

Sundials in London - Linking architecture and astronomy

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1. Sundials in my life

Following the inclusion of Astronomy in the revised National Science Curriculum for England and Wales the Association for Astronomy Education, AAE, embarked on a programme of in-service training workshops for teachers to help them to understand the new ideas and deliver the new curriculum. Teacher confidence and knowledge has been the greatest challenge to establishing astronomy in school curricula. As part of the the AAE team I gave presentations on a host of activities including simple cut and paste sundials for pupil projects. We are now seven years on from the revised Science Curriculum and my interest in sundials has stepped up a gear. I have developed an interest in real dials, both studying existing dials and making dials for the homes of friends and families and for schools. This presentation, which has as its focus, the sundial as an architectural feature, uses slides I have taken of some of the dials to be seen in the central London area including some of my own. I am grateful to the British Sundial Society for a list of dial locations in London.

2. Understanding the hour lines - a model helps

To help explain how hour lines are related to the Sun's motion I have developed a three dimensional stick and card model. The model, in four pieces, builds up gradually during a workshop presentation. I start with an equatorial dial showing 15 degree angles marked on an equatorial plane. ($360 \text{ degrees} / 24 \text{ hours}$ - the only maths you really need to understand dials.)

The addition of two more planes show how the equatorial lines can be projected onto either a horizontal or vertical surface. Horizontal dials are often found in gardens and cheap brass dials can be bought from suppliers of garden furniture. It must be said that they are unlikely to be accurate as they are mass-produced as ornaments! The vertical plane is that of a south facing wall. The hour lines are symmetrical. Many churches in England are built with a east-west alignment and are the most likely locations for such dials. For those readers who wish to draw up their own lines for either a horizontal or a vertical surface and who do not wish to make a model the lines can be calculated as shown in fig 2.

However most of us do not live in churches and our homes are most likely to have walls which 'decline' to either the west or the east. The model can accommodate such a wall and will show how the original equatorial hour lines can be projected onto a wall of any particular declination. It is instructive to note that a wall facing south-east for example is likely to be complimented by another facing north-west. Both walls are potential surfaces for dials. In this case one will be a morning dial with hours from perhaps 5am to 2pm, the other will show afternoon and evening hours up to sunset. Both examples are illustrated in the slides. Needless to say the hour lines on a declining wall are more difficult to calculate. There are computer programmes available to do the calculations but I have a simple domestic programme which will do the trick if you wish to contact me with your location and declination details.

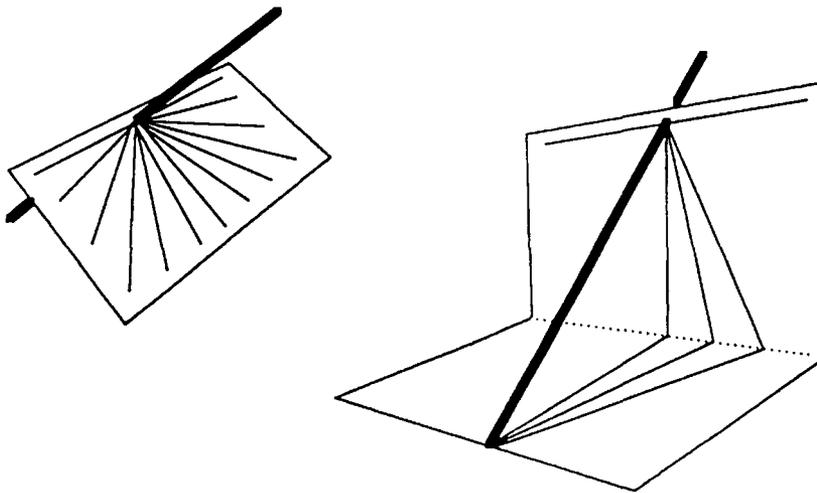


FIGURE 1. Sketches showing the equatorial model and the vertical and horizontal planes. Combining the two together reveals the relationship between hour lines on all surfaces.

