
DENNERT & PAPE and ARISTO Slide Rules 1872 – 1978

Hans Dennert

Preface

This article is intended to enable slide rule collectors to date their DENNERT & PAPE, D&P, DUPA and ARISTO Slide Rules. At the same time it describes the historical background of the company and of some important developments and products. At the first time this review of more than 100 years production of slide rules was presented on occasion of the 1st International Meeting of Slide Rule Collectors on Nov. 10, 1995 at Utrecht, The Netherlands. In the meantime several inquiries showed that additional explanations were required. They have been included in this revised version.

Dates of the Company and its Products

- July 1, 1862** Johann Christian Dennert (1829-1920) takes over a workshop for geodetic instruments in Hamburg 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's name: Dennert & Pape, Workshop for Mathematical Instruments. 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.
- 1869** The firm moves to a newly built workshop in nearby Altona, being a Prussian city since 1867 and therefore promising for the future better business with the Prussian Surveying and Mapping Authorities.
- 1872** The first slide rules of boxwood are produced as suggested by A. Goering (1841-1906), who also provided the first manual of instructions. 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^g.
- July 1, 1884** After Martin Pape's death 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 veneer replace those of boxwood. Within the next few years this production method is adopted by all slide rule manufacturers.
- 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 $\frac{\pi}{4}$ index lines.
- To keep pace with the increasing demand at home and abroad, a new building is erected neighbouring the existing factory.
- Sept. 28, 1901** DRP 126499 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 694,258 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. The "System Rietz" becomes the universal slide rule for engineering.
- Jan. 21, 1903** DRGM 192052 is granted to Dennert & Pape for adjustment screws to regulate the slide movement.
- 1904** After some years of experience with precision instrument making in southern Germany and Switzerland, followed by activities in their father's business, Richard Dennert (1865-1924) and Jean Dennert (1869-1916) join the company as managing partners. Richard Dennert takes care of the slide rules, sales and general administration, while Jean Dennert attends to the surveying and mathematical instruments.
- 1905** The first illustrated catalogue shows slide rules according to the above three patents, also slide rules for engineering purposes other than surveying.
- Dec. 12, 1907** Seinen Yokota (1875-1953) receives the British Patent 18218 for a slide rule with six log log scales (1.0115 to 10⁶ and .9874 to 10⁻⁶). Dennert

& Pape produces this for export to Great Britain. After WWI it is listed under the name “Improved Edponential” rule until 1938.

