

# Engineers in Tights!!



*Despite being past the heyday of the Second Industrial Revolution "engineers in tights" made sure slide rule innovation persisted well into its twilight years.*

The post 1860 *Second Industrial Revolution*, also known as the *Technological Revolution*, was much more than a "second industrial wind". It marked not only a significant acceleration in the speed of technological innovation but it was also an era when inventions broke new ground. No more so than in areas like electricity, new alloys and chemicals, railroads, telegraphy and radio. The past era of steam and iron was quickly overtaken by these new technologies with one possible exception: in the manufacture of textiles. So not unsurprisingly slide rules for the textile industry were some of the earliest and some of the latest (if not last) specialist models.

## Rich history

Before the *Second Industrial Revolution* the textile industry had a rich past, fuelled by the dramatic impact inventions like the *Jacquard loom* had on production techniques back in 1801. Before Joseph Marie Jacquard<sup>1</sup> (1752-1834) automated loom operation and the production of textiles, especially woven fabrics with intricate patterns, it had been extremely labour intensive and needed a highly skilled operator [1]. It involved interlacing a set of vertical (the warp) and horizontal (the weft) threads. Jacquard's innovative use of stitched "punched cards" to control the loom was unwittingly the forerunner of the stored computer program and in this case, computer-controlled manufacturing. So it is hardly surprising that revolutionary inventions in the textile industry spanned both the First and Second Industrial Revolutions and beyond.



Jacquard loom in the,  
Technikmuseum, Berlin [1]

## First and Last

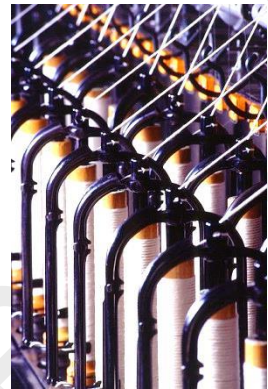
Specialist slide rules were developed for either particular trades or industries. For such models, trade or profession related scales and gauge

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<sup>1</sup> "Jacquard" was just a nickname – he was actually born Joseph Marie Charles.

marks were added. The most common specialist slide rule was the "Elektro" – a model most manufacturers produced specifically for electrical engineers [2]. But given its rich and long history, textile slide rules are probably the earliest and equally the latest examples of specialist rules for a major industry.

As with many industries, textile specific problems came in two classic flavours: working in imperial or working in metric units of measure. However, common to both units was the method of sizing the yarn for spinning or weaving [3, 4]. Besides needing a way to distinguish between one yarn type and another, it was often essential to know in advance the weight of the final product. A well-known example unit of size for yarn is Denier<sup>2</sup>. So tights described as "10 denier" or ultra sheer are finer than tights described as "30 denier" or semi-opaque. But sadly the unit of size used for yarn is different for cotton or wool or nylon etc. Fortunately, whatever the unit, the industry has just two main methods of "counting" or calculating the thickness of spun or woven yarns:



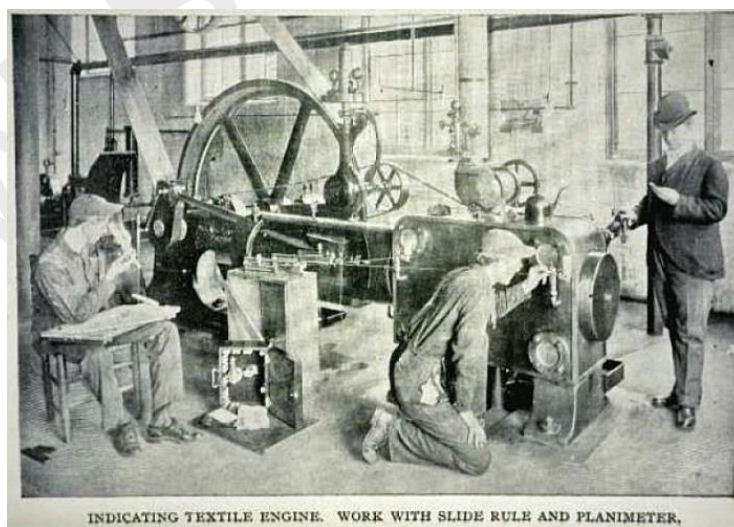
Yarn being spun [1]

- **Indirect or "fixed weight"**

Here the final length of the spun or woven yarn is variable as the weight of the yarn is kept constant - i.e. the thicker the yarn, the lower the count.

- **Direct or "fixed length"**

Here the weight of the spun or woven yarn is variable as the length of the yarn is kept constant - i.e. the thicker the yarn, the higher the count.



"Georgia Tech" 1902 – today known as *Georgia Institute of Technology, Atlanta* [5]

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<sup>2</sup> A unit taken from the natural world - a single strand of silk is roughly one denier.

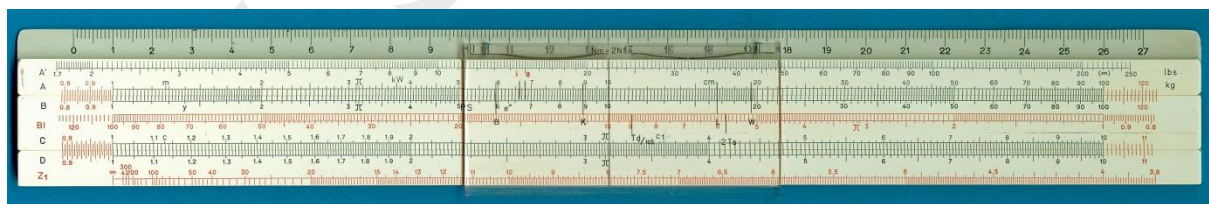
In 2003 Tom Wyman published an extensive account of the earliest textile slide rules in the *Journal of the Oughtred Society* [6, 7]. By the 2<sup>nd</sup> half of the 20<sup>th</sup> century the Second Industrial Revolution had long passed its heyday and slide rule innovation was in its twilight years. But the textile industry and specialist textile slide rules were exceptions. The textile industry continued to innovate with new raw materials and improved manufacturing processes. Unexpectedly this “innovation second wind” inspired several leading slide rule manufacturers to launch post 1950 some highly innovative specialist textile slide rules.

### Impressive post 1950 textile slide rules

Like the slide rules for many trades, the post 1950 textile calculators fall into two main categories. Many are slide chart-like conversion aids – converting specialist weaving and spinning values into imperial or metric units for setting up looms, etc. Rarer are the few specialist slide rules that incorporate innovatively designed and unique weaving and spinning scales and trade related gauge marks. Of these post-1950 specialist slide rules one made by German maker A.W. Faber-Castell (F-C) was particularly impressive and turns out to have a rich provenance.

### Faber-Castell 57/74 *System Schirdewan* – early origins

In 1952 F-C switched to modified polystyrene (ABS-Polymere) injection modelling [8, 9]. They had earlier started using a more economic PVC-based process to launch a “*Scholar series*” of inexpensive plastic slide rules for schools [9]. At first glance the F-C specialist model 57/74 could easily be mistaken for an uninteresting plastic solid-frame linear school slide rule with a “harlequin pair<sup>3</sup>” of a double-width cursor that surely originally belonged to a 50cm desktop model!



