PROCEEDINGS OF FIRST INTERNATIONAL MEETING OF SLIDE RULE COLLECTORS

November 10, 1995 Utrecht, The Netherlands

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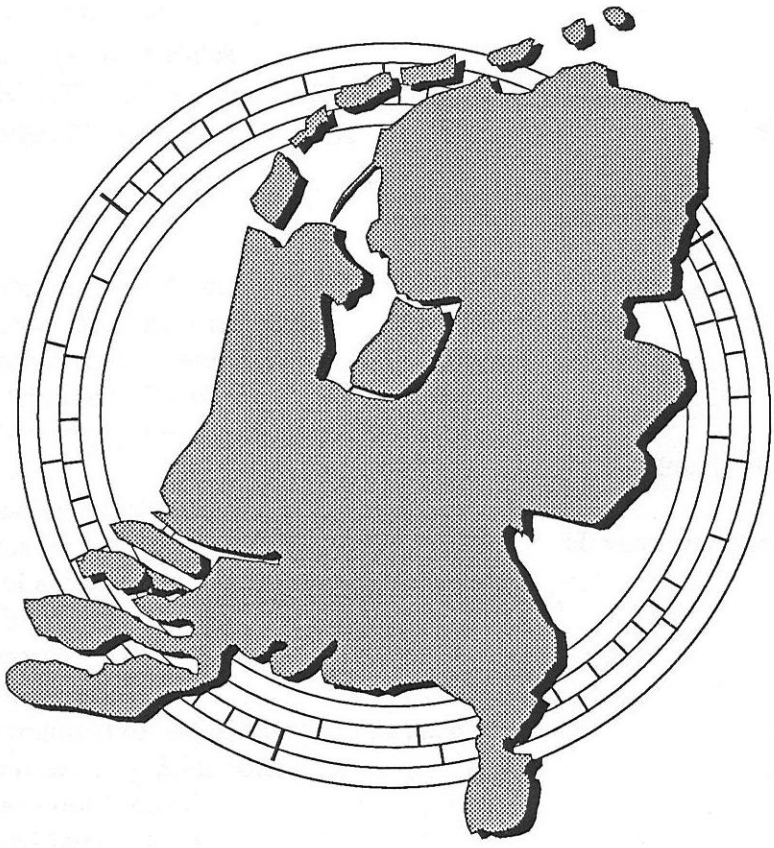

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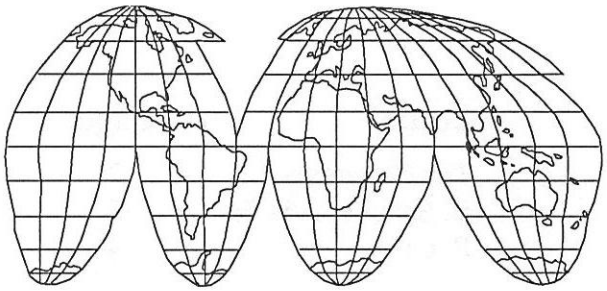


A WORD OF WELCOME

"Slide Rules on a Worldwide Scale"

News of our meeting reached the more than 400 known collectors in the World and the response has been truly international. Approximately forty participants are coming from eight different countries.
Now the meeting is only a few weeks away, we can look back and wonder *how did it all begin*? The Dutch Circle of Slide Rule Collectors is very active and the idea of an international meeting seemed so obvious nobody can now remember who first thought of it! Preparations only started after discussions between Bob Otnes (Oughtred Society) and two members of our Circle, IJzebrand Schuitema and Herman van Herwijnen in October 1994. The moral and financial support promised by the Oughtred Society convinced us the meeting should go ahead. Soon after, an organising committee was formed and the first plans drawn up.
This yellow book is specially prepared for the meeting but we hope it will also double as a valuable reference work. The Dutch Circle hopes, in bringing together so many fellow collectors from different parts of the world, to stimulate and encourage other countries to start similar organisations. We believe an expanding "network" of collectors can only lead to a broadening and deepening of the interest in slide rule collecting.
We obviously all share a common interest but the "how" and "for what reason" is likely to be as varied as the different types of scales found on slide rules! We hope this meeting gives you the chance to make some new collector friends, get a few questions answered and maybe even go home with some prized new additions for your collection.
We, and the numerous other people who have helped, have done as much as we can to make the meeting a success. Now it is up to you.
We hope your enthusiasm matches ours and the call will be unanimous to make such international meetings an annual event!

The Organising Committee:
Herman van Herwijnen — David Rance
Otto van Poelje — IJzebrand Schuitema

The Dutch "Circle of Slide Rule Collectors"

IJzebrand Schuitema / David Rance

"An affiliation of collectors interested in researching, preserving and promoting the collecting of slide rules"

The Dutch "Circle of Slide Rule Collectors" grew out of an informal group of ten enthusiastic collectors who met for the first time on Feb. 23, 1991. Since then it has flourished and can now boast over thirty members.
The foundations of the "Circle" were laid in 1988. Inspired by slide rule collecting being new and relatively unknown in Holland, IJzebrand Schuitema staged a modest exhibition in the "Collector's Museum" in Stadskanaal. This led to a national collector's magazine, "De Verzamelkrant", featuring a short article in their August 1988 edition. Later it became clear the combined publicity generated by the exhibition and magazine article was the catalyst for the start of our "Circle". Soon afterwards people interested in slide rules started contacting IJzebrand. One of them, Herman van Herwijnen, was already a collector for some years and shared the same passion for slide rules. Over the years that first contact has grown into a close bond to help supplement their respective collections, debate various aspects of slide-rule collecting and documentation. Later they agreed to channel their energies into their respective field of interest. Herman focusing on designing a coding and documentation system and IJzebrand on researching the history of the slide rule and publishing various slide rule related articles. Herman's work has led to a unique catalogue of over 2000 slide rules; all classified and meticulously described. The publications and exhibitions resulting from IJzebrand's research brought him in contact with yet more aspirant and established collectors. Some shared the same enthusiasm

and passion for collecting slide rules and soon the hard-core of today's flourishing "Circle" was established.
Instrumental in the growth of the "Circle" is undoubtedly IJzebrand's annual show stand at Europe's biggest Collector's Fair in the Utrecht's "Jaarbeurs". The first year he exhibited, the organisers allocated him 3 metres of display wall. The next and subsequent years, they decided to double his display allocation. Over the years his show stand has become a meeting point for new and established collectors and helped swell the membership of our "Circle". This year his stand will be bigger than ever, with a total surface area of 30 m^2 and obviously will have an extra "international" flavour.
Over the last four years the Dutch "Circle" has not only enjoyed an ever-expanding membership but thanks to the time and energy donated by the new members, its range of activities has increased and now includes:

- **Classification and Coding (Herman van Herwijnen)**
  The result of Herman's dedicated work is a unique reference book and catalogue. The "Blue Book", published for the first time in 1994, currently covers the more than 2000 slide rules unique to the collections of our members. The compliments Herman's classification and coding work has received prompted us to consider expanding its scope to cover items held in "foreign collections". Our proposal for a "worldwide" catalogue is an important item for discussion at the 1st International Meeting of Slide Rule Collectors (see later item)
- **Reference List of Instruction Manuals (Jaap Dekker)**
  Circle members tell Jaap the manuals they have and he publishes a consolidated reference list. From this list members can approach another member for a copy of a missing manual.
- **Reference List of Brochures (Otto van Poelje)**
  The manufacture's brochures and directories published in the past contain a wealth of information. For example, the range of models sold and year of production. Circle members tell Otto the directories they have and he publishes a consolidated reference list to help any "Circle" member researching a particular manufacturer or type of slide rule.
- **Library of Books (IJzebrand Schuitema)**
  IJzebrand probably has the largest library of books on slide rules but he also notes the books owned by other "Circle" members. Many of these books are now out of print but can be borrowed by members for special research projects.
- **Dating of Slide Rules (Günter Kugel and Guus Craenen)**
  Often it is not easy to date accurately or even ascertain the year(s) of production of a slide rule. Two "Circle" members are keen slide rule "historians". Günter is researching *Faber Castell* and Guus *Nestler*. The researchers often consult the "Blue Book" for information and check if a member has a particular slide rule that could help their research.
- **Exhibitions (David Rance, Guus Craenen, Martin Lubberts and IJzebrand Schuitema)**
  Locations can vary from village libraries to national museums but nearly always one or more visitors to an exhibition possesses a slide rule they are prepared to donate to a collection. When combined with an interview for a newspaper or local radio station, the extra exposure can lead to a series of useful contacts and new "Circle" members.
- **Lecturing (IJzebrand Schuitema)**
  Such events often result in a valuable exchange of information. Also it often brings IJzebrand in contact with previously unknown individuals who have access to valuable historical or technical data.
- **Publishing Articles (IJzebrand Schuitema)**
  IJzebrand's prolific pen often leads to valuable contacts. For example, when he followed Bob Otnes' lead and published an article in the *Historische Bürowelt* it prompted a letter from Rodger Shepherd. From this exchange came a close co-operation between the "Oughtred Society" and the "Circle".
  A later article on the history of slide rules in the *Sammler Journal* resulted in meeting Günter Kugel in Cologne. Having made the initial contact, Günter subsequently decided to become an active member of our "Circle" (see item on Dating of Slide Rules).
- **Patent Research (IJzebrand Schuitema)**
  Slide rule related patents can provide a wealth of information. IJzebrand has, over the years, assembled a collection of such patents and through them he is able to make interesting comparative studies or discover some of the "hidden secrets" of slide rule manufacture.
- **Liaison with Manufacturers (IJzebrand Schuitema)**
  Many of the old manufacturers have folded. But as IJzebrand has disappointedly found out, even those still trading have often lost their archives for the period covering slide rule production. However, not all his efforts were wasted. Approaches to *Faber Castell*, *Aristo* and *Blundell Harling* were successful. It turned out a fellow collector, Dieter von Jezierski, still had the complete archives of *Faber Castell*. Approaching *Aristo* in 1988 brought IJzebrand in contact with Hans Dennert and with it a marvellous source of information. Finally a letter to *Blundell Harling*, established contact with Peter Soole. Peter will soon publish "*The History of 50 Years Blundell Harling Ltd*" (watch for one of the 1996 editions Oughtred Society Journal). The contact with Peter provided an added bonus. His company agreed to produce for us a special limited edition slide rule to commemorate the 1st International Meeting of Slide Rule Collectors (see later item).
- **Contacts (IJzebrand Schuitema and David Rance)**
  Securing a vital scrap of research information or the chance to acquire a long sought-after slide rule are just two of the reasons for keeping track of all the known collectors. Several "Circle" members have managed to enhance their collections after approaching a known contact.

- **Condition Standards (Herman van Herwijnen)**
  Buying or swapping slide rules by post can be tricky. This is especially true when crossing geographical boundaries. Sometimes language subtleties can lead to misunderstandings. For example, in some cultures "good" has positive connotations. Whereas for someone else it may suggest "OK" but nothing special. As part of his classification and coding work, Herman was often confronted with this conundrum. Herman has compared the condition standards used by stamp and camera collectors and the Oughtred Society. He believes a universally accepted standard for conditions is urgently needed. During the 1st International Meeting of Slide Rule Collectors we hope to get support for Herman's proposal.
- **Newsletters and Meetings (IJzebrand Schuitema and Herman van Herwijnen)**
  All "Circle" members receive a newsletter, "*Mededelingen en Informatie voor Rekenlinialen Verzamelaars - MIR -*"", three times a year. IJzebrand provided most of the material for the first editions and Herman the editing work. However, now other "Circle" members regularly send in items. An annual meeting and trade fair compliments the newsletters.

Even as it has grown, the "Circle" has retained its unique origins. It still operates as an informal "affiliation" of collectors without any jealousy or rivalry. Tips and special "finds" are shared and members help one another when looking for "something special".
During the November meeting we hope to discover how many others collectors, or collector groups, have or plan similar activities as the Dutch "Circle". Such international co-operation, possibly published in the Oughtred Journal, was very much in our minds when we chose "*Slide Rules on a Worldwide Scale*" as the theme for this meeting.

The Oughtred Society

Bob Otnes

The Oughtred Society was founded in 1991 for the purposes of studying the history of slide rules, helping in their preservation, and educating the collectors, dealers and future scholars in these matters.

These goals are being accomplished in two ways:

First, the Journal acts as a conduit for information on slide rules. The desire has been to preserve information of all kinds: the rules themselves, interviews of people who were associated with their manufacture and recollections of people who made or sold them, books, ephemera. Along with this, articles have been written for the Journal that synthesize the information, and make it available in a fashion so that the readers can understand the progress over the years of the design and manufacture of the rules. Considerable work has been done, but there is much left to do. For example, here in America the histories of Dieztgen, Pickett, Post, Lawrence Engineering and a number of other makers have not been touched, let alone definitively dealt with.

Second, the Society Meetings have traditionally been closed to non-members, and have required attending members to exhibit some part of their collections. This emphasis on exhibition has been a tremendous aid to educating the members in the large variety of rules that are available. And, of course, it has permitted trade and sale amongst the members to the advantage of all.
One item that I personally hope to have the Society promote is the concept of numeracy (a word made up by the British). It is the mathematical equivalent of literacy.

A person who is numerate does not have to be a mathematical genius. Rather, he (or she) is someone who has the basic abilities in arithmetic and algebra that are necessary to live and flourish in the modern world. People who do not have a rudimentary mathematical sense are at a grave and almost tragic disadvantage in our present society. They may not be able to visualize their financial situation, and this lack of understanding can result in the inability to find work in this technical age, and then result suffering in their old age and retirement from lack of financial planning.

SLIDE RULES MANUFACTURED 1872-1978 BY DENNERT & PAPE AND ARISTO

Hans Dennert

A review on occasion of the 1st International meeting of Slide Rule Collectors on Nov. 10, 1995 at Utrecht, The Netherlands.

Dates of the company and their products

July 1, 1862 — Johann Christian Dennert (1829 - 1920) takes over a workshop for geodetic intruments from Carl Plath (1825 - 1910) who starts a new business for nautical instruments.

Oct. 1, 1863 — Martin Pape (1834 - 1884) becomes a partner. The company is called:
Dennert & Pape
Workshop for Mathematical Instruments

1869 — The firm moves to a newly built workshop in nearby Altona, being a Prussian city since 1866 and therefore promising better business for the future.

1872 — As suggested by A. Goering (1841 - 1906) the first slide rules of boxwood are produced.
The first price list offers: Theodolites, Levels, Levelling Rods, Planimeters, Drawing Instruments and Scales with any graduation, made of ivory, brass, nickel silver or silver plated brass.
The company's name changes to:
Dennert & Pape
Mechanical-Mathematical Institute

1879 — Slide rules made of brass are offered additionally.

1882 — Introduction of a boxwood slide rule with 50 cm scale length and special models for surveying with graduations in 360° or 400°.

July 1, 1884 — After the death of Martin Pape J.C. Dennert becomes sole owner.

Feb. 16, 1886 — DRP 34583 is granted to Dennert & Pape for wooden scales with celluloid veneers.

1888 — Slide rules of mahogany with celluloid verneer replace those of boxwood.

1889 — Pantographs and hydrometric instruments become included in the production.

1890 — The cursor with metal framed glass replaces the all metal wing cursor.

Oct. 6, 1891 — With the US patent 460,940 William Cox reintroduces the double face slide rule which is produced by Dennert & Pape for Keuffel & Esser, New York, until their own production starts.

1892 — Cursor with $\pi/4$ index lines

1900 — To keep pace with the increasing demand a new building is errected neighboring the existing factory.

Sept. 28, 1901 — DRP 126 499 is granted to Dennert & Pape for improvements of the body of the slide rule (flat spring for self-adjustment of the slide moving).

Feb. 25, 1902 — US Patent 694 452 is granted to Dennert & Pape for a slide rule with a celluloid bottom plate working like a flat spring.

1902 — Max Rietz (1872 - 1956) proposes the scale arrangement which bears his name.

Jan. 21, 1903 — DRGM 192052 is granted to Dennert & Pape for adjustment screws to regulate the slide movement.

1905 — The first illustrated catalogue shows slide rules according to the above three patents, also slide rules for special purposes other than surveying.

Dec. 12, 1907 — Professor Yakota (German transcription: Jakota) receives the British Patent 18 218 for a slide rule with six log log scales (1.0115 to 10^6 and .9874 to 10^{-6}). Dennert & Pape produces this slide rule until 1938.

Until 1914 — The slide rule is increasingly accepted for engineering and many special models for different purposes are manufactured.

1924 — The trade mark DUPA is introduced for slide rules and scales.

1928 — Dennert & Pape commence to manufacture co-ordinatographs (precision drafting machines for map making).

1934 — Based on the "System Rietz" in the Institute for Applied Mathematics (Prof. Dr. Walther), Technical University Darmstadt, a new scale arrangement including log log scales is developed.
This slide rule called "System Darmstadt" becomes another basic model like "System Rietz".

1936 — Dennert & Pape cease production of wooden slide rules and scales with celluloid veneers. From now on all slide rules and drafting equipment is manufactured from dimensionally stable Plastic materials (Trade marks Astralon and Plexiglas).

1936 — The trade mark ARISTO is introduced for all products of Dennert & Pape made from the new plastics.

1937 — The Greater Hamburg Statute: Altona becomes a district of Hamburg. The company's address changes from Dennert & Pape, Altona/Elbe to Dennert & Pape, Hamburg-Altona.

1937 — C. Plath's Air Navigation Computer "Dreieckrechner, System Knemeyer" is produced by Dennert & Pape using the new plastic materials.

1943 — As a result of the war, a part of the production moves to Bludenz/Vorarlberg in Austria.

1945 - 1948 — During the war the production of slide rules had almost to be discontinued. In the first years after the war raw materials were not available in the required qualities and quantities.

1949 — Double face slide rules are introduced: ARISTO-Scholar for schools and ARISTO-Studio for engineering

July 1, 1951 — The new factory at Geretsried begins production of ARISTO slide rules for schools.

1954 — The air navigation computer DR 3 "System Knemeyer" has been improved to ARISTO-Aviat.

1954 — Industrial demand of precision drawings requires to adapt the co-ordinatagraphs, e.g. for integrated circuits.

1956 — ARISTO is used as trade mark for all products of Dennert & Pape.
Terefore the trade mark becomes part of the company's name:
Dennert & Pape ARISTO-Werke.

1959 — The first punched tape controlled ARISTO-Co-ordinatograph.

April 1, 1960 — The new works at Hamburg-Stellingen commence production.

July 1, 1962 — 100 years Dennert & Pape.

1962 — The new slide rule for elementary schools: ARISTO-Junior.

1966 — The trade mark moves to the first place in the company's name:
ARISTO-Werke Dennert & Pape.

1967 — ARISTO-StudioLog, the improved ARISTO-Studio with 8 log log scales.

1970 — The ARISTO-Co-ordinatograph with computer control leads to CAD.

1972 — 100 years slide rules production.

Dec. 31, 1978 — Liquidation of the company and end of the slide rule production.

Jan. 1, 1979 — ARISTO Craphic Systeme continues the CAD business.

July 1, 1987 — 125th anniversary.

Trade marks

Until 1920 the abbreviation D & P was sometimes used in catalogues and instruction manuals. D & P is also found under the slide of the rules, but very rarely.
1920 - 1936 DUPA was used as the trade mark for the products of Dennert & Pape. Together with the change to plastic materialsfor slide rules the trade mark ARISTO was introduced in 1936.
Until 1952 ARISTO was used for slide rules and drafting equipment only, since 1952 for all products of the company.
After 1950 ARISTO became so prodominant that the company's name was almost unknown to the majority of the users.
During their time the trade mark was used in different styles:

1.
1920 - 1930

2.
1924 - 1936

DUPA

3.
1926 - 1936

DUPA

4.
1936 - 1978

ARISTO

5.
1936 - 1939
for slide rules
and scales

6.
1939 - 1948
for slide rules
and scales

7.
1936 - 1952
for all other
instruments*)

8.
1939 - 1952

9.
1942 - 1952

ARISTO

10.
1952 - 1978

ARISTO

11.
1952 - 1978

*) Until 1939 DUPA continued to be used for surveying instruments and planimeters.

Determination of D & P and ARISTO slide rules

The year of producton of DENNERT & PAPE slide rules can be determined for certain periods approximately only. The following dates will help in many cases when the slide rule is marked with imprints as follows:

Year	Imprint
Before 1902	DENNERT & PAPE ALTONA sometimes in addition: PATENT The imprint is in very smaII letters under the slide.
1902 - 1924	DENNERT & PAPE, ALTONA on the front of the slide rule D.R.P.N°126499 under the slide separately under the slide two blind figures, e.g. 12 meaning production in the year 1912.
1924 - 1930	D.R.P.N°-126499 DENNERT & PAPE Altona bei Hamburg DUPA N° ..... under the slide and two blind figures as above.
1930 - 1936	DENNERT & PAPE ALTONA under the slide.

All ARISTO slide rules are marked with ARISTO and the catalogue number.

1936 - 1939	DENNERT & PAPE ALTONA or DENNERT & PAPE HAMBURG-ALTONA under the slide or on the back of the slide rule. Trade mark ARISTO as per 5 *) on the slide. Sometimes trade mark D & P as per 8 *) on the back of the rule. In this time most slide rules still have scales with longitudinal lines like the wooden models.
1939 - 1948	DENNERT & PAPE HAMBURG-ALTONA or DENNERT & PAPE HAMBURG under the slide or on the back of the slide rule. Trade mark ARISTO as per 6 *) on the slide. Sometimes D & P as above. In this time some of the slide rules still have scales with longitudinal lines like the wooden models.
1948 - 1978	Trade mark ARISTO as per 4 *) on the slide. Name of the slide rule printed on the rule or under the slide, e.g. ARISTO-Studio. Blind imprinted code on the back or the vertical edge of the slide rule.

*) Respective no. of the list of trade marks.

The first letter or figure stands for the place of the production:

Letter	Figure	Production in
H	2	Hamburg
G	3	Geretsried
W	4	Wörgl

The following two figures or letters stand for the year of production:

A	R	I	S	T	O	F	L	E	X
0	1	2	3	4	5	6	7	8	9

The last one or two figures are the lot no. of the respective slide rule of that year.
E.g. GF029 means: Geretsried 1965 Lot 29 or
2LS17 means: Hamburg 1973 Lot 17

Until 1960 the code stands for the year of production and the lot no. only, e.g. 523 means: 1952 Lot 3.

Scales of slide rules, their arrangements and their symbols

The scale arrangement of universal slide rules begins with what later will be called "System Mannheim" or "Mannheim Type". This slide rule was created in 1850 by the French artillery officer Amédée Mannheim (1831 - 1906). His reintroduction of the cursor (called also indicator) allowed the scale arrangement of the A/B and C/D scale combination on the face of the slide rule and the S, L and T scales on the back of the slide, all to be used in conjunction with each other. Without a cursor, only movable scales bordering each other were usable. Mannheim's revival of the cursor improved the flexibility and speed of slide rule calculations considerably. All universal slide rules of later years were based on Mannheim's scale arrangement.

In 1872 Dennert & Pape's first slide rule used the same order of scales with a small change on the back of the slide: Mannheim related both S and T to A. D&P No. I relates S to A as before, but T to D. D&P continues this slide rule No. I in the celluloid version, later from 1920 to 1936 it is listed as No. 2/28. From 1936 to 1940 this model ends production with an inverted scale additionally as ARISTO No. 92, made of Astralon with frameless Plexiglas cursor.