- 1908** In his 80th year, Johann Christian Dennert retreats from daily activity in his company.
- 1914** The slide rule is increasingly accepted for calculations in engineering. The company’s catalogue lists more than 20 different scales arrangements. Additionally special slide rules are made to customer’s order.
- 1924** As a result of the early passing of Jean Dennert (1916) and Richard Dennert (1924) their sons Christian Dennert (1896-1944) and Georg Dennert (1900-1992) become responsible for the future of Dennert & Pape at a very early age.
- 1924** The trademark DUPA is introduced for all products of Dennert & Pape.
- 1926** The original “System Rietz” of 1902 becomes improved by the inverted scale CI, the ST scale for small angles and extensions of the scales A, B, C and D.
- 1928** Dennert & Pape commence to manufacture co-ordinatographs (precision drafting machines for map drafting).
- 1929** The company opens a branch for manufacturing slide rules at Weidenbert in northern Bavaria.
- 1931** Christian Dennert, eldest son of Jean Dennert, leaves Dennert & Pape. He carries on with the slide rule production in Weidenbert under the brand DEWE (Dennert Weidenberg). His business ends with his death during WWII.
- 1931** Georg Dennert, youngest son of Richard Dennert, continues the company as sole owner. Under his management Dennert & Pape survives the difficult years of the Great Depression and WWII.
- 1934** Based on the “System Rietz”, a new scale arrangement including three log log scales is developed in the Institute for Applied Mathematics (Prof. Dr. Alwin Walther), Technical University Darmstadt. This slide rule called “System Darmstadt” becomes another basic model like the “System Rietz”.
- 1936** Dennert & Pape cease production of mahogany slide rules and scales with celluloid veneers. From now on all slide rules and drafting equipment is manufactured from dimensionally stable and humidity resistant plastic materials (trademarks Astralon and Plexiglas).
- 1936** The trademark ARISTO is introduced for slide rules, scales and other drafting instruments of Dennert & Pape made from the new plastics. All other products continue under Dennert & Pape.
- 1937** The Greater Hamburg Statute: Altona becomes a district of Hamburg. The company’s address changes from Dennert & Pape, Altona to Dennert & Pape, Hamburg-Altona.
- 1937** C. Plath’s “Dreieckrechner DR 2 - System Kne-meyer”, a flight computer, is produced by Dennert & Pape using the new plastic materials.
- 1942** Products for military orders have to be imprinted with the code gwr instead of the company’s name or trademark.
- 1943** As a result of the war, a part of the production has to be moved to Bludenz/Vorarlberg in Austria.
- 1945 – 1948** During the last years of the war the production of slide rules almost had to be stopped. In the first years after the war raw materials were not available in the required qualities and quantities.
- 1948** Dennert & Pape is converted into a limited partnership with Georg Dennert as the managing general partner and the members of his family as limited partners. After the interruption by the war, Dennert & Pape begins to regain their former importance as a slide rule manufacturer under the new trademark ARISTO.
- 1949** New double face slide rules are introduced, prototypes of design and scales arrangements in future: ARISTO-Scholar for schools and ARISTO-Studio with 6 log log scales for engineering and sciences. Both slide rules adopted the trigonometric scales on the body like the System Darmstadt.
- July 1, 1951** The new factory at Geretsried begins production of ARISTO slide rules for schools.
- 1952** After graduation as an industrial engineer and working one year in factories in the US, Hans Dennert (1926), eldest son of Georg Dennert, begins his career with Dennert & Pape. In 1957 he is admitted into the company as second managing general partner.
- 1953** ARISTO-MultiLog with 8 log log scales, another version of the ARISTO-Studio for users who prefer the trigonometric scales arranged like on the System Rietz.
- 1954** The flight computers ARISTO-Aviat and ARISTO-Aviat G replace the “System Knemeyer DR 3 and DR 4”.
- 1954** Industrial demand of precision drawings requires to adapt the co-ordinatographs, e.g. for precise drawings of integrated circuits.

1956 Since 1952 ARISTO is used as trademark for all products of Dennert & Pape. Therefore the trademark 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 A new slide rule for elementary schools: ARISTO-Junior.

1966 The trademark 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 computer controlled co-ordinatograph ARISTOMAT allows computer aided design (CAD) of high precision.

1972 100 years slide rule production.

Dec. 31, 1978 The slide rule production is discontinued and this part of the company liquidated. Georg and Hans Dennert withdraw from the company.

Jan. 1, 1979 The CAD business is continued by the new company ARISTO Graphic Systeme.

July 1, 1987 125th anniversary.

Dating of D&P and ARISTO Slide Rules

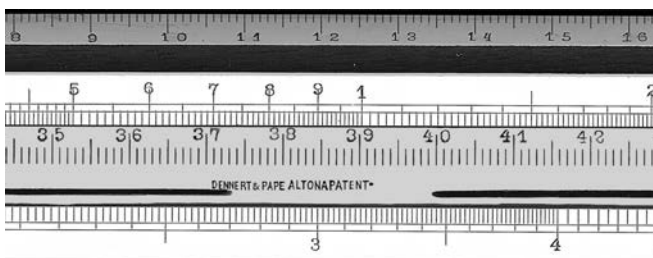


Figure 1: D&P No. I (1890)

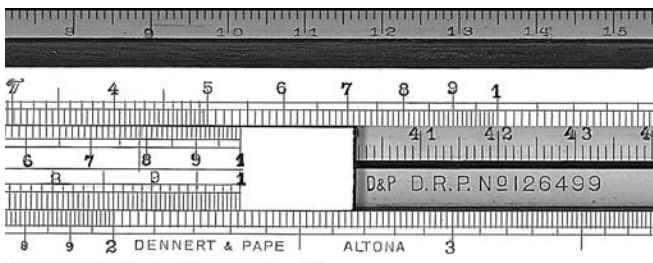


Figure 2: D&P No. I (1908)

Between 1872 and 1935 the production year of slide rules marked DENNERT & PAPE, D&P or DUPA can be

determined for certain periods by different characteristics. The following dates will help when the slide rule is marked with imprints as follows:

Until 1902

Under the slide: DENNERT & PAPE ALTONA

Sometimes in addition: PATENT

Two small blind figures, e.g. 98, meaning made in 1898.

