A Cook

Mass Dials on Yorkshire Churches

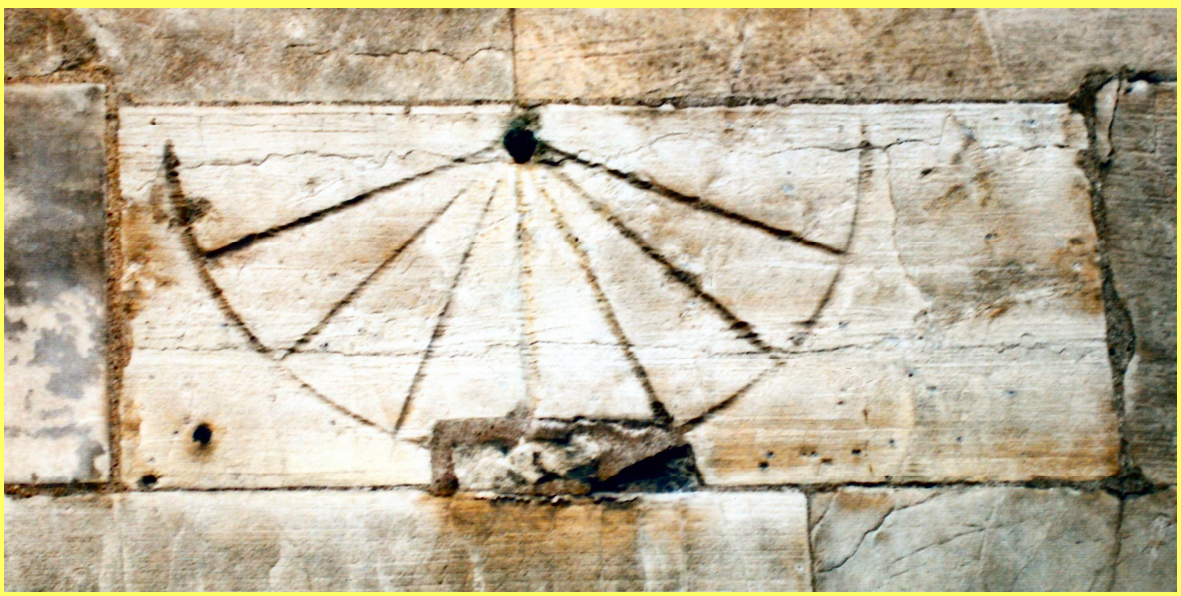
BSS Monograph No 3

MASS DIALS

ON

YORKSHIRE CHURCHES

ALAN COOK



The British Sundial Society

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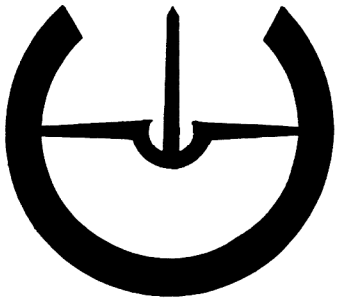

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Front cover illustration: *The mass dial on York Minster.*

Back cover illustration: *The mass dial at Castle Bolton.*

Other British Sundial Society Monographs in this Series

1. C. Daniel: *The Equation of Time: The Invention of the Analemma. A brief history of the subject*, (January 2006).
2. J. Wilson: *Biographical Index of British Sundial Makers from the seventh century to 1920,* (December 2007).
3. A. Cook: *Mass Dials on Yorkshire Churches,* (May 2008).
4. M. Cowham: *A Study of Altitude Dials,* (t.b.p. 2008).
5. J. Davis and C.M. Lowne: *The Double Horizontal Dial,* (t.b.p 2009).

FOREWORD

The recording of mass dials relies on the work of dedicated individuals throughout the country. Today, thanks to the British Sundial Society, they are able to present their findings alongside others so that a countrywide listing is available for all to use.

Alan Cook is in the tradition of individualist recorders which stretches back to Dom Ethelbert Horne who was recording a hundred years ago. Like him, Alan is now able to see his work published as a book.

Between Dom Ethelbert and Alan, a succession of enthusiasts had worked almost in isolation, their results occasionally surfacing in county journals or books about churches. Much of this recording work was carried out between the wars. Then, after the Second World War, a few individuals started to use photography for their records. The British Sundial Society was formed in 1989 which allowed Edward Martin to set up the Mass Dial Group which now collects the records of mass dials onto a database and acts as a central agency. Alan has deposited photographs of Yorkshire mass dials into this database but, as photographs of mass dials often do not show all the features clearly, especially when printed in black and white, he has chosen to use careful drawings of the dials for this monograph. Thus, Yorkshire joins Rutland in having drawings for its records.

For the first time a commentary on dial distribution is given and the particular interest of a 'boundary' in the region is explored. The West Riding of Yorkshire has very few mass dials and, together with Lancashire, forms a 'dial desert' which requires some explanation. This is addressed, together with notes about the distribution of various dial types.

Alan's record now forms an important part of the Mass Dial Register, complementing the work the isolated pioneers and of other BSS members who have explored and recorded Yorkshire's churches.

A 'book on the shelf' is the most useful high speed reference for most of us so this monograph forms a very useful addition to the mass dialling literature. There is still much to be discovered.

Tony Wood
BSS Mass Dial Group
March 2008

AUTHOR'S INTRODUCTION

About 1993 I started to take an interest in sundials. My wife bought me a book *Sundials, Their Theory and Construction* by Albert Waugh. Following the advice contained in that book, I quickly became absorbed in the calculations required to design a sundial that would tell the time accurately on every sunny day of the year. After constructing a wooden horizontal and a wooden vertical dial, and satisfying myself that the theory did indeed work very well in practice, I set about the task of learning how to hand-engrave onto brass sheets. It took many months of practice before my confidence was high enough to attack a one foot square piece of brass sheet to construct my first brass horizontal scientific sundial, complete with a graph showing the 'equation of time'. This enabled my sundial time to be quickly converted to standard clock time. The result was very successful and the dial now stands proudly on a brick plinth in my garden.

Following this early success, I joined the British Sundial Society (BSS) and found that there were a few hundred people in the UK who shared this general interest in sundials. I also found that there was a wide range of interest in aspects of the subject that I had never known about before. One of the objectives of the BSS is to search out and record all the sundials remaining in the UK. Also, within the BSS was a small group of enthusiasts who were particularly interested in 'mass dials' and they were busy searching out and recording these dials separately from the main Sundial Register. I was intrigued by this as I had never heard about mass dials before. Waugh does mention crude early sundials scratched onto many medieval church walls but does not call them mass dials. A book borrowed from the local library, *Sundials - Incised dials or Mass Clocks* written by Rev Arthur R Green, clearly explains the differences and where to look for these very ancient dials. My first search took me to three churches. On the first I found five mass dials, on the second church three and on the third, two. I was hooked, although I must now admit that I was lucky on that first search, an awful lot of churches don't have any sign of any ancient sundials on their walls. That initial experience got me started recording both the conventional scientific sundials and also mass dials for the BSS Registers. I have found this to be a very enjoyable pastime and I still consider that a detour to inspect old churches for sundials adds interest to any journey.

Apart from a very few transitional dials dating just a little later, all mass dials were cut before 1550 AD so it may come as a surprise to find that so many have survived. I recorded one hundred mass dials in Yorkshire before I reached that total of scientific dials in the same area. On reaching the mark of one hundred for each type I admit that my enthusiasm for recording waned a little. My recording rate slowed to a noticeable degree but eventually I reached the stage when I thought, with the aid of Nikolaus Pevsner's *The Buildings of England* books and Frank Bottomley's *Yorkshire Churches*, that I had visited all the churches in Yorkshire which may have been old enough to once have had a mass dial cut into their walls. At the back of my mind had been an idea that I should try to produce a booklet explaining what all this searching had found. One disappointment has been seeing so many good scientific horizontal sundials vandalised or stolen since I started to record them. However, mass dials are carved direct onto the church walls, cannot be removed and don't have any intrinsic value. The main threat to their continuing existence is erosion. After 500 years or so it is hardly surprising that wind, rain and ice has destroyed many dials. I believe that producing a record of Yorkshire mass dials and an explanation of them is a worthwhile task to undertake before erosion eliminates what remains.

Alan Cook
April 2008

A BRIEF HISTORY OF TIME MEASUREMENT

MECHANICAL CLOCKS

There are two ways we may tell the time with any accuracy. Nowadays, we all use the time told to us by our mechanical or electric clocks and watches. We all accept that there are 24 hours each day and every hour is equal in length. In the UK we all set our clocks to a common reference point called Greenwich Mean Time.

SCIENTIFIC SUNDIALS

The only other way of telling the time accurately is by using the sun. Various other methods such as water clocks, sand clocks and calibrated candles have all been tried with varying success but, ultimately, they all require setting and checking against the sun or a clock. Using the sun for measuring time is not as easy as it sounds though. Finding noon is easy enough, we need a straight stick inserted vertically into the ground on a patch of level ground. The stick casts a shadow on the ground and when the shadow is at its shortest it means that the sun is at its highest point for the day. This is noon and the sun is directly South from our observation position. Things now get more difficult. Because the sun's height above the horizon at noon changes each day, the shadow length changes. The position of the shadow at sunrise and sunset also changes a lot throughout the seasons of the year so, to be able to tell the time, we would need to make new calculations throughout the year. Fortunately, around 1400 AD, it was discovered that if the stick, instead of being inserted vertically, was inserted so that it pointed to the celestial north pole (approximately indicated by the Pole Star) then the shadow cast onto the ground would always fall in the same direction at the same time of the day throughout the year. The ground could be marked so that the intervals were the same as those shown on the newly introduced mechanical clocks. It took perhaps another one hundred years for sundial designers in northern Europe to be able to calculate mathematically the hour angles and to be able to construct dials to be mounted horizontally, vertically, on walls declining from south-facing and even on reclining surfaces at any angle between vertical and horizontal. The important key was to align the 'gnomon' (the stick to cast the shadow) directly to the north celestial pole. In fact this is really the angle of latitude for the location of the sundial and means that the gnomon is parallel to the Earth's rotational axis. These are the sundials we now know as *Scientific Sundials*.

So far, so good. A couple of other things should be mentioned before leaving this subject. When a sundial is set up on its location it will record noon when the sun is directly South of it. The Earth revolves through 360° per day, or 15° every hour. This means that a sundial in, say, Liverpool which is 3° West of Greenwich, will show midday on its dial some 12 minutes after noon is shown on a sundial at Greenwich. This is a constant value for each location and needs to be remembered when comparing clock time and sundial time. Finally, the Earth follows an elliptical orbit around the Sun which results in some days being longer than others. Mechanical clocks show an average (or mean) length of day. Although the differences are less than around 30 seconds per day, they accumulate so that at the beginning of November each year our sundial will show a time just over 16 minutes fast and in February 14 minutes slow when compared with an accurate clock. This difference is known as the 'Equation of Time' and repeats reliably (to a reasonable approximation) every year

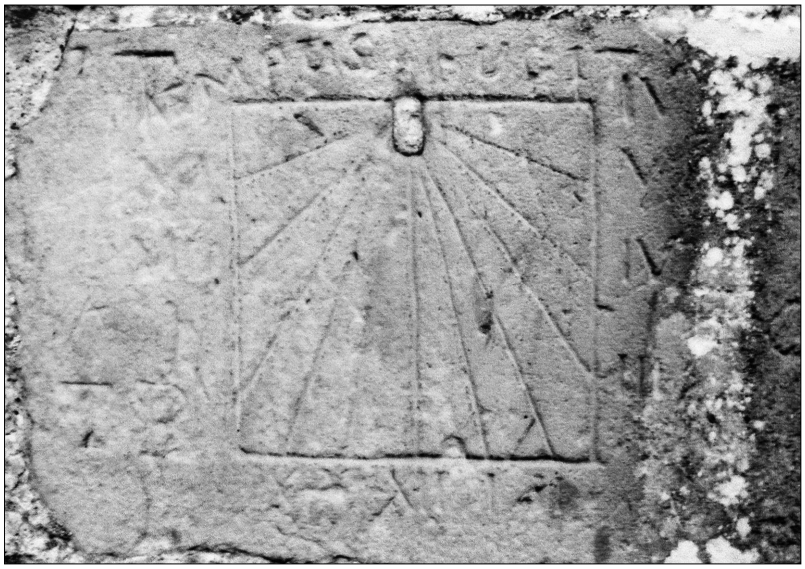


Fig. 1. Londesborough, All Saints. An example of a very early scientific sundial. Note that the hour lines are cut at different angles, narrower near noon and getting wider towards 6am and 6pm. The gnomon is missing but would have been angled away from the dial and aligned with the north celestial pole.

so, by using easy-to-read graphs or tables, this difference can be easily reconciled and our sundial will then tell exactly the same time as our clocks and watches.

It may be a surprise to some that mechanical clocks were invented before scientific sundials. The earliest clock in the UK was installed at Wells Cathederal in 1392. The introduction of clocks showing equal hours was an entirely new concept of time. Scientific sundials were really made to follow this new measurement of time. What we are interested in now is, how did people know the time before mechanical clocks were invented and the population started using this new 'equal hours' system ?

MEDIEVAL TIME SYSTEMS

Remarkably little has been written about time measurement before mechanical clocks were invented but various authors have referred to primitive-looking dials carved or scratched onto our ancient church walls. It is pretty obvious that these were used to tell the time somehow. Rev Arthur Green called them 'incised dials' or 'mass clocks'. Dom Ethelbert Horne called them 'primitive sun dials' or 'scratch dials'. The BSS settled on the term **mass dials** and I believe that that is the name that should be given to describe all the different types of dial dating from the earliest Anglo-Saxon dial found in the UK, found on an Anglo-Saxon cross at Bewcastle, Cumbria, dated at 672 AD, through to the last 'transitional dials' dating from around 1550 AD. The one thing they all had in common was that they all had straight gnomons mounted horizontally onto (approximately) south-facing walls.

GNOMONS

Early dials found on ancient church walls clearly used horizontally mounted gnomons. Although no dials have been found with a complete original gnomon in-situ, the gnomon holes are bored horizontally and some have been found with broken off remnants of the gnomon still jammed into the hole. The size of the gnomon seems to have been in the order of 1.5 to 2 cm diameter and its length probably 10 to 20 cm, depending upon the size of the dial. The gnomon may have been iron or wood and occasionally remnants found have been latten, an alloy of zinc and copper.

EXPERIMENTS WITH THE SUN'S SHADOW

Before looking at mass dial types, it may be worth pausing to consider what the sun's shadow does throughout each day. If we insert a straight stick vertically into the ground and watch the sun's shadow, we quickly realise that the shadow moves differently during the winter months than it does in summer. Similarly, consider an experiment using a straight stick mounted horizontally to cast a shadow onto a vertical surface facing due South. At the spring and autumn equinoxes, the sun rises due East at 6am and sets due West at 6pm. Thus the shadow lies horizontally, grazing the dial surface, at these two times and between them sweeps through 180° in 12 hours (averaging 15°/hr). The situation at other times of the year is different and depends on the latitude of the location. Consider the case for mid-Yorkshire at 54° N. On mid-winter's day (the winter solstice) the sun doesn't rise until just before 8:30am and sets at just after 3:30pm. The shadow sweeps through 180° in about 7 hours, averaging 25.7°/hr. On the summer solstice or mid-summer's day, the sun rises at about 3:30am but the gnomon doesn't cast a shadow on the wall because the sun is too far to the North and the whole test surface is in shadow. Not until about 7:15am does the sun start to illuminate our south-facing wall and by this time it is about 29.5° above the horizon, casting a shadow below the horizontal by the same amount. During the 9½ hours that the wall remains in direct sun, the shadow sweeps through 121°, averaging 12.7°/hr. We can now see clearly that, before the introduction of scientific sundials with their sloping gnomons, telling the 'clock' time by using the sun's shadow would have been a very difficult proposition.

HOW DID MASS DIALS TELL THE TIME?

The markings on mass dials divided the daylight period into parts that may be called *seasonal hours*. The sun's shadow reaching the various markings on the dial face varied with the seasons of the year.

The earliest dials we find in the UK are those dating from the Anglo-Saxon period. The Anglo-Saxons divided daylight into four parts and called them *tides*. The terms noontide and eventide, for example, are throwbacks to our Saxon ancestors' method of timekeeping and have nothing to do with the level of seawater. These dials are easily identified by having a dial face consisting of a half circle, gnomon hole at the top, a horizontal line through the gnomon hole, a noon line vertically down and a line at 45° in each quarter to divide morning and afternoon into equal parts. There may be other lines carved to further divide each of the four tides into equal parts. Our Saxon forefathers were obviously not too bothered about numbering the parts of their days but they did leave some extremely well-carved dials and some with inscriptions that allow the dials to be dated quite well.

The Norman conquest brought about many changes to the daily lives of the population including a new method of marking their timekeepers. They introduced what we now call the duodecimal system. This divided daylight into twelve parts and they numbered them from 1 at sunrise to 12 at sunset. Noon was six. There does not seem to have been a great deal of interest in timekeeping though. The standard of craftmanship shown on most dials of this period is of poorer quality than their Saxon predecessors and the dials vary in design quite widely. No dials have been found with the Norman numbers carved showing hour times 1 to 12 and few carry a full set of twelve divisions. It does seem

that these dials were used more as a day planning arrangement rather than time measurement systems.

The population generally would have been involved in agriculture and associated trades and their lives regulated by the work needing to be done and the amount of daylight in which to carry it out. Probably the only people needing a time measuring system would be the clergy. It is known that they said prayers at regular intervals and held church services at specific times, particularly on Sundays and festival days. They used these primitive dials carved, or scratched, onto their church South facing walls. When the sun's shadow reached the appropriate mark, the sexton would toll the church bell to summon the congregation to church. Before the Reformation, the services would be called Mass, hence the term 'mass dial'. The fact that the actual time of the service changed with the seasons was of no particular interest and in fact may have been an advantage to farming people. It always gave them time between sunrise and the church service to attend to their animals before going to church whatever the season.

CANONICAL HOURS

During this period of our history, the church laid particular emphasis on holding 'offices', i.e. prayers and psalms, at specific times during the day. These 'offices' were at *matins, prime, terce, sext, none, vespers* and *nocturns*: they were called 'canonical hours'. Matins was before daybreak, prime was at sunrise, vespers at sunset and nocturns after nightfall. The other three were indicated by the dial shadow. Terce was at the third hour, sext at the sixth and none at the ninth hour as measured on the Norman system of time. On our modern system these would be 9:00am, mid-day and 3:00pm in the afternoon. The marks on the mass dials are particularly important for these canonical hours and, indeed, some dials only show marks at these hours.

TRANSITIONAL DIALS

After 1400 AD, dials again started to change. Mechanical clocks were beginning to be introduced but only into the cathedrals and large parish churches. They were very expensive and initially unreliable. Scientific sundials were starting to make an appearance: they were used to set and check the time on clocks and were becoming popular on churches from 1600 onwards. During this period, the concept of equal hours was gaining ground and the use of seasonal hours was losing favour. Both these new devices used a new system of calling mid-day twelve o'clock and scientific sundials showed 6:00am to 6:00pm. It must have been an interesting period, a bit like our recent move to decimal currency and the measurement transfer from Imperial to Metric but without any of the publicity. Few people in the country would have been able to read or write so getting over a new concept would not be easy. Mass dials were still in use though and a lot of dials we now see date from that century. The main characteristic is that they went back to dials with lines at fifteen degree angles, usually much better cut than their predecessors and often with a full circle of lines, as if they were trying to copy the face of the mechanical clocks. Some even have numbers of the new hours at the ends of the lines. Some authors, Rev A. Green and others, have suggested that the gnomons on these late mass dials may have had their gnomons bent downwards to give better accuracy. My own view is that this is unlikely. No evidence remains to support the suggestion and, to attain accuracy, they would need lines to be calculated and drawn at different hour angles as well as the gnomon bent at the angle of latitude.

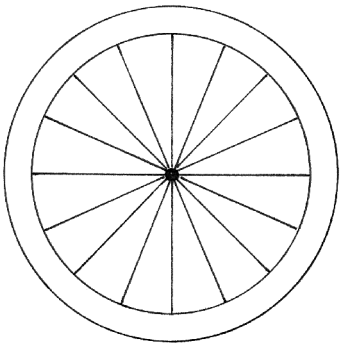
With a few exceptions, by 1550 AD the humble mass dial had given way to scientific sundials and mechanical clocks. The mass dial had become redundant. The survivors we see today leave a story that is difficult to appreciate fully. They also leave a few questions which are hard to answer with any real conviction. For example, why do we often find more than one dial on a church, why are there some areas in the country with a lot of churches with mass dials and others areas with none, and why did so many have markings above the dial horizontal where the sun's shadow could never have reached? We may never know the answers to these questions but that doesn't stop us from speculating what the answers may have been.

LOCATION OF DIALS ON CHURCHES

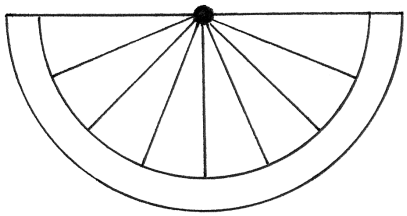
Originally all mass dials would have been located on the south-facing wall of the tower, nave, transept, aisle or chancel. The majority are still to be found where they were originally placed, but not all of them. A lot of renovation, rebuilding and alterations have taken place on our churches since 1500 AD (particularly in the Victorian period) so it isn't entirely unexpected to find mass dials in some unusual places. They can now be found on North, East and West facing walls and even on walls inside churches in a few cases. They were usually placed at a convenient height, 1 to 2 metres above ground level, and very often to one side of the South door or the priest's door. The dials that have been repositioned can be found at any height and often upside down or on their side.

TYPES OF MASS DIALS FOUND

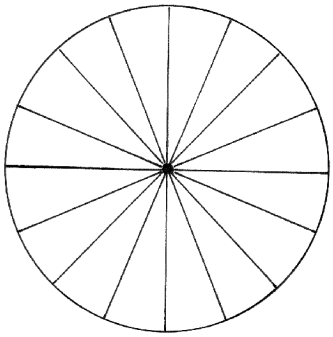
The types of mass dials to be found on our ancient Yorkshire churches vary enormously. Their size varies from about 50 to 380 millimetres radius. The angles between the radiating lines vary but they also look different from each other. Some only have lines radiating from the gnomon hole, some have circles drawn round them, some only have half circles, some don't have any lines at all but do have a circle of holes (or pocks). I have decided to group them by appearance. Fig. 2 shows nine distinct types lettered A to I.



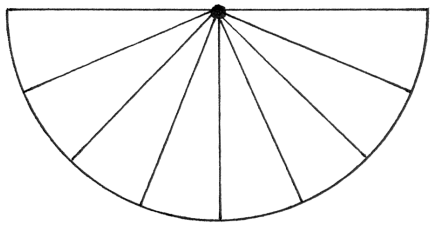
Type A
Full circle, double, with lines



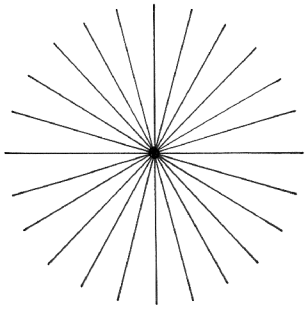
Type B
Semi circle, double, with lines



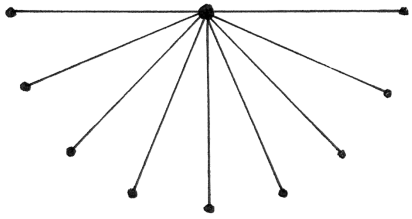
Type C
Full circle, single, with lines



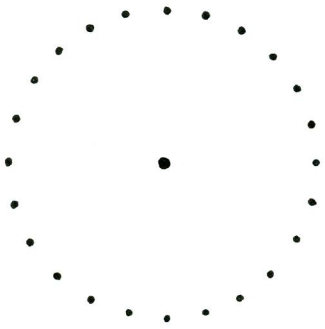
Type D
Semi circle, single, with lines



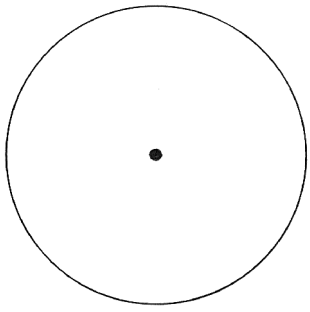
Type E
Lines in full circle, double, with/without pocks



Type F
Lines in semi-circle, with/without pocks



Type G
Full circle, pocks but no lines



Type H
Full circle, no pocks, no lines

Type I Miscellaneous dials not in other types

Fig. 2. Different types of mass dials.

