

SUNDIALS ON THE ISLE OF WIGHT

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Abstract: This paper describes and depicts some of the sundials on the Isle of Wight which are readily accessible. A description of how to read a sundial is followed by illustrated accounts of the various dials that exist (or existed) on the Isle of Wight and covers some of the many types of sundials can be observed world-wide. The appendix lists open access sundials and there is a recommendation to observe sundials when out and about.

Keywords: Analemmatic sundial, armillary sphere, double horizontal sundial, equation of time, gnomon, heliochronometer, meridian line, noon canon, scratch dial, sundial

My interest in sundials began in Northumberland in 1991 when I co-authored *Mathematical Tradition in the North of England* for The Mathematical Association's Annual Conference. At the time, I taught mathematics to students at Prudhoe County High School, an 13-18 state school in Northumberland. When investigating a local mathematician, William Emerson (1701-1782), I noticed some sundials in his home town of Hurworth in County Durham. They had reputedly been made by him, or his protégé, John Hunter. I was always on the lookout for activities that brought mathematics to life. On reading his book, *Dialling, or the art of drawing dials on all sort of surfaces whatsoever*, I realised that I could bring some practical mathematics into my teaching by calculating where the shadow would fall at different latitudes and seasons of the year.

A sundial consists of a flat plate (the dial) and a gnomon, which casts a shadow on to the dial. As the Sun moves through the sky, the shadow aligns with different hour-lines marked on the dial.

I joined the British Sundial Society and started doing 2½ hour mathematics masterclasses for 13-year-old students on Saturday mornings. A couple of years later, I moved from the North-East to Rownhams when I took up a new job, and the masterclasses continued. From the year 2000, I did these dressed as John Blagrave of Reading (1560s-1611), as I enjoy putting the mathematics into an historical context. Blagrave wrote *The Art of Dyalling in two parts* in 1609, and I like to think students enjoyed the challenge of reading some of the original text and following the geometrical constructions using ruler and compasses.

Reading a sundial

*'I am a sundial and I make a botch,
of what is done much better by a watch.'*

Thus wrote Hilaire Belloc, in *On a Sundial* (1938). This is 'a botch' because rarely does a sundial show the same time as a watch. There are three reasons for this:

- the tilt in the Earth's axis of 23.5° and elliptical orbit around the sun;

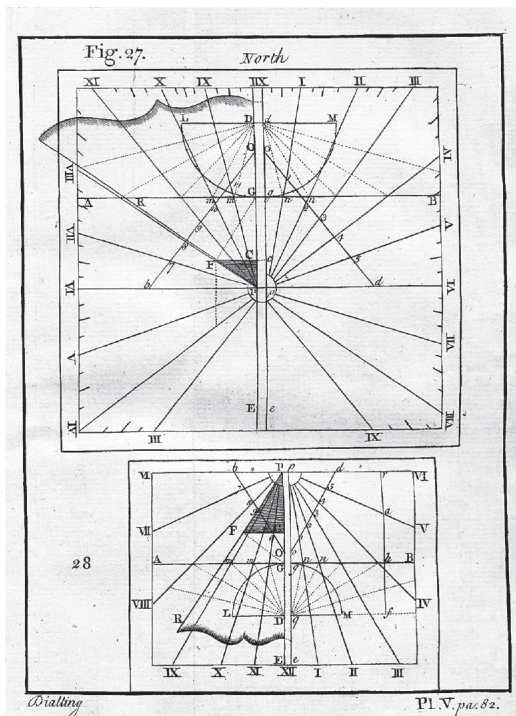
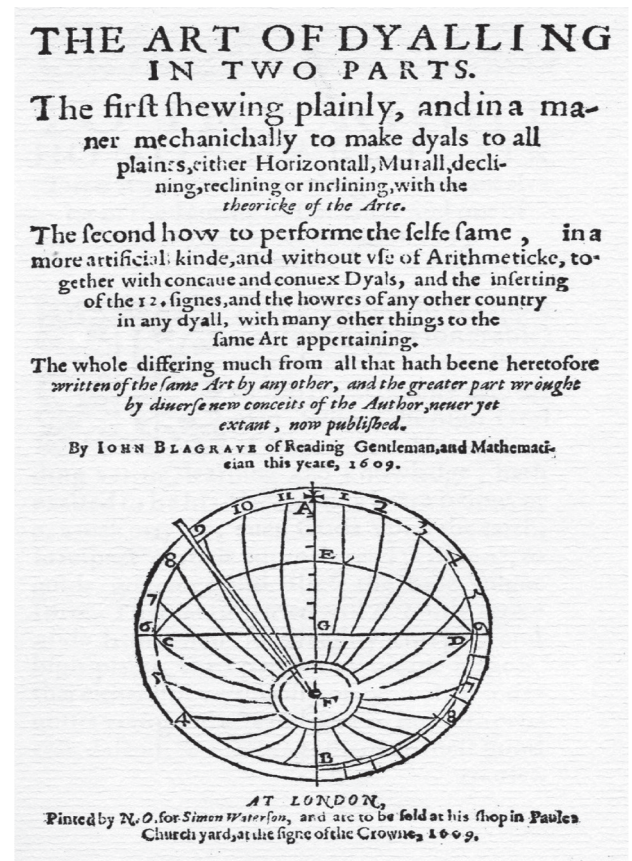


