



DRAFTING AND REPRODUCTION
MATERIALS AND EQUIPMENT
SLIDE RULES

INTERIM EDITION WAR CATALOG
KEUFFEL & ESSER CO.

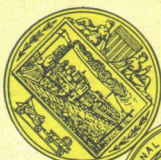
NEW YORK
1869



BUFFALO 1901
GOLD MEDAL

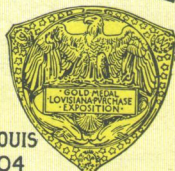


CHICAGO
1883

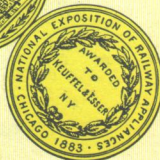


GRAND PRIZE

GOLD MEDAL



ST. LOUIS
1904



CATALOGUE OF

KEUFFEL & ESSER CO.

MANUFACTURERS AND IMPORTERS

DRAWING MATERIALS

SURVEYING INSTRUMENTS

MEASURING TAPES



SAN FRANCISCO
1915



TRADE MARK



PORTLAND
1905

NEW YORK

UPTOWN STORE
60 E. 42ND ST.

PARENT HOUSE
127 FULTON ST.

LONG ISLAND CITY
24-24 JACKSON AVE.

GENERAL OFFICE AND FACTORIES, HOBOKEN, N. J.

BRANCHES:

DETROIT: CONCOURSE GENERAL MOTORS BLDG.

CHICAGO 516-520 S. DEARBORN ST.

ST. LOUIS: 817 LOCUST ST.

SAN FRANCISCO: 30-34 SECOND ST.

LOS ANGELES: 730 S. FLOWER ST.

MONTREAL: 7-9 NOTRE DAME ST., W.

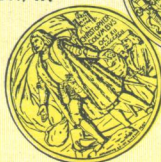


PHILADELPHIA
1876



FOUNDED
1867

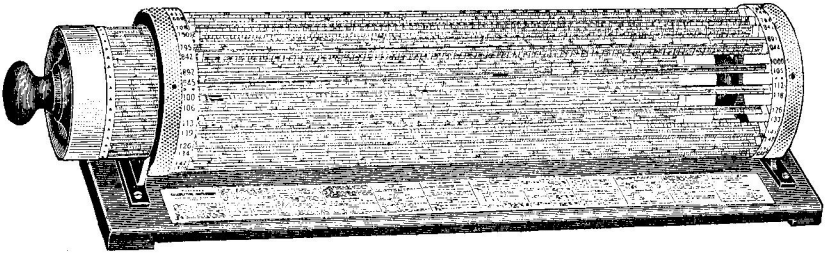
39th EDITION



CHICAGO
1893



THACHER'S CALCULATING INSTRUMENT.



No. N 4012.

N 4012. Thacher's Calculating Instrument, cylinder 18 in.; in polished mahogany Box, with full Directions.

Thacher's Calculating Instrument is a device for performing a great variety of useful arithmetical calculations with rapidity and accuracy. Its operation is simple and is readily learned. By its use the tedious drudgery of calculation is avoided and the chance of error eliminated.

As is shown in the illustration, the instrument consists of a cylinder 4 in. in diam. and 18 in. long, which revolves in an open framework composed of 20 angular bars held between two metal rings. The cylinder bears a scale corresponding to the scale of the Slide Rule, which is duplicated on the exposed sides of the bars. Results can be obtained to the fourth, and often to the fifth place of figures, and are correct to about one part in 10,000 (.01 of 1 per cent), which is sufficient for nearly every requirement of the professional or business man. Examples in multiplication, division, proportion and powers or roots involving not more than three quantities, are solved by one operation and any number of values of an algebraic function composed of two constants and a single variable may generally be found by one setting.

The useful applications of the instrument are almost unlimited; among them may be mentioned: finding the stresses and sections in trusses and girders, mensuration, estimates of work and material, solving trigonometrical formulæ, making and applying tables, problems in mechanical powers, machinery and hydraulics, problems in simple and compound interest, discount, prorating, the conversion of weights and measures, cost of merchandise with per cent. of duty or profit added.

For example, any of the formulæ

$$\frac{ax}{b} \quad , \quad \frac{ax^2}{b} \quad , \quad \frac{ax}{b^2} \quad , \quad \frac{ax^2}{b^2} \quad , \quad \sqrt{\frac{ax}{b}} \quad , \quad \sqrt{\frac{a^2x}{b}}$$

in which a and b may have any values and x any number of values, are readily solved by one setting. Squares, square roots, cube roots and reciprocals are also readily worked.

The following are a few problems which may be readily solved by the use of Thacher's Calculating Instrument:

A 15-in. "I" beam, resting upon supports 14.5 ft. apart sustains a load of 17500 lbs. at the center. What weight of beam is required if $S = 10000$ lbs. per sq. in.? (This problem is solved in three settings of the instrument.)

\$541.36 are to be divided prorata among various accounts amounting to \$7436.00 Required, the amount, going to account of \$427.50, \$763.80, etc. (The several amounts are each found in one setting.)

A train weighing 2500 lbs. per lineal foot passes over a bridge on a 4° curve at a speed of 30 miles an hour; required, its effect upon the lateral system. (This problem is solved in one setting.)

What will be the amount of \$250.00 placed at compound interest for 10 years at 6%? (This problem is solved in one setting.)



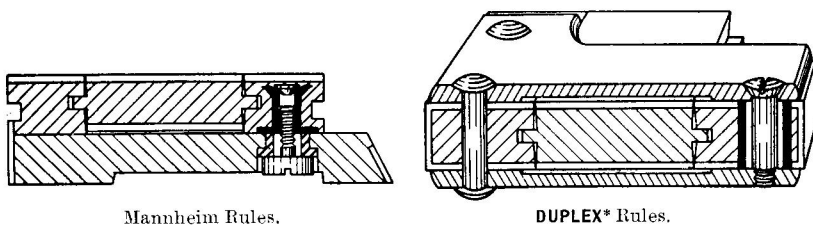
K & E SLIDE RULES.

REG. U. S. PAT. OFF.

K & E SLIDE ADJUSTMENT.

It is well known that the materials of which most slide rules are made (wood, xylonite or celluloid) are affected by atmospheric changes. Under ordinary conditions these changes have no effect upon K & E slide rules; in which the liability of shrinking and swelling has become a nearly negligible factor, due to the use of the most approved processes in the seasoning treatments of the materials employed. Under extreme conditions, however, shrinkage or swelling may become so marked as to interfere with the smoothness of operation of the slide. Consequently, some means is required to readjust the rule.

Before the K & E slide rule adjustment was devised, various means had been adopted to take care of appreciable shrinkage and swelling; but each of these had some serious drawback. None of the so-called "automatic" adjustments, for instance, has proved practicable in use. Those in which the base or stock, cut lengthwise into halves, is held together by springs, soon become useless through uneven shrinkage, and do not afford a rigid bed for the slide; while those which depend upon springs to hold one edge of the slide against the rule, become objectionable because of the gap which appears between the rule and the opposite edge of the slide.



Mannheim Rules. DUPLEX* Rules.
 Cross section of K & E Slide Rules showing Slide Adjustment.

The **K & E Slide Adjustment**, by successfully overcoming these drawbacks, has solved the problem perfectly. In the Mannheim type rules, one of the grooved guide pieces (in which the slide moves) is in a separate piece from the body of the rule, to which it is secured by means of set screws. These setscrews pass through oblong slots in the body of the rule into threaded metal bushings in the adjustable guide piece. This construction, while insuring that the guide piece will be held rigidly in place when the screws are tight, permits it to be moved away from or toward the slide when the screws are loosened. Hence, should adjustment become desirable, it is only necessary to loosen the screws turning the guide piece against the slide according to the friction desired, and tighten the screws again.

In the **DUPLEX*** slide rule, the metal end pieces, which join the two side bars of the stock, are provided with set screws which pass through oblong slots in one of the side bars. Adjustment is made by releasing the setscrew at each end of the bar, shifting the bar toward or away from the slide to give the desired friction, and then tightening the screws.

NUMBERING OF SLIDE RULES.

Great care has been taken to make the numbering of the graduations as distinct and permanent as possible. Since *sub-numbers* are not required by the adept, and tend to confuse and hinder beginners, we do not regularly number the sub-divisions throughout.

* REG. U. S. PAT. OFF.



MANNHEIM SLIDE RULES.

10-INCH RULE.

N4041. K & E Adjustable (Mannheim) Slide Rule, 10-in., engine divided, divisions on white facings, with improved Glass Indicator; in Case, with Directions.