ARISTO

In 1902 Max Rietz (1872 - 1956) added to Mannheim's arrangement the cube scale F. Therefore D&P called this rule "Cube Slide Rule System Rietz" and offered it as No.8 with elastic spring body (DRP 126 499) and as No.9 with additional adjustment screws. The scales were marked with letters and arranged on the front of the rule F, A/B, C/D, E (mantissa scale) and S (related to A), T (related to D) on the back of the slide.

After 1920 the slide rules were listed as 8/28 and 9/28 and called "System Rietz" only. Around 1925 both models get the scales A/B and C/D extended for 3-index-cursors and the trigonometric scales are changed to S, S+T (for small angles), T, all related to D. On the 9/28 the reciprocal scale CI is added.

In 1936 the production changes to Astralon and the names to ARISTO-Rietz No.98 and No.99. Both models are manufactured with longitudinal lines on the scales. The production of No.98 ends in 1940. No.99 is the only slide rule which was manufactured during all war years, finally as No.99k in a simplified version until 1946.

After 1948 the longitudinal lines were discontinued an all ARISTO slide rules, i.e. also on the No.99. Tlie scales become marked K, A/B, CI, C/D, L and S, ST, T. Since 1953 the ARISTO-Rietz is available with trigometric scales graduated to 400°. In 1973 the BI scale is placed between B and CI on the slide.

"System Darmstadt" added 3 exponential scales e^x (log log scales) and the Pythagoras scale $\sqrt{1 - x^2}$ to the arrangement of Rietz. And a new marking of the scales was introduced: mathematical symbols. In 1939 the first ARISTO-Darmstadt was manufactured with longitudinal lines and the order of scales x^3, x^2/x^2, $1/x$, x/x, $\sqrt{1 - x^2}$, $\measuredangle$ sin, $\measuredangle$ tg on the face of the rule, $e^{0.01x}$, $e^{0.1x}$, e^x on the back of the slide and the mantissa scale on the edge of the rule. In 1950 the scale $1/x^2$ joined the rule and the mantissa scale was moved to the back of the slide.

Later the letter symbols of the scales are introduced on the Darmstadt like on the Rietz at the left end of the scales. The mathematical symbols move to the right end of the scales. Since that time the double marking of the scales has been used consistantly on ARISTO slide rules *). From the beginning the ARISTO-Studio and the ARISTO-Scholer had all scales maked in this manner.

The scales of the ARISTO-Darmstadt (K, A/B, BI, CI, C/D, P, S, T on the front of the rule, L, LL1, LL2, LL3 on the back of the slide) remained unchanged until 1973, when the scale ST was combined with the other trigonometric scales.

*) For a complete list of the symbols on ARISTO Slide Rules see Annex II

The ARISTO-Studio was the development of the "System Darmstadt" to a double face slide rule with all its advantages. The scales were placed with T, ST, DF/CF, CIF, CI, C/D, P, S on the trigonometric side and LL01, LL02, LL03, A/B, L, K, C/LL3, LL2, LL1 on the log log side. In 1953 the log log side was improved by adding the scale D at its usual position. In 1969 the T scale was replaced by the scales T1 and T2. In the same year the ARISTO-Studio appeared with trigonometric scales for 400°.

The ARISTO school slide rules were created to provide the students with a less expensive instrument to satisfy their needs and the teachers with a consistent line of rules for different applications. Like the ARISTO-Studio the ARISTO-Scholar 902 was offered at the first time in 1949. All scales were combined on side of a double face rule L, A/B, CI, C/D, S, T. In 1951 the model 902 was replaced by the ARISTO-Scholar 903. The scale K was added to the order L, K, A/B, Cl, C/D, S, T. In 1954 the first variation of the Scholar line appeared, the ARISTO Scholar LL with the scales S, LL2, LL3 on the back of the slide.

In 1954 the profile of the Scholar rules and their cursors was improved. Therefore their catalogue numbers were prefixed by 0, e.g. 0903 LL. In 1958 followed the next variation, the ARISTO-Scholar VS and the ARISTO-Scholar VS-2 with folded scales on the back. The scale arrangement of all rules of the Scholar line was changed by ihcluding in1958 the ST scale and in 1974 the BI scale. Also in 1974 the LL1 scale was added on the back of the slide of the ARISTO-Scholar LL.

The final steps to a double face Scholar were done in 1967 by the ARISTO-BiScholar 0906 and in 1972 by the ARISTO-BiScholar LL. The ARISTO-TriLog 0908, another double face slide rule for schools, has been produced since 1960. The ARISTO-Junior 0901 for elementary schools was created in 1962.

Annex I gives a survey of the most important ARISTO slide rules regarding the years of their production and the quantities manufactured during this time.
The scales arrangements of the above mentioned school slide rules as well as of all other ARISTO slide rules are shown in Annex II, III and IV as they were manufactured in 1976.

The catalogue numbers

ARISTO

1872-1910

In catalogues and price lists the slide rules and the cursors were described only, they had no catalogue numbers.

1910-1920

The different slide rules were numbered, starting with No.1. The first catalog of this kind listed 32 numbers. But some numbers were used for more than one slide rule, e.g. the System Rietz No. 8 and No. 9 were listed under these Nos. 15, 28 and 53 cm long (i.e. scale length 12.5, 25 and 50 cm).

1920-1926

The numbers as above are kept, but prefixed by a letter indicating the type of slide rule body. Slide rules using the same number for different lengths get a letter behind the no., e.g. B8c for the 15 cm Rietz.

1926-1932

The prefix letter is used for adjustment screws (D) and school models (S) only, but behind the catalogue no. follows the length of the slide rule, e.g. 9.15 or 9/15 for the 15 cm Rietz and D 9.15 or D 9/15 for the same rule with adjustment screws.

1932-1936

The style like 9/15 is used without any additional letter. In 1935 some of the slide rules get numbers with a third figure instead of the length, e.g. the Electro No. 143 instead of No. 14/28.

1936-1978

The ARISTO slide rules introduce a new system which modifies the first catalogue numbers of 1910 again. These old basic numbers are kept and supplemented by the prefix 8, 9 and 10 for the scale length of 12.5, 25 and 50 cm, resp., e.g. for the Rietz the nos. 89, 99 and 109. All ARISTO slide rules have been marked with catalogue no. in connection with the trade mark ARISTO, e.g. ARISTO Nr.99.
When the bodies and the cursors of the ARISTO school slide rules and the ARISTO double face slide rules were changed in their dimensions, their catalogue nos. were prefixed with the figure 0, e.g. 0903 or 0968 etc..

Cursors

Since 1898 different cursors were listed, but without specific catalogue numbers. Since the catalogue of 1924 the cursors including magnifying models have been specified by catalogue numbers. The system changed several times. Its description would require a specific explanation. ARISTO spare cursors used the catalogue number of the respective slide rule prefixed by the letter L.

Custom made products

Until 1940 no identifying numbers were used for products made to specific orders.

1940 to 1958 a five figure number connected with the trade mark ARISTO marked instruments made to customer's order. For slide rules and other calculating devices the number began with 10, e.g. ARISTO No. 10.117.

1958 to 1978 this system was more diversified. A successive number of four digits was prefixed by the same characteristic figure as used for all ARISTO products, e.g. ARISTO No. 8.0123 for a custom made slide rule of 12.5 cm scale length.

Important ARISTO Slide Rules
Production years and quantities

Cat. No.	Years of production	Total Production in 1000 pieces
903 / 0903	1951 - 1975	1700
903 LL / 0903 LL	1954 - 1975	1300
0903 VS	1960 - 1972	540
0903 VS-2	1960 - 1975	
0908	1960 - 1975	430
0901	1962 - 1975	920
0906	1967 - 1975	360
0906 LL	1972 - 1975	
School slide rules	1951 - 1975	5250
99	1948 - 1975	240
967	1948 - 1975	235
968 / 0968	1949 - 1975	1300
25 cm slide rules	1948 - 1975	1775
89	1948 - 1975	2300
867	1950 - 1975	400
868	1954 - 1975	650
12.5 cm slide rules	1948 - 1975	3350

The production of ARISTO school slide rules reached at the turn 1950's/1960's an average of 100 000 rules p.a. and increased to more than 400 000 rules p.a. around 1970 to 1972.

25 cm ARISTO slide rules were sold between 1960 and 1975 at an average of more then 100 000 pieces p.a. The overwhelming position of the ARISTO-Studio in this group of slide rules lead to sales of more then 75 000 pieces p.a. at the end of the 1960's and beginning 1970's.

Between 1960 and 1975 more then 150 000 ARISTO pocket slide rules have been sold annually, more than 50 % of the ARISTO-Rietz 89 as advertising gifts.

ANNEX IIa

ARISTO Slide Rule Selector

Application		School and Vocational									
		High Schools, Primary and Trade Schools			Secondary and Grammar Schools, Trade, Vocational and Technical Schools				Grammar Schools, Technical Colleges		Busin Colle
System		Junior	JuniorTrig		Scholar	Scholar LL	Scholar VS 2	BiScholar	BiScholar LL	TriLog	Commerce Junior
5 in. Slide Rule											
10 in. Slide Rule		0901	0902		0903	0903 LL	0903 VS-2	0906	0906 LL	0908	0907
20 in. Slide Rule											
Demonstration Slide Rule		301	302		303	303 LL	303 VS	306	306 LL	308	307
Projection Slide Rule		101	102			103 LL	103 VS	106	106 LL	108	107
Slide Projection Model		201			203			206	-	208	
Scales on Front Face	Upper Body Panel	DF	DF		L K A	L K A	L K A	K A	L K A	T1 T2 A	A DF
	Slide	CF CIF CI C	CF CIF CI C		B BI CI C	B BI CI C	B BI CI C	B BI S C	B BI S C	B BI CI C	CF CIF CI C
	Lower Body Panel	D A K	D A K		D S ST T	D S ST T	D S ST T	D L P	D LL 3 LL 2 LL 1	D P S ST	D L LL1 LL2
Scales on Reverse Face	Upper Body Panel		ST T1 T2				DF	ST T1 T2 DF	ST T 1 T 2 DF	LL1 LL2 LL3 DF	
	Slide	CI C			S LL2 LL3		CF C	CF CIF CI C	CF CIF CI C	CF CIF CI C	
	Lower Body Panel	D P S					D	D DI S	D P S	D L K	

The Scales of Technical Slide Rules

Scale	Mathematical Symbol	Scale description
A	x^2	Scale of squares on rule body
B	x^2	Scale of squares on slide
BI	$\frac{1}{x^2}$	Reciprocal scale of squares B on slide
C	x	Fundamental scale on slide
CF	πx	Folded scale on slide
Ch	$\sphericalangle$ cosh	Scale of hyperbolic cosines, range 0 to 3
CI	$\frac{1}{x}$	Reciprocal scale of C on slide
CIF	$\frac{1}{\pi x}$	Reciprocal scale of CF on slide
D	x	Fundamental scale on rule body
DF	πx	Folded scale on body
DI	$\frac{1}{x}$	Reciprocal scale of D on body
H1	$\sqrt{1 + x^2}$	Hyperbolic scale, range 1.005 to 1.5
H2	$\sqrt{1 + x^2}$	Hyperbolic scale, range 1.4 to 10
K	x^3	Scale of cubes
L	lg x	Mantissa scale
LL0	$e^{0.001x}$	LogLog scale, range 1.001 to 1.011
LL1	$e^{0.01x}$	LogLog scale, range 1.01 to 1.11
LL2	$e^{0.1x}$	LogLog scale, range 1.1 to 3.0
LL3	e^{x}	LogLog scale, range 2.5 to 10^5
LL00	$e^{-0.001x}$	LogLog scale, range 0.999 to 0.989
LL01	$e^{-0.01x}$	LogLog scale, range 0.99 to 0.90
LL02	$e^{-0.1x}$	LogLog scale, range 0.91 to 0.35
LL03	e^{-x}	LogLog scale, range 0.4 to 10^{-5}
P, P1	$\sqrt{1 - x^2}$	Pythagoras scale, range 0 to 0.995
P2	$\sqrt{1 - x^2}$	Pythagoras scale, range 0.995 to 0.99995
R1	$\sqrt{x}$	Scale of roots, range 1 to 3.2
R2	$\sqrt{x}$	Scale of roots, range 3 to 10
S	$\sphericalangle$ sin $\sphericalangle$ cos	Scale of sines, 5.5° to 90° Scale of cosines, 0° to 84.5°
Sh 1	$\sphericalangle$ sinh	Scale of hyperbolic sines, range 0.1 to 0.9
Sh 2	$\sphericalangle$ sinh	Scale of hyperbolic sines, range 0.85 to 3.0
ST	$\sphericalangle$ arc	Scale of angles, 0.55° to 6°, 84° to 89.45°

Technical and Scientific

Civil, Mechanical, Chemical Engineering · Architecture Craftsmen				Pure and Applied Science · Mathematics Physics · Chemistry · Electrotechnics Research						Mathematics · Physics Telecommunications	
Puck	Rietz	Rietz 400g	MultiTrig	Darmstadt	Darmstadt 400g	Studio	Studio 400g	StudioLog	MultiLog		HyperLog
810	89	89/400g	829	867	867/400g	868		869	870		
	99	99/400g	0929	967		0968	0968/400g	0969	0970		0972
	109	109/400g		1067		01068			01070		
						368			370		
						168		169	170		

cm A	cm 99 89 109 K K A A	K A	L K DF	cm K A	cm K A	ST T1 T2 DF	ST T1 T2 DF	ST T1 T2 DF	LL01 LL02 LL03 DF		LL00 LL01 LL02 LL03 DF
B CI C	B B BI CI CI C C	B CI C	CF CIF CI C	B BI CI C	B BI CI C	CF CIF CI C	CF CIF CI C	CF CIF CI S C	CF CIF L CI C		CF CIF L CI C
D K	D D L L	D L	D R1 R2	D P S ST (967) T	D P S T	D P S	D P S	D DI P S	D LL3 LL2 LL1		D LL3 LL2 LL1 LL0

			T1 T2 S A			LL01 LL02 LL03 A	LL01 LL02 LL03 A	LL00 LL01 LL02 LL03 A	LL00 K A		H2 Sh2 Th K A
S L T	S ST T	S ST T	B T ST S C	L LL1 LL2 LL3	L LL1 LL2 LL3	B L K C	B L K C	B BI K L CI C	B T ST S C		B T ST S P C
			D DI P1 P2			D LL3 LL2 LL1	D LL3 LL2 LL1	D LL3 LL2 LL1 LL0	D DI LL0		D DI Ch Sh1 H1

Scale	Mathematical Symbol	Scale description
T	∢ tan	Scale of tangents, 5.5° to 84.5° Scale of cotangents, 5.5° to 84.5°
T1	∢ tan ∢ cot	Scale of tangents, 5.5° to 45° Scale of cotangents, 45° to 84.5°
T2	∢ tan ∢ cot	Scale of tangents, 45° to 84.5° Scale of cotangents, 5.5° to 45°
Th	∢ tanh	Scale of hyperbolic tangents, range 0.1 to 3.0

The Scales of Slide Rules for Businessmen

Scale	Scale description
%	Percentage calculations
KZ	Fundamental scale on rule body, folded at 360
M	Scale for US/British measures and weights
P or P1	Reciprocal scale of T1
P2	Reciprocal scale of T2
T1	Fundamental scale on the slide
T2	Fundamental scale on the slide, folded at 360
Z	Fundamental scale on the rule body
ZZ1, ZZ2, ZZ3	Scales for calculation of factors for compound interest
£ s/d	Scale for calculations in English currency

Uses of the Scales of Technical Slide Rules

Scale	Application
C, D	Multiplication, division, proportion
CF, DF	Multilplication without slide resetting, division, tabulation, proportions, simplified multiplication and division by π
A, B	Squares, square roots, multiplication, division
R1, R2	Squares, square roots with greater accuracy
BI, CI, CIF, DI	Simplified multiplication, division, fractions, proportions and tabulation
K	Cubes, cube roots
L	Logarithms to base 10
S, ST, T, T1, T2	Trigonometrical functions, solving right triangles, complex numbers
P, P1, P2	Conversion sin ←→ cos. More accurate values of sines of large angles, cosines of small angles, and square roots
Sh1, Sh2, Ch, Th	Hyperbolic functions, complex numbers, special applications in telecommunications engineering
LL0-LL3 LL00-LL03	Selected powers, roots and logarithms
H1, H2	Conversion sinh − cosh, more accurate values of hyperbolic cosine functions, coordinates of the unit hyperbola, $y = \sqrt{1 + x^2}$ and $x = \sqrt{y^2 - 1}$

ANNEX III

ARISTO Slide Rule Selector

Application	Commerce			Special Slide Rules					
	Retail & Wholesale · Trade Industry · Import · Export Insurance · Banking			Electrical Technology	Telecommunication Engineering	Textiles	Civil Engineering		Surveying Tacheometry
System	Commerce I	Commerce II	Piccolo	Elektro	Attenuation	Textile	Ferro concrete	Ferro concrete	Surveyor
5 in. Slide Rule	845	865	816	815	852				
10 in. Slide Rule		965		915		930	939	940	0958/360° 0958/400g
20 in. Slide Rule	1055								
Demonstration Slide Rule									
Projection Slide Rule									
Slide Projection Model									

Scales on Front Face	Upper Body Panel	cm 845 1055 % % KZ KZ	cm %	cm DF	cm cm 815 915 K K A A	cm U1/U2 A	Ne_1 L K A	M (A)	F_e m_e M_e (A)	360° 400g ST T1 T T2 ST DF DF
	Slide	T2 T2 P P2 P1 T1 T1	CF CIF CI C	CF CI C	B BI CI CI CI C C	B Neper C	B BI α_{1_e} C	b (B) σ_b k r (C)	$b_{(B)}$ k_d $m_{e(B)}$ max_d d_{zul} a f_1 s_e k CI σ_b k, b (C)	CF CF CIF CIF CI CI C C
	Lower Body Panel	Z Z M M £ s/d	D M LL1 LL2	D A	D D D/M LL3 V LL2 Inch D/M V	D db	D T/1" Ne_2 Ne_3	h (D)	k_e (D) h k	D D P P S S
Scales on Reverse Face	Upper Body Panel						Ne_W Ne_K Ne_L DF	σ_e		1 − cos 1 − cos A
	Slide	£ s/d			S ST L T	mV V	CF N_2 CI C	Bar steel table Checking scale	Bar steel table Diagram representation	B 1/tan $\frac{\alpha}{2}$ sin · cos sin · cos, $\cos^2$
	Lower Body Panel						D N_1 Ne_B Td	z, x		D L K

ARISTO Disk Calculator Selector

Application	Business men		Car Driver	Technician	Chemist	Graphic arts	Air navigation			Sea navigation
System	Percentage Computer	Commerce III	Motorist's Computer	Calculator	Chemie	Reprography Calculator	Aviat	Aviat	AviatJet	Naviat
Diameter 5 cm			670							
Diameter 8 cm	0602									
Diameter 10.4 cm	604, 605						610	613		
Diameter 12.2 cm	603	623		622		609				
Diameter 14.5 cm							615	617	647	661
Diameter 22 cm	606				630					
Scale length	602: 19 cm 603: 31,4 cm 604: 25,2 cm 605: 25,2 cm 606: 58,5 cm	26,7 cm	12,3 cm	26,7 cm	63 cm	32,7 cm	610: 23,8 cm 615: 35,5 cm	613: 23,8 cm 617: 35,5 cm	35,5 cm	35,5 cm
Scales	C, D, % 605: D, %	Gauge marks for English units and weights. C, D, CI, %	Special scales to determine fuel consumption, journey time, average speed.	K, A, C, D, CI	Special scales for calculations with atomic and molecular weights and conversation from atomic or molecular percentages to percentage weight.	A, B Special scales to determine exposure time and copy dimensions in percentages.	C, D, Special scales for solution of speed, distance, time and fuel consumption problems. Determination of true air speed, true height, speed of sound, MACH N° solution of barometric navigation problems. Models 613, 617 and 647 comprise interchangeable diagram slides for graphical solution of wind triangle problems.			Special scales for solution of distance/time problems. Determination of speed and distance. Relation between course, current, drift angle, speed through water and speed over ground.

ARISTO

Advantages of ARISTO Slide Rules

Advantages of ARISTO Slide Rules

When assessing the merits of any given slide rule, first check if all the following points are satisfied.

❶ Clear and convenient scale arrangement. The scales are so related that rational calculating methods, with minimal settings, are possible.

❷ Sufficient space is provided between the scales to ensure maximum readability.

❸ The slide scales are graduated on a tinted ground, to avoid reading errors.

❹ The reciprocal scales are figured in red, to avoid confusion.

❺ That graduations and figuring are deeply and durably engraved.

❻ Pleasing, well proportioned graduations and figuring.

❼ That all scales have excellent readability.

❽ Graduations are exclusively in black, offering maximum contrast in any light, with the white scale surface.

❾ Welded elastic end bars on one face only, to simplify handling.

❿ Permanent adjustment and smooth movement of the slide are provided by the welded end bars.

⓫ Made in especially stable, unbreakable ARISTOPAL plastic.

⓬ That the rule is unaffected by water and a wide range of chemicals.

⓭ Easily cleaned, dirt-resistant, polished scale surfaces.

⓮ Double-faced 25 and 50 cm rules have non-slip rubber inserts on both faces to protect cursor and desk top from scratches. The cursor can be moved with one hand.

⓯ Double-faced 25 cm technical slide rules have non-slip supports, raising the rule off the desk top to a convenient height, at a slope to aid reading.

⓰ Double sided cursor, with pressure lock fasteners (snap fasteners for school rules), provides for easy removal, for cleaning or replacement, without disturbance of adjustment.

⓱ Wave-form cursor lenses, enhancing cursor stability.

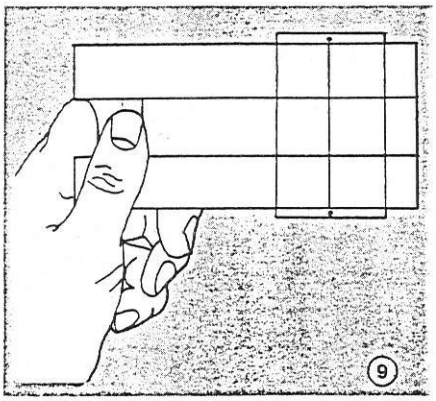
⓲ Modern and attractive styling.

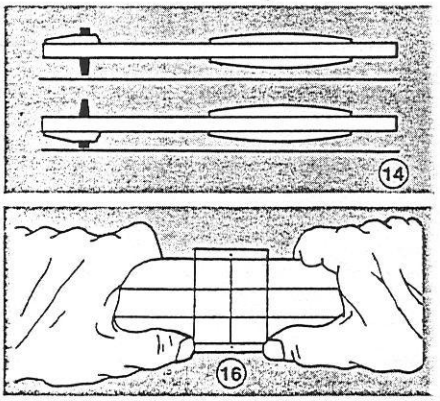
⓳ Robust, elegant plastic cases in ARISTOLEN. Open ended leather cases — with clip if required — supplied with pocket rules.

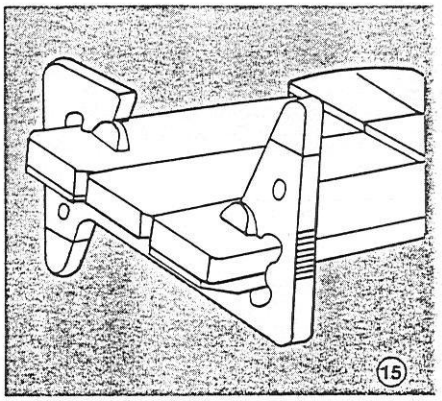
⓴ A magnifying cursor is available, with wave-form cursor glasses providing an uninterrupted view, unmagnified at the cursor edges, enlarged ca ×2 at the hair-line.

