

The Earliest Faber Slide Rules

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Introduction

This article is one of a series which details the early slide rules of A.W. Faber-Castell (hereafter referred to as Faber). The series, by Colin Tombeur and myself, is based on our research collaboration and the resulting development and analysis of a database of slide rule specimens as described in [1]. In this article I discuss details of the earliest period of Faber slide rule production, up to about 1899. My reasons for deciding on this cut-off point are threefold. Firstly it led to an article of a convenient size. Secondly, it stops just as Faber began to expand their slide rule model range: further articles covering the later period are planned. And thirdly, it neatly covers the period when Faber was using a distinctive and somewhat unusual cursor design.

In this period, Faber were in the forefront of slide rule mass-production. Other notable makers at the time were Dennert and Pape (D&P, Germany), Albert Nestler (Germany), Keuffel and Esser (K&E, USA), and to a lesser extent Frederick Post (USA). In this article I compare some aspects of Faber's slide rule development to that of these other companies.

Methodology

The database of early Faber slide rules and their features that Colin and I have developed consists of specimens from our own collections plus as many as we have been able to scrutinise from the collections of others. These others are largely from collections posted on the internet where detailed pictures are provided. For this article I have used the details of the 27 Faber slide rules from our database which we have determined fit my chosen time period. I will refer to these 27 examples as The Collection. My knowledge of the earliest Faber slide rules is limited to The Collection plus certain items of documentation, and my conclusions presented here may be invalidated as other collectors examine their own collections. If readers discover any errors in or omissions from our researches, I would be most grateful if they would communicate them to us, our details can be found in the UKSRC membership directory.

Each example in The Collection exhibits a number of features, for example scales made of celluloid, or a box with advertising labels. Examples with identical features are combined into a **group**, and a year or range of years is provided as an approximate date when the group first made its appearance. Design changes issued by Faber over this period sometimes occurred with great rapidity, and some of our groups contain as few as one example. This suggests that some milestones may not yet be recognised, leading to errors, but the size of The Collection gives us confidence that our postulated dates are rarely if ever in error by more than one year either way. Note that the groups defined in this article relate only to this article and not to any other article in our series of articles.

This article covers most but not all of the features to be found on Faber slide rules or their boxes in my chosen period. The interesting development of the ABCD scales, for example, is dealt with in a separate article [2].

The Earliest Slide Rules

Now, please bear with me while I describe in detail the earliest Faber slide rules in The Collection (**Group 1**, c1892 with two examples), see figure 1. This is a necessary prelude to the sequencing process, as will become clear. The slide rules I describe were introduced as "A.W. Faber's Calculating Rule". The model number of the earliest slide rules is assumed to be 350, although Faber produced no other slide rules at that time and initially the model number did not appear on the slide rules themselves (Faber manufactured many other products including pencils and rulers, so model numbers had been a feature of Faber production for many years. A highly-respected source [7] suggests that Faber produced other models of slide rule from 1892 but Colin and I have found no other evidence of this).

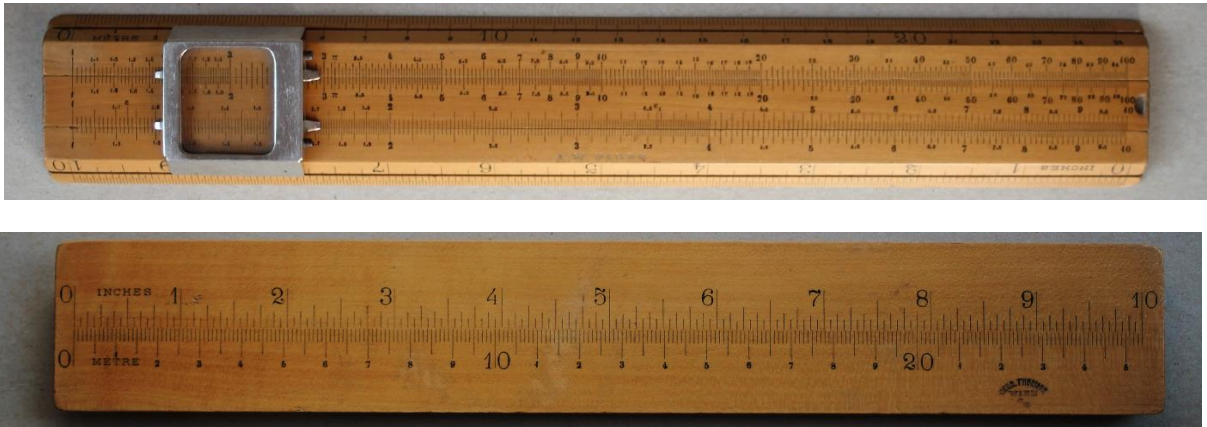


Figure 1. Front and back of a group 1 example

There is some uncertainty about the identification of the first Faber slide rules. We know [4] that in c1895 Faber were marketing a model 350 which was very similar to those described below in groups 2, 3, and 4. Our group 1 examples are broadly similar but do show a few strikingly different features. We have seen no firm documentary evidence showing how these groups 1-4 models were identified, but purely for convenience we are assuming a model number of 350. Similarly, Faber were describing their slide rules as “A.W. Faber’s Calculating Rule” in English-language instruction leaflets, but whether this applied from the earliest period of production cannot be determined.