Mass dials were either carved or scratched onto our church walls but the quality of marking is so varied that we must deduce that the persons responsible for the marking ranged from skilled masons to amateur church wardens. In general terms we find that the types A and B with their full- or semi-double circles are skilfully carved whilst types E and F with lines radiating from the gnomon hole, without a circle or semicircle surrounding them, are frequently of poorer quality. The holes, called pocks, frequently found at the end of lines and those found in Type G, are thought to be construction points. Medieval churches were very often lime washed or white washed and it is believed that a lot of mass dials would have been painted onto the walls instead of carved. Rather than having to set out the dial again after each re-whitening, these pocks would be used to assist in redrawing the dial lines. It is possible that some dials with pocks may originally have had short pegs pressed into them but none have been found to prove this point.

'I' types have been included in the groupings to cover the few dials that don't easily fall into any other group.

The majority of mass dials have a line carved vertically downwards from the gnomon hole. Midday (or noon) is indicated when the gnomon shadow reaches this carved line. On churches that are correctly aligned with their south walls facing due South, this is an accurate measurement. However, some churches are not quite facing true South; they decline a few degrees towards either East or West. Some dial makers ignored this fact and their dials did not indicate noon very accurately. Other makers compensated for the chuch misalignment by carving their noon line a few degrees from the vertical. This is called "ratating for aspect" in this monograph.

MASS DIAL DRAWINGS

The drawings of mass dials thoughout this monograph have been scaled so that their radii have a constant value (about 42mm on the printed page). In order to give an impression of the size of the dials, the drawings contain a scale bar representing a total length of 15cm (3× 5cm). Thus for small dials the scale bar appears large and vice versa.

MASS DIAL SEARCH RESULTS

AREA COVERED IN THE SEARCH

Yorkshire is a large county to search and made more difficult by various county boundary changes. Traditionally, the county was divided into three parts called North Riding, East Riding and West Riding. Local government changes created new divisions such as South Yorkshire, Cleveland, Humberside, North Yorkshire, East Yorkshire and West Yorkshire. These changes also moved the boundaries so it is difficult to be precise when trying to decide how to define Yorkshire as a search area.

One solution is to use the Ordnance Survey National Grid System. This system divides the whole of the UK into squares, each square measuring 100×100 km. Each square has a unique two-letter identification. For example, Aberdeen is in square NJ, Bristol in ST and York in SE. It is fortunate that York is about in the centre of square SE and, because the city is just about in the centre of Yorkshire, National Grid square SE makes an ideal search area (see Fig. 3).

In practice, the search area covered most of the county of Yorkshire, although Lincolnshire does encroach into the southeastern corner of square SE. The northwestern corner is near Reeth in Swaledale, the Northeast corner on the coast to the North of Scarborough, the southwestern corner on the moors near Marsden, and the southeastern corner is to the south of Scunthorpe. The search extended to Lincolnshire on the western side of the River Trent, because the county border was difficult to identify there, but excluded Lincolnshire on the eastern bank.

GRID REFERENCES

The Ordnance Survey National Grid System has been used to pinpoint the location of churches in the search. The grid square letters SE indicate the location on the National map and the six numbers identify the location within that square. The first three numbers are 'Eastings' and are measured from left to right along the bottom of the map. The last three numbers are 'Northings' and measure from the bottom to top of the map. For example, York Minster is at SE 603 524, so indicating that it is 60.3 km from the left edge and 52.4 km from the bottom edge of square SE. To make the results of the search easier to read, square SE has been sub divided into four quarters with York just about in the centre. These are shown on the maps at the beginning of each section.

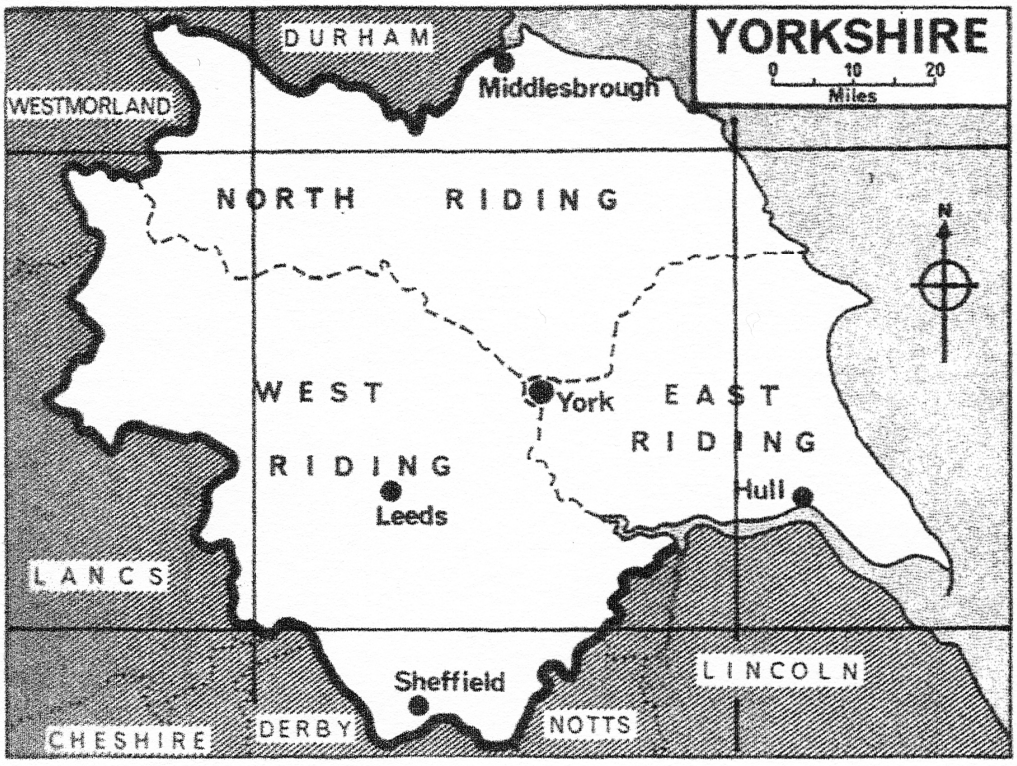
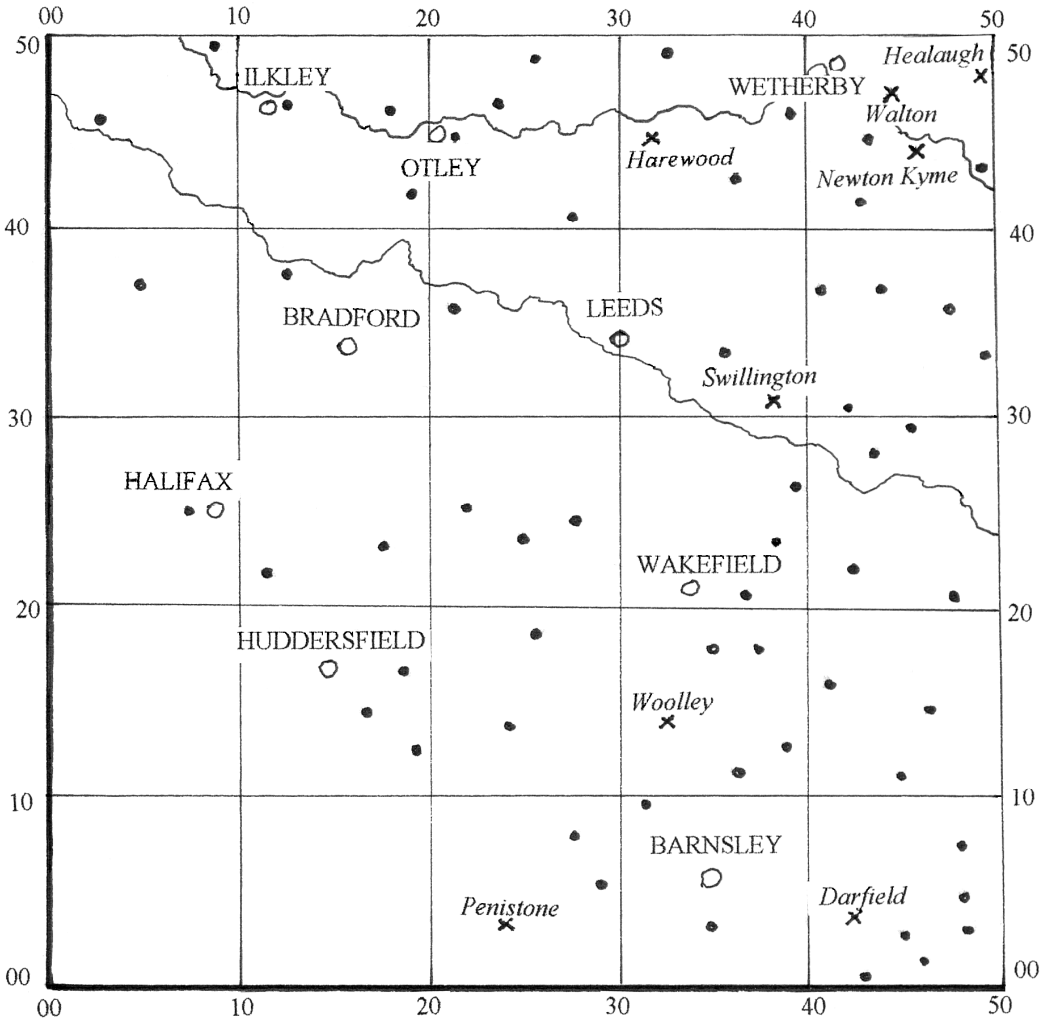


Fig. 3. Map of Yorkshire showing National Grid square SE, defining the limits of the search for mass dials in this study

GAZETTEER

All the mass dials found in grid square SE are summarised in this chapter. 'Height' means the height of the gnomon hole above ground level. Angles of the radial lines and pocks follow the convention of counting from the horizontal line to the left (West) of the gnomon hole and counting anticlockwise. This is 0°. Midday, vertically downwards, becomes 90°. The eastern horizontal is 180°. The position of the dial on the church assumes that it is on a south-facing part of the church and the narrative will indicate when this is not so. The number at the end of each entry is the author's recording number and the letter, giving the type of dial, is that shown on page 5.

SOUTHWESTERN QUADRANT

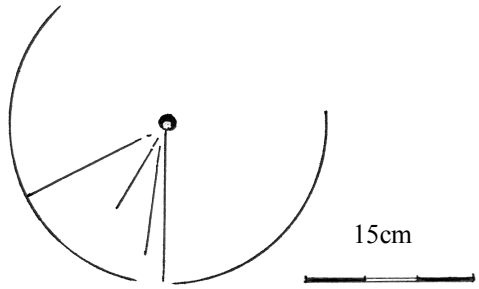


KEY

- O Main towns, e.g. WAKEFIELD
- × Location of a church with a mass dial, e.g. *Walton*
- • Location of a church visited but no mass dial found.

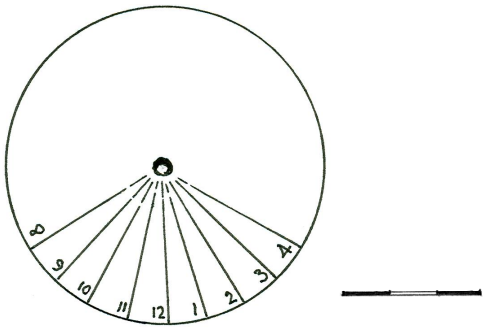
Fig. 4. Map of southwestern quarter of grid square SE.

DARFIELD, All Saints.



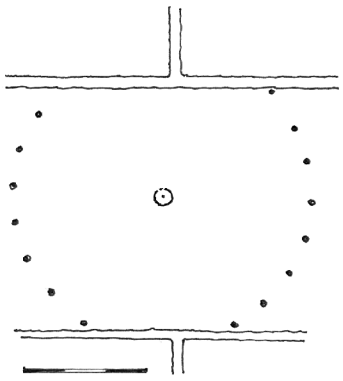
A clear, well cut dial situated on the southwestern corner of the unbuttressed tower. Height 1.15 metres. This is a full circle dial with four cleanly cut lines radiating from a large deep gnomon hole. Angles of lines 30, 60, 82 and 90°. Erosion of the stone has worn away the upper right quadrant but otherwise a nice clear dial. Radius 140mm, 1143, type C.

HAREWOOD, All Saints.



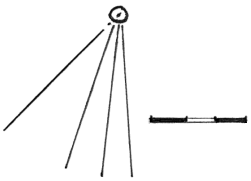
An excellent dial situated on a buttress face, second buttress to the East of the South door. Height 1.90 metres. This is a very good example of a late 15th century mass dial. It is a full circle dial with nine clear radial lines at 15° angles and each line is numbered from 8am to 4pm in arabic numerals. The remains of an iron gnomon and lead packing remain in the gnomon hole. Radius 170mm, 1052, type C.

HEALAUGH, All Saints. Dial 1 of 2.



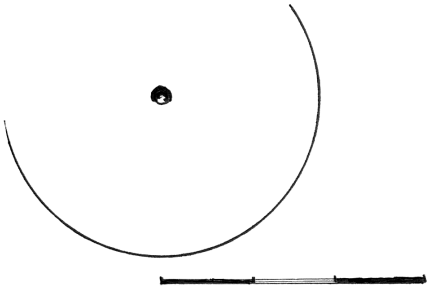
A clear dial situated on the nave wall to the East of the South door**.** Height 4.0 metres. The dial is a good example of a dial comprising a ring of shallow holes, or pocks: it has no lines and no circle. The pocks are drilled evenly at 15° angles with the gnomon hole. The pocks have been re-drilled to an even depth and a modern stainless steel gnomon added in the last 20 years! Radius 180mm, 1028, type G.

HEALAUGH, All Saints. Dial 2 of 2.



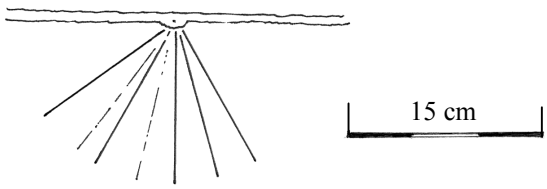
A primitive dial 4.0 metres high on the tower wall. Only four lines, no pocks or circles. Lines at 45, 72, 85 and 95°. Probably rotated 5° for aspect, 95° to show midday. Thin scratchy lines, perhaps re-scratched recently as the lines are a lighter colour than the surrounding stone. Radius 250mm, 1029, type F.

NEWTON KYME, St Andrew. Dial 1 of 2.



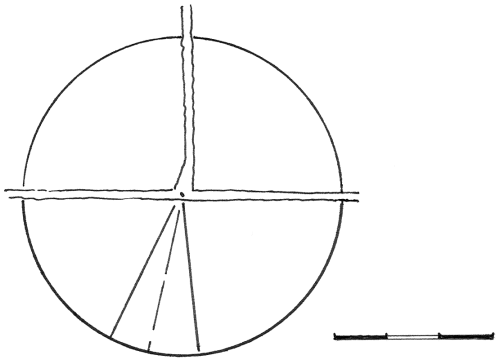
Only a rough circle and gnomon hole remaining. Situated to the East of the priest's door. 1.56 metres high. No lines or pocks but the circle is almost complete on a weathered stone. Radius 90mm, 1055, type H.

NEWTON KYME, St Andrew. Dial 2of 2.



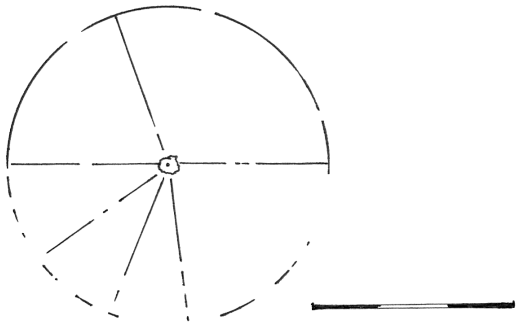
A nice clear but well weathered dial to the West of the priest's door, 1.43 metres high. Seven lines but no pocks or circle. Lines at 35, 50, 60, 75, 90, 105 and 120°. The 35° and 90° lines are very deeply cut and the ones at 50° and 75° only lightly cut. There was a gnomon hole on a horizontal joint but it is now blocked. Radius 120mm, 1056, type F.

PENISTONE, St John the Baptist.



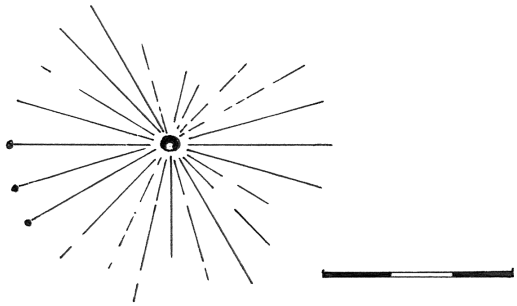
A good clear and well cut dial situated on a buttress face 2.9 metres high. First buttress to East of South door. This is a full circle dial but only three lines are visible and no pocks. I suspect that even when new it may only have had the three lines, they are so clearly cut. Lines at 64, 77 and 97° are unusual angles but it may have been rotated anti-clockwise for aspect giving the noon mark at 97°, although the wall checks out at true South. Gnomon hole blocked on a three-stone joint. Radius 150mm, 1144, type C.

SWILLINGTON, St Mary.



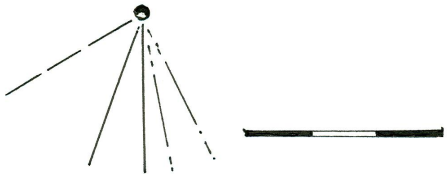
A very faint and eroded dial situated on the nave wall between the first and second windows counting from the South door. 2.0 metres high. A full circle dial, no pocks and six lines still visible. Angles 0, 35, 68, 97, 180 and 290°. Note that no noon line is visible. Blocked gnomon hole in the centre of the stone. Radius 120mm, 1053, type C.

WALTON, St Peter.



A very good full wheel dial radiating from a clean deep gnomon hole. Almost all the dial is still visible although two or three lines have been eroded away. It is located on the face of the first buttress to the East of the South porch. Although only two or three pocks are visible at the end of the lines it is probable that it had a full set of pocks at the end of all the lines when the dial was new. No circle visible. Lines radiate at 15° angles and are well carved and straight. Height of dial 1.35 metres. Radius 130mm, 1027, type E.

WOOLLEY, St Peter.



A very eroded dial situated on the wall to the left of the most easterly window on the chancel. 1.7 metres high. A deep gnomon hole with five faint lines radiating at angles of 30, 70, 90, 100 and 116°. No circle and no pocks. Radius 120mm, 1108**,** type F

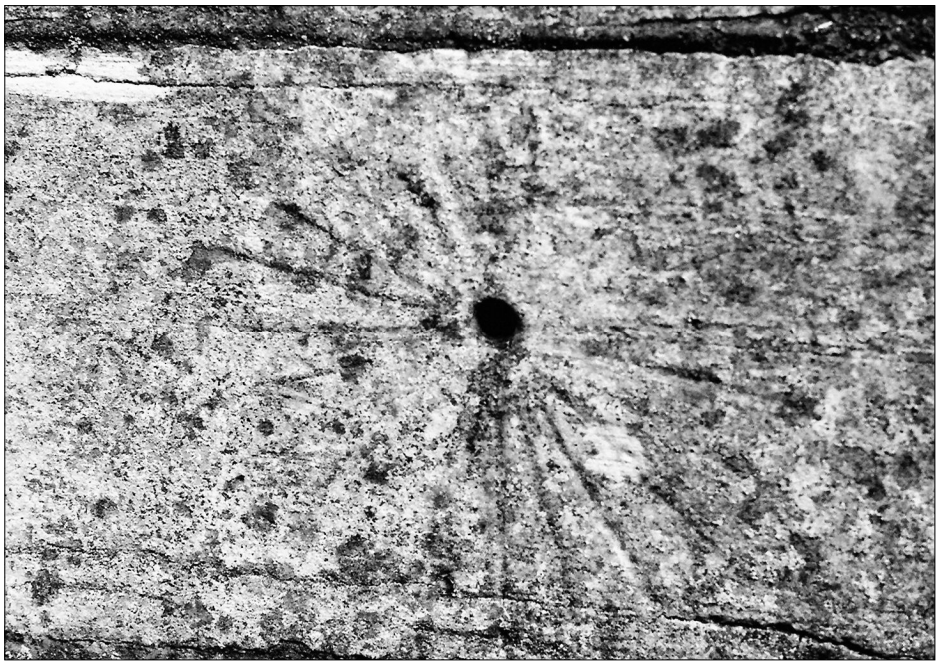
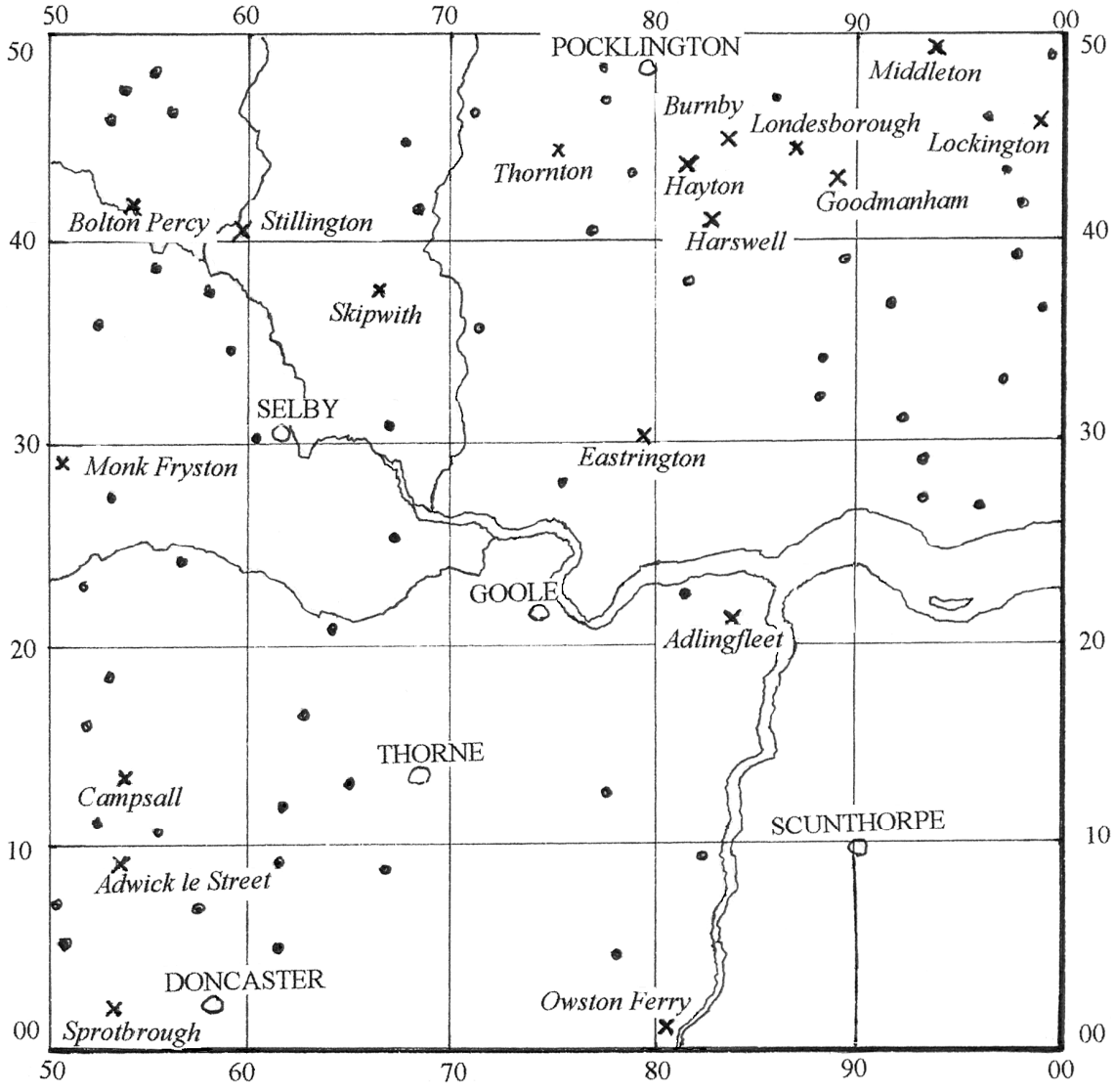


Fig. 5. Walton, St Peter. A good example of a mass dial with lines radiating from the gnomon hole above and below the horizontal.