N4041S. Same as No. N4041 but in sewed Leather Case.

The front face of each of these slide rules carries the following scales:

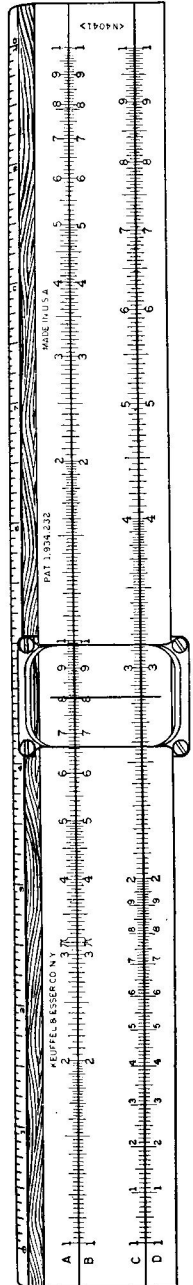
- A, two complete logarithmic scales, giving directly squares and square roots.
- B, two complete logarithmic scales, exactly like A.
- C, a single logarithmic scale.
- D, a single logarithmic scale, like C.

On the back of the slide are the following scales:

- S, a trigonometric scale of sines, referred to the A and B scales.
- L, a scale of equal parts for finding the common logarithms of numbers.
- T, a trigonometric scale of tangents, referred to the C and D scales.

The beveled edge of the slide rule is a handy measuring scale, since it is divided to inches in sixteenths. The other edge, being divided to centimeters in millimeters, serves the same useful purpose, where measurements in the metric system are involved.

The back of the rule carries a table of equivalents and the setting on the rule applying to each; so that inches may be rapidly reduced to centimeters; square yards to square miles, inches of mercury to feet of water; and many other useful conversions.



No. N4041.



POLYPHASE SLIDE RULES.

REG. U. S. PAT. OFF.

MANNHEIM TYPE

The **POLYPHASE** Slide Rule has, in addition to the regular features of the Mannheim (page 195), the following scales:

- K.** three complete logarithmic scales, giving directly cubes and cube roots.
- CI.** an inverted or reciprocal C scale, which enables the operator to take three factors at one setting of the slide, and to read reciprocals by means of the indicator. Consequently, on this rule, almost any combination of three factors involving squares, square roots, cubes and cube roots, may be solved at one setting of the slide.

10-INCH RULE.

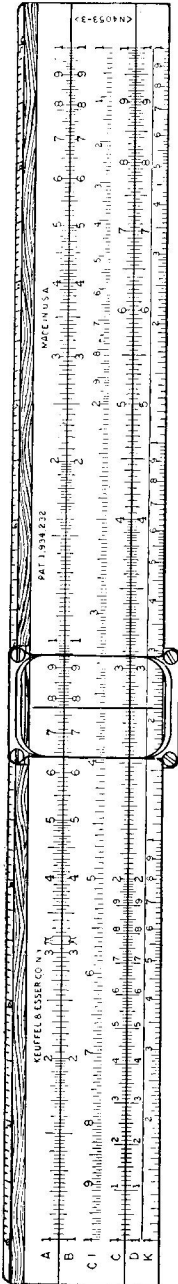
N 4053-3. **POLYPHASE** (Mannheim) Slide Rule, **K & E Adjustable**, 10 in., engine divided, divisions on white facings, improved Glass Indicator; in Case, with Directions.

N 4053-3S. Same as No. N4053-3 but in sewed Leather Case.

20-INCH RULE.

N 4053-5. **POLYPHASE** (Mannheim) Slide Rule, **K & E Adjustable**, 20-in., engine divided, divisions on white facings, improved Glass Indicator; in Case, with Directions.

N 4053-5S. Same as No. 4053-5 but in sewed Leather Case.



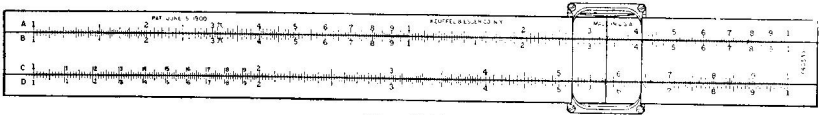
No. N4053-3.



FAVORITE SLIDE RULES.

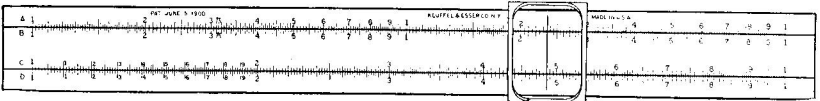
TRADE MARK

MANNHEIM TYPE.



No. 4055.

- 4055. FAVORITE (Mannheim) Slide Rule, K & E Adjustable, 10 in.,**
 engine divided, divisions on white facings, with im-
 proved Glass Indicator; in Case, with Directions.



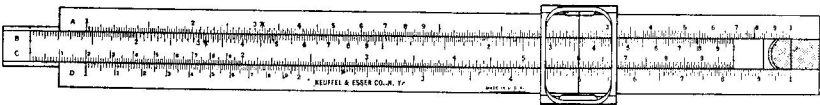
No. 4056.

- 4056. FAVORITE (Mannheim) Slide Rule, K & E Adjustable, 10 in.,**
 divisions on white facings, with plain frame
 Indicator; in plain Case, with Directions.

The **FAVORITE Slide Rules** have all the scales of No. N4041 (page 195),
 except the centimeter and inch scales.

BEGINNERS' SLIDE RULE.

TRADE MARK



No. 4058W.

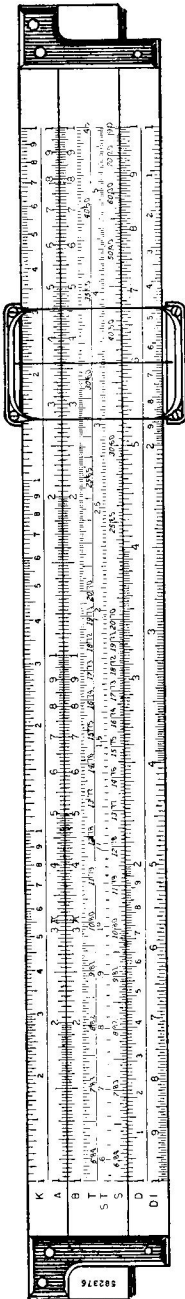
- 4058W. BEGINNERS' Slide Rule (Mannheim), 10 in.,** graduations
 on white finish, with plain frame Glass Indicator,
 in leatheret sheath with Directions.

No. 4058W has all the scales of No. N4041 (page 195) except the
 centimeter and inch scales.

The **BEGINNERS' Slide Rule** is intended only for the use of beginners
 to enable them to become familiar with the slide rule without incurring
 the expense of obtaining the regular rule intended for professional use.



POLYPHASE DUPLEX TRIG TRADE MARK AND POLYPHASE DUPLEX DECITRIG TRADE MARK SLIDE RULES.



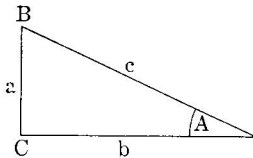
The great improvements which these slide rules exhibit lie not only in the addition of the folded scales (see page 199.) but, in the fact that while the trigonometrical scales are on the slide, as in most slide rules, they are all referred to the C, D, CI and DI scales. Hence, it is possible to take all the trigonometric functions as factors in any operation, without paying attention to their numerical values; so that, in multiplication, division, etc., the trigonometrical scales can be handled exactly like the C and CI scales. Also, due to the double numbering of the scales, all six usual trigonometric functions can be handled in the same problem by direct means and continuous operation, as follows:

Example: $x = \frac{4 \sin 38^\circ}{\tan 42^\circ}$

To 4 on scale D set 42° on scale T.
At 38° on scale S read $x = 2.735$ on scale D.

Example: $x = \frac{555 \cos 75^\circ \sqrt{193}}{5.5 \cot 81^\circ 30'}$

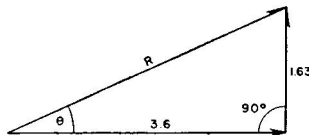
To 555 on scale D set 81°30' on scale T.
Indicator to 75° (red) on scale S.
5.5 on scale C to Indicator.
Indicator to 193 on scale B.
Under Indicator read 2425 on scale D.



The rearrangement of the trigonometrical scales is of great convenience in solving the right triangle (on which vector problems are based), including the determination of both acute angles, by the use of familiar methods, as follows:

Example: Given $a=3$, $b=4$. Find A and c.