1902 – 1924

On the front of the slide rule:

DENNERT & PAPE ALTONA

Under the slide:

D.R.P. No 126499 and two small blind figures as above.

1924 – 1930

Under the slide:

D.R.P. No 126499

DENNERT & PAPE

Altona bei Hamburg

DUPA No

and two small blind figures as above.

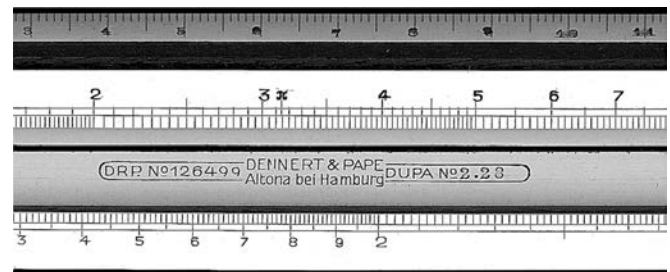


Figure 3: DUPA No. 2.28 (1925)

1930 – 1936

Under the slide:

DENNERT & PAPE, ALTONA

Sometimes the name of the slide rule: e.g. System Rietz

During the first years of production occasionally two blind figures have been used as marks for matching the body and the slide of the rule, e.g. 31 as a blind stamp each under the body and under the slide. This should not be mixed up with the blind stamp for the production year.

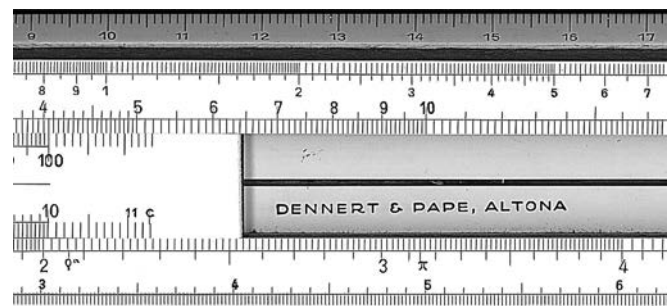


Figure 4: DUPA No. 8/38 (1934)

An additional help for dating are the longitudinal lines of the scales on the slide rules. Until 1924 double lines for each scale were usual. Between 1920 and 1925 it changed to single lines (e.g. Figure 4). But there

were exemptions, e.g. D&P slide rules manufactured for U.S. customers after 1900 had no longitudinal lines. Also school slide rules and one or the other model were made without these lines.

In 1936 the production of slide rules manufactured entirely of dimensionally stable and humidity resistant plastic material starts under the new trademark ARISTO. Slide rules of mahogany with celluloid veneer are discontinued totally.

1936 – 1939

On the right end of the slide:
 Trademark ARISTO as per Figure 14.
 Under the slide or on the back of the slide rule:
 DENNERT & PAPE, ALTONA
 or DENNERT & PAPE Hamburg-Altona
 and/or the name of the slide rule: e.g. System Rietz

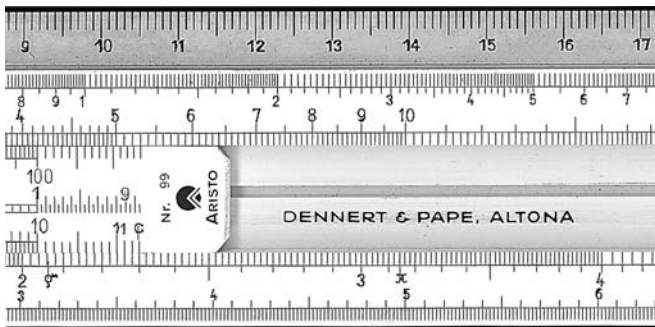


Figure 5: ARISTO No. 99 System Rietz (1937)

Occasionally on the back of the rule:
 Trademark D&P as per Figure 18.

During this period most slide rules still have scales with single longitudinal lines like the DUPA models.

1939 – 1952

On the right end of the slide:
 Trademark ARISTO as per Figure 6.