SOUTHEASTERN QUADRANT

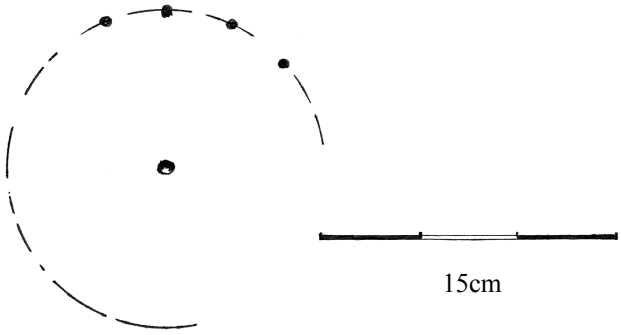


KEY

- O Main towns, e.g. GOOLE
- × Location of a church with a mass dial, e.g. *Burnby*
- • Location of a church visited but no mass dial found.

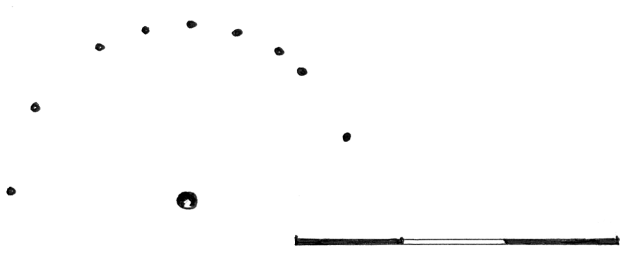
Fig. 6. Map of southeastern quarter of grid square SE.

ADLINGFLEET, All Saints. Dial 1 of 2.



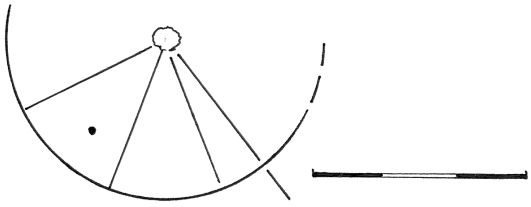
A curious looking dial. It has a good deep gnomon hole and four obvious pocks but no lines and a very faint full circle. I suspect that it has been repositioned upside down. It is positioned 2.1 metres high on the chancel wall with no buttresses or windows. Radius 80mm, angles of pocks at 220, 245, 270 and 295°. 1121. Not obvious which type but perhaps type G fits best**.**

ADLINGFLEET, All Saints. Dial 2 of 2.



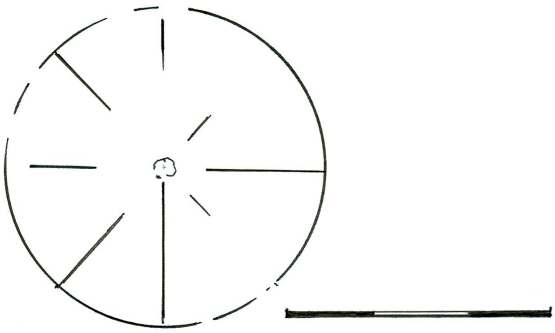
A similar dial to No. 1 on the same church. This dial has a deep gnomon hole and nine clear pocks all above the horizontal line. No lines or circle visible. Again I suspect it may be repositioned and upside down. Situated just above No. 1 dial on chancel wall. Height 2.5 metres. Radius 80 mm, 1122, perhaps type G. Pock angles 215, 230, 242, 255, 270, 285, 300, 330 and 360°.

ADWICK LE STREET, St Lawrence.



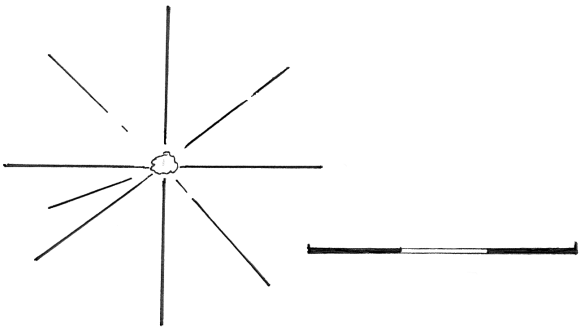
A clear but worn dial situated above the priest's door. The gnomon hole is blocked but the dial has four clean lines and a semicircle. No pocks at the end of the lines but a deep pock 90mm from the gnomon hole at 50° may be original. It is a little unusual in that it has no midday mark but the four lines are well cut and straight at angles of 30, 68, 110 and 126°. The 110° line extends 30mm beyond the semi-circle. Height 2.3 metres. Radius 110mm, 1051, type D.

BOLTON PERCY, All Saints. Dial 1 of 2.



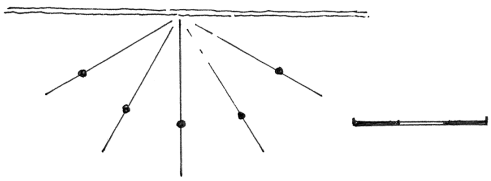
The two dials at Bolton Percy are on separate stones and now inside the church with a plate describing how they were rescued from the churchyard wall in 1936 and are probably from the earlier Saxon church on this site. Number 1 dial is a full circle 90mm radius with deep cut lines at 45° angles. Very worn and some lines indistinct. No pocks and the gnomon hole is now only a shallow indentation. 1057, type C.

BOLTON PERCY, All Saints. Dial 2 of 2.



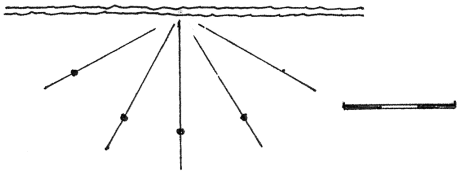
This is another full circle but very faint, 90mm radius. The lines are clearer but are not quite as symmetrical as dial 1. The angles are at 20, 36, 90, 132, 180, 220, 270, 320°, although it is by no means certain which line is midday! No pocks and the gnomon hole is now only a shallow indentation. 1058, type E.

BURNBY, St Giles. Dial 1 of 3.



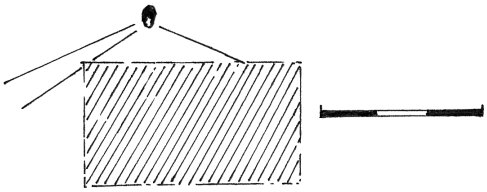
Although the lines are faint, this is a nice well cut dial, 3.1 metres high on the face of a buttress to the West of the priest door. The horizontal line and gnomon hole, now blocked, are on a horizontal stone mortar joint but five thin lines radiate symmetrically at 30° angles at 30, 60, 90, 120 and 150°. The lines are approx. 230mm radius and there are pocks about 180mm from the gnomon hole. No circle. 1135, type F.

BURNBY, St Giles. Dial 2 of 3.



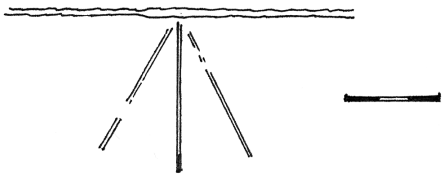
Another very faint dial, same pattern as dial 1. Situated on the same buttress but only 1.4 metres high. The horizontal line and gnomon hole, now blocked, are on a horizontal mortar joint. Five lines at 30° as on previous dial. 215mm radius, pocks at 140mm from gnomon hole. No circle visible. 1136, type F.

BURNBY, St Giles. Dial 3 of 3.



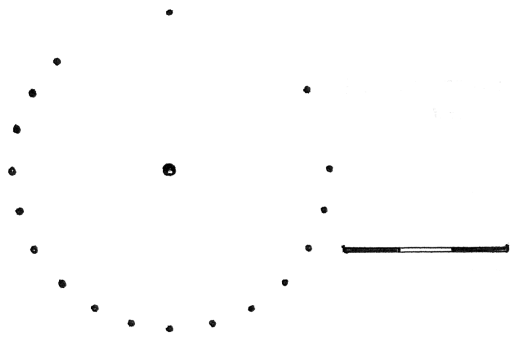
A poor defaced dial situated on the same buttress as the previous two dials, 2.1 metres high. Only three lines remain, 110mm radius, angles at 25, 35 and 155°. Deep oval gnomon hole, no pocks, no circle. Stone has been chiselled away to mount a lamp or similar. 1137, type F.

CAMPSALL, St Mary Magdaline.



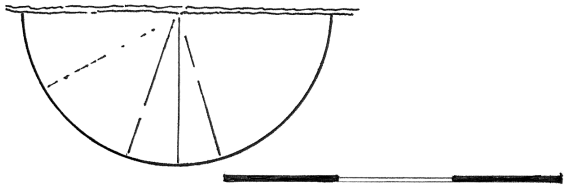
A simple clear three lined dial situated 3.5 metres high on the nave wall near the corner with the South transept. No pocks and no circle visible. Lines at 60, 90 and 115°. Blocked gnomon hole on a horizontal mortar joint. 250mm radius with noon line a little longer than other two lines. 1050, type F.

EASTRINGTON, St Michael.



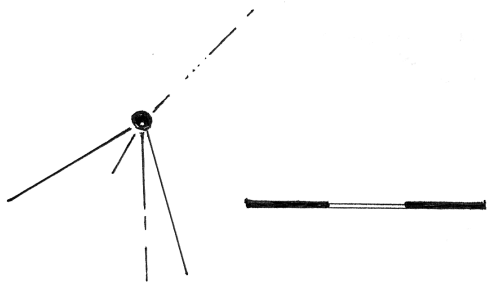
A nice dial consisting of a ring of pocks at 15° angles round a neat, small diameter but deep gnomon hole. No lines or circle visible. Situated 3.1 metres high on the nave wall to the East of the first window just to the East of South door. Dial has been rotated 5° clockwise for aspect. Radius 150mm, 1115, type G.

GOODMANHAM, All Saints. Dial 1 of 2.



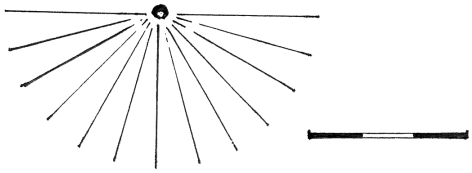
Situated inside the South porch to the West of the South door. A clear half circle with three clear and one faint line. No pocks. Line angles at 30, 70, 90 and 105°. The gnomon hole is on a mortar joint and is now blocked. Height 1.55 metres, 1091, type D.

GOODMANHAM, All Saints. Dial 2 of 2.



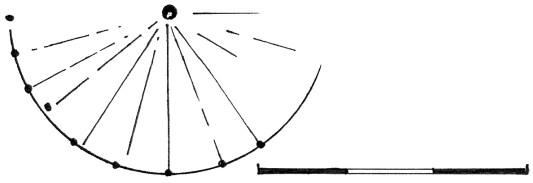
A very worn dial situated 2.6 metres high to the East of the priest door. There is a good, deep-cut gnomon hole and five faint lines, no pocks and no circle. Line angles at 30, 60, 90, 105 and 225°. Radius 100mm, 1092, type E.

HARSWELL, St Peter.



A nice well carved dial but high on the church wall where it is difficult to measure accurately and even photographing it is difficult. It is on a corner stone on the Southwest corner of the nave 3.5 metres high. It appears to have a full set of lines at 15° in the lower half only. Good gnomon hole, no pocks and no circle. Almost certainly repositioned. Radius 150mm, 1114, type F.

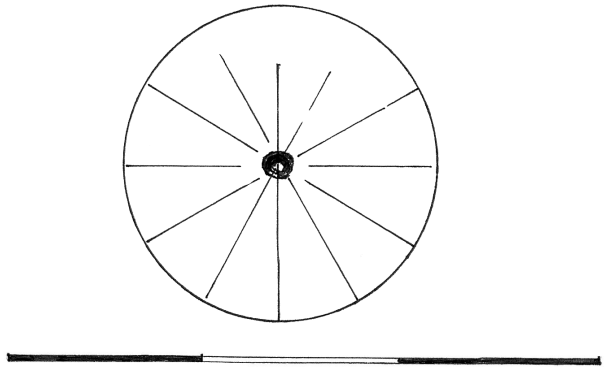
HAYTON, St Martin. Dial 1 of 2.



Situated to the East of the priest's door on the chancel wall. A very eroded, roughly cut dial with a large gnomon hole, ten faint lines, pocks at line ends and a faint semicircle.

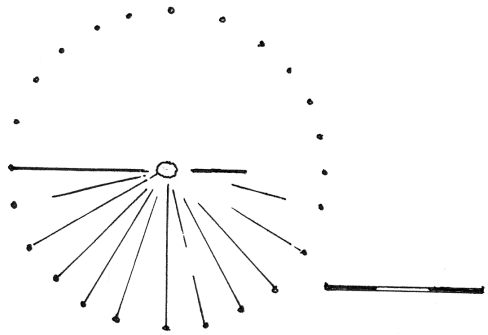
Only 0.40 metres above ground level. Lines at 15, 28, 38, 55, 70, 90, 110, 125, 150 and 165°. Some pocks do not align with line ends. Radius 90mm, 1111, type D.

HAYTON, St Martin. Dial 2 of 2.



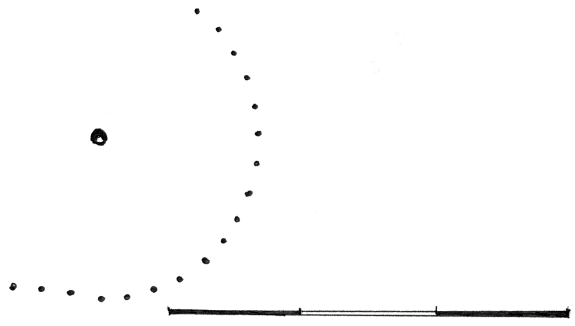
A very unusual dial carved onto the boss above the priest door. It comprises a gnomon hole and a full set of lines at 30° angles. No pocks but probably had a full circle. Height 2.4 metres, radius only 40mm, 1112, type C.

LOCKINGTON, St Mary. Dial 1 of 3.



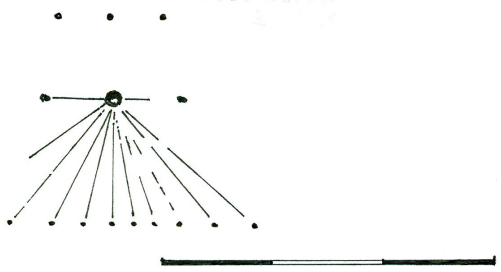
A nice clear dial with deep carved lines but not very accurately cut. I suspect that the lines should be spaced at 15° angles but they are at 0, 12, 30, 45, 60, 72, 90, 105, 120, 150, 168 and 180°. Gnomon hole blocked, pocks round full 360°, no circle visible. Situated 1.7 metres high near the Southwest corner of the nave. Radius 150mm, 1116, type F fits best.

LOCKINGTON, St Mary. Dial 2 of 3.



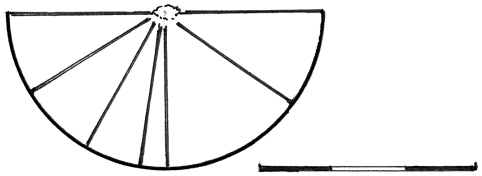
This dial is situated 1.4 metres high on the southeastern buttress of the South transept. Although clear, it is very eroded and only half the dial is now visible. It consists of a clean small gnomon hole and a ring of pocks at 10° angles. Only the afternoon pocks remain. Radius 60mm, 1117, type G.

LOCKINGTON, St Mary. Dial 3 of 3.



A very unusual dial and the only one that I know cut as a square rather than based on a circle. It is probably a transitional dial based on a scientific dial pattern. It has a clean gnomon hole drilled horizontally, so the gnomon was likely to have been horizontal rather than sloping. Lines at 0, 32, 50, 64, 77, 90, 100, 110, 120, 130, 140 and 180°. Pocks at the end of lines and three above the horizontal. Situated just above dial 2, 1.6 metres high, line lengths vary but average 70mm, 1118, type I.

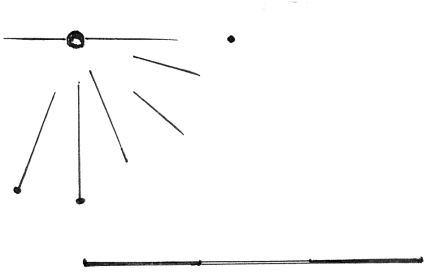
LONDESBOROUGH, All Saints. Dial 1 of 3.



A good clear semicircle dial with a horizontal and five other clear lines, no pocks. Situated above the South door 2.2 metres high. Gnomon hole blocked. Radius 110mm, 1009, Type D. Angles at 0, 30, 60, 80, 90, 145 and 180°.

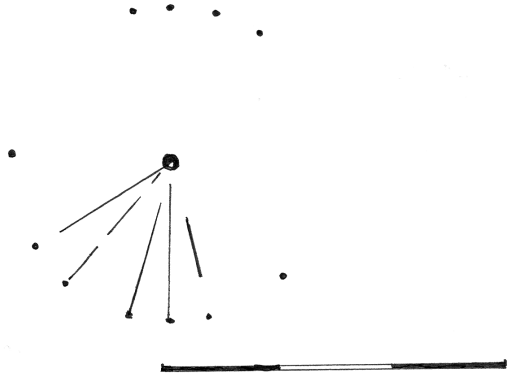
Fig. 7. Londesborough, All Saints. An example of a mass dial with lines radiating from a gnomon hole and contained within a semicircle.

LONDESBOROUGH, All Saints. Dial 2 of 3.



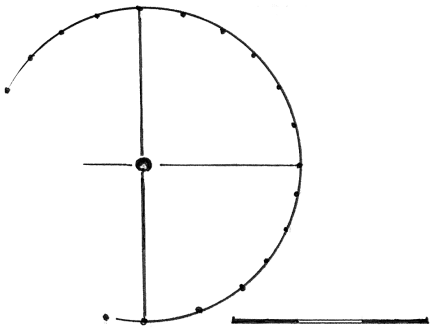
A crude dial carved onto a very weathered stone. Situated on the tower Southwest buttress, 1.7 metres high. Seven lines, 70mm radius. Three pocks visible but no circle. Lines at 0, 68, 90, 112, 140, 165 and 180°. 1010, type F.

LONDESBOROUGH, All Saints. Dial 3 of 3.



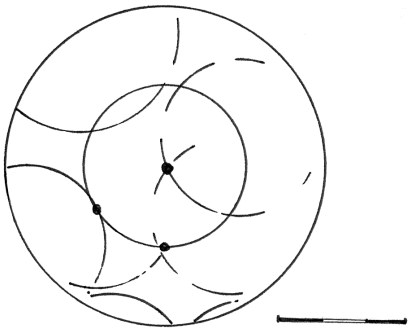
Another very weathered dial situated on the tower buttress just below dial 2. Only 5 lines visible and 11 pocks. No circle. Good deep gnomon hole. Lines at 32, 50, 75, 90 and 105°. Radius 70mm, 1011, type E.

MIDDLETON LE WOLDS, St Andrew. Dial 1 of 4.



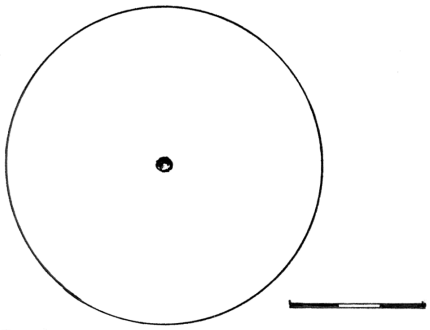
A clear but unusual dial situated on the East-facing wall of the chancel Southeast buttress. The dial has a small diameter, deep gnomon hole with lines at 0, 90, 180 and 270° surrounded by a full clear circle and pocks at 15° angles round 360°. Some damage to stone in morning quarter but otherwise in good condition. Height 1.38 metres, radius 120mm, 1095, type G fits best.

MIDDLETON LE WOLDS, St Andrew. Dial 2 of 4.



A good example of a petal dial. This has a small diameter gnomon hole and a full circle 185mm radius. Within the circle is another 100mm circle and similar radius part circles drawn to intersect within the main circle. Whether this was intended to tell time is not known. Situated to the East of the third chancel window counting from the West. Height 1.68 metres, 1096, type I.

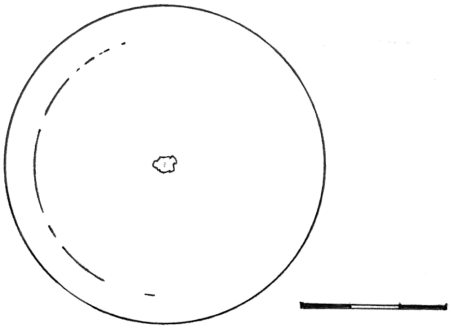
MIDDLETON LE WOLDS, St Andrew. Dial 3 of 4.



A simple full circle dial. Good gnomon hole but no lines, no pocks and full circle visible. Although the stone is a little weathered, it is protected by a buttress overhanging a decorative stone**.** Situated on a buttress to the East of South porch. Height 0.78 metres, radius 180mm, 1097, type H.

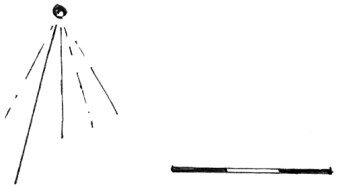
Fig. 8. Middleton Le Wolds, St Andrew, Dial 3. An example of a simple circular dial comprising a gnomon hole and a full circle. Originally, it would have had painted lines radiating from the gnomon.

MIDDLETON LE WOLDS, St Andrew. Dial 4 of 4.



Another simple full circle dial. Shallow gnomon hole. No lines, no pocks but very faint smaller diameter circle within the main circle**.** Situated on the East face of the buttress on the Southeast corner of chancel. Height 1.34 metres, radius 165mm, radius of faint inner circle 125mm, 1098, type H.

MONK FRYSTON, St Wilfred. Dial 1 of 2.

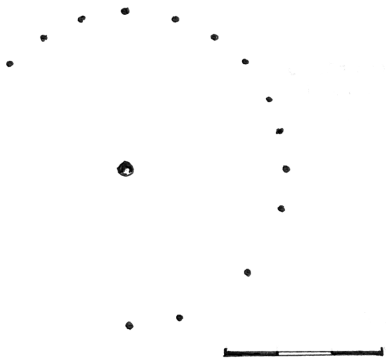


A very eroded dial situated to the West of the second window East of the South porch, 2.2 metres high. Good gnomon hole and five faint lines at 60, 75, 90, 105 and 120°. No pocks and no circle (although it may have had a semicircle now virtually eroded away). Radius 100mm with 75° line 150mm, 1059, type F.

MONK FRYSTON, St Wilfred. Dial 2 of 2.

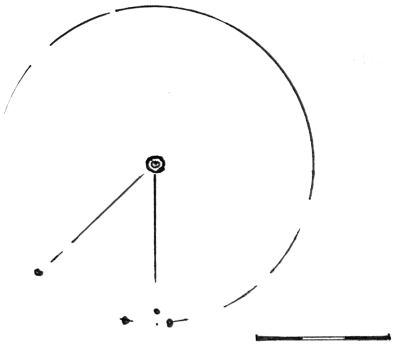
Another very eroded dial on the same stone as dial number 1. This one only has a gnomon hole and two very faint lines remaining. 2.17 metres high. No pocks and no circle. Lines at 90° and 105° but can only be seen close to gnomon hole so it is not possible to measure the radii. 1060, type F.

OWSTON FERRY, St Martin.



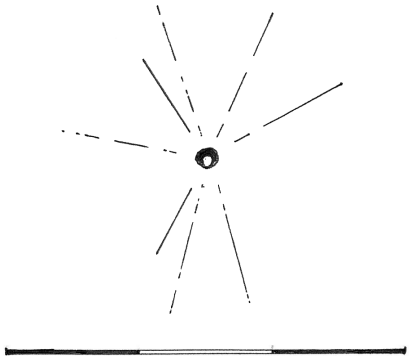
Although in square SE, Owston Ferry is on the West bank of the River Trent and in Lincolnshire. The only dial found outside Yorkshire. Situated 3.0 metres high on a buttress on the Southeast corner of the chancel. Nice clear dial although badly weathered on its lower half. It has a good gnomon hole and a ring of pocks at 15° angles, clear top half, indistinct on lower half. Radius 150mm, 1123, type G.

SKIPWITH, St Helen. Dial 1 of 2.



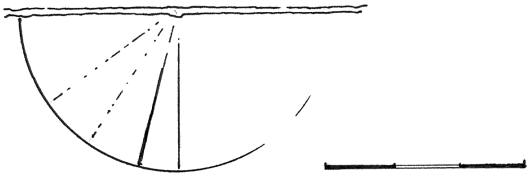
A worn dial situated on the buttress on the southeastern corner of the South aisle. The gnomon hole still has the remains of a metal gnomon rod with lead packing. Although faint, it has a full circle, two clear lines at 45° and 90° and pocks at 45, 80, 90 and 95°. 2.5 metres high, radius 180mm, 1080, type C.

SKIPWITH, St Helen. Dial 2 of 2.



