

A Timepiece for the Time

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William Oughtred, known for the slide rule, was a brilliant mathematician, clergyman, teacher, and an inventor of note. These pages look at his development of the equinoctial ring dial, a cutting edge timepiece for the year 1624.



Figure 1. Equinoctial Ring Dial

Telling time often relied on the stationary sundial, not very satisfactory for those navigating the open seas, or moving from one place to another on land. Oughtred sought to solve that dilemma by developing a portable device; one that could recognize factors of the month of the year, and the latitude of the user. The stationary sundials available were all too heavy to carry and were usually attached to the earth in some manner. A really large one is the Sundial Bridge in northern California, shown in Figure 5 (see page 34). Its primary function is transporting people rather than the telling of time, but it could easily compete in the Guinness Book of Records for the largest sundial, as it has numbers placed for the hours that pass.

I was surprised and fascinated on viewing artist Wenceslaus Hollar's 1666 engraving of Elias Allen, Figure 2, maker of many instruments for William Oughtred. You will observe that Oughtred's ring dial is prominently shown along with a Gunter's Quadrant, and a surveying instrument known as a circumferenter. Allen's engraving also includes dividers and a sector.

This engraving is featured in the Instrument Maker's section of *Slide Rules, Their History, Models, and*

Makers, by Peter M. Hopp, C. Eng. MBCS.



ELIAS ALLEN.
Apud Anglos Cantuarie iuxta Cunnbridge natus, Mathematicis
Instrumentis ac incidentiis sui temporis Artifex ingeniosissimus.
Obiit Londini prepe. Jure. Martii. Anno a Christo nato 1665. aetate 62.

Figure 2. Elias Allen

For telling the correct time, Oughtred took a simple ring dial, and modified it to show not only the time of the year, but also the latitude of those taking the reading, giving it the name of a Universal Dial. Oughtred's invention/development was almost identical to the model the Franklin Mint sold in 1988, Figure 1. An earlier, simple, basic ring dial that preceded Oughtred's is shown in Figure 3.

Oughtred's device is known by several titles: a ring dial, an equinoctial dial, universal dial, a double ring dial, and an horological circle.

Oughtred's device consisted of an outer ring with the latitude scale—to be set for wherever the dial was to be used—and a small hanger to suspend the dial by a string or cord. The inner of the two dials had the time scale, usually in Roman numerals. Attached to the inner ring is a pivoting device with a date slider (sliding peephole) that is adjusted for the month of the year. A later, deluxe model had a scale on the reverse to determine latitude, serving in the manner of an astrolabe. Other models were crafted for the Southern Hemisphere.



Figure 3. A simple ring dial

The steps for the operation of Oughtred's Ring Dial are:

1. Move the smaller hanger on the outer ring to the correct latitude.
2. Move the date slider to the correct date (month)—adjust for the start, middle, or end of the month for greater accuracy.
3. Flip the inner ring until it is perpendicular to the outer ring as far as you can go.
4. Hold your dial by the suspension cord and turn it slowly in the sunlight, until a light beam passes through the small hole on the date slider onto the inner ring with the Roman numeral hour marks.
5. As the sunbeam of light meets the engraved line of numbers on the inner ring, Eureka! You can read the exact time.

It should be noted that the time read is true sun time, and should not be confused either with daylight saving time, or with time in a particular time zone. The time read is for the correct sun time for that time and exact location; using that particular latitude, and for that date of the month, or time of the year.

The ring dial was referred to as a "Dial" in the following quotation from Shakespeare's "As You Like It, II, vii".

And he drew a dial from his poke
 And looking at it with lack-luster eye
 Says, very wisely, "It's ten o'clock";
 "Thus we may see", quoth he, "how the
 world wags."

If one enjoys such devices, he or she can often find them available for sale on the Internet. I also have a replica of Gunter's Quadrant, and an early surveying alidade, similar to the circumferenter in the Allen engraving. See Figure 4.

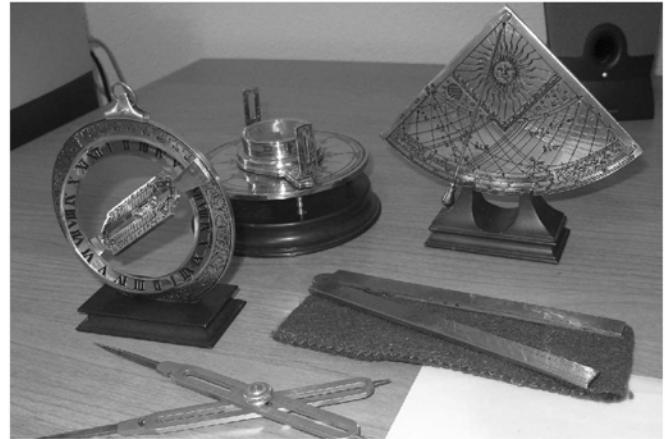


Figure 4. My collection

In the early 1600s watches and clocks were scarce, expensive, and unreliable. Navigation clocks for determining accurate longitude were a dream for the future. Pocket watches became more available after about 1658, but were too expensive and fragile for everyday use. There has always been a need for more accurate time keeping and the ring dial provided a portable device for keeping good local time, in good sunny weather, of course.

These dials come with their own legends, which make them even more desirable to have around, even in replica form. It is believed that Revolutionary War general George Washington treasured his Universal Ring Dial, given him by his friend and military aide, the Marquis de Lafayette. It is also believed that other American generals under Washington also carried these time pieces. Perhaps they wanted to be on time with reveille.

Legend also has it that in 1152, Eleanor of Aquitaine gave an early version of a ring sundial to Henry II, as a reminder of when to meet her for their love trysts, and he was so moved by her love, that he had a copy made for her, encrusted with diamonds, and engraved with the Latin words "carpe diem" (seize the day).

For those that are not happy with a replica that costs less than \$100.00, it is possible occasionally to find original ring dials for sale on the Internet. At this writing, the author knows of one original, available in the range of \$7000-\$8000.

For those of us that appreciate mathematical and scientific ideas and equipment, William Oughtred, had "time" to create this great device before moving on a few years later to develop the slide rule.



Sundial Bridge, Redding, California, USA