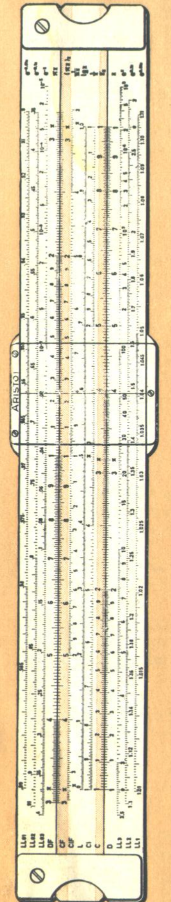

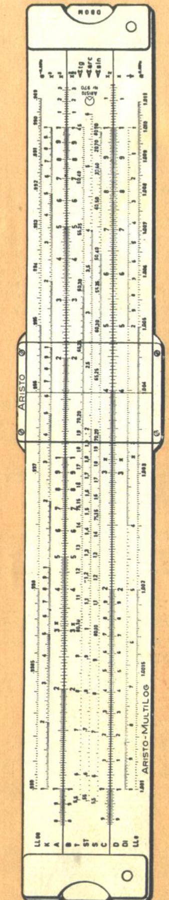

970

970

ARISTO MultiRietz

With decimal trigonometric scales

Scales:

Front: K, DF, CF, CIF, CI, C, D, L

Back: mm, P, A, B, T, ST, S, D, DI, in.

ARISTO 829	Lenght 5 in.
929	Length 10 in.

ARISTO MultiLog

With decimal trigonometric and Log Log scales

Scales:

Front: LL_{01}, LL_{02}, LL_{03}, DF, CF, CIF, L, CI, C, D, LL_3, LL_2, LL_1

Back: LL_{00}, K, A, B, T, ST, S, C, D, DI, LL_0

ARISTO 970 Length 10 in.

ARISTO HyperboLog

With Log Log and hyperbolic scales

Scales:

Front: LL_{01}, LL_{02}, LL_{03}, DF, CF, CIF, L, CI, C, D, LL_3, LL_2, LL_1

Back: Th, K, A, B, T, ST, S, C, D, DI, Sh_1, Sh_2

ARISTO 971 Length 10 in.

1st Edition · 030555 · Printed in Germany

INSTRUCTIONS FOR USE OF THE SLIDE RULE

ARISTO No. 801

Charvoz-Roos Corporation

150 Park Place East, Wood-Ridge, New Jersey
Telephone: WEbster 9-2350

1. Scales

The scales of the ARISTO Slide Rule No. 801 (Fig. 1) resemble those of any ordinary metric rule with the exception that the intervals between their division lines are not uniform in size but shrink progressively from left to right.

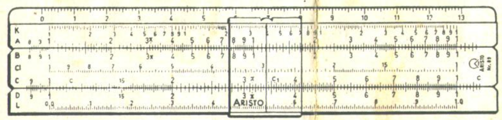

Fig. 1

In exactly the same manner as we may read the "12" on a centimeter rule as 12 cm or 120 mm or .12 m etc., the numbers involved in slide rule computations may also be variously interpreted in respect of the location of the decimal point in the number concerned. In other words, in slide rule operation all numbers are dealt with as sequences of digits, without regard to the presence or location of a decimal point.

The graduations of scales C and D contain division lines of three different lengths (Fig. 2). The longest lines are numerated and represent the first digit in a number. The second digit is found by counting off the next longest lines.

The third digit can be read directly for the *even* digits on the shortest lines whereas the *odd* digits can be readily placed by visual estimate between two of these latter lines. This applies to all numbers beginning with 1.

Numbers having either 2, 3 or 4 for their first digit: Locate the third digit, other than *5* or *0* by visual estimate.

Numbers whose first digit lies between 5 and 9: Locate the third digit, other than *0*, by eyesight.

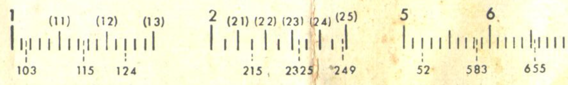

Fig. 2

If you will set the numbers footing the dotted lines on your own slide rule by use of the cursor and observe the respective sector of the scale attentively, you will very soon become familiar with the system governing all slide rule graduations.

2. Multiplication

Multiplication is usually accomplished with the scales C and D. To clarify the principle by which multiplication is performed with the slide rule, it is convenient to use an elementary example, such as 2 x 3 = 6. The beginning of scale C, marked "1" and called the "left index" is set over 2 on scale D by adjusting the slide accordingly. The cursor is then shifted so that its hairline will coincide with 3 on scale C. The answer, 6, then appears under the hairline on scale D.

