addition, an André Gerard from Paris, also a member of the SAF, presented a paper to the society on 8th November 1922 entitled ‘Observation of the planet Mars’. However, given the different spelling of André Gerard’s surname and M. Joseph Barrère living in Bordeaux it was very unlikely that they were the Girard and Barrère of Paris.

Anthony Turner of Rogers Turner Books, who lives in Paris, kindly offered to try to find information on the company of Girard et Barrère, and, if possible, on T.H. de Lange. On 11th February 2014 he wrote:

"E. Girard was a cartographer who worked for many years with the globe publisher J. Forest in Paris and with E. Boitte (1870–1918) in Brussels. In 1934 he entered into a globe-making partnership with Barrère and it was they who succeeded to the business of Forest, not the other way round. They also absorbed the globe and map-making business of Andriève Goujon. In 1946 the firm became Girard, Barrère & Thomas. This means that your dial is perhaps a few years earlier – late 1930s / mid-1940s.

"I know nothing about T.H. de Lange who from his name could have been French, but could equally have been Dutch, Belgian or Swiss. Since he patented the dial it should be possible to trace him in one of those countries' patent offices – even in England perhaps if he took out a parallel patent there as many French and other European inventors did. 45° is quite far south. Bordeaux is slightly below it, Grenoble slightly to the north but there is no major town really on it – at least in France – so perhaps the latitude is not to be taken too literally – rather indicating a region for use, not a precise locality."

Anthony Turner mentions the angle of 45° because that is what is stated on the illustration inside the box. But of course the dial is adjustable for latitude anyway, so why mention 45° in the illustration?

Paul Gagnaire, one of Alain Ferreira's contacts, then located the publication *Lire Correctement le Cadran Solaire* by C. Moureau (Carl Alexandre Moureau)² in which on page 23 it mentions a 'cadran solaire universel' (brevet de Lange) in some detail. Unfortunately there is no illustration of the dial but clearly from the description, and dimensions given, it is a dial exactly like mine. The booklet was edited by La Maison du Cadran Solaire in Carcassonne.

I subsequently forwarded a copy of the booklet to Anthony Turner for his comments. His response was:

"The reference on p. 23 of the pamphlet of which you kindly sent a copy is surely definitely to your dial. The description seems to correspond and it says 'Brevet de Lange' at the top of the page. It's a pity there is no illustration, but do the measurements that he gives correspond with yours?"

"It would be worth following up on the Maison du Cadran Solaire who apparently sold it.

"Since it says that the dial was made only in a small quantity you can assume yours to be rare – especially in its original box."

He followed up with:

"Further to my last, I've just registered that the Maison du Cadran Solaire was at Carcassonne. This town is at Latitude 43° 12', and so helps support my suggestion that the dial was intended to serve a region, rather than a specific place."

Alain Ferreira then responded on 22nd February 2014 with the news that the Maison du Cadran Solaire in Carcassonne no longer existed! Quite clearly the dial had some connection with the Maison du Cadran Solaire but other than that we were still no wiser. Another contact of Alain's, Frédéric Rousseau, had also noted that the decoration detail of the hour plate differed between the illustration in the box and the actual dial but like the rest of us could find no information relating to the dial (Fig. 6).

So at this point in the research I knew a little about the business of Girard & Barrère and some of the company history but nothing about the sundial connection. There was still no information on T.H. de Lange, the designer. There was still no information on the date of manufacture, the manufacturer, the mismatch in the illustrated and actual design, or the connection with Carcassonne. I did know that Maison du Cadran Solaire no longer existed.

So, where to next?

Frans Maes, a BSS member from the Netherlands, had mentioned at the end of my presentation at the Greenwich Conference that T.H. de Lange was just a surname, actually 'ten Houte de Lange', and that he knew of a booklet about a sundial by a W.G. ten Houte de Lange. A further search brought to light a book by W.G. ten Houte de Lange on how to make a sundial but it was not the one that Frans had mentioned at the conference.³ The one he had mentioned was about a sundial on a ship. The book was entitled *The Sundial on Board the Motor Vessel 'Oranje' of the Steam Liner Company Nederland designed by W.G. ten Houte de Lange*, published in 1939.⁴ Unfortunately, neither of us could locate a copy in any antiquarian booksellers.

However, Frans located a copy of the book in the Maritime Museum in Amsterdam, and his brother Joop kindly obtained a photocopy of it for us. The book is of course written in Dutch so Frans kindly provided a précis of the contents. Apparently the

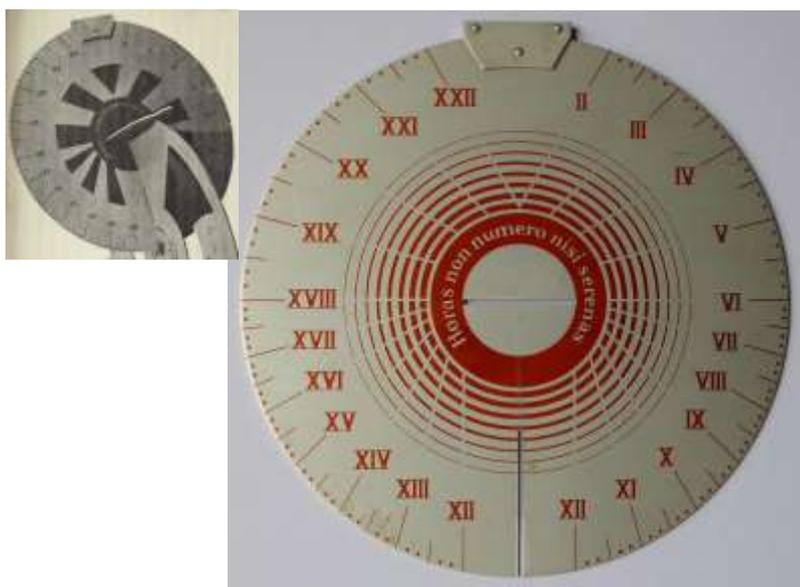


Fig. 6. Hour plates, variation in furniture design between original and extant version of the dial.

author is not explicitly named on the title page, but from the text on page 3 it is clear that W.G. himself is the author. On page 5 of the book, Fig. 2 is the same image exactly as that used in the box lid of my dial, complete with the hour dial design being at variance with the actual dial. On page 6 of the book it refers to the dial being presently sold (1939) by Girard et Barrère in Paris! The book then deals with the development of the dial into the universal navigating instrument used on the ship *Oranje*. As a matter of interest the *Oranje* was baptized by Queen Wilhelmina and launched on 8th September 1938. She was the world's fastest passenger liner at the time. The ship left for the Dutch East Indies on 4th September 1939. On her arrival the Second World War had started so the ship was diverted to Australia to be converted into a hospital ship for the Allies. This maiden trip may have been the last for the sundial. The ship resumed her initial role in 1947, later being converted into a cruise ship again. In 1964 the ship was sold to an Italian company and was renamed the *Angelina Lauro*. In 1979 a fire during a cruise in the Caribbean caused her to become a total loss. While being towed to Taiwan for dismantling she sank in the Pacific. Is the sundial still on board?

Note that in Fig. 3 the image carries the notation 'Brevet T.H. de Lange'. Frans searched the digital patent records for the Netherlands and Europe but could find no patent attributable to T.H. de Lange. But Frans has unearthed more information about W.G. ten Houte de Lange. Willem Geldolph ten Houte de Lange lived from 8th March 1885 to 13th October 1967. He was an electrical engineer and worked in the Dutch East Indies (now Indonesia) from about 1914. He constructed aerial (cable) tramways for the transportation of colonial wares on mountainous plantations. He returned to the Netherlands in 1926. He was deputy director of the Sijthoff Planetarium in The Hague from its beginning in 1934. At that time the director was Jean Jaques Raimond, a Dutch astronomer. In December 1935 W.G. ten Houte de Lange gave a talk on '*Sundials and their construction*' to the Dutch Society for Meteorology and Astronomy (NVWS), and in the 1938/9 season he gave a talk about '*Sundials on board ships*' to the Hague chapter of the society. Frans has uncovered other aspects of W.G. ten Houte de Lange's activities and continues with the research into his quite extensive career.

Summary

Well, I now knew more about W.G. ten Houte de Lange and I knew that the dial could be purchased in 1939 from Girard et Barrère. But it still left the question, was my dial really made in 1939 or possibly later? The 'watermark' image on the cover of the booklet *Lire Correctement le Cadran Solaire* by C. Moureau, which contains the description of the mystery dial, is of the Carcassonne dial delineated by René R.J. Rohr (1905–2000) in 1961. That then dates the availability of the mystery dial as being also probably post 1960! The final edition of *Lire Correctement*

le Cadran Solaire by C. Moureau was published in 1966. I also knew that the hour plate decoration shown in the box image and in the image in the book by W.G. ten Houte de Lange are the same but are at variance with that of the actual dial. Maybe there were two production periods for the dial, one pre-1940 and one post-1960. Given that the book by W.G. ten Houte de Lange was published in 1939, in which he states that the dial is available from Girard et Barrère, it is possible that the onset of the Second World War put an end to production, if it had ever even started.

Maybe C. Moureau who started the Maison du Cadran Solaire in Carcassonne, and whom incidentally René Rohr knew,⁵ was looking for a new product to sell in the 1960s. Maybe Girard et Barrère and C. Moureau jointly decided to resurrect the 1939 product but change the design decoration to update the aesthetics. W.G. ten Houte de Lange died in 1967 and probably still owned the original design copyright. If such was the case, then my dial could be post-1967, which seems more likely given the manufacturing methods used.

However, all this still leaves several unanswered questions. Was Girard et Barrère still looking for a complementary product to its map and globes business given that it supplied globes and maps to French schools? Who manufactured the dials for the company, for Girard et Barrère weren't manufacturers as far as I know? How did the connection with C. Moureau come about? How many were made and why are they not more common if they were a commercial product? Was 1966 the end of collaboration between Girard et Barrère, W.G. ten Houte de Lange, and C. Moureau to resurrect the dial? Did W.G. ten Houte de Lange's death in 1967 cause the project to come to an end? Is mine a rarity?

Conclusion

I'm tempted to think that my dial is a rarity. Remember, the illustration is 'inside' the box lid and the instructions are somewhat crudely typed on a piece of paper. The illustration is taken from W.G. ten Houte de Lange's book of 1939 but the actual hour disc has a different pattern to the illustrated one. There is no illustration of it in C. Moureau's booklet² which suggests to me that the design had not yet been finalised for the printed matter. There is also a bit of a mish-mash in the manufacturing methods adopted as indicated by some of the furniture aspects being lithograph printed while others are machined. The dial base is also crudely stamped with 'made in France' in English on one end, possibly indicating a wider market than just France being considered. Putting all of the available information and manufacturing anomalies together suggests to me that it is one of a pre-production prototype run used for market evaluation, thus explaining its apparent scarcity and the lack of information about it. How though did it come to be in England? I'll probably never know. If you can add to the mystery I would be very pleased to receive the information.

ACKNOWLEDGEMENTS

I would like to thank the following for their assistance with the research: Elspeth Hill; Fred Sawyer; Alain Ferreira; Mike Faraday; Anthony Turner; Frédéric Rousseau; Paul Gagnaire; Philippe Sauvageot. In particular, I am indebted to Frans Maes for his continuing assistance and commitment to the research related to this interesting dial.

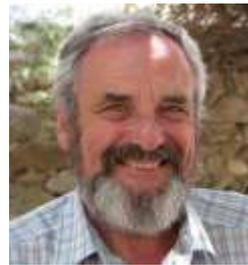
REFERENCES and NOTES

1. An interesting observation on the sundial is from Mr M.J. Hagen, one of the founding fathers of the Dutch Sundial Society and long-time editor of the Society's Bulletin. In his article, 'The sundials of W.G. ten Houte de Lange', *Bulletin of the Dutch Sundial Society* **10** (October 1981), pp. 498–499, he describes the first dial of W.G. ten Houte de Lange. He notes that due to its equatorial nature, it has an equiangular hour scale. By rotating it, this would enable the incorporation of longitude correction, summertime, and EoT into the reading. In this case, however, there are in fact two pole styles, the edges of the rather wide upright strip [i.e. the gnomon]. The eastern edge serves as style from 4 to 6 am (solar time), the western edge from 6 am to noon, the eastern again from noon to 6 pm and finally the western edge from 6 to 8 pm. The centres for

the hour lines are eccentric with respect to the dial plate, which prevents any correction by rotation.

2. C. Moureau: *Lire Correctement Le Cadran Solaire*, La Maison du Cadran Solaire, Carcassonne, France, 23 (1962).
3. W.G. ten Houte de Lange: *Maak zelf een Zonnewijzer*, Van Soest (1936).
4. W.G. ten Houte de Lange: *De zonnewijzer aan boord het motorschip 'Oranje' van de stoomvaart maatschappij 'Nederland'*, Drukkerij-Uitgeverij 'de Hofstad', 's-Gravenhage, 3–6 (1939).
5. R.R.J. Rohr: *Sundials, History, Theory, and Practice*, Dover, New York, viii (1996).

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and a member of NASS (North American Sundial Society) since its founding days in 1994. His interest in sundials started in 1980 with the chance purchase of *The Great Sundial Cut-out Book* by Robert Adzema and Mableen Jones while browsing in an upstate New York bookshop. He can be contacted at sundialduo@gmail.com.

SUNDIALS IN MADEIRA

MAUREEN HARMER

During the recent BSS one-day meeting at Newbury, I mentioned to David Brown that we were going to Madeira in the near future, and he was keen for me to make a visit to Escola da Apel where his recently designed horizontal dial had been installed. Contact was duly made to Professor Goncalo Faria, the Physics and Chemistry teacher at the school, who was delighted for us to go along and inspect the dial (Fig. 1). We were made very welcome and accordingly shown the



Fig. 1. Dial at Escola da Apel.

sundial, which was situated at the end of the school car park near to the sports facility. The dial was set on a concrete block with an explanatory plaque in Portuguese set on the front. The horizontal dial, which is beautifully engraved on slate and bears the red cross of the Madeira flag, looked stunning and Mr Faria was truly proud of the school's latest acquisition. We were then given a guided tour of the Catholic School of Apel (Promotion Association of Free Education) founded in July 1978 and which currently has partnerships with the Universities of Madeira and Lisbon. There were many works of art around the grounds, including busts of famous people, including Einstein, Winston Churchill and HM Queen Elizabeth II.

Mr Faria then kindly transported us back down to the centre of Funchal, having advised us of three other dials to visit. We were dropped off at Largo da Cruz Vermelha (Red Cross Square) where there were two dials of rather poor design, both set on rather unattractive blocks of concrete and situated in the middle of a busy roundabout, making the dials somewhat inaccessible to those less determined (Figs 2 and 3). One dial was installed in the year 2000 and it is suggested that the other dial was put there at the same time, but the maker is unknown, and one might question why two are on the same small area of grass.



Fig. 4. Dial at Liceu de Jaime Moniz by W. Page & Co. London.

Jaime Moniz, a political and intellectual educationalist, who was born in Funchal in 1837. Within the entrance area of the school was a horizontal dial (Fig. 4) bearing a square bronze plate with an inscription ‘W. Page & Co. / GT. PORTLAND ST. / LONDON W’ and the motto ‘I AM A SHADOW. SO ART THOU. I MARK TIME. DOST THOU?’

Along the promenade in the town centre is an analemmatic dial 10 metres in diameter set in decorative paving stones, which are a local feature. The hours are marked out evenly around to 24 (Fig. 5). Last year this dial was obscured by various vehicles and kiosks but now that the promenade has been redesigned, the dial is a feature in its own right.

Near to our hotel, which is a 20-minute walk away from Funchal, is the Promenade Da Orla Maritima where there is a direct south vertical dial measuring approximately 1.5m × 2.75 m made of painted metal with a rather rusty gnomon at the top. The hour numerals and hour lines are symmetrical, and the noon line has dots to indicate the divisions of the



Figs 2 and 3. Dials in Red Cross Square.

We were then caught in a torrential downpour so decided to dodge through the covered fish market, trying not to make eye contact with the more menacing specimens from the nearby Atlantic Ocean, lying on the marble slabs. The sun came out at Liceu de Jaime Moniz, a secondary school in the old part of Funchal, which was named in 1919 after

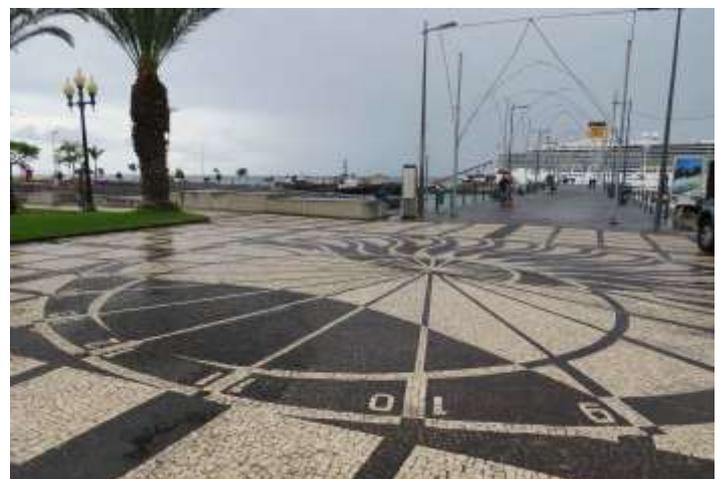


Fig. 5. Analemmatic dial on the seafront of Funchal.