To 4 on D set index of slide.
At 3 on D read $A=36.9^\circ$ on T.
To 3 on D set 36.9° on S.
At index of slide read $c=5$ on D.



Example: Find the magnitude and the angle of the vector representing the complex number $3.6 + j1.63$ where $j = \sqrt{-1}$.

To 3.6 on D set index of slide.
At 1.63 on D read $\theta = 24.4^\circ$ on T.
To 1.63 on D set 24.4° on S.
At index of slide read $R = 3.95$ on D.

The preceding methods can be applied most conveniently to all problems dealing with the right triangle. By means of scale DI another method can be used to solve most right triangles, with but one setting of the slide.

The above solutions of the right triangle apply to the scales on No. 4071-3, but the operation on No. 4070-3 is exactly the same, except that the angles are given in degrees and minutes.



POLYPHASE DUPLEX TRIG
TRADE MARK
AND
POLYPHASE DUPLEX DECITRIG
TRADE MARK
SLIDE RULES.

- 4070-3. POLYPHASE DUPLEX TRIG Slide Rule, K & E Adjustable, 10 in.,** engine divided, divisions on white facings, improved Glass Indicator; with **Trigonometrical Scales divided to represent degrees and minutes; in Case, with Directions.**
- 4070-3S. Same as No. 4070-3, but in sewed Leather Case.**
- 4071-3. POLYPHASE DUPLEX DECITRIG Slide Rule,** Like No. 4070-3 but with **Trigonometrical Scales divided to represent degrees and decimals of a degree.**
- 4071-3S. Same as No. 4071-3, but in sewed Leather Case.**

These slide rules, which are graduated on both sides, have all the scales of the **POLYPHASE*** Slide Rule, (see page 196) with the addition of four others—three of which (CF, DF and CIF) are known as the folded scales, and one (DI), as the inverted D scale. The trigonometrical scales have been expanded and rearranged. Nos. 4070 and 4071 are alike, except that the trigonometrical scales of No. 4070 are divided to represent degrees and minutes, whereas those of No. 4071 are divided to represent degrees and decimals of a degree.

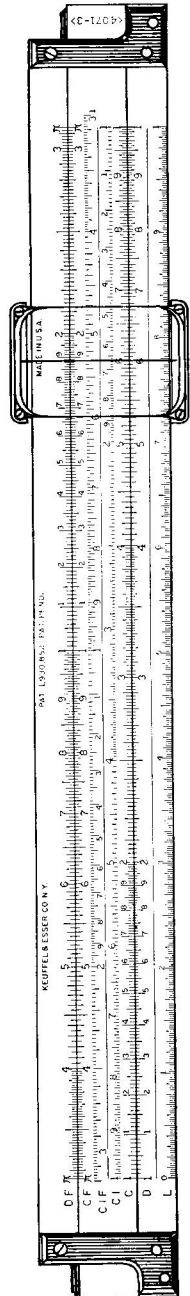
On one face are the following scales:

- DF,** a full length D scale folded. This arrangement admits of the handling of factors which, in rules without these scales, would frequently require the slide to be reset. Since the constant π is in alignment with the indices of the C and D scales, π can be taken as a factor or divisor in any formula without an additional setting.
- CF,** a full length C scale, folded like the DF scale.
- CIF,** a full length inverted folded scale, giving reciprocals of numbers on the CF scale. The inverted scale in connection with the direct scales admits of handling three factors with one setting of the slide, or four factors if π is included.
- CI,** a full length C scale inverted.
- C,** a single logarithmic scale.
- D,** a single logarithmic scale like C.
- L,** a scale of equal parts (for finding common logarithms of numbers).

On the reverse face are the following scales:

- K,** a three unit logarithmic scale, giving directly cubes and cube roots.
- A,** a two unit logarithmic scale giving directly squares and square roots.
- B,** a two unit logarithmic scale exactly like A.
- T,** a full length scale of Tangents and Cotangents, double numbered from $5^{\circ}43'$ or 5.72° to $84^{\circ}17'$ or 84.28° .
- ST,** a full length scale of Sines and Tangents, numbered from $0^{\circ}34'$ or 0.58° to $5^{\circ}44'$ or 5.73° .
- S,** a full length scale of Sines and Cosines, double numbered from $5^{\circ}44'$ or 5.73° to 90° for sines, and from 0° to $84^{\circ}16'$ or 84.26° for cosines.
- D,** a single logarithmic scale.
- DI,** a full length D scale inverted.

* REG. U. S. PAT. OFF.



No. 4071-3. Front.

KEUFFEL & ESSER CO., NEW YORK

LOG LOG DUPLEX TRIG

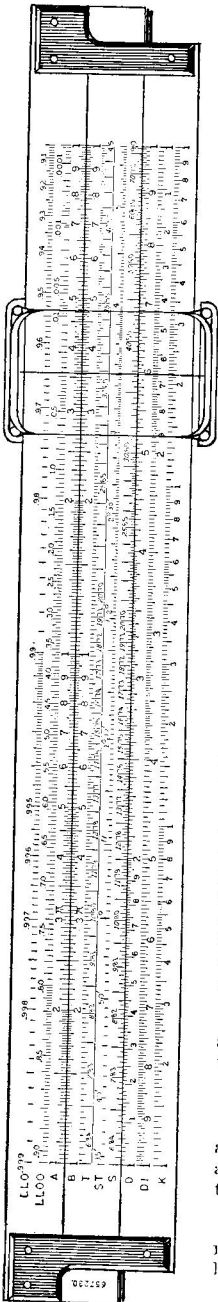
TRADE MARK

AND

LOG LOG DUPLEX DECITRIG

TRADE MARK

SLIDE RULE.



Since these slide rules have all the scales of Nos. 4070 and 4071, they can be employed for exactly the same purposes, and in exactly the same manner, as described on pages 198 and 199. However, since they are also equipped with the Log Log Scales, their scope is considerably increased.

The value of the Log Log Scales is best appreciated in determining powers and extracting roots. The solution of these problems involves no more work than would be required in ordinary multiplication or division on other slide rules. Powers and roots may be found in this way by those who are not acquainted with the ordinary mathematical processes employed in similar cases.

The saving in time and labor through the use of the Log Log Scales is best illustrated in finding a numerical expression for

x^n or $x^{\frac{1}{n}}$. With the ordinary slide rule this involves 4 settings of the indicator, one setting of the slide, and 3 scales. With the Log Log scales only 2 settings of the indicator, one setting of the slide, and 2 scales are required. No inspection of the result is necessary where the Log Log scales are employed, since the answer as found is already pointed off.

The Hyperbolic or Natural Logarithm of any number on the Log Log scales may be directly read upon the D scale. Logarithms to any other base are made instantly available through setting the index of the slide to the number representing the required base on the Log Log scale.

On the Log Log scale of quantities less than unity, problems involving powers and roots of fractions are easily solved by processes which are exactly like those of multiplication and division on the common scales of all slide rules. An improvement has been made through the addition of scale LLOO, which, together with scale LLO forms one continuous scale of decimal quantities from 0.0000454 to 0.999, thus giving a wider range than the usual LLO scale (0.05 to 0.97) by direct reading, and without requiring any recourse to calculation to determine the values not included in the LLO scale.

While simple problems involving powers, roots and logarithms are almost instantly solved by means of the Log Log scales, it is also true that equations like the following:

$$y = \frac{a}{2} \left(e^{\frac{x}{a}} + e^{-\frac{x}{a}} \right) \quad C = \frac{l}{2 \log_e \frac{l_1}{l_2}} \quad R = \frac{It}{C (\log_e E_1 - \log_e E_2)}$$

and similar ones found in Electrical Engineering and other calculations, are solved much more easily and rapidly by means of the same scales than by any other mathematical process.

Exponentials generally, and the many formulas in electrical and mechanical engineering, involving fractional powers or roots, hyperbolic logarithms, etc., are readily handled with the help of this rule



LOG LOG DUPLEX TRIG
TRADE MARK
AND
LOG LOG DUPLEX DECITRIG
REG. U. S. PAT. OFF.
SLIDE RULES.