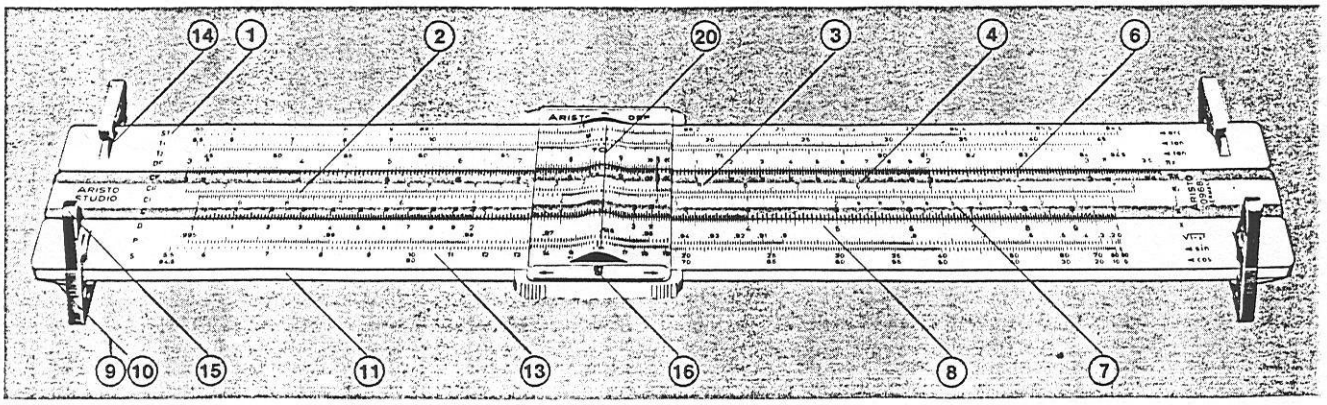
㉑ That the rule is supplied with detailed, carefully prepared instructions. The use of the scales of all ARISTO rules is fully explained by means of examples and easily understood diagrams.

㉒ Every ARISTO technical slide rule, 25 or 50 cm scale length, is accompanied with the ARISTO NZ Preferred Number scale.









FABER CASTELL MERCHANT SLIDE RULES

Günter Kugel with
assistance from D. v. Jezierski

An approach to reviewing their varieties and dating.

1. Introduction

Among the huge varieties of logarithmic slide rules, ever produced since their invention by W. Oughtred in the 17th. century, commercial specialities are much less frequent though interest calculations were a common need for merchants and bankers.

In the first half of the 19th. century there had been already some particular interest computing discs, for example the LEAVITT Interest Computing Wheel, 1845, but they were mechanical number tables. (1)

The interest slide rule with two slides, made by R.R. Bate, London 1824, seems to be one of the earliest linear specialities. (2)

In DYCKS Catalogue, Munich1893, a STANLEY interest computing slide rule is listed. (3)

CAJORI (4) mentioned LEVEN'S Règle pour les Reports de Bourse, made by TAVERNIER-GRAVET, Paris 1903.

The first German special slide rule for merchants was made by NESTLER, No. 40, including a scale, with special currency gauges added, already before World War I, (5). It corresponded probably with DRGM 564 729.

An analogous product with slight modifications of the currency gauges was sold in the USA by Jos. H. Hutten, NY. in 1913. (6)

DENNERT & PAPE, the first German slide rule manufacturer offered a commercial speciality (No. 43) in 1918. (7)

LOGA, the Swiss manufacturer of the famous cylindrical 15m-slide rule , System DAEMEN-SCHMID, made a merchant slide rule out of cardboard, with two slides, a double-sided cursor and some typical currency gauge and commercial units (gauge points), 1920.

KEUFFEL & ESSER was on the American market with the first merchant type model (No. 4095) in 1915. (8)

A. ROHRBERG mentioned his special design for merchants "COLUMBUS" in his "general instructions on slide rules". (9).
This slide rule was the first commercial type model, No. 342, made by FABER-CASTELL, and its design protection was granted as DRGM 836 352- filed by FABER on Febr.1st., 1922 - on Jan. 29th., 1923.

Later on there were some modifications and some new designs for merchant type slide rules with a lot of further model numbers of FABER-CASTELL, some models have been produced up to 1975, perhaps still in 1976.

2. Methods of reviewing and dating

The first approach to reviewing is based upon reference models, as far as number coded blind marks, which can be referred to annual dating, are punched in the body. This is done from the 20ties normally on the reverse side, in case of slide rules with ADDIATOR on the left- or right-hand edge of the body. Thus an optimal set of information, also for dating, is available. In the 20ties the year coded blind mark consists only of one number, for example
6, i.e. 1926, or 8, i.e. 1928.
In the 30ties and the following decades until 1957 the code consists generally of two numbers, for example
37, i.e. 1937, or 45, i.e. 1945. These blind marks are found on the left-hand side of the reverse. Later on the blind marks, consisting of three or four numbers, are punched on the right of the reverse, for example 459, i.e. Apr. 1959, or 1270, i.e. Dec. 1970. As far as known such number codes are unfortunately missing during some periods in the 20ties, 30ties and 40ties.

In such case some "finger prints" as a set of characteristic construction and design elements, or dated DRP (DBP) and DRGM (DBGM) respectively, help to focus the range of dating aids.

Another approach to reviewing and dating can be based upon dated catalogues or price lists, with proper informations, related to slide rules, which were actually available. If pictures of slide rules are printed, some special design or construction elements may differ already from the actual situation at that date due to eventual quick development as was to be seen sometimes.

Instruction manuals with particular reference to merchant type slide rules may support eventually reviewing and dating, especially, when the edition is dated.
Sometimes such instructions show examples of currency calculations with reference to actual dated body exchange rates or of interest calculating in RM or DM. This information may help to define the dating range, but their reliability may be doubtful, as some examples are known that currency rates were not up to date. Some examples are known that foreign currency rates were listed even a lot of years

after the currency had already changed, for example:
Austrian Krone in 1925
Austrian Schilling in 1938.
As far as pictures of slide rules are shown in such instructions, similar doubts, as mentioned above in case of catalogues, should be considered.

* Some results are shown in tables 1, 2 and 3.
A range of uncertainty is marked with dotted lines, • • • •
Scattered lines show probable dating, | — — — |

3. Results and Discussion

Briefly said there were three families of merchant type slide rules, made by Faber-Castell.

3.1 - The "COLUMBUS"-family with reference to the ROHRBERG-system, group A1-A5, which started with model No. 342, based upon DRGM No. 836 352 in 1923. Five slide rules with a simplified design of that system, the so called KLEIN-COLUMBUS, group B1-B5, followed at the beginning of the 30ties, but ended already by 1935 (see table 1). A 1 m-demonstration slide rule with the scales of No. 342 (No. 336/342) was available for some time about 1931, as far as known.

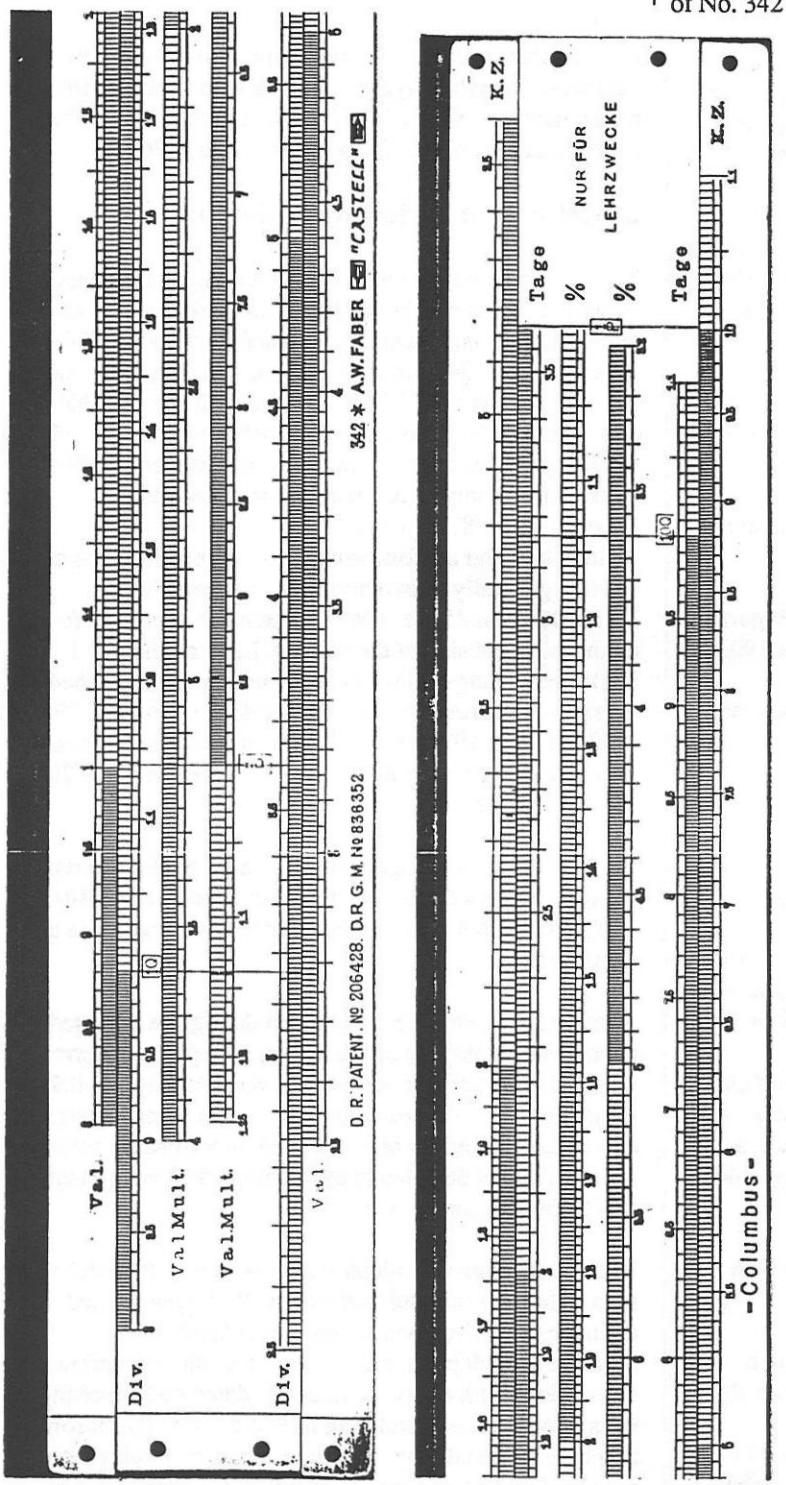


Fig. 1 No. 342 older version

The main design of the big COLUMBUS No. 342 (A1, A2) is shown in figure (1) and (2). As to the reference model (A1), dated 1926 four interesting aspects should be mentioned: this model has no adjusting screws at the lower edge, which should be expected in compliance to DRP 365 637 after 1922. The wooden body is dark brown similar to mahogany and strongly differing from medium brown pearwood, at that time usually used by FABER-CASTELL.
The imprinting "Nur für Schulzwecke" (for teaching purposes only) may give a hint to a particular design.
The typical special scales related to English pence (d), shillings (s) and pound (£) and to E-V-% etc. respectively, are placed in this case (A1) on the reverse side of the slide and not as generally on the bevelled edge of the body (A2).
Though the model numbers of the big COLUMBUS changed in the 30ties - Nos. 342N, 3/42/342, 3/42 - the design and arrangement of the scales remained unchanged but some remarkable construction element alterations should be considered:
- The brass inserts analogous to the old DRP 206 428 were modified:
  two plates vertical No. (342), No. (342N)
  two plates horizontal No. (3/42/342) early version one plate horizontal
  (late No. 3/42/342), No. (3/42)
- The adjusting screws DRP 365 637 were abandoned (late No. 3/42/342), No. (3/42).
- The width of the body, on the front side at the cursor, was reduced from about 43.4 mm to 35.0 mm
  (late No. 3/43/342), No. (3/42).
- The folded %-scale on the slide got a red coloured graduation
  (late No. 3/42/342), No. (3/42).

*The COLUMBUS-slide rules were recently described by D. v. Jezierski (10).

3.2 DISPONENT- family with 14 groups (C) - (Q), started in the early 30ties with model No. 322 (C), was followed by No. 1/22/322 in 1935 (D) and ran partly up to the end of the FABER-CASTELL slide rule production in 1976 with models Nos. 1/22 (E3), 67/22 (M2), 67/22 R (N3) and 57/22 (Q), see table 1.
The groups Nos. 51/22 (J1) and 52/22 (J2), started in 1935, and No. 57/22 (Q), started in 1955, cover DISPONENT type slide rules, made only for school purposes.

Some demonstration slide rules, not listed in the table were available, as mentioned in lists and catalogues as follows:
The No. 315/322 in 1935, 1940 and 1952; and the
No. 315/22 in 1957 and 1966 respectively (all 1.5 m); and
No. 335/22 in 1940 and No. 334/22 in 1955, 1957 and 1966 respectively (all 1 m).
The Overhead-Demonstration-Slide-Rule No. 310/22 is mentioned in the 1972 catalogue.

The most important DISPONENT models Nos. 1/22/322, 1/22, 111/22 and 111/22A, groups D, E1 - E3, and O, P1 - P3 respectively will be considered in other chapters, see 3.5 and 3.6.

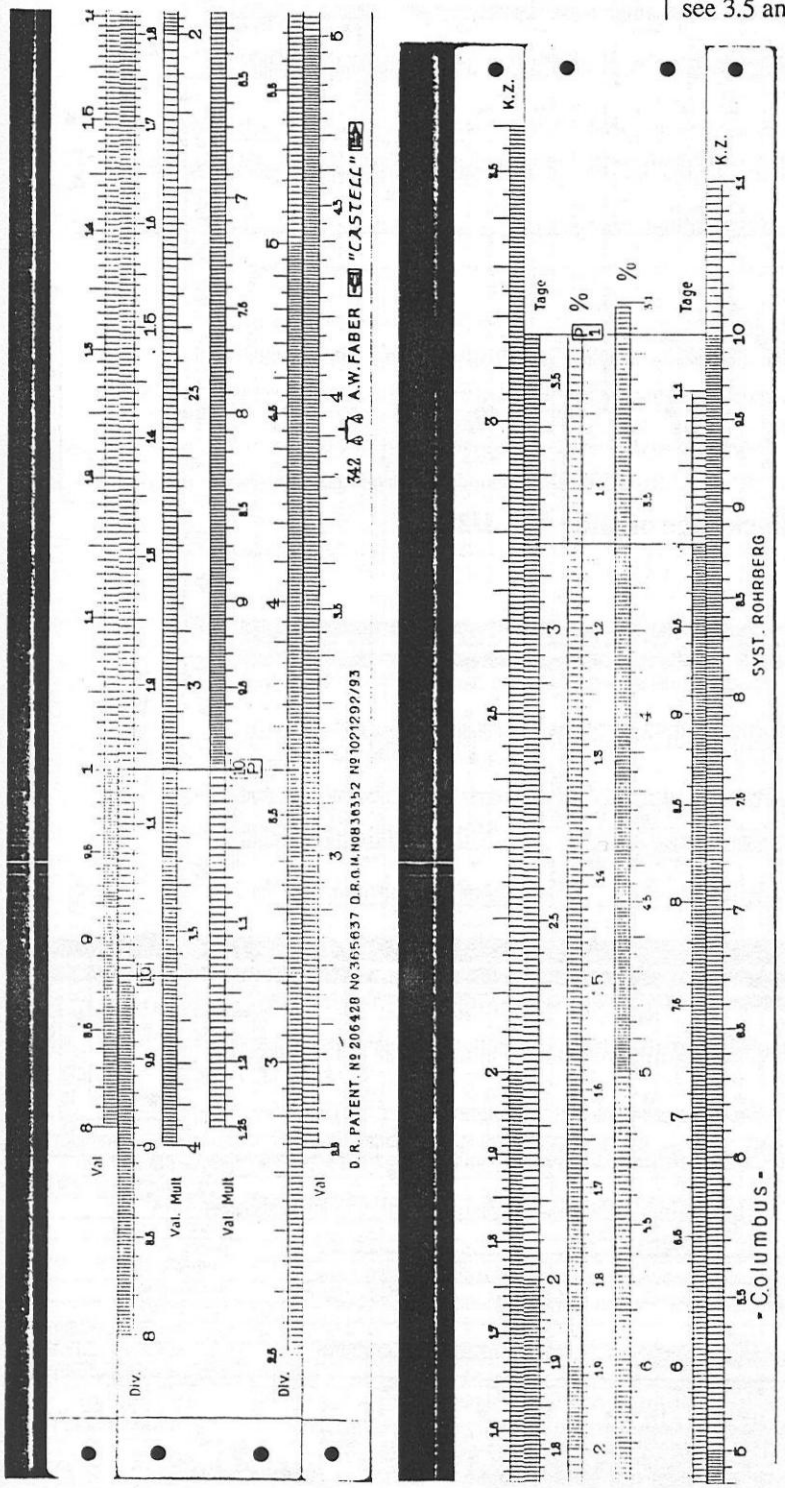


Fig. 2 No. 342 younger version

Among the DISPONENT-family the 50 cm-version No. 4/22 started with a lag of nearly 10 years, in the late 40ties, probably after the important "Währungsreform", i.e. the change from the invalid RM to valuable DM in 1948, when later on an austerity period came to an end in the western part of Germany, where commerce and industries prospered.

3.3 - A third, but not so successful, family comprises some commercial type slide rules with particular applications to industrial merchants- see groups R1, R2, S1 and S2, see table 1. The model No. 1/27 is obviously a mixture of the DISPONENT (No. 1/22) and the RIETZ (No. 1/87).
That uncommon model, anticipated in the 40ties to add to the DISPONENT-1/22-line and obviously abandoned about 1947, is missing in a 1948 survey, attached to a No. 1/54 instruction, which comprises already the other line, i.e. a No. 1/28 model, which had been introduced with the ambitious statement, that the new BIVIUS (No. 1/28) should replace the DISPONENT-type No. 1/22, but the BIVIUS could neither prosper nor die until it disappeared, last mentioned in the 1972-catalogue as far as known.
The typical design of No. 1/27, and No. 1/28 respectively, can be seen in figures (3) and (4) next page, with exception of the sin- and tan-scales and the s/d/£ scales respectively, which were placed on the lateral edge of the body. As far as the No. 1/28 models are concerned the British currency scales are similar and synchronous with the comparable No. 1/22-models.

3.4 Some slide rules of more general applications at schools, but with some special indicators for merchant type computations i.e. the main-line (also 360 days) and a short line (365 days) on the cursor, are not mentioned in table 1, for example Nos. 52/80 (MENTOR), 52/81 (NOVO-MENTOR), 157/80 (MENTOR-FIX), 163/81 (TASCHEN-NOVO-MENTOR).

