Maximator Valorect – A New but Unsuccessful Treatment of Logarithms with a Decimal Adder

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The *Addiator GmbH* Company, founded 1920 in Berlin and deregistered 1975, is well known for its various types of slide adders[i]. Those adders are useful for addition and subtraction, in multiplication and division they provide almost no assistance. Aware of that disadvantage, the founder and owner up to WWII of *Addiator* Company, *Carl Kuebler*, designed and offered decimal aids for multiplication in form of attachments to the adders as well as stand-alone devices or complete multiplication tables.

In 1930 he invented the so-called *Maximator Valorect* slide adder[ii]. One side of the device is used for additions (Fig. 1) and, having turned down the device, the rear side for subtractions. With the additional part *Valorect* at the left side, the slide adder can handle decimal numbers as intended, whereas multiplications and divisions are replaced by the usage of logarithms.

Figure 1. Maximator *with* Valorect, *side for Addition*

To the device belongs a printed graphical logarithmic table, consisting of two sheets of paper with dimensions 11 x 17.5 cm (4.3 x 6.9"), the columns printed with white background for the numbers and green background for the logarithms (Fig. 2). The scale itself is 408 cm (13.4 ft.) long in total and allows to read off four decimal places. In an advertising description from July 1931, the table is correctly called *mantissa* table and not *logarithmic* table[iii].

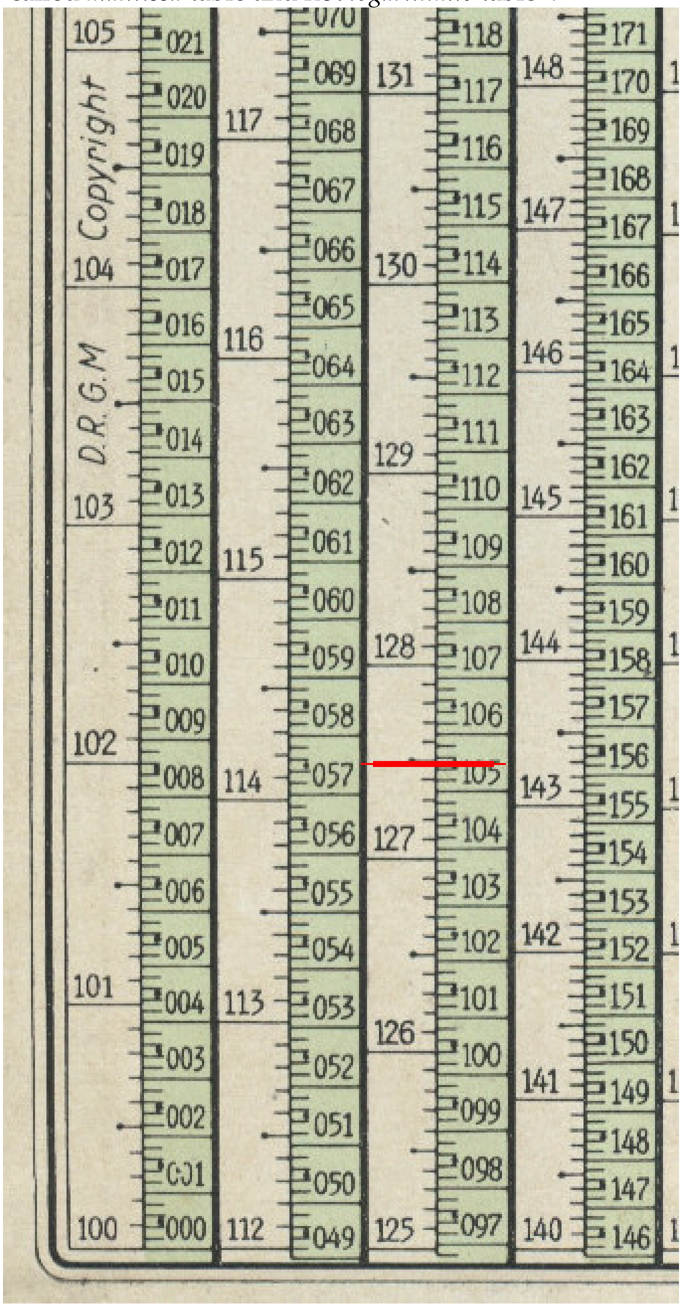

Figure 2. Detail of the enclosed Logarithmic Table
(The red mark gives 1275 white, equals 1055 green)

In *Kuebler's* first opinion it is a too difficult task for the user to determine the characteristic in logarithms of given numbers[iv], especially in decimal fractions. His idea is to split the logarithms into mantissas and characteristics with the latter new defined and treated separately.