- 4080-3.** LOG LOG DUPLEX TRIG Slide Rule, K & E Adjustable, 10 in., engine divided, divisions on white facings, improved Glass Indicator; with Trigonometrical Scales divided to represent degrees and minutes; in Case, with Directions.
- 4080-3S.** Same as No. 4080-3, but in sewed Leather Case.
- 4080-5.** Similar to No. 4080-3, but 20 in.
- 4080-5S.** Same as No. 4080-5, but in sewed Leather Case.
- 4081-3.** LOG LOG DUPLEX DECITRIG Slide Rule, like No. 4080-3, but with Trigonometrical Scales divided to represent degrees and decimals of a degree.
- 4081-3S.** Same as No. 4081-3, but in sewed Leather Case.
- 4081-5.** Similar to No. 4081-3, but 20 in.
- 4081-5S.** Same as No. 4081-5, but in sewed Leather Case.

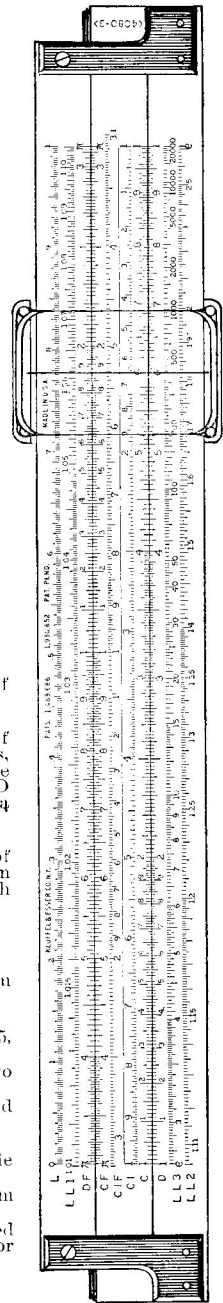
Nos. 4080 and 4081 are alike except that the trigonometrical scales of No. 4080 are divided to represent degrees and minutes, whereas those of No. 4081 are divided to represent degrees and decimals of a degree.

On one face are the following scales:

- L.** a scale of equal parts (for finding common logarithms of numbers).
- LL1, DF,** a full length D scale folded. This arrangement admits of the handling of factors which, in rules without these scales, would frequently require the slide to be reset. Since the constant π is in alignment with the indices of the C and D scales, π can be taken as a factor or divisor in any formula without an additional setting.
- CF, CIF,** a full length C scale, folded like the DF scale.
a full length inverted folded scale, giving reciprocals of numbers on the CF scale. The inverted scale, in connection with the direct scales, admits of handling three factors with one setting of the slide, or four factors if π is included.
- CI,** a full length C scale inverted.
- C,** a single logarithmic scale.
- D,** a single logarithmic scale like C.
- LL3, LL2,** full unit length Log Log scales, which with LL1 form a continuous log log scale from 1.01 ($e^{.01}$) to 22,000 (e^{10}).

On the reverse face are the following scales:

- LL0,** a Log Log scale of decimal quantities from 0.999 to 0.905, referred to the A and B scales.
- LL00,** a Log Log scale of decimal quantities from 0.905 to 0.000054. It is continuous with LL0.
- A,** a two unit logarithmic scale giving directly squares and square roots.
- B,** a two unit logarithmic scale exactly like A.
- T,** a full length scale of Tangents and Cotangents, double numbered from $5^{\circ}44'$ or 5.73° to $84^{\circ}17'$ or 84.28° .
- ST,** a full length scale of Sines and Tangents, numbered from $0^{\circ}34'$ or 0.58° to $5^{\circ}44'$ or 5.73° .
- S,** a full length scale of Sines and Cosines, double numbered from $5^{\circ}44'$ or 5.73° to 90° for Sines, and from 0° to $84^{\circ}16'$ or 84.26° for Cosines.
- D,** a single logarithmic scale.
- DI,** a full length D scale inverted.
- K,** a three unit logarithmic scale, giving directly cubes and cube roots.



No. 4080-3. Front.



LOG LOG DUPLEX VECTOR

REG. U. S. PAT. OFF.

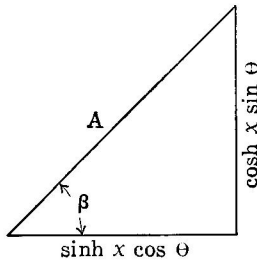
SLIDE RULE

The value of the Hyperbolic Functions will best be appreciated by Electrical Engineers dealing with steady-state power or telephone transmission. For instance, where the constants and terminal conditions of an alternating-current line-conductor are known, the potential, current, and power can be computed, through the use of these scales, in a fraction of the time (and with far less labor) required by any other means.

The following example indicates the ease of the slide rule solution:

Find the steady-state current flowing into the short circuit at the end of a transmission line of No. 10 B & S gauge copper wire whose length $S=25$ miles; whose propagation constant $p=0.0292 / 71.8^\circ$ complex hyperbolic radians; whose characteristic impedance $Z_0=723 / -11.1^\circ$ vector ohms; and whose difference of potential impressed at the sending end, $V_s=100 / 0^\circ$ volts at a frequency of 800 cycles per second.

The steady-state current flowing into the short circuit at the end of the transmission line, is represented by



$$I_R = \frac{V_s}{Z_0 \sinh pS}$$

$$\sinh pS = \sinh x \cos \theta + j \cosh x \sin \theta$$

$$= \sinh (x + j \theta) = A / \beta$$

where

$$A = \frac{\sinh x \cos \theta}{\cos \beta}$$

and

$$\beta = \cot^{-1} \frac{\tanh x}{\tan \theta}$$

$$100 / 0^\circ$$

$$I_R = \frac{723 / -11.1^\circ \sinh (25 \times 0.0292 / 71.8^\circ)}{100 / 0^\circ}$$

To 0.0292 on D set 25 on C.
At 71.8° on S (black) read 0.694 on D.
At 71.8° on S (red) read 0.228 on D.

Consequently,

$$pS = 25 \times 0.0292 / 71.8^\circ = 0.228 + j 0.694 \text{ radians}$$

To π on DF set 180 on CF.
At 0.694 on DF read 39.76° on CF.
 $\sinh pS = \sinh (0.228 + j 39.76^\circ)$
 $\theta = 39.76^\circ$ is less than 45° , but greater than 5.75° .
To 0.228 on scale Th set 39.76° on T (black).

Since the slide protrudes to the left, β is greater than 45° and should be read on scale T (red).

After setting indicator to right index of slide, match the indexes of the body and slide.

At indicator read $\beta = 74.92^\circ$ on T (red).

To $x = 0.228$ on scale Sh 1 set $\beta = 74.92^\circ$ on scale S (red).

At $\theta = 39.76^\circ$ on scale S (red) read $A = 0.680$ on scale D.
 $\sinh pS = 0.680 / 74.92^\circ$

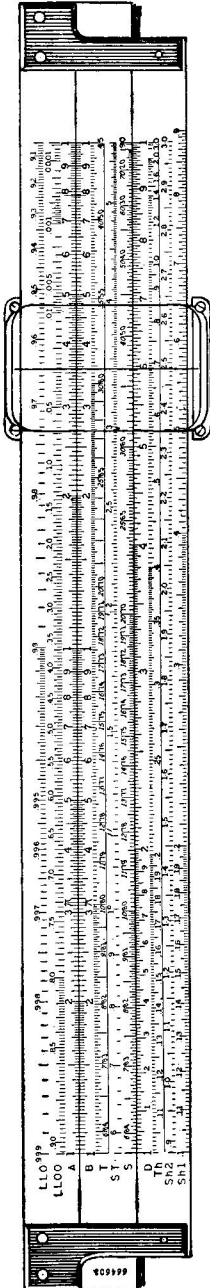
Consequently,

$$I_R = \frac{100 / 0^\circ}{723 / -11.1^\circ \times 0.680 / 74.92^\circ}$$

To right index (100) of D set 723 on C.
At 0.680 on CI read 0.2032 on D.

$I_R = 0.2032 / -63.82^\circ$ amperes with respect to the phase of the impressed voltage.

Problems involving complex hyperbolic cosines and hyperbolic tangents can be solved by similar methods. The determination of inverse hyperbolic functions of complex numbers is also greatly facilitated.



KEUFFEL & ESSER CO., NEW YORK

LOG LOG DUPLEX VECTOR REG. U. S. PAT. OFF. SLIDE RULES.

- 4083-3.** LOG LOG DUPLEX VECTOR Slide Rule, K & E Adjustable, 10 in., engine divided, divisions on white facings, improved Glass Indicator; in Case, with Directions-
- 4083-3S.** Same as No. 4083-3 but in sewed Leather Case.
- 4083-5.** Similar to No. 4083-3 but 20 in.
- 4083-5S.** Same as No. 4083-5 but in sewed Leather Case.

