

A Rare Beauty

Navigation in stained glass

The *Art of Dialling* (the mathematical art of constructing sundials) and the *Art of Navigation* have always been historically linked through the medium of Astronomy. Of all the various forms of sundial that one encounters, stained-glass window sundials, mainly dating from the 17th century and of rare beauty, have been of particular interest to me and I have always wanted to design one. I have been designing sundials, at least in symbolic form, since 1972 when I designed the armillary sundial logo for the Nautical Institute. Nevertheless, it was not until 1996, nearly 25 years later, that my chance to design a stained-glass sundial came my way, followed in quick succession (as with double-decker buses) by another one!

Francis Drake

Early in 1996, I was approached by the National Trust to consider a suitable sundial design for Buckland Abbey in Devon to commemorate the 400th anniversary of the death of Sir Francis Drake. The constraints of the site suggested that a freestanding sundial in the grounds would be unsuitable, due to possible vandalism. A large vertical wall dial would have been a distinct possibility; but a west-facing window in an upper gallery presented the perfect solution: a stained-glass sundial.

My years at the National Maritime Museum and, by a remarkable coincidence, my experience as second-in-command of the reproduction *Golden Hinde*, had given me more than a passing interest in Drake. A vision of a period chart of the Atlantic Ocean in stained glass, depicting this famous little ship came to mind. After Drake's circumnavigation of the world in the years 1577-1580, which brought him fame and fortune, the *Golden Hinde* was permanently docked at Deptford so that all could see and marvel at Drake's astonishing achievement. Fifteen years later, in 1595 Sir Francis Drake was once again in his favourite hunting grounds, in the rich waters of the Spanish Main, coasting along the northern shores of South America in the Caribbean. But this latest endeavour to capture Spanish treasure was not only a complete disaster; sadly, it was also Drake's last voyage. Off the coast of Panama Drake disembarked a small army that landed at Nombre de Dios, with a view to marching

After a career at sea and as a curator at the National Maritime Museum, Greenwich, Christopher St John Daniel is now a freelance sundial designer. He explains how sundials and navigation are irrevocably linked...

on Panama City and holding it to ransom. The weather was against him and the Spanish were lying in wait for his men. In torrential rain, his small army was ambushed and forced to retreat to the waiting English fleet. However, conditions on board ship were so foul, that the weary and hungry men, crew and soldiers alike, without fresh food and water, were stricken with fever and were dying like flies. The fleet sailed on along the coast for three weeks, barely covering 18 nautical miles. They were still in sight of the mainland of Panama and were nearly abreast of Porto Bello bay when Drake himself succumbed to the fever. On the morning of Wednesday, the 28th of January 1596 (NS), right off the island of Buenaventura, Sir Francis Drake died and was buried at sea, with full military honours, 'within the sound of the surf'.

Loxodromic Lines

Buckland Abbey, not far from Plymouth, had been Drake's home. In modern times, the historic building had been badly damaged by fire; but now, in the care of the National Trust, it was deemed a fitting tribute to Drake to carry out the reconstruction of a fine plaster ceiling and to commission the stained glass sundial. The wall, and the window in which the sundial is situated (and thus the sundial itself) declines from the South cardinal point by 66 degrees (towards) West. This situation was fundamental to the design of the sundial, as it allowed the instrument to be constructed in the format envisaged, ie as a 16th century chart of the Atlantic, where the hour-lines are



Exterior view of the stained glass sundial.

represented as loxodromic lines, radiating from a compass-rose. This is so placed that the 8 o'clock evening hour-line is delineated as the *course* from Plymouth to Porto Bello, where an 'encircled' cross indicates the position of Drake's burial. The *Golden Hinde* is depicted under full sail, on this course line, sailing out from England, as it were, towards Sir Francis Drake's last resting place, on the seabed off the entrance to Porto Bello. The westerly aspect of the sundial means that it benefits from the evening sun. In mid-summer the 8 o'clock hour-line (9.00pm Summer time) will receive the gnomon's shadow enhancing the mythical link of the

A Rare Beauty – Navigation in stained glass

past with the present. It is a salutary thought, perhaps, to reflect on the fact that had this sundial been installed 400 years ago (assuming of course that no fire took place), it could well have survived the years to indicate the hour in the same way now as it would have done then!

The design was developed as a 'cartoon' in the studios of Goddard & Gibbs of London, where the dial was executed in stained and painted glass, and manufactured by their craftsmen. The gnomon, in brass, fitted to the exterior of the window, casts its shadow onto the surface of the stained glass dial-plate in the usual way, but is read from within the building – a much more convenient method than with normal wall dials.

