(Left) The original Nailsea dial (photo: C. Daniel).

(Above) The 1969 New York representation of the Nailsea dial.

NAILSEA REPLACEMENT SUNDIAL

CAROL ARNOLD

[The author is a professional stained glass artist working in north Somerset – Ed.]

I first found out about stained glass sundials when I came across the 'Stained Glass Sundials of the World' website.[1] Looking through the site I found a picture of the beautiful Nailsea dial (reputedly made by John Oliver in the 17th century) famously copied, recopied and finally stolen after a fire at Nailsea Court in North Somerset. It transpired that the current owners of the house wanted a replacement dial to be made, hence I became involved.

Chris Daniel sent me an actual size photograph of the original dial from which to work. (See previous article for a colour photograph of the original dial.) John Carmichael and his 'diallers' gave me lots of encouragement, and advice about declination measurements and hour line calculations. To find the declination of the window I used the setup illustrated in Fig. 1 from a window sill inside the house. The spirit level ensured that the blade of the square was perfectly vertical. The sun angle to the window was measured from the angle which the shadow made, with the horizontal line perpendicular to the window. A piece of graph paper was fixed to the board to enable the accurate

Fig. 2. The author soldering the gnomon into position with the aid of a temporary plywood jig.

Fig. 4. The dial viewed from outside the building, showing the gnomon supports. The colours look quite different from this side.

Fig. 3. The completed replica dial by Carol Arnold.

Fig. 5. Close-up of part of the dial. Note the discreet signature (CA 06) in the leaf to the left identifying this as a replica.

Fig. 6. The dial resplendent in position with other stained glass at Nailsea Court

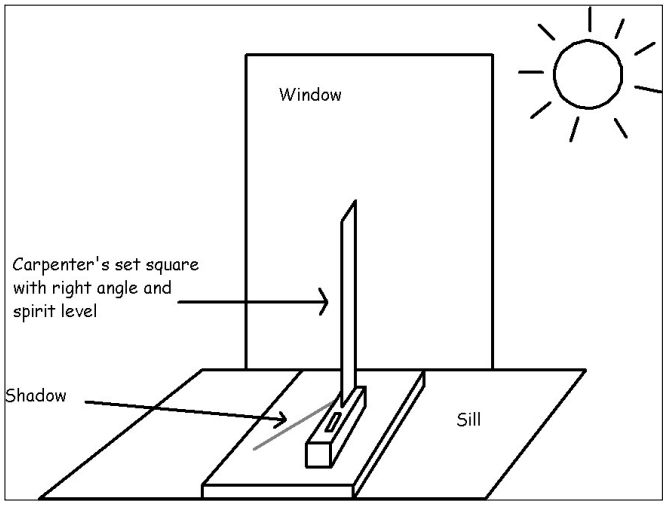

Fig. 1. The arrangement used to find the window declination.

angle to be calculated. Several measurements were taken over a few hours. The declination of the window was then calculated from this angle and the azimuth of the sun. The average declination calculation was 9° 0' 14" East of South.

A reverse-engineering calculation using the photograph of the original dial gave an approximate declination of 35° East of South. It is known that the original dial was not made for Nailsea Court but brought there at the beginning of the 20th century "from an old manor house in Devon". So it would never have given the correct time in its location at Nailsea.

The original dial had cracked – the gnomon and two horizontal stays had been fixed by drilling through the glass. I decided to fix the rods to the lead work to avoid any strain on the glass. The centre of the dial was therefore positioned at a point in the hourglass to allow the gnomon to be fixed to a horizontal brass rod just above the writing.

I used a program called 'Shadows'[2] which draws out hour lines for a particular latitude and window declination. I traced these onto my working 'cartoon'. Other calculations were necessary to pinpoint the centre of the dial, taking into account the thickness of the glass, positions and thicknesses of the brass rods.

The oval dial was first cut out of plain 4mm window glass. It measured 10¼" by 7¾" which was the exact size of the original. There were then many stages of etching, painting, enamelling, silver staining, and firing which I can briefly describe:

* The central rectangle was etched with acid paste to give a frosted appearance.
* The white rectangle and wings, hours glass and scrolls were enamelled and fired.
* The red area was painted with 'rouge' glass paint and fired.
* The black lines, lettering, and details on wings and scrolls were painted with a mixture of black and brown glass paint requiring several firings.
* The bird, fly, and branch were painted using black and brown paint and then fired.
* The leaves painted with green enamel and fired.
* Yellow areas painted with yellow silver stain on the reverse of the glass and fired.

The sundial was then leaded into a new leaded window to replace the old one. Once leaded in, a brass rod was used for the gnomon, held in place by two horizontal stays and a horizontal bar soldered onto the lead at the reverse of the window (Fig. 2). No brass rods were touching the glass.

The window was then installed *in situ*, and the sun came out just as it was in position. (See Figs. 3-6.) We had local solar time, accurate to within a few minutes.

ACKNOWLEDGEMENTS

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REFERENCES

1. www.advanceassociates.com/Sundials/Stained_Glass/
2. www.shadowpro.com.

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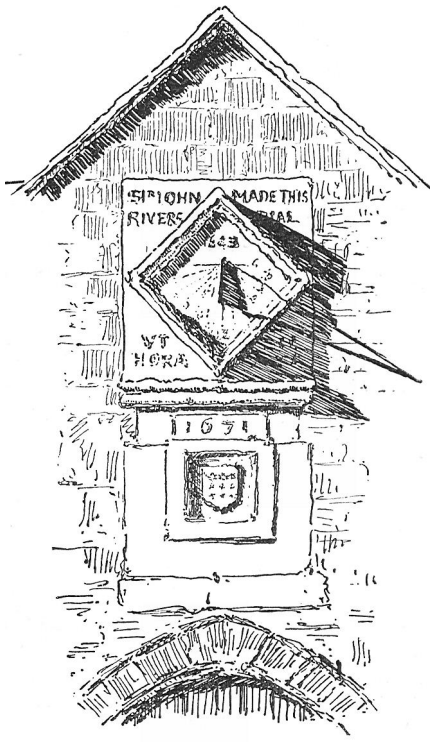

The vertical dial above the porch of Ashurst church, Kent. Ashurst is believed to be the birthplace of the great dial maker Elias Allen (d.1654). He made a brass horizontal dial for the churchyard but it was stolen a few years ago. It had the inscription:

ELIAS ALLEN MADE THIS DIALL AND GAVE IT TO THE PARISH OF ASHHVST AN̄O DOMINI 1634

A replica is now in its place. After *Gatty* (who is wrong about the date).