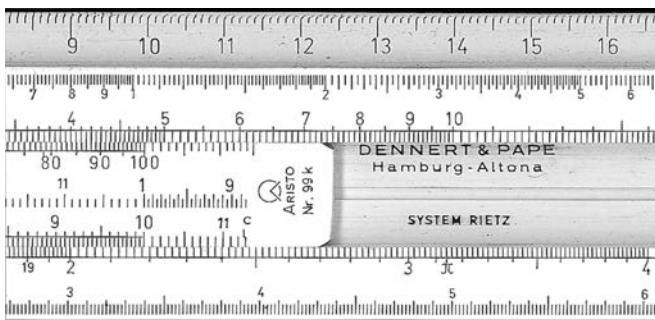


Figure 6: ARISTO Nr. 99k System Rietz (1943)

Under the slide or on the back of the slide rule:

DENNERT & PAPE
 Hamburg-Altona
 or
 DENNERT & PAPE
 HAMBURG

and/or the name of the slide rule: e.g. System Darmstadt. Occasionally on the back of the rule: Trademark D&P as per Figure 18. During this time few slide rules still have scales with single longitudinal lines.

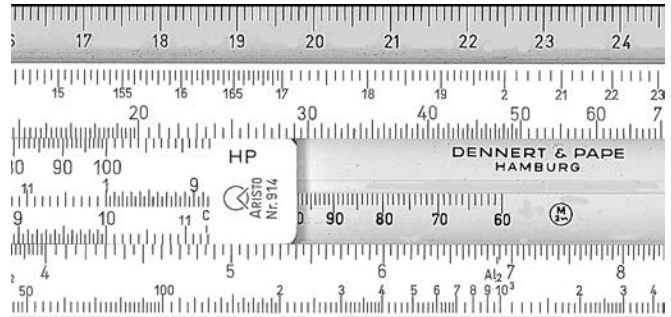


Figure 7: ARISTO-Electro Nr. 914 (1950)

1942 – 1945

Products for military orders have to be marked with the code gwr instead of ARISTO or the company's name.



Figure 8: Dreieckrechner DR4 (1944)



Figure 9: ARISTO-Darmstadt Nr. 967U (1959)

1952 – 1978

On the right end of the slide or elsewhere on the slide rule: Trademark ARISTO as per Figure 13.

On the slide rule or under the slide:
 Name of the slide rule, e.g. ARISTO-Darmstadt.

Codes for Production Years

Since 1939 all ARISTO Slide Rules were dated with a blind imprinted code on the back or on the vertical edge of the slide rule to verify the production year and the lot number.

1939 – 1959

The code of three or four figures stands for the year of

production and the lot no. only, e.g. 415 means produced in 1941, lot 5. An additional G was used for production in Geretsried, e.g. G5812 means produced in 1958, lot 12.

1959 – 1978

Code combined of three or four figures or letters for the place and the year of production and up to three figures for the lot number.

The first letter or figure stands for the factory location:

Letter	Figure	Factory
H	2	Hamburg
G	3	Geretsried
W	4	Wörgl

The following two figures or letters stand for the year of production using ARISTOFLEX as a figure code:

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

The last one to three figures are the lot no. of the respective slide rule:

GFO29 means produced in Geretsried in 1965, lot 29

2LR17 means produced in Hamburg in 1971, lot 17

When the production of slide rules was changed from sheet material (Astralon) to moulding (Terluran) an additional T was added to the lot number, e.g. 2LST5.

During all periods sometimes slide rules have been labelled on request with the name of an importer, a distributor or a dealer additionally, but normally with the imprint of the manufacturer like ARISTO, D&P and/or DRP No. 126499 (e.g. Figure 10; compare also with Figure 2 in *JOS*, vol.5, no.2, page 41). However it has been noticed that in some cases the name of the maker has been milled off or scratched out.

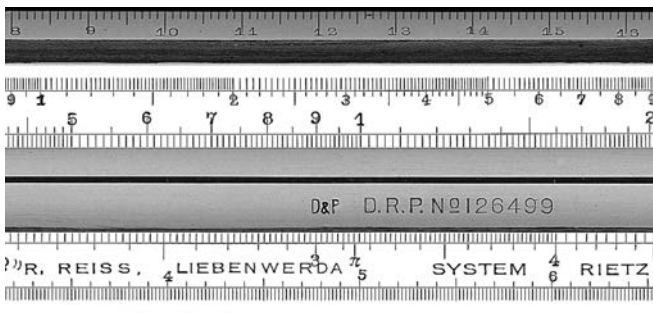


Figure 10: D&P No. 8 System Rietz (1917)

Trademarks

Until 1920

The slide rules were marked with the full name of the company: DENNERT & PAPE. Sometimes the abbreviation D&P was used, also in catalogues and instruction manuals.