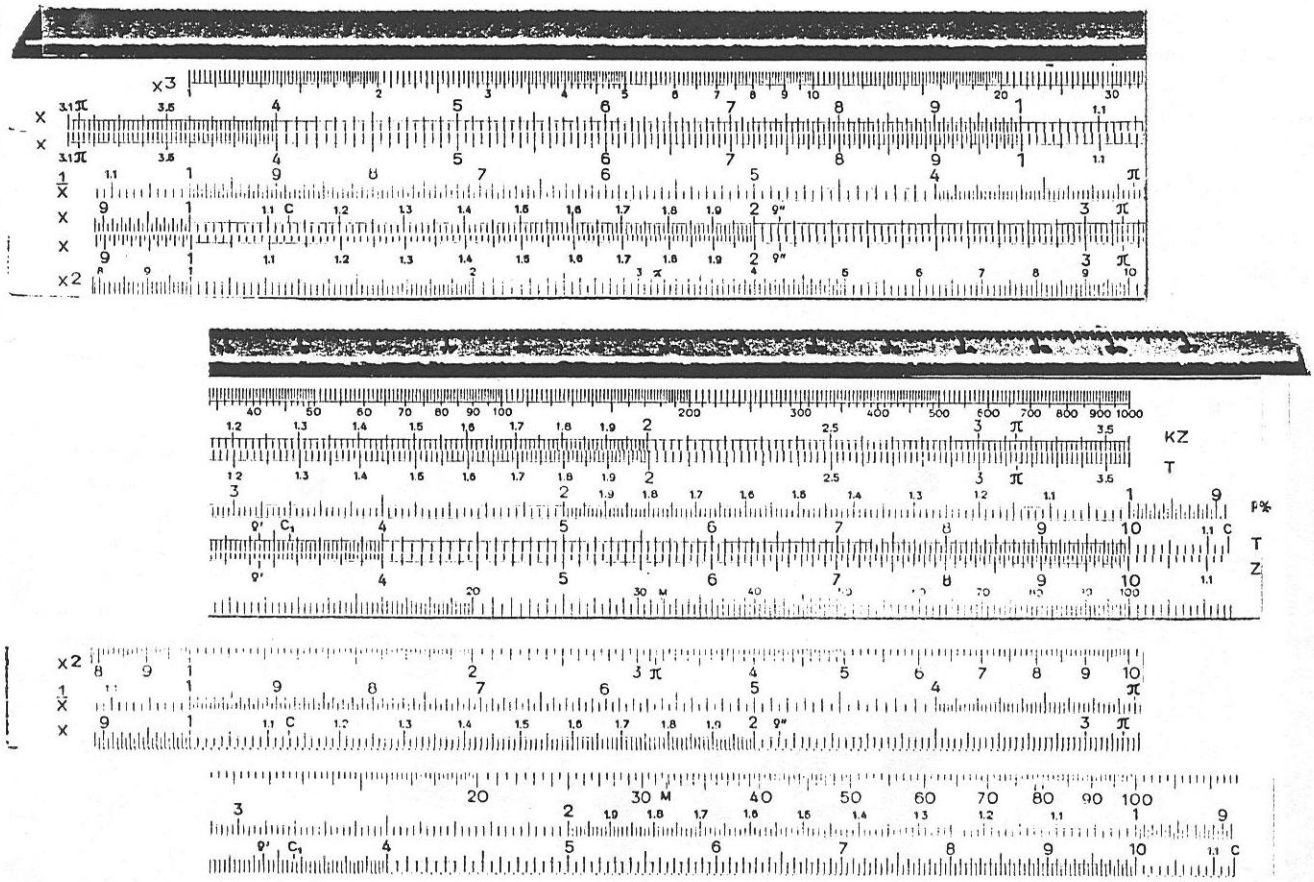


Fig. 3 Front face of body and slide, and back face of slide No. 1/27

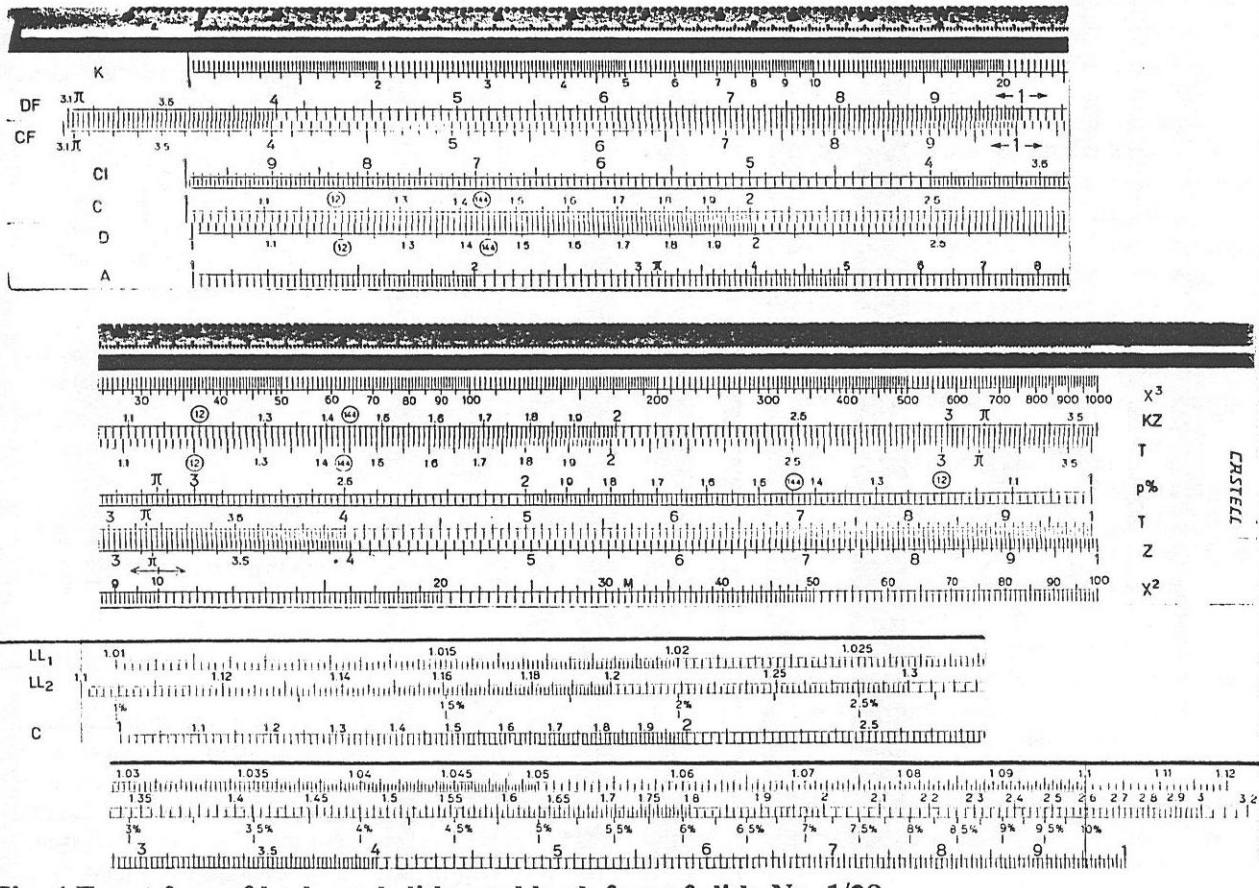
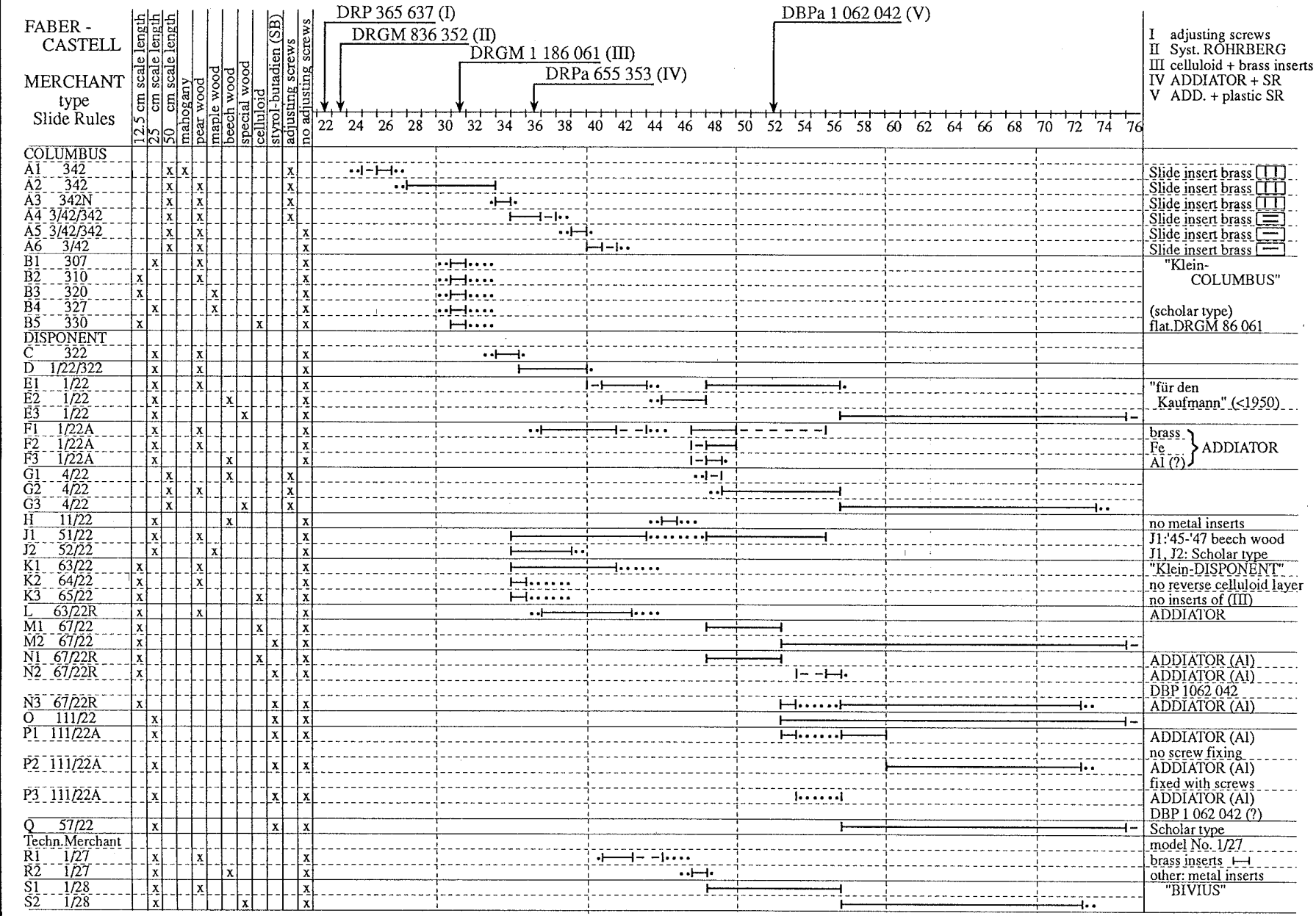


Fig. 4 Front face of body and slide, and back face of slide No. 1/28

FABER - CASTELL
MERCHANT TYPE SLIDE RULES

TABLE 1



3.5 DISPONENT-models No. 1/22/322 and No. 1/22

The models No. 1/22/322 and No. 1/22 , groups D and E1 - E3, see table 1, were the most important 25 cm -type merchant slide rules produced by FABER-CASTELL, see table 2.
The main scale design of the first version (No. 1/22/322) and the last version (No. 1/22) are shown in figures (5) and (6), but the scales on the lateral edge- see table 2, section (e) - are not to be seen.
While the main groups D, E1 - E3 are associated to different wooden material of the slide rules, some dated model versions can be assigned to other varying construction elements or scale design modifications, relating to graduation, numbering, gauge points a.s.o.
The construction elements (a)- wooden pins according to DRGM 371 190 -, and (b) - metal inserts analogous to DRP 206 428 - are unspecific, regarding the particular DISPONENT-family, but both mark important construction versions in combination with the used different wooden material, so that dated cross comparisons with other wooden FABER-CASTELL slide rules, in particular with the Nos. 1/22A, 1/54, 1/78/378, 1/87/387, 1/87, 1/98/398 or 1/98 model lines are attractive.
As a known model No. 1/94/394, dated 1936, and a No. 1/78/378 (1937) respectively, show two horizontal brass inserts in the slide, a similar construction at the early No. 1/22/322 may be assumed, but a known No. 1/22/322, also dated 1937, has only one horizontal brass insert in the slide.
A similar aspect can be considered with respect to the unspecific scale design elements, assigned to section (c)- log scale code and numbering- (d)- parallel lines on main graduation- (g), and (h)- log log-scale coding and numbering respectively.
The design elements of section (e): s, d, £-scales; (f) : (- +%)- scale; (k): index-1 on scale KZ and T; (l) and (m): coding KZ, and T-scale, and %, T and Z-scale are characteristic for the DISPONENT 1/22 model line, but section (f), (l) and (m) are probably synchronous as well as to section (c): log scale coding and numbering.
Thus one of the synchronous elements will be sufficient to define different versions assigned to them, and the table 2 could be reduced for model alteration reviewing and dating. These elements can be also interesting for cross comparisons with other DISPONENT model lines, for example No. 1/22A, 51/22. Though the parity scales of British money (d, s, £) appeared on the No. 1/22/322 basic model already in 1938, these scales were missing on a No. 1/22A (FABER -CASTELL -DISPONENT -ADDIATOR), dated 1939- see table 1, (F1)-, where a 10"-scale is shown on the lateral side of the body instead of.
It is worth to be mentioned that the cursor of the early versions of No. 1/22/322, and No. 1/22A respectively, were an aluminium- framed one- line cursor, without lateral indicator, later on about the end of the 30ties a short-line indicator (365 days) was added on the front of the cursor. About 1940 a full-view frameless cursor with lateral indicator was used, which was derived from a similar construction, applied already on the DARMSTADT-slide rule No. 1/54. It was a rather sophisticated construction of acryl glass (PMMA) plates, fixed with screws to a set of small metal plates and to the guidance device, sliding along the body of the rule.

Material scarcity from 1944 - 1947 compelled to use framed glass cursors with small lateral plastic transparent indicator. In the early 50ties full view cursors, made totally out of PMMA, were used. As cursors can be easily replaced, it is very difficult to find complete reliable reference slide rules. Other construction elements of different tables and covering on the reverse side of the body - see table 2, section (c) (c1.1-c1.2, c2.1-2.2, c3)- may be appreciated to assign further versions of the Nos. 1/22/322 and Nos. 1/22 model lines.

3.6 DISPONENT 111/22 and 111/22A DISPONENT-ADDIATOR

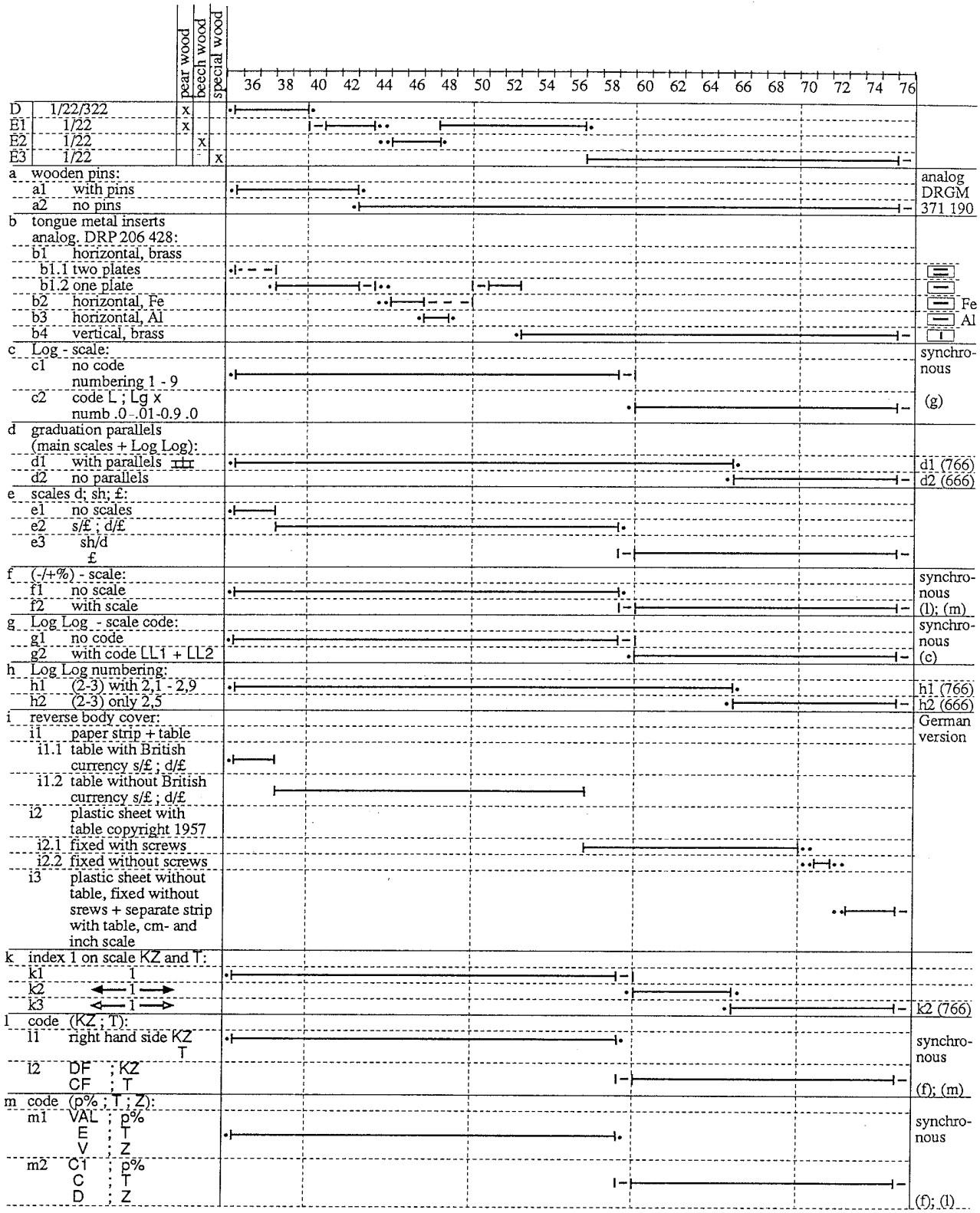
While full plastic DISPONENT pocket slide rules had been manufactured out of celluloid already in the early 30ties (No. 65/22, table 1, K3), and after some interruption from 1935 until a new start about 1948 with the celluloid version of the No. 67/22 line, the first full- plastic 25 cm - DISPONENT slide rule, made out of GEROPLAST- a shock resistant polystyrol-butadien (SB) polymer- was mentioned in the 1952- catalogue as well as the first No. 111/22A with KÜBLER-ADDIATOR, which refers to the KÜBLER-patent DRP 655 353, filed in 1936 and granted in 1937- see table 1, (C) and (P) as well as table 3-. As far as the famous ADDIATOR-calculating devices (addition and subtraction) are concerned, F. Diestelkamp published a brief history of CARL KÜBLER ADDIATOR on behalf of its 70th anniversary (11).

In contrast to the Nos. 1/22 and 1/22A, models No. 111/22 and No. 111/22A have a body of the same size- see figure (7) and (8)-.
The No. 111/22A model was last mentioned in the 1972-catalogue, as far as known. While the basic model No. 111/22 had been listed in the 1974 survey, a manufacturing up to the general end of the slide rule production at FABER-CASTELL in 1976 may be assumed, but there remains some uncertainty as -with respect to an efficient manufacturing- the last graduated lot of DISPONENT slide rules may be dated earlier, this assumption may not contradict to an eventually offered list sometimes later.
The sections (a) - (h) in table 3 show specific and unspecific construction and design elements of model No. 111/22 analogous to those mentioned in table 2 for the No. 1/22 model line. But changes of some characteristic elements, as following

- (c) parallel lines along the main scales
- (d) British money parity scales d, s, £
- (e) (-/+ %) scale
- (f) log log-numbering
- (g) code (p%, T, Z) -scales,
- (h) index-1 on scales KZ and T resp. (g) and (h) in English and French versions Cap./Int. (KZ), Int. (Z), Days (T) or Jours (T) may not fully coincide with those of the No. 1/22 model line, in case tables 2 and 3 are compared.

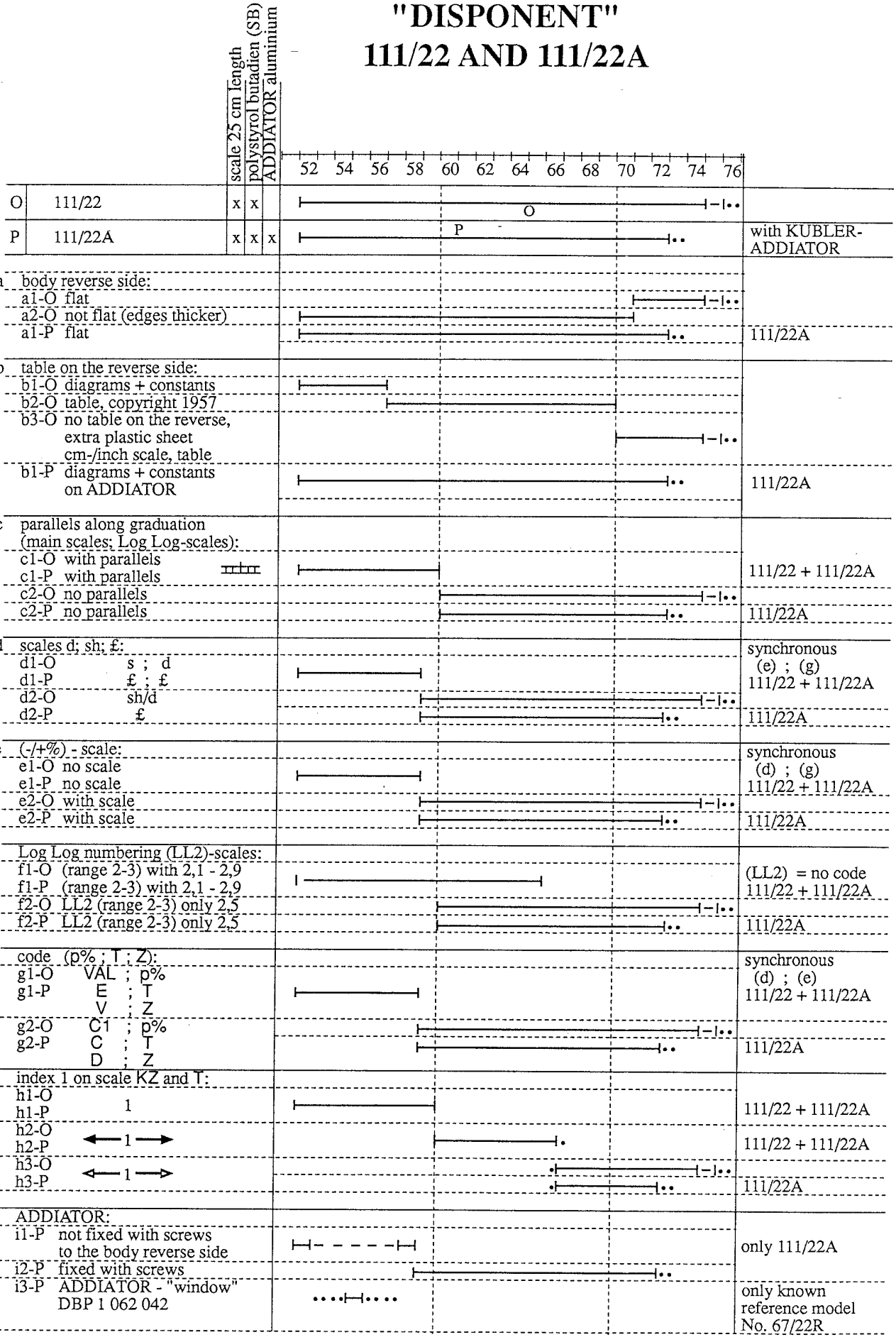
FABER - CASTELL
"DISPONENT"
1/22/322 AND 1/22

TABLE 2



FABER - CASTELL "DISPONENT" 111/22 AND 111/22A

TABLE 3



Similar to the comments on the wooden models, some of the elements, mentioned above for the No. 111/22 model line, and No. 111/22A respectively, were synchronous, for example table 3, sections (c), (d), (e), (f), (g).
Thus this list also could be reduced, if changing characteristics are assigned to different versions of the DISPONENT Nos. 111/22 and 111/22A models, as far as the typical scale design is concerned.

Particularly with respect to the model line No. 111/22A some modifications of implementing or attaching of the aluminium made ADDIATOR should be considered (1)-(3). As to the assumed version (3), analogous to the DBP 1 062 042 of W. Bülow, but there are only references of the (12.5 cm) No. 67/22R to such a construction, as far as known.
This construction had often complaints (defective fixing of the ADDIATOR-covering plate on the reverse) and was cancelled.

4 Summary

Methods of the approach to reviewing and dating of FABER-CASTELL merchant type slide rules are described. Three big families of such slide rules are established and reviewed in table 1, as following

- COLUMBUS
- DISPONENT
- BIVIUS and others

This survey covers an interval of more than 50 years between 1923 until 1976 of FABER-CASTELL merchant slide rule production.

Some results of the important DISPONENT-family are discussed in particular with reference to the model lines Nos. 1/22/322 and 1/22, further to Nos. 111/22 and 111/22A respectively, reviewed and dated in two tables. This paper should be evaluated only as a first approach to FABER-CASTELL merchant slide rule reviewing and dating, because there remain a lot of blanks to be filled up, as well as some ranges of uncertain dating may be cleared by further research.
Any models for export purposes with respect to special scales, for example inch- instead of cm-scale or to modified instruction tables on the body reverse were not considered in detail.

5 Acknowledgement

Both authors express their sincere thanks to all, who supported this research with substantial information, in particular they are obliged to Mr. H. Dennert, F. Diestelkamp, Prof. Dr. G. Erhard, Mrs. M. Schaffhirt-Kübler, Germany; as well to Mr. G. Craenen, J. Dekker, IJ. Schuitema and H. van Herwijnen in the Netherlands, and Mr. B.C. Feazel, USA.

