

THE DINTON CHURCH SUNDIAL

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The unique palimpsest dial-plate of a horizontal sundial, originally mounted on a pedestal in Dinton churchyard, is described. Numerals resembling 1395 are cut into the underside of the plate; but it is considered likely that this was the work of a 16th century artisan attempting to incise the date 1595. It is understood that the dial has now been deposited in and is on loan to the Buckinghamshire County Museum, for security reasons.

INTRODUCTION

In 1982 or very early in 1983, a local NADFAS Church Recording Group discovered a "sundial plate", described as a "re-used plate", at the bottom of a chest in the recesses of the Dinton parish church of St Peter & St Paul.

The sundial, or what remains of it, takes the form of a roughly square palimpsest dial-plate made of brass (the bisecting measurements being approximately 155mm x 158mm) of a 'common or garden' horizontal instrument. The date cut into the underside of the dial-plate, which is unweathered, has suggested that the sundial might have been made in the 14th century; but it is more probable that this is a late 16th century work. The gnomon is missing and two corners of the dial-plate are broken off. On the upper face of the plate, there are the large, slightly domed heads of hand-made iron clout nails, passing through the two remaining adjacent corners. One of these nails is still attached to a lead plug on the underside of the plate. The sundial would have been 'leaded-in' to the uppermost horizontal surface of a stone pedestal. Thus, it would have been set such that the inclined edge of the gnomon would have been aligned in the meridian, parallel to the earth's polar axis, directed to the north celestial pole.

THE UPPER SIDE OF THE DIAL-PLATE

The upper side of the dial-plate is well delineated with incised hour-lines, correctly but not visibly originating from the centre of the dial-plate, at the base of the gnomon, being the junction of the 12 o'clock and 6 o'clock hour-lines and being the *centre of delineation* in this case. (Figures 1. & 3.) These hour-lines are carried out to two concentric circles, forming a band containing Roman numer-

als denoting the respective hours (the *hour-circle*, sometimes called the 'chapter-ring'). The small central circle is also furnished with what appear to be blind-stamped roundels, containing a central point, possibly representing the sun or a star, and intended to mark the position of the half-hours. A little more than midway between the small central circle and the innermost circle of the hour-ring, there are similar, but slightly larger blind-stamped circular images that are clearly intended to mark the half-hours. There are also small pointed inward-pointing marks on the innermost circle of the hour-ring, having a thorn-like appearance, that more accurately indicate the half-hours.

The hour-lines are delineated and denoted by Roman numerals from IIII (4am) to VIII (8pm) Local Apparent Time, except for 12 o'clock (Noon) which is marked by a small cross. This was a customary practice in the *Art of Dialling* (the mathematical art of constructing sundials) in the delineation of sundials, evidently originating from the principal hour of the 'Stations of the Cross'.

THE INSCRIPTION AND DECORATION

On the south-side of the dial-plate within the band of the hour-circle, between the hours of VIII (8pm) and IIII (4am), there is the Latin inscription AVT SOL AVT NIHIL ('Aut Sol: Aut Nihil,' which may be translated as 'Either the Sun, or Nothing,' or 'Without the Sun, there is Nothing'). In the triangular area between the incised VIII and IIII hour-lines there are three small blind-stamped roundels, each containing a central dot, with six spikes emanating uniformly from the circumference of the roundel, evidently representing the sun or stars. One such image is exceptionally clear and well-preserved whilst the other two are quite worn and difficult to discern. The three images form an



FIGURE 1 Photograph of the upper side of the dial-plate.

isosceles triangle, one such image at the apex lying on the meridian line, i.e. the centre line or the 12 o'clock hour-line, which device would seem to be purely decorative. Other stamp-marks, somewhat similar to those on the inner circle of the dial-plate, have also been made along the 12 o'clock line, from the base line of the 'triangle' to the circumference of the inner circle. These, too, would seem to be merely ornamental.

The question as to whether these various stamped images were intended to represent the sun or the stars may be considered in the light of the fact that, in historical illustrations of the heavens, the stars are invariably depicted as devices with triangular 'rays' of four, five or six points, emanating

from the centre of the image. They are seldom, if ever depicted as roundels or circular images with spike-like rays, whereas the sun is normally shown as a circle, often with a human face, with rays stemming from the circle of the image. In reality, this is an historical consideration concerning only the intentions of the instrument maker, since the sun is a star, of course, and vice versa.