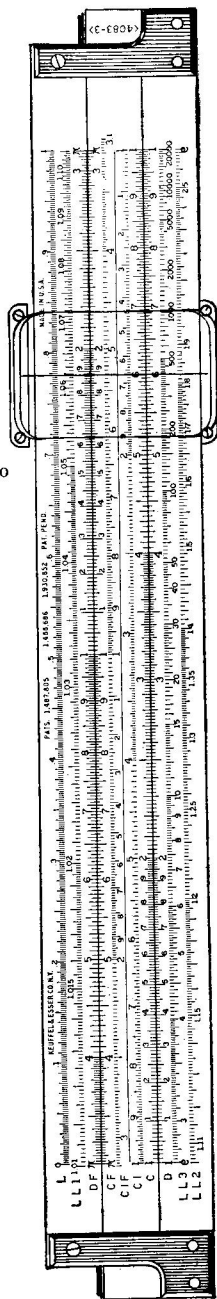
The LOG LOG DUPLEX VECTOR Slide Rule is of particular value to electrical engineers and students of electrical engineering.

On one face are the following scales:

- L, a scale of equal parts (for finding common logarithms of numbers).
- LL1, a Log Log scale.
- DF, a full length D scale folded. This arrangement admits of the handling of factors which, in rules without these scales, would frequently require the slide to be reset. Since the constant π is in alignment with the indices of the C and D scales, π can be taken as a factor or divisor in any formula without an additional setting.
- CF, a full length C scale, folded like the DF scale.
- CIF, a full length inverted folded scale, giving reciprocals of numbers on the CF scale. The inverted scale, in connection with the direct scales, admits of handling three factors with one setting of the slide, or four factors if π is included.
- CI, a full length C scale inverted.
- C, a single logarithmic scale.
- D, a single logarithmic scale like C.
- LL3, LL2, full unit length Log Log scales, which with LL1 form a continuous log log scale from 1.01 ($e^{.01}$) to 22,000 (e^{10}).

On the other face of the rule are the following scales:

- LL0, a Log Log scale of decimal quantities from 0.999 to 0.905, referred to the A and B scales.
- LL00, a Log Log scale of decimal quantities from 0.905 to 0.0000454. It is continuous with LL0.
- A, a two unit logarithmic scale giving directly squares and square roots.
- B, a two unit logarithmic scale exactly like A.
- T, a full length scale of Tangent and Cotangents, double numbered from 5.73° to 84.28° .
- ST, a full length scale of Sines and Tangents, numbered from 0.58° to 5.73° .
- S, a full length scale of Sines and Cosines, double numbered from 5.73° to 90° for sines, and from 0° to 84.26° for cosines.
- D, a single logarithmic scale.
- Th, a scale of Hyperbolic Tangents.
- Sh1, Sh2, a continuous scale of Hyperbolic Sines in two parts.

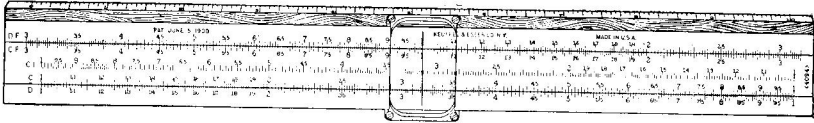


No. 4083-3, Front.



MERCHANTS' SLIDE RULE.

TRADE MARK

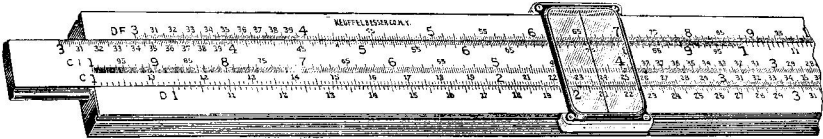


4094. Front showing all scales (DF, CF, CI, C and D)

- 4094. MERCHANTS' (Mannheim) Slide Rule, K & E Adjustable, 10 in.,** engine divided, divisions on white facings, improved Glass Indicator; in Case with Directions.

K & E DESK SLIDE RULE

REG. U. S. PAT. OFF.



Half of Rule

Front, showing all scales: DF, CF, CI, C and D.

- 4096M. Desk Slide Rule (Mannheim), K & E Adjustable, 20 in.,** engine divided, divisions on white facings, improved Glass Indicator; in Morocco Covered Case with Directions.

The **K & E Desk Slide Rule** has been especially designed for the Merchant, Importer, Exporter, Accountant, Manager, Mechanic, Foreman, and others, whose computations involve only multiplication, division, proportion and percentage.

In construction, the rule is of the Mannheim Type. The arrangement of the scales admits of the handling of factors which, in rules without this arrangement, would frequently require the slide to be reset.

The graduations are very distinct and the numbers large, thus reducing eye strain to a minimum.

Note: No. 4096M, has the same scales as No. 4094, but is twice as long.



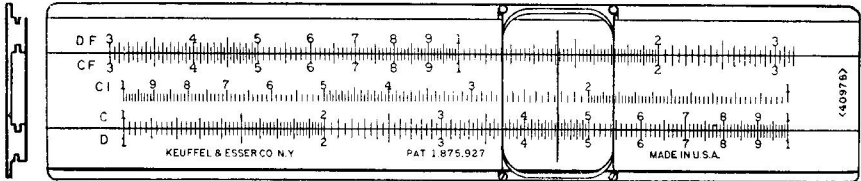
EVER-THERE SLIDE RULES.

REG. U. S. PAT. OFF.

The **EVER-THERE Slide Rule** is made entirely of white Xylonite, a strong, tough material. On this base the graduations are engine-divided. The handiness of the **EVER-THERE** slide rule is evident from the fact that it weighs no more than a fountain pen, and is much less bulky in the pocket.

The **Ever-There Slide Rule No. 4097C** is pre-eminently a pocket instrument, as the following dimensions will indicate:

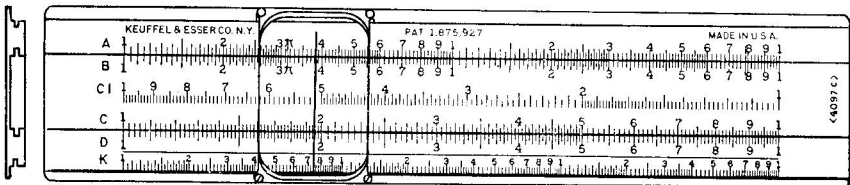
Length over all.....	6 inches.	Width over all.....	1 $\frac{3}{8}$ inches.
Thickness.....	$\frac{1}{8}$ inch.	Thickness of Indicator.....	$\frac{1}{16}$ inch.
Weight.....	about $\frac{1}{4}$ ounce.		



No. 4097B

4097B. EVER-THERE Slide Rule, 5 in., white Xylonite, engine divided, improved Glass Indicator, in high-grade leather sheath, with Directions.

The calculating scales of No. 4097B are all upon the front face. The CF and DF are folded scales, the function of which is to enable factors to be taken without resetting, which would be off the rule when using the regular C and D scales. These folded scales correspond in all respects to the C and D scales, except that each has but one index which is located close to the middle of the rule. The CI scale, an inverted C scale, when used in conjunction with the other scales, enables the operator to take three factors at one setting of the slide and to read reciprocals. The back of the rule has a five inch scale divided in inches to 16ths, and a 13 cm. scale divided in centimeters to millimeters.



No. 4097C.

4097C. EVER-THERE Slide Rule, 5 in., white Xylonite, engine divided, improved Glass Indicator, with Logarithmic and Trigonometrical Scales; in high-grade leather sheath, with Directions.

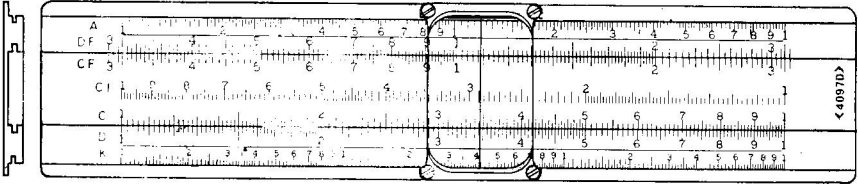
The size, form, weight and handiness of the No. 4097C **EVER-THERE Slide Rule** are identical with those of No. 4097B, as described above. The scales are the same as those described under the **Polyphase* Slide Rule No. N4053-3**, page 196 and are, on the front face, A, B, CI, C, D and K, and on the back of the slide, S, L and T. It has also the inch and centimeter scales as described under No. 4097B above. The slide is reversible.

*REG. U. S. PAT. OFF.



EVER-THERE SLIDE RULE.

REG. U. S. PAT. OFF.