6 References

Besides a lot of FABER-CASTELL publications between 1929 and 1974 this research has the following references:

(1) A Calculator Chronicle, Exhibition Catalogue, IBM Gallery of Science (New York), not dated

(2) D. Baxandall:
The Science Museum Catalogue, Mathematics Calculating Machines and Instruments, London 1926

(3) W. Dyck:
Katalog mathematischer u. mathematisch-physik. Modelle, Apparate und Instrumente, München 1892 und Nachtrag 1893

(4) F. Cajori:
A history of the logarithmic Slide Rule and allied Instruments, London and New York 1909

(5) A. Nestler, Rechenschieberfabrik:
Der logarithmische Rechenschieber und sein Gebrauch, 9. Auflage, Lahr i. Baden 1914

(6) HUTTON, commercial slide rule advertisement, N.Y. 1913 , by courtesy of B. Otnes, Palo Alto 1995

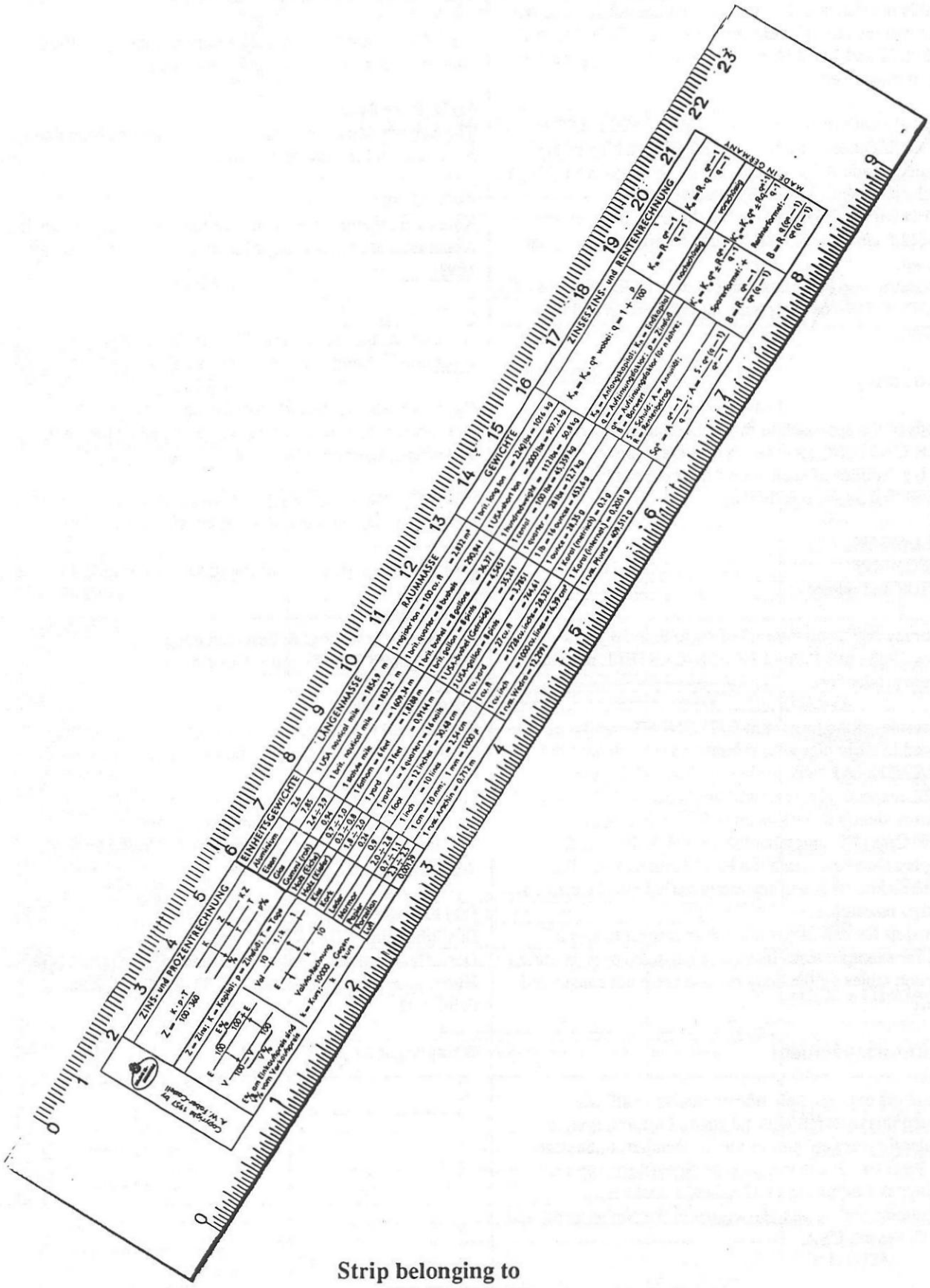
(7) H. Dennert, personal information, Hamburg 1995

(8) B. Babcock:
Slide Rules in Keuffel & Esser catalogs,
The Oughtred Society, Palo Alto 1993

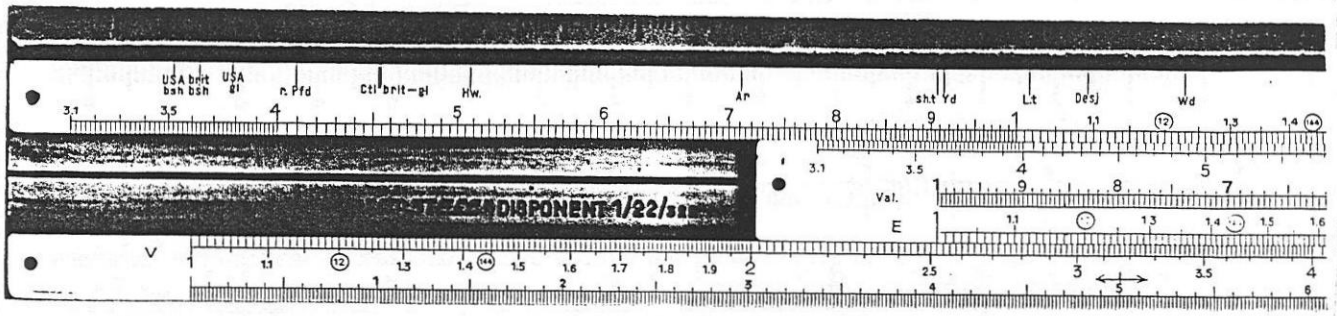
(9) A. Rohrberg:
Theorie und Praxis des logarithmischen Rechenstabes, 3. Auflage, Teubner, Leipzig und Berlin 1925

(10) D. v. Jezierski:
The A.W. Faber-Castell Columbus System,
Journal of the Oughtred Society Vol. 4, No. 1 , Palo Alto, March 1995

(11) F. Diestelkamp:
Das Jubiläum "ADDIATOR" und
Der Lebenslauf: Karl Kübler, Erfinder des "ADDIATOR", Historische Bürowelt (HBw) No. 32, S. 22, 23, Köln, Febr.1992



Strip belonging to
SR fig 6



Body and slide front face

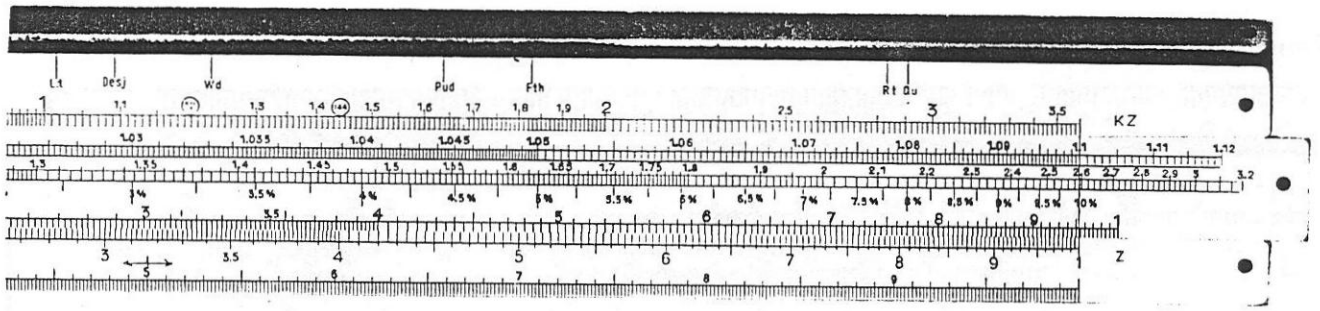
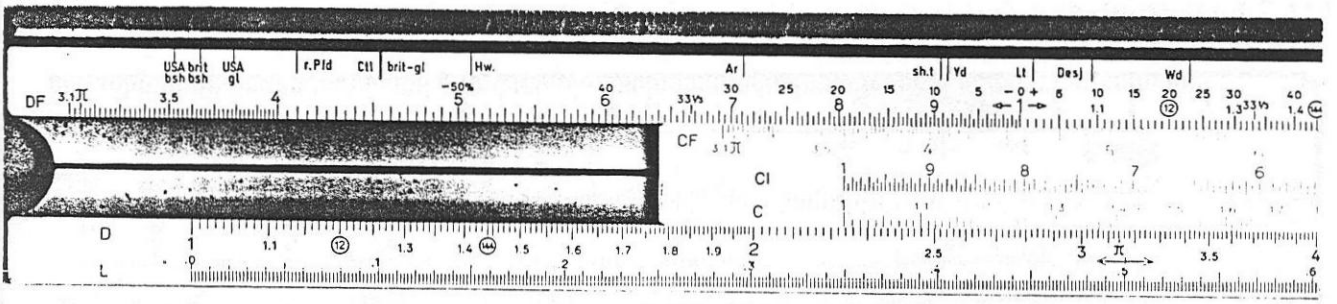


Fig. 5 Body front- and slide back face, older version, No. 1/22/322



Body and slide front face

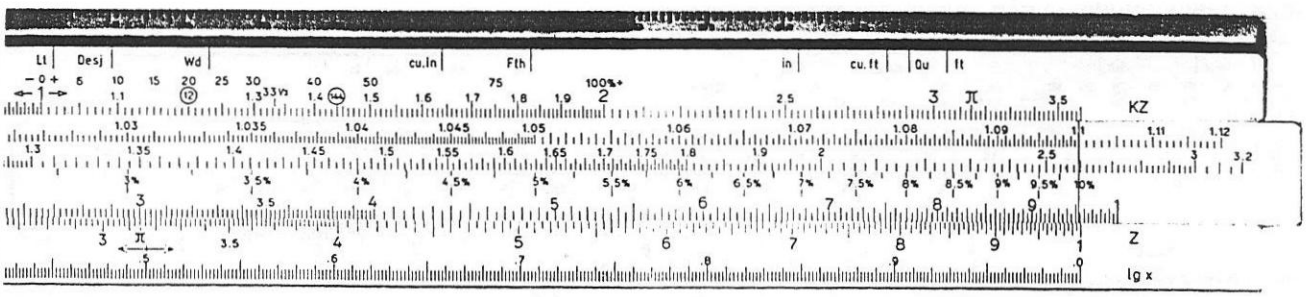
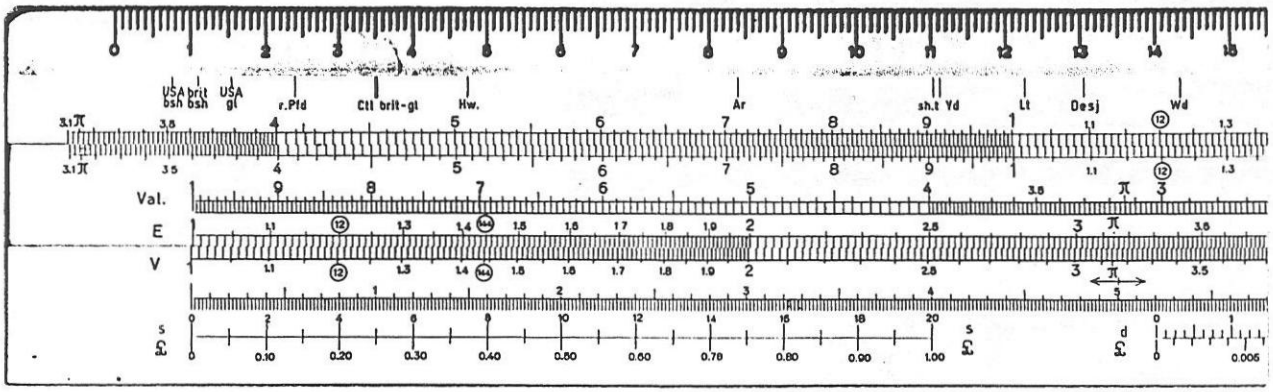


Fig.6 Body front- and slide back face, younger version, No. 1/22



Body and slide front face

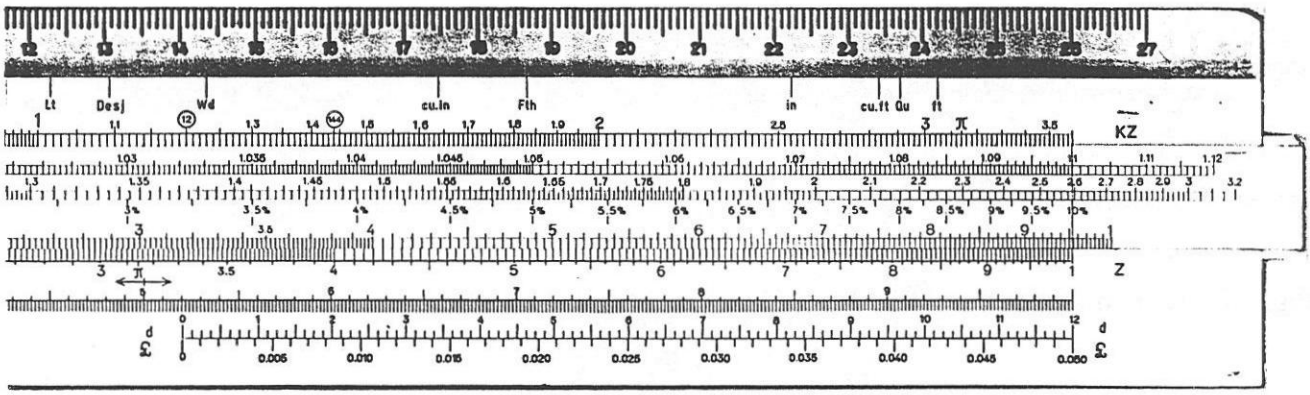
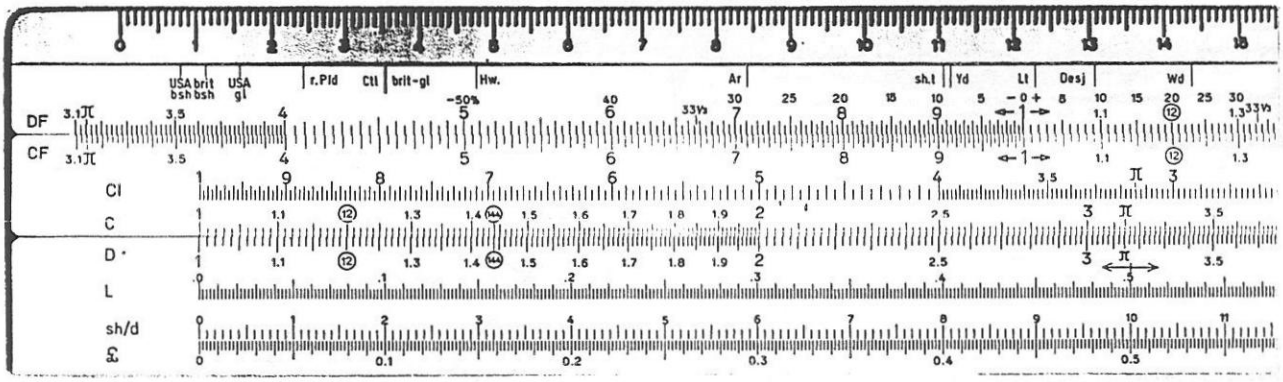


Fig. 7 Body front- and slide back face, older version No. 111/22



Body and slide front face

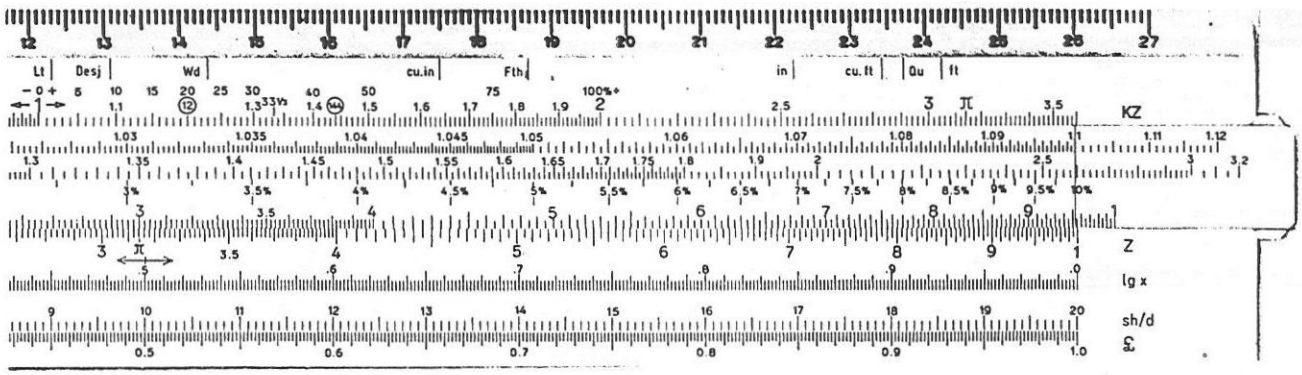


Fig. 8 Body front- and slide back face, younger version No. 111/22

TRACING OF NESTLER SLIDE RULES

Guus Craenen

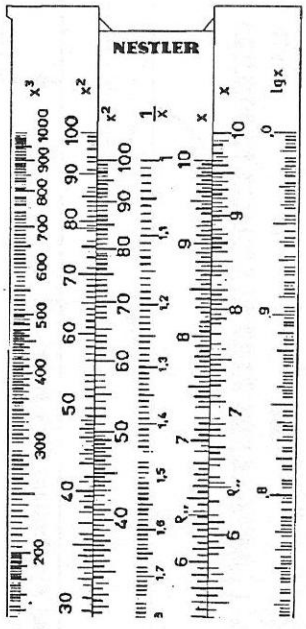
Three tools have been developed for tracing of manufacturing dates of Nestler slide rules. These tools can be found in the following attachments. The sequence of usage is: first attachment 1 and then 2, or first attachment 2 and then 3.

Attachment 1 gives a global overview of the development of both Rietz as well as special application slide rules. This development is related to a time axis, denoted in years of manufacturing from 1878, when design and manufacturing started, until 1978 when production was discontinued.
The development of the Rietz type started with the definition in 1902, and continues through the new type numbers in 1955, until the new design in 1960. The periods during which special applications have been developed, can be determined from the table.
An example: the slide rule for electrical wiring (Nr 32) is mentioned for the first time in a book dated 1911, and for the last time in a catalogue dated 1925. From 1931 the production of this slide rule obviously has been discontinued, and its serial number then is assigned to a "*Heizungsrechner*" (slide rule for heating applications).
The change of serial number is indicated with a bullit sign.

Attachment 2 shows a summary of developments based on six main aspects: from *Frontside* to *Type of Wood*.
An example: a certain slide rule has screws at the front side, which occurred only from 1906 until 1938. Also this slide rule has a cm-scale with a length of 26 cm; this occurred only from 1906 until 1926. And lastly, because the construction uses palmwood, this slide rule can be traced to 1906-1911.

Attachment 3 is a tool for fast tracing, based on texts on the slide rule-base, under the slide. Using these texts and formats, as indicated in the center of the table, the reference formats (1-13) can be determined.

The left column gives a year indication, and some additional aspects, which are explained in the footer of the page. Other information, like data on the back and scale lengths, are contained in attachment 2; hence the advice to use attachment 2 first, and then 3.



Nestler, Development of Rietz and Special Applications Slide Rules

Attachment 1

78 80 1890 1900 1910 1920 1930 1940 1950 1960 1970 78

8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8

Important Dates	♥ 1902	◘ 1911	◘ 1914	◙ 1925	◙ 1931	◙ 1938	▬ 1952	♣ 1955	⌂ 1960

Development Rietz	Definition	CI-Scale		Extended A,B,C,D-Scales	Extended CI,A,B,C,D-Scales	Ana-git	New Number	New Design
Development of Special Applications Slide Rules								
20			Betriebsr.20				-	
21					Darmstadt 21		021x	
25		Perry 25	Perry 25	Perry 25	Perry 25		-	
25B					Betriebsr.25B		-	
26				Betriebsr.26	Betriebsr.26		0260	
27		Präzision 27	Präzision 27	Präzision 27	Präzision 27	Präzision 27	027x	
28		Universal 28	Universal 28	Universal 28	Universal 28	Universal 28	028x	(Geometer)
29		Fix 29	(Fix 29)	Fix 29 •	Doppelr.29	Doppelr.29	0290	
30		Nestle 30	Nestle 30	Nestle 30	Nestle 30		-	
30G					Gewichtr.30G		-	
31			Holzhändler 31	Holzhändler 31	Holzhändler 31	Holzhändler 31	-	
32		el. Leitung 32	el.Leitung 32	el.Leitung 32•	Heizungsr.32		-	
33			Chemiker 33	Chemiker 33	Chemiker 33	Chemiker 33	0330	
34				Hanauer 34	Hanauer 34	Hanauer 34	-	
35	Peter 35 (1901)	Peter 35	Peter 35	Peter 35	Peter 35		-	
36					Elektro 36	Elektro 36	-	
37			Elektro 37	Elektro 37	Elektro 37	Electro 37	0370	
38			Perfekt 38	Perfekt 38	Perfekt 38		-	
39				Besser 39	Besser 39 •	Kursflugr.39	-	
40			kaufmänn.40	kaufmänn.40	kaufmänn.40	Kaufmann 40	0400	(Merkur)
41				Liliput 41	Liliput 41		-	
43				Hoffmann 43	Hoffmann 43	Hoffmann 43	043x	

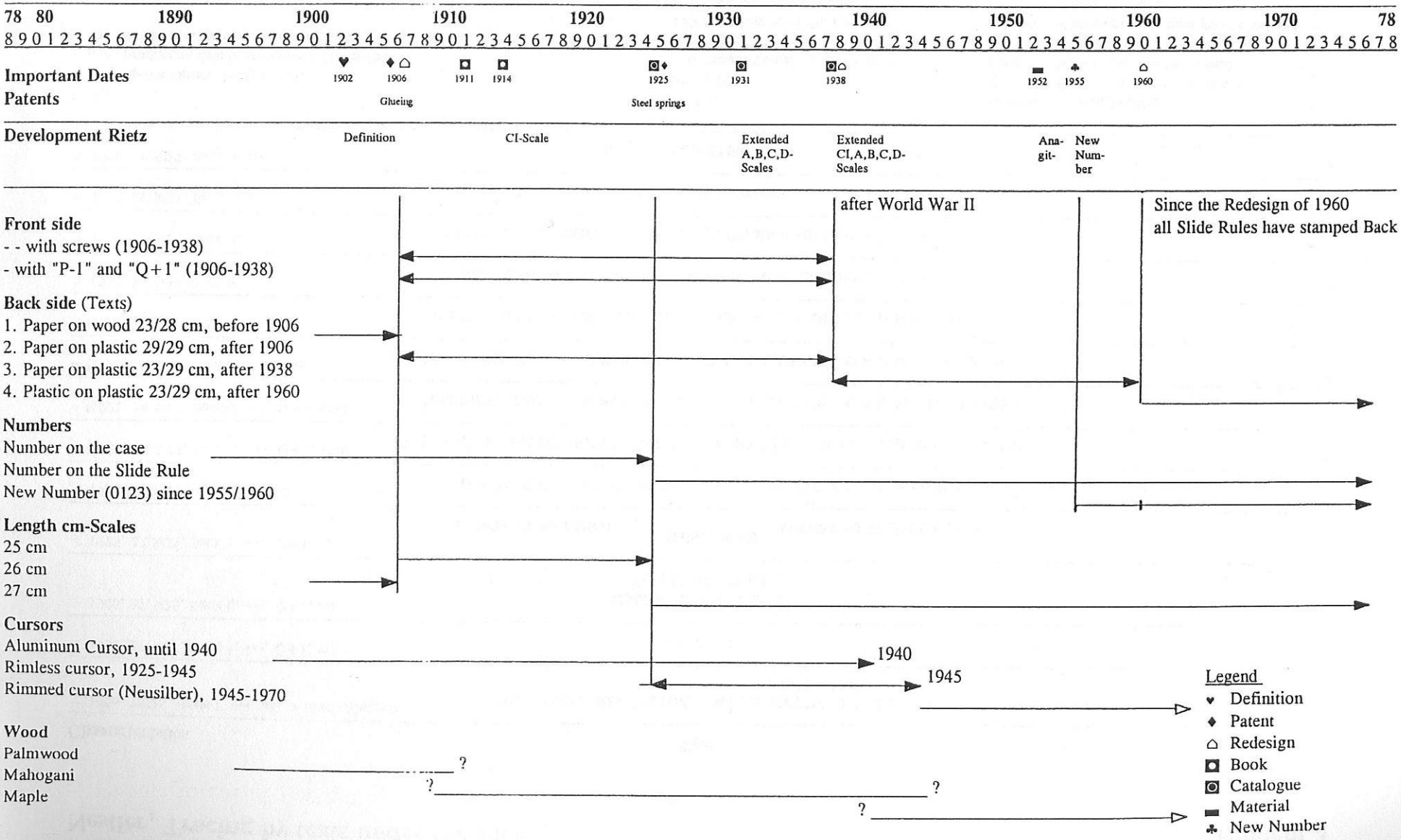
Legend

- ♥ Definition
- ♦ Patent
- ⌂ Redesign
- ◘ Book
- ◙ Catalogue
- ▬ Material
- ♣ New Number
- • Type change

Note: Underlined Names, like Betriebsr.26, indicate new issues, according to book or catalogue.