The stock and slide of the slide rules are made of boxwood, the stock being fashioned from a single solid piece, with information (except the maker’s name) printed on the surface rather than incised into it. On the front were four logarithmic scales, the A, B, C and D scales working from top to bottom, though these scales were not identified on the slide rule itself. These scales were a little over 25 cm long. The A and B scales carried gauge marks for pi (π), and the C scale carried the gauge marks c and c_1 , the square roots of $4/\pi$ and $40/\pi$ respectively. There were no railway tracks (see later). The length of the rule itself was 26.4 cm, and the maximum width was 4 cm. Also on the front was the maker’s name, A.W. FABER, in gold with-serif lettering. Faber rules never carried serial numbers and were not marked with date codes until the 1920’s [7].

In the A and B scales, the numbers 1.5 and 15 were displaced out of alignment by about 1.5 mm. Also the right-hand end of the slide was equipped with a thumb notch to improve the grip on the slide. The runners that supported the slide in its lateral movement were positioned next to the well floor. In other words the slide could not be inserted into the stock upside-down.

The top and bottom edges of the stock were bevelled, and carried measuring scales. The top edge bore a centimetre scale from 0 to 25 cm, labelled MÈTRE on one of our examples and METER on the other. The bottom edge bore an inch scale from 0 to 10 in (labelled INCHES). Neither scale reached to the end of the stock itself. The rear of the slide carried a centimetre extension scale, and the well was plain. With the left-hand end of the stock aligned (upside-down) to the left-hand point of the item to be measured, and the slide extended to the right so that its right-hand end was aligned to the right-hand point of the item, the length of the item could be read off the slide at the point where it entered the stock. By this means, lengths up to 50 cm could be measured, except that, because the centimetre scale on the stock was only 25 cm long whereas the stock measured 26.4 cm, lengths between 25 cm and 26.4 cm could not be measured directly.

The back of the stock was flat and carried a double scale of inches and centimeters (labelled INCHES and MÈTRE/METER as above, ranging from 0 to 25 cm/10 in), arranged so that they provided a visual method of interconverting the two units (figure 1). The dual spelling of MÈTRE/METER shows that Faber were already marketing to various nations, although the full range of spellings may not be represented in The Collection.

The cursor, in common with all the cursors in The Collection, consisted of a nickel-plated brass frame which supported a glass window with rounded corners and bearing an engraved hairline (see figure 2). Such frames can be distinguished from aluminium frames by their greater weight, and from similar-looking brass or nickel silver frames by the fact that the nickel coating is very slightly magnetic. The examples in The Collection had frames of different appearances, from shiny silver to almost completely brass with no silvering left. This difference is probably due to the wear experienced over the years and the original thickness of the nickel plating which may have been changed at some point, although this is difficult to determine. The window was held in the frame by two grub screws, 2 mm. in diameter, running through the right-hand edge of the frame, and a slight protrusion inside the middle of the opposite edge. These features supported the window in such a way that the angle of the hairline relative to the scales could be adjusted (but the screws are best left untouched to avoid the risk of damaging the glass). The outer edges of the frame carried chisel-like extensions, so that the cursor could be used to read the scales in a way analogous to the all-metal cursors which were commonly used on slide rules of the period: this was a time when manufacturers were moving from all-metal to glass-window cursors. Faber is not known to have ever provided all-metal cursors, whereas K&E did not introduce glass cursors until about 1897 [8]. D&P were using all-metal cursors until 1890 when they were superseded by glass cursors [5].