THE FORM OF THE GNOMON

The dial-plate itself has an oblong section, measuring approximately 72mm in length by 6mm ($\frac{1}{4}$ inch) in thickness, cut out along the centre of the dial-plate, along the 12 o'clock noon-line, to allow for



FIGURE 2 Photograph of the reverse or underside of the dial-plate.

the gnomon. The gnomon, evidently, was either 'free-standing', i.e. separately 'leaded-in' to the stone-work of the pedestal, (which would seem to be unique, there being no known dial extant having these characteristics), or brazed to the underside of the dial-plate by some means. The dial-plate appears to have been constructed for a latitude of approximately 50-52 degrees (north), according to the best measurements obtainable from the respective hour-angles. Thus, it may be assumed that the

gnomon took the form of a solid bronze right-angled triangle, the angle of the base at the centre of delineation (the centre of the dial-plate) being equal to the latitude and the angle nearest to the cross, marking 12 o'clock (Noon), being a right-angle. Given the latitude as being 52 degrees and the length of the base as 72mm, the height of the gnomon (above the surface of the dial-plate) may be deduced to be 92mm and the length of the inclined edge of the gnomon to be 117mm.

THE UNDERSIDE OF THE DIAL-PLATE

The underside of the dial-plate appears to have been the work of another, earlier hand. (Figures 2. & 4.) It has not been delineated with hour-lines in the same fashion as the upper side of the plate, although it can be seen that some attempt has been made at delineation, since there are a number of faint lines scored from the centre of the dial, notably the 6 o'clock line (VI), 4pm (III) and 7pm (VII). Otherwise there is a crude circle of Roman numerals, 'blind' stamped or punched above a circle of punched dots, 46 in number, no doubt intended to be 48, but with one missing at 12 o'clock (Noon), where the perpendicular edge of the gnomon would have been situated, and one concealed by the punch mark at the base of the numeral V (5 pm). These dots represent the hours and half-hour points in the 24 equal-hour system

(two periods of twelve hours) as used today. The underside of the dial-plate is decorated with ornamental scalloping around the edges of the plate, and similarly as two small concentric circles around the centre of the plate. The latter have the appearance of small crescent moons. Midway between these two circles and the outer ring of Roman numerals, there is another ring of small circular punch marks, or, possibly, drilled decorative circles, 23 in number being visible, but probably intended to be 24 all told. (It would seem that one such circle has been obscured where the plate has been cut away to take the gnomon.)

THE INITIALS AND DATE

On the south side of the underside of the dial-plate, between the numerals VIII (8pm) and IIII (4am), between the ring of small circular punch-marks and

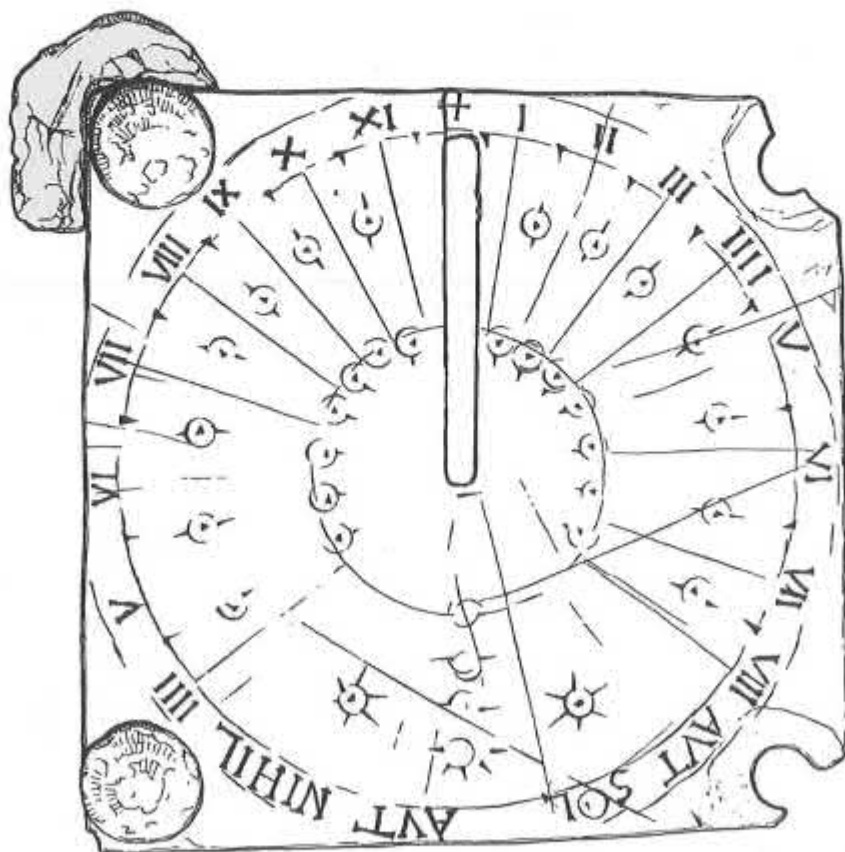


FIGURE 3 Drawing of the upper side of the dial-plate. (Drawing by David Honour.)