Nestler, Additional Characteristics for tracing of Rietz und Special Applications Slide Rules

Attachment 2



Nestler, Tracing by texts under the slide

Attachment 3

Characteristics	Text	Formats
< 1906, 28/26, Back-1, •••, mS, > 1896 (Ahrend)	HOLLANDIA-REKENSTOK WED.J.AHREND & ZOON AMSTERDAM	1
< 1906, 27,5/25, Back-1, •••, Q+1, mS	NESTLER	2
> 1906, 27,5/25, Back-o, •••, Q+1, mS	D.R.PATENT No 173660 ALBERT NESTLER	3
< 1925, 27,5/25, Back-2, •••, Q+1, mS	D.R.PATENT No 173660 SYSTEM RIETZ ALBERT NESTLER LAHRi/B	4
< 1925 29,5/25, Back-2, •••, mS	D.R.PATENT ELECTRO No37 ALBERT NESTLER A.-G. LAHRi/B	5
=*1928, 28,5/27, Back-2, •••, Q+1, mSu	D.R.PATENT SYSTEM RIETZ No23R ALBERT NESTLER A.-G. LAHRi/B D.R.G.M.	6
=*1931, 28,5/27, Back-2, •••, Q+1, mSu	SYSTEM RIETZ No23R ALBERT NESTLER A.-G. LAHRi/B D.R.G.M. D.R.PATENT	7
=*1939, 29,5/27, Back-3, •••, mSu	SYSTEM RIETZ No23R ALBERT NESTLER A.-G. LAHRi/B D.R.G.M. D.R.PATENT	8
<1948, 29,5/27, Back-3, oS	SYSTEM RIETZ No23R ALBERT NESTLER A.-G. LAHR i/B D.R.PATENT	9
> 1950, 29,5/27, Back-3, oS	No21 "Darmstadt" ⌂ ALBERT NESTLER A.-G. LAHRi/B ⌂ D.R.P.	10
> 1950, 29,5/27, Back-3, oS	SYSTEM RIETZ No23R ⌂ ALBERT NESTLER A.-G. LAHRi/B ⌂ D.R.P.	11
< 1955, 29,5/27, Back-3, oS	Nr.23R/3 Rietz Nestler	12
> 1960, 29,5/27, Back-4, oS	Nestler - GEOMETER Nr.0280	13

Usage

- Look up the format (1-13) by text
- Read production date in left column (1906-1960)
- Use additional information (Length, Back, etc.) to check

Legend Format-1

< 1906:	before 1906
28/26:	Total length/Length cm-Scale front
Back-1:	see "Backside", Attachment 2
•••:	with three screws on front side
mS:	with ruler (cm scale) extension
Ahrend:	Dutch commerce firm since 1896

Legend of characteristics

Q+1:	Dec. point, Front, left under
Back-o:	without paper strip on back
*:	Year according to previous owner
mSu/oS:	With extension under groove/without
⌂:	stands for Nestler logo

IDENTIFICATION

Otto van Poelje/Herman van Herwijnen

IDENTIFICATION OF SLIDE RULES BY "NCV"-CODE

For today's collectors, identification of a slide rule is much more difficult than it used to be for the suppliers of the product in the old manufacturing and selling days. The supplier, whether it was a manufacturer or distributor, had his own coding system; but the collector of today often has to guess how the coding system was originally designed

(if there was a system at all). Think for example of specimens with multiple names and codes engraved, against ones with no inscriptions whatsoever.

When collectors talk about slide rules, they need a coding scheme to identify, in a unique way, any slide rule ever produced. Instead of talking about "the Aristo Darmstadt 867U with the logo above the Aristo engraving sideways on the right side of the slide, and D&P recorded on the back", this specimen should be indicated uniquely by something like "Aris 867U .51", with no possibility of misunderstanding.

Apart from the uniqueness requirement, the coding system should also be clear, and easy to understand and use. A simple 8-digit number system would give a unique identification, but gives no clue about the slide rule at all. On the other hand, if too many aspects of the slide rule are included in the unique code (like form, length, material), then the code would become unusable by its sheer length.

With the current knowledge and experience of coding over two thousand different specimens, a three-tiered identification and coding system appears to be the best compromise between uniqueness, clarity and ease of use:

N = NAME (name of the supplier)

C = CODE (as defined by the supplier)

V = VARIANT (as observed by collectors)

Members of the Dutch Circle of Slide Rule Collectors have evolved this determination method into an effective system to uniquely identify any slide rule, by the unique "NCV"-tag.

The NCV tag gives a unique identification, with recognizable key characteristics, while the tag length is kept short.

An example of an NCV tag is:

NAME	CODE	VARIANT
Keuf	**4081-3**	**.01**

for which the more wordy description could be:

"the Keuffel & Esser LogLog Duplex Decitrig 4081-3, in a special wood/plastic sandwich construction variant".

To achieve consistency in the NCV coding system, some rules have to be established and observed:

NAME The name of the manufacturer or distributor, as recorded on the slide rule. When more than one name is recorded, the name determining the definition of the CODE, should be chosen (e.g. the Post 1441 also carries the name "Hemmi", but the name Post is used because the code 1441 is a Post code).

NAME is the compulsary first part of the NCV tag: if no name can be determined, the text NoNa (for "No Name") must be used.

To limit the length of NAME, only the first four characters of the real name (so excluding e.g. letters for initials) are used in the NAME code; should other names have the same first characters, more than four characters have to be used, up to the number needed to resolve t he name conflict.E.g. Loga for the full name Loga, and Logar for the full name Logarex.

CODE

The identification that is defined and recorded on the slide rule by the manufacturer or distributor mentioned in NAME.

If more CODE identifications occur (e.g. a descriptive name like Decitrig, and a more concise code like 4081-3) then the most discriminating one should be chosen, in its literal form (which almost always is the concise code).

The NCV administrator may decide to abbreviate a long CODE string, under the condition that uniqueness of CODES within a NAME is preserved.

The CODE part may be omitted from the NCV tag if no CODE identity is inscribed on the slide rule at all.

VARIANT

In many cases, variations occur of a given NAME-CODE combination, for example by customization for different countries, or introduction of manufacturing improvements, over time. These variations are identified by collectors as they are encountered, and administrated by a unique VARIANT number.

The coding is a two-digit number, starting with a dot, to distinguish the variant number from the NAME-CODE part in the NCV tag.

The NCV administrator may decide to extend the VARIANT number length to more than 2 digits; this may be the case if the number of variants is extremely large, or if some structure needs to be reflected within the VARIANT numbering system.

Also the VARIANT part of the NCV tag may be completely omitted if no variants are known. In that case the VARIANT number is ".00", by implication.

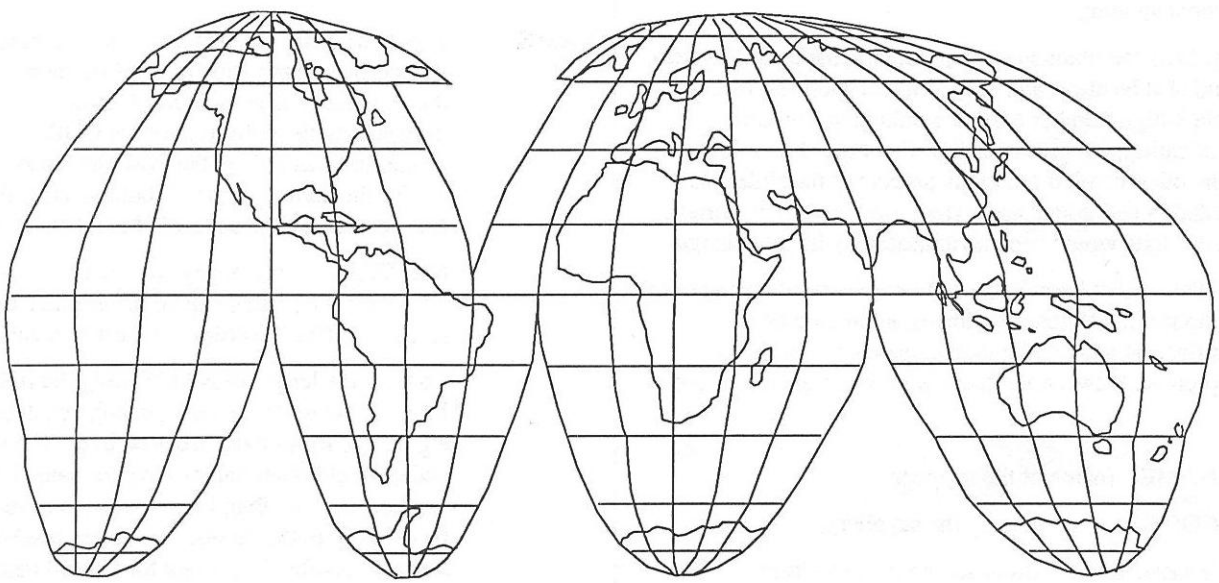
If the CODE looks like a VARIANT (e.g. ".13"), then the VARIANT should not be omitted, to prevent confusion between the two in an NCV-tag.

A general rule is that discovery of a new NAME, CODE or VARIANT should never cause a change in coding of existing NCV tags. This means that NAME, starting with the same first four characters, may exist as 4-character, 5-character or longer names, because the 4-character NAME was decided at a time that no name conflict was foreseen; also a variant with no VARIANT number is allowed to co-exist with variants with a VARIANT number, for the same reason. Then the VARIANT with no VARIANT number is effectively ".00", by implication.

When an NCV tag is printed, it is advised to insert spaces between the three parts for better legibility.

The rules given will minimise the risk of inconsistency or NCV conflicts. But the NCV coding system can only be brought to perfection if determination and administration of codes for the various NCV parts is coordinated on a **worldwide** scale. For example a list of NAME abbreviations and their full name meanings has to be administrated by someone; the same applies for the choice of CODE codes, and the issuing of specific VARIANT numbers. However, it is possible to agree on delegating and distributing the NCV administration and maintenance to different persons on a per NAME (or even per CODE) basis.

And, last but not least, the additional characteristics of slide rules, like form, material, dimensions, scales, VARIANT aspects etc., have to be collected and documented (essential for defining the VARIANTS in a unique way), for all NCV's, in one large common descriptional Data Base (Catalogue). The population and maintenance of this database, again, should be distributed, **worldwide** to the same people as agreed for the NCV administration.



NAME, MANUFACTURER AND NUMBER OF DIFFERENT LOG SLIDE RULES IN DUTCH CIRCLE OF SR COLLECTORS

Situation at 05-10-95

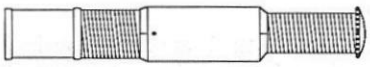
Number	Manufacturer	Name
1	Acrow	Acro
3	Acumath	Acu
1	Addimult	Addi
4	Ahrend	Ahre
1	Alco	Alco
47	Alro	Alro
1	Graphic Calculator Co	Anem
2	Appoullot	Appo
273	Aristo	Aris
1	Aston & Mander	Asto
1	Atlas Copco	Atla
1	BIPM	BIPM
1	Blau Knox	Blau
33	Blundell	Blun
1	Bopp & Reuther	Bopp
1	Brigon	Brig
1	Charles Bruning	Brun
1	Calculigraph H.C.	Calc
1	Cassani Marcantoni	Cass
2	Unknown	Chin
1	Unknown	Circ o
1	Unknown	Circ u
8	Classic	Clas
17	Concise	Conc
7	Controller München	Cont
5	C-Thru	CThr
1	Damien,Maurice	Dami
2	Daniel Industries	Dani
1	Unknown	Dass
4	Davis & Son	Davi
1	Dechesne, A	Dech
1	Degussa	Degu
23	Dennert	Denn
7	Dietzgen	Diet
1	Dimier	Dimi
44	Diwa	Diwa
1	Draper, B	Drap
1	Dring & Fage	Drin
1	Dualface	Dual
1	Duval	Duva
10	Ecobra	Ecob
2	Elcoma	Elco
1	Unknown	EMT
1	Esso	Esso
313	Faber Castell	Fabe
1	FAé-LuM	FAé-
1	Chadburn & Son	Farm
4	Fowler	Fowl
3	Foxboro	Foxb
23	Fuji	Fuji
1	Fullers, Stanley	Full
1	Fysma	Fysm
3	Gamma	Gamm
1	Gasiorowski, K	Gasi
1	Unknown	Gill
1	Gilson (Compass?)	Gils
1	Gilson (Dietzgen?)	Gils
4	Gilson	Gils
57	Graphoplex	Grap
1	Gravet Lenoir	Grav
1	Guedon Camden	Gued
3	Halden	Hald
1	Hansa	Hans
1	HCW Leiden	HCW
1	Heath	Heat

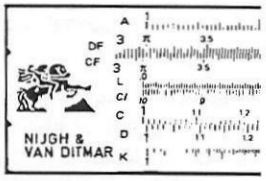
Number	Manufacturer	Name
1	Shell	Heli
1	Herion	Heri
1	Higgison	Higg
2	Hope	Hope
1	Hurter	Hurt
1	Ilford	Ilfo
1	Imco	Imco
2	Itab	Itab
1	Bruël & Kjær	IWA
23	Iwa	IWA
1	Jackson Brothers	Jack
3	Jakar	Jaka
6	Jorgensen	Jorg
1	Kelco	Kelc
8	Kent	Kent
35	Keuffel & Esser	Keuf
2	Kingson	King
1	Klawun	Klaw
2	Koch	Koch
2	Korte, Friedrich	Kort
2	Krygowaja	Kryg
1	Kurvers?	Kurv
2	Kutsawa	Kuts
1	Kyama	Kvam
1	Ladish	Ladi
2	Lange, H.C.	Lang
5	Lawrence	Lawr
1	Lemaire Frères	Lema
4	Linex	Line
1	Löbker	Löbk
12	Loga	Loga
10	Logarex	Loga r
36	Logomat	Logo m
1	Losztályu	Losz
1	Lutz	Lutz
1	Lyth	Lyth
1	Marcantoni	Marc
1	Martin, St. Scale Aids	Mart
1	M.D.S. London	MDS
10	Meissner	Meis
1	Mignon	Mign
1	Minerva	Mine
1	Montana	Mont
3	Morin	Mori
1	Nabla	Nabl
213	Nestler	Nest
53	Unknown	NoNa
2	Norden	Nord
5	Norma	Norm
1	Unknown	NSN
3	Carbic	Otis
1	Park	Park
3	Penol	Peno
1	Perilog	Peri
1	Perray, le	Perr a
5	Perrygraph	Perr y
53	Pickett	Pick e
1	Pickworth	Pick w
1	Piechotta	Piec
2	Pignone	Pign
1	Pilot	Pilo
15	Post	Post
1	Droogtechniek Rotterdam	Payc
1	Raytheon	Rayt
1	American Slide Chart Corp	Reed

Number	Manufacturer	Name
1	Reed	Reed
2	Regal	Rega
9	Reiss	Reis
6	Relay	Rela
1	Reliance	Reli
1	Rheinhold	Rhei n
1	Rheita	Rhei t
1	Richardson	Rich a
1	Richter	Rich t
3	Ricoh	Rico
8	Rista	Rist
1	Roberts, Edw. D.	Robe
1	Roos, The	Roos
1	Rossier	Ross
1	Rotoflow	Roto
7	Royal	Roya
19	Russisch	Russ
2	Rynja	Rynj
1	Sanders	Sand
2	Santok	Sant ok
2	Santoku	Sant oku
1	Sdelaho	Sdel
2	Seehase	Seeh
1	Seger	Sege
2	Siemens	Siem
1	Simi	Simi
2	Simplex	Simp le
2	Simplon	Simp lo
1	Sivad	Siva
2	Skala	Skal
1	Slide Chart Corporation	Slid
1	Smiths	Smit
15	Staedtler	Stae
4	Sterling	Ster
1	Stevenson	Stev
89	Sun Hemmi	Sun
1	Sweco	Swec
1	Tamaya	Tama
8	Tavernier Gravet	Tavé
17	Tecnostyl	Tecn
1	Teknolisk Institut	Tekn ol
4	Teknor	Tekn or
25	Thornton	Thor
1	Threescale	Thre
2	Trilux	Tril
4	Tröger	Trög
21	Unique	Uniq
10	Unis France	Unis
1	Unknown	USA
10	Uto	UTO
5	Veb	VEB
1	Vogelsang (Hähne?)	Voge
1	Vogtli	Vogt
1	Weber	Webe
1	West & Partn.	West
4	Wichmann	Wich
1	Winterthur, Rieter	Wint
3	Wolters	Wolt
4	Wolters (Fuji?)	Wolt
1	Worthington	Wort

Total number log slide rules 1826
Number of Manufacturers 190

Data from the "BLUE BOOK"





THE CATALOGUE

Herman van Herwijnen

15 second summary:

As far as we know no catalogue of slide rules has been made available to collectors other than the so called "Blue Book" of the Dutch Circle of Slide Rule Collectors. The Blue Book started as a personal file of one of the members and has been extended with the help of others. The data available in the computer database are descriptions of some 1800 slide rules with one or more log-scales and some 500 other slide rules.
The purpose of this article is to propose a plan for developing a worldwide catalogue, which will be acceptable to the majority of the collectors and set some rules for describing slide rules (SR's). Rules for identification of SR's and methods of describing SR's are proposed.
In this article the abbreviation SR is used to cover the widest possible choice of slide rules, circular, cylindrical, or other formats.

Purpose of a catalogue

Several types of catalogue could be considered:
- The scientific, historical one for those interested in the technical side and the history.
- The collectors catalogue for knowing which SR's are in one's collection and which are missing.
- A price guide for knowing the value of a SR for selling, buying or insurance purposes.
- Any combination of the above.

The making of a catalogue

"The catalogue will be a loose leaf system".

A loose leaf catalogue has the advantage that it can be built up slowly, production can be spread among several people and updates are also loose leaf. The disadvantage is the considerable effort required, large volume and probably high cost.

Catalogue content

A catalogue can contain all or part of the items mentioned below:
- A summarised history of SR's in general, inventors and literature references.
- The history of one specific SR, year(s) of production, manufacturer(s), factories, patents and documentation.
- A list of SR's described in enough detail to identify the type, the possible variation, collector notes on availability of a case and/or box and instruction booklet. Description of the SR in detail with pictures (in colour) to make the catalogue clear and attractive.
- Rarity, Collectors Price and/or Insurance Value, preferably in a separate list.
- Room for describing individual extensions such as date of purchase, price paid, condition of the SR, and whether a box and/or case or instruction booklet is present.

Types of SR's considered

1. **All possible types**
   with all log- and log-technical SR's and other technical types related to calculation e.g. military, nautical, aviation, medical, financial, etc. (including "conversion" SR's that do not use log-scales).
2. **A limited version**
   with only log- and log-technical SR's.
3. **A mixture of 1 and 2**

Method of presentation

- **A detailed write up**
  of each SR with, where necessary, a picture in colour, to show the important points and/or a cross cut to show the construction details. A detailed description according to strict rules to aid later additions of a new SR.
- **A basic version**
  based on the existing Blue Book but without pictures and many SR's described on one page A4. The modest size of such a version (now 140 pages) would be an advantage.

A more extensive catalogue could include:

- Index
- Introduction
- History of the slide rule, inventors.
- Detailed descriptions of each type in alphabetical order of the manufacturers name.
- Data on instruction booklets, original price catalogues.
- Stories on the inventors, manufacturers, factories, dealers.
- Patents listed and described
- Price guide with rarity and collectors or trade prices.

The approach:

- Reactions to ideas presented at the November meeting in Utrecht will show if there is enough interest to justify the work to be done and if it is feasible. Will the 20-40 known collectors in the Netherlands, 400-800 in the USA and possibly another 1000-2000 in the rest of the world, be interested?
- Find people prepared to take on part of the job as the size of the book could easily grow to some 3000 pages in the year 2000.
- Agree procedure and standards if more than one person works on the catalogue.
- Agree a lay-out acceptable to all interested parties.
- Agree on the most appropriate computer program.
- Sort out the making of digital photographs and/or digital scanning and/or other method of picture taking. See how CD's, CD-i's, Internet, BBS fit in.

Proposal for timing:

- 1995-1997
  Reissue the Blue Book with cosmetic improvements, particularly on the variations, (see example on the Aristo 0903 LL). Simple scanning in black and white of those differences that are difficult to describe. Assemble a group of people prepared to work on the extended catalogue. If feasible agree on a lay-out, format and content.
- 1998-1999
  If feasible, start issuing first pages of the loose leaf system. Start with SR's held in existing collections.

The data required for a catalogue and its page make-up.

It goes without saying that the name of the SR is reported first. This information is often printed on the SR. Also easy to determine is the type (slide rule, circular, etc.), the kind (log type, technical, military etc.), the material it is made of, the sizes, and the scales that are present (L, K, A, B, C, etc.) on the front, on the sides, on the slide, under the slide and on the back. The manufacturer and/or the distributor of the SR is often known. For a detailed write up see next chapter: RULES FOR DESCRIBING SLIDE RULES (SR).
The data mentioned above are shown in the top part of the catalogue page. See example page 46 and below. This part could be called the basic data area of the page. It has the same size and location on the page for each SR in the catalogue and in many cases is sufficient to identify a SR.

Basic data:

Examples of the text that goes into the type, kind and material boxes can be found in the article called PRE-DEFINED DESCRIPTIONS page 44. The basic data area looks as follows:

Name					
Kind	Type	Material	Sizes	Manufacturer	Nr.

Scales		
	Front	
	Back	

Most of the time one line for the front and one for the back will be enough to hold all scale codes, but the computer layout is programmed such that there will be room for two lines in case the number of scales excedes the lenght of the box shown. How these scale codes are determined is described in the next chapter, RULES FOR DESCRIBING SLIDE RULES (SR).

Most common features of the SR:

For a more detailed description one can look at many features of the SR. A distinction is made between features that are standard for most SR's e.g. the colour being white and those that are different. Only the "different from standard" data are reported. It is the next group of data at the page and always in the order:
1. Scale data, 2. Text data and 3. Construction/other data.
After the basic data has been determined, details are given first on the scales e.g. the location of the codes, whether there are extending scales, colour of letters, numbers and tick marks, which numbers are used, colour of the body under the scales. Secondly information is given on text e.g. location of the text and its colour if not black. Thirdly the information is reported on the construction of the SR, e.g. how the scale strips are mounted, whether end plates are present, its location and colour, what the cursor type is and other information on the construction. See example page 46 for the result and below for the way the input lay-out looks like. This lay-out is different from the catalogue page lay-out and is designed to make it easy for the person that feeds data to the computer. Pre-defined sentences will pop up when feeding data to enhance the use of standard descriptions. See separate article RULES FOR DESCRIBING SLIDE RULES (SR). If all data is standard then the catalogue page will show no further description at all.

Common features

Scale codes location at front left
(A B CI etc.) and formulas (x x^2 1/x) right

Scale codes location at back of slide
(S T ST, sin. tg. sin/tan etc. qualify as codes)

Extending scales, which scale, colour

Colour of scale code-letters, figures and stripes

Colour of body under scale

K-scale, A-scale figures used

Other scale info (front)

Other scale info (back)

cm-scale info

inch-scale or scale-scale data

Text at body front, its location and colour

Text at body back, its location and colour

Text at slide front, its location and colour

Text at slide back, its location and colour

Text under slide, its location and colour

How are scale strips mounted

Cursor type and data

End plates info, colour, number screws

Colour and description of case

Other data, like windows, construction

In the case there are more SR's with the same basic data but differ in other aspects then differences must be found between the two or more SR's and reported separately, see under "Variations".