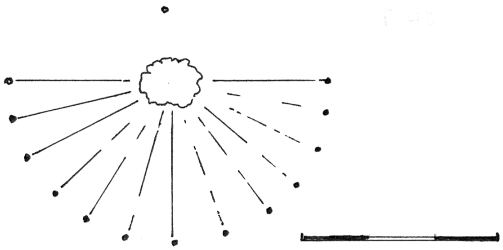
Another very eroded dial and not easy to see. It is situated higher on the same buttress as dial 1 at 2.8 metres high. It has a large worn gnomon hole and eight faint lines radiating at unusual angles, 60, 75, 105, 210, 248, 300, 315 and 350°. No pocks or circle visible and no noon line. Radius 60mm, 1081, type E.

SPROTBOROUGH, St Mary.



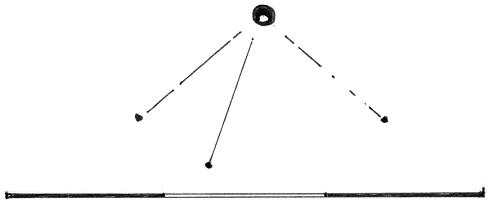
A nice clear dial situated on the second from last buttress from the Southeast corner of the chancel. Although there is quite a lot of erosion, it has a clear semicircle, two clear lines at 75° and 90° and two very faint lines at 35° and 55°. No pocks. The gnomon hole is on a horizontal mortar joint and now is blocked. Height 1.75 metres, radius 120mm, 1031, type D.

STILLINGFLEET, St Nicholas.



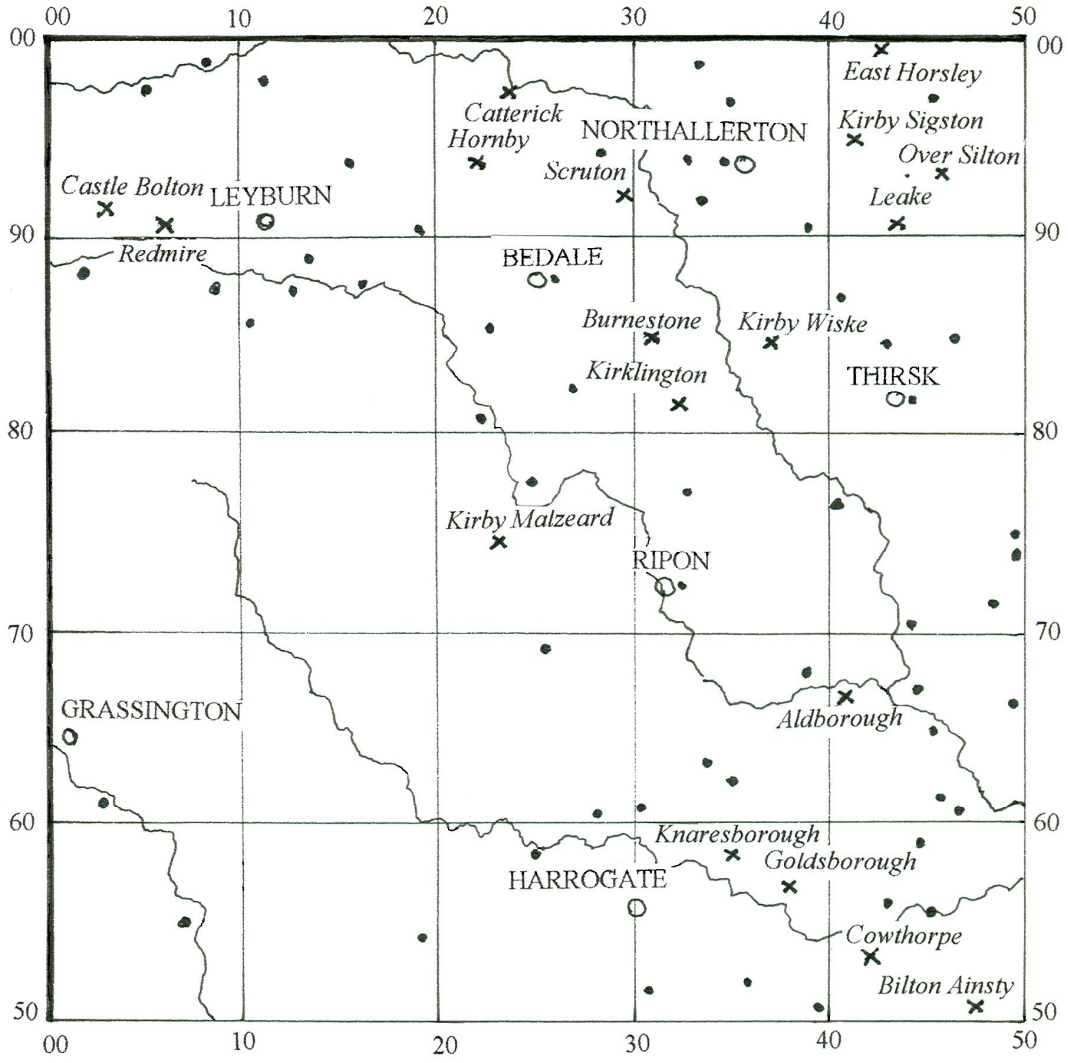
A neat, well carved dial situated 1.47 metres high on the Southeast corner of the South transept. It has a large blocked gnomon hole and lines radiating in the lower half, all at 15° angles. Pocks at the end of the lines but no circle visible. Above the horizontal line there is one pock only at 60mm, directly in line with the noon line: the significance of this is not known. Radius 120mm, 1071, type F.

THORNTON, St Michael.



A small eroded dial, only 0.4 metres high and 1.2 metres from the Southwest corner of the nave. It has a good clean gnomon hole and three lines at angles of 40, 70 and 140° still visible with pocks at the ends of these lines. No noon line and no circle. Only 50mm radius, 1113, type F.

NORTHWESTERN QUADRANT

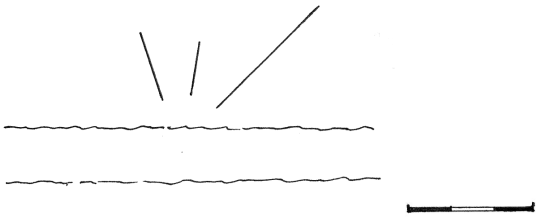


KEY

- O Main towns, e.g. HARROGATE
- × Location of a church with a mass dial, e.g. *Leake*
- • Location of a church visited but no mass dial found.

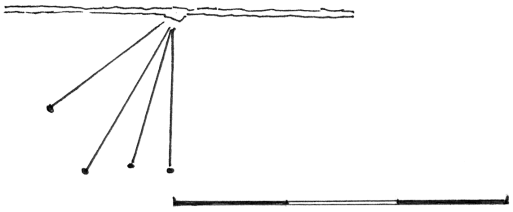
Fig. 9. Map of northwestern quadrant of grid square SE.

ALDBOROUGH, St Andrew.



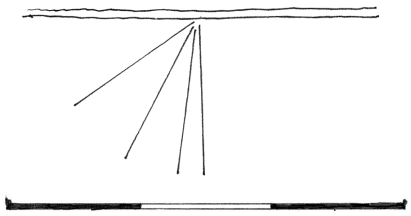
A very unusual dial cut into a window ledge which slopes at an angle of 30° to the horizontal plane. It is situated on the first window to West of the priest's door. 1.2 metres high. There are three lines carved at angles of approx. 45, 80 and 110° to the front of the window sill (difficult to measure). Presumably, a vertical gnomon rod mounted to the front of the sill would cast a shadow onto the ledge. Length of lines 190, 75 and 90 mm, 1026, type I.

BILTON IN AINSTY, St Helen. Dial 1 of 3.



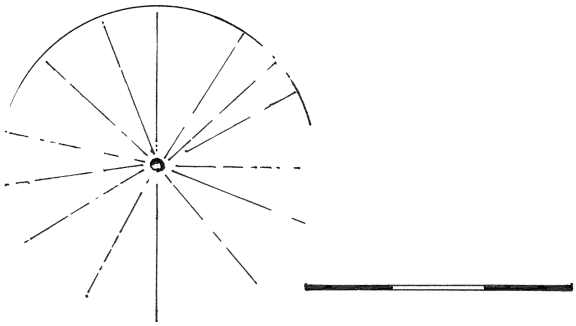
The three dials at Bilton in Ainsty are unusual in the fact that they are all to be found on the nave wall inside the church. A South aisle was added later but the dials were left undisturbed. Number 1 dial is a good well carved dial comprising four lines at 35, 60, 75 and 90°, all with pocks but no circle. The line at 60° is 10mm longer than the other three lines. Height 1.68 metres. The gnomon hole is on a horizontal mortar joint and is now blocked. Radius 70mm, 1037, type F.

BILTON IN AINSTY, St Helen. Dial 2 of 3.



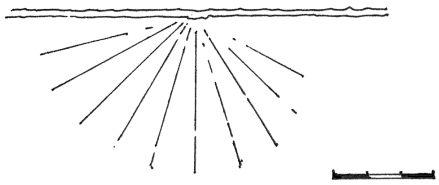
Situated just below dial 1 at 1.47 metres high. This is a very similar dial to No.1 comprising four lines, no pocks and no circle. Gnomon hole is on a mortar joint and blocked. Line angles 35, 60, 80 and 90°. Radius 60mm but the 10° line is only 40mm, 1038, type F.

BILTON IN AINSTY, St Helen. Dial 3 of 3.



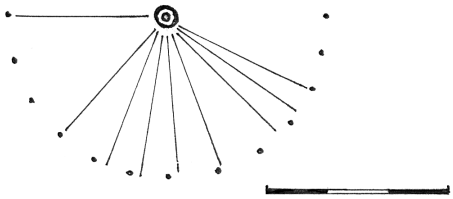
A nice clear dial situated close to the other two dials and 1.09 metres high. Shallow tapered gnomon hole. Thin scratchy lines at 10, 32, 62, 90, 130, 160, 180, 210, 222, 238, 270, 292, 318 and 348°, no pocks and very faint circle in upper half just visible. Radius 90mm, 1039, type C.

BURNESTON, St Lambert.



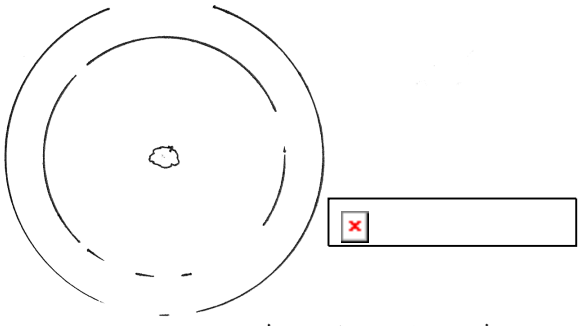
A nice clear but weathered dial situated to the West of the priest's door at a height of 1.4 metres. It has a blocked gnomon hole on a horizontal mortar joint, no pocks, no circle but a full set of lines radiating at 15° in the lower half only. Stone crumbling at the bottom. Radius 240mm, 1090, type F.

CASTLE BOLTON, St Oswald.
A good dial situated on the face of the first buttress to the



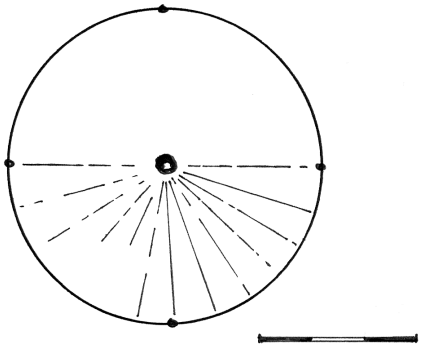
East of the South door. 1.48 metres high. It has a semi-circular set of pocks and a gnomon hole that still has the remnants of its gnomon and lead packing in the hole. The unusual thing about this dial is that it also has nine clear lines that do not align with the pocks. The pocks are at 15° and the lines are at 0, 45, 68, 80, 95, 110, 130, 140, and 150°. Radius 130mm, 1146, type F. See back cover.

CATTERICK, St Anne.



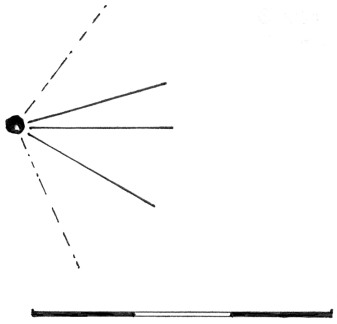
A very worn dial repositioned 1.09 metres high on the West side of the South porch. A large blocked gnomon hole and two clear circles are all that is visible now. No pocks, no lines. Outer circle 150mm and inner circle 110mm radius, 1088, type H fits best.

COWTHORPE, St Michael.



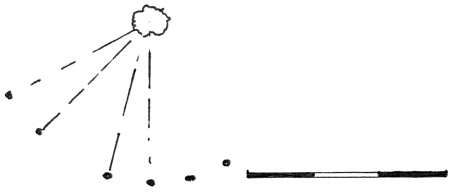
An eroded dial but still quite clear except in the lower left hand quadrant. It is situated on the second buttress to the East of the South door, 2.7 metres high. It comprises a full, deeply cut circle with four pocks at the cardinal points and lines radiating at 15° in the lower half only. Lines are now very faint. Good deep gnomon hole. Radius 150mm, 1054, type C.

EAST HARSLEY, St Oswald. Dial 1 of 2.



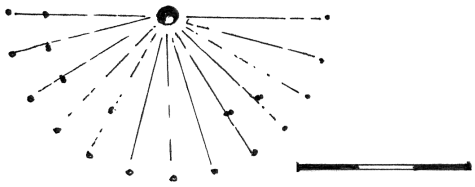
Situated inside the South door porch and to the West of the door. This dial is protected from the weather but looks to be eroded badly. I suspect that it has been repositioned and rotated 90° anticlockwise. It has a good deep gnomon hole and three deeply cut lines at 150, 180 and 198°. It also has faint lines at 115° and 235°. No pocks, no circle. Height 1.48 metres, radius 80mm, type F.

EAST HARSLEY, St Oswald. Dial 2 of 2.



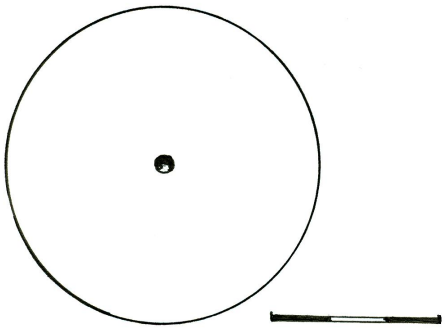
This dial is 1.2 metres high on the outside wall of the South porch to the West of the doorway. It has a blocked gnomon hole and 6 clear pocks, no circle but four very faint lines at 30, 45, 75 and 90°. Radius 120mm, 1140, type F.

GOLDSBOROUGH, St Mary.



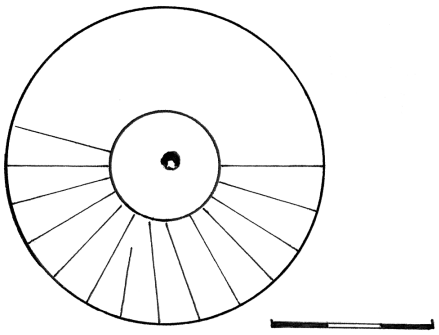
A nice clear dial situated 1.72 metres high on the SW corner tower buttress. It has a good deep gnomon hole and lines radiating at 15° in the lower half. No circle but pocks at line endings and also about 20mm from line ends. Radius 140mm, 1069, type F.

HORNBY, St Mary.



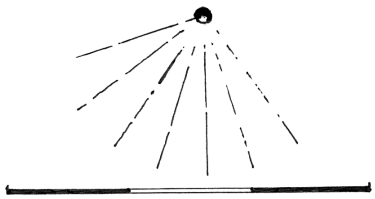
A simple, deeply carved full circle dial, 1.8 metres high on a buttress to the West of the most Easterly window on the South aisle. It has only a deep gnomon hole surrounded by the full circle. No lines or pocks visible. Radius 140mm, 1148, type H.

KIRBY MALZEARD, St Andrew.



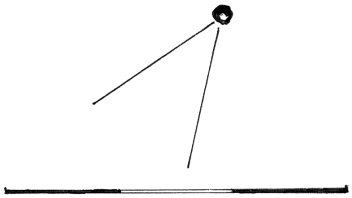
A very good dial situated prominently above the door on the outside of the porch. Approx. 3.5 metres high. It has a deep gnomon hole and two full circles. The outer is 150mm radius and the inner 50mm. Between the two circles radiate lines at 15° angles, all deeply cut and clear. No pocks. Although the dial has been generally accurately carved it looks odd in that the gnomon hole is not exactly in the centre of the inner circle and the 75, 90 and 105° angle lines do not align with the gnomon hole. 1040, type A.

KIRBY SIGSTON, St Lawrence.



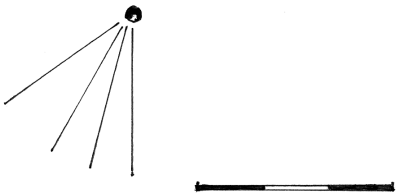
This dial is situated on the centre buttress of three on the South aisle at 1.17 metres high. It is very faint and almost eroded away by the weather. The gnomon hole is still clear and seven very faint lines radiate at 18° angles (decimal time!). No pocks or circle visible. Radius 65mm, type F.

KIRBY WISKE, St John the Baptist. Dial 1 of 2.



A poor eroded dial situated on the buttress to the West of the priest's door. Only two lines at 35° and 78° remain along with a deep gnomon hole. No circle or pocks visible. 1.9 metres high, radius 70mm, 1141, type F.

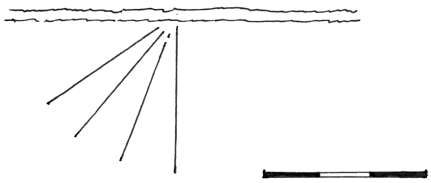
KIRBY WISKE, St John the Baptist. Dial 2 of 2.



This dial is situated just below dial 1 on the buttress to West of the priest's door, 1.65 metres high. Very eroded but has a deep gnomon hole and four faint but clear lines. No pocks or circles. Line angles at 35, 60, 75 and 90°. Radius 120mm, 1142, type F.

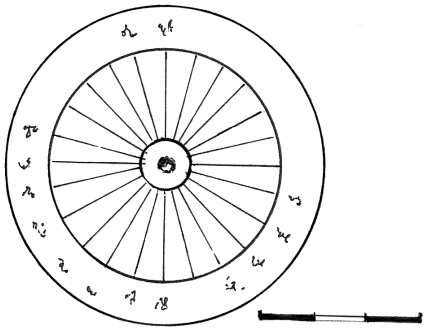
Fig. 10. Knaresborough, St John. An example of a dial with lines below the horizontal only and the gnomon hole blocked.

KNARESBOROUGH, St John.



A nice cleanly cut dial of four lines radiating at angles of 35, 50, 68 and 90°. No pocks or circles. Gnomon hole blocked on horizontal mortar joint. Situated 1.25 metres high to East of third buttress to East of South door. Radius 150mm, 1070, type F.

LEAKE, St Mary. Dial 1 of 2.



An excellent dial, clear and accurately cut and situated above the priest's door, approx 3.5 metres high. It is a full double circle dial with lines cut at 15° angles, no pocks but a clean deep gnomon hole. There is a small diameter circle close to the gnomon and evidence of numbers or lettering between the outer circles but now too worn to decipher. Outer circle approx. 150mm and inner 110mm radii, 1079, type A.

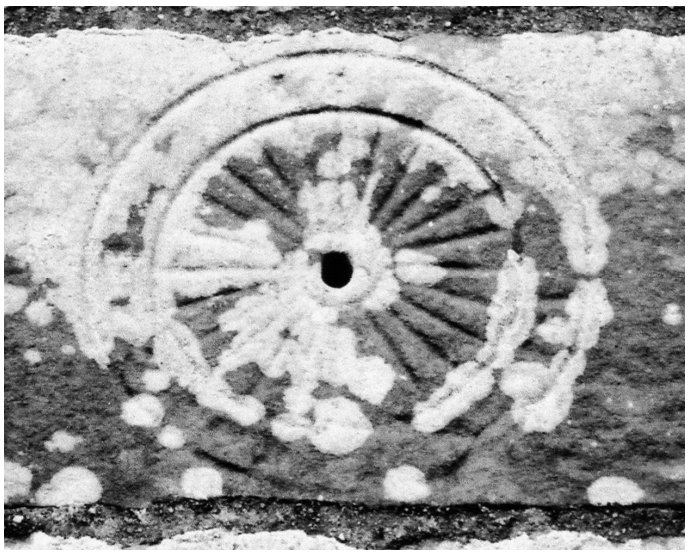
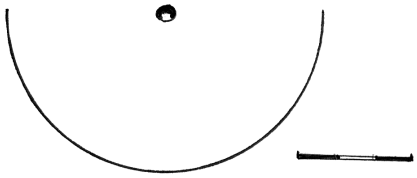


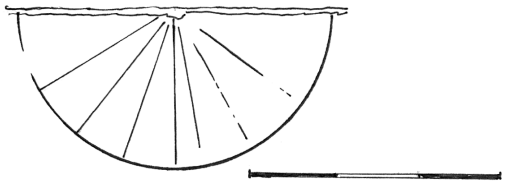
Fig. 11. Leake, St Mary, dial 1. An example of a full double circle dial with lines radiating from gnomon hole. This dial has lines at 15 degree angles and numbers, or letters, between the two circles.

LEAKE, St Mary. Dial 2 of 2.



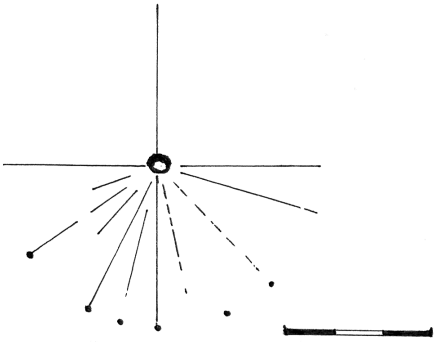
An unusual dial, probably very old, situated 1.4 metres high to East of the main South door and to the West of the first nave window. It is a deeply carved semicircle without any lines or pocks but has a good gnomon hole with the remains of an iron gnomon still in situ. The semicircle is so deeply carved that it is probable that it had no lines or pocks even when new. Radius 210mm, 1078, type I .

KIRKLINGTON, St Michael the Archangel.



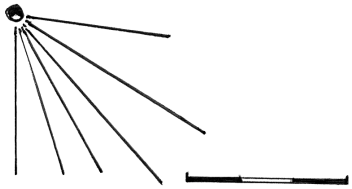
A well carved dial comprising a semicircle and lines at 30, 50, 70, 90, 100, 120 and 145°. No pocks and the gnomon hole is blocked on a horizontal mortar joint. Slightly protected by an overhanging buttress stone sill but a little weather-worn. Situated on the second buttress to the East of the South door. Height 1.6 metres, radius 95mm, 1089, type D.

OVER SILTON, St Mary.



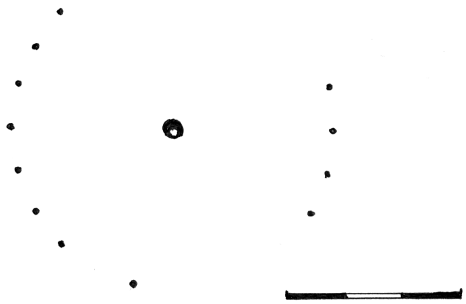
A very eroded dial. It has a shallow gnomon hole and faint lines at 0, 33, 47, 63, 75, 90, 112, 135, 165, 180 and 270°. No circle but pocks at some line ends. Situated 1.54 metres high on the Southwest corner quoin of the nave. Radius 160mm, 1077, type F fits best.

REDMIRE, St Mary.