Original solid-frame 25cm plastic 57/74 with a strange double width cursor

To start selling the 57/74 in 1956 [8] was a brave, if not risky, marketing step. By their nature any specialist slide rule can usually only sell in limited numbers to a niche market. So the 57/74 deserves a closer look – being a standard sized plastic enhanced Mannheim-like rule it is easy to miss just how different and innovative it was. The first clue that it is something out of the ordinary is that F-C called it: *System Schirdewan*. A

<sup>3</sup> Term used by antiquarians for something: “going together but not quite matching.”

"system" accreditation on an F-C rule alluded to the name of an external designer<sup>4</sup>. Over the years they contracted 20 such designers - see *Appendix A* for the full list. Especially if covered by a patent or a registered design, F-C would usually pay such external designers a royalty payment of no more than 8-10% of the trade price to (re)use their design and possibly pay for a set of instructions. For the 57/74 the external designer and registered design holder was Ulrich Schirdewan (1904-1959).

### *Ulrich Schirdewan*

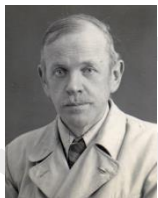
Sadly Ulrich Schirdewan never knew just how successful the 57/74 became for F-C as he died just three years after it went into production. He originally worked in the family business in Wrocław<sup>5</sup>, Poland [10]. *Carl-Schirdewan AG* was a distiller and famous for its own brand of snaps. Later, while working as an engineer for a German manufacturing company making machines for spinning yarn and thread, he came up with his innovative design for a textile slide rule. It was never patented but in October 1931 Schirdewan was granted Deutsches Reichsgebrauchsmuster (DRGM) **1189815** for his "*Textilrechenstab*". Such German registered designs



**Ulrich Schirdewan**  
aged 51 [10]

offered the inventor an initial three years of copyright protection - extendable for a maximum of another three years. Given that Schirdewan's design dates from the late 1920s it should come as no surprise that F-C were not the first to be impressed with its innovative qualities.

### *Seehase and Schirdewan*



Hans Seehase (1887-1974) was a multitalented engineer and an inventor with many patents to his name. Several such patents were related to his design for a slide rule. At first he collaborated with established German slide rule maker *Nestler* but later he doggedly chose to produce independently all his own slide rules and established his own business in Berlin [11, 12]. His simple cardboard/celluloid design was cheap to produce and as shown by variety of different Seehase models, highly adaptable. One such specialist slide rule was a textile model based on Ulrich Schirdewan's design.

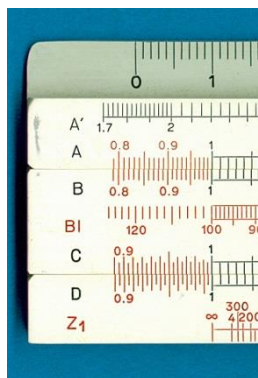
<sup>4</sup> Some F-C "system models" also had an additional name referring to its use - e.g. "Ekagnost" (as in ECG for heart diagnosis) on the F-C 1/44 System Dr. Sandera.

<sup>5</sup> Before 1945 the city was known as Breslau and was part of Germany.



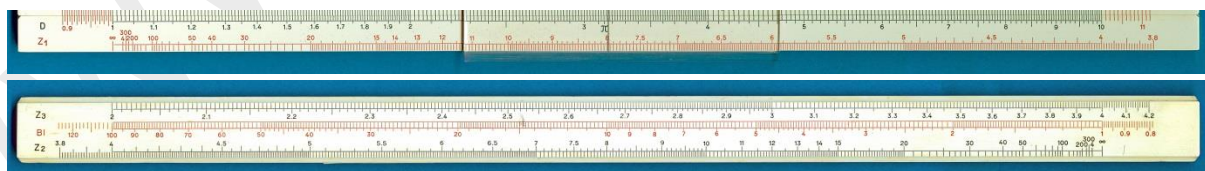
### 57/74 version 1 – the original

Predictably the first version was made for the home metric-based textile market. It came with summarised instructions on the back of the stock<sup>6</sup> and an extensive guidebook of instructions – both in German. The 57/74 was strikingly different from the *Seehase-Schirdewan* slide rule. But this is understandable as by now the original design was over 25 years old and F-C wanted to reuse existing in-house design elements - for both the rule and for the cursor. Ulrich Schirdewan died shortly after production started. But from a 1955 account in the same industry journal that featured the Seehase model, he clearly knew the F-C System Schirdewan design was based on a scale layout largely made up of standard scales of the day [17]. In fact the scale layout is unique – unique to any other F-C model or any other slide rule ever made. The F-C design team flipped what Seehase had originally done. So instead of multiple specialist textile scales and just two standard scales, the F-C 57/74 design has just two specialist textile scales but many standard scales and numerous innovative textile gauge marks. Naturally all these aspects F-C strongly promoted in the special 57/74 promotion leaflets.



An inspirational part of the layout was the "... A / B, **BI**, C / D ..." combination of scales surrounding the slide. Many different manufacturers had models with a layout of B, BI, CI and C scales on the slide. But leaving the CI scale off the 57/74 was a clever simplification because for many textile calculations the reciprocal **BI** scale is really handy. When, for example, the **BI** scale is used with the A scale it makes short work of the many indirect proportions<sup>7</sup> that often crop up in textile calculations.

This is also why the **BI** scale is repeated as part of the scale layout on the back of slide. The specialist textile scales, partly on the back of the slide, with scale notations **Z<sub>1</sub>**, **Z<sub>2</sub>** and **Z<sub>3</sub>** are for calculating twisted yarn counts for 2 or more single threads [15, 16].



The **Z<sub>n</sub>** scales are the F-C equivalents to the E and F scales on *Seehase-Schirdewan* slide rule and greatly simplify the repetitive nature of such calculations when just using the formulae. Although slightly extended

<sup>6</sup> To solve complex textile problems the special instruction guide was needed.

<sup>7</sup> Given the many loom settings possible, many combinations can give the same result.

(down to 3.8 instead of 5) the  $Z_1$  bottom scale on the stock is otherwise identical with the Seehase's F scale. Like Seehase's E scale, the  $Z_2$  scale is a reciprocal version of the  $Z_1$ . However, the  $Z_3$  scale is an F-C addition. Post 1950 some twisted yarn calculations for possible loom settings could fall outside the range of the  $Z_1$  and  $Z_2$  scales – even with their extensions. The  $Z_3$  scale covered this eventuality by providing a stock wide expanded extension to the  $Z_2$  scale (i.e. down to 2.0).

Naturally, although intended for the home market, F-C still wanted to attract as much of the limited niche textile market as they could. So they tried to make the 57/74 also appeal to textile customers working in imperial units of measure. So besides including some predictable and largely metric-based gauge marks on the A, B and C scales, F-C took the extraordinary step of adding a totally non-standard and unparalleled "A' scale".