Since Kuebler doesn't work with real logarithms, he thoroughly avoids the words *logarithm* and *anti-logarithm* and uses instead *green numbers* for the mantissas and *white numbers* for the real numbers according to the colors of columns in the logarithmic table. Probably he uses these new words not to remind his readers of maths with logarithms at school.

To go into details with the calculating process, mantissas read from the table are added or subtracted with help of the four slots to the right of the framed area *VALORECT* (see Fig. 3). Thus a carry is ported to the adder for characteristics. Next the sum of mantissas is *de-logarithmised* with the table.

In a third step, the position of the decimal point within the result must be determined by adding or subtracting the number of digits within the product factors. In case of numbers greater than 1 the number of digits equals the numbers of digits left of the decimal point. In case of numbers less than 1 the number of digits is negative and refers to the number of zeros right of the decimal point. Written in a formula: number of digits = characteristic + 1.

A calculating example (1.893 * 262.50 * 0.025 / 365), taken from an instruction for use and performed in detail, may clarify the whole procedure.
We read from the table and add the *green numbers* 2772 (for *white number* 1893), 4192 (for *white number* 2625), 3979 (for *white number* 2500) and subtract *green number* 5623 (for *white number* 3650) on the reverse side[v].
The sum 5320 is a *green number.* Its corresponding *white number*, read from the mantissa table again, is 3404.

In an early design of *Valorect* two sliders are available for the addition of numbers of places: slot A for numbers greater than 1 and slot B for numbers less than 1 (see Fig. 3-A from an instruction for use).
In our example now we add the number of places 1 for 1.893 in slot A, 3 for 262.50 in slot A too, 0,0 for 0.025 in slot B and, subtract 3 in slot A on the reverse side for 365. One of the two small windows displays 0,0 and, having appended the intermediate result white number 3404, we get the final result 0.03404. For a result greater than 1 the other small window would display the number of places left of the decimal point.

To add 1 in slot A isn't really possible. Fig. 3-A and the red arrow there show why. The hole in the slider for digit 1 is placed at the lower end of the slot. So when the user adds a number *n* by moving the slider down with a stylus he really adds *n* – 1. On the rear side the same arrangement is used. There the user subtracts *n* + 1. In fact the *Valorect* adder doesn't work with number of digits, it works with characteristics. The arrangement of symbols and sliders subtracts 1 from every entered number and a complicated mechanism adds 1 to the result again.

Kuebler held several patents and property rights for his adders[vi]. In January 1931 he tried to obtain a patent for his *Valorect*, named (in free translation) "apparatus to automatically determine the number of digits in logarithmic calculations". Two months later the claim has been refused. The official in charge at patent office in Berlin argued that the new invention wouldn't be a improvement to the original invention of the slide adder. Appeals by the patent attorney couldn't change the decision. I'm not a legal expert, but having read the papers thoroughly, from a technical point of view it seems to me that the official didn't understand what *Kuebler* really intended.
In May 1933 *Kuebler* withdrew claims for the patent, and in July for the registered design of *Valorect* [vii].

Before WW II the adder for characteristics has been demonstrably built and offered in three different designs:

A) with two sliders for numbers greater and smaller than 1, with four signal windows (Fig. 3-A)
B) with one result window (Fig. 3-B)

C) with one result window and a slider that doesn't subtract 1 (Fig. 3-C).
For this variant I don't know any instruction for use and therefore cannot definitely reconstruct its usage with respect to logarithms. I only have a substantial assumption.

A fourth design with four signal windows and one slider (comparable to Fig. 3-A, but not shown here) is mentioned in the patent claim. I don't know whether the latter variant has ever been sold.

