MULTIPLICATION AND DIVISION:
For this work, use only the C and D scales, and in some cases the CI scale. The C and D scale start with the unit 1 at the left, then the unit 10 at the right. The spaces between 1 and 2 and 2 and 3 have numbers indicating the “times” following the left hand 1 and 10. The lines between the figures divide each segment into 10ths. The markings between 2 and 4 again represent individual numbers following 2 or 20, but the markings between unit numbers are in 5ths, or 2/10ths. From 4 to the right hand 1 or 10, each unit space is divided in halves, or 5/10ths. The diagram below shows these as they appear on the rule, and gives readings as they appear.

MULTIPLICATION:
On a logarithmic scale, the progression of numbers is constant, therefore, the multiplier of any unit or number of units can be read off if we place the factor 1 on the line of one of the factors in the problem. The problem of 2 x 3 is therefore solved as follows:
1—move the slide until the figure 1 of the left is over the 2 on the D scale. (Move the slide to the right.)
2—move the cursor until the horizontal is over the 3 on the C scale on the slide.
3—the horizontal will be over 4 on the D scale.

DIVISION:
Since division is the reverse of multiplication, we reverse the process shown in multiplication, as follows: Problems: divide 4 by 2. Start with 4 on the D scale. Move the slide until 2 is over the 4. Against 1 to the left, read 2.

5 x 3 = 15 of C over 5 of D. read 1 or 10.
NOW 3 x 3 = 9 of C over 3 of D. reduce 9 against 3 to 1.

THESE B = 2/2 of C over 8 of D. reduce 4 against 1 of C.

PROBLEMS
5 = 4 of C over 5 of D. reduce 1.25 against 1 of C (SEE BELOW)

For numbers which after multiplied are more than 10, it is necessary to achieve the same effect by using the right hand 1 (or ten) as the factor. For instance,

2 x 6 = 12. By placing the right hand 1 over 6 and reading against the 2 on the C scale, the cursor will indicate the 12 on the D scale. (left hand 1 or 10 plus the factor 2 times 6.)

NOW 7 x 4 (right hand 1 on C over 7 on D.
TRY 4 read 8 above 6 on D, place 8 on C.

THESE 8 = 0 over 6 on D, place 8 on C.

PROBLEMS Against right hand 1 on C, read 8.

Some division or multiplication problems will “run off the rule.” In this case, reverse the slide, using the right hand or left hand 1, and read the answer as shown.

EXAMPLE: 4 x 4—out left hand 1 on C against 4 on D. The 4 on C is “off the rule.” Slide the slide to the left until the right hand 1 is over 4 on D. Against 4 on C, read 16 on D.

USING THE C SCALE:
The C scale is the same as the C scale, it reads from right to left. This scale is the RECIPROCAL of the C scale, and can be used to avoid the necessity of moving the slide left or right.

EXAMPLE: 4 x 4—Reading from the C right on C, place the 4 above the 4 on D—against the left hand 1 on C, read 16 on D. (SEE BELOW)

24 = 4—place left hand 1 on C above 24 on against 4 on D, read 6 on D.
USING THE A OR B SCALE:
The A and B scales are made up of 2 half size or half length logarithmic scales, therefore they are the SQUARE of the full A and B scales. For practice, remove the slide. You can now clearly read the A against the B scale. Since the curvature of the horizon line is not over 3 in D — you will read 9 on the left half of the scale.

The square of 5 on D is 25 on the right scale of A.

(SEE BELOW)

SQUARE ROOT:
Since the A scale is the square of the numbers on D, in turn, the numbers on D are the SQUARE of the numbers on scale A. Of prime importance here is which half of the A scale to use when putting the number in on the B scale. The rule for use in determining the number to put into the square root is: 7

The rule for this is simple. If ODD number of digits, use the right scale. If EVEN number of digits, use the right scale.