Pictures:

Some times differences between text, at otherwise identical SR's, are hard to describe when the words are identical but the way they are printed is different. In that case a picture of the text is the best solution. The same is true for a logo which may be difficult to describe. Also differences in scales can be shown in pictures. In a table (see under Variations) it can be made clear which picture belongs to which SR. See example page 46.

Variations:

One part of the page is reserved for the reporting of variations if there are any. One SR with the same basic features can have as many as 25 or more variations. When setting up a page in the catalogue for a certain SR with many variations one will look for one with as many common features as possible as the one that is described first and will be the one all others are compared with. This may in the end, when the catalogue becomes more complete turn out not to be the ideal start off example but it is suggested not to change that anymore.
Again in the some order: Scales, Text and Construction and other, descriptions of variances are put in tabular form. The variation is described in a short sentence and all SR's with that variation receive a cross in the column that belongs to that particular SR. The more crosses in the column the more differences that SR has with the basic one. The variation number is given at the top of the table.

Variations

	01	02	03	04	05	06	07	08	09	10	11	12	13	14
Scale:														
BI letters and numbers red		X			X								X	
4 extending scales, A, B, C, D, red		X												X
K=1-1-1-1			X			X								X
no cm scale			X			X	X							X
Text:														
(flt) Aristo 0903 LL red				X		X		X		X				
(sfr) vertical DBGM								X	X	X	X			
Under slide no text				X						X				
(brb) ***PATENT 163487***						X						X		
Construction/other:														
End plates with round edges				X								X		
Each scale strip mounted with 2 screws					X									

Rules for describing SR's

Probably the most important element for describing a SR is an identification code.
See page 33 en 34 for a detailed description.

Describe the SR in the following order:

I. **All about scales.**
II. **All about text**
III. **All about material and construction**

What to mention and what not

Rule 1: What is considered common is not mentioned.
Rule 2: 90% of the uncommon elements of the description should come from multiple choice pre-defined sentences.
Rule 3: In the other 10% of cases, stick to the house-style.

Ref. rule 1: Assumed common and therefore not mentioned in the description are:
- The front side of the SR is the side that has the A-scale (x^2 = 0-10-100) or if there is no A-scale the DF-scale.
- Scale-codes (K L A B etc.) when printed at the left-hand side of the SR and formulas (x, x^2, 1/x) on the right-hand side.
- Scales not extending below 1 and above 10, 100 or 1000 (example: A-scale from 1-100 and not from 0.8 to 110)
- A-scales with the numbers 1-10-100 and K-scales 1-10-100-1000.
- A cm- or inch-scale ending with an even number.
- Text on a SR is put horizontal.
- Letters, numbers and tick marks are printed in black.
- SR's with one slide.
- SR's without end plates.
-. SR's having end plates but they are on one side.
- SR is white including the end plates, if present.
- The cursor is made of flat perspex.
- A slide has the same length as the body.
- "Wood", as indication of the type, means wood covered with plastic or celluloid scale strips.
- Scale strips, when present, are glued on.
- "All wood", as indication of the type, means only wood is used, with or without metal pins or screws.
- Other, still to define.

Ref. rule 2: Non standard elements of the description should come from multiple choice pre-defined sentences.
This reduces inconsistencies in terminology
(see pages 44 and 45)

I. All about scales:

Scales and the scale codes (L, K, A, B, C, CI, D, LL1 etc) printed near the scales are a very important part of the description. These codes are very useful for quickly identifying variants of SR's with the same identification code because different scales indicate different variants. Often the scale codes are printed with capital letter on the SR in front of the scale. e.g.: L, K, A, B, C, CI, D, LL1 etc. At the right hand side, the scales are often printed formulas belonging to the scales e.g.: lgx, x^3, x^2, x^2, 1/x, x, x, $e^{0.01x}$. In the description of the scales these capital letters are used and if the location of the letters is not at the left hand side of the scale and formulas not at the right hand side then this should be mentioned. If scale code letters are present then they are used to indicate which scales are on the SR in the following way: **K A = B C = D L**. If there are no codes printed at all, then it should be checked what type of scales they are and put in the scale-code field underlined e.g.: K A = B C = D L

Scale codes at the front and back of the SR are shown separately. In the coding for the front also the scales at the top side (often the cm- or inch-scale), bottom side and scales located under the slide on the body are given. For example, in a description of the front scale codes such as: **25cm / A = B C = D / K L #30-60cm#** the **25cm /** means that a 25 cm scale is at the top side of the SR. Often these cm scales are a part of the SR that is at an angle with the main body. In the example description the **A** scale is the first scale located on the top part of the body. What is in between = and = are scales at the slide and the **D** is at the bottom part of the body. At the bottom side, indicated with / **K L** the K and L scales are located. What is **under the slide** printed on the body is given between the # and # symbol, for example **#30-60cm#**. The # sign is being used because it practically never appears on a SR and therefore avoid confusion. While **25cm** and **#30-60cm#** are written without spaces to indicate each of them is one scale, between the other codes and symbols = and / two spaces are put. At the back, for instance, **= S ST T** = means that in this case there are only three scales at the back of the slide and nothing on the body.

If the scale codes are not mentioned at the left hand side of the scale but at the right hand side, then this should be mentioned. In case the scale codes are not located at the left side of the scale then this should be mentioned. If non standard scale codes are used, then use these in the scale code fields and also explain which scale each code represents: **B^3=K, B^2=A, b^2=B, a=CI, b=C and B=D.**

If the scale code or name printed on the SR is not the equivalent of a familiar scale (see list of familiar codes page 43), then mention in the scale field **1)** or **2)** or **3)** etc. for instance **25cm / 1) 2) = 3) 4) = 5) / 10inch** and describe these unknown scales giving the name of the scale and the range it covers e.g:
2)=Cv VALUES from 0.04-10^4 and notice that between 2)=Cv there are no spaces.

For details on scale descriptions

see pages 44 and 45

Examples of what to look for are:
Scale numbers, code letters and tick marks can be coloured.
Parts of the SR under the scales can be coloured.
Scales can be extended below 1 and/or above 10, 100 or 1000. This must be mentioned and if coloured, this must be recorded, e.g.: **5 extended scales of which CI red** (by default the others are black).
Numbers on A- and K-scales can be different from the common 1-10-100 and 1-10-100-1000, then this should be mentioned by saying: **K=1-1-1-1** (by default A= 1-1-1) or if there is no K-scale but only an A-scale then say: **A=1-1-1.**
If the cm-scale is longer than the last number indicates, then mention this.
Some times the inch-scale is extended e.g.:
8inch-scale has both sides 1 inch extra divided in 1/20th and 1/32nd inch. Do not call this a 10inch-scale.

II. All about text

Text location and printing

Indicating where a text is located at the SR requires a standard code. For example, "(frb)" means that the text is located at the front, right, bottom and "(sbl) vertical" means that the text is at the slide, the back, left and vertical. Although abbreviations should be avoided, they are proposed for indicating the location of the text because practically every SR has some text. The code shown between brackets is built up from the following letters in the following order:
s=slide, when text is on the slide the code starts with an s
f=front, b=back
l=left, m=middle, r=right
t=top, m=middle, b=bottom*
for text under the slide on the body of the SR, always begin with "Under slide" and then again add the codes for the location.
text must be printed as it appears at the SR with CAPITALS, small print, **BOLD**, underlined, *italic* , outline etc.
*Note: the "b" for "back" is always first and "b" for "bottom" last in the code. It can hardly give confusion.

III. All about material and construction

Check first for unusual features.

- Are there transparent parts?
- Are end-plates present?
- Are there end plates on both sides?
- Are end-plates coloured?
- Do end-plates have odd shapes?
- Are there rubber pads or strips?
- How are scale strips mounted? Glued is standard and therefore not mentioned.
- Is an unusual cursor used? The same SR may exist with different cursors.
- Information on what is printed at the back.
- Mention the serial number (if present) and its location. It may be stamped into the material in relief and can give information on the date of manufacture.

Information on instruction booklets, including the title, for which SR's the booklet is made, the publisher, the size, page numbers, language and any other data.

A description of a circular SR's is in general more complex than that of a ruler. The different discs, the windows, the scales, different cursors, the colours, the text are all more difficult to describe. No uniform system has been worked out so far.

Does and don'ts

- Put sizes in mm and not in cm or inches. Also the thickness of a SR even if it is 0.5 mm.
- If there are no code letters for the scales but the familiar x, x^2 of 1/x on the right side of the scale then do not mention those but say A = B CI etc. Thus the normal codes but underlined meaning they are not printed on the SR.
- Always include the size of a cm- or inch-scale. Thus 25cm or 8inch wthout spaces between number and letters.
- The scales under the slide to be put between the # and #. Electrical type SR's are well known for scales under the slide.
- In the text part of the description, use a comma to divide the different parts of a description while talking about one subject, say scales. Do not use the ; When going to a new subject, say the construction details, start with a capital.

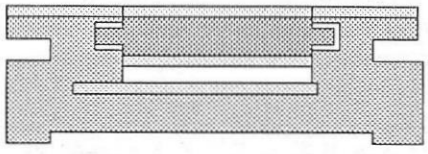
Price and rarity

The price of a SR is different in different countries and may change in time and should therefore not be included in the catalogue but be given in separate lists that can be updated periodically. The rarity has to be determined by a committee after sufficient data is available.

The computer program used as database

Claris Filemaker Pro is the program containing the existing data of the Blue Book and is the second most used data base for both Apple and IBM compatible computers (after D-Base). It is very user friendly and can be used on both types computers and is interchangeable.

- A lay-out example (still without colour) is added page 46



CHECK-LIST:

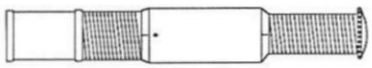
When describing a SR take this list for checking

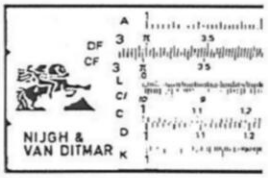
Are there scales under the slide?
Are there scales on the sides?
Are scales coloured?Are the letters and/or numbers coloured?
Are scales on a coloured background? Is slide coloured?
Are there extending scales? Are extended parts coloured?
If K-scale is not 1-10-100-1000: K is 1-1-1-1. or: A is 1-1-1.
Are unusual scales present? Then enter 1) 2) 3) etc in the scale code field.
Any unusual scale codes at the right? like: KZ = T % T = Z.
Does cm- or inch-scale end with even number?
Does 8inch scale have both sides 1 inch extra divided into 1/20th and 1/32nd inch?
Is there any text: at the front, under slide, at slide front and back, at back, at the side, at end plates, at cursor, vertical, printed in relief?
Are scale strips mounted with metal or wooden pins or screws?
Are there end plates on both sides?
Are end plates (both sides) coloured?
Are there serial numbers printed at the SR?

A photo copy of the SR on paper together with a description of any colour present is the simplest method of describing a SR for archiving by somebody else.

LIST OF MOST USED CODES

Codes				Formula	Range	
A	$=B^2$			x^2	1-10-100	
B	$=b^2$			x^2	1-10-100	
C	=b	=T1	=E	x	1-10	
D	=B	=Z	=V	x	1-10	
AI				$1/x^2$	1-0,01	I means: inversion
BI	$1/B^2$			$100/x^2$	100-1	B and BI next to each other
CI	=a	=P1	=R	1/x	1-0,1	C and CI next to each other
DI				1/x	1-0,1	D and DI next to each other
CF		=KZ		πx	3-10-33	
DF	=T	=T2		πx	3-10-33	
CIF		=P2		$1/\pi x$	0,33-0,1-0,03	CI and CIF next to each other
DIF				$1/\pi x$	0,33-0,1-0,03	DI and DIF next to each other
K	$=B^3$		=R	x^3	1-10-100-1000	
L	=lg			log x	0,0-1,0	
P				$\sqrt{1-x^2}$	0,996-0	
LL0				$e^{0,001x}$	1,001-1,01	
LL1		=ZZ1		$e^{0,01x}$	1,01-1,11	
LL2		=ZZ2		$e^{0,1x}$	1,1-3,0	
LL3		=ZZ3		e^x	2,5-100 000	
LL00	=LL/0			$1/e^{0,001x}$	0,999-0,990	
LL01	=LL/1			$1/e^{0,01x}$	0,99-0,90	
LL02	=LL/2			$1/e^{0,1x}$	0,91-0,35	
LL03	=LL/3			$1/e^x$	0,4-0,00001	
S	=sin			sin en cos x	5,5-90° en 84,5-0°	
ST	=S&T	=SRT		sin en tg x	0,55-6° en 89,45-84° for small angles	
T	=tg			tgx cot <45°	5,5-45° en 84,5-45°	
T1				tg en cot x	5-49° en 49-85°	
T2				tg en cot x	41-85° en 5-49°	
Ch				coth	0,1-1-3,0	cotangus hyperbolicus
Th				tanh	0,1-1-3,0	tangus hyperbolicus
Sh1				sinh	0,1-0,9	sinus hyperbolicus
Sh2				sinh	0,85-1-3,0	simus hyperbolicus
R1	=W1'	=W1		$\sqrt{x}$	1-3,2	
R2	=W2'	=W2		$\sqrt{10x}$	3-10	
P				$\sqrt{1-(0.1x)^2}$	0,996-0	
P1				$\sqrt{1-x^2}$	0,995-0	
P2				$\sqrt{1-x^2}$	0,99995-0,995	
Dynamo					20-100	
Motor					20-100	
Volt					0,5-10 ook 0,2-20	
Some times scales are defined differently for instance:						
CI				10/x	10-1,0	
DI				10/x	10-1,0	
CIF				$10/\pi x$	3,6-1-0,28	





PRE-DEFINED DESCRIPTIONS

Herman van Herwijnen

In order to standardise the descriptions of the slide rules (SR) pre-defined sentences are proposed. If none of the sentences apply then a new description should be made in the same style as the pre-defined ones. Information supposed to be the standard is shown in brackets in the pre-defined lists. This information should not be printed.

The kind of SR is defined as

ruler
circular
cylinder
slide chart
watch type
addiator

The type of SR is defined as

logarithm
log/tech.
technical
conversion
financial
military
aviation
medical
calculate
photography
nautical
other
chemistry
electrical
concrete
hydrology
radioactivity
astronomy
astrology

For the material

synthetic
wood/synth.
all wood
bamboo/synth.
wood/celluloid
metal
plastic
perspex
cardboard

To show where scale code-letters (A, CI, etc.) and formulas (x^2, 1/x etc.) are located on the front

((f) Scale codes left, formulas right)

(f) Scale codes right, formulas left
(f) Scale codes left, no formulas right
(f) Scale codes left except ..
(f) Scale codes right except ..
(f) .., .., .. scale codes left and .., .., .. scale codes right

To show where scale code-letters (S, ST, T, etc.) and formulas (sin, sintan, tg, etc.) are located on the back

((b) Scale codes left, formulas right)

(b) Scale codes right, formulas left
(b) Scale codes left, no formulas right
(b) Scale codes left except ..
(b) Scale codes right except ..
(b) .., .., .. scale codes left and .., .., .. scale codes right

Colour of scale letters, numbers and symbols

(All letters, numbers and symbols black)

CI numbers red
CI letters and numbers red
CI completely red
CI, C and P completely red

Number and colour of extending scales (fill in the correct no.)

(No extending scales)

5 extending scales
5 extending scales red
5 extending scales, of which CI red
6 extending scales, of which CI and BI red

Colour of body and/or slide

(Whole ruler white)

Under A, B, C and D yellow
Under A, B, C and D blue
Under A, B, C and D green
Whole SR yellow

Numbers used in the K-scale and or A-scale

(K= 1-10-100-1000 and/or A=1-10-100)

K=1-1-1-1
A=1-1-1

Other scale information front

(f)
(sf)

Other scale information back

(b)
(sb)

Data on cm-scale
(cm-scale ends with whole number)

cm-scale does not end with whole number

Data on inch-scale
(inch-scale ends with whole number)

inch-scale has on both sides extra 1 inch giving 1/20 and 1/32 inch
inch-scale does not end with whole number

For identifying variants of SR's it is important to know which text is printed on the SR and where. The way it is written should be copied i.e. CAPITALS, small print, *Italic*, underline, **Bold** with all dashes and points in its place.

Text on front of body. Also text written in front of scales other than the codes. Describe logo's used

(flt)
(fmt)
(frt)
(flb)
(fmb)
(frb)

Data on the back of the body of the SR or on a separate strip. Describe logo's used. If much information is given specify what kind, conversion factors, formulas, instructions, graphs etc. and mention language and any code.

(blt)
(bmt)
(brt)
(blb)
(bmb)
(brb)
Plastic strip with ..... at the back
Paper strip with ..... at the back
Separate plastic strip with ..... data
Separate paper strip with ..... data

Text on front of slide, describe logo's used, mention colour

(sfl)
(sfr)
(sfl) vertical
(sfr) vertical

Text under slide at body, describe logo's used, mention colour

Under slide (lt)
Under slide (mt)
Under slide (rt)
Under slide (lm)
Under slide (mm)
Under slide (rm)
Under slide (lb)
Under slide (mb)
Under slide (rb)

Text on the back of slide, describe logo's used, mention colour

(sbl)
(sbr)
(sbl) vertical
(sbr) vertical

Way in which scale-strips are mounted and mention number of screws or pins. In case not all strips are mounted with pins or screws then mention this separately
(Scale strips glued on)

Scale strips mounted with .. screws
Scale strips mounted with .. metal pins
Scale strips mounted with .. wooden pins

Type of cursor used and number of screws used.
Be sure the cursor is original
(Flat perspex cursor without screws)

Flat perspex cursor in metal frame
Curved whole perspex cursor
Curved perspex cursor in metal frame
Curved perspex cursor, loupe type
Glass cursor in metal frame
Celluloid cursor
Celluloid cursor in metal frame
No cursor
Radial perspex cursor
Radial metal cursor

Where are end plates mounted and mention colour if not white and number of screws per end plate
(No end plates)

End plates on the front
End plates on the back
End plates on front and back
Metal end plates at front and back

Case type. Note that some times SR's come in leather etui and cardboard box. If so mention.

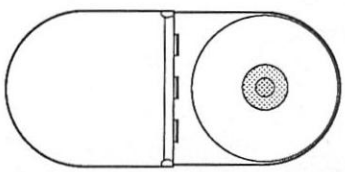
Brown leather case
Synthetic case
Black cardboard case
xxxx cardboard case
Perspex case
Yellow and red plastic case
Plastic case
Wooden case
Textile case

Other information

(b) One closed window
(b) Two closed windows
(b) No window

For describing the rarity the following codes could be used.

Common (4 out of 5 collectors have one, can be bought at flea markets)
R (only 1 out of 5 collectors have one, may come up for sale every month)
RR (one out of 25 collectors have one, it may take a year to find one on the market)
RRR (very rare only one or two known under collectors, may take several years before it comes up for sale)
RRRR (extreme rare, museum piece, unlikely it will ever come up for sale)

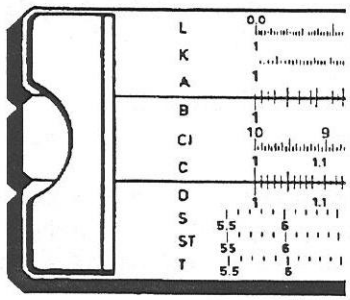


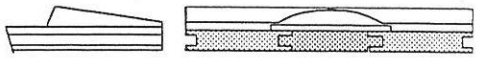
Aristo Scholar 0903 LL

Kind	Type	Material	Sizes	Manufacturer	Nr. Aris0903LL
ruler	log	synthetic	330x44x3.9	Aristo	

Scales

Front	L K A = B CI C = D S ST T
Back	25cm = S LL2 LL3 = 8inch





CI letters and numbers red. <cos and numbers counting from the right in the S, ST and T scale red.
Under L, K, S, ST and T yellow

The numbers 800,900 and 1000 in the K-scale may have different size. See under variations a thru d. a=(900 and 1000 smaller), b=(800, 900 and 1000 smaller), c=(800 smaller, 900 and 1000 much smaller) and d=(900 and 1000 much smaller)

(b) S with 1-2 mm line between 5.5 and 6
LL2 with 1.10 1.12 1.14 1.16 1.18 1.2

inch-scale has both sides extra 1 inch giving 1/20 and 1/32 inch

Text

(blt) ARISTO SCHOLAR LL
(sfr) see pictures

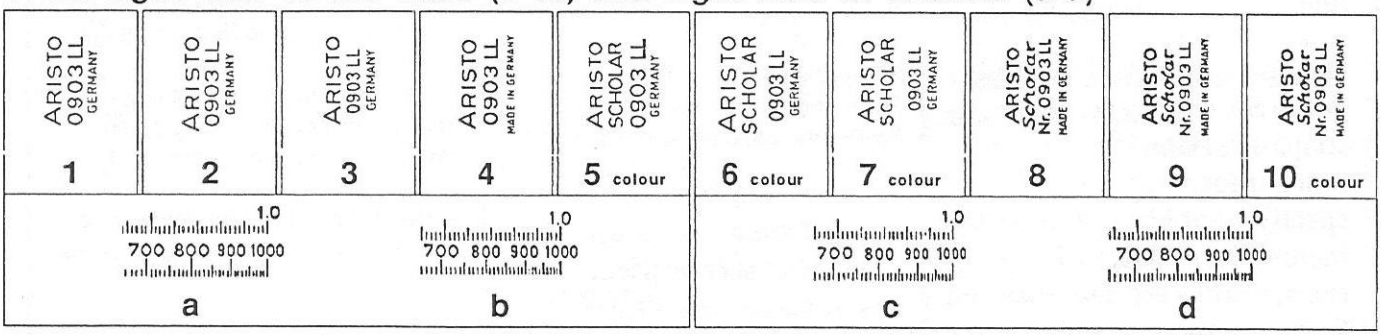
Other

Curved perspex cursor
End plates at the front with sharp edges without text
Cardboard box yellow. PVC case yellow and red.
Slide width between 16.4 and 16.9 mm.

Variations

	51	61	64	60	53	62	56	52	57	59	65	38	25	31	32	30	45	54	55	63
Scale:																				
Other scale (f) L K A = B BI CI C = D S ST T													x							
Other scale (sb) = S LL1 LL2 LL3 =													x							
Other scale (f) 25cm K A = B CI C = D S T L												x								
No 25cm scale												x	x	x	x	x				
No 8inch scale												x	x	x	x	x	x			
LL2 with 1.1 1.12 1.14												x								
LL2 with 1.10 1.15 1.2													x	x	x	x	x	x		
(b) S with 4-5 mm line between 5.5 and 6				x	x	x														
(b) S with 1-2 mm line and o between 5.5 and 6							x	x	x	x	x									
(b) S with 4 mm line and o between 5.5 and 6												x								
Variations in numbers in K-scale, see pictures	a	c	d	a	a	a	a	a	d	d	d	a	b	d	d	d	d	d	a	d
Numbers and letters of BI scale red													x							
Under L, K, S, ST and T red											x									
Text:																				
(b) No text at all												x	x	x	x	x				
(sfr) vertical text as in pictures	2	1	4	4	9	9	9	9	9	8	8	10	6	5	7	1	1	3	2	3
(sfr) vertical Made in Germany red												x								
(sfr) vertical ARISTO SCHOLAR red													x	x	x					
(frt) vertical DBGM							x	x	x	x	x									
(sfr) vertical DBGM												x								
(f) No red letters and numbers in S and ST scale												x								
(frb) No <cos												x								
Name in relief at endplates vertical ARISTO													x	x	x	x	x	x	x	x
(brt) URHEBERRECHTLICH GECHÜTZT											x									
Construction/Other:																				
End plates with round edges									x	x	x	x								
Ruler 10 mm shorter						x	x	x	x	x	x	x								
Slide width 17.9 mm													x							
Completely white without yellow												x								
Flat perspex runner								x	x	x	x	x								
Old grey cardboard case												x								

Front right side of the slide (1-10) and right side of K-scale (a-d)

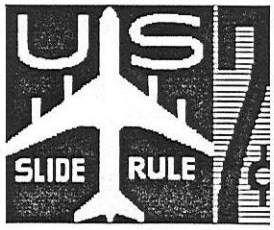


CONDITION DESCRIPTION

Herman van Herwijnen

A description of the condition of a stamp, a camera or a slide rule is very often required when being sold at an auction or when the buyer cannot examine the object. A list or catalogue is needed in which it is clear to the buyer what he is going to buy before he makes an offer. The seller will try to give a favourable description as he wants to sell at the highest possible price. The buyer must be protected against inflated descriptions. The Dutch Circle of Slide Rule Collectors have developed a condition rating system which covers most cases. It is proposed to accept this system World wide. A comparison of six methods is given and pro's and con's are highlighted.

