

The background features a dark blue gradient with a subtle pattern of white dots. Overlaid on this are several circular and semi-circular white lines of varying thicknesses and styles (solid, dashed, dotted). A prominent feature is a large circular scale on the left side, with numerical markings from 140 to 260 in increments of 10. The scale is partially obscured by other circular elements. The overall aesthetic is technical and scientific.

A SHORT HISTORY OF MAP MEASURING DEVICES:

HOW TOOLS TO MEASURE SCALE ON MAPS HAVE EVOLVED FROM THE
VICTORIAN AGE TO THE PRESENT

By: Mike Flaherty January 22, 2021 Zoom Brief for Chicago Map Society
Email: flaherty_michael@sbcglobal.net Phone: 314-968-8574

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HOW DID I GET ONTO THIS SUBJECT

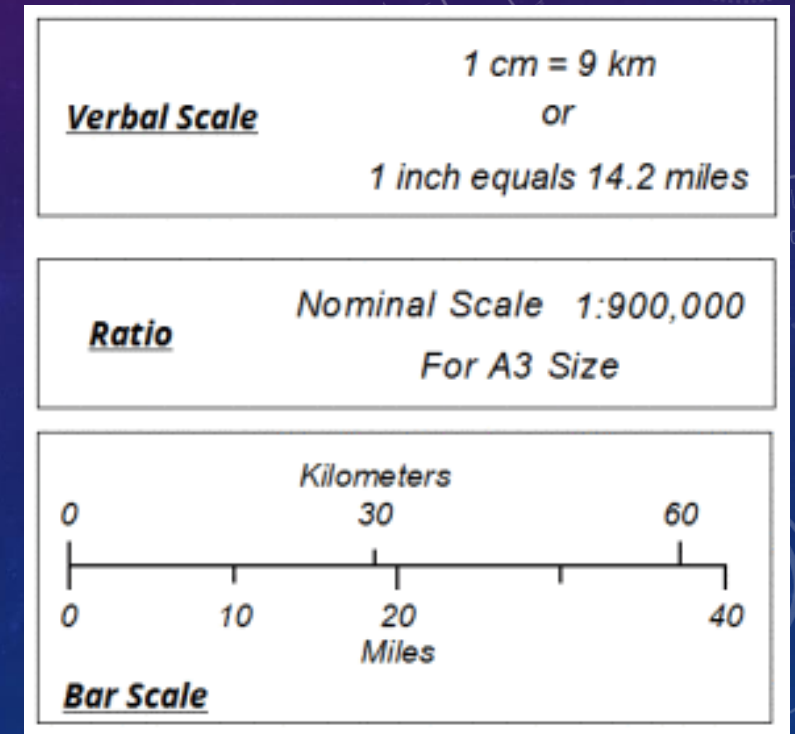
- I started working as a cartographer for Defense Mapping Agency in 1991 and used a few map measuring devices on the job back in the early 1990s
- With the decline of printed maps, I thought it might be interesting to collect the devices that were designed to used with paper maps
- About 5 years ago I started collecting map measuring devices, and bought a collection of about 70 of them from a engineers estate that I found for sale online
- Most of the remaining ones I have found were on eBay and gifts from friends
- The more I collected them, the more variety I spotted in them, and thought it might interesting to put together a presentation about them to the CMS
- Here is a presentation on what I've been able to find out so far

HISTORY OF MAP ACCURACY

- Accurate and correctly scaled maps had to exist before developing accurate map measuring devices
- Map projections have been around for at least 2500 years, but accurate scales and well defined map projections were a product of advances in surveying and statistics starting in the 16th century.
- The production of accurate maps improved with the adoption of the metric system, developments in chronometers and accurate astronomical tables for determining longitude, improved statistical survey methods and surveying equipment and techniques, and the development of modern datums and map projections (see the History of Cartography series set by the University of Chicago for more details)
- Starting in the mid 19th century accurate maps became widely available and affordable

MAP SCALE

- The scale of the map being measured has to be stated some way on the map for map measure to be used
- Three Types of Scale:
 - Verbal Scale: This type of scale use simple words to describe a prominent surface feature.
 - Fractional or Ratio Scale: A fractional scale map shows the fraction of an object or land feature on the map.
 - Linear Scale: A linear scale shows the distance between two or more prominent landmarks.