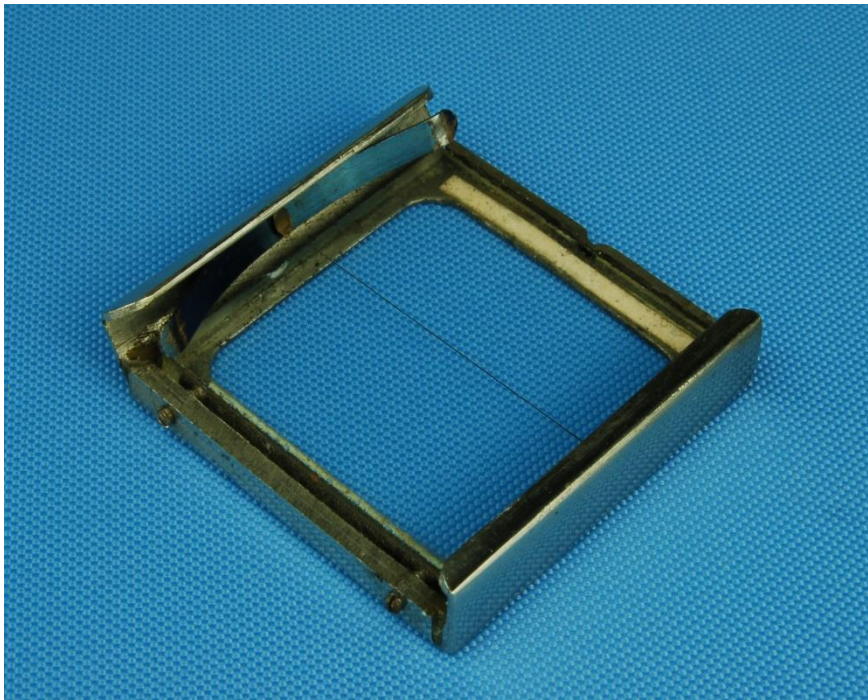


Figure 2. Underside of cursor with adjusting screws (lower left)

Faber were using these cursors with adjusting screws exclusively from 1892 until about 1899. Such cursors were not widely used elsewhere. D&P received a design registration (DRGM), number 25025, in 1894 for such a cursor and they did use them, but some or all of their cursor frames were made of nickel silver. D&P did not use these cursors exclusively as Faber did. No record exists of the full description of DRGM 25025, but the difference between Faber cursors (nickel-plated brass) and D&P cursors (probably nickel silver) may explain how Faber were able to avoid violating the terms of D&P's DRGM.

I cannot describe the boxes of these early slide rules as none are known to us. Later rules in The Collection have boxes and these will be described below (group 4).

The First Changes

I will now proceed to describe the changes that took place in Faber slide rules over the next few years. Changes should be assumed to persist into subsequent groups unless specifically noted later.

The first change (**Group 2**, c1892-3 with one example: figure 3) was the size of the rule itself: its dimensions were reduced to a length of 26 cm and a width of 3.2 cm. The bottom edge became square instead of bevelled and carried a centimetre scale running the full length of the rule. This scale was clearly intended to be used in conjunction with the extension scale, which was moved from the rear of the slide to the well. The top edge was still bevelled and in our example carried a scale of centimetres, from 0 to 25 cm. I cannot believe that the inch scale was removed entirely, though: I expect that other examples destined for sale in the U.K. or U.S.A. had an inch scale on the top edge (see Group 3 below). Neither of these measurement scales carried a label (metres or inches). A rounded slot was cut in the right-hand end of the well. This slot was the correct size and position to read the scales of sines and logarithms found on the rear of slides of later rules, except that on our example, at least, the rear of the slide was blank and the slot had no index lines. The thumb notch on the front of the slide was discontinued.

Our group 2 rule carried double line railway tracks: these persisted through to the end of The Collection. These tracks ran longitudinally along the scales. In group 2 the tracks were closer together on scales A and B than on C and D. When, later on, scales for sines, tangents, and logarithms were added (see below), the tracks for these scales were a single longitudinal line. The scale divisions usually ran up to one or the other of the railway tracks, but some extended beyond the tracks for a short distance. I call these extensions “ticks”, and these ticks appear in group 2 on the A and B scales.

The cursor now had no chisel points, and the diameter of the adjusting screws was reduced to 1 mm.

Another change with this model was the appearance of a MADE IN BAVARIA statement on the front, following the A.W. Faber logo. At this point I must introduce a warning. Not all changes are date-related. For example, the country of origin of a Faber slide rule, such as MADE IN GERMANY or MADE IN BAVARIA, may or may not be displayed on it. This was dependent more on the country where the slide rule was to be sold than the date of manufacture of the product. Because The Collection is limited in size, we are fairly certain that not all destination countries are represented and the conclusions presented here should be treated with caution (the same caveat applies to other language-dependent features such as back labels and box labelling). The GERMANY country of origin was to be found on slide rules destined for the US market. BAVARIA indicated a destination of the UK or certain countries in continental Europe (for example France). If no country of origin was shown the destination was probably a German language area. All of the rules in this survey were in fact made in Geroldgrün, near Nürnberg in Germany [4]. It is possible, but not certain, that a MADE IN message may appear on some Group-1-type examples although none in The Collection do.

I can only assume that Bavaria and not Germany was displayed on the rules made for the UK and French markets because there was a certain historical sensitivity to the word Germany in the UK and France at the time (the use of BAVARIA on Faber slide rules sold in the UK persisted until at least 1938). Faber slide rules sold in France were lacking a MADE IN message by 1899 (see group 9 below) but the exact date of this change cannot be determined from The Collection.