As a stamp-, camera- and slide rule collector I am familiar with several different methods of condition description, which are explaned below:

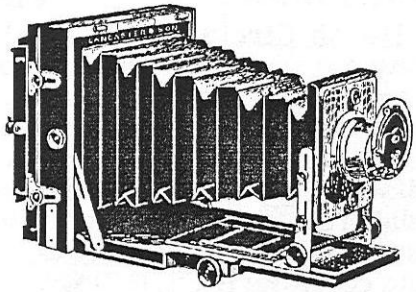


Stamps:

***	= Mint with full original gum without hinge (rests)
**	= Mint with hinge (rests)
*	= Mint without original gum
de Luxe	= Superb in every respect
Beautiful	= Used stamps of first quality without any defects
Nice	= Fine copy without faults but less attractive (**van Dieten Stamp Auctions**) or With faults, short dents or small margins (**Amsterdam Stamp Auctions**).

Remark: Experience is that you should never buy a "Nice" stamp and be very careful with the "Beautiful" ones. Note that there are three types of "Mint"

Cameras:



At the Cornwall Auctions (Germany) they use:

A	= New condition
B	= Very good condition (only small signs of use)
C	= Normal condition (usual signs of use)
D	= Outward surface very warn
E	= Very bad condition

Remark: Experience shows most items presented are in condition C.
Often ratings A/B, B/D and C/D are used to cover the in-between cases.

At the Breker Auctions (Germany) they use:

An optical (external) and technical (functional) value, on a scale of 1-6, is given as (3/2) meaning: optical "3" (satisfactory) and technical "2" (good).
The description is:

1	= Very good (unused, no trace of use)
2	= Good (like new, slight traces of use)
3	= Satisfactory (normal traces of use)
4	= Sufficient (strong traces of use, immaterial parts added)
5	= Poor (defect, strong traces of use, important parts exchanged, needs repair)
6	= Deficient (totally defect, important parts missing, heavily damaged)

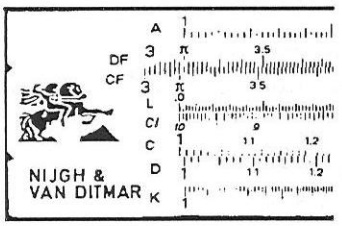
Remark: This code system does not seem to cover the full range of conditions because in 50% of the cases a + or - is added to a number or a / between two numbers to indicate a slightly better or worse- or an in-between condition. Notice three ratings for damaged material.

In the McKeown price guide they use:

0 = New merchandise, never sold. In original box with warranty.
1 = AS NEW. Never used. Same as new, but not warranted with box or original packing.
2 = No signs of wear. If it had a box, you would not be able to tell it from new.
3 = Very minimal signs of wear.
4 = Signs of light use but not misuse. No other cosmetic damage.
5 = Complete but showing signs of normal use or age.
6 = Complete but showing signs of heavy use. Well used.
7 = Restorable. Some refinishing necessary. Minor parts may be broken or missing.
8 = Restorable. Refinishing required. May be missing some parts.
9 = For parts only, or major restoration if a rare camera.
The use of a + or - is allowed to indicate in-between conditions.

There is another scale from A thru K to describe the functioning of the camera. Note that there are 3 numbers to describe unused (new) camera's (0, 1, 2) and 3 ratings for damaged ones (7, 8, 9).

Slide rules:



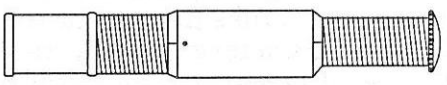
The Oughtred Society uses:

1 = Very good
2 = Good
3 = Slight traces of use but fully functional
4 = Strong show of use, scratches, slight functional disorder
5 = Some defects, some parts may be missing
6 = Defective, important parts missing, bad condition.

The disadvantage of this system is that of the top conditions, no distinction is made between mint and very good and no information on box, case and instruction manual is given. These data have to be added in writing. Codes 4, 5 and 6 indicate more or less damaged slide rules, as in McKeown's and Breker's condition description.

The Dutch Circle of Slide Rule Collectors thinkthey have defined a 95% unambiguous condition scale without needing to resort to +'s or -'s or 1/2's. The McKeown camera condition description was used as basis. As in the stamp condition description there are 3 condition codes for unused slide rules (C0, C1 and C2) because, as in the stamp business, the price difference may be a factor 2 between CO and C2. There are two descriptions of the damaged condition (C7 and C8) for those people that do not mind a small defect as long as the rest of the slide rule looks good and to clearly identify a damaged, bad condition slide rule. Conditions C3 thru C6 offer four grades to describe the used, but undamaged, slide rules. This should cover the B/C's, C/D's, 3/4's, 3-4's, 3+'s and 2-'s used in most of the other condition descriptions. It is therefore designed to cover both the needs of those that only want "Mint" rulers and those with a wider range of interest. However clear the individual interpretation this can cause differences, but this seems unavoidable. The "Circle" conditions are:

C0 = Mint condition with all extras such as box, case and instruction manual present also in mint condition, factory clean.
C1 = Mint condition with all extras such as box, case and instruction manual present but these extras not or not all in mint condition.
C2 = Mint condition but without one or more of the extras.
C3 = Very minimal signs of use.
C4 = Minimal signs of use.
C5 = Signs of normal use.
C6 = Signs of heavy use.
C7 = Small damage but for the rest C4 quality or better.
C8 = Damaged and well worn.



Important information, like "cursor broken" or "cursor missing" or type of damage, should be given in writing to avoid making the coding more complex. No +'s and -'s are allowed.
See page 3 for a graphical presentation and comparison with other familiar grading systems.

CONDITION

C0 = Mint condition with all extras such as box, case and instruction manual present also in mint condition, factory clean.
C1 = Mint condition with all extras such as box, case and instruction manual present but these extras not or not all in mint condition.
C2 = Mint condition but without one or more of the extras.
C3 = Very minimal signs of use.
C4 = Minimal signs of use.
C5 = Signs of normal use.
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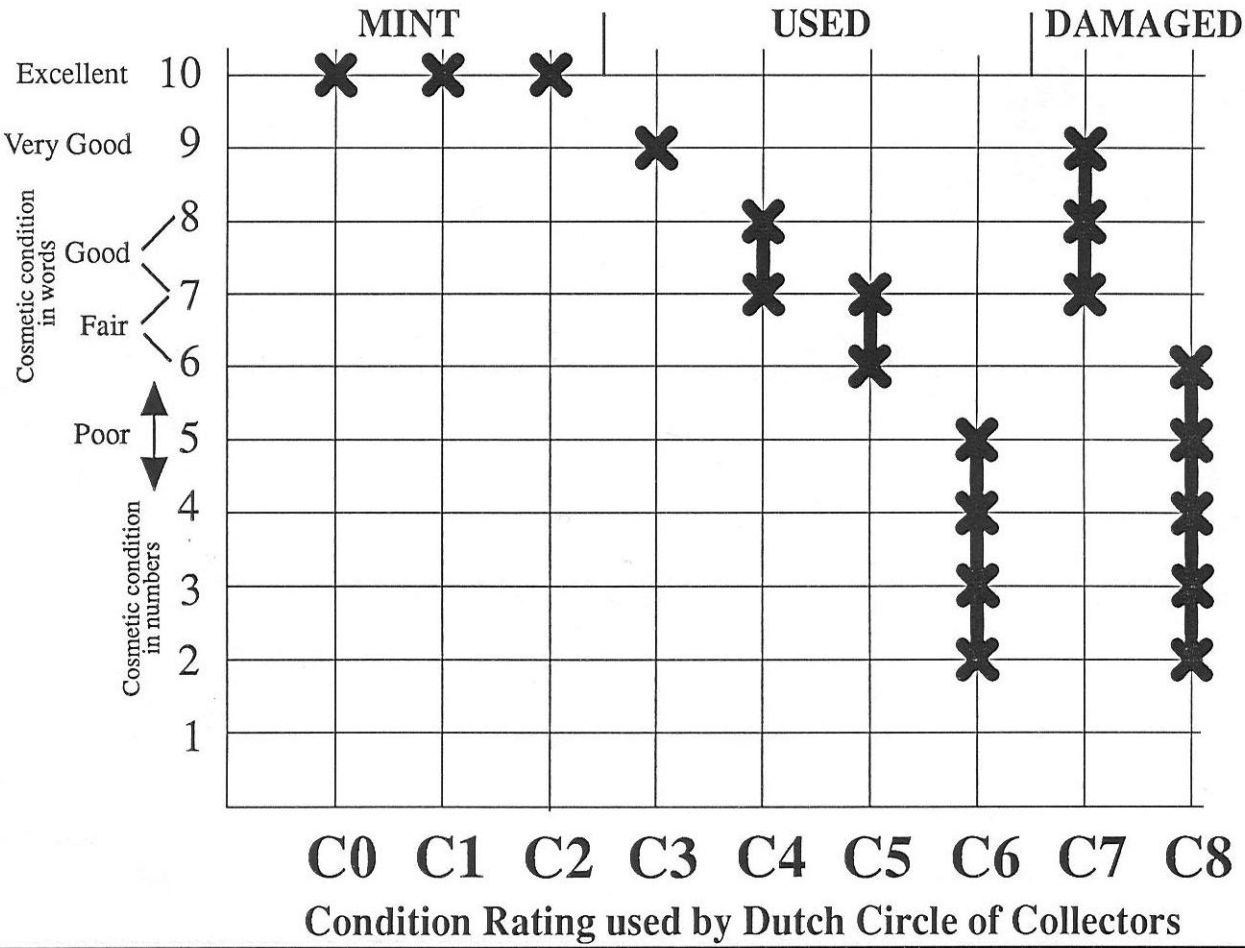
Important information, like "cursor broken" or "cursor missing" or kind of damage, should be given in writing to avoid making the coding more complex.



Condition Rating used by Dutch Circle of Collectors

INFORMATION SUPER HIGHWAY FOR SLIDE RULE COLLECTORS

Otto van Poelje

Communication types

For the purpose of this paper we divide the ways in which we communicate with each other, in different methods (speaking, writing, or "showing things" in general), and in levels of participation (just two persons, one person-to-many, or many-to-many).

Traditional communication

For hundreds of years we have been using the following traditional media:

	ONE - TO - ONE	ONE - TO - MANY	MANY - TO - MANY
SPEAKING	*CONVERSATION*	*LECTURE*	*DISCUSSION*
WRITING	*LETTER*	*NEWS*	*LETTERS TO EDITOR*
SHOWING THINGS	*DEMONSTRATION*	*PRESENTATION*	*MARKET FAIR*

TYPES OF COMMUNICATION

Of these communication methods, **speaking** is the most easy, it comes natural (mouth and ear are always available), and is interactive: communication problems can be resolved immediately. But speaking is also temporal, fleeting; and a lot of redundancy is involved in speaking, which is good for avoiding misunderstanding, but bad for communication efficiency.
The method of **writing** is slow, and there is no immediate interactiveness. But the advantages of writing are in the kept records, which can be stored, copied and forwarded to others in an identical form. Also it is possible to look at a page of writing in its entirety, and see all the different lines and pictures in parallel (while speech is a single continuous stream of information).
By **showing things**, all senses (seeing, hearing, touching, etc.) are being used in a moving environment, giving the maximum impact and information content.

For **writing** there is no distance barrier thanks to postal services. But for traditional **speaking** and **showing things**, the simultaneous presence of the people involved is needed, i.e. expensive traveling in our world-wide context.

Electronic communication

The invention of electricity and electronics allowed us to overcome the distance barriers in communications. Let us look at currently available electronic media:

	ONE - TO - ONE	ONE - TO - MANY	MANY - TO - MANY
SPEAKING	*CONVERSATION* ↓ *TELEPHONE*	*LECTURE* ↓ *RADIO BROADCAST*	*DISCUSSION* ↓ *CB RADIO CHATBOX*
WRITING	*LETTER* ↓ *FAX*	*NEWS* ↓ *TV TELETEXT*	*LETTERS TO EDITOR* ↓ .....
SHOWING THINGS	*DEMONSTRATION* ↓ *VIDEOPHONE*	*PRESENTATION* ↓ *TV*	*MARKET FAIR* ↓ *VIDEO CONFERENCE*

Digital Communication

The new media that are now emerging, have been named "the Information Superhighway", on which all information is transported and handled in digital electronic form, with high speed.
This information is transported over phone lines, private business networks, bulletin boards, hobby networks and commercial networks; examples of commercial networks are:

- CompuServe
- America On-Line (AOL)
- Prodigy
- MicroSoft Network (MSN)
- AT&T Interchange
  and many others.

Our familiar communication types are getting new names:

	ONE - TO - ONE	ONE - TO - MANY	MANY - TO - MANY
SPEAKING	*CONVERSATION*	*LECTURE* ↓ *(POSSIBLE, BUT NOT IDEAL)*	*DISCUSSION*
WRITING	*LETTER* ↓ *E-MAIL*	*NEWS* ↓ *NEWS GROUP NEWS FLASHES*	*LETTERS TO EDITOR* ↓ *USENET FORUMS*
SHOWING THINGS	*DEMONSTRATION* ↓ *MULTI-MEDIA MAIL*	*PRESENTATION* ↓ *WORLD WIDE WEB PAGES*	*MARKET FAIR* ↓ *MULTI-MEDIA FORUMS*

DIGITAL COMMUNICATION ON THE INFORMATION SUPER HIGHWAY

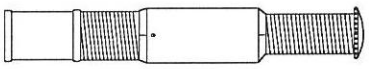
Comparison of Communication on a world-wide scale

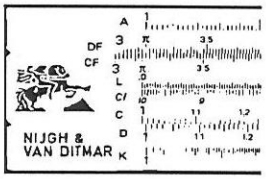
Example: Writing 3 pages of text from one-to-one person, international

1. **Traditional (letter delivered by post)**
   - cost: dfl 1.60
   - slow (1 to 4 days)
   - personal (fountain pen)
   - needs only pen, paper, envelope and stamps
2. **Electronic (fax by telephone connection)**
   - cost: dfl 3.00
   - needs telephone subscription (dfl 25.00 per month)
   - needs fax machine (dfl 1000.00) at both sides, simultaneously
   - fast (after connection has been established: within two minutes)
   - transports any type of page (written, drawn, typed, printed)
   - bad quality
3. **Digital (E-mail over the Internet)**
   - cost: dfl 0.30 (local access for about one minute, both sender and receiver; Internet transport itself is free!)
   - needs telephone subscription (dfl 25.00 per month)
   - needs Internet access subscription (dfl 30.00 per month)
   - needs PC + modem (one time dfl 2000.00) at both sides, but not simultaneously
   - access as fast as modem speed (less than 20 seconds typically for the 30K bytes of the 3 pages);
   - network transport typically within a few minutes
   - receiver can pick up E-mail whenever convenient
   - easy to send to a group of persons
   - easy to forward and to reply
   - received data (attachments) can be handled and processed by PC
   - multi-media possibility

Internet Opportunities for Collectors on a World-wide Scale

- Replace sending letters and floppies by exchanging E-mail
- Organize a many-to-many "digital discussion" on Bulletin Board, Commercial Network Forum or Internet Usenet, on the topic of sliderule collecting
- Make available a WorldWideWeb Home Page on Internet, to advertise the sliderule collecting hobby, and the collectors organizations (Oughtred Society, Circle)
- Distribute magazines to subscribers (like J.O.S or MIR)
- Make available (and keep up-to-date) files on the Internet with sliderule information of general interest to collectors (like the "Blue Book" catalogue, papers, swap lists)





STATISTICS

Herman van Herwijnen

To get a feel for what type and kind of slide rules are in the collection of the Dutch collector, what are the most common ones and how many slide rules have variants that are slightly different from one another some statistics are given. Certainly not complete but the result of 14 collections, the largest with 1426 items the smallest with 33 for a total of 4200 and an average of 300. The total of different ones is 2300. Numbers are rounded.

Kind of SR

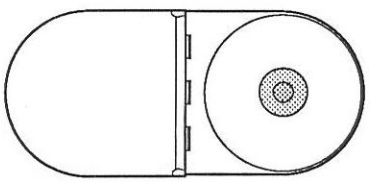
Kind	Number	Percentage
ruler	1735	75.5
circular	440	19.1
slide chart	100	4.3
cylinder	20	0.9
watch type	5	0.2

Type of SR

Type	Number	Percentage
logarithm	1700*	74.0
technical	260	11.4
aviation	130	5.6
military	60	2.6
financial	50	2.2
conversion	25	1.1
medical	15	0.6
calculate	15	0.6
photography	10	0.4
nautical	10	0.4
other	25	1.1

*Including 20 instruction SR's varying in length from 1.2 to 2.0 m

Note: in catagories other than logaritm also log-scales may be present.



Material of SR

Material	Number	Percentage
synthetic	1431	62.2
wood/synth.	548	23.8
all wood	52	2.3
metal	199	8.7
cardboard	70	3.0

Scale types

Scale	Number	Percentage
LL on front	271	11.8
LL on back	350	15.7
LL both sides	63	2.7
No scale at back	839	36.4

cm-scales

Length	Number	Percentage
10, 11, 12 cm	19	<1
13 cm	139	6.0
14 cm	102	4.4
15 cm	35	1.5
16, 17, 18 cm	7	<1
20, 21, 22 cm	7	<1
25 cm	111	4.8
26 cm	29	1.3
27 cm	354	15.4
28 cm	83	3.6
29 thru 49 cm	18	<1
50 cm	17	0.7
55, 56 cm	5	<1
100 cm	1	<1

Unique per Collection

The following list gives in detail how many SR's are fed into the computer by 14 different people and how many of these are unique i.e. only that person has that SR.
The first number is the total in the collection of one person and the second number ***(bold and Italic)*** is the number of SR's that is unique in that collection.

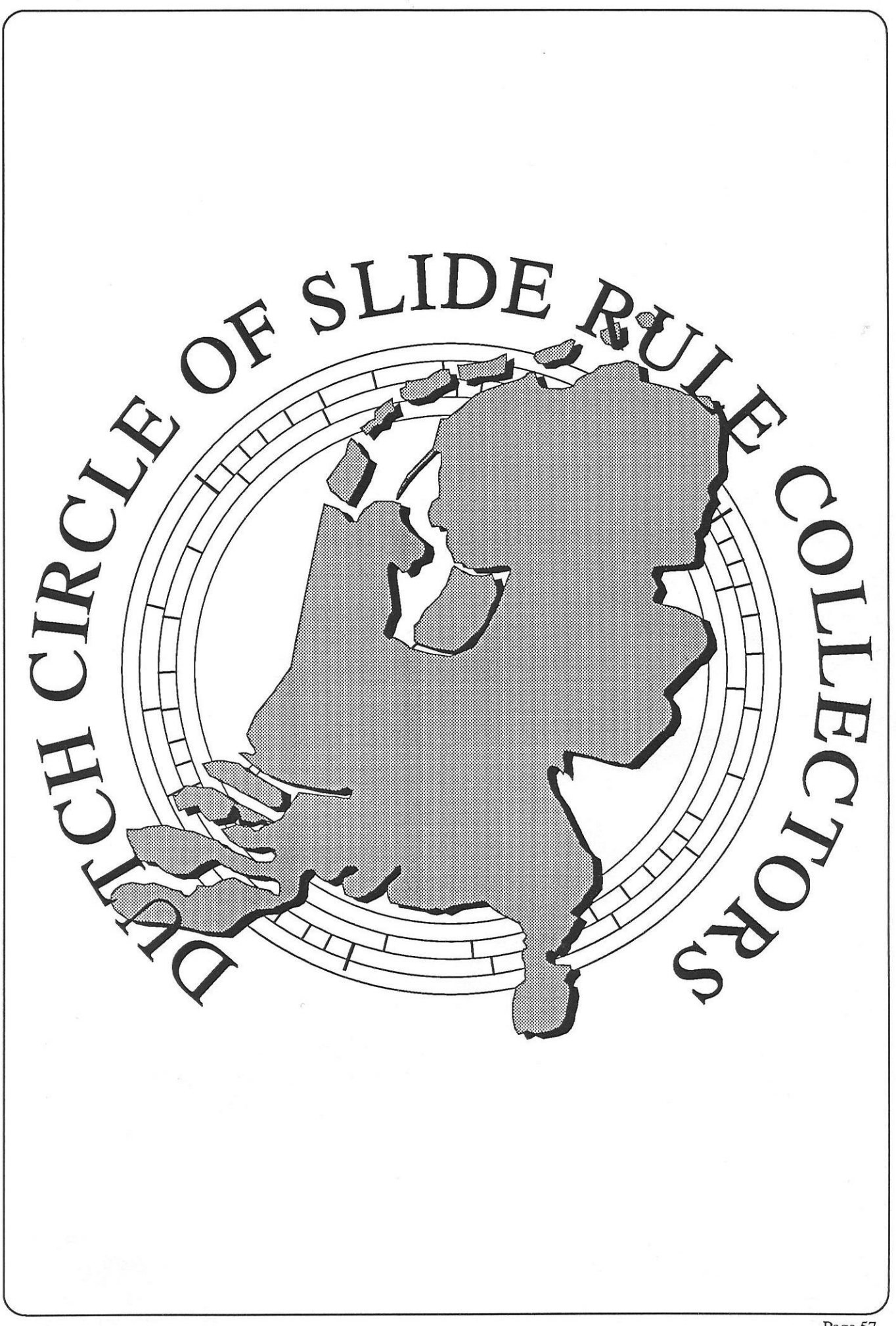
Total	Unique	Total	Unique
1426	*(858)*	89	*(16)*
1152	*(560)*	81	*(16)*
369	*(92)*	57	*(9)*
348	*(39)*	46	*(8)*
260	*(63)*	39	*(0)*
189	*(1)*	36	*(3)*
143	*(22)*	33	*(2)*

Variations

An analysis of how many SR's have variants shows that of all 2300 SR's in the data base some 271 have variants representing in total 952 SR's.

Name and Code of SR's with number of variants are given below:

Name		Others	
Aris 89	22x	5 SR's	10x
Aris 0903LL	21x	6 SR's	9x
Alro 200R	13x	7 SR's	8x
Fabe 1/87	13x	4 SR's	7x
Nest 0123	13x	3 SR's	6x
Aris 0986	12x	16 SR's	5x
Fabe 1/54	11x	19 SR's	4x
Fabe 75/87	11x	64 SR's	3x
		141 SR's	2x


DUTCH CIRCLE OF SLIDE RULE COLLECTORS