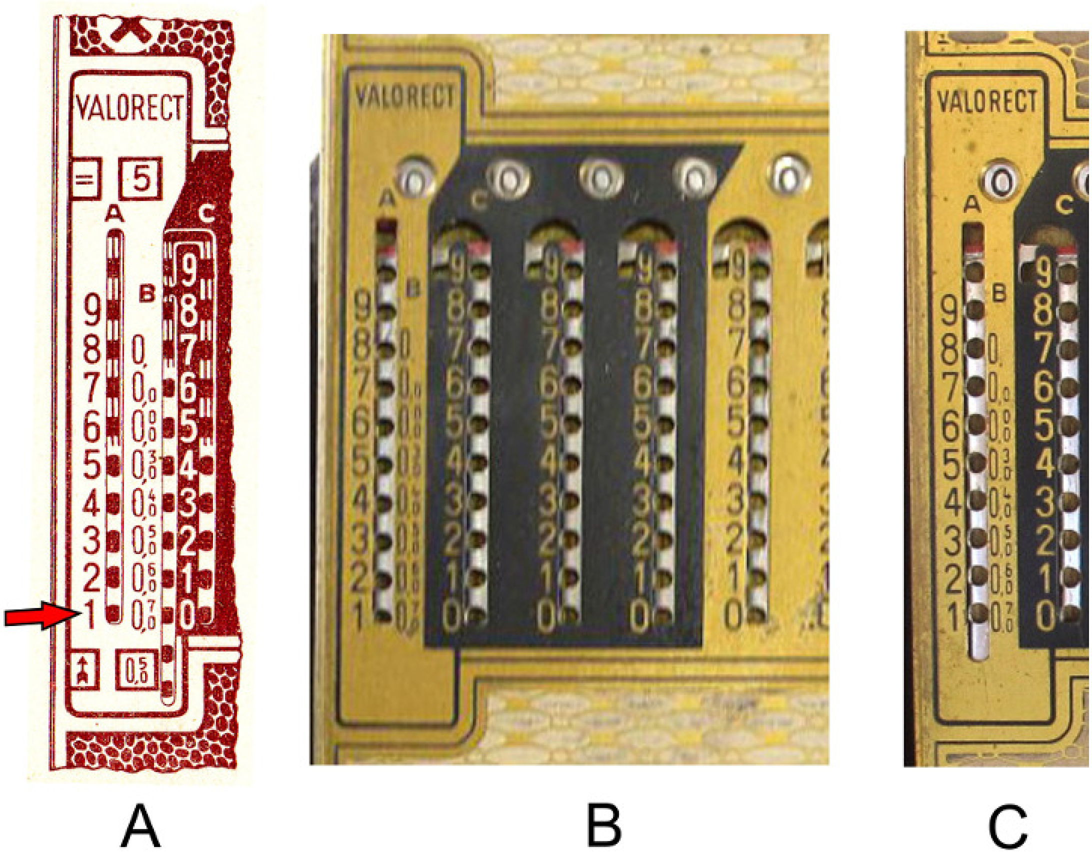

Figure 3. Details of the Maximator Valorect

Years later but definitely before WWII the *Addiator* company offered a graphical logarithmic table, almost identical to the preceding one, with two pages too, but bigger in size. The table is named *Maximator Logarithmen Tafel* (M. Logarithmic Table). For me this title implies, that sometime in the following years *Carl Kuebler* dropped his idea of replacing characteristics by numbers of places and returned to genuine logarithms. Otherwise he wouldn't have used the word *Logarithmen*. With the return to logarithms there is no longer any need to subtract 1 and in my opinion that is the reason why *Valorect* adders of type Fig. 3-C were offered. The machine number on my adder of variant C is almost 400 items higher than the number on my adder variant B, a detection, that supports my assumption.

From Kuebler's daughter, who lead the company after WWII, we know that *Valorect* has been her father's very special hobby. At least three sold variants confirm this statement. On the other hand three variants indicate, that he got into trouble with the implementation of his idea. Besides the replacement of characteristics by the numbers of digits doesn't really simplify calculations. Maybe exactly because of that *Maximator* plus *Valorect* had only little success. Only a few adders in combination with the logarithmic table were sold[viii].

After WWII, between 1950 and 1962, the slide adder *Maximator* has been offered again, without *Valorect,* optionally in conjunction with a printed multiplication table.

All figures produced by the author and from items in the author's collection.

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[i] From begin of the Thirties of last century on renamed *Addiator Rechenmaschinenfabrik* (Addiator Factory for Calculating Machines) *C. Kübler*.

[ii] I assume that the artificial name *Valorect* has been derived from a combination of the Latin words *valor* (value, sth. is valid or effective) and *recte* (correct, the right way).

[iii] Those graphical logarithmic tables were already known. See Hans Loewe: *Rechenscalen für numerisches und graphisches Rechnen, Heft 1: Logarithmische Rechenscalen,* R. Reiss, Liebenwerda, 1893 or Anton Tichy: Graphische Logarithmen-Tafeln, Wien 1897.

[iv] An example: log(24) = 1.38 and log(240) = 2.38 with 0.38 as mantissa and 1 and 2 respectively as characteristic.

[v] log 1.893 = 0.27715; log 262.5 = 2.41913; log 0.025 = 0.39794 - 2; log 365 = 2.56229

[vi] Among many others German patents DE367599 (since 1919 base patent for a two sided slide adder), DE586918 (1930 for a slide adder that calculates below zero), registered trademarks WZ436143 for *Maximator* (1931 up to 1981) and WZ437021 for *Valorect* (1931).

[vii] Sources for this article were the original correspondence between *Carl Kuebler*, his patent attorney and the Patent Office in Berlin, as well as copies of original documents concerning the registered design. My thanks go to Mr. Friedrich Diestelkamp, who lent me these papers for inspection and gave me valuable informations about *Carl Kuebler*.

[viii] Attention should be drawn here to Faber-Castell with Addiator, a combination offered since 1935.