K+E

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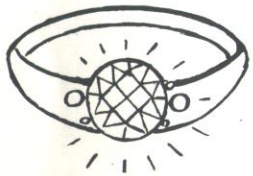
A slide rule with intellect and..horse sense

THE CONSISTENT

K+E

LOG LOG DUPLEX DECITRIG®

by don herold



CONSISTENCY

"—thou art a jewel."—Shakespeare or somebody

"Compatibility or harmony between things, acts or statements."
Funk & Wagnalls

"It's horse sense."—don herold

THE CONSISTENT

K+E LOG LOG DUPLEX DECITRIG

A slide rule with intellect and . . . horse sense

by don herold

You want your slide rule to make sense, as well as mathematics.

No matter what miracles you expect it to perform, you want it to be simple.

You want it to "play easy."

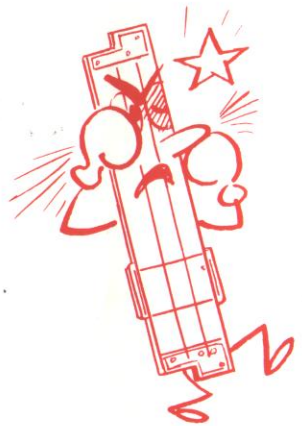
You want it to have no self-contradictions, no inner conflicts, no inbuilt complexities to trip you up.

How would you like to play a piano which had some of its high notes at one end of the keyboard, and some of them at the other?

A piano keyboard is consistent. All its notes go one way.

Now, I happen to know that there are some slide rules which, to achieve certain objectives in specialized fields, are about as cuckoo in their "arrangement" as a piano would be with a scrambled keyboard.

But Keuffel & Esser Co. — the first manufacturers of slide rules in the United States — have made it their guiding principle to keep their slide rules simple — yes, even to



It does not fight itself

make them simpler — even as they have made them to perform more complex calculations.

They've found one simple keynote to keeping the "keyboards" of their slide rules simple:

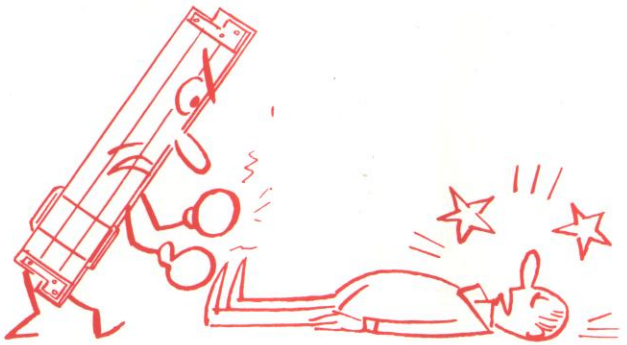
Keep them consistent.

That is, don't let the slide rule disagree with itself or fight itself in such a way as to make its user perform some kind of mental switches in operating it.

The most highly advanced general purpose slide rule available today is the K & E Log Log Duplex Decitrig.

Because of its planned ***consistency*** with itself — because of its lack of self-contradictions — it soon becomes possible for you to play it by second nature.

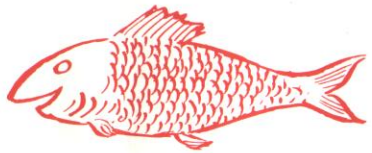
Students and professionals alike agree that it is the most harmonious slide rule in the business — that it is as highbrow as a slide rule can be, but also as sensible as an old shoe.



It does not fight you

3

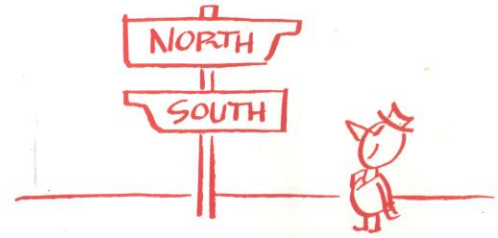
EXAMPLES OF CONSISTENCY IN THE K&E LOG LOG DUPLEX DECITRIG

1 

Consistent scale relationships

All scales relate consistently and solely to the basic C and D scales.