The next change, **Group 3**, c1893-5 with three examples (figure 3), incorporated several more modifications. One was the appearance of logarithmic scales of sines and tangents, and a linear scale of logarithms, identified by letters S, T, and L, on the rear of the slide, so that the arrangement of the A, B, C, D, S, L, and T scales conformed to the then-fashionable Enhanced Mannheim design [10]. The S and L scales could be read easily thanks to the slot introduced previously (group 2) in the well, now with the appropriate index added, but reading the tangent scale required removing the slide and inserting it upside-down, a process which was facilitated by repositioning the slide’s runner to the centre of its edge. Based on examples in other groups, the top measurement scale now represented inches or centimetres, depending on the intended point of sale. Rules destined for the UK or USA carried inches, those for other destinations carried centimetres.



Figure 3 with cursor spring

One of our group 3 examples carried no MADE IN information: it was destined for the German language market. This is confirmed by the paper label stuck in a rebate on the back (figure 4), which is a new feature in group 3 but only on German-language rules. This German-language label lists various mathematical and physical constants. On this early model there is an error. In a table of *Elastic. Grenze (elastic limits)* with two columns of numerical values headed *Druck* and *Zug* (Compression and Tension in English), the values in the two columns were erroneously exchanged. Later examples were corrected, and because the correction remained in place for many years it is easy to recognise that the earliest version is the one in error.



Figure 4. Early German-language back with error in the table's right-hand column

Group 3 incorporated for the first time a spring inside the top edge of the cursor, so that the bottom edge was held firmly against the edge of the rule, ensuring the hairline is always perpendicular to the scales. Also a small metal strip was positioned in the cursor between the adjusting grub screws and the edge of the glass to protect it from damage.

Group 4 (c1895) with two examples is where we find our earliest slide rule in a box whose pedigree we can be reasonably certain matches the contents. This box was of black-covered cardboard with a rectangular cross-section and square corners, and consisted of a "body" which contained the slide rule itself and a "lid" which slid horizontally onto the open end of the body.

About half of the slide rules in this and later groups of The Collection have boxes, and there is a regularity about the boxes which gives us confidence in our findings. We have noticed two distinct styles of presentation on the front and backs of the boxes.

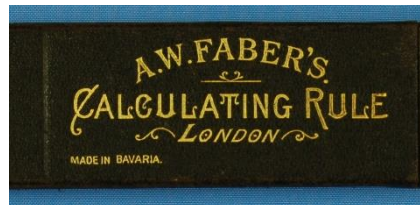


Figure 5a and 5b. Box designs (front) for German and English language rules

Boxes with information in German bore the words "Rechenstab von A.W. FABER." (Rechenstab = slide rule in German) on one face, the front, and that is all (figure 5a). English-language boxes appeared with a distinctive imprinted design headed by "A.W. FABER'S" in the form of an arch in place of the "Rechenstab" label (figure 5b). Under the arch was "CALCULATING RULE" and perhaps some text such as "LONDON" and the same MADE IN XXX that appeared on the slide rule itself. On the opposite face of the box, the back, extending onto the lid, was a stuck-on label advertising some of the products made by Faber. Both US and UK boxes initially had labels that were gold text on a black background. These labels (figure 6) were subject to severe discolouration over time so that they sometimes became unreadable.



Figure 6. Label on backs of English-language boxes in groups 4 and 5

The Collection contains boxes bearing English-language or German-language text only. Information about other possible languages that may have appeared on the boxes from this time period is not available to us.

A more subtle change also occurred in group 4. Where a slide rule still carried the inch/centimetre scale on the back of the rule, the 25 cm mark became aligned to the index line of the slot at the right-hand end of the well. The purpose of this alignment is something of a mystery. Also at this time the length of the ABCD scales was reduced from a little over 25 cm to exactly 25 cm: the mystery here is why the scales were not exactly 25 cm long in the first place.

Celluloid makes its appearance with a New Model

Group 5, dated to c1895 (together with group 4) and with one example, demonstrates the introduction of celluloid on the front faces of the stock, the well, and both faces of the slide. Celluloid facings on slide rules were introduced by Dennert and Pape in 1888. D&P had been granted a patent, DRP 34583, for this in 1886, and celluloid facings gradually appeared on slide rules from other manufacturers over the next few years (The title of DRP 34583 was Unveränderlicher Maßstab, or Unchangeable Ruler, with no mention of slide rules, which perhaps explains why other manufacturers were able to supply slide rules with celluloid facings in apparent violation of D&P's patent). The patent emphasised how the celluloid would make the wooden frames of a ruler "unveränderlicher", unaffected by ambient challenges such as temperature changes and moisture. The celluloid also made the scales easier to read, and so paved the way for woods other than boxwood to be used in the manufacture of slide rules. Faber's earliest celluloid-faced models were given the model number 360, and were marketed alongside the cheaper all-wood model 350 (now identified for certain) for many years. Note that D&P discontinued all-wood slide rule bodies as soon as the celluloid faced models appeared [5]. Faber slide rules did not carry model numbers until about 1908, although these numbers did appear on their boxes and in catalogues and manuals much earlier.