Fig.1 Above: Plate 5 of Emerson's book features the constructions used to make a horizontal dial (27) and a vertical south facing dial (28)

Fig 2 Right: Frontispiece of Blagrave's *The Art of Dyalling in two parts*



- the longitude of the position of the sundial;
- and finally, British Summer Time.

Therefore, three corrections are needed to the time indicated by the shadow on the sundial.

The first is known as the Equation of Time (Here the meaning of the word equation is 'to reconcile a difference'). It is best illustrated by the following graph.

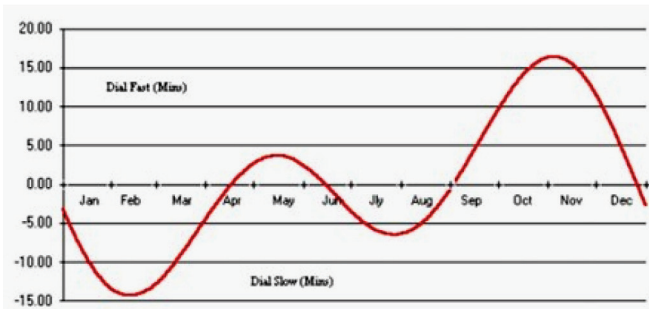


Fig 3: Equation of Time graph

Around the middle of February, the sundial can be about 14 minutes slow, so 14 minutes need to be added to the local solar time. In early November it can be nearly 17 minutes fast, in which case 17 minutes need to be subtracted from the local solar time.

A second correction is required due the Earth's rotation about its axis. Since it revolves through 360° in 24 hours, the Sun appears to us to move through 1° every 4 minutes. Greenwich Mean Time (GMT) is based on when the Sun passes the Greenwich Meridian. Taking an Island example, the longitude of Freshwater is 1.5° West, so the Sun appears to take 6 minutes to travel from Greenwich to Freshwater. This means that 6 minutes needs to be added to a sundial's shadow in Freshwater, in addition to the Equation of Time correction to obtain the time shown on your watch. During the 19th century, as railways spread throughout Britain, a common time system was needed so that people didn't miss their trains, so the UK adopted GMT as its standard time.

The final correction needed arose when British Summer Time (BST) was introduced. If we use a sundial during the period when BST is in use, then we need to add an hour to the time shown on a sundial.

Isle of Wight sundials

The earliest sundial on the Isle of Wight is not a working one, but a mosaic of one (Fig. 4). In the mosaic, the sundial is on top of the pillar and is a representation of the type of Greek sundial shown in Fig. 5. The other two objects are not sundials despite sometimes being featured as such.



Fig 4 The astronomer at Brading Roman Villa



Fig. 5: the Roman sundial at Piraeus, Greece

Interestingly, there is another sundial at the Brading Roman Villa. This is an analematic sundial, sometimes referred to as a human sundial; when a person stands at the appropriate point on a central



Fig 6: The mosaic analematic sundial at Brading Roman Villa.

In the picture you can see that there are two ecliptic rings of mosaic hour markers, the inner ones being used during BST, the outer ones using GMT.

scale and the shadow indicates the local solar time. I am unaware when this excellent sundial was constructed, but I was led to believe the hour tiles were made by local schoolchildren.

Fig. 7 shows a sundial photographed in 1994 in St James's Square Newport. It is an example of an armillary sphere sundial, which is basically a hollow model of the Earth. The gnomon, which is an essential part of a sundial, represents the Earth's axis and its shadow on the broad band that represents the equator indicates the time. Unfortunately, it is no longer there. Today all that remains is the plinth on which it stood (Fig. 8).



Fig.7: The Newport armillary sundial in 1994



Fig.8: The remains of the Newport armillary sundial in 2024

Scratch (or mass) dials are often found on churches. The purpose of these was probably not to tell the accurate time, but to indicate to the local incumbent the time to toll the bell for mass. They are often found near the vestry or porch door, scratched onto quoins. Some are reused consecration crosses, as they would have been nice circles to offer a starting point in which to scratch lines. There is often a central hole or dimple where a rod of wood (or possibly metal) would have been inserted to act as a horizontal gnomon. These no longer exist, as wood rots, and metal would have been too valuable to leave *in situ*. Scratch dials exist on a number of churches on the Isle of Wight and examples are shown in Figs.9 -11. A full list is given in Appendix 1.