THE K SCALE:
The K scale, you will note, consists of 3 log scales inscribed in A. The result is that these figures are the CUBE of the D scale figure, 3 X 3 X 3 = 27, or the cubes of the second part of the D scale. Also, K is the ROOT of the read on K or MIDDLE scale. is 4 (4 X 4 X 4). Since there are 3 scales, left, middle, and right, the rule for use of them in determining the number to put into the "root" is: The left scale is for numbers of 3 digits, the middle scale for 2 digit numbers, the right scale for 3 digit numbers.
The rule to be learned is as follows: FROM THE DECIMAL POINT TO LEFT, divide the number into groups of 3 digits. Now, skip over the groups of 3 next to the deciam, and determine the number of digits in the "outside" numbers. The answer is 1 digit. Use the left part of the K scale in your computation. H 2 digits, the center part of K, 33 digits, right part of K. For instance: 1— 25, has three digits left of decimal — use right K — K = CUBE ROOT

THE L SCALE:
This scale is actually a graduated scale exactly 125 millimeters long. It is graduated in 200ths of this length since this scale is the same as the log scale. Therefore, by reading a number on this scale we can find the logarithm of any number on the D scale. Note that the numbers are preceded by a decimal point, reading therefore from 1.0 to 1.00. This is called base 10. Place one index of the .L. scale against the log number of D. Read the answer against the other factor at end of D scale. (SEE BELOW)

THE S SCALE:
This scale is for direct reading of the sines of angles. The scale is divided into degrees, minutes and seconds. The scale is used in conjunction with the A scale to read the answer directly. It must be noted that sines above 60° must be carefully judged, since the scale decreases rapidly. The scale divisions are in minutes (60° EQUAL 1°) with decrements in 10s.

THE T SCALE:
The tangent scale starts at 5.7° end increases up to 45° on the right. To find the tangent of 64.45° or 6.45°, the log is read on the T scale and then added to 1.185 on the D scale. (SEE BELOW) It can be seen here also multiplication of the sine or tangent of the required angle, then transferring this to the D scale, by using the slide, and putting the 1.185 in front of the desired scale.

In quick review, here is a problem in each of the scales: check your answers with these, and if any question, refer to the proper instruction.

123 X 123 (C & D scales) Answer: 355.65 (first 2 numbers approximated)

924 X 16 (C & D scales) Answer: 57.75

42 X 42 (D) (D & A scales) Answer: 1764 (end 2 of 8 number mantissa lost. Last Square root of 2450. Answer: 49.5 (A scale — right half — answer on D)

The square root of 26 is 675 on the left scale of A.
The square of 19 is 361 on the left scale of A. Note that the products have even and odd numbers of digits. When the square root is found, this factor is most important in determining which scale to use.

The square root of 25 (even number of digits — right scale) is 5 on D.
The square root of 250 (odd number of digits — left scale) is 15.81 on D scale.
The square root of 2500 (even number of digits — right scale) is 50.

Be sure to include all decimal points, including the one on the scale in your answer. The logarithm is read directly on the L scale, allow the index of D.

EXAMPLE: log. 4 (D scale) is .6021 (L scale) log. 2 (D scale) is .301 (L scale).

Inverse, set the mantissa over the index of D, and read the answer or base number on D below the index of L.

Mantissa — .6021 is 4.

Mantissa — .301 is 2.

To determine the Sine of an angle, follow this example Sin 15°48' — Set hairline over 15°48' on S scale — read answer on A. [548] (Remember that the left scale on A is .1 of right scale, therefore an additional decimal is required.)

Sin 47°20' is .7538

9 X 9 X 9 = 919 D and K scale. Answer: 729 (approx. 730 on scale.)

Cubes of 125 (D & K scales — right side of K become 3 digits. Answer is 5 on D scale.

Log 6 — REVERSE SLIDE — the L and D scale — .778

Sin 13.4° or 13°24'— 5 and A scale. Answer: 232 Tantan 6.75° or 64°5'— T and D scale — 1.185

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