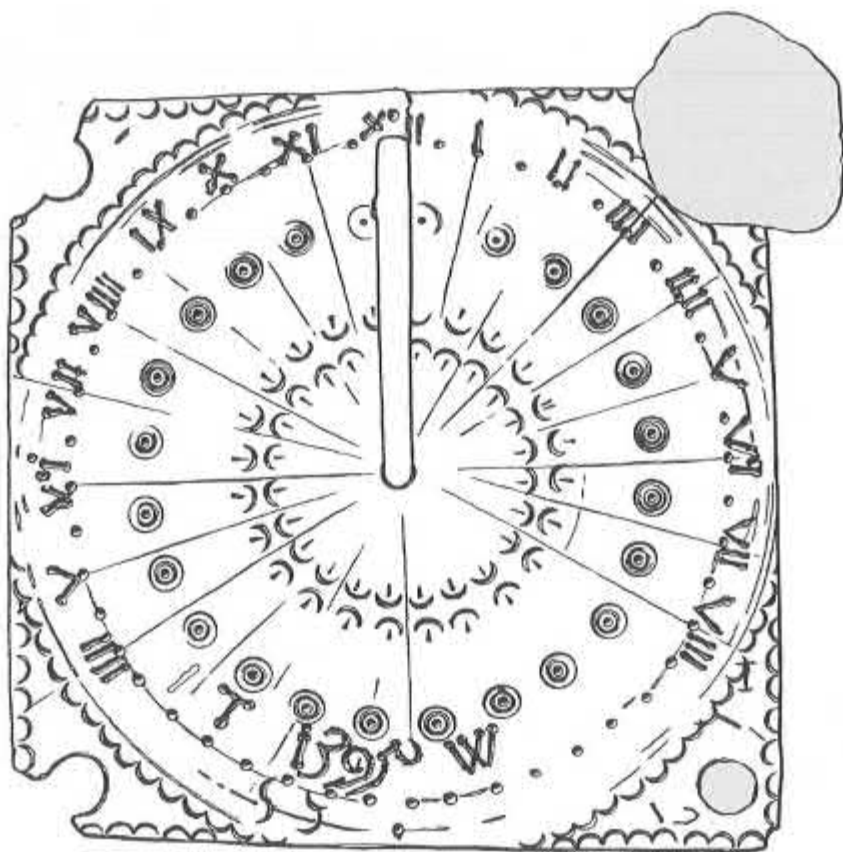


FIGURE 4 Drawing of the reverse of the plate. (Drawing by David Honour.)

the punched ring of hour and half-hour dots, there are what appear to be two punched, but possibly incised, letters T and W. These probably represent the initials of the would-be maker, being placed on either side of a crudely cut date, which has the appearance of being 1395, in Arabic numerals. (Figure 5.) The initials and the date would appear to have been added at the end of the construction.

Whether the workmanship on the underside of the dial was a preliminary trial for the delineation of the upper side of the dial-plate is uncertain; but the apparent difference in style suggests otherwise. Nevertheless, the upper side of the dial-plate and the underside may well have been laid out within a few years of each other. It is the date, however, that arouses curiosity and some excitement.

THE ARGUMENTS

The argument that the date 1395 is valid for the instrument is that Arabic numerals, in the style of those cut into the dial-plate, were in use in Europe in the early 15th century, if not before. Contrary to this, an authority on the Chaucer period has stated that the numerals are not consistent with the period.¹ Analysis of the metal indicates that the sundial matches the average for Flemish brass before AD 1560.² Thus, the analyses of the sundial are not incompatible with it having been made in 1395 in England from imported Flemish brass. However, neither are the analyses incompatible with it having been made from brass that was imported in the mid 16th century.