Fig. 8. Sunshine Recorder in the Botanical Gardens.

Fig. 6. Promenade Da Orla Maritima dial by Sampaio E Mello.

Fig. 7. Dial by Brookbrae in the Palheiro Gardens.



zodiac signs which are coloured in red and blue (Fig. 6). The dial is further decorated with the word Funchal and the letters F and is signed by Sampaio E Mello 2001 who is described as a Gnomonista. We often walk along this promenade; it is situated high up on the cliff-top with a wonderful view of the sea, and the dial is one of the landmarks, along with an impressive statue of Zarco who discovered the island in the early 1400s.

Another famous name is Blandy, who were wine merchants from England and subsequently became wealthy landowners in Madeira. Blandy, still a very highly regarded family selling their Madeira wine, have since diversified into the hotel and golfing industries. Their family home is set within the Palheiro Gardens which are half way up the mountainside, giving a cooler and wetter climate. Within the beautifully kept gardens, which are open to the public, is a horizontal dial set on an ornate weathered marble pedestal. When we visited it was a rainy day thick with mist, but luckily on a previous occasion I had taken photographs in the sunshine. The gardens were laid out in 1885 by John Burden Blandy but there is no record of the date on the dial, which was made by Brookbrae, London (Fig. 7). The plate has Roman numerals with a date scale and an ornate gnomon. I managed to borrow a historic book of the garden but sadly there was no picture showing the dial, but it could have been *in situ* from the beginning, or installed at a later date.

Madeira is famous for its flora and boasts a splendid botanical garden, again built on the mountainside overlooking the sea. On an earlier visit I climbed up many steep pathways and came across a metal and glass instrument (Fig. 8) which looks identical to the Campbell–Stokes sunshine

recorder at Chatsworth House, as illustrated on the back cover of the *BSS Bulletin* for September 2014. I had great fun photographing our find as the globe reflected the pink bougainvillea entwined along the fencing together with the upside-down faces of my family.

I know of no other dials on the island but maybe on future visits we will come across a previously unknown sundial to enhance our time spent there even further.

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Fig. 8. Sunshine recorder in the Botanical Gardens.

MICHAEL MALTIN

Spitfire Pilot and a Gentleman

Michael Maltin, DFC, died on the 25th of January, aged 94. Michael served as a pilot with 234 and 616 Squadrons in RAF Fighter Command, flying Spitfires, and 550 Sqn RAF Bomber Command, flying Lancasters. He flew 100 missions in the Spitfire, posted to training, and after moving to Bomber Command took part in the 1000 bomber raids over the Ruhr. After the war he joined British Overseas Airways Corporation (BOAC) and he flew the Argonaut, Comet 4 and VC10 airliners. Members would be lucky to hear of his flying career, and one of his proudest moments was to attend the unveiling of the Bomber Command Memorial in London. When learning of his destination from Paddington Station the taxi driver refused to take his fare.

Stemming from his interest in timing equipment for sports car hill climb rallies (he used to own a Porsche 911), Michael was also actively involved with the electrical horology group of a clock society. Not surprisingly, his home was fitted with accurate clocks, receivers and loop aerials for low frequency time signals. He even monitored the performance of the clock at Westminster, colloquially known as Big Ben.

Given his aviation career and an interest in navigation by means of the sun, Michael was a very early member of the Society with membership number 29. Many will remember his enthusiasm for all things sundial related, and until last year he was a regular attender at the Newbury meetings. He also attended almost all the conferences. The Newbury events were almost invariably supported with a short talk and a demonstration of his latest optical 'gadget'. Ever helpful with local clock and sundial problems, an opportunity arose to help to set up an enormous horizontal dial with a 17-foot gnomon. This featured in the *Bulletin*, as described by Tony Wood: The *Woodchester 'Unicorn' Dial*, in the June 2010 issue, 22(ii), page 41. Michael



Michael at his home a couple of years ago.

determined the meridian line for the Unicorn dial with a pair of 'retro-reflecting' mirrors in a following note: *A Simple Meridian Instrument*, on pages 42–43.

To quote – he was an archetype of Society members and will be much missed.

Doug Bateman



Michael at the 2013 Newbury meeting demonstrating one of his meridian-finding instruments.

Wrapped up for the Winter

On a warm day last October we went to Hampton Court to see the sundials in the Privy Garden, but they were both prematurely wrapped up for the winter, which was a great disappointment to say the least. Unfortunately unwrapping them was not an option as they were securely taped and tied with string leaving little scope for a peep. The dials which were wrapped up are the pair of replicas of the Thos Tompion dials - a double horizontal and an azimuth dial.

Maureen Harmer



DIAL DEALINGS 2014

MIKE COWHAM



Here is my selection of some of the dials sold in 2014. The market is still somewhat depressed but some interesting items have appeared. Prices shown generally include premiums.

Christies, South Kensington. Travel, Science and Natural History. 10 April 2014

A universal equinoctial crescent dial by Johann Martin of Augsburg, ca. 1700 (Fig. 1).

The dial's main plate is inscribed on its upper face with the latitudes of 45 cities. The semi-circular gnomon, a bit like

inverted cow's horns, when set to the correct date position throws its shadow onto the two semi-circular scales, one for morning and the other for afternoon. Its latitude arc, in the centre of the assembly, covers from about 10° to the North Pole. Such dials are quite rare and usually fetch high prices. This one is of particular interest as it retains its original gilt-tooled leather case (Fig. 2). Notice also the attractive carving between the two hour arcs. On its underside is a perpetual calendar, not illustrated but this was probably similar to that on another crescent dial of his (Fig. 3).



Fig. 1. Crescent dial by Johann Martin, Augsburg.



Fig. 3. Perpetual calendar on the underside of a similar dial by Johann Martin, Augsburg. (Ignore what appears to be the 'date' of 1570.)

Its price was estimated at £7,000 to £10,000 but it sold for a healthy £16,250.

Charles Miller. Maritime and Scientific Models, Instruments and Art. 30 April 2014

There were several dials in this sale. The one I have chosen for illustration (Fig. 4) is a small French garden dial by a well-known French maker, Pierre le Maire. (There were two makers of this name, the father, 1672–1745 and his

Fig. 4. Small French dial by Pierre le Maire.



Fig. 2. Nicely tooled leather case for crescent dial.

son, 1730–60.) The latitude is inscribed as 48d 51m. The dial is 19.5 cm (7¾") in diameter. It sold for £660 including premium.

Bonhams, Knightsbridge. Scientific, Technological and Mechanical Musical Instruments. 20 May 2014

A magnetic compass dial by William Fraser (Fig. 5), made for London, latitude 51° 32', ca. 1800. The fixed scale



Fig. 5. Magnetic compass dial with its cover by William Fraser.

Fig. 6. Vertical slate dial by Bianchi.



around the outside of the floating compass dial is for the Equation of Time. This dial sold for £625.

An almost identical dial by Fraser, which still has its original glass domed cover, is illustrated in my book, *A Dial in Your Poke*. This, unfortunately, is missing from the current dial.

A rather interesting and unusual 19th century vertical slate dial (Figs 6 and 7) by Bianchi, France, was sold. At the top of the slate is the inscription: CADRAN VERTICAL MÉRIDIONAL / BIANCHI À TOULOUSE. The dial stands 37 cm (14½") high. Although estimated at £300 to £500 it sold for just £125. This dial was originally unsold in their 28 January sale.



Fig. 7. Inscription on the slate dial.

Summers Place Auctions. Sculpture and Design for the House and Garden. 21 October 2014

This auction house seems to sell many dials, not for their beauty as dials but as garden furniture. Most dials sold are complete with their pedestals. Their website lists around 80 dials sold. The dial that perhaps interests us the most is a fine double horizontal dial (Figs 8, 9 and 10): HENRICUS WYNNE, LONDINI FECIT ca. 1690.¹ It was certainly recognised as an important piece being estimated at £20,000 to £40,000. It made £20,000 (hammer price).



Fig. 8. Double horizontal dial by Henry Wynne.



Fig. 9. Signature of Henry Wynne.



Fig. 10. Henry Wynne dial complete with its pedestal.



Fig. 11. Slate dial sold by Mealy's in Ireland.

**Mealy's Fine Art Ltd, Castlecomer, Co Kilkenny.
Collections and Estates of Aesthetes.
21–23 October 2014**

An interesting and finely carved octagonal slate dial was sold at Mealy's (Fig. 11). It is dated 1835, and is finely engraved with numerous scales. Unfortunately, it has not been signed by its maker. On the south side is the inscription:

ANNO MDCCCXXXV DOMINI
HORIZONTAL SUN DIAL SYSTEMATICALLY
CALCULATED FOR NORTH LAT DEG. MINNI
WEST LONGITUDE DEGREES MINUTES

THE MARINES COMPASS, THE TWELVE SIGNS, THE PRIMARY PLANETS RECTIFIED

The figures for latitude and longitude have not been inserted. A further inscription around the dial reads:

A TABLE OF THE EQUATION OF TIME SHEWING HOW MUCH
A GOOD PENDULUM WATCH OR CLOCK OUGHT TO BE
FASTER OR SLOWER THAN A SUN DIAL MATHEMATICALLY
CALCULATED FOR EVERYDAY IN THE YEAR IN MINUTES
AND SECONDS FOR THIS MERIDIAN

This fine slate dial sold for €2000 (about £1600) less its premium.

I would like to thank Michael Harley for sending me the information about this dial.

**Bonhams, Knightsbridge. Scientific and
Mechanical Musical Instruments and Cameras.
4 November 2014**

There were several dials in this sale, so I have taken two of the more interesting ones.

First, a compass dial (Fig. 12) in the manner of a Butterfield dial, with a moveable gnomon showing the latitude from a bird's beak. It is 8 cm (3 1/8") in diameter. Its large diameter compass has a tip that pokes up through the dial plate for simple setting. The compass scale is marked with a magnetic declination of about 22° West, suggesting a date of around 1840 (for the location of Paris). The dial sold for just £750.



Fig. 12. Butterfield-style dial.

Also in the sale was an equinoctial dial (Fig. 13) with an offset gnomon signed with the retailer's name, HERBERT & C^o BOMBAY. However, the dial is English and would have been made in the late 19th century. Both the dial and its case are almost identical to one that I have seen signed by Dollond of London. This fine dial sold for £687.

ACKNOWLEDGEMENTS

The illustrations in this article are the copyright of the various auction houses and must not be reproduced without their permission. Christies, South Kensington: Figs 1, 2. Charles Miller: Fig. 4. Bonhams, Knightsbridge: Figs 5, 6, 7, 12, 13. Summers Place Auctions: Figs 8, 9, 10. Mealy's Fine Art Ltd: Fig. 11.

NOTE

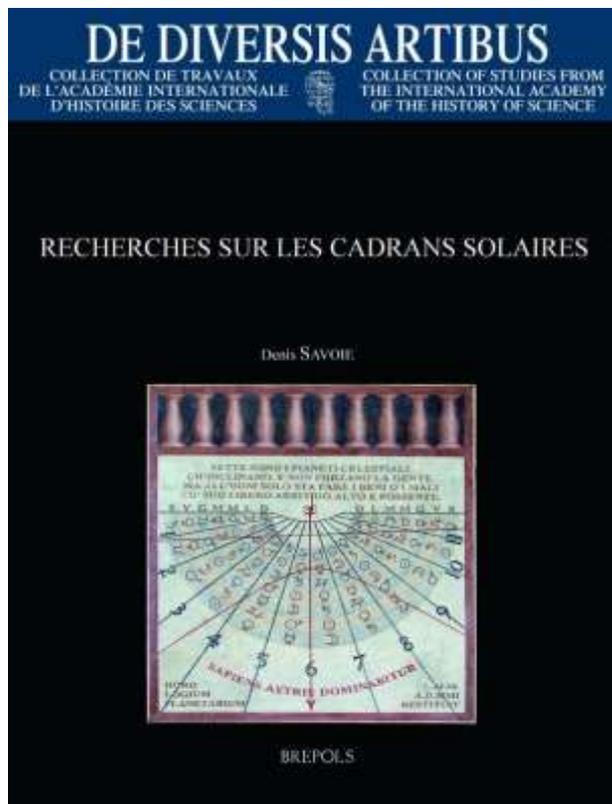
1. John Davis has commented on the Henry Wynne double horizontal dial sold by Summers Place. Notwithstanding the auction catalogue's date of 'ca. 1690', this dial is datable to 1667/8 which makes it one of the earliest of Wynne's large double horizontal dials. See entry DH-37 in *The Double Horizontal Dial: and Associated Instruments*, BSS Monograph (2009).

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Fig. 13. Equinoctial dial signed Herbert & Co., Bombay.

NEW BOOK



Recherches Sur Les Cadran Solaires by Denis Savoie. Brepols Publishers (2014). 200×260mm. Price €95 (but, by searching the Web, you may be able to find copies available at the launch price of €80). 240 pages with colour illustrations. In French. ISBN 978-2-503-55298-9.

The publisher's website is www.brepols.net and further information about the book can be found by keying Cadran into their search box and then clicking on Savoie. They quote from an extensive, enthusiastic and chapter-by-chapter review by Fred Sawyer in the *NASS Compendium*, 21(4), December 2014:

“The nine chapters of this book cover a wide range of topics from the ancient gnomonic world to the very modern. Each chapter displays a true appreciation for the history that underlies its topic and for the mathematics that makes the relevant dial work. Savoie does a superb job of sharing the history, the mathematics, and the excitement of discovery. The book is an excellent journal of more than a decade of work by a dedicated, insightful expert in the field.”

THE MOVING SUNDIAL OF ARDROSSAN

CHRISTINE NORTHEAST

Ardrossan is a small town on the Firth of Clyde and is the main point of departure for the Isle of Arran. It is home to what W.B. Stevenson, in his 1934 Presidential Address to the Glasgow Archaeological Society,¹ described as a ‘unique composite dial’, so I decided to have a look at it during a recent visit to Arran.

Playing Hunt the Sundial

The 2010 version of the *BSS Register* indicated that the dial, SRN 1497, was to be found on Ardrossan Promenade, and a brief Google search (too brief, as it turned out) confirmed this by means of an official site record of the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS),² with a map showing the precise position of the dial in the ‘Sunken Garden’.³ Additional information stated that it had originally been at ‘Kirkhall Farm’, and the reader was directed to a site record for Kirkhall Farm in the former county of Lanarkshire. It seemed that the sundial had travelled a distance of some 40 miles sometime in the past.

I duly went to the Sunken Garden, but the dial had moved again! In its place was a memorial commemorating the wartime sinking of the aircraft carrier HMS *Dasher* (Fig. 1). A dozen passers-by (all Ardrossan inhabitants) failed to elicit any information about the current whereabouts of the dial. Indeed, it was clear that none of them knew it existed, although several directed me to a large ground-level horizontal dial (not in the *Register*)



Fig. 1. The Sunken Garden with no sign of a sundial; there is a memorial tablet on the large stone block.



Fig. 2. The dial at the Civic Centre, from the northwest.

beside the harbour at the nearby town of Saltcoats. The next step was to consult the staff at the public library, who had not heard of it either, but their Googling was more successful than mine and they were able to direct me to its present site just 300 metres away, outside the Civic Centre, where I found it, partly shaded by trees (Figs 2–5).

‘A Remarkable Dial’

Ancient Scottish sundials display a variety of forms, but Thomas Ross divided detached polyhedral dials into ‘lectern’, ‘obelisk’ and ‘facet-headed’.⁴ This one, however, does not easily fit into his classification: it is indeed unique. The dial is about 150 cm high and is carved from sandstone, now damaged and repaired in places, and badly lichened. Stevenson,⁵ who found it ‘remarkable’, wrote:



Fig. 3. The head, from the south (above) and west (below).

“It includes perpendicular, sloping, curved and horizontal dial faces, strangely combined. It has a large irregular dial head and dial faces are set also round its pedestal-shaft and base. On the N and S sides of the dial head there are projecting solid hemispheres and on the E and W sides large shallow hollow basins... Triangular and other cavities are inserted at scattered points... Shadows are cast by numerous metal pointers and by many sharp stone edges.”