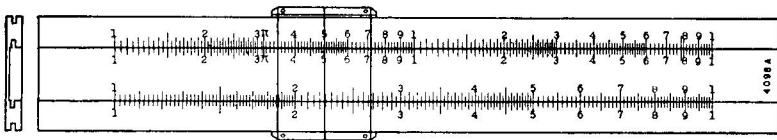
No. 4097D.

- 4097D. EVER-THERE** Slide Rule, 5 in., white Xylonite, engine divided, improved Glass Indicator; with **Logarithmic, Trigonometrical and Folded Scales**; in high-grade leather sheath, with Directions.

No. 4097D has the same size, form and weight, as Nos. 4097 B and C. On the front face it carries the A, DF, CF, CI, C, D and K scales, and, on the back of the reversible slide, the B, S, L and T scales. It also has the inch and centimeter scales on the back of the rule, as described under No. 4097 B.

K & E POCKET SLIDE RULE.

REG. U. S. PAT. OFF.



No. 4098A.

- 4098A. K & E Pocket Slide Rule**, 5 in., white Xylonite, "Frameless" transparent Xylonite Indicator, with **Mannheim Scales**, in leather sheath, with Directions.

The K & E Pocket Slide Rule is made entirely of white Xylonite, a strong, tough material. It weighs less than a fountain pen, and is much less bulky in the pocket. It is pre-eminently a pocket instrument, as the following dimensions will indicate:

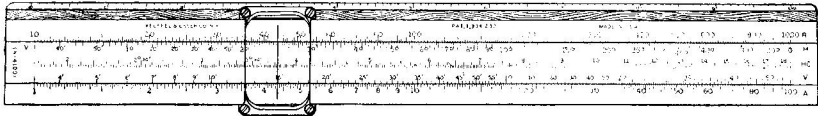
Length over all.....	6 inches	Width over all	$1\frac{3}{8}$ inches
Thickness	$\frac{1}{4}$ inch	Thickness over indicator	$\frac{1}{8}$ inch
Weight.....	about $\frac{5}{8}$ ounce		

The front face of this rule carries the A, B, C and D scales. The Trigonometric scales S and T, and the Logarithmic Scale L are on the back of the slide, which is not reversible.

The back of the rule has a five inch scale divided in inches to 16ths, and a 13 cm. scale divided in centimeters to millimeters.



STADIA SLIDE RULES.



No. N4100.

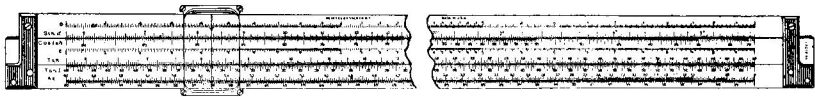
- N4100.** K & E STADIA (Mannheim) Slide Rule K & E Adjustable, engine divided, 10 in. divisions on white facings, improved Glass Indicator; in Case.
- N4100S.** Same as No. N4100 but in sewed Leather Case.
- N4101.** K & E STADIA Slide Rule like No. N4100, but 20 in.; in Case.
- N4101S.** Same as No. N4101 but in sewed Leather Case.

The very simple Directions are printed on the rule.

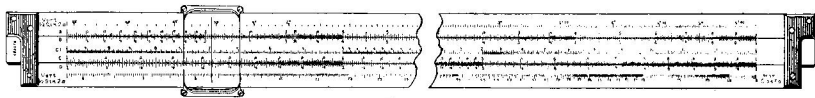
This form of Stadia Slide Rule is remarkable for its simplicity. By one setting of the slide, the horizontal distance and vertical height can be obtained at once, in every case where the Stadia rod reading and vertical angle are known. For the angles commonly encountered in stadia surveying, the values thus found are correct to the nearest $\frac{1}{10}$ of a foot, and sometimes closer. The 20-inch rule naturally gives values which are, in general, more precise than those obtained with the 10-inch rule.

The under side of the slide has a scale corresponding to the lower scale of the rule and resembling the A and B scales of the Mannheim and DUPLEX* rules, so that the rule can be used also for ordinary slide rule computations. One edge is graduated to inches and tenths, to serve as a scale for distances.

SURVEYOR'S DUPLEX REG. U. S. PAT. OFF. SLIDE RULE.



Front



Back

No. N4102

- N4102.** SURVEYORS' DUPLEX Slide Rule, K & E Adjustable 20 in., engine divided, divisions on white facings, improved Glass Indicator; in Case, with Directions.
- N4102S.** Same as No. N4102 but in sewed Leather Case.

All astronomical data essential to surveying, such as azimuth, time, latitude, etc., can be ascertained by means of the usual type of Transit with vertical circle but without solar attachment. While the observations may be made with great rapidity, the computations are tedious and require a great deal of time.

The K & E Surveyors' Slide Rule entirely eliminates this difficulty by reducing the hitherto complicated calculations to mere mechanical operations, thereby rendering the method of field astronomy with the regular Engineer's Transit extremely simple and practical.

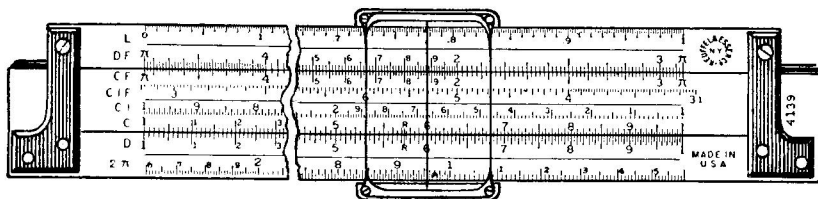
One face is arranged for the determination of the meridian by direct solar observations; it also carries the sine and cosine scales used in computing the latitudes and departures of the course.

The other face has the usual scales A, B, CI, C and D, for all general numerical calculating, as well as two full length stadia scales for computing horizontal distances and vertical heights.

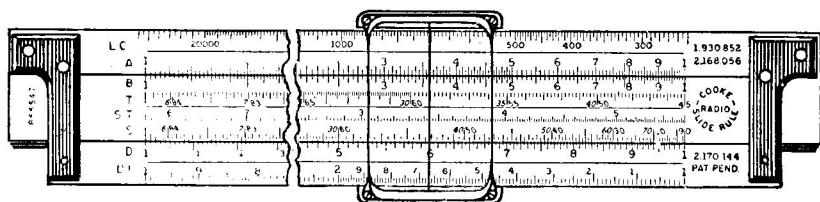
* REG. U. S. PAT. OFF.



COOKE RADIO SLIDE RULE



Front



Back

4139. COOKE RADIO Slide Rule, K & E Adjustable, engine divided, 10 in. divisions on white facings, Improved Glass Indicator: in Case, with Directions.

4139S. COOKE RADIO Slide Rule. Same as No. 4139 but in sewed Leather Case.

Designed to facilitate the rapid solution of radio engineering problems as well as for general use, this slide rule is like the **POLYPHASE DUPLEX DECITRIG** slide rule (No. 4071-3) except that the K scale is omitted, the position of the L scale is changed and two special scales, 2π , and LC have been added.

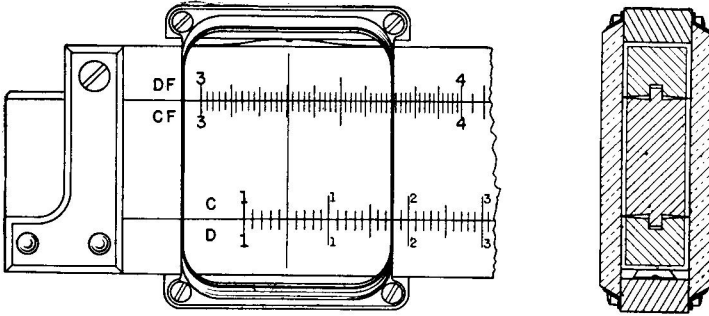
The 2π scale is a single unit logarithmic, "folded" at the value of 2π , which is conveniently used in a wide variety of problems involving inductance, capacity, reactance, etc. The LC scale provides a rapid method of determining the resonant frequency for any given combination of inductance and capacity, and for the solution of similar problems involving resonance.



K & E SLIDE RULES.

REG. U. S. PAT. OFF.