You don't have to stop and think about which way one scale is related to another scale on the Log Log Duplex Decitrig. Before this slide rule was designed, some scales related to the A & B scales, others to the C & D scales. The ***consistent*** relationship of this slide rule masterpiece is a great thing for its user, because the C & D scales are the basic element of any general purpose slide rule.

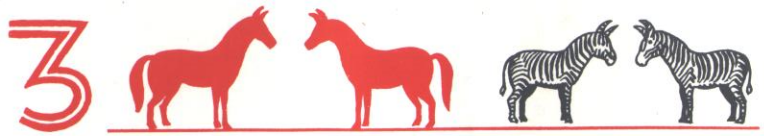
2 

Consistent indication of reading direction

The direction of numbering is consistent on all scales.

Black numbers ***always*** increase from left to right, and red numbers ***always*** increase from right to left.

This horse sense consistency makes the K & E Log Log Duplex Decitrig easier and speedier to use. And another feature — all numbers on double-numbered scales are slanted in the direction of the increase.

3 

Consistent color relationships

There is no variation in the relationship of scale colors.

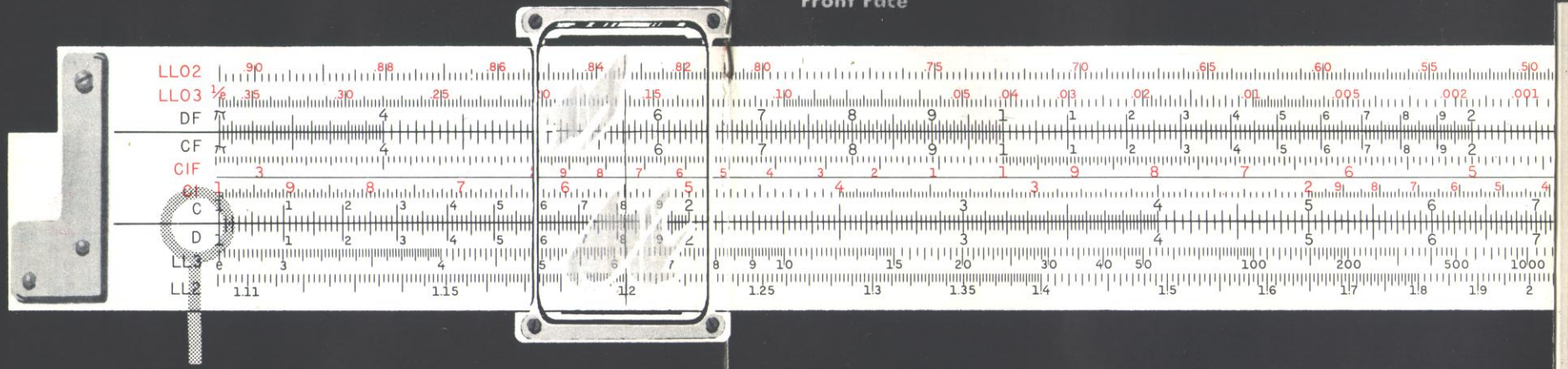
In short, all DIRECT FUNCTIONS (sin, tan, sec) are read on ***like*** colors — black to black or red to red, but never on opposite colors.

Similarly, CO-FUNCTIONS (cos, cot, csc) are read on ***opposite*** colors — black to red or red to black, but never on like colors.

This makes just one simple rule to remember — ***direct*** functions on ***like*** colors, ***co-functions*** on ***opposite*** colors.