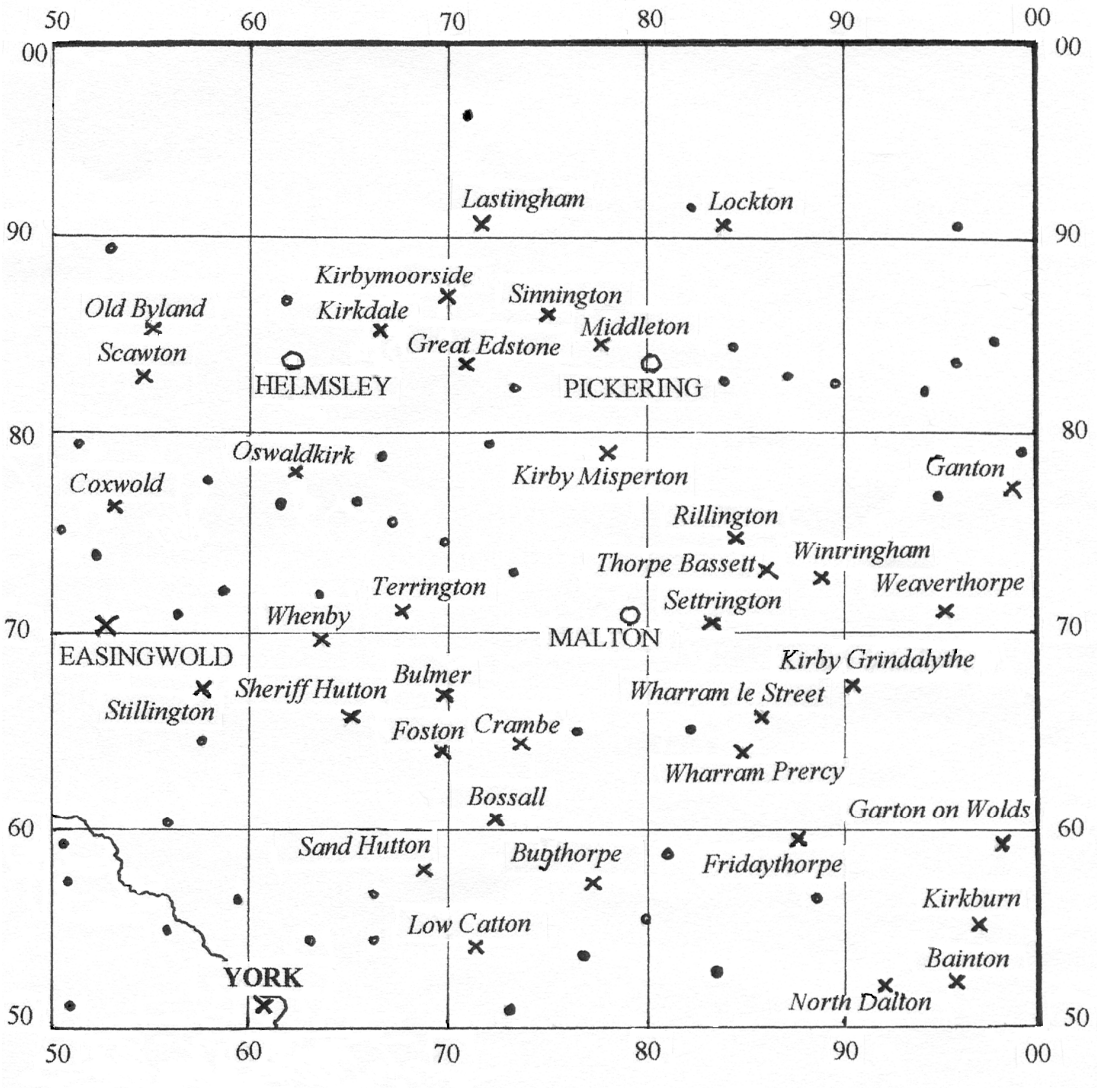
A deeply carved dial of six lines and a deep gnomon hole. No circle and no pocks. 1.13 metres high situated to East of priest's door just to West of first chancel window. The dial is unusual in that the lines are different lengths. These vary from 150 to 210 mm. Angles are 90, 108, 120, 132, 150 and 175°. 1145, type F.

SCRUTON, St Radegund.



Situated 3.0 metres high on the tower wall, this dial has almost eroded away and is not easy to see. It has a shallow gnomon hole and a ring of very shallow pocks at 15° angles, with only those on the left hand half still clear. No lines and no circle visible. Radius 135mm, 1147, type G. Scruton is a 'thankful village', one of very few in England where no deaths were recorded in WW1.

NORTHEASTERN QUADRANT

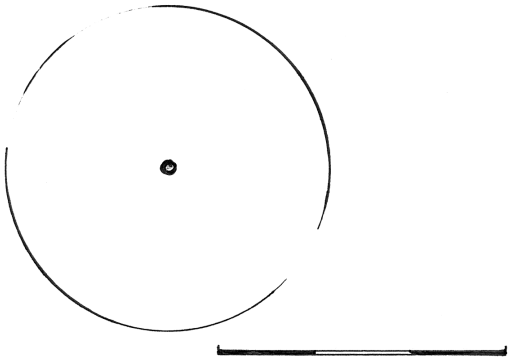


KEY

- O Main towns, e.g. MALTON
- × Location of a church with a mass dial, e.g. *Ganton*
- • Location of a church visited but no mass dial found.

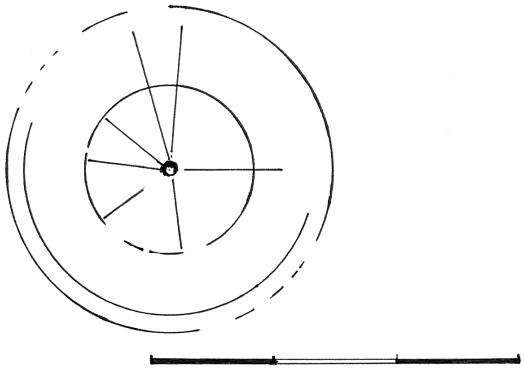
Fig. 12. Map of northeastern quadrant of grid square SE.

BAINTON, St Andrew. Dial 1 of 4.



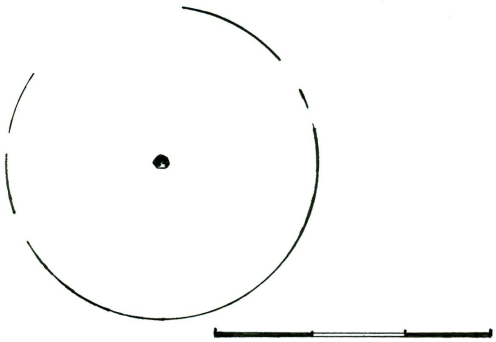
A simple full circle dial, no lines and no pocks and only a very small shallow gnomon hole. The circle is accurately cut and, although faint, it is clear to see. It is situated on the East face of the chancel SE corner buttress. 1.34 metres high, 83mm radius, 1099, type H.

BAINTON, St. Andrew. Dial 2 of 4.



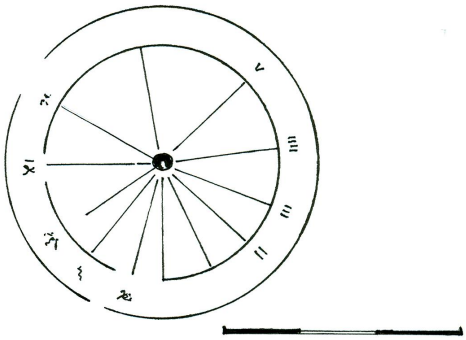
An unusual dial, it has two full circles with lines radiating from the gnomon hole to the inner circle but evidence of a third full circle just inside the outer circle. Now quite worn but clear to see. It is situated on the East-facing wall of the chancel. Lines at 35, 95, 180, 265, 285, 315 and 355°. 0.9 metres high, outer circle 65mm and inner 38mm radius. Third circle 56mm, 1100, type A.

BAINTON, St Andrew. Dial 3 of 4.



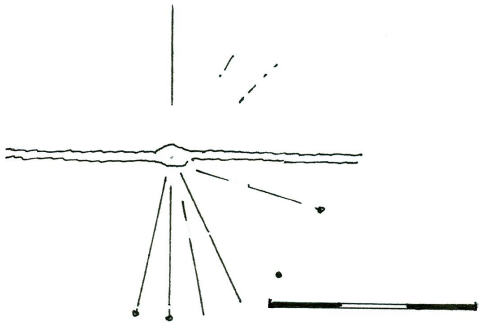
Another simple full circle dial, no lines or pocks but a good clean deep gnomon hole. Situated on the second buttress to the East of the priest's door, 1.13 metres high. 85mm radius, 1101, type H. Clear but worn well-cut circle.

BAINTON, St Andrew. Dial 4 of 4.



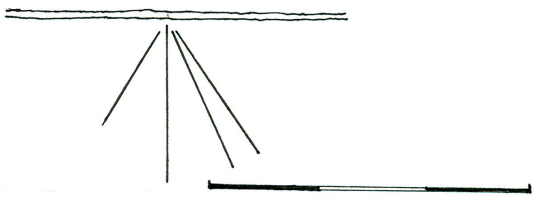
This is a very crudely cut, full double circle dial with 12 clear lines and roman numerals carved in the space between the circles. It has a good deep gnomon hole and is situated 1.46 metres high just to the East of the second window on the South aisle East of the South door. Angles of lines 0, 32, 50, 75, 90, 115, 138, 160, 190, 245, 280 and 330°. Radii 105 and 80mm, 1102, type A.

BOSSALL, St Botolph.



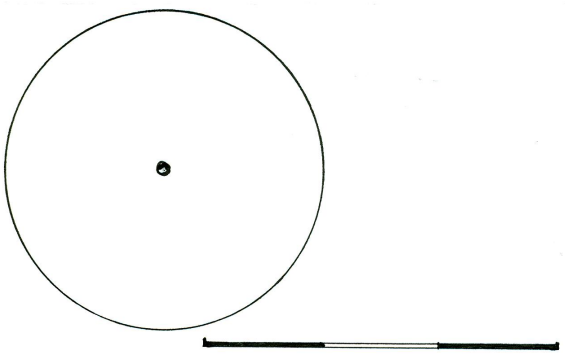
A very weathered dial situated 1.6 metres high to the East of the priest's door. It has no circle visible but has pocks at the ends of the lines. Six lines at 80, 90, 105, 120, 165 and 270°. Gnomon hole blocked on a horizontal mortar line. Radius 115mm, 1126, type E.

BUGTHORPE, St Andrew. Dial 1 of 4.



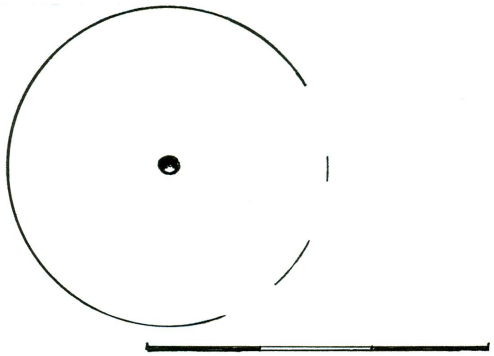
A deeply carved but crude dial consisting of four lines at 60, 90, 115 and 125° angles. No pocks and no circle visible. The gnomon hole is blocked and on a vertical and horizontal mortar junction. Situated on a buttress to the East of the priest's door, 2.6 metres high. Radius 75mm, 1128, type F.

BUGTHORPE, St Andrew. Dial 2 of 4.



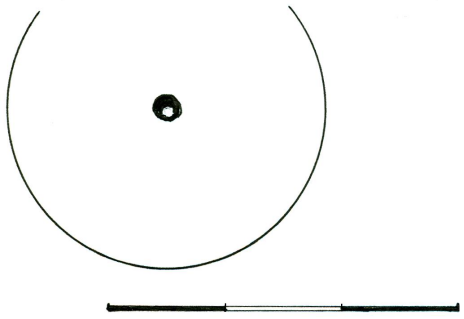
Situated on the second buttress from the East end of the chancel, this is a simple full circle dial. No pocks and no lines. 0.8 metres high. The gnomon hole is a small diameter shallow hole. Radius 68mm, 1129, type H.

BUGTHORPE, St Andrew. Dial 3 of 4.



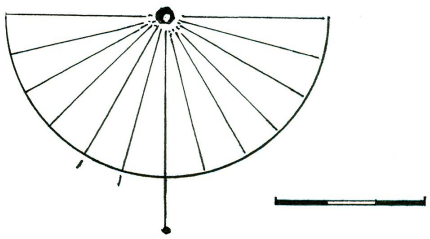
An almost identical dial to No. 2 and cut onto the same stone on the buttress, at the same height and only 20mm to the East of No. 2. Very slightly larger at 70mm, the only other difference is that the gnomon hole is slightly larger and deeper. 1130, type H.

BUGTHORPE, St Andrew. Dial 4 of 4.



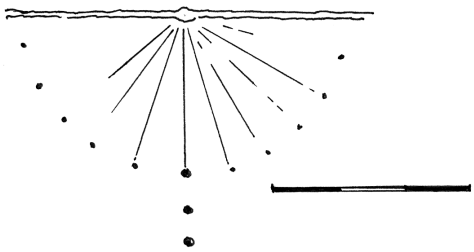
This dial is situated just below the No. 2 & 3 dials on the next buttress stone below. This too is a simple full circle dial, no lines, no pocks and 60mm radius. 1131, type H. The only difference from the others is a very worn large gnomon hole.

BULMER, St Martin. Dial 1of 2.



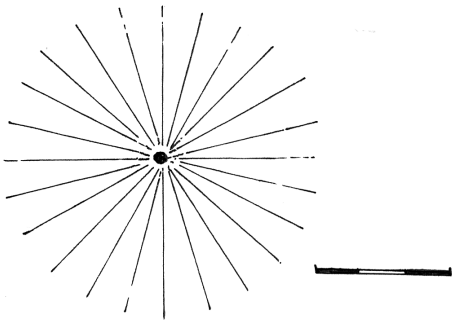
A very nice clear dial, accurately cut on the nave wall between the two most easterly nave windows, approx 3.7 metres high. It has lines at 15° radiating below the horizontal surrounded by a well cut semicircle. The midday line extends some 50mm beyond the semicircle to the only pock visible. Good gnomon hole. Radius 160mm, 1046, type D.

BULMER, St Martin. Dial 2 of 2.



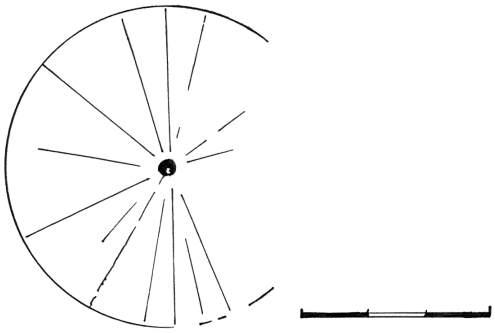
Another nice dial but now quite damaged by weathering. It comprises lines at 15° below the horizontal radiating from a now blocked gnomon hole on a horizontal mortar joint. The lines end on a ring of pocks with the midday line having a further two deep pocks at 150 and 180mm from the gnomon hole. The dial is 2.4 metres high just to the West of the second-most easterly nave window. Radius 120mm, 1047, type F.

COXWOLD, St Michael.



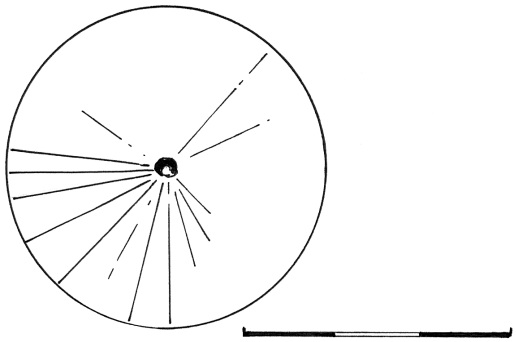
A faint but still quite clear dial situated 1.22 metres high below the third nave window to the East of the South door. It has lines at 15° radiating from a small gnomon hole and ending at small shallow pocks. No circle. The lines radiate above the horizontal as well as below but, very oddly, the lines above have been cut rotated anticlockwise at 5° compared with the lines in the lower half. The reason for this is not known. Radius 180mm, 1072, type E.

CRAMBE, St Michael.



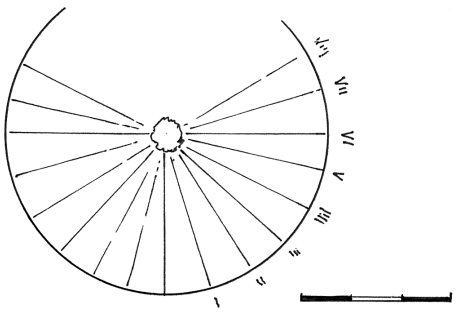
A most unusual dial, crudely cut into a large stone in a rough nave wall of smaller stones and brick. Situated 1.2 metres high to the West of a blocked priest's door. It has a neat, small gnomon hole and a good, well cut full circle, no pocks but 15 very poorly cut lines, not very straight and at peculiar angles. Lines at 23, 45, 57, 79, 90, 101, 112, 195, 215, 255, 270, 295, 320 and 350°. Radius 130mm, 1020, type C.

EASINGWOLD, All Saints and St John. Dial 1 of 2.



This is a clear but very weather-worn dial. It is deeply cut but erosion has badly damaged the right side of the dial. Situated 2.0 metres to the East of the priest's door at a height of 1.1 metres. It consists of a full circle, no pocks and 13 lines at angles of 12, 27, 45, 75, 90, 105, 120, 135, 205, 228, 325 and 355°. There is a large, worn gnomon hole. Radius 90mm, 1124, type C.

EASINGWOLD, All Saints and St John. Dial 2 of 2.



Situated 2.0 metres high on the West face of the SW nave buttress, this is a good, large, well cut dial. It has a blocked gnomon hole and a full circle. No pocks, lines radiating at 15° in the lower half of the dial and two additional lines at 15° above the horizontal on both sides. Outside the circle a few markings can be seen that look like roman numerals

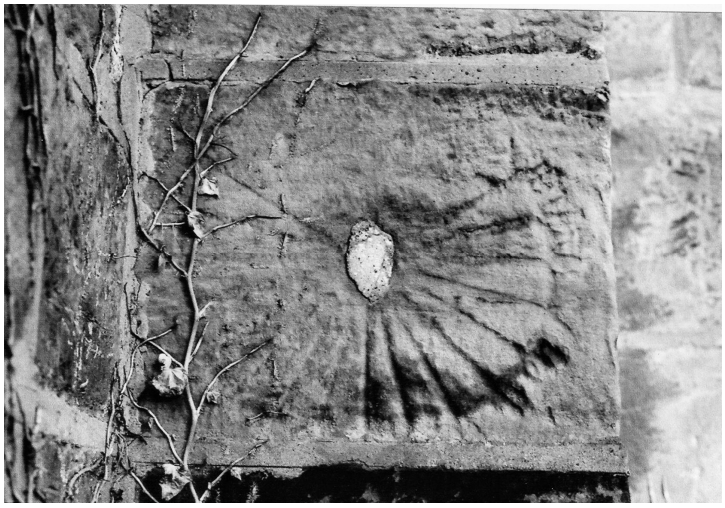
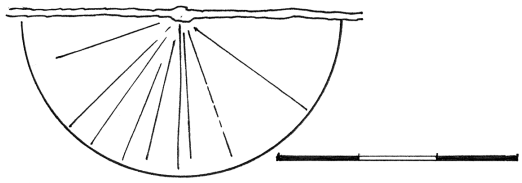


Fig. 13. Easingwold, All Saints and St John, dial 2. An example of a full circle dial with lines radiating above as well as below the horizontal. This dial has lines at 15° and numbers outside the circle.

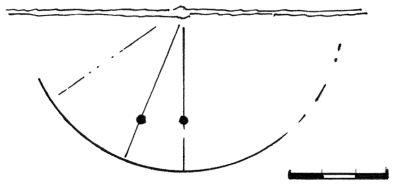
but these are too eroded to read with any certainty. Radius 180mm, 1125, type C.

FOSTON, All Saints.



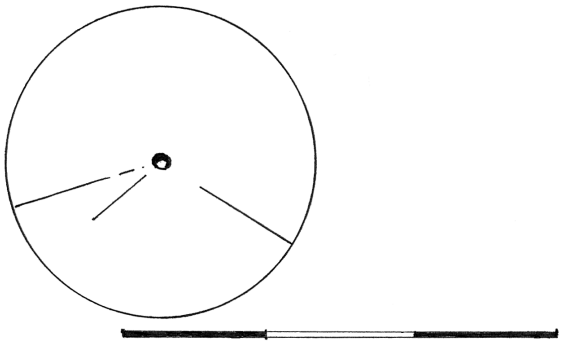
A very crudely cut semicircular dial with 9 lines but no pocks. It is situated inside the South door porch to the West of the main door. The gnomon hole is blocked on a horizontal joint. Although the semicircle is well cut, the lines are poor, not straight and amateurish. The line angles are 20, 45, 55, 68, 80, 90, 95, 112 and 145°. Height 1.38 metres. Radius 100mm, 1061, type D.

FRIDAYTHORPE, St Mary.



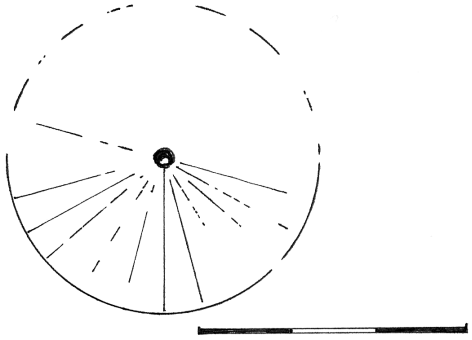
A very worn dial situated to the East of the second window East of the South door. 2.8 metres high. Only three lines now visible, at 32, 67 and 90°. Half circle and two pocks unusually placed along the 67° and 90° lines. Radius 250mm, 1012, type D. Blocked gnomon hole on a horizontal mortar joint.

GANTON, St Nicholas. Dial 1 of 3.



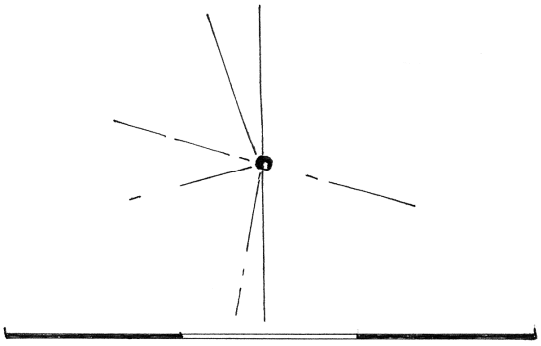
A full circle dial now badly worn but having three lines visible at 20, 40 and 150°. No pocks but a large shallow gnomon hole. Situated 1.36 metres high on the tower wall. Radius 55mm, 1006, Type C.

GANTON, St Nicholas. Dial 2 of 3,



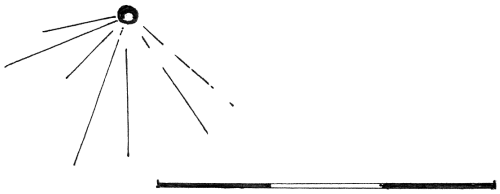
A very faint full circle dial with twelve lines visible and pocks at the ends of the lines. Situated to the East of the outer porch door, 1.48 metres high. Lines at 15, 28, 40, 58, 75, 90, 105, 122, 140, 152, 165 and 345°. Deep gnomon hole. Radius 90mm, 1007, type C.

GANTON, St Nicholas. Dial 3 of 3.



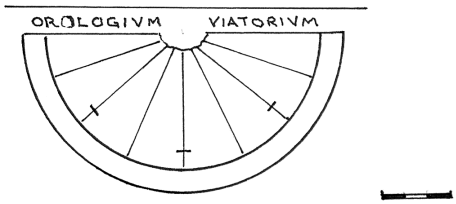
A rough dial carved onto a quoin stone on the East side of the South door porch. It has a good deep gnomon hole but no pocks and no circle. Seven lines still visible at 15, 80, 90, 165, 270, 290 and 345°. Radius 45mm, 1008, type E. 1.4 metres high.

GARTON ON WOLDS, St Michael and All Angels.



A badly weathered dial on a flaky stone in the tower wall, 3.1 metres high. A deep gnomon hole but no circle or pocks. Seven faint lines at 12, 20, 45, 70. 90, 125 and 140°. Radius 70mm, 1119, type F.

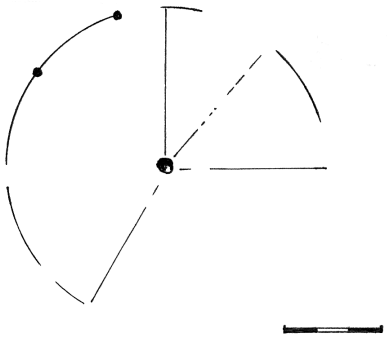
GREAT EDSTONE, St Michael and All Angels.



This is a well-documented Saxon dial situated above the South door and approximately 3.5 metres high. The dial is carved into a large stone block about 1.3×0.7 metres which originally had an inscription carved but only the letters "LODAN 'EPRO HTEA" remain. These have been translated to read *Lothan me wrohte a – .*

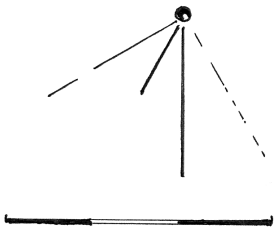
Above the dial can be found in smaller letters "OROLOGIVM VIATORIVM" or *Wayfarers' time teller.* The dial itself is worn but still quite clear. It has a double semicircle and is divided into typical Saxon tides with lines at 0, 22.5, 45, 77.5, 90, 112.5, 135, 157.5 and 180°. No pocks. Radius 350mm, 1084, type B.