The majority of Stevenson’s ‘metal pointers’ were of two types: polar-oriented gnomons on the dials on the vertical and horizontal surfaces, all now broken off, and pin gnomons, most of which remain, albeit bent in some cases. Hour lines and numerals are incised into the stone in the case of the dial faces on the head and



Fig. 4. Dials on the pedestal shaft: south side (above), west side (below).



Fig. 5. Dials on the north (above) and east (below) faces of the cube on the north side of the head.





Fig. 6. Lower block, south face, with inscription and gnomons.

shaft, but presumably others were once painted – it is unlikely that the pin gnomons were merely for decoration. Stevenson also mentioned, but did not spell out, the slightly cryptic inscriptions that appear on all four sides of the lower block (Fig. 6). These couplets are hard to decipher in places and include odd spelling, but appear to be more or less⁶ as follows:

North	USE ALL FREEDOM WITH YOUR EYE BUT LET NOT THE HAND COME NIGH
East	TENDER IS STONE AND BREAKS IF SET IN LINE IF TWIST CRACK OR BREAK LOST IS ALL DESIGN
South	MY BEAUTY THE SUN ONLY CAN DISPLAY IF BUT HURT ME AWAY GO THEY
West	CONNOISSEUR LAT CHARITY BE KEPT IN VIEW BE INFORMED MY ARCHITECT ONLY BRED TO PLOW

There are other inscriptions, particularly on the dial head where the legends NORTH, EAST, SOUTH and WEST appear on vertical surfaces of the three cubes (as in Fig. 5).

A most unusual feature is the presence of single letters on many of the faces, some of which may be seen in several of the illustrations, suggesting that the dial might originally have had some kind of key or set of instructions. Finally, on the head, below the hemispherical hollow on the west side, is an inscription RW / KIRKHAL / OWNER. Above the



Fig. 7. The maker, RW of Kirkhall (a slightly off-centre inscription).

corresponding hollow on the east side is the date 1795, and below it is the inscription RW / KIRKHAL / ARCHITECT (Fig. 7). The 'RW' of these inscriptions is the maker of the dial, Robert Weir.

Robert Weir and the Kirkhall Estate

It is appropriate at this point to consider Robert Weir and Kirkhall and, indeed, the assertion that the dial came from Kirkhall Farm in Lanarkshire. For it to have come from a farm would have been unusual, because almost all the dials described by Thomas Ross were to be found at castles, palaces, other large houses and country estates: there was a minor mystery here. (Although this dial falls within the period he and MacGibbon covered, it appears that he did not visit Ardrrossan until the early 20th century.)⁷ More easily disproved is the assertion in the RCAHMS record that RW's Kirkhall is (or was) in Lanarkshire, because the sundial itself appears, clearly labelled, on the First edition 6-inch and 25-inch Ordnance Survey maps of Ayrshire (Fig. 8).⁸ It is there shown in the grounds of what was described by Robertson⁹ in 1820 as 'a small mansion' on the 'Kirkhall estate.'



Fig. 8. Kirkhall and its sundial on the 25-inch Ordnance Survey map of 1860. Reproduced by permission of the National Library of Scotland.

In 1795, the date of Robert Weir's dial, the parish of Ardrrossan was largely rural. The main centre of population was Saltcoats at the southeastern corner of the parish, a town making its living mainly from the sea.¹⁰ It was not until the first decade of the 19th century that Hugh, 12th Earl of Eglinton, began construction of a large harbour and the town of Ardrrossan, a mile and a half away to the southwest of the Kirkhall estate.

Kirkhall estate, purchased from the 8th Earl of Eglinton, and about 30 metres above sea level, consisted of just over 20 acres of fertile land,¹¹ together with ornamental gardens in which the mansion and dial were situated. Since 1748 it had been owned by the well-to-do Weir family who boasted their own private burial ground at the nearby site of the old

Ardrossan parish church.¹² Successive heads of the family were known locally as ‘Laird Weir’.

Robert Weir, born on 3 January 1757, was the eldest of the three sons of Hugh Weir whose father (also named Robert) had purchased the estate. Robert succeeded on the death of his father in 1800 and he married first, in 1802, Helen Ferry (also spelled variously as Ferrie or Fairie) who died without issue in April 1814.¹³ His second wife was Mary Porter, the daughter of a shipmaster in Saltcoats, by whom he had two children, and whom he named after his first wife: Hugh Ferrie Weir, born in October 1815, and Helen Ferrie Weir, born in November 1817.

Stevenson, who disappointingly did not provide a detailed bibliography, reported the belief that Robert was, at the time of the construction of the sundial, a ‘retired navyman’. He was greatly attracted to the study of local history and other antiquarian matters, so perhaps this interest was what motivated him to make a dial that was reminiscent of a style that had long gone out of fashion.¹⁴ He also, according to an obituary of his son, written a century after the dial was made, “had a wonderful mechanical skill, not to say genius... although he was never taught stone-cutting or astronomy”.¹⁵ Whether or not he was a ‘retired navyman’, it seems likely that by the 1790s he was occupied in

assisting his father (the then Laird) with running Kirkhall estate. This is borne out by the couplet on the west side of the lower block, where he (the ‘architect’, but not trained as such) asks for allowance to be made for any imperfections in the dial. There are, indeed, some spelling and layout errors in the inscriptions.



Fig. 10. Stevenson's illustration of the dial head.¹⁶ Reproduced by permission of the Scottish Archaeological Journal.



Fig. 9. The dial at Kirkhall in 1908. Photo: J.C. Oliver; courtesy of North Ayrshire Heritage Centre.

Robert Weir was said to have spent 9 years¹⁷ constructing the dial in his spare time, and he placed it in a commanding position in the grounds of the mansion: it stood on an elevated stone platform with steps leading up to it (Fig. 9). There was more to the dial than exists today, for attached to the head there was what Stevenson described as ‘an adjustable metal apparatus’. His illustration (Fig. 10) gives tantalising glimpses of the ‘apparatus’, now completely disappeared, although it is still possible to see some of the points at which it was attached (Fig. 11). The meaning of the couplet on the north side of the lower block now becomes clear: ‘Look, but don’t touch’, for the apparatus needed protecting from curious hands. The message is repeated in the sun-related couplet of the south side.



Fig. 11. The dial head from above, showing remains of the metal fittings: on the south hemisphere; in the centre of the head; and on the north cube.

Perhaps Robert Weir encountered problems with the sandstone in the construction of the dial that caused him to compose the couplet on the east side; the present condition of the stone certainly seems to bear this out in places.

From Country Estate to Council Estate

Robert died on 31 July 1838 and was succeeded as Laird by his only son Hugh Ferrie Weir who, although he worked the estate himself as a young man, later let the fields to two neighbouring farmers so that he could devote himself to his love of local history and the workshop, interests inherited from his father Robert.¹⁸ Hugh died in 1898 and was the last of the Weirs to be interred at the family burial ground. When his sister Helen died in 1902 the estate passed into the hands of Captain Hugh Wylie Auld,¹⁹ an accountant and sometime magistrate and member of Saltcoats Town Council, and clearly proud of the dial (Fig. 12).

Hugh Auld might have wished to depict himself with the impressive sundial at Kirkhall, but he continued to live in Saltcoats. The dial remained in the grounds of the house, but over the years the estate was let to a succession of tenants by a succession of absentee landlords. The fields continued to be let to two neighbouring farmers, of Stanley and Whiteles (or Whitelees) Farms, and a family called Anderson occupied the house and garden with its sundial, working their part of the land as a market garden.²⁰ Here, then, was the probable origin of the informal name 'Kirkhall Farm'.²¹

After the First World War, Ardrossan Town Council embarked upon an ambitious programme of house building,

first around the existing town, and later up country to the northeast. After the Second World War the expansion of social housing continued apace, and Kirkhall estate found itself no longer surrounded by countryside but at the edge of the growing town. It had already, in Hugh Ferrie Weir's time, lost some land to the Ardrossan Commissioners for their new reservoir, but in 1950 the Council turned their attention to part of the farmed land for their next housing estate and asked the proprietrix, Mrs Aileen Dunsmuir of Dalry, to sell them just over 13 acres for the purpose.²²

The next phase of building began on this part of the Kirkhall lands, but the builders and inhabitants of the new estates caused problems: the Anderson sisters complained about trespassing into their garden and grounds²³ and Mrs Dunsmuir complained that the fences of the burial ground had been knocked down and that gravestones were missing. She requested that the Council make good the damage to the burial ground and offered them the sundial in return.²⁴ The Council agreed and accepted the gift.

Meanwhile the Council needed yet more land and in 1955 approached Mrs Dunsmuir with a view to purchasing the rest of the farmed land (just over 7½ acres), but Mrs Dunsmuir proposed that *all* the rest of the estate be purchased by them.²⁵

The whole of the Kirkhall estate was thus built over in the 1950s, but new streets commemorated Kirkhall and the Weir family with such names as Kirkhall Gardens, Kirkhall Drive and Weir Road; indeed, one of the estates bears the title 'Laird Weir Estate'.



Fig. 12. Hugh Wylie Auld's election flyer for 1910 (above), incorporating another 1908 photograph by J.C. Oliver, part of which is enlarged on the right to show the metal additions that still existed at that time. Images courtesy of North Ayrshire Heritage Centre.

The Sundial Moves – Twice

Mrs Dunsmuir had suggested that the dial might be sited at the old Kirkhall burial ground, to ‘keep it in the family’, presumably. Fortunately the Council decided against this somewhat vulnerable place (Fig. 13).

Instead, they found an excellent new position for it, in the already-existing Sunken Garden on the Promenade where it was not overshadowed by trees, and where it would be seen by people strolling beside the sea, or enjoying the flowers at one of the seats in the garden. The dial had lost its square base and steps; it was now set on a low circular plinth (Fig. 14).

However, the dial was destined to move again. On 27 March 1943, the Royal Navy aircraft carrier HMS *Dasher* had been destroyed by an internal explosion and had sunk in the Firth of Clyde with the loss of almost 400 lives. As the 50th anniversary approached, the Royal Naval Association proposed to commemorate the tragedy with a permanent memorial in Ardrossan.²⁶ The appropriately boat-shaped Sunken Garden was chosen for the purpose, and it became the Dasher Memorial Garden, formally inaugurated on 27 March 1993.

The displaced dial was moved, this time to the forecourt of the Civic Centre (the former Ardrossan Town Hall) on the wide main street of the Earl of Eglinton’s New Town; it no longer has a plinth and is slightly sunk into the ground. On my visit it was clear to me that very few of the passers-by had any idea of its purpose, although many noticed my interest and asked questions about ‘the monument’, as some referred to it.

The entry in the *BSS Register*, by Andrew Somerville, described the dial’s condition as ‘Excellent’ and his photographs of it in the Sunken Garden showed that this was indeed the case in the mid-1980s. Sadly, though, that description no longer applies. The sandstone of the dial has delaminated in places and a crack that showed in one of the 1985 photographs has resulted in damage to one of the cubes on the dial head (Fig. 15).



Fig. 14. The dial in the Sunken Garden in 1985, from the south. Photo: Andrew Somerville.

The most noticeable difference is the growth of lichen. Current advice on the care of sandstone sculptures seems to be that crustose lichen such as this should not be removed, as this may expose the stone to mechanical damage, and in any case the lichen may be regarded as enhancing the appearance of the sculpture. However, in the case of sundials, the obscuring of hour-lines, numerals and other dial furniture is hardly to be welcomed. In order to take some of the photographs included here I compromised by gently rubbing some of the lichen off the surface of the dial.



Fig. 13. The remains of Kirkhall burial ground.



Fig. 15. The damaged southeast cube.

Yet Another Home?

It should be mentioned, for completeness, that some in Ardrossan believe that the dial was once on Cannon (or Castle) Hill, which may be seen in the background of Fig. 14, but I have not found any confirmation of this. A local historian of the town suggests that they may be confusing the dial with a drinking fountain, about the same size and general shape, that was on the hill at one time.²⁷

Conclusion

This is indeed a unique dial, not just because it does not easily fit into any of the categories suggested by Thomas Ross, but because of the extra metal fittings that once adorned the dial head, and the implication that some kind of explanatory notes once existed. It would be much enhanced by the provision of an interpretation board to let the people of Ardrossan know the purpose and history of the interesting and unusual object they have in their town.

ACKNOWLEDGEMENTS

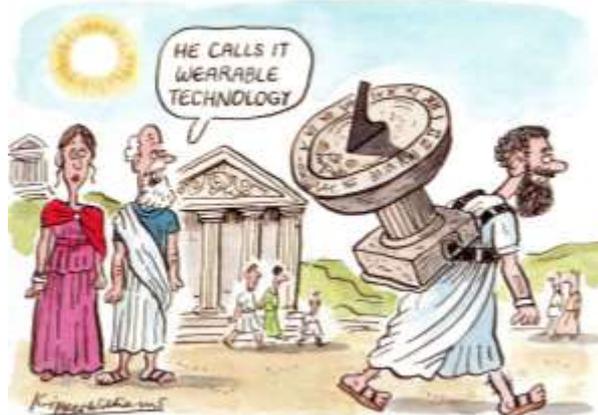
Thanks are due to the BSS Registrar, John Foad, for the photograph by Andrew Somerville; to the staff of the RCAHMS; and in particular to the staff of the North Ayrshire Heritage Centre.

REFERENCES and NOTES

1. W.B. Stevenson: 'Sundials of six Scottish counties, near Glasgow', *Transactions of the Glasgow Archaeological Society*, 2, 227–86 (1940).
2. canmore.rcahms.gov.uk/en/site/300260/details/ardrossan+south+crescent+road+public+garden/ accessed May 2014.
3. Or 'Sunken Gardens': opinion appears to be divided as to which is correct or most often used, even in Ardrossan.
4. D. MacGibbon and T. Ross: *The Castellated and Domestic Architecture of Scotland from the Twelfth to the Eighteenth Century*, Vol. 5. David Douglas, Edinburgh (1892).
5. Ref. 1, pp. 280–1.
6. These couplets are taken from interpretations by others, amended by me after looking at the stone itself. The version in an article in the *Ardrossan and Saltcoats Herald* of 18 September 1908 is sometimes repeated, but examination of the dial shows that it was not entirely accurate.
7. Ross prepared a report for Ardrossan Town Council

- concerning the condition of the ancient castle in Ardrossan in his capacity as one of His Majesty's Commissioners on Ancient and Historic Monuments (Scotland) (copy of report at the North Ayrshire Heritage Centre).
8. Ayrshire Sheets XVI and XVI.1, respectively. Access via link from maps.nls.uk/os/ The 1910 revision of the 25-inch map also shows the sundial, albeit as 'S.D.'
9. G. Robertson: *Topographical Description of Ayrshire; more particularly of Cunninghame*. Irvine, Cunninghame Press (1820), p. 161.
10. For a full description of the parish of Ardrossan around Robert Weir's time, see the [First] *Statistical Account* of 1791–9, vol. 7, pp. 42–51.
11. See Ref. 9.
12. The parish church of Ardrossan itself might be the subject of an article entitled 'The Moving Church of Ardrossan', for it was originally built on the Castle Hill near the sea, was blown down in 1695 then rebuilt near Kirkhall. In 1744 it was moved to the centre of population, Saltcoats, only to be damaged by storms in 1773 and rebuilt yet again. Today it is the home of the North Ayrshire Heritage Centre and bears a vertical dial (SRN 2062), a replacement for an earlier dial.
13. J. Paterson: *History of the Counties of Ayr & Wigton [Scotland], Vol. III: Cunninghame*, James Stillie, Edinburgh (1866).
14. A.R. Somerville: 'The ancient sundials of Scotland', *Proceedings of the Society of Antiquaries of Scotland*, 117, 233–64 (1987). He says (p. 235) that the main dial-making period of Scottish polyhedral types was 1623–1731.
15. *Ardrossan Parish Magazine* (June 1898).
16. Ref. 1, p.281.
17. *Ardrossan and Saltcoats Herald*, 18 September 1908. Stevenson (Ref. 1) reports that the task took 7 years.
18. *Ardrossan Parish Magazine* (June 1898).
19. *Ardrossan and Saltcoats Herald*, 30 May 1902.
20. *Valuation Rolls of the County of Ayr: Ardrossan* (various years).
21. The minutes of Ardrossan Town Council continued to refer to the land as 'Kirkhall Estate', but bowed to local usage in the mid-1950s.
22. Minutes of the Housing Committee of Ardrossan Town Council (various dates between 1950 and 1953).
23. Housing Committee, 10 November 1955.
24. Housing Committee, 10 January 1956.
25. Housing Committee, 8 March 1956.
26. Cunninghame District Council minutes (Finance and Personnel Committee), 14 December 1992.
27. George McGrattan: personal communication.

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This cartoon first appeared in the *Engineering and Technology* magazine (www.eandtmagazine.com).

We are grateful to them, and to the artist Kipper Williams, for permission to reproduce it here.