Scratch dials



Fig. 9: Holy Cross, Binstead



Fig.10: St John's, Yaverland

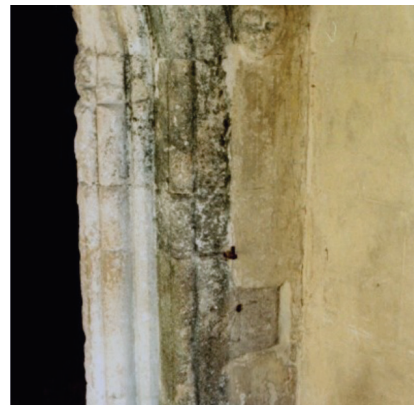


Fig.11: St Michael's, Shalfleet

Scientific dials date from the 15th century, as during the Renaissance science made rapid advances and people required more accurate time keeping. Large mechanical clocks and astronomical clocks in churches and cathedrals needed to be set to time if they stopped, as did long case clocks and watches. To do this, peripatetic clock repairers would carry a suitable sundial, or wealthy landowners would have a horizontal sundial in their gardens. These are the types most people recognise as sundials today. They vary in size, from the one at the church in Godshill, to the one at Blackgang Chine.



Fig.12: Horizontal dial at Godshill



Fig.14: The Newchurch sundial today, after restoration by John Davis



Fig.13: Horizontal dial at Blackgang Chine in 1994

One of the most scientific sundials is in the church at Newchurch. This is a type known as a double horizontal sundial because the shadow of the vertical part of the gnomon gives various other astronomical information. A double horizontal sundial is a horizontal sundial with two scales for reading the hours. The first is a standard scale which is used with the inclined edge of the gnomon. The second is formed by the vertical edge of the gnomon (set at the centre of the dial plate) and the lines of projection of the celestial sphere onto the plane of the horizon (the horizontal projection). This projection shows the lines of solar declination, the ecliptic and the right ascension of the Sun. Due to the intricacy of the engraving, this type of sundial is very rare.

Sundials can be horizontal or vertical, but to be accurate their gnomon must be parallel to the Earth's axis and hence point true north close to Polaris, the Pole Star. Vertical sundials are generally

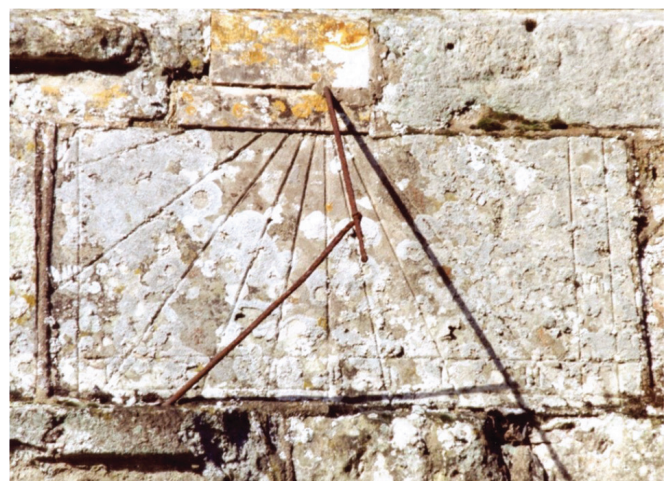
erected on a flat wall and those walls are often declined to the east or west of south, so the hour lines need to be calculated and delineated to take this into account.

Vertical sundials

Fig.15 Left: St Mary's Church, Brighstone



Fig.16 Below: St George's Church, Arreton



On the Promenade at Ventnor is an interesting type of sundial known as a noon dial or meridian line. This is the Brisbane Meridian Obelisk, named after Sir Thomas Brisbane, and is shown in Fig. 17. Unfortunately, it is not complete. The obelisk is there, with part of the meridian line, but the rest of the line and the stone plaque is missing. The plaque

is now in the local history museum at Spring Hill, Ventnor. The history of Sir Thomas Brisbane and the gnomon obelisk are well described on the information board next to the obelisk (Fig. 18).



Fig. 17: The Brisbane Meridian Obelisk. The grey flagstones are part of the original noon line.