A Sundial for York

The second stained-glass sundial commission came about a year later from the York Glaziers Trust, who had been engaged to put some colour back into the lights of the great south window of the Chapel of the Merchant Adventurers' Hall in the City of York. It is known that before the Reformation the Chapel had been very richly decorated with stained glass windows, fine stone carvings and beautiful tapestries. All this seems to have been swept away in the turbulent years that followed, since the present furnishings date from 1661, with a few later additions. Until now, the great south facing window had been entirely in plain glass and, financed by the generosity of particular benefactors, the idea was to replace several panels with some coloured lights in a 17th century style, reflecting the historical interests of the Merchant Adventurers. The highlight of the window was to be a panel containing the stained glass sundial.

The Company of Merchant Adventurers of the City of York is a similar body to the great livery companies of the City of London. Originally a religious fraternity of influential men and women, the guild was founded in 1357. Such guilds were established in many towns and cities soon after the Norman Conquest in 1066, to provide mutual benefit to their members and to support a Christian way of life. Not only were they social organisations, that gave charity to the poor and to their own members who had fallen on hard times, but regulators of commerce to maintain standards and to ensure the quality of manufactured goods. They looked for prosperity in a system of mutual government and fair-trading. The Merchant Adventurers of York was a guild that embraced most of the richer traders of the city, whose principal source of wealth came

from the export of English wool to the Continent. England already imported alum in bulk from Genoese merchants for the purposes of cleaning wool at the time when the Company was founded in 1357. The immediate construction of their Hall in 1357-1361, with its own quay on the River Foss, a navigable tributary of the River Ouse, says much for the prosperity and wealth of the company's founding fathers. Furthermore, it is evident that they were engaged in a profitable sea-going trade, from the seaport of York as it then was, using sea-going ships. Undoubtedly, members of the Merchant Adventurers were acquainted with the art of oceanic navigation and the instruments employed in pursuing this art, even if they were not actually seafarers themselves.

The Merchant Adventurers' Hall

In the 17th century, the mariners astrolabe, the cross-staff and the back-staff were all used in order to determine the altitude of celestial bodies, to obtain the ship's position at least so far as latitude was concerned. The sundial is set in a panel portraying a 17th century vessel under sail, somewhat similar to the sundial window at Lullingstone in Kent. The sundial itself measures just 10 inches (254mm) in diameter and declines from South 35 degrees East. It features an image of a young gentleman, dressed in a blue coat and green breeches, holding a cross-staff to his eye. He is depicted taking an equinoctial meridian altitude observation of the sun, the angle measured being $36^{\circ} 03'$, giving a direct indication of the latitude $53^{\circ} 57' N$, ie the latitude of the position of the sundial in the window of the Merchant Adventurers' Hall in York. The hour-lines create an impression of wooden deck planking. The spidery 17th century-style handwritten inscriptions around the crown of the yellow stained border give the signatures 'Christopher St J H Daniel: *Delineavit*', 'Dav Bonham: *Pinxit*' and 'York Glaziers Trust: *Fecit*', with the date '1998', just below the shield of the Trust. Also around the border are given the various relevant technical values relating to the sundial: 'Aeq Mer Alt $36^{\circ} 03'$ ', 'Lat $53^{\circ} 57' N$ ', 'Long $01^{\circ} 05' W$ ' and 'Dec S $35^{\circ} E$ '.

It is, of course, entirely appropriate that the young gentleman using the cross-staff should be the principal feature of the sundial. The cross-staff represents the navigational instruments and the techniques that were used by seamen of the period for measuring the altitude of the sun, or of the pole star, to determine the latitude of the ship at sea. The young gentleman represents the Merchant Adventurers as master mariners and navigators, engaged in



oceanic navigation, ensuring the safe passage of their ships and the prosperity of their overseas trade.

Stained glass window sundials are exceptionally rare, due to their fragile nature. There are, perhaps, fewer than 40 such dials in this country, almost all of them from the 17th century. At this period, they were a popular form of dial, as they were colourful and could be read from inside the room, without having to go outside the building. So far as I know, England has more dials of this form than any other country in the world. It has given me much pleasure to have added two unique 'navigational' stained glass dials to this rare and beautiful class of sundial.

For more information on sundials contact the British Sundial Society on 01344 772303 or email douglas.bateman@btinternet.com