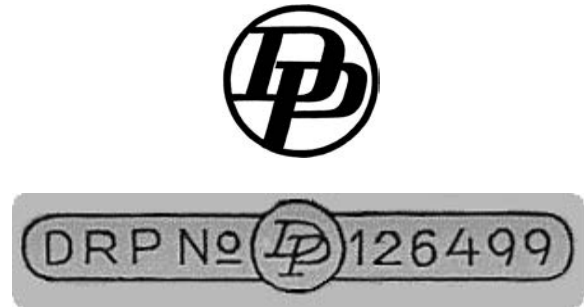


Figure 11: 1920 – 1936

1920 – 1936



Figure 12: 1924 – 1936

D&P (Figure 11) and DUPA (Figure 12) appear as trademarks on products and printed material.



Figure 13: 1936 – 1978



Figure 14: 1936 – 1939



Figure 15: 1938 – 1952

1936

The trademark ARISTO (Figure 13) has been created for the new slide rules and drafting instruments made entirely of dimensionally stable and humidity resistant plastic material. ARISTO was written with small capitals and also used connected with the circle and angle symbol (Figure 14). D&P combined with the circle and

angle symbol (Figure 15) stood for all other products of the company.

1936 – 1939

Slide rules are marked with ARISTO and the respective catalogue number as shown in Figure 5.



Figure 16: 1939 – 1952



Figure 17: 1939 – 1952



Figure 18: 1939 – 1952

1939 – 1952

The trademark ARISTO is changed to the same circle and angle symbol like D&P (Figure 16). The marks on the slide rules look like Figures 6 and 7. Both trademarks were also used in another style (Figures 17 and 18).



Figure 19: 1942 – 1952



Figure 20: 1952 – 1978



Figure 21: 1942 – 1978

1942 – 1978

For catalogues and other advertising purposes ARISTO got a specific style shown in Figures 19, 20 and 21.

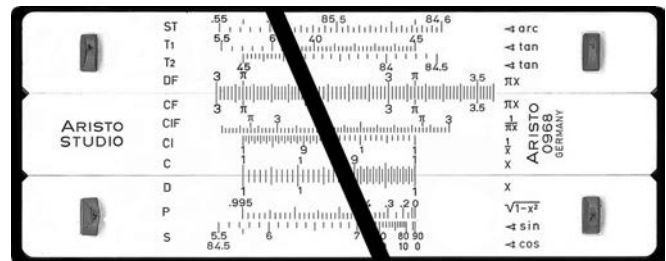


Figure 22: ARISTO-Studio 0968 (1969)

1952 – 1978

Since 1952 the trademark ARISTO was used for all products of the company. Both on the product (Figure 22) and on all printed material ARISTO was combined with the name and/or the catalogue number.

Scales of the 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 (also called indicator or runner) allowed the scale arrangement of the A=B, 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 together. 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 scales 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 mahogany/celluloid version, later from 1920 to 1936 it is listed as No. 2.28 or 2/28. From 1936 to 1940 this model ends production with an additional inverted scale as ARISTO No. 92, made of Astralon with a frameless Plexiglas cursor.

In 1902 **Max Rietz** (1872-1956) added the cube scale F to Mannheim's arrangement. Therefore D&P called this rule "Cube Slide Rule System Rietz" and offered it as No. 8 with self adjusting body (DRP 126499) and as No. 9 with additional adjustment screws. The scales were marked with letters and arranged on the front of the rule: F (cube scale), A=B, C=D, E (mantissa scale) and on the back of the slide: S (related to A), T (related to D).

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, C=D extended for 3-index-cursors and the trigonometric scales are changed to S, S+T (for small angles), T, all three scales 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 ARISTO-Rietz No. 99. Both models were 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 on all ARISTO slide rules, i.e. also on the No. 99. The scales became marked K, A=B, CI, C=D, L and S, ST, T. Since 1953 the ARISTO-Rietz is available also with trigonometric scales graduated to 400^g. In 1973 the BI scale was placed between B and CI on the slide.