It is better drawn than most 'artistic' dials but the ancient Greeks didn't have horizontal pedestal dials with polar-pointing gnomons and the gnomon angle suggests a latitude somewhat to the north of Greece.

JD

A THEATRICAL DIAL

JACKIE JONES

Some months ago, the New Venture Theatre in Brighton staged a production of *The Herbal Bed* by Peter Whelan. The play, written in 1996, takes place in 1613 at Hall's Croft, Stratford-upon-Avon, the house of Shakespeare's daughter Susanna and her husband Dr John Hall. It is based on the true story of her being accused of adultery and suing for slander.

My role in the production was as costume designer, but realising that most of the action was in the garden where the medicinal herbs were grown, I suggested that a sundial would be appropriate. Fortunately the director agreed and we went through various ideas with the set designer before settling on a horizontal dial. The theatre does not have a big budget and all the flower beds were being painted onto the floor, so the dial had to be without a pedestal to sit amongst the 'plants'.

It was then up to me to make it. I found that there is a dial (Fig. 1) in the garden at Hall's Croft; the house still exists. No date is given for the dial, so there is no assumption that there was one there in 1613, but this could be the basis of my design. It looked interesting and not too complicated to make, given the time and money restrictions.

So it was then cutting a cardboard circle and painting it with acrylic paints to make it look like worn, old metal. The gnomon was cut from two pieces and glued together to give thickness to it, sticking it on with small supports and painting it to match. There was never any thought of making it from metal; as two of the actors have a fight nearby and it was on the ground, it had to be safe for them if they fell onto it. Better that the dial broke.



Fig. 1. Dial at Hall's Croft, SRN 2619. Photo: Frank Coe.



Figs 2 & 3. The finished cardboard dial and the stage set of Hall's Croft garden with sundial in the painted flower bed.

The hour lines and Roman numbers were added with a permanent drawing pen, as was the motto. TIME IS VALUABLE is on the original, so that was what I used, although in a different position. It was then attached to a thick board which was painted to represent stone (Figs 2 and 3).

I delineated the dial for 51° North, which is correct for Brighton; even though it would be indoors, I think all dials should be made accurately. The director, who now has the dial, may give it more layers of varnish and put it outside in the summer; her house has a south-facing garden.

It was not a long or complicated job; maybe more dials should be included in set designs.

For a portrait and CV of the author, see *Bulletin* 26(ii), June 2014. She can be contacted at jackie@waitrose.com

BSS ACCOUNTS FOR THE PERIOD

STATEMENT OF FINANCIAL ACTIVITIES FOR THE FINAL PERIOD ENDED 8TH AUGUST 2014

	Notes	Unrestricted Funds £	Restricted Funds £	TOTAL 7 months 2014 £	TOTAL 12 months 2013 £
INCOMING RESOURCES					
Voluntary Income	2a	1,522	0	1,522	14,485
Investment Income	2b	135	0	135	286
Incoming Resources from Charitable Activities	2c	37,746	454	38,200	36,138
TOTAL INCOMING RESOURCES		39,403	454	39,857	50,909
RESOURCES EXPENDED					
Charitable Activities	3a	25,644	0	25,644	34,533
Administration Costs	3b	4,706	150	4,856	4,118
Governance Costs	3c	6,026	0	6,026	5,195
TOTAL RESOURCES EXPENDED		36,376	150	36,526	43,846
NET INCOMING/ (OUTGOING) RESOURCES		3,027	304	3,331	7,063
Total Funds Brought Forward		75,011	8,659	83,670	76,607
Transfer to The British Sundial Society, a Charitable Incorporated Organisation, Charity Registration Number 1155688	13	-78,038	-8,963	-87,001	0
TOTAL FUNDS CARRIED FORWARD		0	0	0	83,670

Movements on all reserves and all recognised gains and losses are shown above. All of the organisation's operations have been transferred to the Charitable Incorporated Organisation and all activities of the old society (Charity Registration Number 1032530) discontinued.

The accounts presented in these two pages are extracts of the full 10-page accounts document prepared by Independent Examiners Ltd. Any member may access the full report on the BSS website or by application to the Treasurer. That document gives a full explanation of the various Notes and also provides breakdowns of the detailed elements.

1 JANUARY TO 8 AUGUST 2014

BALANCE SHEET AS AT 8TH AUGUST 2014

	Notes	Unrestricted Funds £	Restricted Funds £	08-Aug-14 Total £	31-Dec-13 Total £
Fixed Assets					
Tangible assets		0	0	0	16,635
Current Assets					
Debtors	7	0	0	0	0
Cash at bank and in hand	6	0	0	0	67,614
Total Current Assets		0	0	0	67,614
Creditors: amounts falling due within one year	8	0	0	0	579
NET CURRENT ASSETS		0	0	0	67,035
NET ASSETS		0	0	0	83,670
Funds of the Charity					
General Funds		0	0	0	75,011
Restricted Funds	5	0	0	0	8,659
Total Funds		0	0	0	83,670

Trustees Responsibilities

The Charities Act 2011 require 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 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 (See Note page 5).
- state whether applicable accounting standards and statements of recommended practice have been followed , subject to any material departures disclosed and explained in the financial

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 and signed on their behalf on the 24th October 2014.

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

Signed *G. Stapleton* G. Stapleton. Treasurer

CONARACHNE ET PELECINUM: ABOUT SOME GRAECO-ROMAN SUNDIAL TYPES

JÉRÔME BONNIN

This article presents some of the new discoveries I have made on the extensive subject of Graeco-Roman sundials. However, since most of the subject is unpublished and original, I give here a brief account of all the reasoning. More information will be given in a forthcoming publication.¹

In his well-known book, *De Architectura*, the first-century AD Roman architect and engineer Vitruvius gave names to many types of ancient sundial.² Every gnomonicist interested in ancient sundials knows this text and the long debates it created and still creates. Since this list is, with the archaeological remains, one of the rare existing sources for the historian to comprehend ancient gnomonics, the main difficulty is to understand what Vitruvius meant when he wrote *arachne*, *plinthium sive lacunar*, *pharetram*, *conarachne*, *pelecinum* etc. Indeed, whereas some elementary typologies such as *hemisphaerium* or *conus* are not too difficult to grasp, some others are really obscure. To add to the problem, another author quoted, and in addition described, two types of sundial in Antiquity: Cetus Faventinus, in the third century AD, with the *hemicyclium* and the *pelecinum*.³ The lack of agreement between Cetus Faventinus and Vitruvius has been the subject of numerous articles. Nevertheless, a consensual list seems to have been accepted by most scholars since the publication of Sharon Gibbs' book *Greek and Roman Sundials*, with 236 items.⁴ This consensus linked the *conus* with the conical dial, the *hemicyclium* with the roofed spherical dial, and the *hemisphaerium* with the hemispherical dial for example. Other names were still under debate (such as *arachne*, *conarachne*, *pelecinum*).

During and after my doctorate in Roman Archaeology on the Graeco-Roman Sundials, I created a new list of typologies, starting with the texts of the two authors but also taking into account two new archaeological discoveries. The goal of this article is to present the two discoveries and a revised classification of Graeco-Roman sundials.

The Hemicyclium and Pelecinum of Cetus Faventinus

Until a few months ago, I followed the general consensus in thinking that the *hemicyclium* quoted by Vitruvius and described by Cetus Faventinus was the roofed spherical dial. The description of Cetus indeed fits perfectly well with archaeological remains, such as the dial of Carthage displayed in the Louvre (Fig. 1), or that of Tenos, in the Sanctuary of Poseidon, designed by Andronikos of Kyrrhos himself, the Greek architect and astronomer, creator of the



Fig. 1. Roofed spherical dial of Carthage displayed in the Louvre. Photo: J. Bonnin, © Musée du Louvre.

Tower of the Winds in Athens. Therefore, no doubts were expressed about this interpretation. Similarly, no doubts were expressed about his description of the *pelecinum*, also quoted by Vitruvius. Once again, he perfectly described a real type of sundial, the vertical dihedral dial, made from two slabs of stone joined together at an angle of 90°. This typology was, until recently, known by few exemplars. The most famous is the dial from Delos (Fig. 2). It is also present in many representations made on sarcophagi. As for Cetus Faventinus and the name he gave us, all was ideal. But research does not follow ideal ways...

The Conarachne of Vitruvius...

Since many scholars concurred that Cetus Faventinus was describing the *hemicyclium* as a roofed spherical dial, it was difficult to link the *arachne* of Vitruvius with this type of dial. Therefore, most commentators have seen in the *arachne* a specific dial (either horizontal or spherical) 'with many curves' and thus, in the *conarachne*, a specific conical dial (the name is a contraction between the *conus* and the *arachne*), once again with more than three curves, in order to look like a spider's web.

However, the hypothesis of dials with many lines is not appropriate. First, there is no real difference between a spherical dial with three calendar lines and one with seven, for example. If one manages to create the first, one can easily create the second. It is the same for a conical dial. Moreover, the name *arachne* should have given those commentators something to think about. Indeed, a spherical



Fig. 2. Vertical dihedral dial of Delos stored in the Archaeological Museum of Delos. Photo: J. Bonnín, © Archeological Museum of Delos.

dial with seven calendar lines does not look like a spider's web, or only a very strange one. And the names of those two dials are very important. If the *arachne* was a specific type of dial, as Vitruvius seems to indicate, the *conarachne* should be a conical dial with the specificities of the *arachne*. So, if we look at archaeological remains, we should find some strange conical dials amongst 'common' ones.

Indeed, in Sharon Gibbs' catalogue, one dial meets the specific requirement, listed as 'Conical, Variant'. It is 3109G, from Izmir, stored in the Archaeological Museum and illustrated with a poor photograph (Fig. 3). But Gibbs did not classify this dial as a 'roofed conical dial':

"White marble – The unique shape of this dial is shown in the adjoining meridian section. The surface is conical, possibly a complete right circular cone. The vertex of the conical surface is carved out of the stone. Its position is marked by a shallow, square, depression which contains no metal. The generator of the conical surface is horizontal at

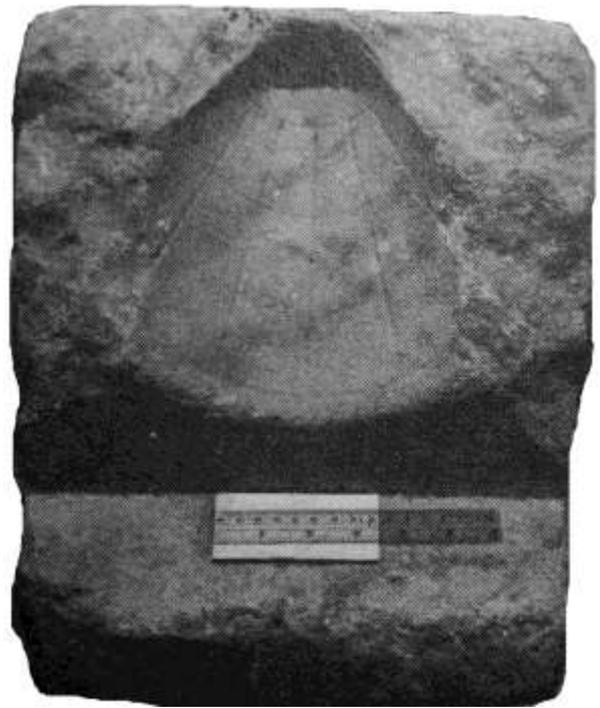


Fig. 3. Dial from Izmir. From Gibbs,⁴ p. 325.

the meridian. Seven preserved hour lines cross three day curves but do not extend beyond either solstice."

And, as a note, she adds: "All roofed spherical sundials have catalogue numbers beginning with 2."

Therefore, it was not a roofed spherical dial, just a strange conical one. Nobody cared about this dial then. Since Gibbs' photo was not good enough to see what kind of dial it was, I sent a request to the Archaeological Museum of Izmir in January 2014. The museum answered me quickly, and sent me many pictures. It was definitely a very beautiful roofed conical dial (Fig. 4). The pierced metallic sheet that admitted a beam of light into the dial is missing but evidence of it is still very obvious. But a unique proof is not



Fig. 4. Roofed conical dial from Izmir. © Archaeological Museum, Izmir.



Fig. 5. Roofed conical dial from Agrigento. From E. De Miro, G. Fiorentini, *Agrigento Romana VI*, pl. XVI, fig. 3.⁵

a proof in archaeology, and I decided to have a look at my own database (575 dials, against 236 for Gibbs).

Another dial stands out from the rest, a 'spherical' dial found at Agrigento in 2009 or 2010 and published in 2011 with a picture (Fig. 5). The Soprintendenza Agrigento sent me better photos and this too appeared to be a roofed conical dial, with straight hour lines, a conical vertex, and part of the metal sheet on the upper surface. Those discoveries are of importance, for they demonstrate that, in Antiquity, roofed conical dials were known and built. We have identified only two but, since you discover only what you search for, many others may exist in museum stores. Of course, those dials could have been rare in Antiquity and the example of roofed spherical dials can be quoted by way of comparison. We know of 33 roofed spherical dials, against more than 169 spherical dials. If roofed conical dials were more difficult to construct than roofed spherical dials (but this point has yet to be established), the proportion might be smaller.

... and the Reality of the *Arachne*

Let us now return to the names given by Vitruvius. Only two names can be applied to conical dial: the *conus*, and the *conarachne*. If the *conus* refers to the simple conical dial, which seems to be plausible, *conarachne* must refer to the roofed conical dial. And, as a result, the *arachne* can only be the roofed spherical dial of Vitruvius. The network of the receiving surface looks indeed like a spider's web with the spider not far from the centre.

What about the *hemicyclium* then? The Latin term comes from the Greek and signifies 'amphitheatre' or 'semicircle'. Vitruvius used it elsewhere to describe the semicircle of a theatre or basilica. And it can be applied to spherical dials without difficulty: the quarter of the sphere of the receiving surface looks like a semicircular theatre. Cetus Faventinus,

in the third century AD, might have made an error and linked the name of the roofed spherical dial with the name of the spherical dial. He was far from being an expert, unlike Vitruvius, and copied many texts without always perfectly understanding them.

There is also another possibility. At the time of Cetus, when the production of sundials was declining, the names used by Vitruvius, themselves taken from Greek books, were no longer understood or even used for most of them. Cetus Faventinus would prefer more readily understood names (and also the most 'Latin' ones), without worrying about truthfulness: who would contradict him?

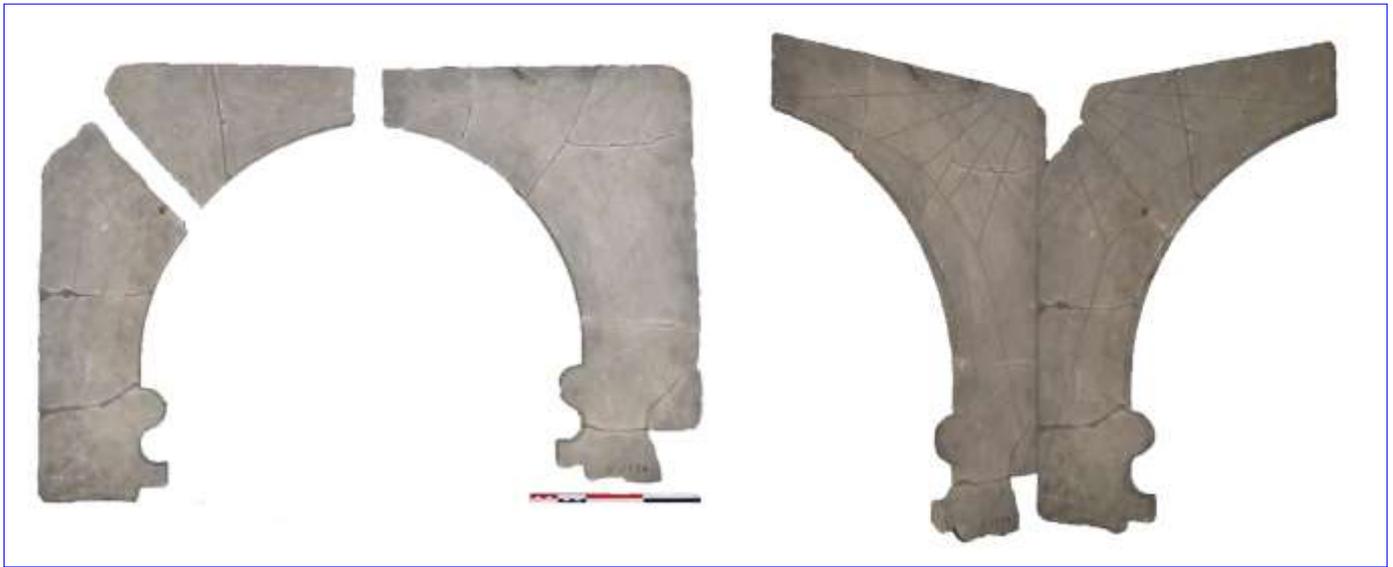
As a final consequence: if we cannot have faith in Cetus' names, is the concordance between the vertical dihedral dial and the *pelecinum* valid?