We can be certain that Faber introduced their celluloid-faced models in about 1895 [3]. Another article [4] confirms this dating. It illustrates a page in the Faber catalogue (price list) from 1896, which shows their model 350 and 360 slide rules and describes them as the company's "two oldest slide rules". The dimensions of these 360's are similar to the 350's except that the thickness of the stock increased slightly, from 0.8 cm to 0.9 cm, due to the celluloid facing.

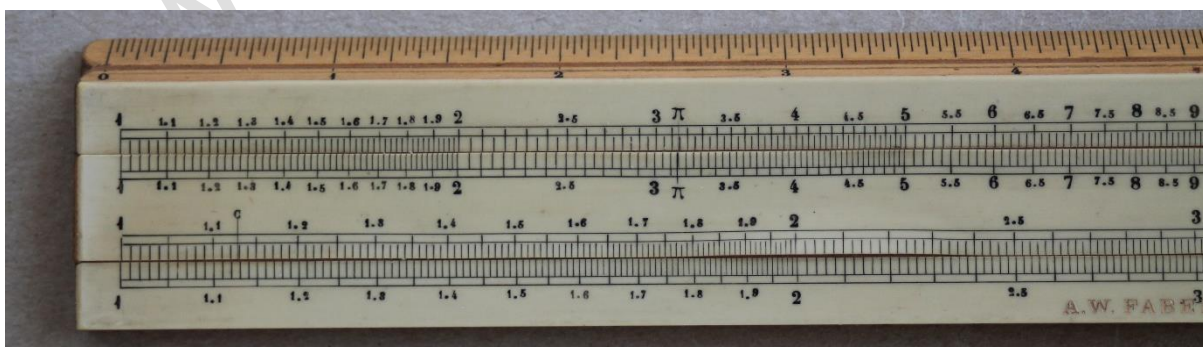


Figure 7. Group 6 example with celluloid, with 1.5/15 aligned, and no ticks

In the next change, **Group 6**, 1896-9 with eleven examples, the numbers 1.5 and 15 on the A and B scales were adjusted so as to be in-line with the other numbers (figure 7). Also, the inch/centimetre conversion scale on the rear of non-German language rules was replaced with a paper label in a rebate (figure 8), as had occurred in group 3 with German-language rules. The scale double line railway tracks (cf group 2) became equally spaced while the ticks were removed completely. On the boxes, the English language box labels described for group 4 were altered. In the UK the gold-on-black style was retained but with slightly different ornate corners to the borders (figure 9), and other small changes. The US labels also changed to this new style but became black text on a white background (figure 10). For a possible Art Nouveau influence on the design of these corners see [11].

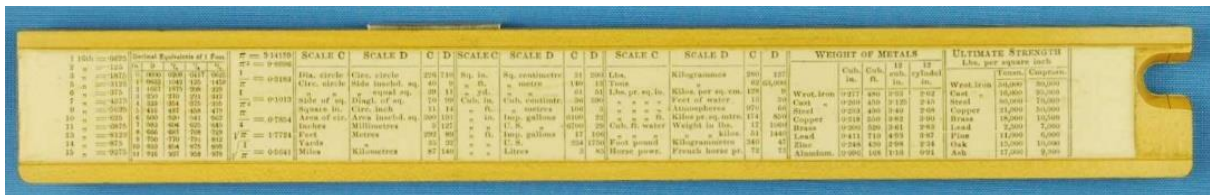


Figure 8. English-language back label



Figure 9. Old (top) and new (bottom) English-language box labels. Note the changed corners to the borders



Figure 10. The new style of box label for rules marketed in the USA

Strikingly, at the end of the lid appeared a label announcing the model number of the slide rule it contained. This was the earliest appearance of the model number to be seen in The Collection, and probably dates from the introduction of the model 360. Unfortunately, boxes do suffer damage, and early boxes are often seen where the end of the lid, with the model number, is missing, so the date of the appearance of the model number remains uncertain.

A change in the slide rule back label design occurred in this group for German-language products (see figure 11).