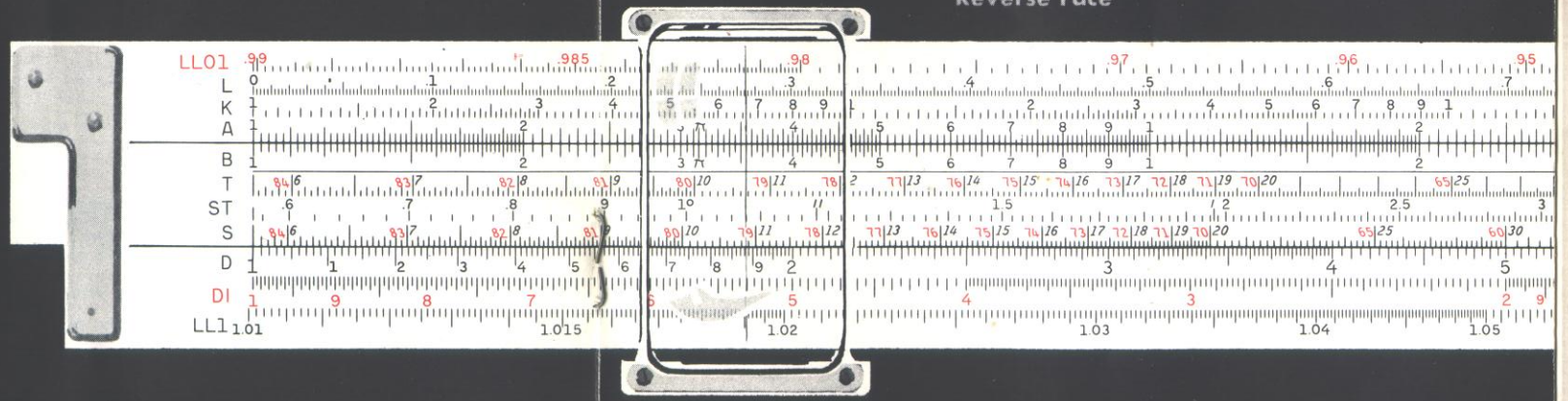
K&E Log Log Duplex Decitrig Slide Rule

Front Face



1 Consistent scale relationships

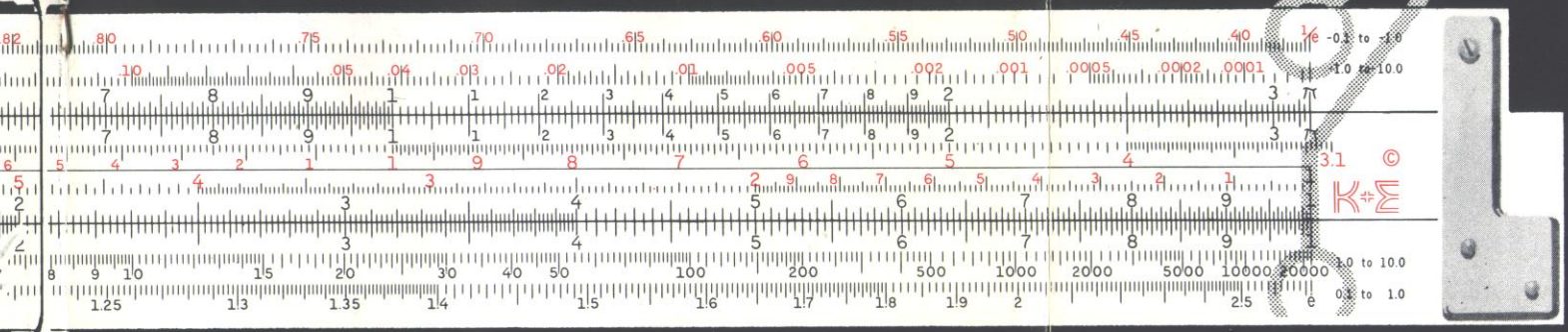
Reverse Face



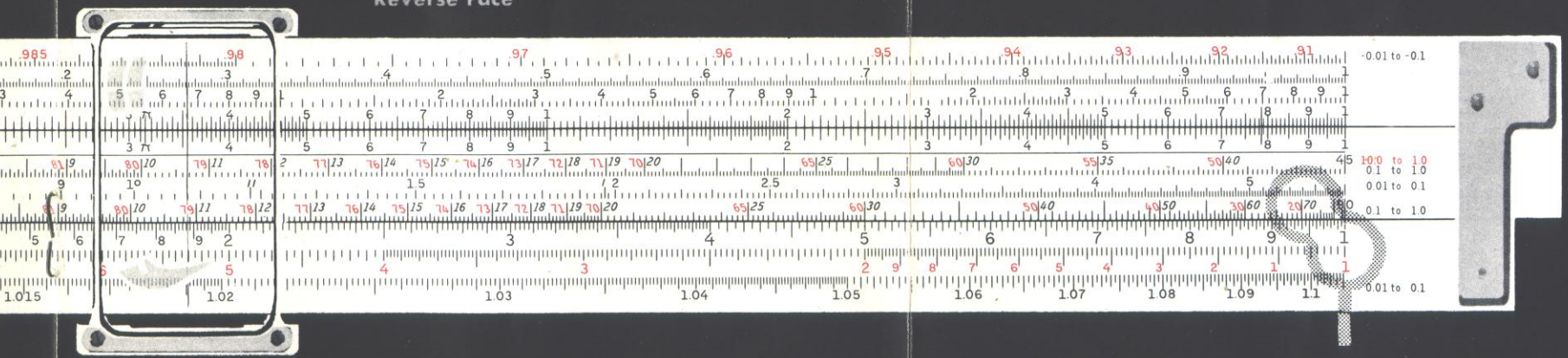
Actual Size

2 Consistent indication of reading direction.

Front Face

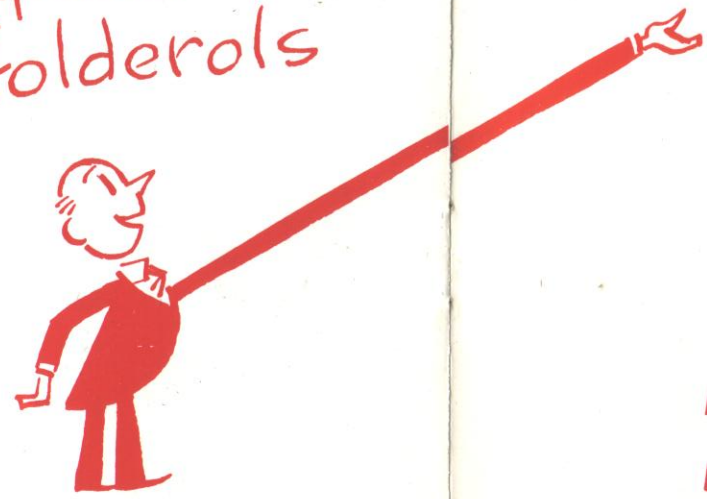


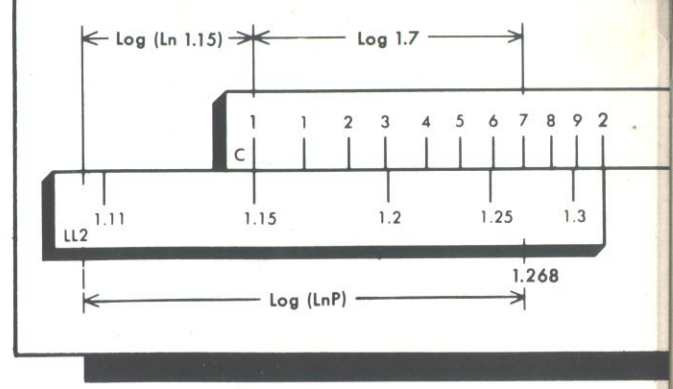
Reverse Face



3 Consistent color relationships.

No fancy complications or folderols