The Vertical Dihedral Dial

Once again, Vitruvius gave us only a name and the possible inventor, Patrocle, while the description that Cetus Faventinus gave of the *pelecinum* is very detailed. He describes a sundial he knew and saw in his everyday life. But what sundial was it?

Cetus explains that the instrument is made from two slabs of stone joined together with an included angle of 90°. The left part is used in the morning, the join indicates the sixth hour (midday), and the right part is used in the afternoon. The hour lines radiate from the smaller date curve to the bigger and, in summer, the shadow is the longest and reaches the lower curve. Until recently, we knew only a few vertical dihedral dials that could correspond to Cetus Faventinus' description: the one from Delos for example, or the one from Athens, stored in the British Museum, with multiple faces. Sarcophagi and intaglios were the only other places where an historian could find a representation of the sundial that Cetus described. And it was not a convincing proof since they were only iconographical representations.

Such sundials were, however, quite common in Antiquity. That is the conclusion I reached after I found and studied a dial stored in the Museo delle Terme of Rome, in the Magazzino Garibaldi. Gibbs had described this sundial (n° 5016) purely on the basis of an eighteenth-century drawing that depicted only the left part. She was not aware that it was actually stored in the Museo delle Terme. Now, I found not only one fragment, as described by Gibbs, but many more, that correspond to a single instrument (Figs 6 and 7). This exceptionally well preserved large sundial (more than 70 cm high) is very similar not only to the description of Cetus Faventinus, but also to the sundials depicted on some sarcophagi from the third century AD, such as the one displayed in Rome, in the Sala della Colombe of the Musei Capitolini (Fig. 8). A final component can now be put forward to complete this description (Fig. 9). It is the inscribed base of a sundial found in 1972 in Bulgaria at Kjustendil (Pautalia) and described by P. Vălev.⁶ As often happens, the instrument



Figs 6 & 7. Fragments and reconstruction of the vertical dihedral dial from the Museo delle Terme. Photos: J. Bonnin, © Museo delle Terme.



Fig. 8. Vertical dihedral dial from a sarcophagus. Photo: J. Bonnin, © Musei Capitolini.

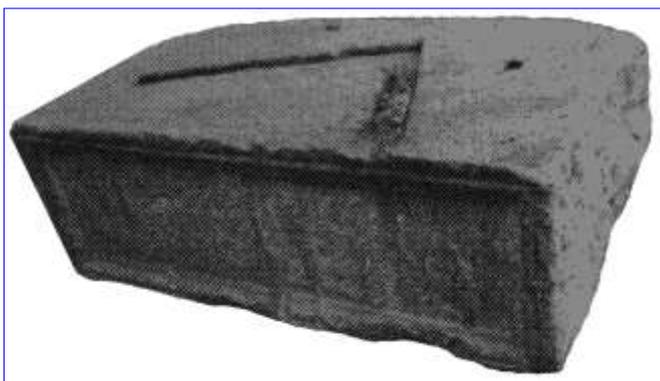


Fig. 9. Base of the sundial from Pautalia. From P. Válev (2001).⁶

has disappeared but its properties are confirmed by the inscription engraved on the base and which declare it the gift of the “architects Laomedon and Glaukias, son of Straton, who set up the sundial (*horoskopion*) in honour of the town and of the sacred temple”. Dating from the end of the second or the beginning of the third century AD, the base still includes, at the top, the attachment fittings for the sundial. This example is the unique witness to a long-vanished support arrangement. There is a V-notch, asymmetric with regard to the axis of the base, completed behind by two small holes with traces of lead inside them. The vertical dihedral dial was therefore embedded in the notch and had a support which is now missing, the only vestiges of which are both holes placed behind the dial. These openings can be connected to the marks in crosses present on some dials. They would indicate the place of supports connected behind the dial and set in the base.

All this information is of huge importance, since many fragments of sundials, usually described as vertical declining dials North or South, are in fact part of complete vertical dihedral dials. On some, part of the midday line at the join is still visible, such as on the one from Carthage (Gibbs 5021); on others, there is an angle of 45° at the join. This is the case on two dials from Oropos. There are in reality a least 24 vertical dihedral dials, and not just the three that were identified previously.

The *Pelecinum*: who is right?

Nevertheless, if we identify the sundial Cetus Faventinus described in the third century with the name *pelecinum*, it does not mean that this dial is the one Vitruvius called *pelecinum* in the first century. The case of the *hemicyclium* and the *arachne* prompts us indeed to remain cautious. The term *pelecinum* used by Vitruvius comes originally from the Greek *pelekinos* and describes a double-bladed axe (*bipennis* in Latin). With this origin and the shape of a double-bladed axe, most scholars saw in the *pelecinum* a



Fig. 10. Horizontal dial from Delos. Photo: J. Bonnin, © Archaeological Museum of Delos.

horizontal sundial with a vertical gnomon. We have indeed many horizontal dials and they do exhibit the form of a double-bladed axe (Fig. 10). Thus it is not impossible that the *pelecinum* describes the horizontal dial for Vitruvius and the vertical dihedral dial for Cetus Faventinus. In such a case, why did Cetus use this name since the vertical dihedral dial does not look like a double-bladed axe? A first possibility is that he has been misled by the Latin *bipennis*, meaning ‘which has two wings’. He insists, moreover, on these two wings: “*pelecinum enim horologium dicitur quod ex duabus tabulis*”. On the other hand, Vitruvius still thinks in Greek. He can thus make a reference to an instrument looking like the *pelekinoj*, the double axe.

Another hypothesis is possible, even if it remains less convincing. The focus on the term *pelekinoj* could be the origin of our own error, Graeco-Romans granting maybe less importance for the meaning of the word. A passage by Pliny about a plant is interesting in this respect.⁷

“*There is a grass which kills the chickpea and the lentil, by winding all around (...). The rye grass does the same in the wheat, (...) The securidaca, a plant in the shape of hatchet which the Greeks, metaphorically, call pelecinum, does the same in the lentil.*”

He speaks about the *Coronilla securidaca*. Yet, no part of this plant really looks like an axe. Its leaves can evoke two wings, as those of the chickpea (Pliny also makes this link) or of numerous plants. The comparison stops there: nobody has ever questioned the use of the term by Pliny. It could thus be the same for the *pelecinum* of Vitruvius, which would have no real link with a double axe. The name could then describe without difficulty the vertical dihedral dial. In this case, the name of the horizontal dial remains unknown to Vitruvius.

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Puzzle Corner



This picture of an emeralds-set-into-platinum ring dial was taken by a professional jewellery photographer who rather overdid his use of Photoshop. Can you spot the two gross errors?

Readers may be assured that the real dial, made by a Hatton Garden jeweller, Ana de Costa, with gnomonic guidance from Frank King, is fine!

The ring dial was for a client who lives just north of the Tropic of Cancer.

IN THE FOOTSTEPS OF THOMAS ROSS

Part 10: A Mixed Bag of Sundials in Edinburgh

DENNIS COWAN

John Knox was a 16th century Scottish clergyman who was the leading figure in the Scottish Reformation which resulted in the Protestant religion eventually replacing Catholicism as the major religion in the country. His house is situated in Edinburgh's Royal Mile and is a major tourist attraction today, but not many of the thousands of people who visit it or pass by it each day notice the two-faced vertical sundial (Fig. 1) on the corner of the building.

However, it did not escape the notice of Thomas Ross who described it in *The Castellated and Domestic Architecture of Scotland*¹ as follows:

“On the south-west projecting corner of this house there is a remarkable piece of sculpture, containing a dial [Fig. 2] which does not appear to have been hitherto recognised. It contains a figure, very skilfully twisted round the corner of the house, representing Moses kneeling on the top of a mount pointing with his right hand to a figure overhead of the sun in glory, on which is carved, in Greek, Latin, and English, the name of God. The sun's rays are represented as flames of fire. The left arm of Moses is bent backwards, and the hand rests on one of the tables of the law.”

The dial is not contemporary with the house, however, and appears to be a later addition. It has Arabic numerals from 1 pm to 8 pm on the left-hand west-facing dial and was restored by Alexander Handyside Ritchie in 1850. A plaque to the left of the dial has the initials “IMMA” for James Mossman and his wife Mariota Arres. James was one-time owner of the house and a supporter of Mary Queen of Scots and who paid with his head for his loyalties. This dial was visited by delegates from the BSS Edinburgh Conference in April 2013.

Still in the Royal Mile, but further down the hill towards the Palace of Holyroodhouse, is the Canongate Tolbooth. Ross records that there is a sundial on the tower and says:

“There is a very weather-worn dial on the south front of the tower of this building. The date of the tolbooth is 1591, but the dial has the appearance of having been inserted at some later time.”

Unfortunately there is no sign of the sundial today. Similarly, higher up the Royal Mile, Ross recorded a sundial on the famous St Giles Cathedral by saying:



Fig. 1. The dials on the corner of John Knox's House.



Fig. 2. Ross's sketch of the John Knox dials – note the difference in the hour lines and gnomon on the left hand dial.



Fig. 3. Huntly House multi-faceted dial.

“In a view of this church, painted in 1790, and now in the possession of the Town Council, there is a large dial, surmounted by a cross, shown on the apex of the gable of the Chepman aisle.”

So apparently the dial was missing in Ross’s day too as he does not provide a sketch and makes no comment as to having seen it.

Almost opposite to the Canongate Tolbooth is the Museum of Edinburgh, otherwise known as Huntly House. In a closed gated courtyard off Bakehouse Close which runs underneath Huntly House is a fine multi-faceted dial (Fig. 3). Luckily for the BSS delegates at the Edinburgh Conference in 2013, arrangements were made to open up the courtyard. The museum staff had no knowledge of the provenance of this dial other than that it originally came from either Grange House or Saughton House. However, I now understand that this dial is almost certainly an 1886 copy of an Archibald Handasyde dial from 1732 that used to stand at Cramond Tower in Edinburgh’s western outskirts as Ross’s description of the Cramond dial indicates:

“This is a most remarkable dial [Fig. 4], and possesses certain peculiarities giving it a distinct character of its own within the type. It stands on a graceful square baluster, nicely moulded and carved, on which rests its peculiarly faceted double head. On the lower part of the head there are four circular upright dials with grotesque faces between and sloping dials above. The upper part of the head is of the form peculiar to the type. On one of the round dials is carved the name SIR ROB DICKSON, and the date 1732. Sir Robert was a descendant of the well-known David Dickson, Professor of Divinity in Edinburgh University. His father acquired the estate of Carberry and Sornbegg, now designed Inveresk, and sold the latter to the

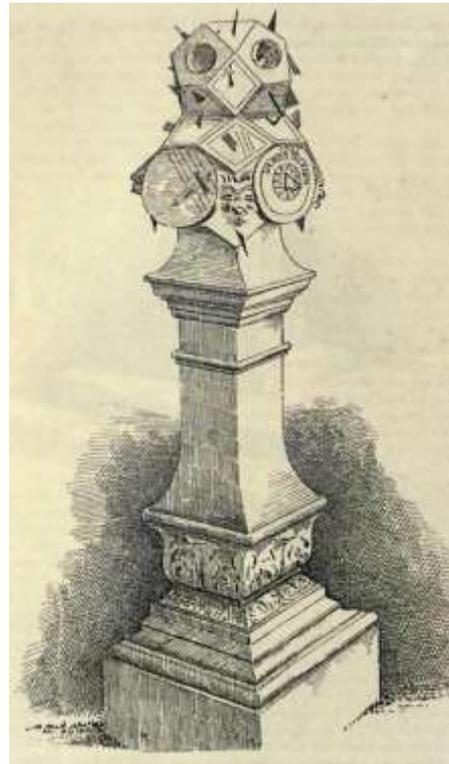


Fig. 4. Ross's sketch of the Cramond dial of which the Huntly House dial is a copy.

Duchess of Monmouth at the beginning of last century. Sir Robert was the chief bailie of Musselburgh during the rebellion of '45. He died in 1760. On the other side of the dial occurs the inscription ACH HANDASYDE FECIT. The same name occurs on one of the two dials lying in the churchyard of Inveresk, and others are mentioned as being known to be by the same maker. We are thus able to identify Handasyde as a dial-maker. Although the dials at Inveresk and Cramond are widely different in design, they have a point of resemblance in their open gnomons.

“A few years ago this dial was found lying in an outhouse, broken in several pieces, and we were then informed by the gardener that it once stood in the neighbouring grounds of Lauriestoun. In 1886 it was repaired and placed in the grounds of the Edinburgh Exhibition, and on being returned to Cramond it was set up in front of the house. It now bears a modern finial, which is the “poppy-head” of a cast-iron railing. While in the Exhibition it was copied, at least once, and a copy, with a different support, was shown in the Exhibition of Decorative Handiwork held in Edinburgh in 1888. The height of the square base is 9 inches, above which to the top of the cornice is 3 feet 2 inches, and from thence to the top of the dial (not including the finial) 2 feet 2 inches. The total height is 6 feet 1 inch.”

I believe that the Huntly House dial is the one mentioned above with the different support. The Cramond dial was moved many years ago and was last heard of at the House of Aldie in Fife.

Edinburgh’s West Kirk, otherwise known as St Cuthbert’s Church, lies at the west end of Princes Street and Ross states that:

“This finely-cut dial [Fig. 5] is placed on the west face of the steeple, and in design is not unlike those in Inveresk Churchyard. It has a bead and hollow moulding round its four sides, and has an open iron gnomon; above is the



Fig. 5. Ross's sketch of the West Kirk dial.



Fig. 6. West Kirk dial today.

motto VIVITE FUGIO, with the date 1774. The dial and its frame appear to be made of stones from different quarries. The builder and supposed designer of the church was a Mr. Weir."

This church is not to be confused with the church on Princes Street itself but is to the immediate south of and behind this building. The vertical dial has a single face with a complete simple open gnomon and has Roman numerals from 11 am to 9 pm (Fig. 6).

Moving on to another church, this time in Corstorphine, now a western suburb of Edinburgh, Ross (and Mrs Gatty²) had it wrong when he said that "there are seven dials on this church, all similar to the one shown in [Fig. 7]". Only the one on the SW corner was ever a dial – the others are all blank, and unlike the SW dial are not canted in the proper direction, and are just square to the building. There are three dial faces whilst the north face is blank (Fig. 8).

At Liberton House on the southern outskirts of Edinburgh, there is a fine stone dial set into the corner of the house. Liberton House was rescued from ruin by the current owners after a fire in 1991. They now run an architectural practice from an annex to the house. The house is home to one of the few ghosts that have been successfully photographed – the picture appeared in the *Scotsman* in 1936.

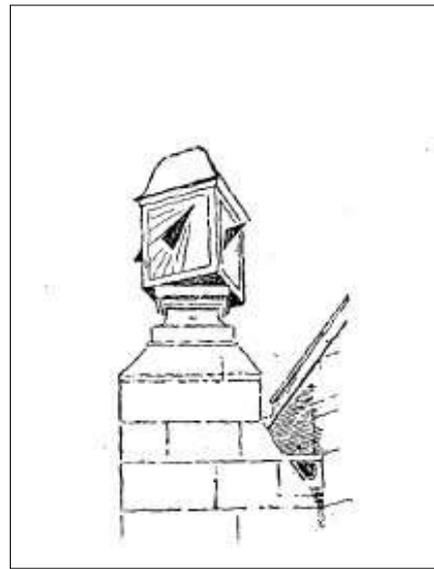


Fig. 7. Corstorphine Church dial sketch.



Fig. 8. Corstorphine Church dial today.