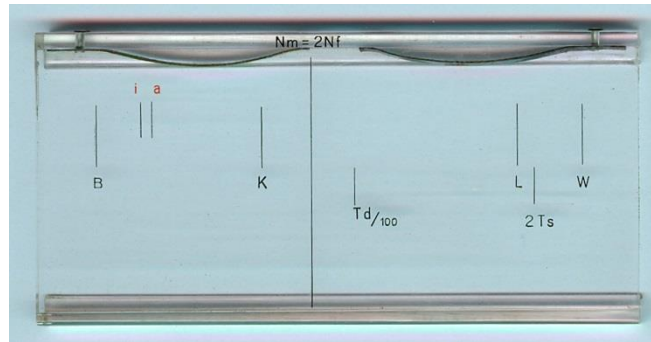


This top scale is found on no other known slide rule<sup>8</sup>. Its sole function, with the A scale, is to convert (factor: 2.205 [18]) metric kilograms (kg) to imperial pounds (lbs) or the other way around. It was a short-lived innovation as within two years F-C started making a dedicated imperial version and replaced the original version 1. However, for all versions F-C followed a common European slide rule maker's trend and redid much of Schirdewan's design as gauge marks on a cursor double the normal width for a 25cm linear slide rule.

American and Japanese slide rule manufacturers always opted for simple cursor designs – usually not incorporating much more than a central hairline [19]. Whereas F-C, like most European slide rule manufacturers, often incorporated innovative gauge marks or gauge gaps<sup>9</sup> into many of their cursor designs [18]. But outside their desktop models F-C seldom used extra wide cursors. The exceptions are the cursors on the 2/66, the 2/84 and the specially commissioned Organ Pipe slide rule for *Aug. Laukhuff GmbH*, Weikersheim [20]. However, all these cursors were radically different and unique for their respective specialist purpose. For the unusual cursor design for the 57/74 F-C cost-effectively used a narrow version of the extra wide cursor from their 4/xx desktop series.

<sup>8</sup> Most slide rule makers favouring gauge marks for such conversion factors.

<sup>9</sup> Gauge marks on cursors are often the gap between two peripheral hairlines.

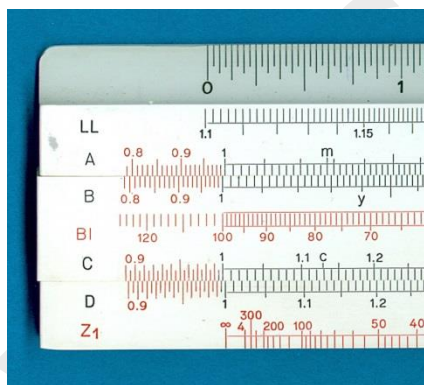


**Plastic 8cm wide cursor with two metal tensioning springs and metric gauge marks**

F-C needed 30 pages in the instructions just to explain how, for different types of yarn, the metric textile specific gauge marks on the cursor could be used with the scales to perform various loom-based textile calculations [21]. It is suffice to say here, that of the eleven gauge marks/peripheral hairlines on the cursor, six are for calculating the thickness of yarns according to the indirect or “fixed weight” system. The other five are for calculating the thickness according to the direct or “fixed length” method.

#### *57/74 version 2 - imperial*

Two years after the launch of the 57/74 F-C decided to start making a tailor-made imperial version. This is not surprising since the only textile specific imperial help offered on version 1 was the A' conversion scale. But this did pose a dilemma as many more imperial units of measure were used in textile calculations in countries like the UK and the USA. Many yarn types also had their own specific and eclectic imperial based units of measure [21].

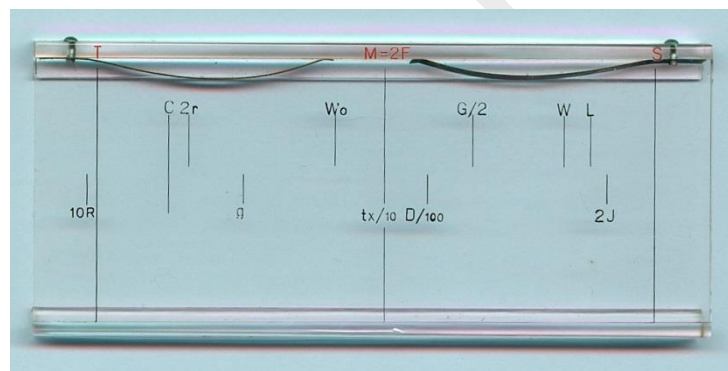


Only minor changes were made to the stock for version 2. As F-C often did for export versions, the bevelled top cm edge scale was replaced with an inch scale. On the back the summarised German instructions were replaced by a modified English language version and a cm scale. As the calculations using the special  $Z_n$  scales are generic for all types of yarn, they did not ostensibly need to change. The step-change in the design was redoing the gauge marks on the cursor for the textile specific imperial equivalents. This meant the non-standard A' scale was now redundant. F-C replaced it with a log-log scale. On most slide rules a log scale is added as at least a pair of scales – e.g. LL1 and LL2. But clearly F-C did not want to change unnecessarily the version 1 tooling for the new imperial version. So to keep the width of the stock the same, they opted for adding the little-used and excessively

compact LL scale – presumably for general calculations involving powers. The 57/74 is the only model where F-C used the LL scale. However, it was used sporadically by other leading manufacturers such as Aristo and Nestler. The only other refinement made to the stock was to add a simple % decrease/increase scale at either end of the  $Z_3$  scale<sup>10</sup>. Although loss percentages, etc crop up in both imperial and metric textile calculations the range and positioning of the % scales on the 57/74 meant they quickly lost their accuracy and their usefulness.



Being an imperial version F-C also consistently extended the complement of standard gauge marks on the A and B scales with imperial gauge marks for yards, lbs and inches. The major design change was to the cursor. None of the previous innovative textile gauge marks were applicable to the new imperial version. The new design also had to accommodate more gauge marks than its metric predecessor. So F-C came up with an even wider cursor for version 2 of the 57/74.



**Plastic 9cm wide cursor with two metal tensioning springs and imperial gauge marks**

For the imperial version the cursor has fifteen imperial textile gauge marks/peripheral hairlines. Ten of them are for calculating the thickness of yarns according to the indirect or “fixed weight” system while the other five are for calculating the thickness according to the direct or “fixed length” method. All the changes were reflected in a new English language version of the original instruction guide.

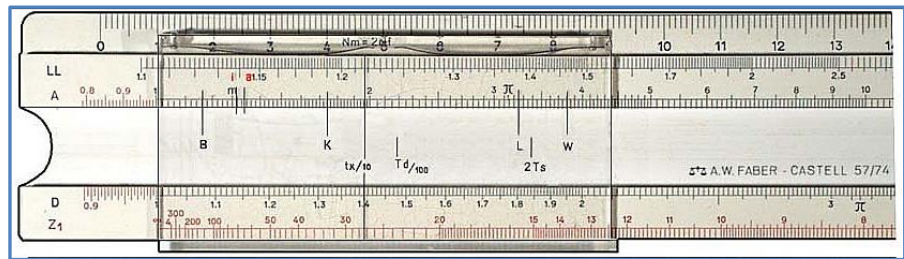
### **57/74 version 2 - metric**

As the market potential for the 57/74 was always many hundreds rather than many thousands, F-C naturally wanted to limit production run differences for the same model. As the new version 2 met the needs of the textile industry and countries working in imperial units of measure,

<sup>10</sup> The original right-hand scale extension to the  $Z_3$  scale was dropped to make room.

the A' scale on the original version was now superfluous. But as the stock and new scale layout for version 2 was neither imperial nor metric specific, F-C adopted it for the replacement of the original version 1.