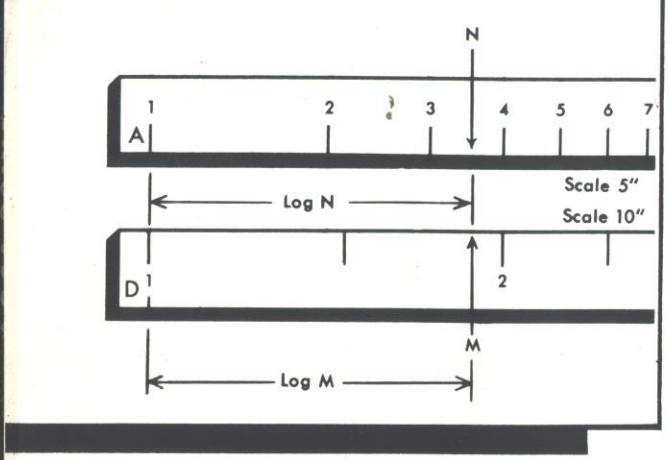


Every scale that is needed, and not one too many

Three scales, *LL*1, *LL*2 and *LL*3, are used in calculations involving the powers and roots (including fractional and negative powers and roots) of numbers ranging from 1.01 to 22000. Mated with these are three scales, *LL*01, *LL*02 and *LL*03, which are used in calculations involving powers and roots of numbers ranging from 0.99 to 0.00005. Opposite numbers on mated pairs are reciprocals of each other.