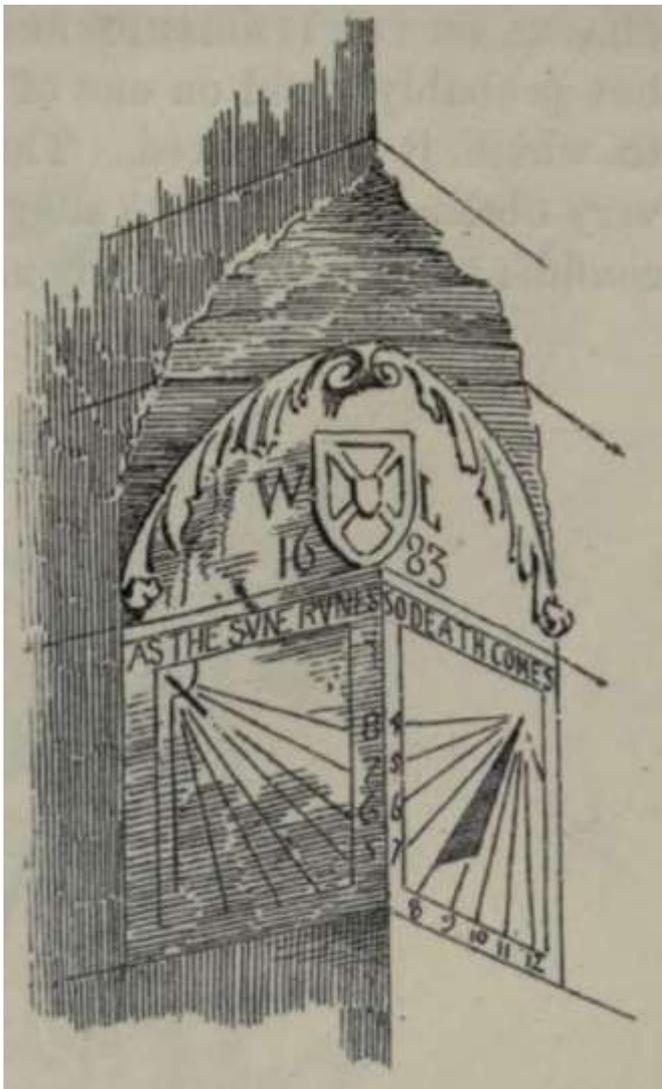


Fig. 9. Ross's sketch of the Liberton House dial.



Fig. 10. Liberton House dial today.

The ghost has not been seen since the fire in 1991; however, its ghostly voice is still heard now and again. It appears to have developed a habit of interfering with electrical equipment which frequently malfunctions for no obvious reason.

Ross records that:

“On the south-west corner of this house, the ancient mansion of the Littles of Liberton and Craigmillar, there is a fine angle dial [Fig. 9], round the top of which is the motto AS THE SVNE RVNES SO DEATH COMES. Above the dial the corner is rounded and enclosed with a carved scroll containing the arms of Little (a saltire with an inescutcheon) betwixt the initials of William Little and the date 1683.”



Fig. 11. Ross's sketch of the precarious-looking Hudson Cottage dial.



Fig. 12. Hudson Cottage dial looking rather more solid today.

The dial appears to be a little more worn nowadays (Fig. 10) but the west-declining face numerals can be seen to be Arabic from 1 pm to 8 pm although the gnomon is broken. The south-declining face has Arabic numerals which are a little indistinct today, but from Ross's sketch are from 4 am to noon.

Still in Liberton, but on the road back towards the centre of Edinburgh, a cube dial sits atop the gate leading to the garden of the house known as Hudson Cottage. According to Ross:

"This sundial [Fig. 11] now occupies a peculiar position over a gateway leading through a small garden to a house on the roadside. It is supported on an arched bar of iron thrown between the gate pillars in the manner shown. The dial is of neat workmanship, but the finial on top is not original."

The dial today (Fig. 12) is almost as described by Ross except that it is supported by two iron bars, and probably was in Ross's day too. It has Roman numerals from 4 am to 2 pm on the east-declining face and 10 am to 8 pm on the west-declining face.

Finally in Edinburgh's northern seaside Spanish-sounding suburb of Portobello, a large cube sundial stands in Brighton Park. In Ross's day, however, it stood at Portobello Tower (now desecrated by an ugly amusement park butted up against it), and Ross records that:

"There is a large collection of carved stones from various old buildings gathered together at this place, and amongst them is this sundial [Fig. 13]. It stands in front of the tower, and the steps are concealed with a garden rockery. The faces of the dial are very large, and consist of separate slabs cramped together; it is finished with a moulded tapering top, surmounted with a Scotch thistle."

It no longer sits on its high shaft as sketched by Ross, and now sits much lower to the ground. All four dial faces have Arabic numerals (and some graffiti) and all four gnomons are now missing (Fig. 14), but at least it still survives.

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Dennis Cowan is married and lives in Fife, Scotland. He recently retired from his job as a Contracts Manager. His main sundialling interest is tracking down and photographing ancient Scottish sundials, especially those identified by Thomas Ross. His other main interest is in climbing all of Scotland's Munros (mountains over 3,000 feet) and he is a member of the Cioch Mountaineering Club. His website is www.sundialsofscotland.co.uk and he can be contacted at dennis.cowan@btinternet.com

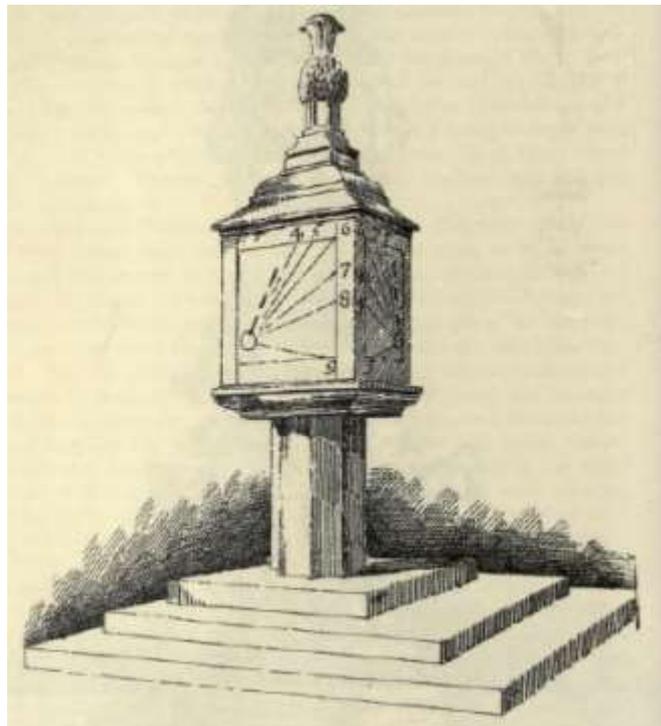


Fig. 13. Ross's sketch of the Portobello dial.



Fig. 14. Portobello dial minus its tall shaft.

SOME NEW SUNDIALS IN ST PETERSBURG

VALERY DMITRIEV

Not everyone knows that some of the most interesting symbols of St Petersburg are ships and angels. Ships provide a link with the world, and angels – with God.

Angels

One of the ‘main’ Angels of St Petersburg is located in the historic centre – on the spire of the Cathedral of Saints Peter and Paul fortress, the construction of which began on 27 May 1703 (the date is considered to be the founding of St Petersburg). In the summer of 2014, the Peter and Paul fortress gained another angel, or rather a sundial with an angel, perhaps, the ‘youngest’ angel of the city.

The idea of creating the sundial in the historic centre of St Petersburg belongs to the President of the Guild of Blacksmiths Petersburg, Vasily Kondurov. He turned to me for help, and within a month there was the project and model of the sundial ‘Time of Master’ (Fig. 1).



Fig. 1. Sundial ‘Time of Master’ maquette.

This is an equatorial sundial, the dial of which is in the form of a spiral (time), and through the spiral breaks the gnomon in the form of a spire with an angel. A feature of the project was that the manufacture of the sundial involved the collaboration of several dozen blacksmiths from Russia, Sweden and Finland who were attending the 10th international festival of blacksmiths ‘Golden Girders’. It is an amazing example of collective creative work. Each master has made a small piece placed on the dial (Fig. 2), because each blacksmith has his own time. There are two suns – large for the happiness of the family and small for personal happiness – and only one angel ‘flying high’ on the gnomon.

Fig. 3 shows the dial installed at the Naryshkin bastion, where a signal cannon fires at midday, a tradition dating from the 18th century. The dial is 2 metres in diameter and has a total weight of more than 500 kg. In accordance with the 18th century tradition the dial shows the true solar time. Unfortunately, the festival blacksmiths were not able to complete the underside of the dial, so that, in the apt words of my friend Martins Gills, in winter the sundial “goes on vacation”.



Fig. 2. Sundial ‘Time of Master’ – details.



Fig. 3. Sundial ‘Time of Master’.

Ships

I have long wanted to make a sundial with a sailboat, one of my projects not completed. By chance, one of my private customers had been a sailor in the past and had a nautical surname. The site in his garden was suitable for a sundial with a marine theme. It was agreed that the basis of



Fig. 4. Sundial 'Sailing vessel'.

the composition should be one of the first ships of the Russian Baltic Fleet – the frigate *Standart*, built in 1703 according to the decree of Peter the Great under the direction and by the project of Dutch shipwrights.

The completed sundial based on this design was installed in 2014 in a suburb of St Petersburg (Fig. 4). The diameter of the dial is 2.6 m, and the height of the gnomon is 1.9 m. The garden features were intended to symbolize the sea, but the flowers, unfortunately, were slightly higher than expected for the project. Let us imagine that the ship is in a small storm – a mariner's life is not always carefree!

But not only ships and angels live in St Petersburg: the main hope of the city is its children.

Children

Have you ever read out loud a lecture about sundials to 12-year-old children? If so, you know that they do not hide their emotions, and will not be silent if the lecture is really boring. A catalyst for positive emotions during a lecture to students of the Design Centre of the Palace of Young Creativity of St Petersburg was a proposal to make a sundial for a McDonald's. This caused strong admiration and approval, and much enthusiasm. The competition for the best design of a sundial was attended by 30 children, who produced quite unexpected ideas (Fig. 5).

Best in the competition was recognized to be Ludmila Shadrina's project 'Dandelion or nothing is forever' (see Fig. 6). In justifying the design, she wrote:

"My heart is beating, will break. I have to go through, absorbed into the darkness. This sundial tells us about the things that should be used, as long as they are – for example, friendship, good weather or rainbow. Appreciate what you have. Times like dandelion's seeds are carried away in the bottomless blue sky. This sundial I would put in a cozy square. Sitting there people will look at this sundial and remember his life. They are dedicated to those who because of the fatal circumstances failed to survive the most remarkable events of his life."

Surprising text and project for a 12-year-old girl.

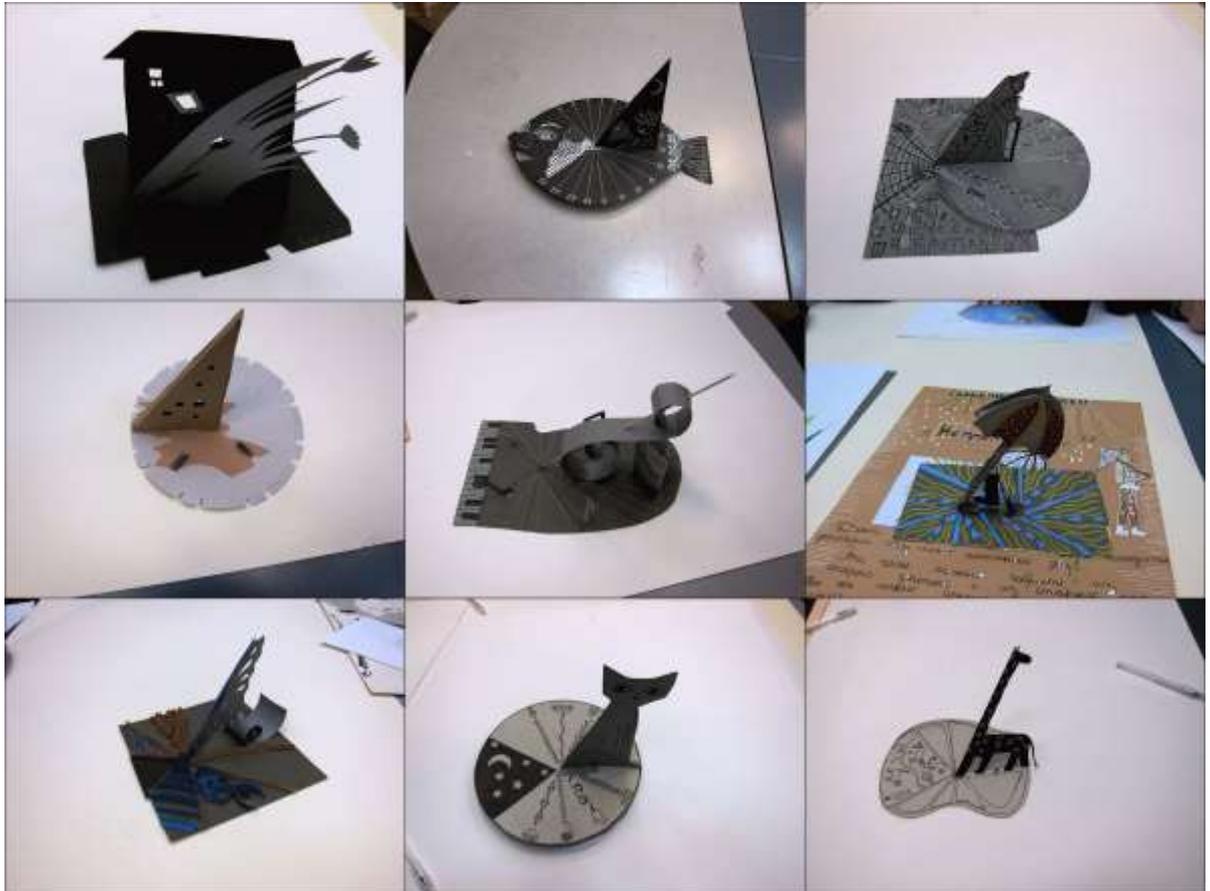


Fig. 5. Children's projects of sundials – models.

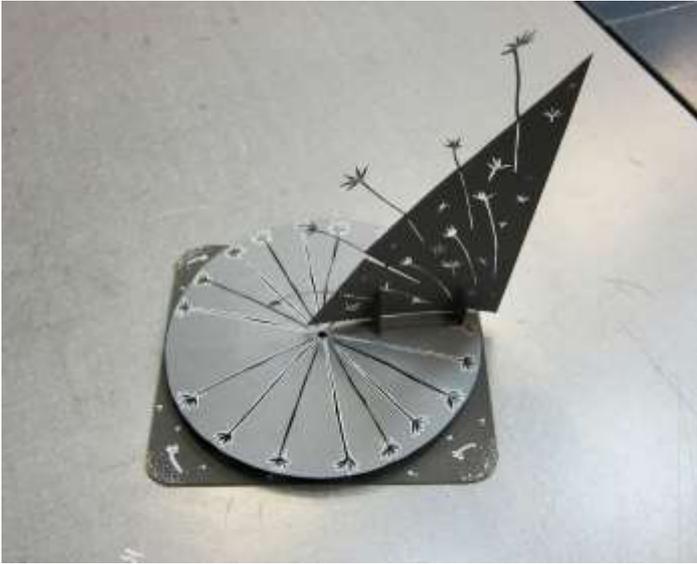


Fig. 6. Ludmila Shadrina's project 'Dandelion or nothing is forever'.

After the finish of the competition, we continued to work on the project, and the result was a sundial in the form of a dandelion. In the summer of 2014 it was executed in metal and installed in the park on Krestovsky Island of St Petersburg (Fig. 7).



Fig. 7. Sundial 'Dandelion or nothing is forever'.

The last sundial I would like to describe was made for the suburbs of Moscow.

Vine

The remarkable Russian poet Bulat Okudzhava has a poem entitled 'Georgian song'. Here are a few lines from the poem:

I will plant grape seeds in warm earth,
Kiss the vine and pluck ripe grapes,
Will call my friends, and open my heart for love.
Otherwise, why I live in this eternal earth?

This poem was the starting point for the project. It gave the idea of a sundial with a vine as the main decorative element. In addition, it could be like a 'vintage' sundial by making the vine appear to have grown through the 'old' pedestal and look as natural as possible.



Fig. 8. Sundial 'Grapevine'.

Fig. 8 shows the completed dial with the vine by the skilled blacksmith Vasily Kondurov who used brass, an unconventional and difficult material for hand-forging.

ACKNOWLEDGEMENTS

My thanks to Douglas Bateman for help with the English.

Valery Dmitriev sundials_spb@mail.ru

SOME OLD SUNDIALS IN SOUTH AFRICA

HENK VAN DER HAM and MALCOLM BARNFIELD

This article has appeared previously, in Catalan, as:
Henk van der Ham and Malcolm Barnfield: 'Alguns antics
rellotages de sol de Sud-àfrica', *La Busca de Paper*, No. 78,
pp. 24–28 (Summer 2014).

By European standards the effects of European influence on South African society and culture may be considered very recent and it then follows that cultural artefacts like sundials might be absent. It is most certainly not so and this article deals with five old sundials extant in South Africa. Two of the dials are in such remote locations that visiting and recording them is quite an undertaking and the journey to see them all could never be thought of as a sundial trail since the total mileage driven to do so was over 4200 kilometres.

