Instrumental Background

Slide Rules: How Quickly We Forget

Charles Mollan

If you have not thrown out your old slide rule, treasure it, especially if it is one of the more sophisticated types. It is a relic of a recent age

In 1614 John Napier published details of his logarithms which reduced multiplication and division to simple addition and subtraction. To make logarithms easier he devised rectangular rods inscribed with numbers which became known as 'Napier's Bones'. By 1620, Edmund Gunter had devised his 'Gunter scale', or 'line of numbers', a plot of logarithms on a line. Using two of these inscribed on a rule, multiplication and division could be done by adding and subtracting lengths using a pair of dividers. Shortly after, William Oughtred placed the two logarithmic scales side by side so that one could slide relative to the other. This was the first slide rule, and dispensed with the need for dividers. With the addition of a runner, or cursor, (*figure* 1) straight slide rules became the standard hand-held devices for multiplication and division up to the invention of the electronic calculator.

The bigger the slide rule, the more accurate the calculations. But there are limits to practicable lengths so various ingenious people devised ways of increasing the scale while maintaining the device at a workable size. Several of these slide rules became fairly popular, and included a cylindrical one patented by Edwin Thatcher in 1881 (which had scales forty times as great as its equivalent straight slide rule) and the Otis King spiral calculator (*figure* 2) patented in 1922, equivalent to a 160 centimetre slide rule. But the most successful of all was the spiral slide rule (*figure* 3) patented in 1878 by George Fuller, Professor of Civil Engineering at The Queen's College (now University of) Belfast in Northern Ireland. It is the equivalent of a straight slide rule measuring no less than 25 metres.

Fig 1 top A straight slide rule from A.W. Faber of Bavaria c1905. (The illustration is from a 1911 catalogue). In this engraving the number 1 on the bottom scale of the slide is placed above 1.26 on the lower scale on the main body of the rule. The number 2 on the slide corresponds to 2.52 on the lower scale, the number 4 to 5.04, and any other number gives a multiple of 1.26. The line on the transparent cursor is at 4.1, giving the result of the multiplication 1.26 x 4.1 as 5.15 (it should be 5.17 but the engraving is a little out). The longer the slide rule and the more accurately divided it is, the more precise the result. You supply your own decimal points, so the multiplication could just as well be 1260 x 4100

Further reading
D. Baxindale (Revised by Jane Pugh) *Calculating Machines and Instruments* (Science Museum, London, 1975)
G. Tweedale *Calculating Machines and Computers* (Shire Publications No 247, Buckinghamshire, 1990)

A few weeks before writing this I asked a young science graduate to find an interesting slide rule that I had seen where he worked. He asked: "What is a slide rule?" I recounted this incident to a post-doc ten years older than the graduate; she responded: "Oh yes, they showed us one of those in our physics lectures"—she had never used one herself.

I don't consider myself old, with more than a decade to go before normal retiring age, but I now feel considerably older than I did. I am of a student generation that pre-dates the electronic calculator. It was in 1972 that Sir Clive Sinclair introduced the Sinclair Executive Calculator, claimed to be the world's first pocket electronic calculator. I remember paying the enormous sum of £35 (45 Ecus today) for my first calculator, although it was not a Sinclair. Before my first purchase, electronic calculators had been too expensive and way beyond my means. But afterwards, my slide rule, a personal friend during all my student years, immediately went into retirement.

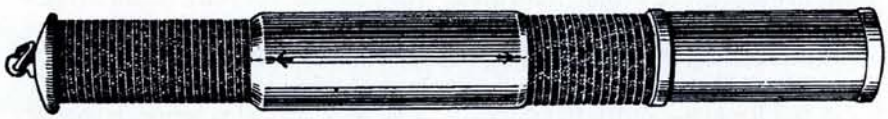

Fig 2 The Otis-King Calculator, a pocket spiral slide rule equivalent to a straight slide rule 1.6 metres long

Fig 3 The spiral slide rule designed by George Fuller, mounted on its carrying box for convenience. Made by W.F. Stanley of London from the late 19th century until well into this century. It is equivalent to a straight slide rule over 25 metres long