With the *LL* series of scales applying to numbers greater than 1 and the *LL*0 series to numbers less than 1, it may appear as though provision is lacking for numbers very closely approaching 1. However, that is not the case, because the *D* scale may be used as a series of additional Log Log scales in order to approach 1 with any degree of closeness. This is accomplished by adding 1 to each reading x on the *D* scale, or to each reading $(0.1)x$, or $(0.01)x$ . . .

Likewise, numbers less than 0.00005 or greater than 22000 can be dealt with by writing the base in the powers-of-ten notation, then, using the law of exponents, by resolving the power into an integral power of 10 and other powers within the range of the scale. The computation can then be made regardless of how small or how large the number may be.



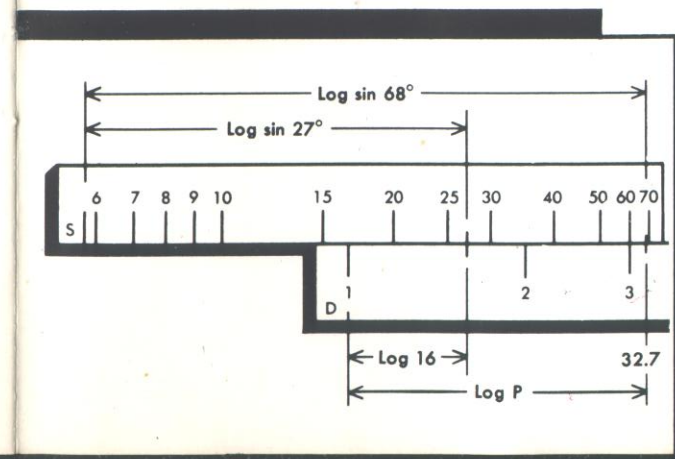
Such cases are exceptional, and users have found that three *LL* scales with their three mates in the *LL*0 series directly take care of nearly all computations. It would be easy to add more *LL* scales by enlarging the Log Log Duplex Decitrig rule, but the practical advantage to be gained is negligible compared with the disadvantage in the loss of compactness. There is obviously a limit to the number of scales that can be incorporated into a slide rule of practical size, and in the Log Log Duplex Decitrig that limit is established by the point of diminishing returns.

The *A* and *B* scales refer to the basic *D* and *C* scales in exactly the same way as do all other scales on the rule. Through these consistent scale relationships, problems in which squares and square roots appear as factors may be solved without resetting. The same applies to cubes and cube roots, using the *K* scale which likewise refers to the *D* scale.

By means of the folded scales *CF* and *DF*, multiplications and divisions can be performed which would require resetting if only the *C* and *D* scales were available. A development originated by K&E is folding the *CF* and *DF* scales at π, which permits the use of π as a factor without resetting. The *CI* scale and the folded *CIF* scale are used with the *D* and *DF* scales for multiplying or dividing one number by the reciprocal of another, again without resetting the rule. The *DI* scale is of particular value in combination with the trigonometric scales.

Vector problems, and problems involving continuous operations or progressive manipulation, can be solved simply by a direct reading of the final answer, without reference to any intermediate figure. What makes this possible is the placement of the *S*, *T*, and *ST* scales on the slide, thus referring all trigonometric scales to the full length *C* and *D* scales — another design originated by K&E.

These features, and especially the principle of consistency, make for extreme ease and efficiency in teaching and learning to use the slide rule.



The K&E Log Log Duplex Trig Slide Rule No. 4080

The same K&E slide rule is available with the trigonometric scales graduated in degrees and minutes, instead of in degrees and decimals of a degree as on the No. 4081.

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