The argument against the date being a valid one is that English craftsmen experienced difficulties in



FIGURE 5 Close-up photograph showing the detail of the punched initials 'T.' / 'W.' and the numerals '1395' chiselled into the underside of the dial-plate. The initials may be those of the original maker, diallist, or patron. The date is probably an error that caused the instrument to be reversed and engraved on the other side.

the use of the 'new' Arabic numerals, introduced into this country, before and throughout the 16th century.³ Antiquarian authorities view the date as being suspect and consider that it was an unsuccessful attempt by the metal-worker to incise the date 1595. This may be one reason why the underside of the dial-plate was not completed and used for its intended purpose.

THE 'SCIENTIFIC SUNDIAL'

It would, of course, be an exciting discovery if this could be proved otherwise. The dial-plate of the Dinton sundial, as already stated, is that of a horizontal instrument that can be described as a 'scientific sundial.'⁴ Sundials take many different forms and are placed in various classes, i.e. horizontal, vertical, polar and equinoctial. Anglo-Saxon vertical sundials and medieval 'mass' dials, carved into the walls of churches, employed an horizontal gnomon⁵ to indicate the 'hours' of the church services; but they were inaccurate except at Noon. The 'scientific' sundial is generally accepted as an Arabic invention⁶ in which the gnomon was inclined parallel to the polar axis of the earth, directed to the north celestial pole. In this manner it indicated *equal hours*. This invention, sometimes called the 'Moorish' sundial,⁷ is thought to have made its first appearance in Europe about the end of the 14th century or the beginning of the 15th century, in Germany.⁸ Certainly, by the end of the 15th century, the scientific sundial had become an established instrument for use in the determination of time by the equal or equinoctial hours system. Probably in the latter part of the 15th century, the scientific sundial was introduced into England from Europe. The earliest dials of this kind, still extant, of which there are few, chiefly date from the second half of the 16th century, mostly made by London instrument makers, such as Humphrey Cole.

CONCLUSION

One must conclude that the Dinton church sundial was likely to have been made by an artisan or 'country' metal-worker, probably a blacksmith, under the direction of an educated gentleman with a knowledge of mathematics, at the end of the 16th century. This in no measure detracts from the importance of this instrument, which, so far as it is possible to ascertain, is unique.

Note: The author was not aware of the existence of the pedestal (Figure 6.) until recently, when provided with a photograph of Dinton churchyard by Mr George C Lamb. The pedestal seems to be referred to in church literature as a cross; but it would appear to have been 'stumped' i.e. cut down, almost certainly during the Reformation in the reign of Queen Elizabeth. The horizontal surface of the stump evidently contains two lead plugs inserted with iron nails that match those of the dial-plate.⁹ This would seem to confirm the date of the sundial as being of the late 16th century.

In a very recent letter move,¹⁰ Mr Lamb has informed me that: "There is a gnomon, but detached from the dial. I enclose a crude sketch, but the dimensions are pretty accurate (and extremely close to your calculations). It is made of iron but very corroded at the lower end and there is no surviving trace of brazing/lead/solder to shew how it could have been fixed in to the dial. Moreover, it is 3-4mm thick and the slot cut in the dial is 6-7mm." He goes on to say that Dinton church has a total of nine monumental brasses, that were examined and restored in 1949. Several of these are palimpsests. One, in particular, is the monument to Francis Lee (d 1558)... "a brass, one piece of which is a palimpsest of a Flemish memorial engraved c 1380. So the sundial might be made of metal brought to the village at various dates during the sixteenth century by craftsmen installing one of the memorial brasses... [The full description of the palimpsest brasses is contained in an article in *Recs. Bucks* by D. C. Rutter in 1949 (Vol XV pt 3)] ..."

This latest information is of much interest as it tends to confirm the possibility that the gnomon (which I think is likely to be the original) was 'free-standing' and probably separately 'lead-in' to the pedestal, having been aligned in the meridian first. This also provides further weight to the argument that the sundial was made in the 16th century.

ACKNOWLEDGEMENTS

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FIGURE 6 Photograph of the pedestal of the sundial in the churchyard of St Peter & St Paul, Dinton. (Photograph by Joan Lamb.)

D J Cooke, the Rector of Stone and Dinton, for the kind loan of the article so that it could be studied and recorded; to Dr A M Pollard of the Research Laboratory for Archaeology and the History of Art, Oxford University, for his work on the analysis of the metal; to Mr David Honour, especially, for his excellent and meticulous drawings of the instrument; and to Mr George Lamb for specifically suggesting that the author should write a note on the Dinton sundial for the *Records of Buckinghamshire* and to his valuable contribution to this resulting article.

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