The "**System Darmstadt**" added three exponential scales e^x (log log scales) and the Pythagoras scale $\sqrt{1-x^2}$ in a new arrangement to the scales of the "System Rietz". Mathematical symbols were introduced as a new marking of the scales. In 1939 the first ARISTO-Darmstadt was manufactured with longitudinal lines and the order of scales x^3 , $x^2 = x^2$, $\frac{1}{x}$, $x = x$, $\sqrt{1-x^2}$, \sin , \tan on the face of the rule, and with $e^{0.01x}$, $e^{0.1x}$, e^x on the back of the slide and the mantissa scale on the edge of the rule. In 1950 the scale $\frac{1}{x^2}$ was added and the mantissa scale was moved to the back of the slide.

Later the letter symbols of the scales were introduced on the Darmstadt like on the Rietz at the left end of the scales. The mathematical symbols were moved to the right end of the scales. Since that time the double marking of the scales has been used consistently on all ARISTO slide rules (for a complete list of the symbols on ARISTO Slide Rules see Appendices I, II and III, a reprint of the ARISTO Catalogue GK 73 E). From the beginning the ARISTO-Studio and the ARISTO-Scholar had all scales marked 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 and L, LL1,

LL2, LL3 on the back of the slide) remained unchanged until 1973, when the scale ST was added to the other trigonometric scales.

The **ARISTO-Studio** was the development of the ARISTO-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 or exponential side. In 1953 the log log side was improved by adding a second 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 became available also with trigonometric scales for 400^g.

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 slide rules for different applications. Like the ARISTO-Studio the ARISTO-Scholar 902 was offered for the first time in 1949. All scales were combined on one 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 pattern: L, K, A=B, CI, C=D, S, T. In 1953 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 were improved. Therefore their catalogue numbers were prefixed by 0, e.g. 0903 LL. In 1958 followed the next variations: The ARISTO-Scholar VS and the ARISTO-Scholar VS-2 with folded scales DF=CF, C=D on the back. The scale arrangement of all slide rules of the Scholar line was changed in 1958 by including 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. In 1962 the ARISTO-Junior 0901 was created for elementary schools.

The scales arrangements of the above mentioned ARISTO School Slide Rules as well as of all other ARISTO Slide Rules as they were manufactured in 1973 are shown on the Appendices I, II and III. The last section gives a survey of the most important ARISTO slide rules with years of production and quantities manufactured.

The D&P and ARISTO Catalogue Numbers

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 catalogue of this kind

listed 32 numbers. But some numbers were used for more than one slide rule, for example, System Rietz No. 8 and No. 9 were listed under these Nos. in length of 15, 28 and 53 cm (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 number 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 respectively, e.g. for the Rietz the Nos. 89, 99 and 109. All ARISTO slide rules have been marked with their catalogue number in connection with the trademark 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 numbers 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 1924 catalogue the cursors including magnifying models have been specified by catalogue numbers. The system changed several times. Its description would require a specific explanation.

Since 1955 ARISTO spare cursors used the catalogue number of the respective slide rule prefixed by the letter L. ARISTO magnifying cursors were prefixed by LM, LZ, LA or LU depending on their type.

Custom Made Products

Until 1940 No identifying numbers were used for products specifically made to customer's order.

1940 – 1958 A five figure number connected with the trademark 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 – 1978 The 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.

ARISTO Slide Rules Production 1948 – 1975

School Slide Rules

Cat. No.	Years	1,000 pieces
902/903/0903	1949 – 1975	1,700
903 LL/0903 LL	1953 – 1975	1,300
0903 VS/0903 VS-2	1958 – 1975	540
0908	1960 – 1975	430
0901	1962 – 1975	920
0906/0906 LL	1967 – 1975	360
Other	1948 – 1975	150
Total	1948 – 1975	5,400

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.

10 in. Slide Rules

Cat. No.	Years	1,000 pieces
99	1948 – 1975	245
967	1948 – 1975	235
Other single face	1948 – 1975	130
968/0968	1949 – 1975	1,300
Other double face	1948 – 1975	490
Total	1948 – 1975	2,400

10 in. ARISTO slide rules were sold between 1960 and 1975 at an average of more than 100,000 pieces p.a. Between the middle of the 1960's and the beginning 1970's the leading position of the ARISTO-Studio and the other ARISTO double face slide rules reached sales of more than 100,000 slide rules p.a.

