

A Solution That Did Not Help

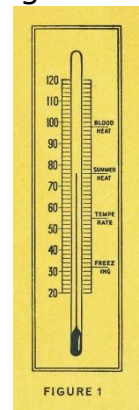
When the result is easier to see but wrong!

Special Year

It is apt for the Gazette's visionary 2020 edition to highlight a slide rule innovation to ease eye strain.

Burns Snodgrass - the visionary educator

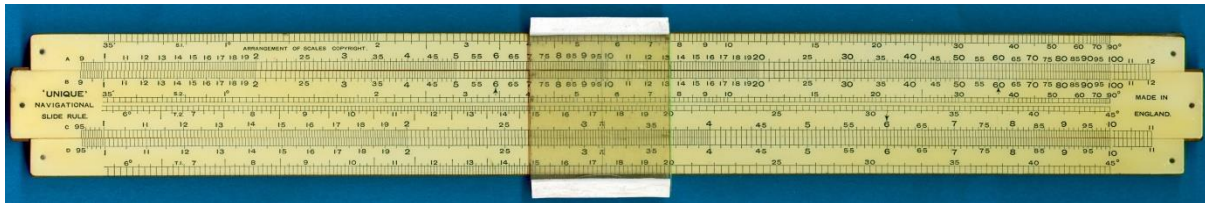
In 1922 the charismatic Burns Snodgrass (1886-1954) founded the *Unique Slide Rule Company* in Brighton, a seaside resort on the South-East coast of the UK [1]. He was the passionate and shrewd driving force behind a company that to 1975 successfully marketed a distinctive range of linear slide rules. Before founding *UNIQUE* Burns was a lecturer in Mechanical Engineering at the *Brighton Technical College*. So his favourite education analogy was that anyone able to see a temperature of 76° on the featured thermometer will be able to use a slide rule [2]. He later went on to author an outspoken but highly popular teach yourself book on how to use a slide rule [3]. But Burns also wanted to make sure that the "common man" could not only use but also afford a slide rule [4]. Hence he consistently and substantially underbid and undersold all his competitors. His slide rules were inexpensive because they were cheaply made. The *UNIQUE* manufacturing process involved printing scales onto strips of paper before laminating them with clear plastic which in turn were crudely pinned onto a cheap wooden stock and slide. The process never changed but later white plastic did replace the paper. Nevertheless Burns' creative flair for designing innovative features and models ensured year on year increasing sales volumes [5].



Burns Snodgrass - the visionary (most of the time) innovator

At first, like many collectors, I turned up my nose at the poor quality slide rules from *UNIQUE*. Most surviving models are often missing at least one of the metal pins securing the scales and the fragility of the cursors made them a strong contender for the "Most Flimsy Cursor Award" [6]. Despite never being in the same league as any slide rule made on a dividing engine or later by photo etching, thanks to Burns the company was a hotbed for innovation that outshone most other slide rule makers.

Some simple ideas, such as making the slide longer than the stock so that the slide rule was easier to use, were inspired. Although the inferior manufacturing process never changed, Burns used it to great effect. He could print any desired scale arrangement or even a nomogram. This led to countless specially commissioned slide rules such as a series of five highly technical models made for the *General Post Office* (GPO). But from the start Burns also used the flexible process to devise unconventional standard scale layouts. For example, the Enhanced Mannheim type model **N Navigational**.

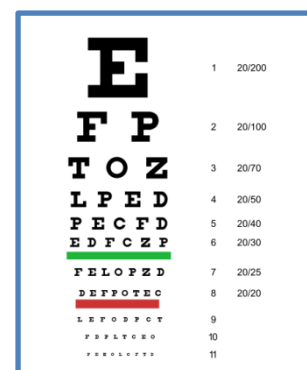


10 inch wood/paper coated with plastic laminate model N for Air Navigation

Apart from some air navigation worked examples in the instructions, there is little in the model **N**'s scale layout¹ to warrant its speciality "Navigational" billing. However, promoting the classically "hidden" trigonometric scales off the back of the slide and onto the front face was inspired. This not only saved costs but elevated the model to the ideal simplex slide rule for all types of general arithmetic-based calculations and made it superior to competitor offerings [3]. The *UNIQUE* range of slide rules was extensive but they never made a 20 inch linear desktop model. Instead Burns came up with three long-scale models² that offered 20 inch precision on a 10 inch long scale and three pocket long-scale models³ that offered 10 inch precision on a 5 inch long scale. However, inevitably some innovations were flawed.

Misplaced foresight

It is often said that anyone with "20/20 vision" has perfect eyesight. This is an exaggeration as 20/15 or 20/10 is a more impressive acuity score. Anyone wearing glasses will be familiar with such scores and the Snellen eye test chart developed by Dutch ophthalmologist Herman Snellen in 1862 [7]. A 20/20 score refers to the eye's ability to read off correctly on the shown chart the 8th line of characters from a simulated distance of 20 feet (6 metres).