Any further multiplication involving the same multiplicand 2 can now be performed by simple moves of the cursor to the respective multiplier without changing the position of the slide. For instance: 2 x 4, 2 x 4,63 etc. up to 2 x 5. As will be seen, at this point we have reached the end of scale D. Further readings must now be obtained by a process often referred to as "resetting the slide" which consists in shifting the slide to the left so as to bring the right index "1" under the hairline. We can now continue reading the answers to 2 x 6, 2 x 7 etc. etc.

The decimal point is at first disregarded in slide rule work and its location is left to be determined by rough estimate when the calculation is completed, as the following examples illustrate:

13.8 x 35.2 = 486	Roughly 10 x 40 = 400
8.08 x 6.25 = 50.5	Roughly 10 x 6 = 60
.176 x 1.04 = .183	Roughly .2 x 1 = .2

3. Division

Since division is the reversal of the process of multiplication, the foregoing examples may again be conveniently employed, except that now the order of setting and reading will be reversed; thus:

$6 \div 3 = 2$ $486 \div 35.2 = 13.8$ $50.5 \div 6.25 = 8.08$

Align the dividend 6 on scale D to the divisor 3 on scale C and read the answer under the index. Depending on the nature of the problem, the result may appear under one or the other of the two indexes; there is no "resetting the slide" in division.

4. The reciprocal Scale CI

Scale CI is a replica of C, except that its graduation and numeration run in the opposite direction, i. e. from right to left. Hence, for any number x set on scale C, the reciprocal of this number, i. e. 1 divided by x, can be read on CI under the hairline. For example: Over 5 we find the value .2 (viz. $1 \div 5$ or 1/5 written as a common fraction).

Consequently then, the multiplication 4 x 5 can now also be accomplished by carrying out the division $\frac{4}{1/5}$ i. e. aligning 4 on scale D to 5 on scale CI and reading the answer, 20, under the respective index as in the customary mode of division. In continued multiplication, as in 4 x 5 x 3, we can by this process, therefore, reduce the number of settings and avoid the trouble of resetting the slide occurring in ordinary multiplication. In the present problem we have only to shift the cursor to 3 on scale C, following the foregoing operation (multiplication replaced by division) to obtain the result, 60, on Scale D.

5. Proportions and Tabulations

The reciprocity existing between multiplication and division makes the slide rule the ideal instrument for computations involving proportions, as well as in the compilation of tables. In this class of work the slide rule is superior to any other calculating device.
The slide need only be set once in order to produce a complete table of relations by consecutive moves of the cursor, as we have been able to see in the example involving the constant factor 2. For instance:

$$\frac{6}{3} = \frac{8}{4} = \frac{2}{1} \text{ etc.}$$

6. Scales A and B: Squares and Square Roots

The previously discussed multiplications and divisions can also be performed with the scales A and B. The accuracy, however, is rather less refined, for the reason that each of these scales actually represents two scales C or D shrunk to one half of their lengths and placed end to end.
The most important feature of the A and B scales, however, is its convenience in finding the squares and square roots of given numbers. For any number set on scale D its square is found under the hairline on A; for instances:

$2^2 = 4$ $3^2 = 9$ $3.27^2 = 10.7$

Reversing the process we read on D the square root of any number set on A; for instance:

$\sqrt{4} = 2$ $\sqrt{10.7} = 3.27$ $\sqrt{435} = 20.8$

7. Scale K: Cubes and Cube Roots

A relationship similar to that described above also obtains in respect of the pair of scales D and K. For any number set on D the corresponding cube value is read on K. Proceeding in the opposite order the cube root is determined.

$3^3 = 27$ $1.39^3 = 2.69$ $\sqrt[3]{27} = 3$ $\sqrt[3]{270} = 6.46$

8. Scale L: Decadal Logarithms

This scale is used for finding the logarithm of any given number. As in using a table of logarithms, only the mantissa can be read and the characteristic must be prefixed by using the customary rule: number of digits in the antilogarithm minus 1.

log 13 = 1.114 log 180 = 2.255

Procedure: Match the antilog on scale D with the hairline of the cursor and read the mantissa on scale L. Reversing this process we can also, of course, find the antilog corresponding to a given logarithm.

9. Areas of Circles: $A = d^2 \times \frac{\pi}{4}$

The mark $c = \sqrt{\frac{4}{\pi}}$ is permanently engraved in the graduation of scale C.
The above formula may therefore be rearranged to read $A = d^2/c^2 = (d/c)^2$.
This reduces the computation of circle areas to a simple problem in division followed by a squaring of the quotient.
Example: d = 4.2 in. A = ?
Procedure: The mark c or c_1 of the slide is made to coincide with d = 4.2 in. on scale D. The area A = 13.88 sq. in. can then be read on scale A at the left index of the slide.