5 in. Slide Rules

Cat. No.	Years	1,000 pieces
89	1948 – 1975	2,340
867	1950 – 1975	500
868	1954 – 1975	660
Other	1948 – 1975	700
Total	1948 – 1975	4,200

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

Appendix I ARISTO Slide Rule Selector	Technical and Scientific								
	Civil, Mechanical, Chemical Engineering, Architecture			Pure and Applied Science, Mathematics, Physics, Chemistry, Electrotechnics				Mathematics, Physics, Telecommunication	
System	Puck	Rietz	MultiTrig	Darmstadt	Studio	StudioLog	MultiLog	HyperboLog	HyperLog
5 in. Slide Rule	810	89	829	867	868	869	870		
10 in. Slide Rule		99	0929	967	0968	0969	970	0971	0972
20 in. Slide Rule		109		1067	01068		01070		
Demonstration Slide Rule					368		370		
Projection Slide Rule					168	169	170		

Scales on Front Face

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

Scales on Reverse Face

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

The Scales of Technical Slide Rules

Scale	Mathematical Symbol	Scale Description	Scale	Mathematical Symbol	Scale Description
A	x^2	Scale of squares on rule body	K	x^3	Scale of cubes
B	x^2	Scale of squares on slide	L	$\lg x$	Mantissa scale
BI	$\frac{1}{x^2}$	Reciprocal scale of squares on slide	LL0	$e^{0.001x}$	LogLog scale, range 1.001 to 1.011
C	x	Fundamental scale on slide	LL1	$e^{0.01x}$	LogLog scale, range 1.01 to 1.11
CF	πx	Folded scale on slide	LL2	$e^{0.1x}$	LogLog scale, range 1.1 to 3.0
Ch	\cosh	Scale of hyperbolic cosines, range 0 to 3	LL3	e^x	LogLog scale, range 2.5 to 10^5
CI	$\frac{1}{x}$	Reciprocal scale of C on slide	LL00	$e^{-0.001x}$	LogLog scale, range 0.999 to 0.989
CIF	$\frac{1}{\pi x}$	Reciprocal scale of CF on slide	LL01	$e^{-0.01x}$	LogLog scale, range 0.99 to 0.90
D	x	Fundamental scale on rule body	LL02	$e^{0.001x}$	LogLog scale, range 0.91 to 0.35
DF	πx	Folded scale on body	LL03	e^{-x}	LogLog scale, range 0.4 to 10^{-5}
DI	$\frac{1}{x}$	Reciprocal scale D on body	P, P1	$\sqrt{1-x^2}$	Phytagoras scale, range 0 to 0.995
H1	$\sqrt{1+x^2}$	Hyperbolic scale, range 1.005 to 1.5	P2	$\sqrt{1-x^2}$	Phytagoras scale, range 0.995 to 0.99995
H2	$\sqrt{1+x^2}$	Hyperbolic scale, range 1.4 to 10			

Appendix II ARISTO Slide Rule Selector	School and Vocational								
	High School, Primary and Trade Schools		Secondary and Grammar Schools, Trade, Vocational and Technical Schools				Grammar Schools, Technical Colleges		Business Colleges
System	Junior	JuniorTrig	Scholar	Scholar LL	Scholar VS 2	BiScholar	BiScholar LL	TriLog	Commerce Junior
10 in. Slide Rule	0901	0902	0903	0903 LL	0903 VS-2	0906	0906 LL	0908	0907
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 Projektion Model	201		203			206		208	

Scales on Front Face

Upper Body Panel	DF	DF	L K A	L K A	L K A	K 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 LL3 LL2 LL1	D P S ST	D L LL1 LL2

