

# “Wrong Way Up!”

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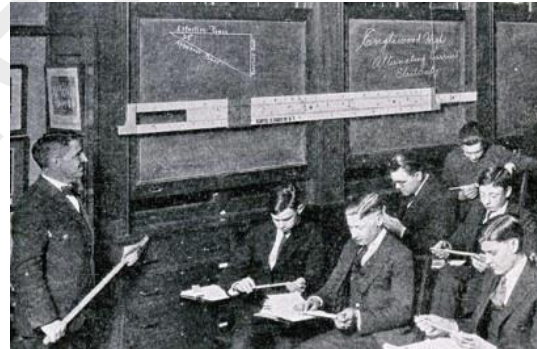
*Give a man a fish and you feed him for a day;  
teach a man to fish and you feed him for a lifetime<sup>i</sup>.*

Surprisingly right up to the 1960s “*how to use a slide rule*” sessions were not taught in secondary schools [1]. In fact in most countries no course on calculating with a slide rule ever became part of their national school curriculum [2] [3]. Even the later development of “modern” teaching aids was too little, too late.

## In the beginning ....

This teaching conundrum cannot be explained by any lack of teaching aids. By the start of the 20<sup>th</sup> century large **Demonstration slide rules** were part of the product range of many slide rule manufacturers and some retailers [4].

The main manufacturers recognised the importance of being taught at a young age how a slide rule could be used. So they offered 1 to 2 metre long replicas of their popular models for hanging over a classroom blackboard. However, such versions did not match the quality of their standard length models. This is because until the photochemical process arrived in the 1960s, the most common production method for incising the scale divisions was a “dividing engine”. However, apart from the machines developed by the German maker *Nestler*, most dividing engines could only handle a maximum stock length of 60cm [5]. Therefore many demonstration slide rules were made by a local carpenter using one of the cheaper hardwoods such as poplar. Most would have failed the Soole **27 x 37** accuracy test [6]. However, this shortcoming was not a problem as the purpose of any demonstration slide rule was to show to an audience the settings and steps needed to perform example calculations.



**Figure 1: Scene out of a 1930s High School classroom**

1960s, the most common production method for incising the scale divisions was a “dividing engine”. However, apart from the machines developed by the German maker *Nestler*, most dividing engines could only handle a maximum stock length of 60cm [5]. Therefore many demonstration slide rules were made by a local carpenter using one of the cheaper hardwoods such as poplar. Most would have failed the Soole **27 x 37** accuracy test [6]. However, this shortcoming was not a problem as the purpose of any demonstration slide rule was to show to an audience the settings and steps needed to perform example calculations.

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<sup>i</sup> Proverb attributed to the writer Anne Ritchie (1837–1919).

Of course demonstration slide rules were not the first teaching aid. Apart from the ubiquitous instruction folder that came with any slide rule, how-to-use books pre-empted demonstration slide rules. Such "Teach Yourself" books or guides were often published or sponsored by slide rule manufacturers. Other like-minded books were published by educators. However, the demonstration slide rule was the first teaching aid for the masses. They were available from slide rule makers worldwide. For example, from *ARISTO*, *Faber-Castell* (F-C), *Graphoplex*, *Loga* and *Nestler* in Europe, from *Dietzgen*, *Keuffel & Esser* (K&E), *Pickett & Eckel* (P&E), *POST* and *Welch* in the United States and from *Sun Hemmi* in Asia. Impressively the slide on the demonstration slide rules from German maker *Faber-Castell* was lockable for transport and uniquely the duplex models had a sophisticated metal swivel hinge. This made it possible to switch between sides without awkwardly having to reverse and rehang a large slide rule back onto a blackboard or hanging brackets. Given their oversized/non-standard nature and limited sales potential, demonstration slide rules were expensive to produce. So many manufacturers consciously priced them as "loss-leaders". Even so demonstration models cost as much as three or more times than the equivalent conventional sized model. For a large and valuable enough order of conventional slide rules, makers or resellers would often include a promotional demonstration model as a "gift".