Obviously for the metric version the bevelled top edge scale had to in centimetres and the summarised



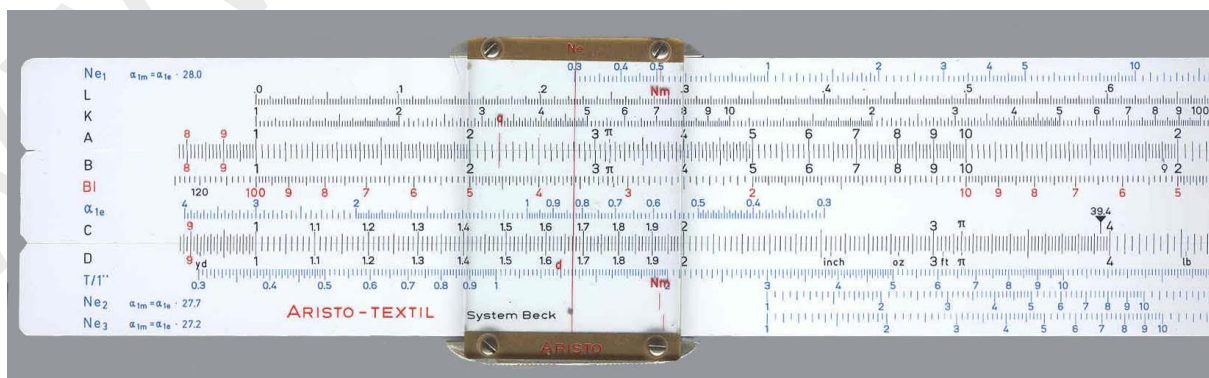
instructions on the back, in German. To mirror the version 2 imperial design, an inch scale was added to the back of the stock. So from 1958 F-C sold the imperial version 2 with its extra wide cursor and the metric version 2 with the original cursor from version 1. F-C also chose not to rewrite the original German language instruction guide for the metric version 2. Instead they opted for adding a few new pages to the original that referred to the changes. For example, it just said: "... an LL scale has replaced the A' scale and any references to the original A' scale should be ignored"!

### Other post 1950 Textile slide rule makers

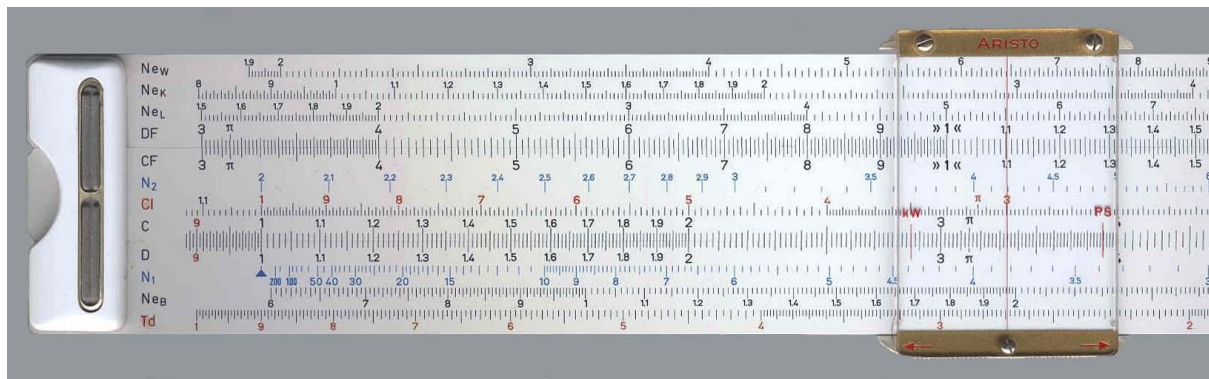
As in many businesses all the leading slide rule manufacturers of the day kept a close eye on their competitor's latest developments. The revolution that came with the electronic pocket calculator was still two decades away but the first electronic desktop calculators would soon come on to the market. This looming electronic threat may be why F-C did not have many competitors for the post 1950 niche textile market.

### Aristo - Textil 930 System Beck and special commissions

A great rival of F-C, Aristo, did respond to the F-C 57/74. In 1962<sup>11</sup> they started making a new specialist textile production model: the 930 System Beck. It is not known who or what "Beck" refers to but presumably it relates to the origins of the design or the name of the designer.

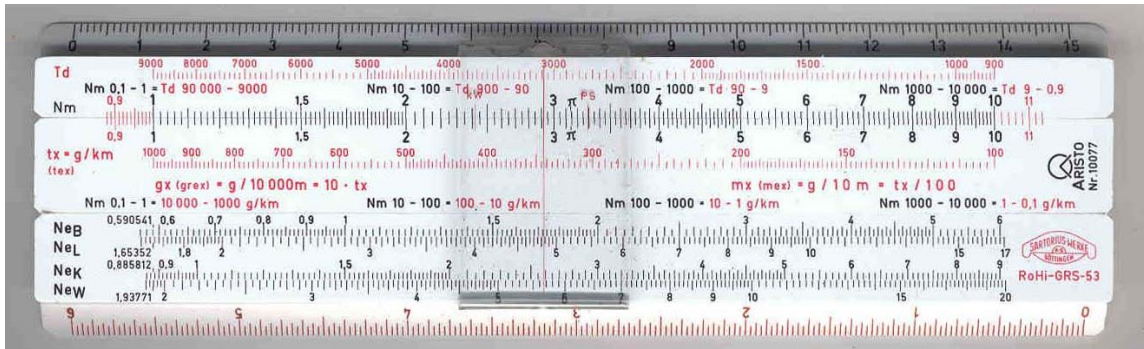


<sup>11</sup> Earliest known examples and the date printed on the instruction guide for the 930.



**Open-frame 25cm duplex plastic 930 with double-sided cursor [22]**

The Aristo design bears startling little resemblance to the uncomplicated looking F-C 57/74. It is a plastic (Astralon) open frame duplex slide rule with an impressive and imposing complement of 24 scales – 12 of which are specialist textile scales. Textile specific scales appear on both the front and back of the rule. Being generic for twisted yarn calculations only the  $N_1$  and  $N_2$  scales on the back correspond to the  $Z_1$  and  $Z_2$  scales on the 57/74. By including scales and conversion factors for both metric and imperial working Aristo, unlike F-C, opted for maximum versatility and a single model for all branches of the textile industry. However, this did make it highly complex. Even when following the examples in the instructions the 930 is not intuitive to use. Also despite the many examples in the instructions, it is unclear how the slide rule would have been used in conjunction with a loom on the work floor [23]. But there is one notable similarity to the 57/74. On the front face Aristo mirrored the 57/74 design innovation by favouring the little-used **BI** + **A** scale combination for the many textile related indirect proportion calculations - relegating the popular **CI** scale to the back of the rule. Predictably the double-sided cursor carries far fewer gauge marks than the 57/74 cursors – having just two textile related on the front of the cursor. The 930 would have been expensive to make and so retailed for more than the price of the 57/74. Aristo kept the 930 in production until 1977 [11]. Interestingly a case can be made that Aristo could have easily pre-empted the successful F-C 57/74. Aristo have a rich history of making over 400 specially commissioned slide rules – 10 of which can be considered post 1950 specialist textile slide rules.