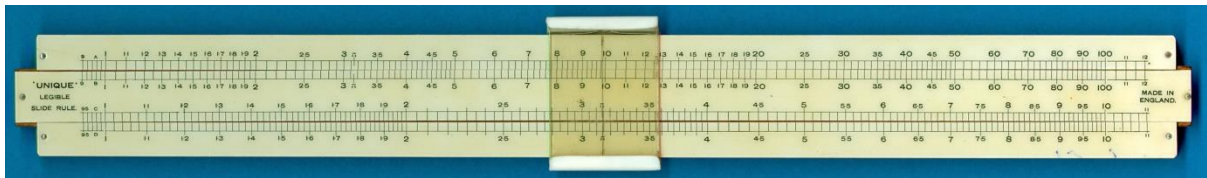
Snellen acuity chart

¹ Apart from linear edge scales for measuring distances on maps and a related table on the back of the stock, it has no air navigation-related logarithmic scales.

² 10/20 Ten-Twenty, D3 Dualistic High-Speed and D4 Dualistic High Speed.

³ 5/10 Five-Ten, D1 Dualistic High-Speed and D2 Dualistic High-Speed.

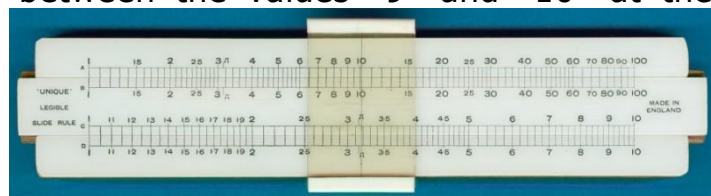
Burns never went in for aids such as cursor magnifiers or even multiple cursor hairlines. But he was aware that accuracy through interpolation could be trying on the eyes of slide rule users with less than 20/20 vision. So Burns came up with the idea of two Mannheim type models where the density of the vertical scale-interval graduations or “tick marks” was significantly reduced and given a heavier line weight to make them easier for people not gifted with perfect eyesight to see and read off an interpolated result. These models he suitably named: **Legible**.



10 inch wood/paper coated with plastic laminate model 10 G Legible

The innovative but doomed 10 inch **10 G** and pocket 5 inch **5 G** Legible models were one of the earliest pairs of slide rules in the *UNIQUE* product range. The tick marks between the labelled divisions on any logarithmic scale are intended to help users, through interpolation, estimate accurately the result of any calculation to 3 or 4 significant figures. The number of divisions depends on the nature of the scale and how it is laid out over the length of the stock or slide. For example, the C and D scale on a standard 10 inch/25 cm linear slide rule has room for **100** tick marks between the starting values of “1” and “2”. But understandably there is room for just **20** tick marks between the values “9” and “10” at the narrower end of the scale.

Burns felt that as the gap between tick marks got smaller and smaller it placed an unacceptable strain on the eyes for any user who did not have 20/20 vision. Thus he reduced by half the number of tick marks between all the divisions on the scales of the Legible models!



5 inch model 5 G Pocket Legible

Therefore between “1” and “2” on the C and D scales of the model **10 G** there are only **50** thickly drawn tick marks. For the corresponding values on the model **5 G** there are just **20** thickly drawn tick marks. But Burns’ innovative but flawed design for the Legible models only works for results that come out exactly on a tick mark. If not falling on a tick mark, the lack of graduations and their increased thickness often made it often impossible to determine accurately the third (let alone estimate the fourth) significant integer in the result of any calculation. Notably the design was not adopted by any other maker as it was gloriously self-defeating for a slide rule **by being more legible but less accurate!**

You cannot make an omelette without breaking eggs

Over the years my *UNIQUE* collection and my admiration for Burns Snodgrass' forward-thinking and creative flair has grown. If collectors can see past the poor quality, they will discover an unparalleled range of novel and innovatively designed slide rules.

The *UNIQUE Slide Rule Company* was a highly visionary maker. The eye-catching innovation behind the design of the Legible models looked impressive but was a case of style over substance!

References

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2. **Hopp, Peter**: "*Matters arising (Continued)*", UKSRC Skid Stick Issue 46, February 2014.
3. **Snodgrass, Burns**: "*Teach Yourself The Slide Rule*", part of a series by The English Universities Press Ltd., London, 1st edition 1955 but many reprints followed.
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5. **Von Jezierski, Dieter**: "*Slide Rules A Journey Through Three Centuries*", Astragal Press, ISBN 1-879335-94-8, 2000.
6. **Rance, David**: "*Where to Draw the Line?*", UKSRC Slide Rule Gazette, ISSN 1472-0000, Issue 18, 2018.
7. **Wikipedia**: "*The Free Encyclopaedia*", Wikimedia Foundation, Inc. 22 July 2004. Web. 10 Aug. 2004.