Scales on Reverse Face

Upper Body Panel		ST T1 T2				ST T1 T2 DF	ST T1 T2 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			Uses of the Scales of Technical Slide Rules	
Scale	Mathematical Symbol	Scale Description	Scale	Application
R1	\sqrt{x}	Scale of roots, range 1 to 3.2	C, D	Multiplication, division, proportion
R2	\sqrt{x}	Scale of roots, range 3 to 10	CF, DF	Multiplication without slide resetting, division, tabulation, proportions, multiplication and division by π
S	$\angle \sin \angle \cos$	Scale of sines, 5.5° to 90°; Scale of cosines, 0° to 84.5°	A, B R1, R2	Squares, square roots, multiplication, division Squares, square roots with greater accuracy
Sh1	$\angle \sinh$	Scale of hyperbolic sines, range 0.1 to 0.9	BI, CI, CIF, DI	Simplified multiplication, division, fractions, proportions and tabulation
Sh2	$\angle \sinh$	Scale of hyperbolic sines, range 0.85 to 3.0	K L	Cubes, cube roots Logarithms to base 10
ST	$\angle \text{arc}$	Scale of angles, 0.55° to 6°, 84° to 89.45°	S, ST, T, T1, T2	Trigonometrical functions, solving right triangles, complex numbers
T	$\angle \tan$	Scale of tangents, 5.5° to 84.5°; Scale of cotangents, 5.5° to 84.5°	P, P1, P2	Conversion $\sin \leftrightarrow \cos$, more accurate values of sines of large angles, cosines of small angles
T1	$\angle \tan \angle \cot$	Scale of tangents, 5.5° to 45°; Scale of cotangents, 45° to 84.5°	Sh1, Sh2, Ch, Th	Hyperbolic functions, complex numbers, special applications in telecommunications engineering
T2	$\angle \tan \angle \cot$	Scale of tangents, 45° to 84.5°; Scale of cotangents, 5.5° to 45°	LL0 – LL3 LL00 – LL03	Any power, root and logarithm
Th	$\angle \tanh$	Scale of hyperbolic tangents, range 0.1 to 3.0	H1, H2	Conversion $\sinh \leftrightarrow \cosh$, more accurate values of hyperbolic cosine functions, coordinates of the unit hyperbola $y = \sqrt{1-x^2}$ and $x = \sqrt{1-y^2}$

Appendix III ARISTO Slide Rule Selector	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
20 in. Slide Rule	1055								

Scales on Front Face

Upper Body Panel	845	1055			815	915					360°	400°	
	cm	cm	cm	cm	cm	cm	cm	Ne ₁		F _e	ST	T	
	%	%	%		K	K	U1/U2	L		m _e	T1	T	
	KZ	KZ	DF	DF	A	A	A	K		M _e (A)	T2	ST	
								A			DF	DF	
Slide	T2	T2	CF	CF	B	B	B	B	b(B)	b(B)	k _d	CF	CF
	P2	P2	CIF	CIF	BI	BI	BI	BI	σ _b	m _e (BL)	max _d	CIF	CIF
	P	P1	CI	CI	CI	CI	Neper		k	d _{zul}	α	CI	CI
	T1	T1	C	C	C	C	C	C	r (C)	ε ₁	ε _e	C	C
									σ _b	k, b (C)	k, b (C)	C	C
Lower Body Panel	Z	Z	D	D	D	D	D	D	h (D)	k _e (D)	D	D	
	M	M	M	A	D/M	LL3	db	T/1"		h	P	P	
	£	LL1		V	LL2		Ne ₂	Ne ₃	k	k	S	S	
	s/d	LL2			D/M	V							

Scales on Reverse Face

Upper Body Panel							Ne _w					1 - cos
							Ne _K					1 - cos
							Ne _L					A
							DF		σ _{e'}			
Slide	£				S	mV	CF	Bar steel table	Bar steel table		B	
					ST		N ₂	Checking scale	Diagramm representation		1/tan α/2	
	s/d				L	V	CI				sin · cos	
					T		C				sin · cos, cos ²	
Lower Body Panel							D	z, x			D	
							N ₁				L	
							Ne _B				K	
							Td					

The Scales of Slide Rules for Businessmen

Scale	Scale Description	Scale	Scale Description
%	Percentage calculations	T1, C	Fundamental scale on the slide
KZ, DF	Fundamental scale on rule body, folded at 360	T2, CF	Fundamental scale on the slide, folded at 360
M	Scale for US/British measures and weights	Z, D	Fundamental scale on rule body
P, P1, CI	Reciprocal scale of T1, C	ZZ1, ZZ2, ZZ3, LL1, LL2	LogLog scales for calculation of factors for compound interest
P2, CIF	Reciprocal scale of T2, CF	£ s/d	Scales for calculations in English currency

ARISTO Disk Calculator Selector	Businessmen	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	602									
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					