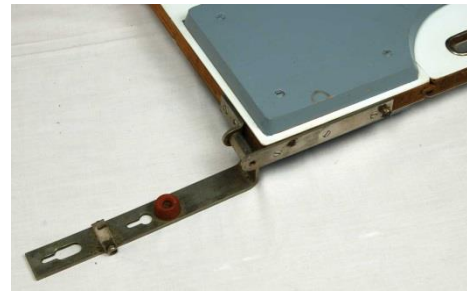


Figure 2: Swivel hinge on a 100cm F-C 334/83 Novo-Duplex

### "Modern" aids

Especially the German maker *ARISTO* realised that promoting their slide rules in schools and with teachers was an astute way of fostering brand loyalty from the next generation of engineers and technicians. In the early 1950s they published the "*ARISTO Bulletin*" [7]. These serialised specialist journals in German, English, French and Spanish were for teachers – specific editions for secondary schools and others for various forms of higher education. But as teaching slide rule proficiency was never part of standard secondary school curriculums, it was left to technical colleges and company training centres to plug the educational gap. So for year's large demonstration slide rules did good service in such institutions.

Apart from plastic replacing wood, nothing new came along to usurp the venerable demonstration slide rule until the 1960s. The catalyst was the introduction of overhead projectors (OHP) as a modern presentation aid. Using a powerful light source to project an enlarged image onto a screen or a suitable flat surface was a 19<sup>th</sup> century invention. But once cheap page-size transparent sheets became available for OHPs it revolutionised presentation techniques in business and education. The slide rule had its heyday in the 1950s. So many makers used the OHP to renew lagging interest in slide rules by marketing two types of **Projection slide rules**.



Figure 3: Overhead projector during a classroom lesson

The basic version was a replica of a fully working slide rule but entirely made of clear plastic. Known examples are from *ARISTO*, *Blundell Harling*, *Beseler* and *P&E*. Most were based on a popular model from their respective product ranges. Such transparent versions were merely laid flat onto the glass projection surface – a simple but effective innovation.

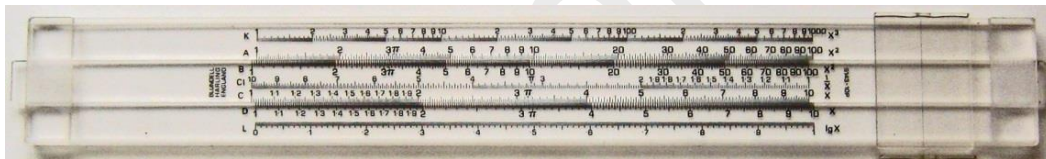


Figure 4: Blundell Harling Rietz-like S143-10P basic projection slide rule

Possibly driven by the demand for the basic version, several slide rule makers decided in the late 1960s to create the “next generation”. The advanced version was specifically designed for OHPs. This time a facsimile of an existing model of a slide rule was built into a frame of similar size and oblong shape as the flat OHP glass projection surface.