KIRBY GRINDALYTHE, St Andrew. Dial 1 of 2.



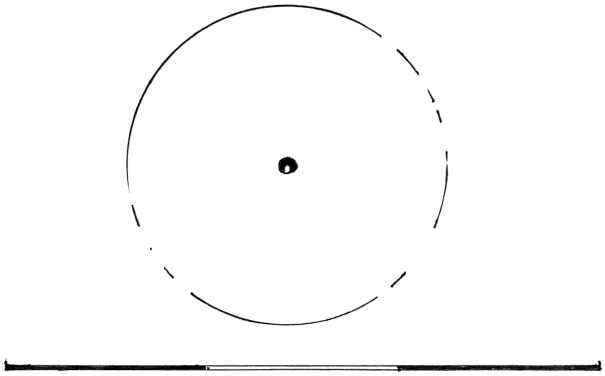
A large well cut but now faint dial repositioned on the East wall of the chancel. It has a deep gnomon hole and parts of a full circle, four faint lines and two definite pocks on the circle. Lines at 60, 180, 230 and 270°. Pocks at 285° and 325°. Height 1.45 metres, radius 250mm, 1065, type C.

KIRBY GRINDALYTHE, St Andrew. Dial 2 of 2.



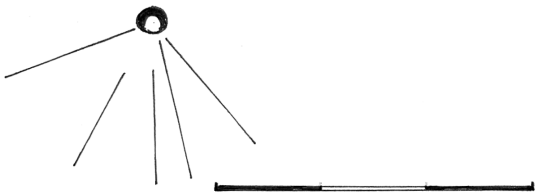
Repositioned high on the East wall of the chancel, this is a small and faint dial, difficult to see. It has a small diameter deep gnomon hole with four lines visible. No pocks or circle. Lines at 30, 60, 90 and 120°. Radius 90mm, 1066, type F.

KIRBY MISPERTON, St Lawrence. Dial 1 of 3.



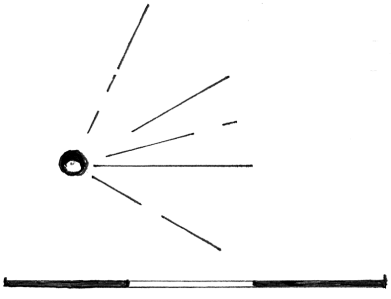
A very worn dial repositioned on the West wall of the South door. Only a gnomon hole and full circle remain. No lines or pocks visible. Height 1.45 metres, radius 40mm, 1105, type H.

KIRBY MISPERTON, St Lawrence. Dial 2 of 3.



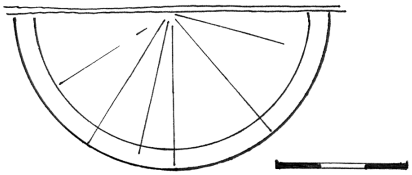
Although now very eroded, this would once have been a deeply carved dial. No circle or pocks remain but there are five lines at angles of 20, 60, 90, 102 and 130°. It has a large gnomon hole. It is situated below the second window to the East of the South door at a height of 1.2 metres. Radius 75mm, 1106, type F.

KIRBY MISPERTON, St Lawrence. Dial 3 of 3.



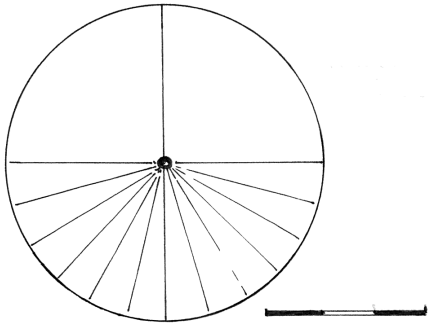
Another very eroded dial. Similar location to dial 2, below the second window East of the South door. It is possible that this dial has been relocated and rotated by 90° anticlockwise. Good deep gnomon hole, five lines at 150, 180, 195, 210 and 255°. No circle or pocks. Height 1.36 metres, radius 70mm, 1107, type F.

KIRKBY MOORSIDE, All Saints.



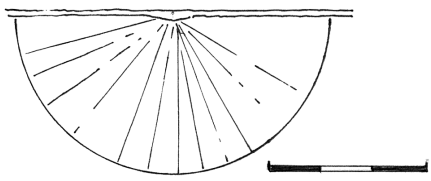
A good clear dial repositioned inside the church. It is inside the window opening, first window to East of South door, East side. Although it is protected from the weather, the stone has been redressed and the dial lines and circles are now quite shallow. Gnomon hole blocked on a horizontal mortar joint, two well cut semicircles, no pocks and six lines at 30, 55, 75, 90, 130 and 165°. Height 1.7 metres, radius of outer circle 180mm, inner 160mm, 1103, type B.

KIRKBURN, St Mary. Dial 1 of 4.



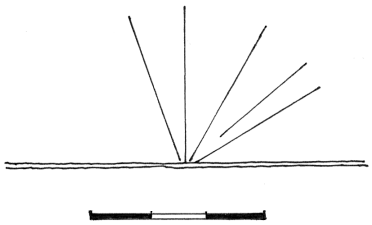
A nice clear, well cut dial situated 3.5 metres high on the buttress at the SE corner of nave. It comprises a very small diameter gnomon hole, a full circle, no pocks but a full set of lines at 15° below the horizontal and a line at 270°. Radius approx. 150mm, 1093, type C.

KIRKBURN. St Mary. Dial 2 of 4.



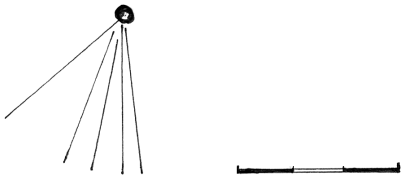
Situated on the same buttress as number 1 dial at SE corner of the nave, this dial is at a height of 1.78 metres. The gnomon hole is blocked and on a horizontal mortar joint. It has a well cut semicircle, no pocks and a curious set of lines. Some lines are well cut and straight whilst others are scratchy and bent. I suspect that at some stage in its life it has been poorly restored. Lines are at 15, 25, 35, 45, 70, 80, 90, 100, 110, 120, 135 and 150°. Radius 150mm, 1094, type D.

KIRKBURN, St Mary. Dial 3 of 4.



A clear dial situated on the nave wall just to the West of the SE nave corner buttress at a height of 3.0 metres. The gnomon hole is blocked on a horizontal joint. No circle or pocks visible but five good clear lines at 210, 220, 240, 270 and 290°. Probably repositioned and rotated by 180°. Radius approx. 140 mm, 1109, type F.

KIRKBURN, St Mary. Dial 4 of 4.

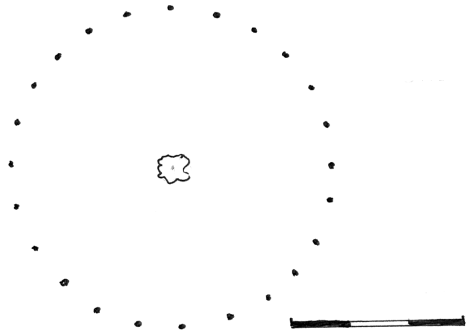


This dial is situated directly below number 3 dial, at a height of 1.8 metres. A cleanly cut gnomon hole and five lines are all that can be seen; no circle or pocks. Lines at 40, 68, 78, 90 and 97°. Radius 150mm, 1110, type F.

KIRKDALE, Dial 1 of 4**.** St Gregory. *See appendix 1 on page 42* .

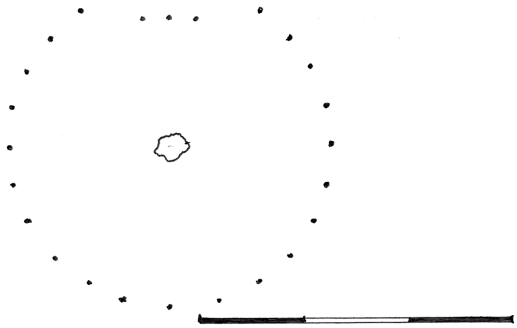
This is the best known and well documented early dial in the UK. It has been protected from the weather for centuries by the porch to the South door of the church so is in extremely good condition. The inscriptions on either side of the dial have enabled it to be dated accurately to between 1055 and 1065. The dial is carved onto a single stone block 2.13 × 0.42 metres and the dial itself has a radius of 380mm, 1024, type B. It has lines dividing it into eight equal parts, i.e. four tides and their halves.

KIRKDALE, St Gregory. Dial 2 of 4.



Although Kirkdale dial 1, the Saxon dial, is very well known and documented, there are three other less famous mass dials to be found at Kirkdale. Dial 2 is located to the West of the priest's door at a height of 1.41 metres. It has a blocked gnomon hole and a complete ring of pocks at 15° angles, now very faint and not easy to see. Radius 136mm, 1146, type G.

KIRKDALE, St Gregory. Dial 3 of 4.



This dial is situated to the East side of the priest's door and is similar in appearance to dial 2 but with a smaller radius of 75mm. The gnomon hole has been blocked with mortar

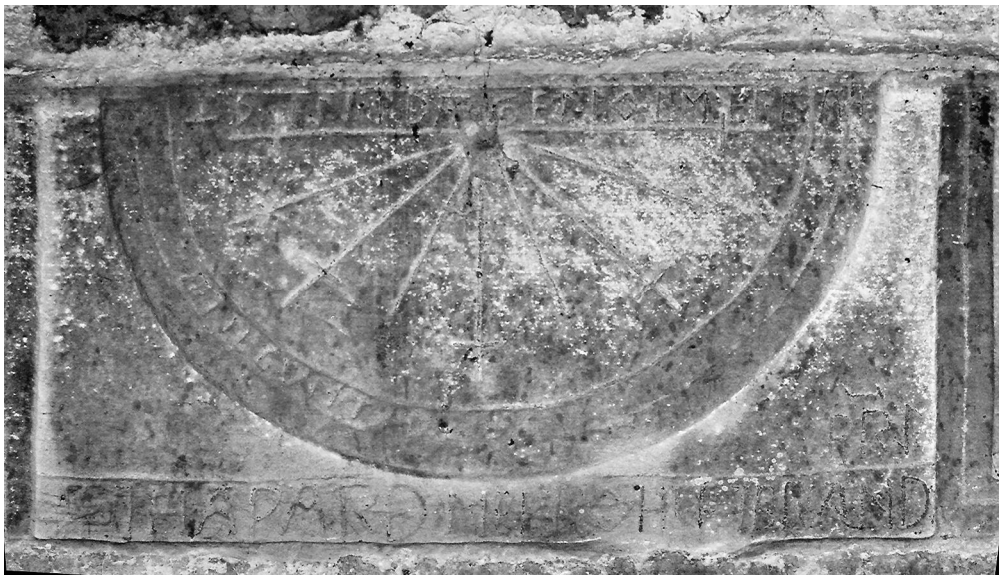
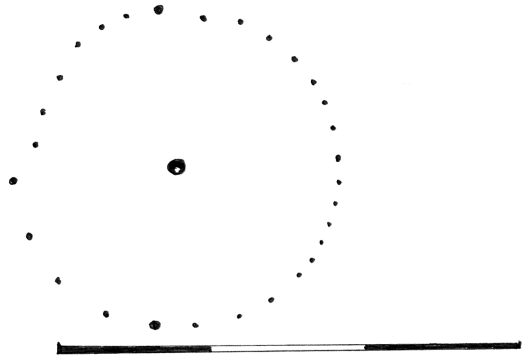


Fig. 14. Kirkdale, St Gregory, dial 1. An excellent example of a Saxon dial. Double semicircle with lines.

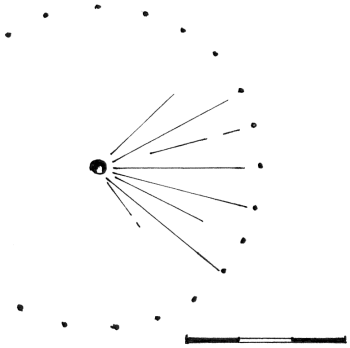
but this has crumbled to leave a shallow hole. It has a full set of pocks at 15°, well set out. No lines. Height 1.6 metres, 1147, type G.

KIRKDALE, St Gregory. Dial 4 of 4.



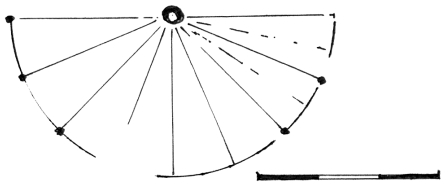
This dial is easier to see and is situated just a few centimetres to the East of dial 3 to the East of the priest's door. It has a deep gnomon hole and a full ring of pocks, no lines. The ring of pocks have been deeply drilled but they are haphazardly placed and amateurish in appearance which leads me to suspect that this could be a fake. Height 1.6 metres, radius 52mm, 1148, type G.

LASTINGHAM, St Mary.



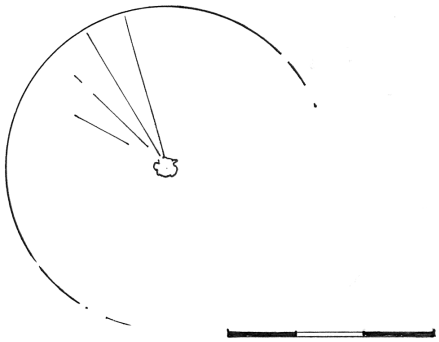
Although very eroded, this is a nice clear dial carved onto the first buttress to the East of the South door. It has a full ring of pocks at 15° angles and lines leading from a good deeply cut gnomon hole to the pocks. Lines can now only be seen on the East side of the dial because of erosion. Height 3.0 metres, radius 150mm, 1083, type E.

LOCKTON, St Giles.



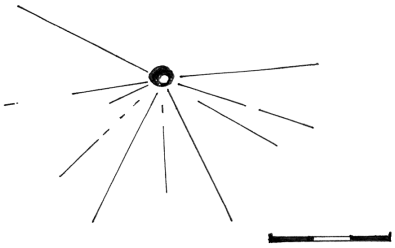
VAlthough very weathered, this appears to have been a well cut accurate dial 0.55 metres high on the nave wall close to the SE corner. It has a semicircle, nine clear lines at 0, 22, 45, 67, 90, 113, 135, 157 and 180° plus two faint lines at 146° and 168°. Five pocks still visible. Radius 130mm, 1104, type D.

LOW CATTON, All Saints.



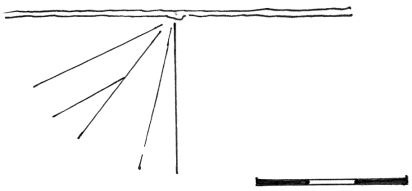
This is a well cut but faint dial now almost eroded away. Only the upper western quadrant now visible. With a shallow gnomon hole, it once had a full circle and lines at 15°. Situated to West of second window East of South door. Height 3.0 metres, radius 115mm, 1127, type C.

MIDDLETON, St Andrew.



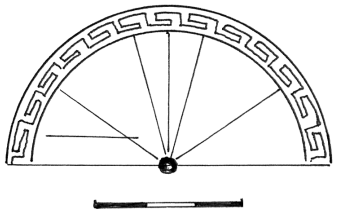
A nice dial on a badly eroded flaky stone. The dial is situated on the buttress on the SE corner of the South aisle, 1.3 metres high. The church declines 25° West so it is probable that this dial was cut to allow for this. No pocks and no circle but a good gnomon hole and 11 lines at unusual angles of 8, 23, 42, 62, 80, 90, 115, 150, 162 and 187°. Radius 200mm, 1082, type F.

NORTH DALTON, All Saints.



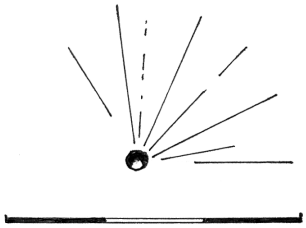
Deeply carved simple dial comprising four lines, no circle, no pocks. Lines at 25, 50, 75 and 90°. Situated 3.0 metres high on the chancel wall to the East of the most easterly window. The 40° line appears to be divided but I suspect that this may be damage caused at a much later date than original dial carving. Radius 160mm, 1120, type F.

OLD BYLAND, All Saints.
This is another well documented Saxon dial. It has been repositioned upside down on the East face of the tower approx 3.0 metres high. Mrs Margaret Gatty recorded the dial around 1890 and, at that time, it had an inscription



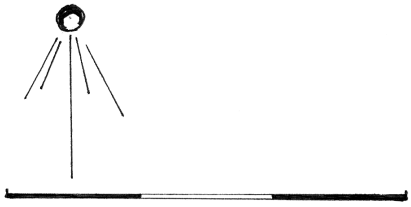
along the straight edge of the dial "Sumarlethi'shuscarl made me". Unfortunately, since that time erosion has completely obliterated it. The dial itself is still clear. It has a double semicircle with a Saxon zig-zag motif between the circle lines. It has lines at 0, 34, 75, 90, 105, 146 and 180°. Radius 160mm, 1023, type B.

OSWALDKIRK, St Oswald. Dial 1 of 3.



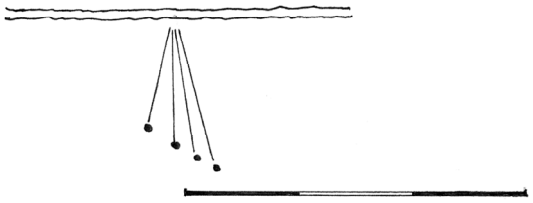
A crudely cut dial on a badly flaking stone. Cut to the West of the priest's door at a height of 1.3 metres, this dial only has lines above the horizontal remaining. No circle and no pocks. Lines at 180, 190, 205, 225, 245, 265, 275 and 300°. Good gnomon hole, radius 80mm, 1043, type E.

OSWALDKIRK, St Oswald. Dial 2 of 3.



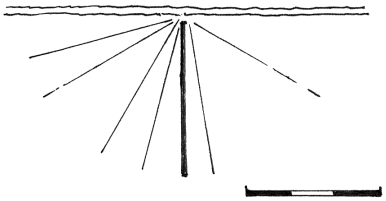
Another dial in a very distressed state cut into a very badly flaking stone to the West of the priest's door, 0.9 metres high. A good deeply bored gnomon hole, no circle or pocks and only 5 faint lines remaining at 60, 66, 90, 105 and 120°. Radius 60mm, 1044, type F.

OSWALDKIRK, St Oswald. Dial 3 of 3.



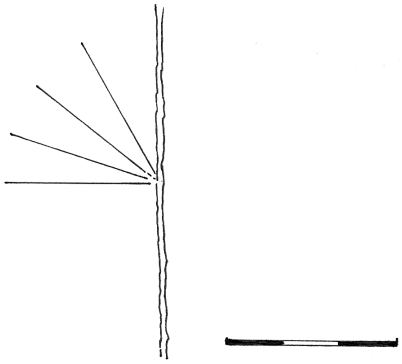
A crudely cut dial situated on the West side of the priest's door, 0.63 metres high. Gnomon hole blocked on a horizontal mortar joint, no circle but 4 clear lines and 4 pocks at the end of each line. Angles of 75, 90, 98 and 105°. Unusual that each line is a different length, 50mm to 70mm,1045, type F.

RILLINGTON, St Andrew. Dial 1 of 2.



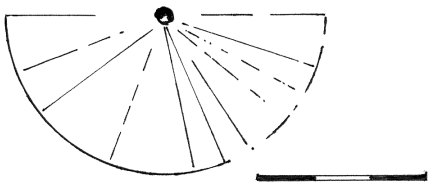
A good, deeply cut dial, repositioned on the East wall of the chancel at a height of 3.0 metres. It is now close to the SE chancel buttress where the sun can only reach it early in the morning. The gnomon hole is blocked and on a horizontal mortar joint. No circle, no pocks but 7 lines at 15, 30, 60, 75, 90, 100 and 150°. The 90° mark is wider than the other lines. Radius 180mm, 1018, type F.

RILLINGTON, St Andrew. Dial 2 of 2.



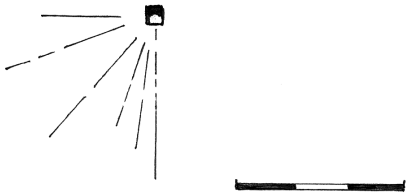
Another good dial repositioned on the angled buttress on the SE corner of the chancel but on the NE face at a height of 1.12 metres. It has been rotated 90° clockwise during the repositioning. Gnomon hole blocked and on a mortar joint. No circle, no pocks but 4 clear well cut lines at 300, 320, 340 and 360°. Radius 140mm, 1019, type F.

SAND HUTTON, St Mary.



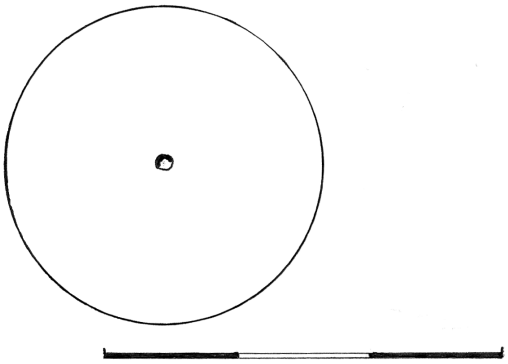
This dial is on the ruined remains of a chapel in St Mary's churchyard. It is located to the West of the main door at a height of 1.4 metres. This is a very eroded, but still clear, dial. It has a good clean deep gnomon hole, a faint semicircle, no pocks and ten faint lines, although the noon line is missing. Lines at 0, 35, 68, 100, 112, 123, 140, 150, 162 and 180°. Radius 140mm, 1068, type D.

SCAWTON, St Mary.



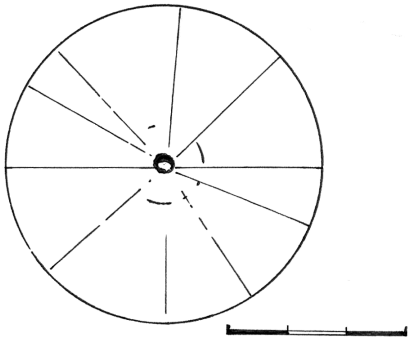
A roughly cut dial on a rough stone nave wall. Approx 3.5 metres high near the SW corner and difficult to see. No circle or pocks, deep gnomon hole. Lines at 0, 20, 45, 70, 80 and 90°. Radius 14 mm, 1134, type F.

SETTRINGTON, All Saints. Dial 1 of 2.



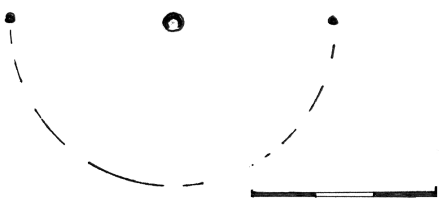
A simple full circle dial repositioned on the West wall of the tower South of the West door. Height 1.03 metres. It has a shallow gnomon hole, no pocks and no lines but a well cut circle. Radius 60mm, 1062, type H.

SETTRINGTON, All Saints. Dial 2 of 2.



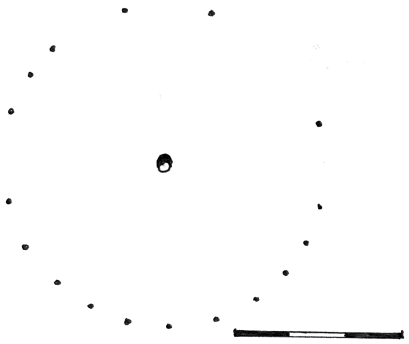
This dial is carved into the same stone as No. 1 dial, same height and just to the South. It is a well cut, clear dial with a full circle, no pocks, ten lines and a large gnomon hole. Lines at angles of 0, 40, 90, 125, 160, 180, 225, 265, 315 and 330°. Radius 135mm, 1063, type C. It may also have had a smaller diameter circle, but this is not clear.

SHERIFF HUTTON, St Helen and the Holy Cross.



A poor, very eroded, dial carved onto a nave buttress, 2.8 metres high. It has a good gnomon hole and two clear pocks on the horizontal. No lines but a very faint semicircle visible. Radius 130mm, 1021, type I fits best.

SINNINGTON, All Saints.



This repositioned dial has been cut on a larger stone than the others forming the West wall of the nave, 2.17 metres high just to the North of the blocked West door. It has a deep gnomon hole, no lines but an almost complete ring of pocks at 15° angles. It may have had a full circle at one time but this is now not really visible as it is too eroded. Radius 140mm, 1085, type G.

