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ELEMENTARY INSTRUCTIONS FOR OPERATING THE SLIDE RULE.

MANNHEIM TYPE

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The Slide Rule has application in the fields of engineering, architecture, estimating, cost accounting, statistics, physics, chemistry, astronomy, merchandising,—wherever quick calculations are necessary.

It is used primarily for multiplication and division and the related operations of proportion, percentage, and combined multiplication and division.

Problems involving squares, square roots, and trigonometric functions are also solved by means of the Slide Rule; but the beginner is advised to confine his study to the simple operations of multiplication and division on the "C" and "D" scales.

Before attempting to perform the calculations, the student should practice the reading of the scale until he has acquired accuracy in locating numbers without hesitation.

The C and D scales are identical and are numbered from 1 to 10, the spaces between the whole numbers decreasing steadily toward the right, as is brought out in the following diagram:

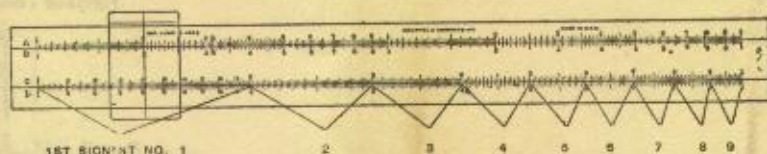


Fig. A.

TO LOCATE THREE-FIGURE NUMBERS ON THE C AND D SCALES

STEP I.—Read the first significant figure. (The first significant figure of a number is the first non-zero figure, as in 0.024, or 2.40.)

If the first significant figure is 1, the number will lie between the main divisions 1 and 2.

If 3, between 3 and 4, etc. (See figure A, Page 1.)

EXAMPLE. The number 246 lies between the main division 2 and 3 (as indicated since the first significant figure is 2).

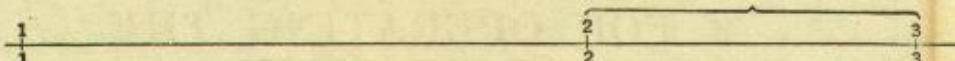


Fig. I. MA

STEP II.—The second figure locates the number on the secondary divisions in a similar manner.

EXAMPLE. In the number 246 the second figure 4 indicates that the location is, as indicated by the bracket in figure II, which is a sketch of these secondary divisions to each main division.

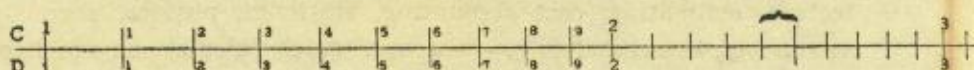


Fig. II. SECO

NOTE: On the 10 in. rule, owing to the lack of space, the secondary divisions

STEP III.—In a like manner the third figure locates the number on the third set of divisions, which

EXAMPLE. Since the number 246 lies between the main divisions 2 and 3, the third small space past the 4th secondary division beyond the main d

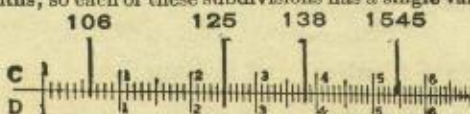
246



Fig. III. CON

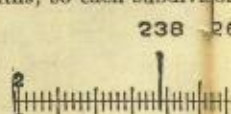
IMPORTANT NOTE:—Were it practical to manufacture a rule with ten subdivisions to every main division, as have the secondary divisions. However, since the spaces grow smaller toward the end of the scale, the subdivisions are made into tenths throughout the scale. Therefore:—

(a) The spaces between the secondary divisions lying between Main Divisions 1 and 2 are divided into tenths; so each of these subdivisions has a single value.



10 spaces, each=1

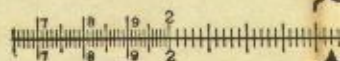
(b) The spaces between the secondary divisions lying between Main Divisions 2 and 3 are divided into fifths; so each subdivision has a value of 2.



STEPS I, II and III are condensed in figure IV, b

(1ST) 246 LIES BETWEEN 2 AND 3

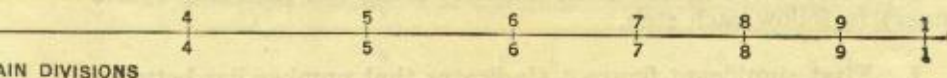
(2ND) LIES BETWEEN SUBDIVISIONS (2)



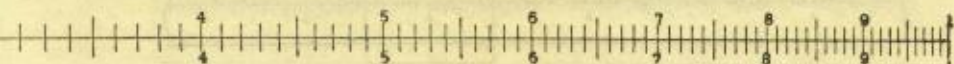
246 FINAL
Fig.