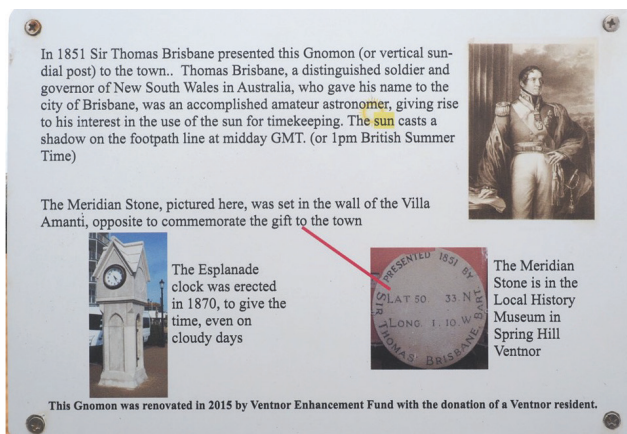


Fig.18: Interpretation board for the Brisbane Meridian obelisk. Photo: Keith Marston

In Ryde Cemetery, there is an unusual type of sundial, a heliochronometer, on the grave of John (Jack) William Towers-Clark (Lieutenant). (Fig. 19) These very precise instruments were made by Pilkington & Gibbs and include a mechanism that takes into account the Equation of Time, so that correction does not need to be made. In the early 20th century, every French railway station had one of these heliochronometers so that their clocks could be accurately checked.

Sundials are not always silent timepieces. On a visit to the Isle of Wight in 1997, I saw a noon cannon sundial in a window in Cowes High Street. (Fig.20) The idea behind it is that the Sun's rays are focussed on the touchhole of the cannon at noon, so that it fires at that instant, alerting those in the vicinity to the fact it is local solar noon. This one was



Fig. 19: Ryde heliochronometer on the grave of John (Jack) William Towers-Clark (Lieutenant), who was killed on 1st July 1916.



Fig. 20: A noon cannon sundial, made or sold by "Ling, Chevalier". Optician place du Pont Neuf, Paris. Photo: Max Aitken Museum, Cowes

made in Paris, probably in the 19th century.

It is said that the UK contains the greatest density of sundials per square mile of any country. With all the sunshine the Isle of Wight receives, it is well worth looking out for them when out walking. The appendix lists many sundials on the Isle of Wight that have open access: I have not listed any that have restricted access for reasons of privacy. Some of those listed were seen in 1994, so may no longer be in existence.

The British Sundial Society <https://sundialsoc.org.uk> has been promoting the art and science of gnomonics since 1989 and is a society that anyone interested in sundials could benefit from joining.

References

Blagrave, J. 1609. *The Art of Dyalling in two parts*, Da Capo Press reprint 1968.

British Sundial Society. 2015. *The Sundial Register*, British Sundial Society.

British Sundial Society BRIDOL (British Dials Online) [Online]: <https://sundialsoc.org.uk/dials-filter/>

Davis, J. & Lowne, M. 2009. *The Double Horizontal Dial*, British Sundial Society.

Emerson, W. 1770. *Dialling, or the art of drawing dials on all sort of surfaces whatsoever*, Nourse.

Green, A. 1926. *Sundials*, S.P.C.K.

Gatty, M. 1900. *The Book of Sun-dials*, Bell & Son.

Hutchings, E. Discovering Isle of Wight Sundials [Online] <https://www.iwhistory.org.uk/ehsundials>.

Ransom, P. 1998. *A Dozen Dials*. Privately published.

Wallis, P., Wallis, R., Ransom, P. & Fauvel, J. 1991. *Mathematical Tradition in the North of England*, NEBMA.

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Appendix 1

Scratch dials (or remnants of them) can be found on the following churches:

Arreton, St George's Church, in south porch, on stone seat near west side of door.

Binstead, Holy Cross Church, on south-east corner of chancel.

Calbourne, All Saints' Church, two on east jamb of priest's door; two on west jamb of priest's door.

Shalfleet, St Michael's Church, on door jamb of south porch door.

St Boniface Old Church, Bonchurch.

Wootton Bridge, St Edmund's Church, on south-east buttress, facing south.

Yaverland, St John's Church, on west jamb of south doorway in the porch.

Other dials

Arreton, St George's Church. A vertical dial above the porch.

Blackgang Chine, Amusement Park. Large horizontal walk-on dial.

Brading, St Mary's Church. Horizontal dial on the post of a 1714 cross.

Brightstone, St Mary's Church. Vertical dial above porch.

Godshell, St Lawrence and All Saints Church. Horizontal dial.

Newchurch, All Saints' Church. Double horizontal dial inside church.

Niton, St John the Baptist Church. Horizontal dial Ryde, Cemetery. Heliochronometer on grave of John (Jack) William Towers-Clark.

Ventnor, Promenade. Brisbane Meridian Obelisk Wootton, St Edmund's Church. Horizontal dial, probably a modern replica.