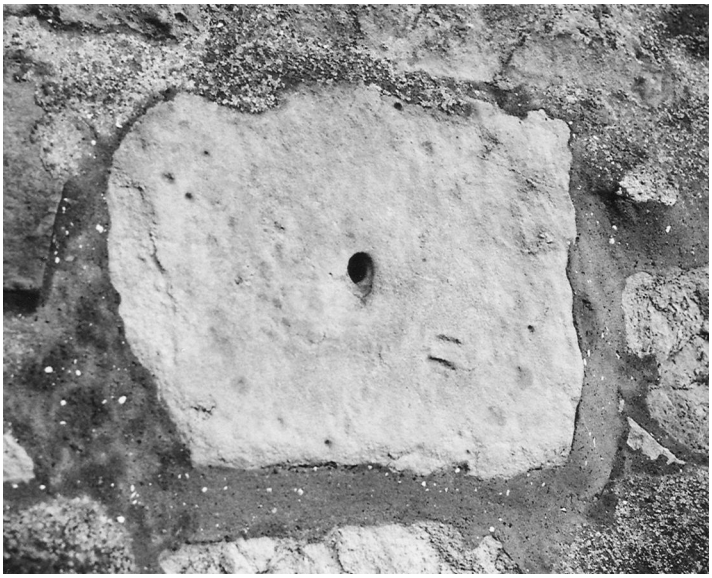
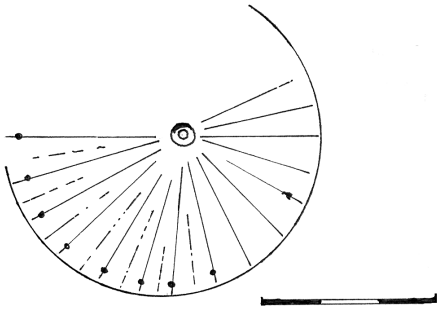


Fig. 15. Sinnington, All Saints. An example of a dial having a full ring of pocks but no lines visible.

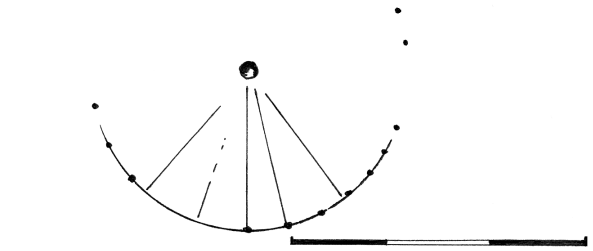
STILLINGTON, St Nicholas.



A nice dial, still clear but with some curious features. It had a full circle with lines at 15° angles but with fainter lines

cut to divide it into 7.5° divisions. There are pocks on the 15° lines but not the 7.5° ones. The pocks are just inside the circle and not on the circle as usually found. Another odd feature is that the gnomon hole still has the remains of a broken off iron gnomon *in-situ* but the gnomon hole is not quite in the centre of the dial. Situated 1.75 metres high to the East of the priest's door. Radius 135mm, 1042, type C.

TERRINGTON, All Saints.



A very weathered dial but deeply carved and still clearly visible. It has been repositioned and is now situated on the North wall of the nave just to the West of most Easterly nave buttress. 1.44 metres high. It has a deep gnomon hole, a clear semicircle, five lines at angles of 50, 70, 90, 105 and 130°. There are pocks but these do not seem to align with the visible lines. Radius 80mm, 1013, type D.

THORPE BASSETT, All Saints. Dial 1 of 4.

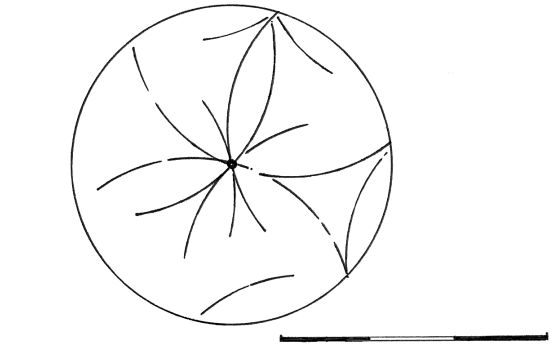
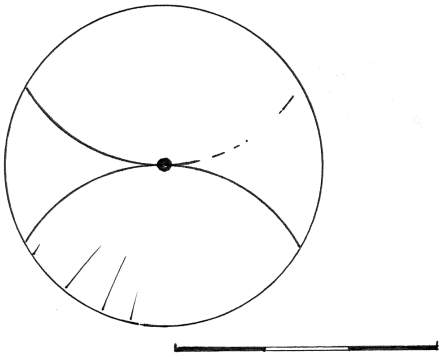


Fig. 16. Thorpe Bassett, All Saints, dial 1. An example of a dial known as a 'petal dial': the arcs of the internal circles look like the petals of a flower.

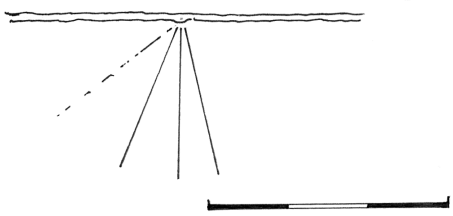
Situated on the SE face of the angled buttress on the SW corner of the nave, this is good example of a 'petal dial'. Although erosion has obliterated some parts, it is obviously an accurately cut dial. It consists of a shallow gnomon hole and a full 90mm diameter circle. Inside the circle are arcs of the same diameter arranged to form what looks like six petals with their points touching the outer circle at angles of 0, 75, 125, 195, 250 and 320°. How it was used to determine the time remains a mystery. Height 1.35 metres, 1014, type I.

THORPE BASSETT, All Saints. Dial 2 of 4.



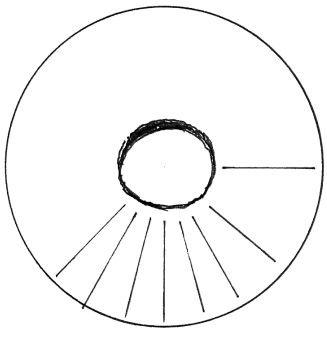
This dial is close to dial No.1 but is on the South facing wall of the nave close to the SW nave corner buttress. This dial is very eroded but has a clear full circle and a deep gnomon hole. No pocks visible but it has two clear arcs that touch the outer circle at 25, 155, 205 and 335° and is probably the remains of another 'petal dial'. However, this dial also has three lines at 50, 65 and 75°. Height 1.3 metres, radius 90mm, 1015, type I.

THORPE BASSETT, All Saints. Dial 3 of 4.



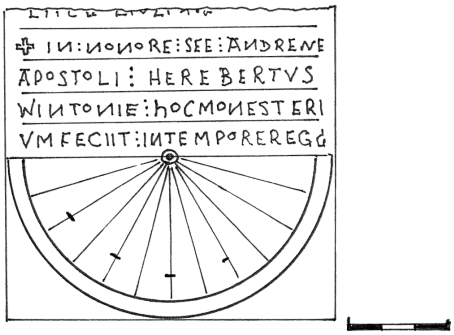
This is a simple dial of four lines, no pocks and no circle visible. The gnomon hole is blocked and on a horizontal mortar joint, 1.82 metres high on the nave to East of second window East of the South door. Lines at 40, 70, 90 and 105°. Radius 100mm, 1016, type F.

THORPE BASSETT, All Saints. Dial 4 of 4.



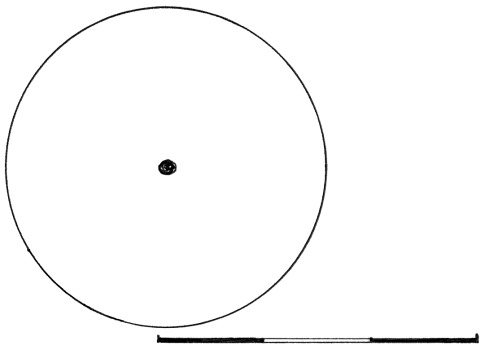
A small radius dial, 30mm, with a large gnomon hole, 15mm diameter. It has a full circle, no pocks, lines at 45, 60, 75, 90, 105, 120, 140 and 180°. Situated at the SE corner of the chancel. Height 1.7 metres, 1017, type C.

WEAVERTHORPE, St Andrew. *See appendix 2 on page 43.*



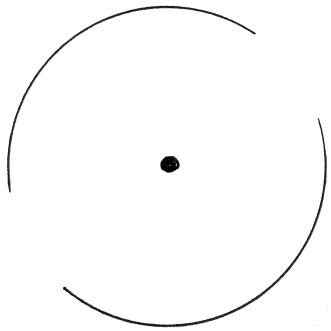
This is a well documented Saxon dial. It has been protected from the weather for centuries, being situated above the South door and inside the porch. It has been carved into a large square stone with the dial on the lower half and four lines of inscription on the upper half. The dial itself has a double semicircle and lines at 15° angles. The gnomon hole still retains the remains of a metal gnomon rod. Radii approx. 250 and 220mm, 1064, type B.

WHARRAM PERCY, St Martin. Dial 1 of 4.



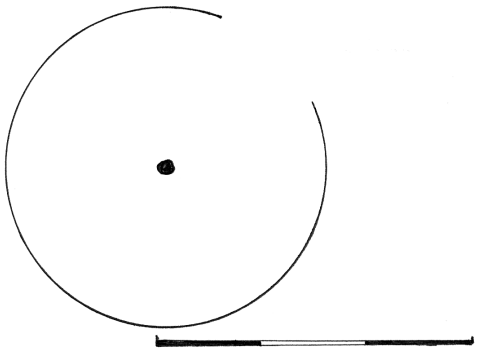
Wharram Percy is an abandoned village: the last inhabitants left after a plague around 1500. The ruin of the church is the sole surviving structure. Inside the roofless nave is an arch separating the nave from the roofed choir. On the North arch pillar, South face, can be seen three simple carvings which may have been mass dials. The upper one is a full circle, accurately cut but with no lines or pocks. It has a small gnomon hole and is 1.47 metres high. Radius 76mm, 1073, type H.

WHARRAM PERCY, St Martin. Dial 2 of 4.



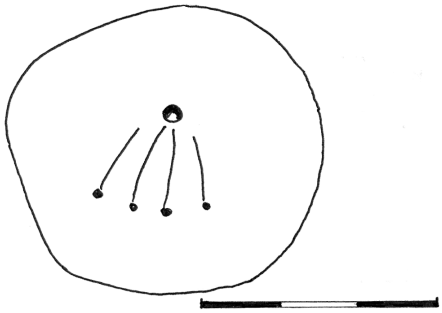
Situated on the same pillar as dial No. 1 but on the SW face, this dial is the same as No. 1 but is only 29mm radius, no lines or pocks and a small shallow gnomon hole. Height 1.25 metres, 1074, type H.

WHARRAM PERCY, St Martin. Dial 3 of 4.



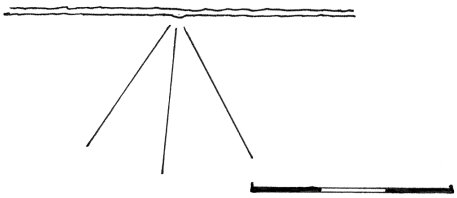
Situated on the same pillar but on a lower stone to numbers 1 and 2. Again, this is a simple full circle dial with no lines or pocks. 1.07 metres high. Radius 76 mm., 1075, type H.

WHARRAM PERCY, St Martin. Dial 4 of 4.



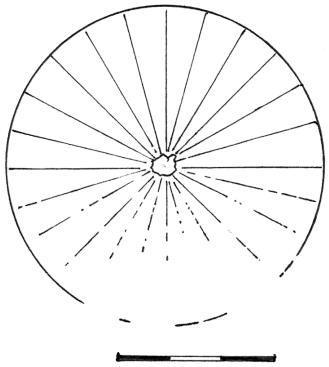
Probably the crudest cut dial seen in this search. It is situated on the East facing wall of the nave, 1.14 metres high. It has a very roughly cut circle surrounding a gnomon hole and four bent lines terminating at four pocks and with the outer two lines not starting at the gnomon. Line lengths 100mm, 1076, type I.

WHARRAM LE STREET, St Mary.



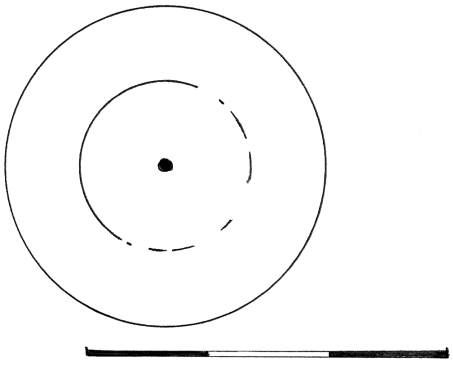
This is a simple dial consisting of only three lines, no circle or pocks visible. The gnomon hole is blocked and on a horizontal joint. It has been repositioned on the East wall of the chancel at a height of 0.9 metres. The three lines are deep and well cut so may have been the only lines cut when the dial was new. The lines are at 55, 83 and 117° so the dial may have been rotated 7° clockwise for aspect. Radius 120mm, 1067, type F.

WHENBY, St Martin. Dial 1 of 2.



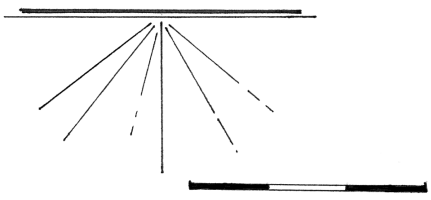
An excellent, well cut dial situated on the second buttress to the East of the South door. It has a full circle and lines radiating at 15°. No pocks and the gnomon hole has been blocked. It is possible that it may have had roman numerals outside the circle but it is now too eroded to be sure. The top of dial is clear but the lower half is eroded. Height 3.8 metres approx. Radius 150mm, 1132, type C.

WHENBY, St Martin. Dial 2 of 2.



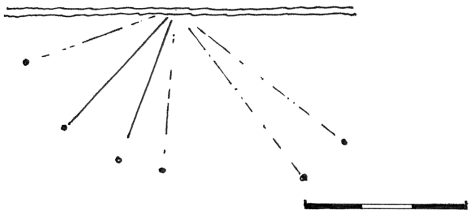
This dial has two full circles and a very small gnomon hole. No lines or pocks visible. It is situated 1.35 metres high below the first window to the East of the South door. Radius of outer circle 66mm; inner 28mm, 1133, type H probably fits best.

WINTRINGHAM, St Peter. Dial 1 of 5.



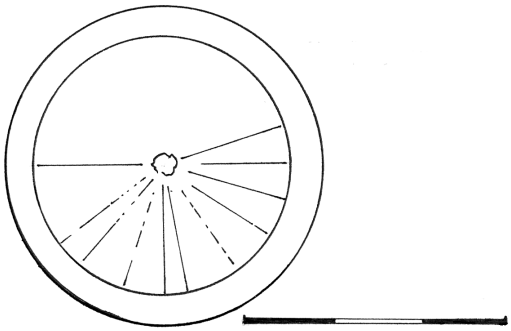
Situated on the tower wall 1.4 metres high, this dial has a blocked gnomon hole, no pocks or circle but has eight roughly cut lines at 0, 35, 50, 75, 90, 120, 140 and 180°. It has a deep horizontal 'slot' just above the dial but this is thought not be part of the dial. Radius 100mm, 1001, type F.

WINTRINGHAM, St Peter. Dial 2 of 5.



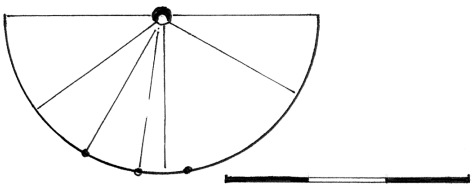
This dial is situated on the aisle wall just to the East of the first window at a height of 3.0 metres. It has a blocked gnomon hole on a horizontal mortar joint, no circle but has pocks below the horizontal at 18, 45, 68, 85, 128 and 142°. It has faint lines extending to these pocks 150mm radius but 180mm at 128° and 142°. 1002, type F.

WINTRINGHAM, St Peter. Dial 3 of 5.



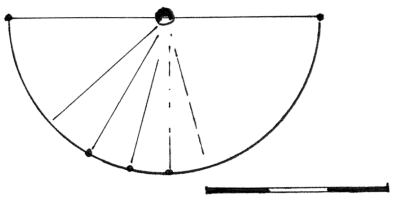
Positioned to the East of the most easterly aisle window at a height of 1.15 metres, this is a very nice dial. It consists of well cut double circles, a blocked gnomon hole, no pocks but ten well cut though now faint lines still visible at 0, 35, 47, 70, 90, 100, 125, 148, 165 180 and 200°. Radius of outer circle 90mm, inner 75mm, 1003, type A.

WINTRINGHAM, St Peter. Dial 4 of 5.



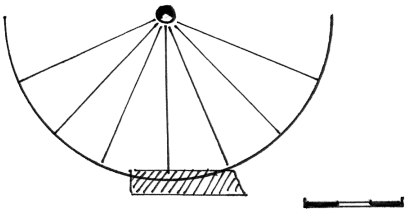
This dial is to the East of the priest's door at a height of 2.0 metres. It is a crudely cut dial, having a semicircle, a good deep gnomon hole, lines at 0, 35, 60, 80, 90, 150 and 180° and pocks visible at the end of some of the lines. Radius 100mm, 1004, type D.

WINTRINGHAM, St Peter. Dial 5 of 5.



Another crudely cut dial consisting of a semicircle, seven faint lines and pocks at the end of some of the lines. Clean deep gnomon hole. Lines at 0, 40, 60, 75, 90, 105 and 180°. This dial is situated to the East of the most easterly chancel window at a height of 1.6 metres. Radius 130mm, 1005 type D.

YORK MINSTER, St Peter.



An excellent, well carved dial situated on the first buttress to the East of the SW tower at a height of approximately 3.0 metres. It has had a repair made to the lower part of the dial but otherwise it is in very good condition. It has a semicircle of approximately 250mm radius, a good deep gnomon hole and lines at 22, 45, 68, 90, 112, 135 and 158°. It does not have a horizontal line, presumably because nearby housing would always have made such markings unusable: the sun needs to rise above the houses before reaching the dial. 1025, type D.

THE CITY OF YORK

The ancient city of York has a medieval defence wall surrounding it. The wall remains almost intact and stretches for almost three miles. Inside the city walls can be found seventeen old parish churches that date back to the Norman conquest, or only shortly after. Detailed search has revealed no mass dials on any of them, although at their age it is perhaps surprising that none have been found. The only mass dial in York is the one located on the Minster. There are two possible reasons for this. Perhaps all the parishes relied on the Minster bells to summon their congregations to attend their own parish church or, perhaps, any original parish mass dials may have been lost due to church restoration, alteration and rebuilding.

The survey for mass dials on Yorkshire churches should include these seventeen but it has been decided to leave them separate in the analysis of results. The seventeen are:-

On the West bank of the River Ouse:-
- All Saints, North Street.
- Holy Trinity, Micklegate.
- St John the Evangelist, Micklegate.
- St Martin cum Gregory, Micklegate.
- St Mary Bishophill Junior, Bishophill.

On the East side of the River Ouse:-
- All Saints, Pavement.
- Holy Trinity, Goodramgate.
- St Andrew, St. Andrewgate.
- St Denys, Walmgate.
- St Helen, St Helens Square.
- St Margaret, Walmgate.
- St Martin le Grand, Coney Street.
- St Mary, Castlegate.
- St Olave, Marygate.
- St Sampson, Church Street.
- St Saviour, St. Saviourgate.
- St Cuthbert, Peasholme Green.

ANALYSIS OF MASS DIAL SEARCH RESULTS

The search for Yorkshire mass dials in grid square SE entailed searching an area 100 kilometres by 100 kilometres and inspecting all churches which still retain parts predating 1600 AD and where it is thought that mass dials could probably be found. Nikolaus Pevsner's books *The Buildings of Britain* became well thumbed throughout this process. Three hundred and eighteen churches were visited and 83 churches (26.1%) were found to have one or more mass dials.

The search area was divided into four quarters, each measuring 50 by 50 kilometres. This was to ease the search process but also to enable easy comparison to be made between the four areas.

The Southwest quadrant, for example, contains many of the largest cities and towns e.g. Leeds, Bradford, Halifax, Huddersfield and Wakefield. It obviously contains the largest population of the four quadrants and is by far the most industrialised with the remains of once thriving coal, engineering, cloth manufacturing and woollen industries. The terrain is generally low rolling hills but with higher hills to the western edges and where moorland precludes much human habitation. Sixty-seven churches were visited in this quadrant but only eight churches (11.9%) still had mass dials.

The Southeast quadrant is flat country containing the Humber, Ouse and Trent river basins with only a few low hills of the Yorkshire Wolds in the northeastern corner of the area. In practice, this quadrant lost about 16% of its search area because of the Humber estuary and the County of Lincolnshire South of the Humber which was not searched. The area is mostly agricultural but with Doncaster, Selby and Goole providing some manufacturing industries. Eighty-five churches were visited in this quadrant and eighteen (21.2%) were found to have one or more mass dials.

The Northwest quadrant contains the wide Vale of York which is a flat agricultural plain. To the West of the plain, and covering perhaps one third of the quadrant, are the hills of the Pennines. These are high moorlands with little human habitation except in the valleys of the Swale, Ure and Nidd which flow East into the Vale. Harrogate, Ripon and Northallerton are the main towns but these are market towns and have never sustained much manufacturing. The Pennine valleys have had a long history of lead mining, although no mining is carried out now. Seventy-three churches were visited in this quadrant and eighteen churches (24.7%) still have mass dials.

Finally, the Northeast quadrant is, apart from the City of York, totally agricultural. The main towns of Malton, Pickering and Easingwold are small market towns. The area is dominated by the wide flat Vale of Pickering running West to East. To the North of the Vale are the North Yorkshire Moors, high moorland with very little human habitation, and to the South are the low rolling hills of the Wolds and Howardian Hills. These areas are wholly agricultural and inhabited. Ninety-three churches in this quadrant were visited and thirty-nine churches (41.9%) were found to have mass dials.

The full search results are shown in Table 1.

The survey found 83 churches with one or more mass dials and it also revealed that 51 of these have just one dial. The other 32 churches have 88 mass dials shared between them, a surprising statistic of nearly three per church. The highest number found on one church in this area is five, at Wintringham.

It has been an accepted fact that there is a variety of different types of mass dial throughout the UK but the reasons for this is not known. Whether one type is more

Quadrant of grid square SE	Churches visited	Churches with mass dials		No. of dials (total)	Churches with only one mass dial
		No.	%		
Southwest	67	8	11.9	10	6
Southeast	85	18	21.2	33	8
Northwest	73	18	24.7	23	14
Northeast	93	39	41.7	73	23
TOTALS	318	83	26.1	139	51

Table 1. Distribution of mass dials in grid square SE

Quadrant of square	Mass dial type									
	A	B	C	D	E	F	G	H	I	Total
Southwest	-	-	4	-	1	3	1	1	-	10
Southeast	-	-	4	5	3	11	6	2	2	33
Northwest	2	-	2	1	-	13	1	2	2	23
Northeast	2	5	12	11	4	19	4	11	4	73
TOTAL	5	5	22	17	8	46	12	16	8	139

Table 2. Distribution of mass dial types.

common in some areas and not in others is also an unknown. To try to understand this problem a little better, this search tried to place each dial found in grid square SE into one of nine types, as detailed on page 5. The results are shown in Table 2.

The results produced by this style of categorisation, by type, obviously depends on the initial selection and number of different types chosen. This survey clearly shows that the type of mass dial most common in this search area is type F, i.e., the type of dial with lines radiating from a gnomon hole below the horizontal only. The lines may, or may not, terminate with pocks but it never has a semicircle drawn. Forty-six of the 139 dials found are of this general pattern, or 33.1% of the total. Generally, this type is quite roughly carved or scratched and the number of lines, and the angles that they subscribe, vary widely. The photograph shown on page 22 is typical.

Type A dials are the type with a full double circle surrounding lines radiating round the whole 360°. Only five of these were found but they are all well carved. They look different from each other but that is mainly because they each have a different number of lines and angles.

Only five type B dials have been recorded and all of these are in the northeastern quadrant. These are all well documented Saxon dials and, given their age, are in remarkably good condition. They are all very well carved and are the stars of this search.

Type C dials are the second most commonly found mass dials found in the search area, twenty-two dials or 15.8% of the total. These full circle dials with lines are generally well cut. A good proportion of these have angles of 15° which probably means that this type were relatively late dials and their design may have been influenced by the early mechanical clock faces in the 1400s.

Type D dials, semicircular with lines, are not quite as common as the type C full circle dials but they are generally well cut. The angles vary widely from one dial to another and this may indicate that they were cut before the influence of mechanical clocks was being experienced.

Type E dials, no circle but lines radiating above as well as below the horizontal, are relatively rare. Only nine were found in the search area. They varied in quality; some are well cut whilst others are very rough. They are probably quite early dials.

Type G dials are the type comprising a ring of pocks surrounding the gnomon hole but with no lines. Most of these dials have pocks at 15° angles. These dials almost certainly date from the late 1400s and early 1500s and were probably the last mass dials to be made before scientific sundials superseded them.