Figure 11. Altered German-language back label

Manufacture of other models begins

A little while after this (**Group 7**, c1898-9 with two examples) Faber began to introduce other models into their slide rule range. Contrast this with Nestler which produced only one model until 1901 [6]. Initially Faber's new models were 26 cm long, like the existing models 350 and 360, but soon afterwards 28 cm models began to appear. The additional length provided better cursor control at the ends of the scales, and also allowed some text to be placed in these positions. Some of the new models benefitted from a new feature which consisted of a springy length of boxwood, positioned below the groove in the stock where the slide ran (figure 12). This provided a firm but not too stiff grip on the slide. Faber's first German design registration for slide rules, DRGM 98350, was awarded for this feature in 1898, and the boxwood springs became a feature of selected models in the Faber range from that point until about 1910. The earliest new models in The Collection are the two model 365's in Group 7: these were 26 cm long and incorporated the boxwood springs.

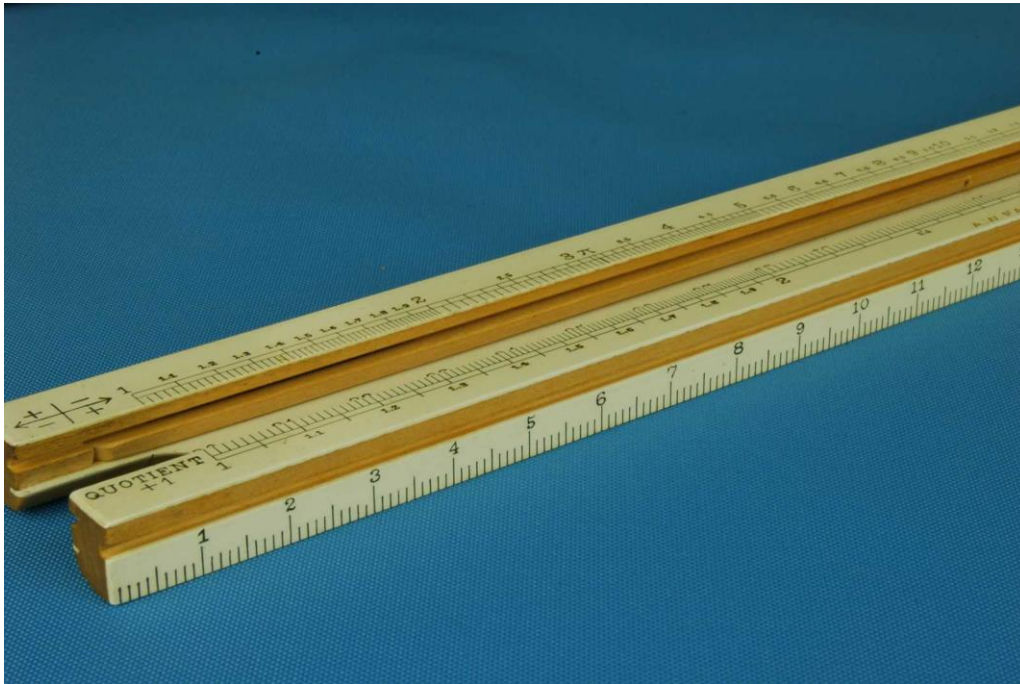


Figure 12. A boxwood spring inside the top slide groove, often overlooked by collectors

This DRGM award can be dated precisely to 1898. The existence of boxwood springs in themselves does not guarantee a manufacturing date on or later than 1898, because sometimes a maker would use a new feature before the DRGM was awarded. However, sometimes the ownership of the award would be announced on the slide rule, so the existence of "DRGM 98350" on the slide rule makes it certain that the rule can be dated not earlier than 1898. Furthermore, other evidence goes a long way to confirming 1898 as the date when slide rules with boxwood springs made their appearance.

