AN IMPROVED TABLE OF FIVE-FIGURE LOGARITHMS

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OF

FIVE-FIGURE LOGARITHMS

ARRANGED WITH A VIEW TO SECURING THE BEST POSSIBLE COMBINATION OF ACCURACY AND SPEED IN USE, AND WITH SPECIAL REGARD TO AVOIDING UNNECESSARY FATIGUE TO THE EYES.

BY

E. ERSKINE SCOTT,

FORMERLY FELLOW OF THE INSTITUTES OF ACTUARIES AND OF ACCOUNTANTS,

AUTHOR OF LOGARITHMS AND ANTI-LOGARITHMS TO FIVE PLACES,

&c., &c.

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INTRODUCTION.

FOR many years there has been a growing opinion among users of Logarithms, that for all—or nearly all—practical purposes five figures are amply sufficient, and that only in the occasional small number of cases in which accuracy to a greater extent of figures is desirable, a seven-figure Table had better be used.

At all events, it is evident that in working out by Logarithms any question in which no number exceeding five figures is involved, it is useless to employ any Table of greater extent than five figures, as the extra figures could convey no useful meaning to the result.

It was with these facts in view that I compiled, in 1870, my large Tables of Logarithms and Anti-logarithms, giving at once on inspection the Logarithm or Anti-logarithm to five places of any number or Logarithm complete.

This Book was published by Messrs. C. & E. Layton in that year—and has since then reached a second edition and been stereotyped, and is now, I believe, extensively used and appreciated in particular by Life Assurance Companies in their periodical valuations, and by other large Institutions.

But it is necessarily cumbrous in use from its large size and weight—and its price is also considerable—and such as a purchaser would grudge to give, unless he required to take out a great number of figures at a time, and unless it was an object to do this at the least practicable expense of time.

It will be readily understood in these circumstances, that the present Table has been produced—certainly as no rival to the large Table—but for the use of such Calculators, or Students, as require to use Logarithms only in isolated cases, and would be glad to possess a trustworthy desk companion like the present, always ready at hand, to afford every convenience required in the best manner, and at a small comparative cost.

In producing this Table, I have also had in view that the practical Tables of five-figure Logarithms hitherto obtainable are all, to a certain extent, deficient in affording their contents in the shortest available time and space, and I have therefore done my best to remedy this deficiency.

The present Table is, in the first place, a perfectly complete Table of the Logarithms to five figures of all multiples of 10—from numbers 10,000 to 100,000—contained in 60 pages, each consisting of 150 of these numbers and logs.

To find the Logarithm of any of the nine numbers between any two of these tens, adjacent to each other—by the ordinary system—we require to add to the Logarithm of the lesser number the proportional part of the difference between that Logarithm and the Logarithm of the greater

number corresponding to the number of tenth parts added to the lower number.

Thus, to find—by the ordinary five-figure Tables—the Logarithm to five places of the number 28267—

Log. 28260 by the Table is ... ... ·45117
and Log. 28270 being 45133

The Difference caused by the increase of 10 to the number is 16

Of which 7/10ths=11·2 11

Adding which to the Log. of 28260, we get ·45128

being the required Log. of 28267 carried to the last figure.

This is the universal mode of obtaining the Logarithm of any number between two tabulated numbers in existing Tables of Logarithms, unless the calculation of the tenth parts be made in a small auxiliary Table in the margin, as is very common in seven-figure Logarithmic Tables.

So that in the best Tables, before a required Logarithm can be found, there must be a calculation of the given tenths or reference thereto in the margin, each involving a separate consumption of time.

The ordinary process is further, on the face of it, unsatisfactory, as the *differences* used being only approximate are liable to differ to the extent of unity from each other, both in excess and deficiency from the truth, although in reality they follow a distinct and uniform law of decrease, as would be manifest by comparing these differences with those correspondingly correct to a greater number of figures, as in the following example:—

No.	Log. to 5 Figures.	Differences.	Log. to 7 Figures.	Differences.
10030	·00130	...	·0013009	...
10040	·00173	43	·0017337	43·28
10050	·00217	44	·0021661	43·24

The differences in this case, taken from five-figure Logarithms, actually increasing by 1. Whereas, in reality, if the figures were extended it would be found that the differences at the above point would be as taken from seven-figure Tables, for the first, 43·28, and for the second, 43·24, as above noted.

To obviate this, and save time and work to the eyes, I have in the subjoined Table carried out the following changes—

1. I have calculated the proportional parts on the *average* amount of the ten adjacent differences, doing away entirely with the above specified anomaly, and using the proportional parts direct, so that no calculation of the proportional parts of the differences is required in practice.

2. I have put the tenth parts of these average differences in close contact with the Logarithms to be added to, so that the exact proportion to be added may be instantly ascertained without calculation and without appreciable motion to the eyes.

In point of fact, it will be observed on examination of the subjoined Table, that any Logarithm of any number to five places can be found in a square of less than 1½ inches contents, and so that the reply may be at once obtained

without the eye deviating an inch from the centre of the square.

The following two examples will fully illustrate the use of the Table.

EXAMPLE 1.—Required the Logarithm to five places of 24678.

SOLUTION.

N		L	
24670		·39217	
8		14	PP.
24678		·39231	

Opposite the number 24670 is its Logarithm ·39217 —and opposite to 8 in the No. part is the proportional part 14—adding which we get

Logarithm of 24678 is ·39231—which is correct.

EXAMPLE 2.—Required the number to five places corresponding to the Logarithm ·38626.

SOLUTION.

N		L	
24330	—	·38614	
7		12	P.P.
24337	=	·38626	

Opposite to the Logarithm ·38614 is found the number 24330, and opposite to 12 in the proportional parts (making the Logarithm amount to the given sum of ·38626) is the number 7, which, added to 24330, makes the required number amount to 24337—which is correct.

In repeating these processes, it will soon be found that the requisite simple additions may be always made mentally