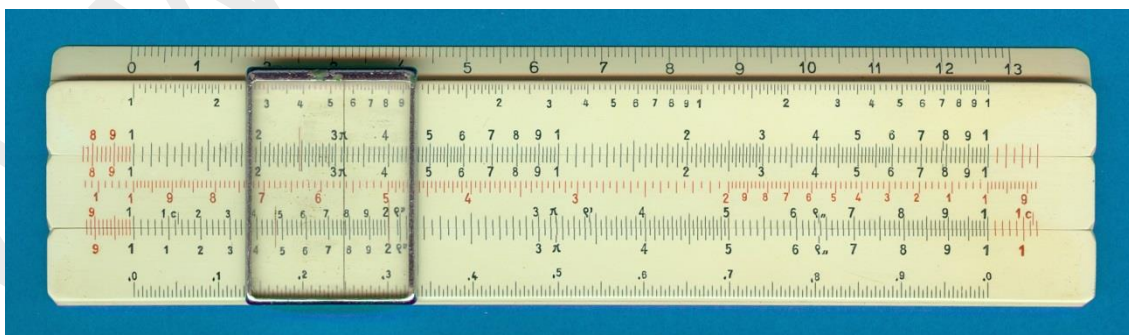


**Solid-frame 12.5cm plastic 10077 textile pocket slide rule from 1952 commissioned by Sartorius-werke AG, Göttingen [22]**

The Aristo registered numbers for these special textile commissions were: 10056, 10066 (90192), 10077, 10102, 10121, 10183, 30078, 80124, 80125 and 80141 [11]. Notably all except the last (commissioned in 1968) of these post 1950 special commissioned textile slide rules predate the Aristo 930.

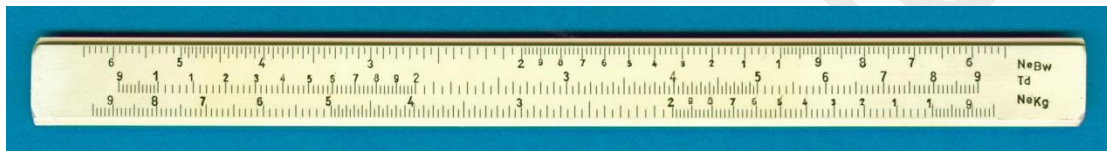
#### **Nestler - specially commissioned pocket textile slide rule**

By contrast the other great rival to F-C, Nestler, chose not to respond to F-C's new commercial offering. Ironically Nestler, unlike Aristo, did have a provenance for making a special textile slide rule. In fact before they started making slide rules the Nestler family business was weaving and linen making. This could explain why one of Nestler's earliest slide rules was the 1912 36cm model 36 "Weaving & Spinning" specialist slide rule [24]. It is a little-known model because in 1934, a decade after they stopped making the specialist textile slide rule, Nestler confusingly reused model number 36 for a 25cm Elektro slide rule. Then fifty years after making their first textile slide rule Nestler were commissioned by Wuppertal based *Vereinigte Glanzstoff-Fabriken AG* (VOF) to make a solid-frame pocket slide rule incorporating special textile scales and printed conversion factors.

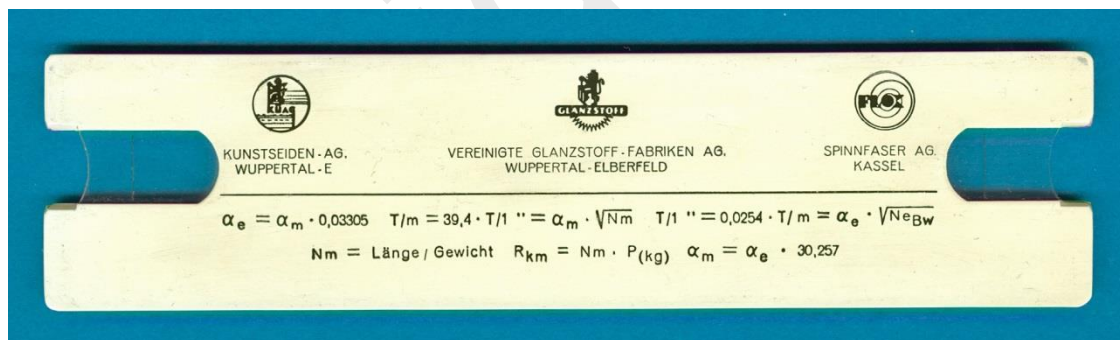


**Solid-frame 12.5cm plastic textile pocket "11R look-a-like" slide rule from circa 1956**

Nestler slide rules can be tricky to date but as this pocket slide rule is made of ANAGIT<sup>12</sup> it must have been made after 1951 [25]. It probably dates from around the same time as the F-C 57/74 – circa 1956. Similar to the 57/74 it is also easy to dismiss this pocket slide rule as “nothing special” as it looks deceptively like the standard Nestler model 11R or the later model 0123. But besides missing the S, S&T and T scales for such Rietz types of slide rule, the only visible clue that it is special is the wider than usual body. The width is the same as Nestler used on their pocket Darmstadt models. For VOF a Rietz-like layout with the special textile scales on the back of the slide was enough for the synthetic fibre metric textile calculations they needed to make. The same 3 special textile scales, Ne<sub>Bw</sub> (for English cotton), T<sub>d</sub> (for titer or denier numbering) and Ne<sub>Kg</sub> (for English worsted) can also be found on the back of the Aristo 930 – respectively as the Ne<sub>B</sub>, **Td** and Ne<sub>K</sub> scales.

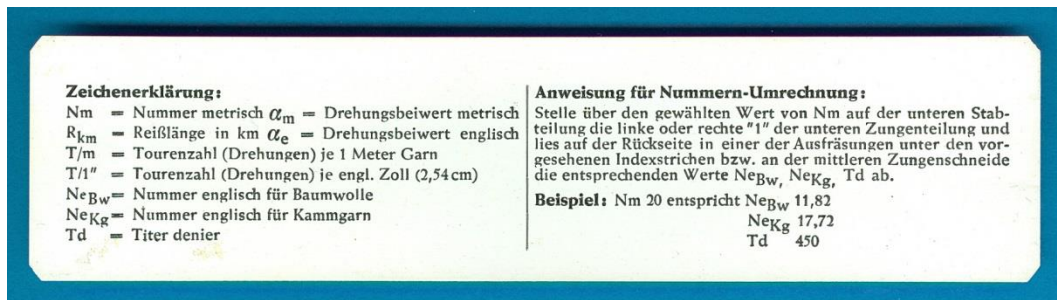


Hand stamped on the back of the stock and sandwiched between the names and logos of two other associated textile companies is the VOF company name and logo. Underneath the company names and logos are various conversion factors needed for textile calculations.



This specially commissioned slide rule also came with a stock sized thin plastic strip with a basic explanation in German of some textile units of measure and how to use them in textile calculations.