IMPROVED GLASS INDICATOR

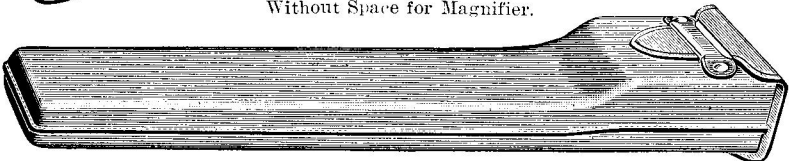


The K & E Improved Glass Indicator has a glass which is surrounded and protected by a frame formed from one piece of metal. This metal frame has flanges through which the screws pass to hold the glass to the ends or sliding pieces of the indicator. The frame surrounding the glass does not overlap its faces; hence, every number on the rule is visible at all times. Consequently, the improved indicator offers the chief advantage of the "Frameless" indicator—i.e. visibility—and, in addition, a much greater insurance against damage to the glass.

SEWED LEATHER CASES FOR SLIDE RULES.



Without Space for Magnifier.



With Space for Magnifier.

Sewed leather cases are made of the best top-grain cowhide, hand sewed; and are lined with real chamois. The loop on the case through which the tongue passes has friction springs. These springs insure that the flap will not open accidentally.



GLASSES.* INDICATORS.* MAGNIFIERS AND CASES

Cat. No. of Slide Rule	Indicator No.	Glass No.		Magnifier No.	Sewed Leather Case No.	Cat. No. of Slide Rule	Indicator No.	Glass No.		Magnifier No.	Sewed Leather Case No.										
		Improved	"Frameless"					Improved	"Frameless"												
4031 S	A	.....	1	.....	O	N 4088-5S	1aL	7L	*	4185 C	Z								
4035 S	B	.....	2	.....	P	4090-3	IL	7L	*	4185 C	X								
N 4035 S	EL	4L	*	4185 B	P	4090-3S															
4041	D	.....	3	4185 B	R	4091-3														
N 4041	EL	4L	*	4185 B	R	4091-3S															
N 4041 S		.....	3	4185 B	R	4092-3														
4041 F	D	.....	3	4185 B	R	4092-5	IL	7L	*	4185 C	X									
N 4041 F	EL	4L	*	4185 B	R	N 4092-5	IaL	7L	*	4185 C	Z										
N 4041 FS						N 4092-5S	IL	7L	*	4185 C	Z										
4045	EL	4L	*	4185 B	S	N 4092-5S	IaL	7L	*	4185 C	Z										
4045 S						4093-3	IL	7L	*	4185 C	X										
4051	EL	4L	*	4185 B	T	4093-3S	IaL	7L	*	4185 C	Z										
4051 S						4093-5						IL	7L	*	4185 C	X					
4053-2S	FL	4L	*	4185 B	P	4093-5S	IaL	7L	*	4185 C	Z										
N 4053-2S	EL	4L	*	4185 B	P	4094	EL	4L	*	4185 B	R										
4053-3	FL	4L	*	4185 B	R	4095	H	.....	5	4185 B	W									
N 4053-3	EL	4L	*	4185 B	R	4095-1S	K	.....	8	.....	U†								
4053-3F	FL	4L	*	4185 B	R	4095-3	GL	6L	*	4185 B	W										
N 4053-3F	EL	4L	*	4185 B	R	4095-3S															
4053-3FS	FL	4L	*	4185 B	R	4095-5	IL	7L	*	4185 C	Z										
N 4053-3FS	EL	4L	*	4185 B	R	4095-5S															
4053-3S	FL	4L	*	4185 B	R	4096	EL	4L	*	4185 B	.....									
N 4053-3S	EL	4L	*	4185 B	R	N 4096	JL	7L	*	4185 C	.....									
4053-5	FL	4L	*	4185 B	T	4096 M	JL	7L	*	4185 C	.....									
N 4053-5	EL	4L	*	4185 B	T	4097	N2	.....	.....	.....	AA†							
4053-5S	FL	4L	*	4185 B	T	4097 B	N2	.....	.....	.....	AA†							
N 4053-5S	EL	4L	*	4185 B	T	4097 C															
4055	EL	4L	*	4185 B	.....	4097 D														
4056	M2	.....	.....	.....	.....	4098	N2	.....	.....	.....	AA†			
4058	M3	.....	.....	.....	.....	4098 A	N3	.....	.....	.....	BB†			
4058 C	M4	.....	.....	.....	.....	4100	D	.....	3	4185 B	R					
4058 D	M3	.....	.....	.....	.....	N 4100	EL	4L	*	4185 B	R						
4058 W	M4	.....	.....	.....	.....	4100 S	D	.....	3	4185 B	R					
4059	M3	.....	.....	.....	.....	N 4100 S	EL	4L	*	4185 B	R						
4070-3	PL	9L	.....	4185 D	W	4101	EL	4L	*	4185 B	T									
4070-3S						N 4101 S										
4071-3						N 4101										
4071-3S						N 4101 S															
4080-3	IL	7L	.....	4185 C	X	4102	IL	7L	*	4185 C	Z									
4080-3S						N 4102	IaL	7L	*	4185 C	Z										
4081-3						4102 S	IL	7L	*	4185 C	Z										
4081-3S						N 4102 S	IaL	7L	*	4185 C	Z										
4080-5	IaL	7L	.....	4185 C	Z	4128	IL	7L	*	4185 C	Z									
4080-5S						4128 S											
4081-5						4133 S	C	.....	2a	.....	P								
4081-5S	4133 S	EaL	4aL	*	4185 B	P															
4083-3	IL	7L	.....	4185 C	X	N 4135 S	K	.....	8	.....	U†							
4083-3S						4138	IL	7L	.....	4185 C	X									
4083-5	IaL	7L	.....	4185 C	Z	4138 S	PL	9L	.....	4185 D	W								
4083-5S						4139											
4088-1S	K	.....	8	.....	U†	4139 S	IL	7L	*	4185 C	X								
4088-2S	GL	6L	*	4185 B	V	4142						IL	7L	*	4185 C	Z					
4088-3	GL	6L	*	4185 B	W	4142 S	.....	.....	.....	.....	.....					
4088-3S						4160	IL	7L	*	4185 C	Z										
4088-5	IaL	7L	*	4185 C	Z	4160 S	IL	7L	*	4185 C	X										
4088-5S	IL	7L	*	4185 C	Z	4165	EL	4L	*	4185 B	R										
						4166	IaL	7L	*	4185 C	Z										
						4175	JL	7L	.....	4185 C	.....									

* The old-style "Frameless" indicator glasses are not now made for this slide rule. Customers having "Frameless" indicators who need replacement glasses should therefore order complete "Improved" indicators--an economy in the long run since the "Improved" indicator glasses are much less likely to crack, chip, or break. See the description on previous page. †Sewed leather sheath.

†NOTE. Whenever an empty sewed leather case with space for magnifier is desired, add the letter "M" to the letter in the column headed Sewed Leather Case No., as "OM", "PM", "TM", etc.



GLASSES, INDICATORS, MAGNIFIERS AND CASES.

(continued)

The old-style "Frameless" indicator glasses are not now made for many of the slide rules. See previous page. Customers having "Frameless" indicators who need replacement glasses should therefore order complete "Improved" indicators—an economy in the long run since the "Improved" indicator glasses are much less likely to crack, chip, or break. See description on page 209.

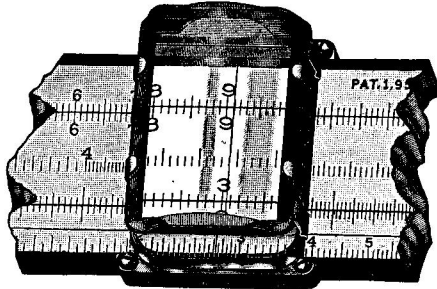
Indicators	Glasses Glass only	Sewed Leather Cases	
		Plain	Space For Magnifier
A, B, D.	1, 2, 3.	O.	OM.
C.	2a.	U.	PM. VM.
EL.	5, 8.	P, V.	RM.
EaL.	4L, 6L.	R.	XM.
FL.	4aL.	S.	PM.
GL.	7L.	T.	TM.
H, K.	9L.	W, X.	WM.
IL, IaL.		Z.	ZM.
JL.		‡AA.	
M2.		‡BB.	
M3.		‡Sewed leather sheath	
M4.			
N.			
N2.			
N3.			
PL.			

Where indicators are sent in to have a glass fitted, an additional charge will be made for each glass:

Nos. 1, 2, 2a, 3, 4L, 4aL..... extra

Nos. 5, 6L, 7L, 8, 9L..... "

MAGNIFIERS FOR SLIDE RULES.



No. 4185B.