Type H dials just have a full circle with no lines visible. They were probably originally painted dials although there is now no remaining evidence to support or disprove this hypothesis.

Type I is essentially the miscellaneous group intended to capture all those dials which do not naturally fall into one of the other eight types. Eight dials are captured in this grouping, two semicircle dials with no lines, one square shaped dial with lines, one window ledge dial and one very crudely cut dial resembling an F type but with a rough cut circle surrounding but at some distance away. It also includes three dials commonly called ‘petal dials’ (two at Thorpe Bassett and one at Middleton on the Wolds). Very little is known about petal dials, so called because the curved lines look like the petals of a flower contained within a circle. It is by no means certain that they are time markers; some authors have suggested that they may be masons’ practice pieces although it would seem to make more sense to practise on loose stones rather than on the outside walls of churches. However, although they are quite rare, they have been found on churches throughout the UK. They are about the same age, about the same size and are found in the same places on the church walls as the more recognisable mass dials. Perhaps someone will, one day, produce an acceptable theory on how they could have told the time. Until then, they remain something of a mystery and only tenuously cling to the name and categorisation of mass dials.

SUMMARY

The search area quadrants each had a roughly equal number of churches visited, 67, 85, 73 and 93 for the SW, SE, NW and NE quadrants respectively. It is extremely likely that all these would have had, originally, one or more mass dials carved onto their walls. However, the percentage of churches with surviving mass dials varies widely with 11.9%, 21.2%, 24.7% and 41.7% for the same respective quadrants. The rural Northeast quadrant has a much higher survival rate than the industrial Southwestern quadrant.

This variation is interesting and the diversity within this single grid square SE is believed to be repeated throughout the UK. Some areas have a lot of mass dials whilst others have very few. A number of possible reasons have been suggested to explain these variations nationally. It has been suggested, for example, that areas where the churches were built using very hard stone had fewer dials originally because of the physical difficulty of carving them. Perhaps churches built using soft stone have suffered more from weather erosion so that fewer mass dials have survived in these areas. Perhaps both suggestions have some credibility but the detailed search in one grid square has allowed another possibility to be explored.

Church construction throughout the search area has been very consistent. Almost all of the Yorkshire churches visited are stone built, the majority have squat square towers with just a few with steeples and a few with a bell cote instead of a tower. The stone used in construction is a variety of locally hewn limestone or sandstone with a few pockets of gritstone on the Western area edges. No discernible difference was noticed from one quadrant to another.

The variation can probably be better explained by looking at the history of the churches themselves. Until the Industrial Revolution, the whole of the search area was wholly agricultural and very little population movement would have occurred. The sole exception was the City of York which has had a very long history of commerce as well as being an important inland port. The Industrial Revolution caused a vast migration of the population from the rural areas to the rapidly expanding towns supporting the various new industries. In Yorkshire this meant that the West Riding agricultural villages quickly changed into manufacturing towns. One obvious result of this population shift was that the old West Riding parish churches were too small to accommodate this increasing number of people. The solution to the problem was to enlarge the parish church, often by adding North and South aisles, or to knock the old church down and rebuild. All the churches in Leeds and Bradford, for example, are Victorian or later and so would never have had any mass dials. It cannot be too surprising, therefore, to find so few mass dials in the SW quadrant of the search area.

During this same period, the churches in the depopulated areas, such as the NE quadrant of the search area, would remain unchanged and under-used compared with their earlier history. Erosion would remain their main enemy.

One more important factor must be taken into consideration when trying to understand area variations. During the Industrial Revolution some people were making vast fortunes and many of them became local benefactors (local boy made good!). Often this was in the form of donations of money to provide schooling but often it also provided money to rebuild, enlarge or beautify their local parish church. Even in rural areas this must have resulted in many mass dials being lost but it is more noticeable in the market towns where there are some magnificent churches but no mass dials. With the exception of York Minster, Knaresborough and Easingwold, no mass dials have been found on any large town churches in the search area. This must be the result of benefactors or rebuilding inspired by population increase.

The survey placed all 139 mass dials into one of nine types and these were then analysed to compare whether any particular type was more common in some areas than others. The results are not conclusive and no claim can be made to suggest that there is a significant difference between the quadrants. In the whole search area, types F and C together accounted for 50% of the total mass dials recorded, although it is perhaps worth noting the following points:

a. Type F is more common in the Northwest quadrant with 13 out of the total of 23 mass dials found in that quadrant.

b. Type B, the five Saxon dials, are all located in the Northeast quadrant.

c. Type H is more common in the Northeast quadrant with 11 out of the 16 of this type found in the whole search area.

It has been noted in the analysis that thirty-two churches have more than one mass dial compared with fifty-one with only one. This is a very considerable total and it is difficult to understand why any church would need more than one. Various suggestions can be made but it is still difficult be convinced by any of the suggestions. Maybe new buildings, or tree growth, prevented the sun from shining on the

original dial and this resulted in new one being carved in a sunnier position. Perhaps different dials were in use during different seasons of the year. Remember that, before mechanical clocks, the humble mass dial could only divide daylight into roughly equal parts and we know that the duration of daylight changes quite significantly from one season to another. The parish priest decided which church services to hold and when was the best time to hold them. Perhaps a new parish priest with different favourite times would merely have a new mass dial carved to suit his requirements. A number of churches have dials carved in the same position, on a buttress face for example, so perhaps the original dial's gnomon or gnomon hole became damaged and that caused another mass dial to be carved nearby. It may be the case that the truth is a combination of these suggestions. We will probably never know the real answer to the problem but it remains an intriguing puzzle as to why so many churches have more than one mass dial.

The survey also revealed that of the 104 mass dials with lines, 36 were found with lines above as well as below the horizontal (types A, C and E). This is a high proportion of the total when we consider that the sun's shadow could never have been cast on these 'above horizon lines'. All these dials are believed to have been carved onto a vertical face with a horizontal gnomon. If they were originally mounted flat with a vertical gnomon then the 'above horizon lines' would begin to make some sense but there is no evidence at all to support this suggestion. The type G dials, a ring of pocks surrounding the gnomon hole, are believed to be transitional mass dials and these have pocks above the horizontal, probably influenced by the appearance of the new mechanical clock faces. It is possible that the dials with lines above the horizontal (types A, C and E) are late mass dials too and are merely following the new clock face convention. This suggestion would gain more support if the lines on these dials were predominantly at 15° angles but, in fact, only half are at this angle. The problem remains unsolved and only emphasises that much is still to be understood about mass dials.

APPENDIX 1

Kirkdale, St Gregory. Dial 1. See page 30.

The mass dial detailed on page 30 is a very special dial because of the inscriptions on and around it. These have enabled the dial to be dated to between 1055 and 1065 AD. The dial and associated inscriptions are carved onto a single block of stone measuring 2.13 metres by 0.42 metres (about 7×1.38 ft), thought to be the underside of a stone coffin lid. The dial was discovered in 1771 during renovation work on the church that necessitated removing some external wall plaster rendering above the South door. Since that time it has attracted a lot of archaeological interest and, for over two hundred years, has been protected from the weather by a specially built South door porch. In 1959 a mould of the whole dial was taken and copies of this can be seen in the British Museum and at the Museum of Clocks and Watches at Upton Hall in Nottinghamshire, indicating its importance to the subject of time measurement.

The inscriptions, written in Early English, are particularly interesting and it is amazing that we can still read and understand (with a little help) what the stonemason was writing. There are five lines of script on either side of the dial which informs us that,

> Orm, Gamal's son, bought St Gregory's Minster when it was all broken down and fallen and he let it be made anew from the ground to Christ and St Gregory in Edward's days, the King, and in Tosti's days the Earl.

King Edward was Edward the Confessor who died in 1065 AD and Tosti, the Earl, was made Earl of Northumberland in 1055 and died at the Battle of Stamford Bridge, near York, in 1066.

On the dial section itself are two inscriptions. Above the dial is,

> "This is day's sun marker at every tide"

and below the dial,

> "And Haworth me wrought and Brand provosts".

APPENDIX 2

Weaverthorpe, St Andrew. See page 35.

The Weaverthorpe mass dial is another well documented Saxon dial and, like the Kirkdale dial, is particularly interesting because of the inscription carved above the dial and on the same stone block. The stone is approximately 0.5 metres square and mounted above the South door where it is protected from the weather by a stone porch. This stone has obviously been damaged at some period in its history because the lower half of letters carved along its top edge are still just visible. It is impossible to guess how large the original stone was, nor can we guess what the full inscription may have told us. However, the four remaining lines of inscription are still clear and reveal some of the dial's life.

The inscription is in Saxon script and is therefore difficult for the layman to read but, apparently, it tells us,

> In honour of St Andrew the Apostle, Herbert of Winchester made this monastery in the time of King Reginald.

King Reginald was a Danish king who frequently visited Northern England in the mid-900s. At the top of the dial, the line with only the lower half of the characters remaining, has been interpreted to read, "Oscestuli Archepiscopi." Oscestuli was made Archbishop of York in 956 A.D. so the dial is almost certain to have been carved around that date which makes it the oldest surviving dial in Yorkshire. Little is known about Herbert of Winchester but apparently he was known as a builder of monasteries and was probably the Abbot of Weaverthorpe at this time. The Doomsday Book (1085 AD) records that the Weaverthorpe Monastery was in a ruined state so it is very likely that the dial stone was broken during that period of its history.

APPENDIX 3

List of Churches with Mass Dials in Grid Square SE

Numbers in brackets are the number of mass dials at that church

SOUTHWESTERN QUARTER

Darfield	All Saints	(1) SE 419 043
Harewood	All Saints	(1) SE 313 451
Healaugh	St John	(2) SE 499 480
Newton Kyme	St Andrew	(2) SE 466 448
Penistone	St John the Baptist	(1) SE 246 033
Swillington	St Mary	(1) SE 385 306
Walton	St Peter the Baptist	(1) SE 441 479
Woolley	St Peter	(1) SE 320 130

SOUTHEASTERN QUARTER

Adlingfleet	All Saints	(2) SE 844 210
Adwick Le Street	St Lawrence	(1) SE 541 086
Bolton Percy	All Saints	(2) SE 521 413
Burnby	St Giles	(3) SE 835 464
Campsall	St Mary	(1) SE 545 141
Eastrington	St Michael	(1) SE 796 300
Goodmamham	All Saints	(2) SE 890 432
Harswell	St Peter	(1) SE 819 408
Hayton	St Martin	(2) SE 821 460
Lockington	St Mary	(3) SE 997 469
Londesborough	All Saints	(3) SE 869 454
Middleton Le Wolds	St Andrew	(4) SE 946 496
Monk Fryston	St Wilfred	(2) SE 505 298
Owston Ferry	St Martin	(1) SE 805 003
Skipwith	St Helen	(2) SE 657 385
Sprotborough	St Mary	(1) SE 540 020
Stillingfleet	St Nicholas	(1) SE 593 411
Thornton	St Michael	(1) SE 760 452

NORTHWESTERN QUARTER

Aldborough	St Andrew	(1) SE 406 664
Bilton In Ainsty	St Helen	(3) SE 476 504
Burneston	St Lambert	(1) SE 309 850
Castle Bolton	St Oswald	(1) SE 033 919
Catterick	St Anne	(1) SE 240 980
Cowthorpe	St Michael	(1) SE 427 504
East Harsley	St Oswald	(2) SE 426 998
Goldsborough	St Mary	(1) SE 384 561
Hornby	St Mary	(1) SE 222 938
Kirby Malzeard	St Andrew	(1) SE 235 746
Kirby Sigston	St Lawrence	(1) SE 417 947
Kirby Wiske	St John Baptist	(2) SE 377 848
Kirklington	St Michael	(1) SE 319 811
Knaresborough	St John	(1) SE 347 572
Leake	St Mary	(2) SE 433 906
Over Silton	St Mary	(1) SE 456 932
Redmire	St Mary	(1) SE 051 908
Scruton	St Radegund	(1) SE 305 926

NORTHEASTERN QUARTER

Bainton	St Andrew	(4) SE 965 524
Bossall	St Botolph	(1) SE 719 608
Bugthorpe	St Andrew	(4) SE 772 579
Bulmer	St Martin	(2) SE 699 676
Coxwold	St Michael	(1) SE 533 771
Crambe	St Michael	(1) SE 734 649
Easingwold	All Saints & St John	(2) SE 529 701
Foston	All Saints	(1) SE 699 652
Fridaythorpe	St Mary	(1) SE 875 595
Great Edstone	St Michael	(1) SE 705 840
Ganton	St Nicholas	(3) SE 990 776
Garton On Wolds	St Michael	(1) SE 982 595
Kirby Gridalythe	St Andrew	(2) SE 904 675
Kirby Misperton	St Lawrence	(3) SE 779 796
Kirkbymoorside	All Saints	(1) SE 697 867
Kirkburn	St Mary	(4) SE 980 551
Kirkdale	St Gregory	(4) SE 677 858
Lastingham	St Mary	(1) SE 728 905
Lockton	St Giles	(1) SE 843 905
Low Catton	All Saints	(1) SE 715 540
Middleton	St Andrew	(1) SE 782 855
North Dalton	All Saints	(1) SE 934 523
Old Byland	All Saints	(1) SE 551 859
Oswaldkirk	St Oswald	(3) SE 621 789
Rillington	St Andrew	(2) SE 852 744
Sand Hutton	St Mary	(1) SE 694 586
Scawton	St Mary	(1) SE 549 836
Settrington	All Saints	(2) SE 839 703
Sheriff Hutton	St Helen Holy Cross	(1) SE 658 663
Sinnington	All Saints	(1) SE 746 861
Stillington	St Nicholas	(1) SE 583 679
Terrington	All Saints	(1) SE 672 708
Thorpe Bassett	All Saints	(4) SE 858 734
Weaverthorpe	St Andrew	(1) SE 967 711
Wharram Percy	St Martin	(4) SE 859 642
Wharram Le Street	St Mary	(1) SE 864 659
Whenby	St Martin	(2) SE 631 689
Wintringham	St Peter	(5) SE 888 732
York Minster	St Peter	(1) SE 603 524

APPENDIX 4

Churches Visited With No Mass Dials

Southwest Quadrant

Aberford	SE 433 372
Addingham	SE 085 497
Adel	SE 274 403
Adwick Le Dearne	SE 471 015
Almondsbury	SE 168 151
Badsworth	SE 463 150
Bardsey	SE 365 431
Barnburgh	SE 484 033
Barwick in Elmet	SE 401 374
Batley	SE 242 245
Bingley	SE 105 365
Birstall	SE 218 262
Bolton On Dearne	SE 456 025
Bramham	SE 428 431
Calverley	SE 208 372
Cawthorne	SE 285 080
Collingham	SE 390 461
Crofton	SE 377 183
Darrington	SE 485 203
Darton	SE 311 099
Elland	SE 107 212
Emley	SE 245 134
Featherstone	SE 422 222
Felkirk	SE 387 127
Guiseley	SE 194 422
Halifax	SE 097 253
Hartshead	SE 179 234
Haworth	SE 030 372
Hickleton	SE 483 053
Hooton Pagnell	SE 486 080
Ilkley	SE 116 479
Kildwick	SE 012 459
Kippax	SE 420 305
Kirby Overblow	SE 324 492
Kirk Burton	SE 198 125
Kirk Heaton	SE 179 172
Kirkthorpe	SE 362 210
Ledsham	SE 455 295
Leathley	SE 232 470
Ledston	SE 435 280
Methley	SE 391 266
Normanton	SE 387 225
Otley	SE 202 454
Royston	SE 364 113
Sandal Magna	SE 343 183
Saxton	SE 476 369
Sherburn Elmet	SE 336 488
Silkstone	SE 291 058
South Kirby	SE 453 111
Stainburn	SE 247 485
Tadcaster	SE 486 436
Thornhill	SE 253 188
Thorpe Arch	SE 438 461
Wath On Dearne	SE 433 009
Weston	SE 177 467
Whitkirk	SE 363 336
Woodkirk	SE 272 250
Worsborough	SE 350 026
Wragby	SE 407 173

Southeastern Quadrant

Allerthorpe	SE 785 475
Althorpe	SE 835 096
Arksey	SE 579 069
Armthorpe	SE 622 049
Askham Bryan	SE 553 485
Askham Richard	SE 537 480
Barnby Dun	SE 614 097
Barnby Moor	SE 777 489
Beilby	SE 788 437
Bilborough	SE 530 466
Birkin	SE 531 266
Bishop Burton	SE 990 397
Brantingham	SE 944 301
Brayton	SE 605 310
Bubwith	SE 712 362
Burghwallis	SE 537 120
Copmanthorpe	SE 565 469
Cadeby	SE 515 006
Cantley	SE 619 015
Cawood	SE 578 378
Chapel Haddlesey	SE 583 261
Cherry Burton	SE 992 419
Church Fenton	SE 514 368
Crowle	SE 771 130
Drax	SE 676 264
Elloughton	SE 944 283
Elvington	SE 701 475
Epworth	SE 781 038
Etton	SE 982 436
Everingham	SE 804 424
Fishlake	SE 656 132
Hatfield	SE 663 095
Hemingbrough	SE 673 307
High Melton	SE 509 019
Holme On Spalding Moor	SE 821 390
Hotham	SE 894 346
Howden	SE 748 283
Kilnwick	SE 997 496
Kilnwick Percy	SE 827 498
Kirk Bramwith	SE 620 117
Kirk Smeaton	SE 520 166
Knottingley	SE 500 241
Lund	SE 970 482
Little Weighton	SE 977 327
Marr	SE 515 054
Market Weighton	SE 878 418
North Cave	SE 896 328
North Newbold	SE 903 367
Nunburnholme	SE 848 478
Owston	Se 551 112
Pocklington	SE 820 490
Ryther	SE 555 395
Sancton	SE 890 395
Seaton Ross	SE 781 413
Selby Abbey	SE 616 325
Skyehouse	SE 629 169
Snaith	SE 641 222
South Cave	SE 917 311
Thorganby	SE 689 417
Sutton On Derwent	SE 706 437
Thorne	SE 690 132
Walkington	SE 998 368
Welton	SE 959 274
Wheldrake	SE 683 450
Whitgift	SE 808 227
Wistow	SE 592 357
Womersley	SE 532 190

Northwestern Quadrant

Ainderby Steeple	SE 335 921
Aldfield	SE 293 694
Alne	SE 495 660
Ayesgarth	SE 012 885
Bafferton	SE 436 702
Bedale	SE 265 885
Birdforth	SE 498 756
Bolton Priory	SE 073 542
Brompton	SE 323 965
Burnsall	SE 037 615
Burton Leonard	SE 328 639
Copgrove	SE 346 633
Coverham	SE 104 864
Danby Wiske	SE 339 983
Downholme	SE 110 984
Felixkirk	SE 465 845
Finghall	SE 191 902
Great Ouseburn	SE 449 618
Grinton	SE 046 984
Hampsthwaite	SE 260 590
Hauxwell	SE 166 931
Hunsingore	SE 429 537
Kirby Fleetham	SE 281 958
Kirby Hill	SE 393 686
Kirk Deighton	SE 399 506
Kirk Hammerton	SE 465 556
Little Ouseburn	SE 452 612
Marrick Priory	SE 068 978
Masham	SE 226 807
Middleham	SE 126 889
Myton Swale	SE 439 667
Nidd	SE 301 608
Northallerton	SE 367 942

Osmotherly	SE 456 977
Pannal	SE 306 517
Raskelf	SE 490 715
Ripley	SE 283 605
Ripon	SE 314 713
South Kilvington	SE 425 840
Spennithorne	SE 137 890
Spofforth	SE 364 511
Thirsk	SE 427 823
Thormanby	SE 499 755
Thornton Steward	SE 170 869
Thornton Beans.	SE 395 904
Thornton Watlass	SE 233 854
Tockwith	SE 466 524
Topcliffe	SE 400 760
Upper Dunsforth	SE 443 649
West Tanfield	SE 268 788
Wath	SE 325 772
Well	SE 268 821
Wensley	SE 092 869
Whixley	SE 442 584
Yafforth	SE 344 945

Northeastern Quadrant

Allerston	SE 872 830
Ampleforth	SE 580 780
Appleton Le Street	SE 735 735
Birdsall	SE 820 660
Bishop Wilton	SE 800 555
Bransby	SE 590 725
Brompton	SE 950 825
Broughton	SE 765 735
Crayke	SE 565 710
Carlton Husthwaite	SE 500 795
Dalby	SE 635 716
East Ayton	SE 990 850
Ebberston	SE 898 832
Ellerburn	SE 833 840
Fangfosse	SE 775 538
Gillamoor	SE 678 900
Gilling East	SE 610 775
Hackness	SE 910 970
Hawnby	SE 535 890
Helmsley	SE 618 838
Holtby	SE 660 540
Hovingham	SE 670 760
Huggate	SE 880 560
Huntington	SE 595 560
Husthwaite	SE 520 750
Hutton Buscel	SE 972 838
Hutton Wandesley	SE 505 505
Kirby Underdale	SE 810 590
Kirkburn	SE 515 795
Langton	SE 795 665
Levisham	SE 910 843
Millington	SE 830 525
Nether Poppleton	SE 556 544
Newton On Ouse	SE 515 595
Moor Monkton	SE 510 567
Normanby	SE 730 825
Nun Monkton	SE 510 590
Nunnington	SE 665 790
Old Malton	SE 800 730
Osbaldwick	SE 620 545
Pickering	SE 795 838
Rosedale Abbey	SE 720 965
Salton	SE 718 798
Sherburn	SE 955 773
Slingsby	SE 695 650
Sproxton	SE 618 818
Stonegrave	SE 655 775
Sutton on Forest	SE 585 647
Thornton Dale	SE 830 830
Warthill	SE 660 565
Westow	SE 759 660
Wilberfosse	SE 730 515
Willerby	SE 998 790

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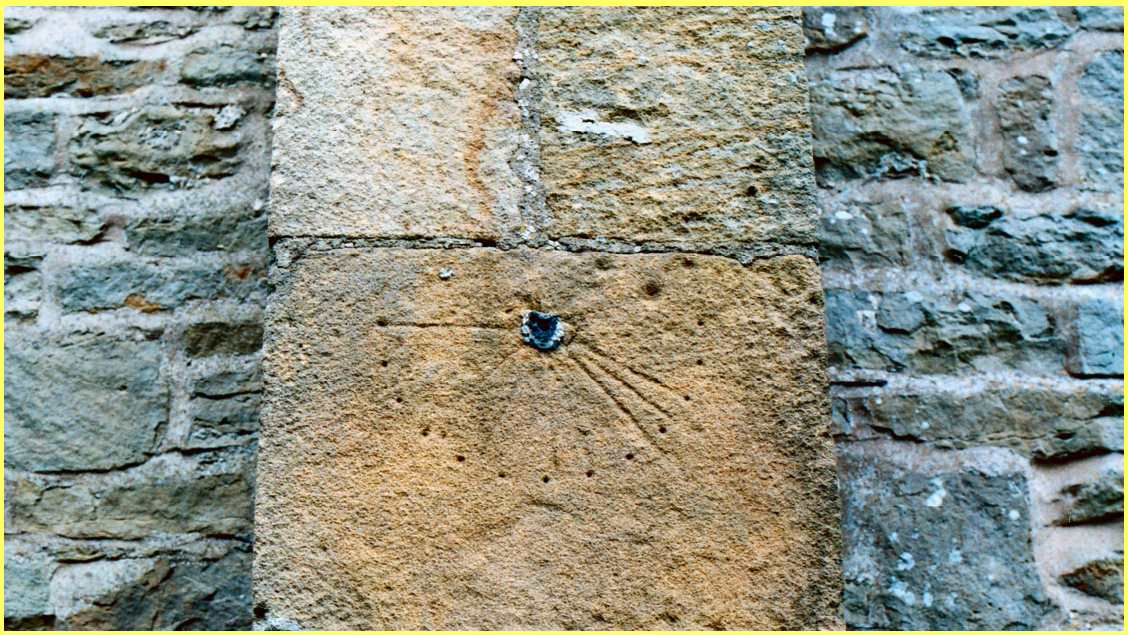

The British Sundial Society

Patron: The Hon Sir Mark Lennox-Boyd
President: Sir Francis Graham-Smith FRS
Chairman: Christopher St J H Daniel

The Society was formed in 1989 and is a thriving and friendly society of some 500 members. Our objects are to advance the education of the public in the art and science of gnomonics and the knowledge of all types of sundial; to catalogue and advise on the restoration of the sundials that still exist in the British Isles, and to research their history. We organise meetings and conferences and publish four 48-page journals each year. For more information, or if you have a general query about sundials, write to the Secretary at 4, New Wokingham Road, Crowthorne, Berks, RG45 7NR
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