<sup>12</sup> Abbreviation for **A** (Albert) **N** (Nestler) **AG** (Aktiengesellschaft) **IT** – a plastic developed by Nestler for the injection moulding of slide rules.



This pocket textile slide rule never became a standard Nestler production model. But because of the legendary flexibility of their dividing machines and even with the hand stamping on the back, it was still economic for Nestler to make such a low-volume specially commissioned slide rule.

### LOGA - specialist textile circular slide rules

It is reputed that at one time any bank of repute had a slide rule drum made by the Swiss company: LOGA. Besides drums, the company also made linear and circular slide rules. Given their accuracy, especially the drums, they were popular choices for all financial based calculations or for solving complex technical problems [26]. Less well-known are the specialist textile circular slide rules LOGA started making in the 1950s.

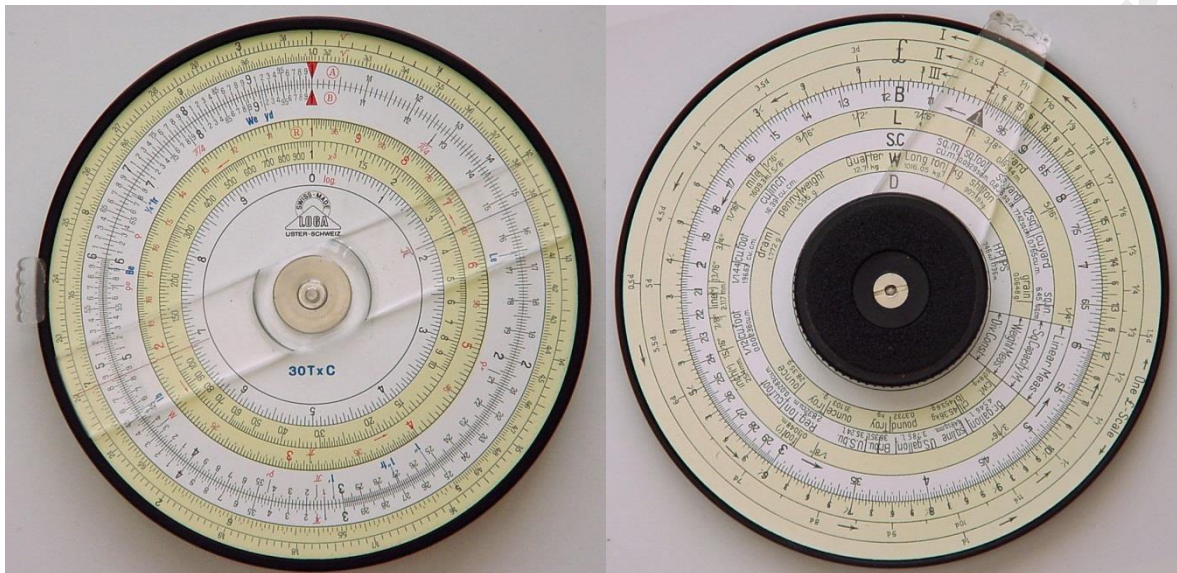
LOGA made two ranges of circular rules – the “30” and the “75” series. The series number, found on most models, reflects the scale lengths in cm rather than the respective diameters (12.5 and 29cm) of the two sizes. LOGA made both series’ from 1935 to 1975 [26]. But similar to Nestler, dating is tricky because LOGA never used serial numbers or a dating code. Ironically and again like Nestler, there is one reliable guide. LOGA did not start using transparent thermoplastic (more commonly known as Plexiglas) for their cursors, etc until after 1950.

LOGA rarely produced a specialist model solely for a particular trade or profession. But because of the use of Plexiglas, LOGA clearly decided post 1950 to introduce 4 new specialist textile types in their 30 series: the Rtx/Rtx(h), the sE Tx, the TxC, and the EtxC models<sup>13</sup>. Significantly they were all imperial versions. LOGA clearly believing that, even in the 1950s, the main market for such specialist models was for imperial-based textile calculations. Strictly speaking the latter 2 models, as shown by their model designations, are merchant or commercial textile hybrids. The scale layout on the front of the TxC is identical with the technical model 30T except for the 9 textile related gauge marks added to the B scale – e.g. **We** and **yd**. LOGA did not follow the trend of the other European makers. Instead they



<sup>13</sup> Legend for model designations: **R** = reciprocal scale, **tx** or **Tx** = textile type, **(h)** = with turning lever, **s** = school version, **E** = basic version and **C** = merchant type.

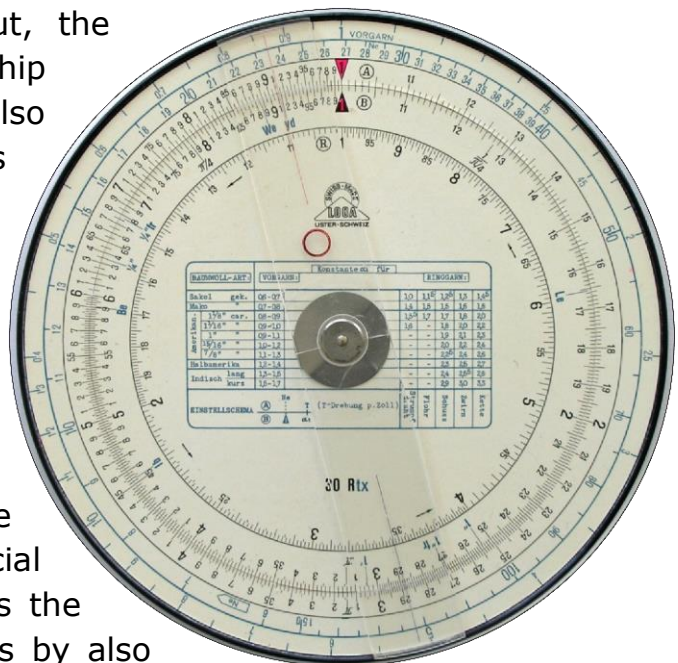
steadfastly resisted the temptation to add any gauge marks to the cursors of their circular slide rules. In contrast to the 30T-like front, the back of the TxC has a rich complement of specialist scales and gauge marks for the working in British pre-decimal pounds sterling and converting all possible metric weights and measures into their imperial equivalents. LOGA clearly positioned the TxC as the model of choice when, for example, knowing the price per spun yard/meter was equally important.



Ø 12.5cm duplex plastic on aluminium 30 TxC hybrid with Plexiglas cursors

Being a single-sided school version, the sE Tx model is a basic adaptation of the front of the 30 TxC. The scale layout is limited to just "A + B" but with the same 9 special textile gauge marks again added to the B scale.