The Magnifiers are mounted in a metal frame and are applied to the rule by springing them on the glass indicator. The lens is thus always in position for reading and is always in focus. The magnification is ample for even the finest graduations, the field covers the full area of the indicator, and the lines do not appear distorted. These Magnifiers cannot be used on glass indicators with two hairlines.

When ordering please indicate kind of slide rule for which the magnifier is wanted. See Table, Page 210.

4185 B. Magnifier for Slide Rules,

4185 C. Magnifier for Slide Rules.

4185 D. Magnifier for Slide Rules.

KEUFFEL & ESSER CO., NEW YORK

BOOKS ON THE SLIDE RULE.

The following are Self-Teaching Manuals, with Tables of Settings, Equivalent and Gauge Points; prepared by competent authorities, and applying specifically to K & E Slide Rules:

- 4187 G. "The Mannheim Slide Rule" (Nos. N4041, 4045 & 4056).
 - 4187 H. "The Polyphase Slide Rule" (No. N4053).
 - 4187 R. "The Log Log Duplex Trig Slide Rule" (No. 4080).
 - 4187 S. "The Log Log Duplex Decitrig Slide Rule" (Nos. 4081 & 4083).
 - 4187 T. "The Polyphase Duplex Trig Slide Rule" (No. 4070).
 - 4187 U. "The Polyphase Duplex Decitrig Slide Rule" (No. 4071).
 - 4187 V. "The Log Log Duplex Vector Slide Rule" (No. 4083).
 - 4187 W. "The Cooke Radio Slide Rule" (No 4139).
-
-

PACIFIC COAST Price-List

APPLYING TO

GENERAL CATALOGUE

39TH EDITION

This Price-List relates to shipments from our establishments at 30-34 Second St., San Francisco and 730 So. Flower St., Los Angeles, and to all Dealers located West of the Rocky Mountains.

Prices are Subject to Change Without Notice and to all Sales and similar Taxes now or hereafter imposed by Federal, State, or other Authorities.

Aug. 15th, 1943.



KEUFFEL & ESSER CO.
NEW YORK

WINNER TECHNO-TONE

	Gross	Doz.	Each
N3378-6B to 8H	\$12.50	\$1.25	\$.12½

KOHINOOR

3380-6B to 9H			
Drawing	10.80	1.00	.10
3383-6B to 9H Artist			.75
		Doz.	Box
		Boxes	of 6

3385-6B to 9H Leads for 3383	5.00		.45
3386 Compass Leads HB to 4H	.80		.08

COLORED PENCILS**MONGOL**

Indelible—E. Faber's

	Gross	Doz.	Each
3393	10.80	1.00	.10
			Box
3394 (E. F. 741) Box of 12			1.00

DIXON'S BEST

3397	12.15	1.15	.10
			Box
3398 box of 12			1.20

DIXON'S THINEX

3399	10.80	1.00	.10
			Each

BLUEPRINT PENCILS**VAN DYKE**

	Gross	Doz.	Each
3400	10.80	1.00	.10

LUMBER CRAYONS**FAVORITE**—4¼ in. x ½ in.

		Doz.	Each
3404 Black			.65
Blue			.95
Yellow			.95
Red			.95

DIXON'S

	Gross	Doz.	Each
3405 4½ in. x ½ in.	9.60	1.00	.10

**DRAFTSMEN'S ERASING
SHIELDS**

N3411 Swedish spring steel			.25
3412 Xylonite			.12

ERASERS**E. F. PINK**

		Doz.	Each
3453 (E. F. 101) 2½ in. x 1½ in. x ¾ in.		1.10	.10

E. F. ERASERS

		Doz.	Each
3456R-1 (EF 112)			
Red, 2½ in. x ¾ in. x ¼ in.		\$.60	\$.05
3456R-2 (EF 212)			
Red, 3½ in. x 1½ in. x ¾ in.	1.10		.10
3457 (EF 6500)			
Soft Ink Eraser, 2¾ in. x 1¾ in. x ¾ in.	1.10		.10

ART GUM

3460-A 1½ in. x 1½ in. x 1½ in.			.05
B 2 " x 1 " x 1 " "			.075
C 2¼ " x 1½ " x 1½ "			.10
D 3 " x 2 " x 1 " "			.20
E 3 " x 3 " x 2 " "			.50

DUPRO

		Box of 5	
3470 Felt erasers			.20

STEEL ERASERS

		Each
3481 Coco handle, long blade		.50
3486 " " short "		.45

PENCIL FILE

3488		.55
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PENCIL POINTERS

3507 Flint paper		.15
3508 Black Abrasive Paper		.15

DUST BRUSHES

3510 Flat type, 2½ in. bristles		.90
3511 Plain " 2 " "		.50

SLIDE RULES**THACHER**

N4012		70.00
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MANNHEIM

N4041 10 in. plain case		6.50
N4041S 10 " leather "		7.50

POLYPHASE

N4053-3 10 in., plain case		7.50
N4053-3S 10 " leather "		8.50
N4053-5 20 in., plain case		17.50
N4053-5S 20 " leather "		19.00

FAVORITE

4055 10 in., improved indic.		4.00
4056 10 " plain "		3.00

BEGINNERS

4058W 10 in., plain glass indic., plain case		1.25
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POLYPHASE DUPLEX TRIG

4070-3 10 in., plain case		11.00
4070-3S 10 " leather "		12.00

POLYPHASE DUPLEX DECITRIG

	Each
4071-3 10 in., plain case	\$11.00
4071-3S 10 " leather "	12.00

LOG LOG DUPLEX TRIG

4080-3 10 in., plain case	12.50
4080-3S 10 " leather "	13.50
4080-5 20 " plain "	27.00
4080-5S 20 " leather "	29.00

LOG LOG DUPLEX DECITRIG

4081-3 10 in., plain case	12.50
4081-3S 10 " leather "	13.50
4081-5 20 " plain "	27.00
4081-5S 20 " leather "	29.00

LOG LOG DUPLEX VECTOR

4083-3 10 in., plain case	13.50
4083-3S 10 " leather "	14.50
4083-5 20 " plain "	31.50
4083-5S 20 " leather "	33.50

MERCHANTS

4094 10 in., Mannheim, plain case	6.00
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DESK

4096M 20 in., plain case	15.00
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EVER-THERE

4097B 5 in., leather sheath	3.00
4097C 5 in., leather sheath	3.75
4097D 5 in., leather sheath	4.25

POCKET

4098A 5 in., Mannheim, leather sheath	2.00
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STADIA

N4100 10 in., plain case	7.50
N4100S 10 " leather "	8.50
N4101 20 " plain "	17.50
N4101S 20 " leather "	19.00

SURVEYOR'S DUPLEX

N4102 20 in., plain case	28.00
N4102S 20 " leather "	30.00

COOKE RADIO

4139 10 in., plain case	12.75
4139S 10 in., leather case	13.75

MAGNIFIERS

4185B	2.50
4185C	2.75
4185D	2.50

INSTRUCTION MANUALS

4187G Mannheim	.50
H Polyphase	.50
R Log Log Duplex Trig	.50
S " " Decitrig	.50
T Polyphase Duplex Trig	.50
U " " Decitrig	.50
V Log Log Duplex Vector	.50
W Cooke Radio Slide Rule	.50

CASES

	Sewed Leather	Each
O		\$ 1.15
P		1.35
R		1.70
S		2.50
T		2.80
U		.65
V		1.35
W		1.70
X		1.70
Z		3.30
AA		.40
BB		.30

Sewed Leather with space for Magnifier

OM	2.50
PM	2.75
RM	3.20
TM	4.30
VM	2.75
WM	3.20
XM	3.20
ZM	4.80

INDICATORS

A-B	.60
C	.80
D	.60
EL	.65
EaL	.80
FL	.75
GL-H	1.20
IL-1aL	1.35
JL	.90
K	1.20
M2	.35
M3	.15
M4	.30
N2	.50
N3	.35
PL	1.25

GLASSES

No. 1-2	.25
2a	.40
3, 4L	.25
4aL	.40
5, 6L	.25
7L	.35
8	.25
9L	.30
Glasses No. 1, 2, 2a, 3, 4L, 4aL fitted, extra	.10
Glasses No. 5, 6L, 7L, 8, 9L fitted extra	.20

PLANIMETERS

4236 Compensating Reading to .01 sq. in.	25.00
4236M Compensating Reading to .1 sq. cm.	32.50

FORESTRY INSTRUMENTS

4305 Tree Calipers 18 in.	8.50
4307 " " 34 " "	11.50
4309 " " 50 " "	15.00
4340 Bark Measure	11.30