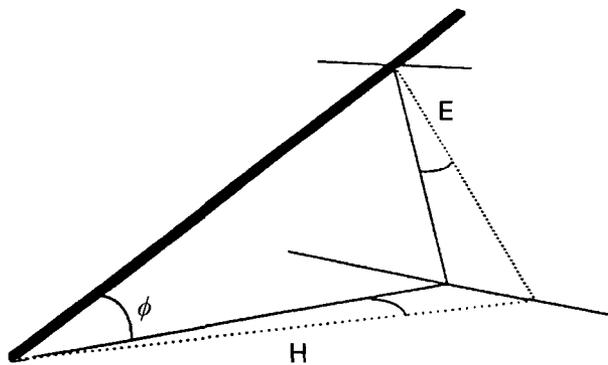


FIGURE 2. To calculate hour angles, H , for a horizontal surface use $\tan H = \sin \phi \tan E$ where ϕ is the latitude of the location and E the hour angles on the equatorial plane. (For vertical dial angles simply replace by the colatitude, $90^\circ - \phi$.)

3. Dials in London

A wander about any town will reveal dials to the keen observer. Churches are likely places as are public gardens and museums. However you will find an increasing tendency for dials to appear either as an architectural feature of a building or as a civic commemorative feature, perhaps a centenary dial or a millennium dial. A walk around the City of London will reward the keen observer with a dozen interesting dials. Some of my favorites selected from the slide presentation are listed below. I have presented them in an order such that you can visit them all by foot during a casual Sunday stroll through central London. The walk will take between three and five hours and should be punctuated by refreshment stops in either cafes or pubs. The route will take you to a number of interesting landmarks within London. It is best to have a handy street map with you. I can give only approximate instructions here.

A convenient place to start is at Tower Hill tube station. However I prefer to enjoy a detour at this point to take in the dial high on the wall of the synagogue at the corner of Brick Lane and Fournier Street. To reach this location you must walk northwards towards Spitalfields Market, itself a lively trading attraction on a Sunday morning. The detour will take the best part of an hour but offers an interesting contrast to the visitor, a cosmopolitan part of London steeped in the clothing trade with strong Huguenot connections

Outside Tower Hill tube station, as you face the Tower of London, is an imposing horizontal dial. Use the underpass to cross the road towards the Tower and bear left under Tower Bridge towards St Catherines Dock where you will find an equatorial dial outside the Hotel beside the bridge. Note the dial is calibrated for all hours including midnight! The dock area has its own interest but keep one eye on the clock as you have much walking ahead of you.

Retrace your steps to the Tube station and continue westwards towards St Dunstons and the ruins of St Dunstons church. There behind the hanging overgrowth lies a slate dial - a memorial to the church gardener. Continue westwards and head for St Pauls cathedral. If you are walking on a Sunday these streets will be deserted. Enjoy the variety of architectural styles and imagine the noise and bustle of a trading day. My favourite route would take me a few streets north to Leadenhall market. A really special place. Onwards to Cheapside where above the BT shop you will find two dials on the corner of the wall. One was gnomonless the last time I visited. By all means take in St Pauls but dont linger too long. Head south towards the river and enjoy the views as you walk along the embankment past Blackfriars bridge. A few hundred metres on and the Temple appears on your right. If it is accessible this whole area is worth a visit. There are three horizontal dials in the gardens facing the river and two more high on the walls of the the courts. You are in the nerve centre of the British legal system as you wander through these old courtyards and back streets. Leave at the north end of the Temple which brings you to Fleet Street. Head westwards and take in the dial on the tower of St Clement Danes church located in the centre of the road just before the Aldwych. Note that the wall is not perfectly south facing. Continue westwards along the Strand past Waterloo Bridge. A detour south to the gardens behind the Savoy Hotel will take you to the Savoy centenary dial, a modern armillary sphere.

Back up the hill now to take in the final dial. Head back to the Strand again and cross to Covent garden. If you have not yet stopped for refreshment you will certainly need to. Take in the atmosphere of one of Londons most energetic attractions, once a blooming flower, fruit and vegetable market. Head northwards past Covent Garden tube

station to Neal Street and bear left to the Seven Dials. There are only six dials on this renovated obelisk, the seventh apparently being the pillar itself.

This is where my walk ends. If your legs will stand it I can recommend retracing your steps to cross over Waterloo Bridge and head for the South Bank where the National Theatre and Festival Hall complex offers refreshments, evening entertainment and one of the best, no, the best, evening panorama available.

Sadly this walk does not take in my favorite dial. To reach this you will need to take a tube to the Angel, Islington where, high on a wall above the tube station is a morning dial, facing south-east which captures for me the very best in the synthesis of architecture and astronomy.

These are but a few of the many dials in London. I hope that this excursion will encourage you to do something similar for your own town. And of course if your town is rather short of dials then now is the time to make one of your own.