Despite its restrained scale layout, the single-sided Rtx was LOGA's flagship model for the textile industry. It also has the most design similarities with competitor textile offerings. Like Nestler, LOGA went for a classical "R/CI" reciprocal scale when the F-C and Aristo choice of a BI scale works better for many typical textile calculations. Consistent with the other LOGA textile models the B scale on the Rtx has the same extra 9 special textile gauge marks. But it mirrors the textile designs of the other makers by also including two specialist scales for



Ø 12.5cm single-sided paper on aluminium 30 Rtx with Plexiglas cursor

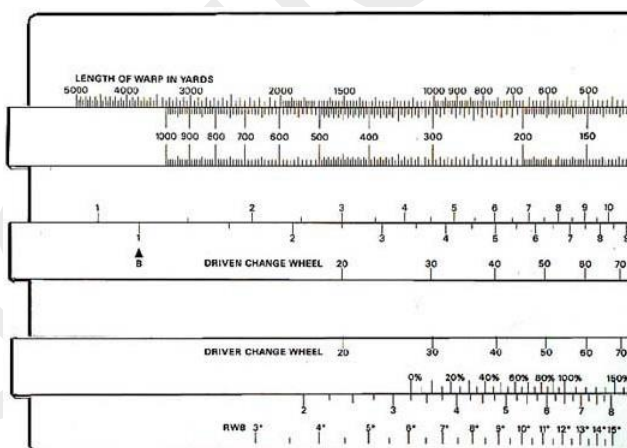
spinning/weaving twisted yarns. The outermost “VORGARN” or Ne scale runs from 0.4 to 13 and the inside neighbour scale runs from 6 to 150.

### Blundell - specially commissioned P 3969-77 textile slide rule

Blundell Rules Limited<sup>14</sup> (BRL) was set up in 1948. Based on early successes the company decided to make specially commissioned slide rules and slide charts a core part of their business. Such commissions were usually given a 4-digit “P” design number – a simple serial number for administration purposes [27]. The earliest recorded P number is 1000 but BRL/BH went on to make over 5000 special commissions.

Special commission P 3969-77 is special, even for Blundell. First as the year of production was not normally part of the administration, P models are often impossible to date. In this case the unusual “-77” suffix to the design registration number stands for the year of production: 1977.

The solid-frame impressively dimensioned (40 x 11 x 0.9cm) plastic poly-slide rule was made for long established and renowned UK loom maker: *George Hattersley & Son’s* - based in Keighley. The original factory closed down in 1984 but the company is still trading under the name: *Hattersley (Narrow Fabrics) Ltd*. The concept for the scales and the design probably came from Hattersley as it focuses on specific set-up aspects of warping and weaving machines. All the scales are textile specific and for imperial units of measure. However, with its chunky base and 3 machined slides and grooves it would have been an expensive slide rule to produce. As at the time Hattersley was still producing traditional looms, this specialist textile slide rule was most probably part of the delivery of an ordered a loom. Company contact details and a table of textile conversions were printed on the back. Very few are known to have survived. But dating from 1977 it has the honour of being the last specially designed textile slide rule although BH continued making P models, including many textile based conversion slide charts, until the New Millennium.



**Solid frame 40cm plastic poly-slide P 3969-77 with no cursor**

<sup>14</sup> In 1964 they became Blundell Harling Limited (BH) after purchasing W.H. Harling Ltd.

### Other post 1950 Textile conversion aids

The plethora of eclectic units of measure (both imperial and metric) used throughout the textile industry's long history prompted many post 1950 textile conversion aid slide charts. The advertisement potential of such handy calculators added to their popularity and many became promotional gifts. The makers are almost as various as the aids but examples also exist from most of the leading slide rule manufacturers. But as they fall outside the scope of "specialist textile slide rules" I have just included a selection of some of the more colourful and interesting examples<sup>15</sup> as a picture gallery – see *Appendix B*.

### Tights and textile slide rules go "hand in hand"

In many ways the evolution of tights typifies how the textile industry continued to evolve through both industrial revolutions. The earliest hosiery references date back to Greek and Roman times. Later silk or cotton socks were popular for centuries in ancient Japan and China. Stockings first appeared in Europe in the 12<sup>th</sup> century – also being worn by men as breeches. The knitted stocking first became a fashion item in the 16<sup>th</sup> century. Then in 1935 when the 2<sup>nd</sup> Industrial Revolution was well past its heyday, the American chemical company *Dupont* came up with a revolutionary new synthetic polymer: *Nylon*. So after WWII cheaper nylon rather than silk stockings were all the rage in the 1940s and 1950s. In the 1960s tights or pantyhose largely replaced stockings. Modern-day stockings and tights are still made on circular textile knitting machines [28].

So given the colourful longevity of the textile trade it is perhaps no surprise that even in the twilight years of slide rule production, some remarkable new textile specialist slide rules were developed. Despite its deceiving appearance, the F-C 57/74 remains a masterly lesson in post 1950 specialist slide rule design and efficient production techniques. It stayed in production until 1973 [8]. From the outset F-C were undoubtedly proud of the innovation it represented as the 57/74 was one of the show models the company proudly had on display at the 1956 edition of the world's leading trade fair for industrial technology: the "*Hannover Messe*" [29]. Only F-C, Aristo and LOGA marketed their new textile designs as standard production models. They are strikingly different but like the special commissions, all are rare - although collectors should especially look out for version 1 of the F-C 57/74. It has a truly unique scale layout and was only made for a brief two-year period.

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<sup>15</sup> Almost all are notoriously difficult to date with any degree of certainty.

The "punch card" of the Jacquard loom went on to inspire development of the electronic digital programmable computer. Ironically two and half centuries later the same basic loom technology also provided the inspiration for some of the last specialist analogue slide rules to come onto the market.

### Acknowledgements & bibliography

A special word of thanks must go to my late and great friend: Dieter von Jezierski (1927-2013). Without his willingness to answer my many, many questions I could not have uncovered the origins and significance of the design for the F-C 57/74. But I also had valuable help with other parts of the story from Jürgen Nestler, Nico Smalenburg and Peter Soole. They all provided insights and explanations that are not in any published reference work. I am also grateful to Karl Kleine as being possibly the only accessible source collectors now have for information on German registered designs.



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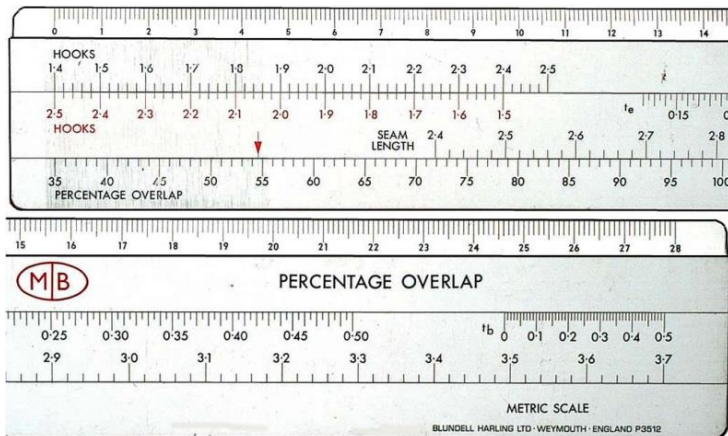
## Appendix A: A.W. FABER & A.W. FABER-CASTELL Slide Rules

All the listed models have at least a "System" accreditation for an external designer [8].