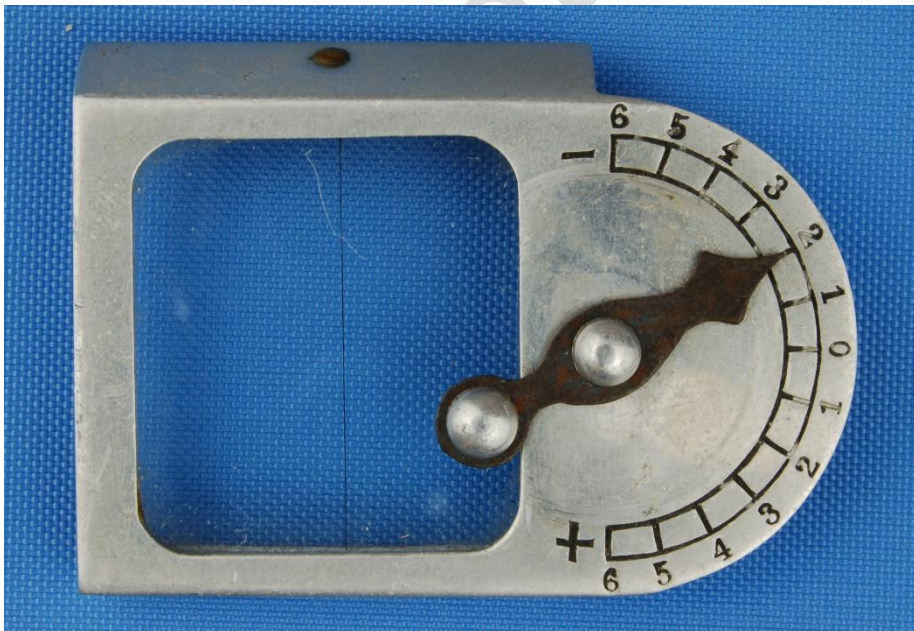


Figure 13. A digit registering cursor. This example is made from aluminium and has no adjusting screws.

The introduction of one particular new model can be dated fairly accurately (**Group 8**, c1899 with one example). This is the 28 cm model 367, well known for the inclusion of a “digit registering cursor” (figure 13) which was the subject of a Faber DRGM, number 116832, awarded in 1899. The cursor on the two model 367s in The Collection had the adjusting screws which are a feature of all cursors in The Collection, which places an upper limit on the manufacturing date. Other features, which affected the scales, were introduced on the model 367 at this time, namely the M gauge mark on the B scale, and the Quod/Prod panels at each end of the D scale which were designed to supplement the use of the digit registering cursor. Also noticeable on the model 367 was the “minimal decimal” system of scale numbering that reduced clutter by eliminating certain digits from the scales. For example, all numbers containing decimal parts, such as 2.5, were dispensed with, except for the numbers between 1 and 2 on the C and D scales. These latter numbers were shown with only the decimal part, for example 1.3 was shown simply as 3.

The model 367 saw the introduction of a second slot in the left-hand end of the well, to enable the tangent scale to be read *in situ* from the rear. The second slot was added to other models over a period of time, but was initially found on the 28 cm long models only.

Ticks were reintroduced on all models in group 8, on all four of the main calculating scales.

Another feature, designed to minimise the effects of distortion caused by the effects of time on wooden objects, was introduced soon afterwards (**Group 9**: c1899 with three examples) on all models. This feature consisted of two end-to-end slits in the well, extending altogether for nearly 20cm of the well floor. Later, Faber experimented with other features intended to reduce the effects of distortion and the slits were discontinued, but these changes lie outside the time period covered by this article.

Also in this group a French-language slide rule can be seen with no country of origin. Refer back to group 2 for further comment on this.

The final change in my chronology (**Group 10**, c1899 with one example) affected the paper labels on the back of English-language rules. Here the size of the scripts became slightly, but noticeably, smaller. As a result the labels themselves became a little shorter.

Conclusion

This is a convenient point to bring this article to an end. Many changes took place in the next stage of development, from about 1900, which would have required a major increase in the size of this article. For example the adjustable cursors which we have grown to know and love were replaced by cursors with an aluminium frame and no adjusting screws, although Frederick Post was marketing Faber slide rules with “nickel metal” cursors in 1903 [9]. But these developments will have to wait for another time. The slide rules themselves, all of them well over 100 years old now, have told us their stories, but only with some effort on our part. There is no-one else to do it for them.

References

- [1] *Every Slide Rule Tells a Story - Establishing an Early A.W. Faber-Castell Chronology* (Colin Tombeur), United Kingdom Slide Rule Circle (UKSRC), Slide Rule Gazette, Issue 17, Autumn 2017, page 15
- [2] *How did A.W. Faber-Castell Mark their Scales?* (Trevor Catlow), United Kingdom Slide Rule Circle (UKSRC), Slide Rule Gazette, Issue 17, Autumn 2017, page 70
- [3] *Transition from boxwood to celluloid on boxwood within A.W. Faber* (Dieter von Jezierski), Skid Stick 11, June 2002, page 7
- [4] *Werk Geroldsgrün und der Rechenstab* (Geroldsgrün Factory and the Slide Rule), (Dieter von Jezierski und Hans Schiller). 2008, www.rechenschieber.org/Rechens_110708.pdf
- [5] *Dennert & Pape and ARISTO Slide Rules 1872-1978* (Hans Dennert), Journal of the Oughtred Society Vol. 6 No. 1, March 1997, page 4
- [6] *Albert Nestler: Innovation and Quality* (Guus Craenen), Journal of the Oughtred Society Vol. 11 No. 1, Spring 2002, page 38
- [7] *Rechenschieber, Slide Rules A.W. Faber, A.W. Faber-Castell* (Peter Holland), self-publication, seventh revised edition, 2014
- [8] Clark McCoy's K&E web site: <http://www.mccoys-kecatalogs.com/index.htm>
- [9] *Notes on Frederick Post Slide Rules* (Bob Otnes), Journal of the Oughtred Society Vol. 7 No. 1, Spring 1998, page 7
- [10] *The Oughtred Society Reference Manual (Second Edition)*: Oughtred Society, 2010
- [11] *Suggestions for Dating pre-1920 Faber-Castell Slide Rules: an Update* (Trevor Catlow), Journal of the Oughtred Society, Volume 22, No. 1 (Spring 2013), page 45

Note. Back issues of the Journal of the Oughtred Society and UKSRC's Gazette and Skid Stick may be viewed on Rod Lovett's web site, <http://www.sliderules.lovett.com/extendedlitsearch.html>.