We had become aware of the dials with the help of Piet Conradie and his website <http://www.afrikaner.co.za/pietwerf/sonwys.htm>. Thus when Henk and his wife Tonny decided to take an adventure and exploration holiday drive down the west coast of South Africa from Pretoria to Cape Town and back, an ideal opportunity to record the dials presented itself. In Henk's words this is how that journey went:

While enjoying an ice-cold beer, in nearby Johannesburg, with friend and sundial maker Malcolm Barnfield, I told him about the adventurous trip we were planning, to explore in the Northern and Western Cape. The main objective was to drive through the inland of Namaqualand all the way south on un-tarred roads, ending in Cape Town. Immediately Malcolm got excited and told me that he was busy writing an article about some of the oldest sundials in South Africa, and three of these sundials were close to my planned route! He asked me about the possibility to adapt my route to take some pictures and get physical data of the old sundials in Kuruman, Leliefontein and Cape Town. As I am a hobby sundialist and have assisted Malcolm with several interesting sundial projects, I gladly agreed to do this.

On Sunday morning early the 3rd of March my wife, Tonny, and I left Centurion (near Pretoria) and drove our first shift of 550 km west to Kuruman. Arriving there in the afternoon, it was very hot, the thermometer reading in the shade 42 degrees! Unfortunately we could not find anybody on the premises of the old Moffatt's Mission church to give me any information. It was too hot for Tonny to stand by me in the sun and I was sweating a lot while taking measurements, pictures and studying the

condition and physical facts of the dial.

The next day we proceeded on our journey and visited Pofadder, Springbok, Hondeklip Bay on the coast and Kammieskroon. After 4 days of driving very slowly on badly corrugated and sandy roads, and seeing no other cars on most of these roads we finally arrived at the oldest village of the Namaqualand, Leliefontein. Again it was a very hot day measuring 40 degrees, and an old coloured man directed us to the old Mission station. Only a few old white brick houses, a small general dealer and the old Mission church with the rectory next to it is Leliefontein! There was a keeper/groundsman who was not capable of giving any valuable information about the sundial in the rectory garden. Again I was sweating in the heat while measuring, observing, taking pictures and making notes. But how wonderful to inspect a 185-year-old sundial, and knowing that only very few eyes have seen this dial, as no tourists ever visit this unknown town, and if the uninformed went there they would not know of this hidden sundial treasure.

From Leliefontein we proceeded with our journey to Garies where we stayed over and in the following days we visited Vanrhynsdorp, Nieuwoudtville, Loeriesfontein, Calvinia, Wuppertal and Clanwilliam. Here we ended by driving only on alternative dirt roads and went straight to Cape Town via several well-known towns. In the Mother City (Cape Town) we went to the oldest colonial building, the Castle of Good Hope, where two vertical sundials stand. Fortunately the weather was fine, sunny and about 25 degrees. I took measurements, pictures and obtained all the data that Malcolm requested by talking to the curator, reading in their library and seeing other information inside the museum.

We are very pleased to have been at these special places in South Africa due to this extra sundial data collection mission. In total our whole trip was 4250 km. The personal sundial experience in my life was once again enhanced thanks to the request of Malcolm. I do hope that many readers will enjoy the following article by him.

Cape Town Castle

Cape Town Castle was built by the Dutch East India Company between 1666 and 1679. The labour came from soldiers and slaves and the granite was cut from Signal Hill. In 1682 a defensive wall was built across the courtyard which includes the 'De Kat' balcony and an

arched port entrance. The two vertical sundials were installed in 1787. The location of both is S 33° 55' 33" E 18° 25' 40". The designer's and installer's names are not known but were most likely Hollanders since the fort was under Dutch control at the time. The north-west facing dial stands above the port.

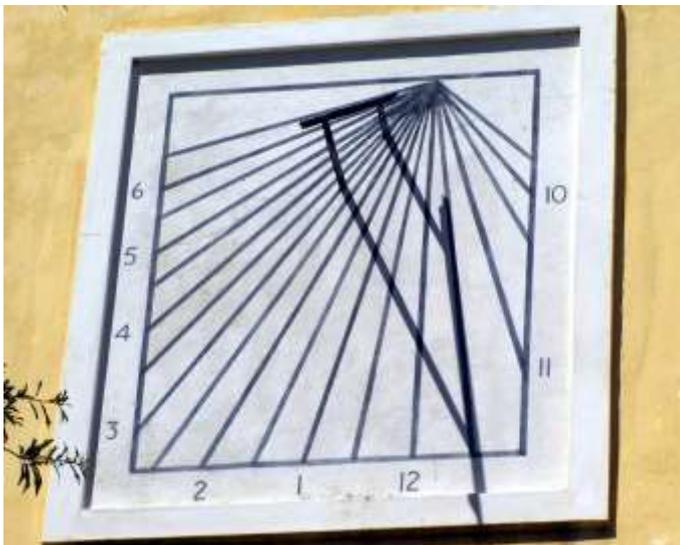


Fig. 1. Cape Town Castle. The north-west facing vertical dial. Photo: Henk van der Ham.

The NW dial is 235cm × 235cm square including the plastered frame (see Fig. 1). It declines to the west by 25° and reads from 10 am to 6 pm in half-hour divisions, local solar time. Its condition is fair to good and it has been repainted many times. The iron gnomon seems to be original and no evidence of it having been replaced can be seen. However, Cape Town has a highly aggressive marine atmosphere so unless maintenance was of a high degree this seems unlikely.

The NE dial is 130 cm × 130 cm square (see Fig. 2). There is no frame. It declines to the east by 50° and reads from 5 am to 12 noon in half-hour divisions, local solar time. It is in need of restoration and shows signs of cracking and paint peeling. Gnomon as above.

There is a 2-hour overlap of time reading between 10 am and 12 noon from both dials. No Equation of Time graph or table is on either dial. The sundials measured the official local time for the settlement in the area. The bell was rung hourly to announce the time, which could be heard up to 10 km away. At night or when it was overcast, an hourglass was used. The guard on duty was responsible for turning the hourglass every hour, and ringing the bell.

Time was of great importance at Cape Town since it was the major replenishment port for the spice trade from the East. In 1806 the Noon Gun was installed on Signal Hill. This allowed mariners to adjust their chronometers. It is still fired daily at noon. In 1818 and because of the slow speed of sound, a time ball was installed to compensate for the distance to the harbour from Signal Hill. It can still be

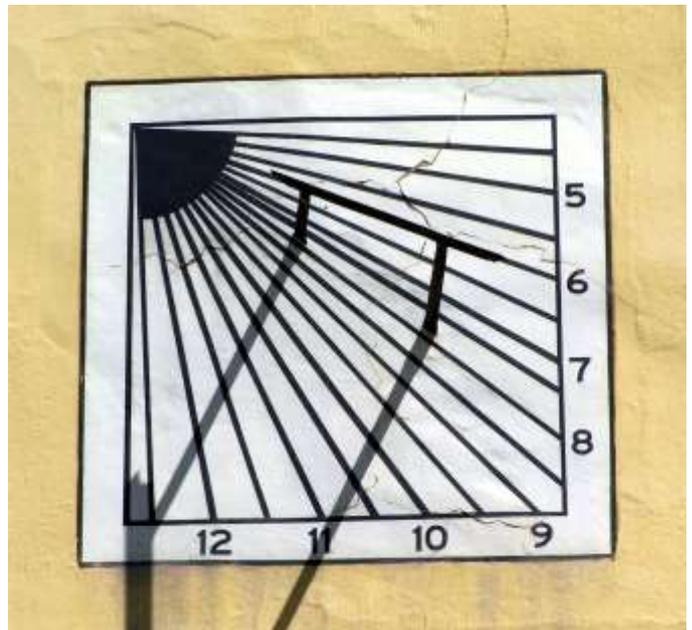


Fig. 2. Cape Town Castle. The north-east facing vertical dial. Photo: Henk van der Ham.

seen in the Victoria and Alfred Waterfront although it no longer works.

Leliefontein (Lily Spring or Fountain in English)

The tiny hamlet of Leliefontein is so named because of the profusion of the lily *Lanticeschia aethiopica* that flourishes around the spring, the only abundant fresh water in the very remote and isolated area. The mission station was founded by the London Missionary Society's Reverend Barnabus Shaw in 1816 and is the oldest settlement in Namaqualand. It lies 30 kilometres east of Kammieskroon. The road to Leliefontein is on what is called the 'Copper Way' and mining that remains an activity in the area.

The octagonal horizontal sundial (Fig. 3) stands at S 30° 18.886' E 18° 05.065' and was installed in 1828. It is 33 cm across flats and of 3 mm thick etched and engraved brass. It is in excellent condition for its age. The blue patina is



Fig. 3. The Leliefontein horizontal dial. Photo: Henk van der Ham.

probably as result of the high copper content in the surrounding ground. At some point the dial has been re-fixed on the original plinth using un-plated steel washers. Fortunately the area is so dry that no real damage from corrosion has resulted as yet. An Equation of Time plaque was added at an unknown date later. This is a 10 cm × 15 cm brass plate, 1 mm thick. It is marked in the Afrikaans language. It reads the following, 'Time correction in minutes for Leliefontein (18° 05'). Add to solar time for standard time'. As the sundial reads local solar time, a longitude correction of 48 minutes is added and the EOT applied. However, in gentler times, local solar time would have sufficed and time zones only came into being in the 1880s.

The dial reads from 5 am to 7 pm in 5-minute intervals. At first glance the numeration would appear to be mirrored or inverted but the dial is marked in the pre-Roman Etruscan Shepherds counting stick numbering system, the first time we have seen such work. The dial is designed to be read from the south and that is unusual in the southern hemisphere. The dial is signed 'W Dunbar sculpt' and dated 1828. The 5-minute intervals are marked in Arabic numerals every 15 minutes and these are then upside down compared to the Etruscan numerals. The compass rose is etched in very fine patterns and lines and all bearings are given in the Old Dutch language. North 'NOORDE' is letter-punched into the top of northern tip of the gnomon. In English the dial is marked 'This dial was presented by Messrs Lodge Calvert and John Laycock of Keighley Yorkshire Great Britain to the Mission in South Africa as a token of their affectionate regard and esteem for the Rev B Shaw Missionary'. Shaw came from Yorkshire so there may be some connection there. Again in Old Dutch the motto at the bottom reads 'Elken uur verkort't Leven' which means 'Every hour shortens life' in English. This is rather macabre for a mission station which is a place of hope.



Fig. 4. The Leliefontein dial's gnomon. Photo: Henk van der Ham.

This mixture of Old Dutch and English leads us to suspect (not proven) that the maker used etching templates for his export work to South Africa where Old Dutch was most common at that time as is Afrikaans today. The signature could be that of the Scottish sundial maker 'Dunbar' mentioned by Mrs Gatty in her *The Book of Sun-Dials* and Jill Wilson in her *A Biographical Index of British Sundial Makers from the Seventh Century to 1920*.¹ However, the use of Old Dutch could indicate otherwise. There was a practising optician in Cape Town at the time and the well-known connection between opticians and diallists may indicate that the dial was made in Cape Town but this could not be proved. But, the addition and use of Old Dutch on the dial strengthens this suspicion.

The original plinth is in good condition, 1.3 metres high and of local granite. It has never been moved and shows no signs of repair. The gnomon is rather fancy (see Fig. 4). The patterning is definitely engraved on both sides. It is correct for the latitude as are the arc angles on the dial plate and the noon gap.

Kuruman

The Kuruman Mission station was established under the auspices of the London Missionary Society by missionaries William Edwards and Robert Hamilton in 1816 about 80 km from where it now stands at the kraal (village) of Chief Litakoo. They were joined in 1820 by missionary Robert Moffat. The station was moved to Seodin just outside Kuruman in 1824 because of the abundant water available at the large spring there, The Eye of Kuruman. This spring still delivers millions of litres of pure fresh water daily.

Moffat was an incredible man. Having had farming training in Britain he planted a large vegetable garden and supplied the local people freely. He and Hamilton built what was then the largest church in Africa which can seat over 800 people. It is still there. He also translated the whole Bible into the Setswana language then typeset it and printed it in 1857 on a small letterpress at the mission station. The first Bible in an African language. His eldest daughter Mary became the wife of missionary Dr David Livingstone in January 1845. The stump of the almond tree under which Livingstone proposed to her is still visible in the mission station's garden. In that same garden is a slate sundial dated 1831 (see Fig. 5).

Position: S 27° 25.338' E 23° 25.763'. Date of installation: 1831. Dimensions: 30 cm diameter. Condition: Outside edging slightly damaged, data on dial still clearly visible, generally good for age of the dial. Unfortunately the gnomon has been replaced with a stainless steel one with no detail on it, angle is 26 degrees thus being acceptably correct. Orientation of setup is correct. Material of dial: Engraving is done on a light-grey slate disc, with an interesting natural band inlay of darker coloured slate. Equation of Time plaque: No EOT graph or table was



Fig. 5. The Moffat Mission horizontal dial at Kuruman.
Photo: Henk van der Ham.

added. Range of time on dial: 5 am to 7 pm, 15-minute intervals, local solar time. Plinth: Height – 90 cm, still original, material – rough sand cast cement. It has been moved once – from Litakoo to the Moffat church premises.

Some history: Left and right of the gnomon on the dial plate are the words 'For' and 'Litakoo' and also the date, 1831. It was the local name of a village 80 km north of the later-established Kuruman, where the London Missionary Society first met the Batswana in 1802. Litakoo has moved five times inside that area. The signature appears to be J Mc G.

The Moffat Mission church was built in 1838 by Robert Moffat and Robert Hamilton with a band of local men.

An erroneous myth has sprung up about this dial. Some say that it was given to Moffat by Livingstone just before he asked for Moffat's daughter's hand in marriage. This is impossible. The dial was installed in 1831 and Livingstone first arrived at Kuruman in 1841.

Kimberley

At the outbreak of the Boer War in October 1899 Kimberley had come a long way from its very informal beginnings as a scruffy mining camp centred on the diamond diggings. Normal municipal services were fully in place for what had become a modern and prosperous town. Streets had been surveyed and paved and parks put in place. Police, waste removal, water supplies and other facilities like a public library existed. These were provided by the Kimberley Corporation via the contributions of ratepayers.

At the Annual Meeting of library subscribers held on 18th April 1899, the following extract from the speech given by Chairman Mr Justice Laurence was reported in the *Diamond Fields Advertiser*² the next day:

"You may remember that last year I mentioned one want. I thought our little (library) garden was not complete without a sundial." There had begun the long and interesting story of the still extant library sundial.

The decision to purchase the dial had been taken in 1899 and the task of obtaining it was given to a Captain Penfold who was going 'home' to England. This he did and awarded the commission to construct the instrument to opticians and sundial makers Newton and Co. of 3 Fleet Street, London and thus the dial was probably manufactured in July of 1899. Generously, Captain Penfold then donated the dial to the library.

The completed instrument was then sent to South Africa but in the meantime the Boer War had broken out in the October of 1899 and Kimberley was besieged by Boer forces for 154 days, from 14th October 1899 until relieved on 15th February 1900. During this time the dial was safely kept in Port Elizabeth and was finally installed at the Kimberley Library in April 1900.

There it remained for 104 years. The library has now expanded and moved to new premises and the old building became the Africana Museum. Sadly, after three theft attempts between 1994 and 2004, the dial was removed from its attractive plinth and is now on display inside the Africana Museum. The plinth remains in exactly the same spot.

The dial is of solid brass throughout and perfectly correct for its southern hemisphere orientation and is site specific for Kimberley. It is 38 cm in diameter and in typical style of the period and contains the Equation of Time adjustments around a dated inner ring. Thus the dial is almost as accurate now as it was when made and that accuracy is to within seconds of South African Standard Time. It bears the Latin inscription *Pereunt et Imputantur* which means 'The hours pass away and are reckoned up to us'. See Fig. 6.

Six replicas of the dial have since been made: two for Johannesburg, three for Kimberley and one for Boston USA. One of those in Johannesburg went to the late Bridget Oppenheimer, wife of the late Harry Oppenheimer, the well-known diamond magnate and past Chairman of the De Beers diamond mining group. De Beers was founded by Cecil John Rhodes in 1888 and the company is named after the de Beer brothers who owned the farm which is now



Fig. 6. The Kimberley dial. Photo: Kokkie Duminy.

Kimberley. The Oppenheimer connection goes back to the early days of Kimberley.

ACKNOWLEDGEMENTS

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SEMPER NOVUS, SEMPER IDEM

Two Slotted-Gnomon ‘Conservatory’ or ‘Parlour’ Pottery Dials

MALCOLM BISHOP

Some coincidences are hard to credit. In October 2014 I consulted John Davis for his advice on the feasibility of a single datum line or point for the equinoxes and solstices when using a partially split tent-shaped hollow gnomon with converging sides on a horizontal dial.



Fig. 1. The prototype horizontal dial in clay, 17th October, 3 pm simulated.

A prototype clay dial (Fig. 1) had already been constructed, but not yet fired, and another with a different design was under way. Both used the lateral traverse of a light bar or strip (originating from a slot in an otherwise conventional shadow-casting gnomon) for time during the shadowed period, and the centrifugal/petal travels of the light strip for the seasonal indication.