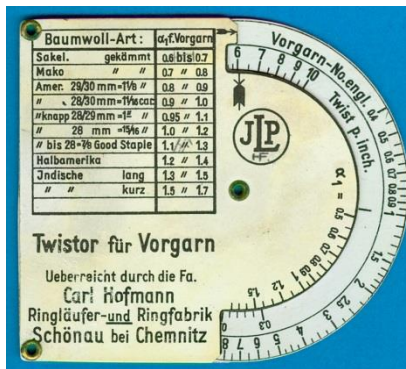
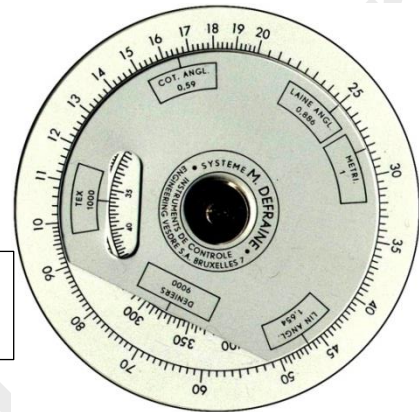
System #	Model No.	Years in Production
Baur	343	1915 - 1931
DYWIDAG/Kluge	2/62 57/62	1952 - 1956 1957 - 1967
Hohenner (Dr.)	345 346 349 1/45/345 1/45	1912 - 1935 1924 - 1928 1927 - 1935 1935 - 1939 1939 - 1940
Kotteck	1/33	1940 - 1941
Kramer	special commission 63/32 67/32	1937 1942 1951 - 1952
Martius-Hosemann	51/88	19??
Pickworth	374 377 384	1909 - 1920 1909 - 1915 1913 - 1915
Rensch	special commission	1969
Rohrberg	307 310 342 version 1 342 version 2 342N 3/42/342 3/42	1929 - 1933 1929 - 1933 1923 - 1929 1929 - 1934 1934 - 1935 1935 - 1939 1940 - 1942
Römer	2/77	1955
Sandera (Dr.)	1/44	1951 - 1955
<b>Schirdewan</b>	<b>57/74 version 1</b> <b>57/74 version 2</b>	<b>1956 - 1958</b> <b>1958 - 1973</b>
Schirmer	2/66 111/66 version 1 111/66 version 2 special commission	1951 - 1956 1956 - 1969 1969 - 1975 1961
Schumacher	366	1909 - 1929
Schweppe-Aebli	347	1914 - 1932
Titscher	67/56 67/56b	1956 - 1961 1962 - 1970

<b>System #</b>	<b>Model No.</b>	<b>Years in Production</b>
Torda	371 1/71/371 1/71	1929 - 1936 1935 - 1937 1939 - 1940
Vogel (Dr.)	67/34 version 1 67/34 version 2	1954 - 1961 1962 - 1975
Windisch	51/80 57/80 67/80	1934 - 1940 1956 1961
Winkel (Dr.)	348 1/48/348 1/48 111/48	1924 - 1936 1935 - 1939 1939 - 1961 1962 - 1975

## Appendix B: Selection of post 1950 textile related conversion aids



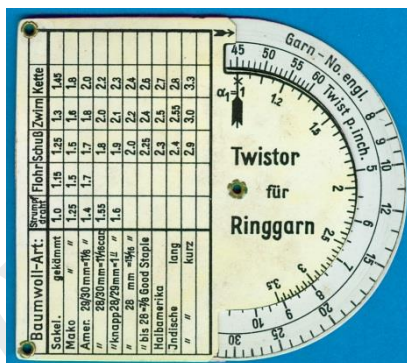
Vesdre Systeme  
M. Defraigne Ø 7.5cm [18]



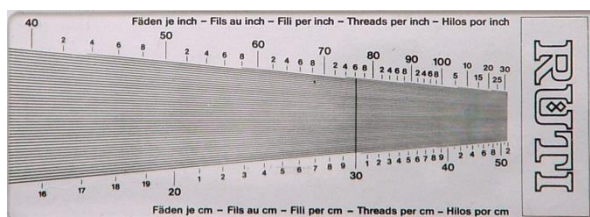
JLP Carl Hofmann  
8cm (Ø 7cm)

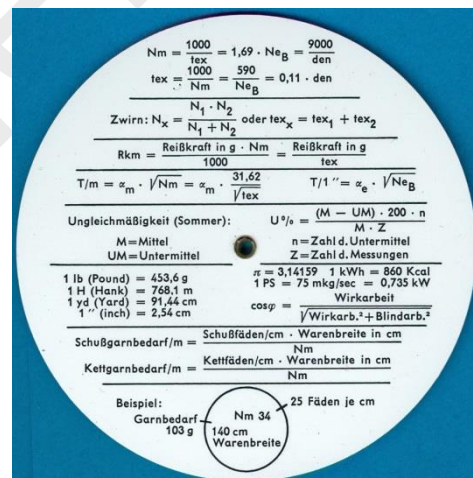
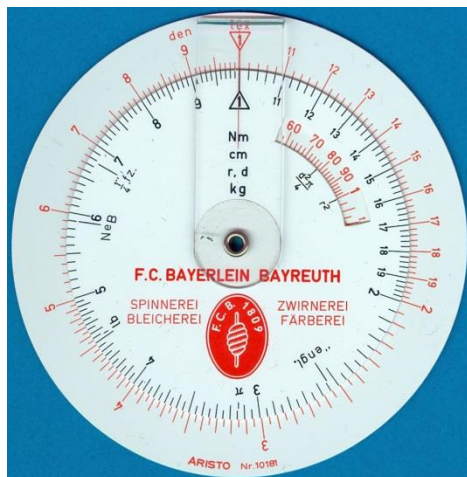
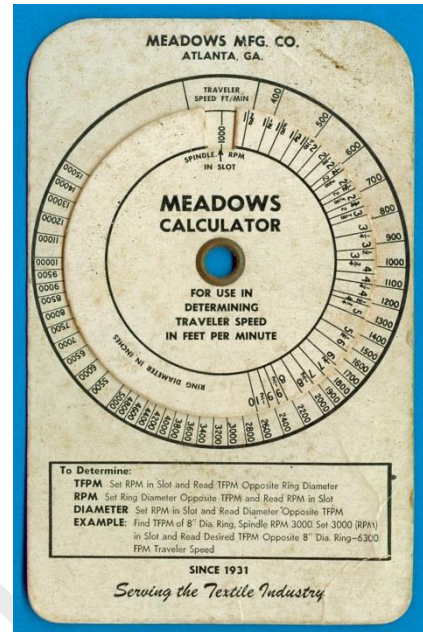


AnoxAl Ø 10cm

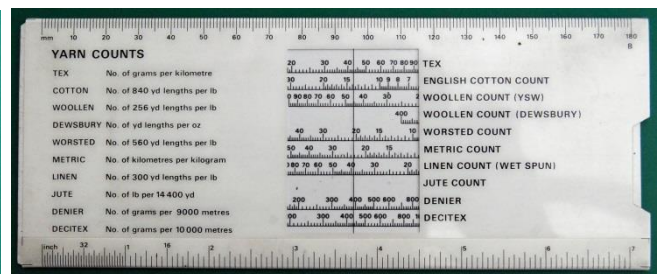


LOGA 12.5cm [26]





Aristo 10181 Ø 8cm



Front and back of two versions (for different companies)  
 Blundell Harling 19cm P 4241 [30]