A full bibliography of sources used in the development of this article can be found in [1].

Appendix. Quick Summary of Changes

Group /year	Stock & Slide	Scales	Text & labels	Cursor/Box
1 c1892	<ul style="list-style-type: none"> • 26.4 cm long • Stock made from a single piece of solid boxwood • Back of stock is flat with no rebate • Stock top and bottom edges are bevelled • Thumb notch at right end of front of slide • Slide runners at bottom of edge • plain well 	<ul style="list-style-type: none"> • Length 25.2 cm (approx.) • Plain scales with no railway tracks • Rulers on top and bottom edges not to end of stock • cm extension scale on back of slide • Inch/cm conversion scale on back of stock 	<ul style="list-style-type: none"> • Decimal notation for scale numbers (eg 1.1, 1.2 ...) • Displaced 1.5/15 on A & B scales • FABER text with gold serifs 	<p>Cursor:</p> <ul style="list-style-type: none"> • Nickel plated brass • Chisel indexes • Adjustable glass with 2 mm screws • Window with rounded corners <p>Box:</p> <ul style="list-style-type: none"> • Unknown
2 c1892-3	<ul style="list-style-type: none"> • Stock shortened to 26 cm • Stock bottom edge becomes perpendicular • Thumb notch removed from slide • Slot introduced in back of stock at right end 	<ul style="list-style-type: none"> • Unequal width double line railway tracks added • Tick marks outside railway tracks • Bottom edge ruler now full length of stock • cm extension scale moved to well 	<ul style="list-style-type: none"> • "MADE IN ..." introduced for non-German markets 	<p>Cursor:</p> <ul style="list-style-type: none"> • Chisel indexes removed • Adjustable glass screws become 1 mm
3 c1893-5	<ul style="list-style-type: none"> • Rebated back introduced on German language rules • Slide runners moved to centre of slide edge 	<ul style="list-style-type: none"> • Inch/cm conversion scale removed from back of stock on German language rules • SLT scales added to back of slide 	<ul style="list-style-type: none"> • Label added in new rebate in back of stock for German language rules 	<p>Cursor:</p> <ul style="list-style-type: none"> • Tension spring added
4 c1895		<ul style="list-style-type: none"> • Scale length becomes 25 cm • Inch/cm conversion scale on back of stock becomes aligned to right slot index 		<p>Box:</p> <ul style="list-style-type: none"> • 1st known example • Rectangular cross-section • Arched script on front for English language boxes • "Rechenstab..." on front for German language boxes • Gold text on black back label for English language boxes
5 c1895	<ul style="list-style-type: none"> • New models with celluloid facings to front, well and front/back of slide 			
6 c1896-9	<ul style="list-style-type: none"> • Non-German rule backs become rebated (all rules now have rebate back) 	<ul style="list-style-type: none"> • Double line railway tracks become equal width • Ticks outside railway tracks removed • Inch/cm conversion scale removed from non-German rules 	<ul style="list-style-type: none"> • Displaced 1.5/15 on A & B scales becomes aligned with other numbers • German language back label changed • Back labels introduced on non-German language rules 	<p>Box:</p> <ul style="list-style-type: none"> • English language back label borders changed • Text now black on white for US rules • 1st known example of model number label – no border
7 c1898-9	<ul style="list-style-type: none"> • New models with boxwood springs to grip slide introduced 		<ul style="list-style-type: none"> • "DRGM 98350" for boxwood slide springs appears 	
8 c1899	<ul style="list-style-type: none"> • New models introduced with 28 cm stock length • Slot introduced in back of stock at left end on new models 	<ul style="list-style-type: none"> • Ticks outside railway tracks re-introduced • M gauge mark introduced on some new models 	<ul style="list-style-type: none"> • Minimal decimal notation introduced for scale numbers on new models • "Quotient" & "Product" panels introduced on some new models • "DRGM 116832" for digit registering cursor appears 	<p>Cursor:</p> <ul style="list-style-type: none"> • Digit registering cursor introduced on some new models
9 c1899	<ul style="list-style-type: none"> • 2 longitudinal slits introduced into well 			
10 c1899			<ul style="list-style-type: none"> • English language back label text made smaller 	

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