LES, there are *three* steps of procedure in the following sequence:
 numeral that is *not* zero. Thus, 2 is the first significant figure of the numbers 0.0024, 24.0,
 2. If it is 2, the number will lie between 2 and 3.

by the bracket in figure I, a skeleton scale showing only the main divisions),



is between the 4th and 5th secondary divisions beyond the second main division scale with only the secondary divisions filled in. Note that there are ten of

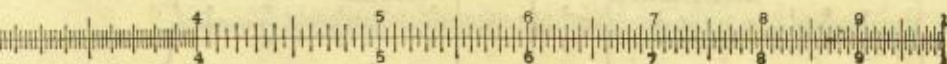


SECONDARY DIVISIONS

ns between the 1st and 2nd main divisions are the only ones numbered.

ch appear in figure III—the Slide Rule Scale in its final form.

re the subdivision is in fifths, the third figure locates the number finally on the division 2, as indicated by the arrow in figure III.

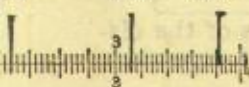


COMPLETE SCALE

secondary division, it would certainly be done, so that each space would have a **single** value, the right end of the scale, it is **practically impossible to subdivide the secondary divisions**

secondary divisions between 3 and 4 are divided in 3 has a double value.

64 306 341



5 spaces, each=2

(c) The spaces between the secondary divisions for the remainder of the scale are only divided in **half**; so each subdivision has a value of five.

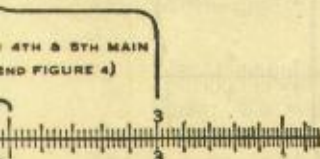
720 805 925



2 spaces, each=5

below, showing the location of the number 246.

(1ST SIGNIFICANT FIGURE 2)



LOCATION
IV.

It is advisable for the student to follow the same procedure on his Slide Rule, locating those numbers with the aid of the **hairline** on the **indicator** (glass runner).

Now locate 478 in the same manner, using the **indicator** (glass runner) to follow each step.

I. First significant figure 4 (indicates that number lies between 4 and 5). Set indicator at 4 (fig. V.).

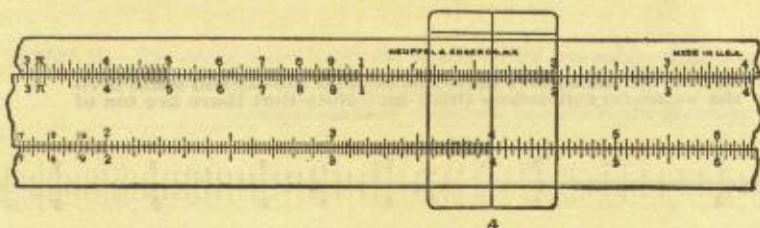


Fig. V.

II. Second figure 7 (indicates number lies between 7th and 8th secondary divisions). Move indicator to 7th secondary division (fig. VI.).

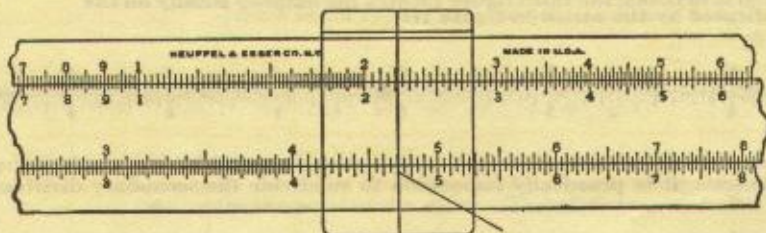
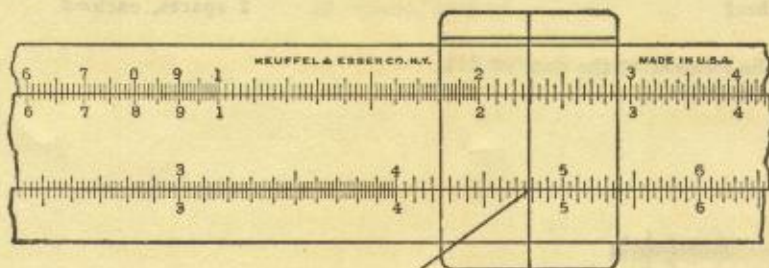


Fig. VI.

III. Third figure 8 (indicates the number lies $\frac{3}{5}$ ths of the distance between the single subdivision (half) and the next secondary division (fig. VII.).



478

Fig. VII.

Numbers containing a single digit are located at the main divisions, as—



Fig. VIII.