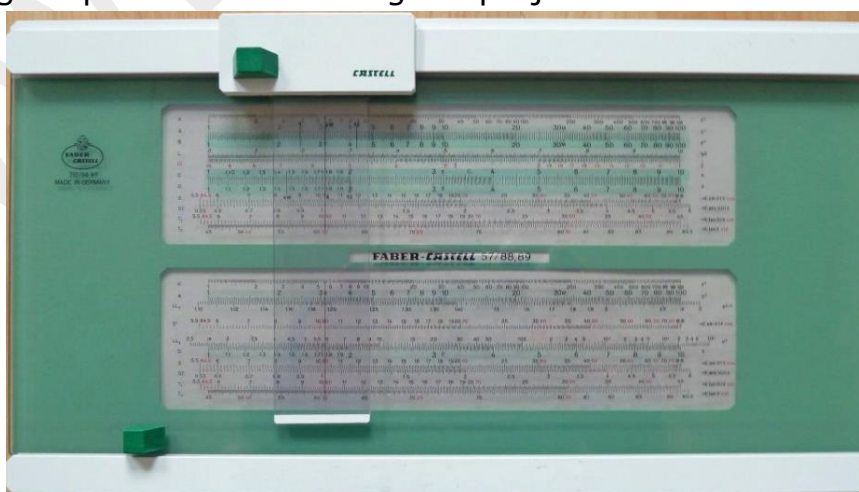
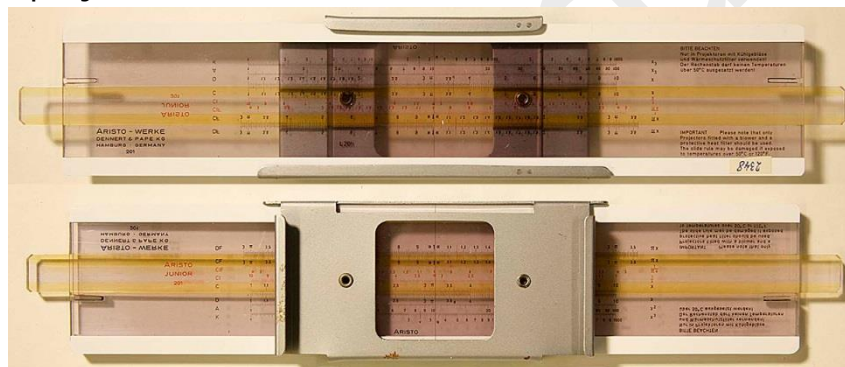


Figure 5: Faber-Castell Rietz/Log-Log 310/88,89 advanced projection slide rule

Generically two sheets of plastic were sandwiched between a solid top and bottom bar. The bottommost sheet was fixed and showed the scales normally carried on the stock. The other sheet slid horizontally over it and was for the corresponding scales off the slide. The top bar incorporated the cursor. Being the width of a projector, such OHP slide rules had the room to show both sides of the equivalent conventional duplex model in the same plane. Makers *ARISTO*, *F-C*, *Staedtler-MARS*, *K&E*, *Dietzgen* and *POST* sold such advanced versions [8]. However, it is unlikely that any of them had (or wanted) the tooling needed to make them in-house. Tellingly none of the known examples carry any manufacturing identification marks. In fact they are so similar they may have all been commissioned from the same, sadly unknown, specialist 3<sup>rd</sup> party [9]. Like the early demonstration models they also would have been expensive to make and most likely were also sold as “loss-leaders”. Alongside the OHP models there was a variant. At least *ARISTO* and *Sun Hemmi* are known to have sold a version specifically for photographic 35mm slide projectors.



**Figure 6: Front and back of ARISTO School 201 Junior basic projection slide rule**

Such metal and clear plastic variants are similar to the basic OHP version except this time mounted up in the fashion of a “magic lantern<sup>ii</sup>” slide. With this design the projection slide rule has to be fixed into the feeder slot of a manual feed 35mm slide projector. To be seen the needed parts of the scales on the stock and on the slide had to be aligned with the central projection window in the metal frame.

### **Too little, too late ....**

In the early 1950s Italian company *Filotecnica Salmoiraghi* developed a dedicated backlight screen slide rule projector. But the innovative design never made it past the prototype stage [10]. However, it was the forerunner of the swansong of slide rule teaching aids.

<sup>ii</sup> Or *Laterna Magica* - an early candle or oil lit projector for showing images on glass.

In the 1970s at least three prominent slide rule makers took the brave step of commissioning an expensive multimedia slide rule training course. For the first time the teaching aid included a pre-recorded audio accompaniment. Given their past track record it is not surprising that *ARISTO* was one of them but multimedia courses were also marketed by *P&E* and *British Thornton*. They all wanted to harness the higher resolution and greater enlargement potential possible with 35mm transparency photography. When I was growing up “the projectionist” in our house was my father. In a darkened room friends or family had to endure our latest holiday transparencies. But my lasting memory is everybody saying in unison “*wrong way up*” when my father inevitably loaded one of the slides upside down. But this human failing was avoided with such multimedia training sets as the catalyst for their development was the Carousel Slide Projector. Such projectors had an audio interface but could also be preloaded with a set of slides for an unbroken slide show.