Unknown to me, but in press at the time, was the Savoie and Turner piece on the exceptional dial by Langlois at

Roche-Guyon,¹ also employing a light strip for time-keeping and measure of the seasons. That paper identifies only one other comparable dial, by Sisson, so to find work well advanced on two modern dials using similar principles is indeed unexpected after the elapse of 250 years.

Description

The clay dials are not in the same category as the Langlois dial as scientific instruments; their interest lies in the progression of ideas imposed by the decision to use clay as the construction material. A conventional gnomon in pottery would be very vulnerable, even if made clumsily thick, so the potential for distortion or collapse in the firing led to the design of these tent-shaped hollow gnomons with converging sides.

The introduction of the light strip for the two shadowed hours when the gnomon straddles the 11 am and 1 pm lines was an obvious further step, with inspiration coming from the Piers Nicholson ‘Spot-on’ gnomon which identifies noon.²

The strength of the clay was retained by limiting the slot, and the lower and upper extent of the slot was then designed to produce a light strip that would appear to terminate on a marked datum point at each solstice. At the equinoxes the datum point would lie at the mid-point of the light strip.

Construction Method

Rough sketches were made and then the baseplates, each approximately 8 inches in diameter, were thrown on the wheel, as the original intention was to give them a slightly convex profile. They could just as easily have been prepared by rolling to the desired thickness and cutting out using a template (a large plate, for example).

At the leather-dry stage, circumferential guide marks were made, and preliminary noon, 6 and 11 am, 1 and 6 pm lines

drawn before the clay was separated from the bat. For the second dial the baseplate was repositioned eccentrically on the wheel to mark and then cut free the smaller moveable section (again, this could just as easily be done using a template – a saucer, perhaps). The cut was angled so that the moveable section could not fall through when the whole dial was lifted.

Additional clay formed the eyes and lips, the outer canthus (corner) of the eyes to coincide with the 6 am and 6 pm shadow lines; the pronounced mid-line of the lips provides important noon or centring orientation for the light strip, and in the case of the second dial the meeting of the lips forms the datum line for the solstices and equinoxes (the datum point again being where the light strip and datum line intersect).

Cheek discs were used to carry the motto in the first dial, and the date on which it was made in the second.

Each gnomon was constructed from two parts cut from a rolled slab of clay. The two halves were joined along their full length at the crest, and the lower edges adjusted to give the correct gnomon angle. The lower edges were then fixed with a clay sludge to the baseplates along the 11 am and 1 pm hour lines, which had been provisionally marked.



Fig. 2. Template for hour lines before insertion in the gnomon (for illustration, hour lines already drawn).

The two sides then made an angle of 30° to each other. In order to form the correctly angled slot, the first cut was made from inside the gnomon with a round-ended table knife pressed lightly against each inner wall in turn, the slot then being widened to approximately $1/16^{\text{th}}$ of an inch (ca. 1.5 mm) (the photographs show that in the clay the intended precision did not survive the firing and glazing – nevertheless the slots still worked as intended).

The intended site for the dials lies at $51^\circ 47' \text{ N } (5^\circ \text{ W})$, and the fundamentally crude construction of a pottery dial led to the gnomons of the dials being set at 51° . In the event there was so little distortion on firing that an accurate angle could have been used.

The hour lines were then completed using a simple card template with a backing prop (Fig. 2) which set it at a right

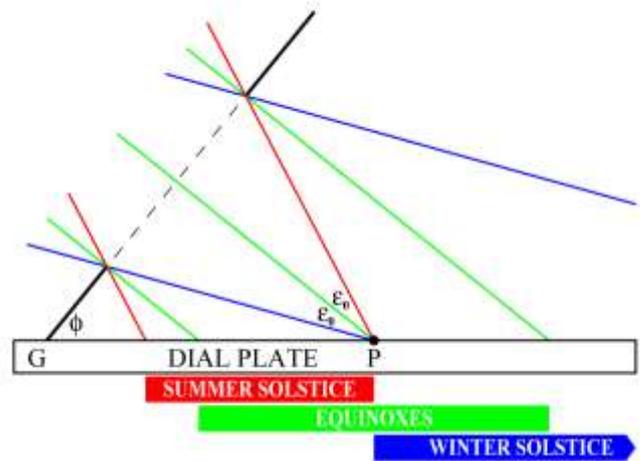


Fig. 3. Principle of template design to achieve a single datum point, P, for the solstices and equinoxes. Light strip at the winter solstice (blue); light strip at the summer solstice (red); light strip at the equinoxes (green). Diagram courtesy Frank King.

angle to the crest of the gnomon when the prop was inserted into the gnomon. A mark was made where an extension of each 15° line met the workbench (at a considerable distance for the 7 am and 5 pm lines, and infinity for the 6s), and then a line was ruled to the appropriate mark from the base of the gnomon (at the ‘bridge of the nose’ on these anthropomorphic dials).

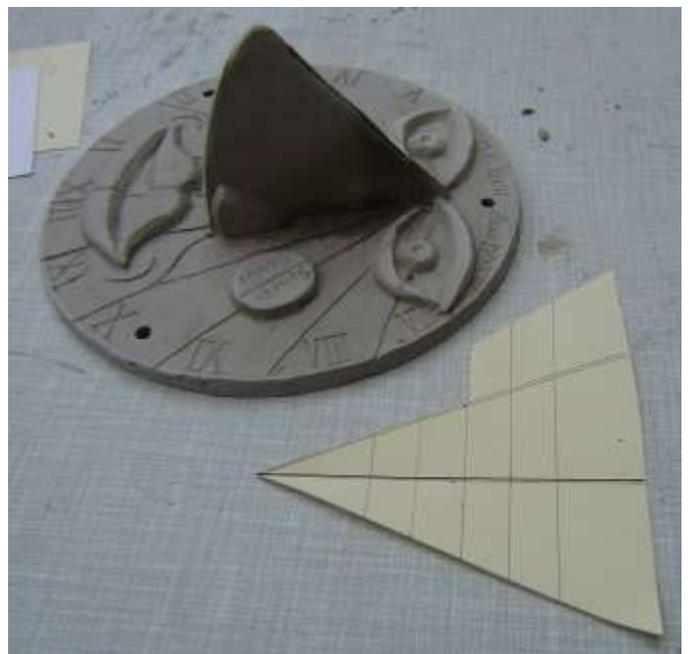


Fig. 4. The second template.

Another simple card template was used to check the angle of the gnomon, and as a guide while the slot was progressively extended to limit the summer and winter travel of the light strip relative to the datum point (Figs 3–6).



Fig. 5. The template inserted in the slot – the extent of the slot is not yet correct, so the base of the card is not in contact with the baseplate, and the tip does not touch the datum line.



Fig. 6. The glazed slot in the first dial.

This template was folded in half to allow the winter solstice limit to be cut first, then unfolded to cut the upper, summer, extent of the slot. For the second dial the fold in the template indicated the required position of the equinoctial marker bridge, while the lower border showed where the winter solstice marker should be positioned, this too made by adding a thin clay bridge; these bridges also serve to strengthen the gnomon.

The first dial is a simple one (Fig. 7): the gnomon functions in the normal way between 6 am and 6 pm, except that between 11 am and 1 pm the light strip takes over with a brief period of ten minutes or so of transition. The solstices are demonstrated at noon as the respective ends of



Fig. 7. The finished and glazed first dial, noon on 24rd December (no sun on the 22nd) showing the accuracy of the position of the light strip relative to the datum line for the winter solstice.

the light strip touch the datum line, the equinoxes by estimating the half-way mark (but see below for a later modification).



Fig. 8. The finished and glazed second dial, noon on 19th December.

The second dial (Fig. 8) is dual-purpose. The moveable gnomon may be left at the position where the light strip at noon falls over the noon marker, and the dial functions in the same way as the first dial for the solstices and equinoxes with the difference of the additional bridge markers.

Alternatively the observer can move the gnomon so that the light strip falls on a compass dial.

This construction means that the slot in the gnomon must extend to the baseplate, so that low sun angles at dawn and dusk will still produce a useful light strip, hence the marker for the winter solstice, to be read at noon.



Fig. 9. The Nicholson 'Spot-on' gnomon and light bar, by kind permission.

Absolute accuracy is not intended – since a regular user will observe the onset and progress of the seasons through the steady direction or cessation of movement of the light strip over a few days (cf. Figs 7 and Fig 10 centre, 35 days). The Langlois pattern shows, however, that great accuracy is possible when other construction materials are employed, allowing the gnomon slot to be calibrated in detail.

Similarities and Differences

The obvious similarity with the Langlois dial and the Nicholson Spot-on dial is the slotted gnomon. In the Nicholson dial this is used to establish the orientation of the dial with precision (Fig. 9) and the slot is produced by having a double plate gnomon, precisely machined. The depth of the slot is not important as the light strip will only be 'read' at noon.



Fig. 10. Traverse of the light strip from 11:30 am to 12:30 pm on 27th January.

The gnomon of the pottery dial differs from the Nicholson dial in that, as with the Langlois dial, the slot in the bridge of the gnomon has no depth, to enable the light strip to traverse the shadowed area as the earth moves during the two otherwise obscured hours (Fig. 10).

However, unlike the Langlois dial, the inclined walls of the tented gnomons of the pottery dials allow for a conventional scale, whereas the rectangular box gnomon of the Langlois dial requires three noon inscriptions, one in the shadowed area



Fig. 11. The three noon markers of the Langlois dial.
Photo: Denis Savoie, by kind permission.

for the light strip, and two for the broad rectangular gnomon acting in the usual way (Fig. 11).

The slot gnomons of the pottery and Langlois dials can also be seen as developments of the 17th century oculus spot and meridian lines of Cassini and others,³ but transposing the order of light and line whilst maintaining the datum point of their intersection at noon.

Differing considerably from the other dials, the second pottery dial with its moveable gnomon also allows the light strip to be used to give a compass bearing for the sun at any given time. The time is read from the dial in the usual way, and then the gnomon is moved to point roughly in the direction of the sun, before being adjusted precisely using the light strip, which will then give a reading from the compass scale (Fig. 12). (The compass dial is therefore upside down relative to the time scale.)

This is perhaps something of a toy, but a young person who carries out this experiment for a while will acquire a useful orientation tool; by inwardly absorbing the knowledge of where the sun will be at any given time he or she will know where South is without the need for compass or map.

No doubt ingenious minds will think of other uses for a moveable slotted gnomon and its light strip. Clay is in many ways an ideal medium for such trials, because errors can be corrected easily, and failures disposed of without fuss.



Fig. 13. Simulated summer solstice on the second dial.

Results

Allowing for the crudity of material, and the empirical nature of the construction, the results are gratifying.

So far only the winter solstice position of the light strip can be demonstrated (Fig 7), but this has proved to be satisfactorily accurate on both dials, proving at least the principle. (This was of course proved on the Langlois dial, but as mentioned earlier, details of this dial had not been published at the time of construction of the pottery dials.)

Simulation of the equinoctial and summer solstice positions (Fig. 13) seems encouraging. In the case of the first dial the slit is single, the datum point being where the light strip touches or intersects the datum line located at the base of the gnomon, and the equinox judged to be half-way along the strip (but again please see below).

In the second dial the datum line is the 'smile' of the lips, and the winter solstice and the equinoxes are marked by the shadow of the narrow clay bridges in the slot. In this case for the winter solstice the top of the lowest section of the light strip is read.



Fig. 12. The sun at 09:30, 19th December. Compass bearing between SE and SSE.



Fig. 14. The Langlois gnomon slot and the light strip, showing both the superior accuracy and the ease of identification of the marks attainable with this design. Photo: Denis Savoie, by kind permission.

The design of the markers in the Langlois dial is far superior (Fig. 14) with a central light spot to each, and has been copied on the first dial by incorporating a simple ‘Langlois Bridge’. For indoor use this consists of a perforated metallic sun and moon device on double-sided tape (Fig. 15). Empirical adjustment at the equinox for precise alignment of the light spot on the datum line is readily made. For outdoor use, either a thin pottery bridge may be used, or an after-fitted thin brass bridge.



Fig. 16. The second dial in a (sometimes) sunny spot in a drawing-room window bay.

Conclusion, ‘Conservatory’ or ‘Parlour’ Dials and the Motto

The principles behind the construction of these pottery dials having been satisfactorily demonstrated, dials formed in metal with mathematical accuracy may be considered as a worthwhile addition to the dial range. (The errors in these prototype pottery dials are too obvious to need itemising, the most glaring being the bent nose on the second dial and the stray 6 pm line on that dial, for which I offer no excuse.) As it is the light strip that measures the seasons, there is no need to retain a sharp tip to the gnomons (although the prototypes have done so), and they can be



Fig. 15. The gnomon of the first dial with a simple ‘Langlois bridge’ fitted (above, left and right). Simulated equinox (left).

rounded for safety if so wished. The tent-shaped slotted gnomon design may be constructed at any scale, when suitable materials are employed, while the side walls lend themselves to inscription.

Describing these dials as conservatory or parlour dials implies a certain fragility, whereas in fact pottery is fairly robust when securely mounted on a suitable base. However, small gardens do not necessarily have any more sun than modern conservatories, and as the noon readings on these dials require close examination if the solstices and equinoxes are to be read, they might just as well, and more conveniently, be situated in a sheltered environment (Fig. 16).

When the dials are to be used as conservatory or parlour dials, they should be given a felt or baize lining to protect polished surfaces.

The motto may be read in either order, deisil, or sunwise: SEMPER NOVUS, SEMPER IDEM [Ever new, always the same, the light and time of each new day] or reading from left to right: SEMPER IDEM, SEMPER NOVUS [Always the same, ever new]. It is perhaps equally applicable to the design of the dial, being a new take on an idea at least 250 years old.

ACKNOWLEDGMENTS

Thanks to Elizabeth Buchanan, potter and pottery instructor. Her glazes were rutile based for the dials (sponged off for the ‘cheeks’ and lips), and tenmoku for the pupils of the ‘eyes’.

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CANVEY ISLAND DIAL

PATRICK ARNOLD



Fig. 1. The sundial.

In the summer of 2014, in Canvey Island, Essex, I found what appeared to be a recent, though incomplete, sundial (Fig. 1). There were 'hour' marks but no other dial furniture; a nearby information board had nothing to say about it, so further investigation was needed.

The local newspaper (*Echo*) of 26 April 2012 reported that Castlepoint Council planned to spend £37,000 to spruce up the scrubland next to Benfleet Creek to improve the entrance to Canvey Island ahead of the 2012 Olympic Games. Among various ideas was a giant 8 metre sundial/sculpture in the design of a Thames barge's main mast, the aluminium artwork to be coated in a white powder, all to be ready for 11 August.

A request to Castlepoint Council for up-to-date information brought forth a reply from Ryan Lynch who states: "*The project... never really came to fruition. There is a mast/sail... although some marks were placed on the concrete... it was never very clear if it worked*".

I returned on 17 October 2014 to Canvey Island to survey the dial for the BSS Registrar, John Foad. With a Garmin GPS device I fixed the position of the mast to be 51° 32.393' N × 0° 33.935' E. The eleven 'hour' marks are unlabelled so, for the purposes of my survey, I allotted the letters A to K to them, reading left to right (Fig. 2). I noted

that the sun's shadow fell on mark B (Fig. 3) at 14h 23m GMT. By applying a longitude correction of 2 minutes and equation of time of 15 minutes, together with juggling figures from Sight Reduction Tables, I place the true meridian to be a little to the left of mark E, which leads me to assume that sometime in late September/early October someone with a watch set on British Summer Time marked a point as noon. What happened then is pure speculation and I leave it to others to resolve the logic behind the other 'hour' marks.



Fig. 2. Unlabelled 'hour' marks, with my mark A at far left.



Fig. 3. The shadow at mark B.

If I had a free hand I would remove the existing 'hour' marks and establish a true meridian line to create a noon mark. Nearby there would be a plaque giving corrections to find GMT and BST.

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DUMFRIES HOUSE ARMILLARY SPHERE

BRAD DILLON



This bronze 800mm armillary sphere, which I made last year, stood centre stage at the July official opening of the restored Walled Garden at Dumfries House in Scotland . It was unveiled by HM The Queen, and HRH Prince Charles (when the cover got stuck on the tip of the arrow).

My wife and I (*left, in tails*) were invited to attend, and were given a ham butty and a cup of tea for our trouble.

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Mass Dial Mélange

This entry in the British Sundial Society's equivalent of the Great British Bake Off was on show at the Greenwich Conference.

This single collection must surely mean that its creator, Chris Williams, can claim that he has made more mass dials in the 21st century than all other dial makers put together.

As a noted authority on the vulnerability of mass dials, Chris cannot have been surprised to discover that not a single example in this collection survived the Conference. A careful examination of the photograph demonstrates that the gnomons were particularly vulnerable.

Photo: Tony Moss

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