Two digit numbers are located like the three digit numbers, but are finally located on the secondary divisions instead of the final subdivisions, as—

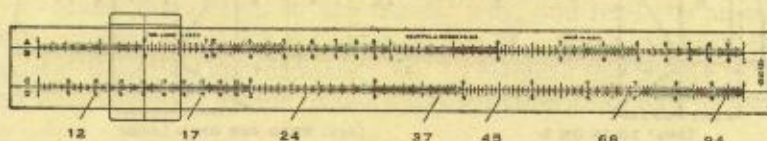


Fig. IX.

Numbers containing a large number of digits need only be set to the third or fourth place; since the percentage of error introduced in the result is so minute, as to be insignificant in the majority of problems,—especially ratio and percentage calculations, combined multiplication and division, and multiplications involved in estimating and appraising.

Thus, 187,575 would have to be called 187,600 and set as follows:

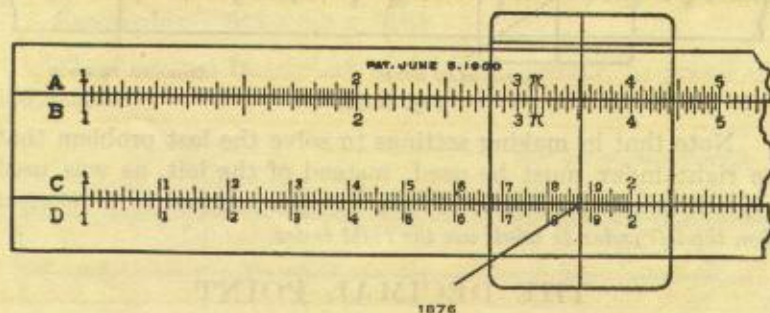


Fig. X.

The student should practice setting and reading until he feels confident that he can do so accurately and without hesitation. Then he is ready to give his attention to the solution of simple multiplication problems.

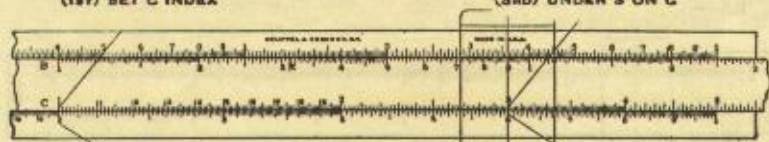
MULTIPLICATION

Rule: To multiply two factors together, set the index of the C Scale (either the right or left end figure one) adjacent to one of the factors on the D scale and read the answer on D under the other factor on C.

$$2 \times 3 = x$$

(1st) SET C INDEX

(3rd) UNDER 3 ON C



(2nd) TO 2 ON D

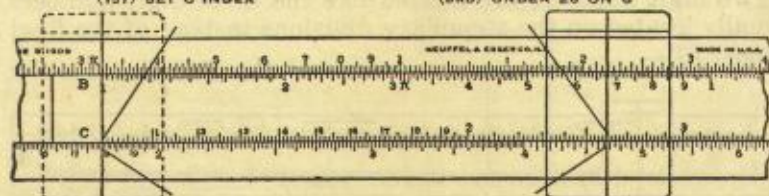
(4th) READ 6 ON D (ANS.)

Fig. XI.

$$18 \times 26 = x$$

(1st) SET C INDEX

(3rd) UNDER 26 ON C



(2nd) TO 18 ON D

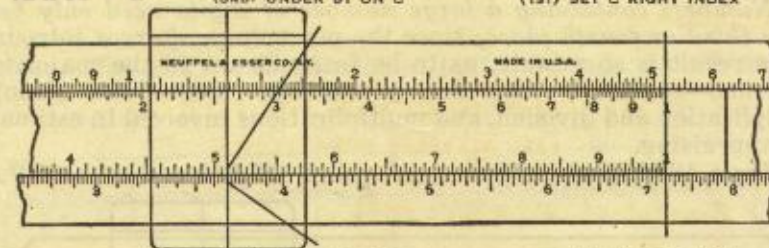
(4th) READ 468 ON D (ANS)

Fig. XII.

$$72 \times 51 = x$$

(3rd) UNDER 51 ON C

(1st) SET C RIGHT INDEX



(4th) READ 3672

(2nd) TO 72 ON D

Fig. XIII.

Note that in making settings to solve the last problem that the right index must be used, instead of the left, as was used in the first two problems. If the slide projects too far to the right when the left index is used, use the right index.

THE DECIMAL POINT

Important: No mention has been made as to the method of determining the position of the decimal point in the last problems, since it has been apparent at a glance. In most cases, however, the operator should substitute round numbers for those appearing in the problem and determine the correct position of the decimal point by approximation.