**Figure 7: Pickett multi-media carousel with 80 slides**

The *British Thornton 35mm Sound Synchronized Slide Training Programme* boxed set came in a chunky 3-ring stiff cardboard insert binder (8 x 9 x 2½ inch) covered in black imitation leather. The company logo and name are emblazoned on the front in gold.



**Figure 8: British Thornton 35mm “Sound Synchronized” Slide Training Programme**

The binder has two types of plastic sleeve. The uppermost sleeve is for the teaching instruction book/audio script. The rest have pouches for 6 slides per sleeve. There are 47 plastic mounted coloured slides in the set. The binder also came with a box containing a Ø 4 inch spool of ¼ inch reel-to-reel magnetic tape. The 15-minute soundtrack is recorded dual-

track but at the long-outdated speed of  $3\frac{3}{4}$  inch/second (9.53 cm/second). The left-hand channel carries the narrator's voice and audible cueing tones for manually advancing to the next slide. The right-hand channel or "click track" has just pulse tones at 1000 Hz. When played through a carousel projector's audio interface these pulses automatically trigger the advancing to the next slide in sync with the soundtrack. As the "*How to Multiply and Divide using a Slide Rule*" title suggests, the course covers just basic arithmetic. The set came about through cooperation between *British Thornton, International & Commercial Education Macmillan Ltd* (ICEM) and an external consultant. At the time ICEM was a Surrey based company specially founded for improving employee education in industry and commerce. The introduction course only dealt with the elementary 1-cycle **C** and **D** scales. Follow-on training programmes using other scales and solving more complex problems were planned by *British Thornton*. However, there is no record of any other instalment ever being produced.

### Reliving history

None of the advances in teaching aids helped rectify that slide rule proficiency never made it into the curriculum of secondary schools. Although admirable, even the multimedia training courses of the 1970s were tragically too little, too late. By now pocket electronic calculators were on sale and the days of the slide rule were numbered [11]. Ironically today many impressive computer simulations of slide rule models popular in their day are readily available online. Educators from the slide rule era would be jealous of such powerful teaching aids.

There are few survivors of the short-lived multimedia training courses. Luckily I have the *British Thornton* version. To make sure the inspiration and effort behind such courses is not forgotten I have recreated it as a self-running Microsoft (MS) PowerPoint slide show. But over the decades the 35mm slides had badly discoloured and suffered from foxing. It was only possible to digitally restore some of the damage. The soundtrack fared better but some "print through" distortion of the magnetic tape is audible and in places the volume level fluctuates. Nevertheless to experience the "look and feel" of the original download<sup>iii</sup> my digital facsimile (file size: 33mb) for your personal use from:

<http://tinyurl.com/hz4uykr>

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<sup>iii</sup> A fast and secure standard Internet *File Transfer Protocol* (FTP) download service.

It runs automatically and correctly synchronised on any MS-Windows 7/8/10 system - even with Windows 10 Mobile on supported tablets and smartphones! With a suitable MS-PowerPoint viewer it should also run trouble-free on any XP, LINUX<sup>iv</sup> or MAC OS system.

So after downloading have a chuckle and relive in 15 minutes a slice of 1970s slide rule nostalgia.

## Acknowledgments

Friend and fellow collector, **Peter Holland**, kindly donated the *British Thornton* multimedia set to my collection. But a special word of thanks must go to my brother-in-law: **Brian Hunt**. Having a passion for vinyl recordings and hi-fi he provided the crucial introduction to professional sound engineer **Philip Ray**. In his commercial studio [12] Philip benevolently converted and remastered the sound recording into a contemporary digital format.

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<sup>iv</sup> The slide show will NOT run correctly with any *OpenOffice* presentation software.

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Figure 3 **Wikipedia**, "The Free Encyclopaedia", Wikimedia Foundation, Inc. 22 July 2004. Web. 10 Aug. 2004.

Figure 4 **Peter Hopp**, UK.

Figure 6 **Arithmeum/Rheinische Friedrich-Wilhelms-Universität**, Bonn, Germany.