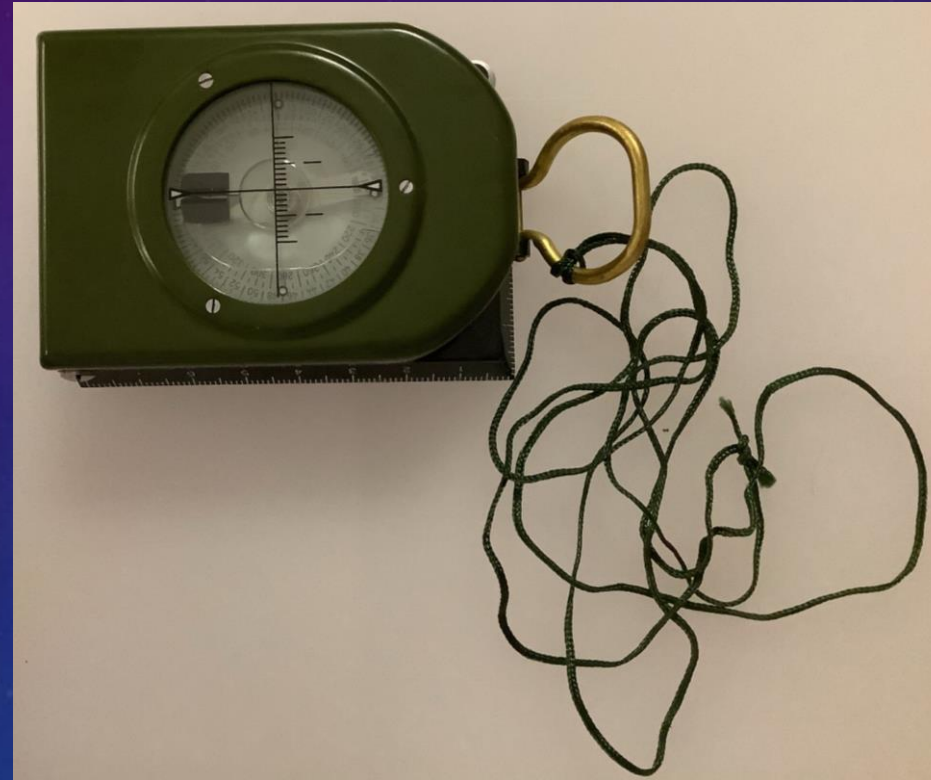


CHRONOLOGY OF MAP MEASURING DEVICES

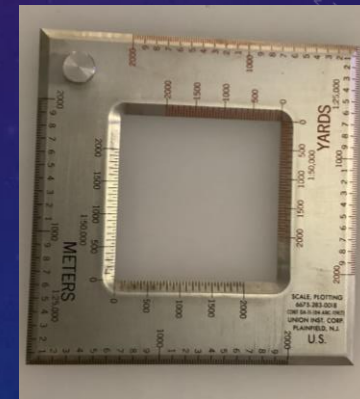
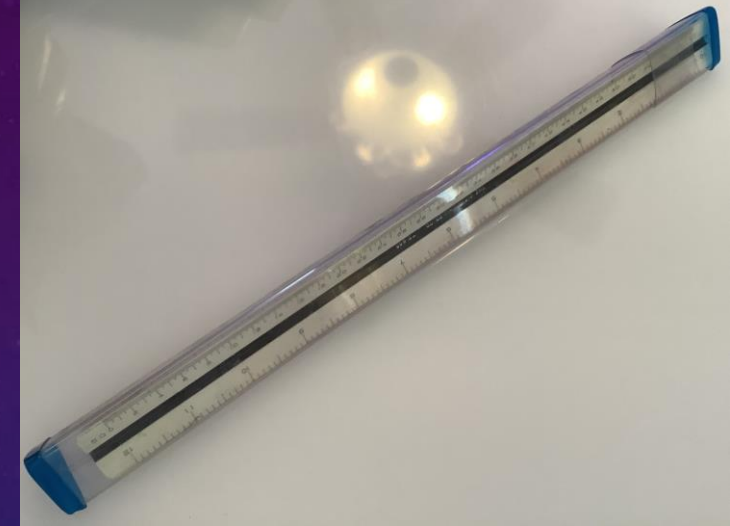
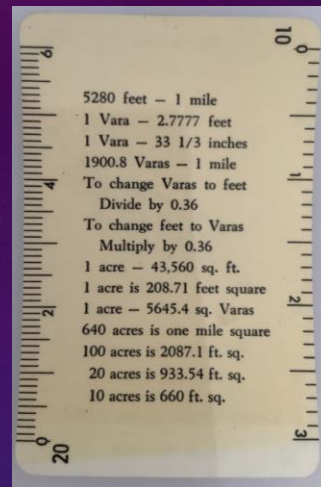
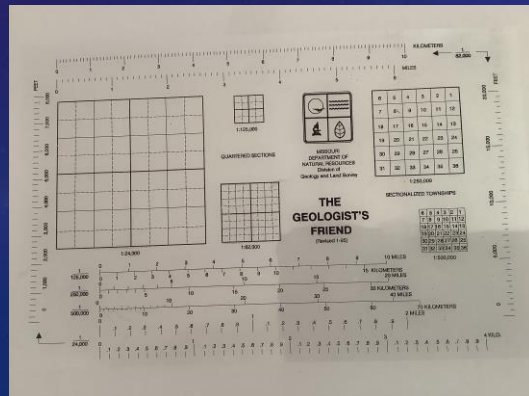
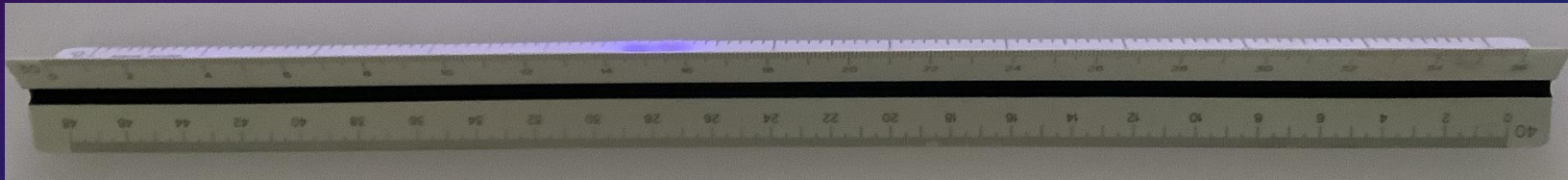
- Rulers
- Dividers
- Opisometers (1675)
- Planimeters (1854)
- Morris Chartometer patented in 1873
- Curvimeters
 - Analog
 - Digital

RULERS

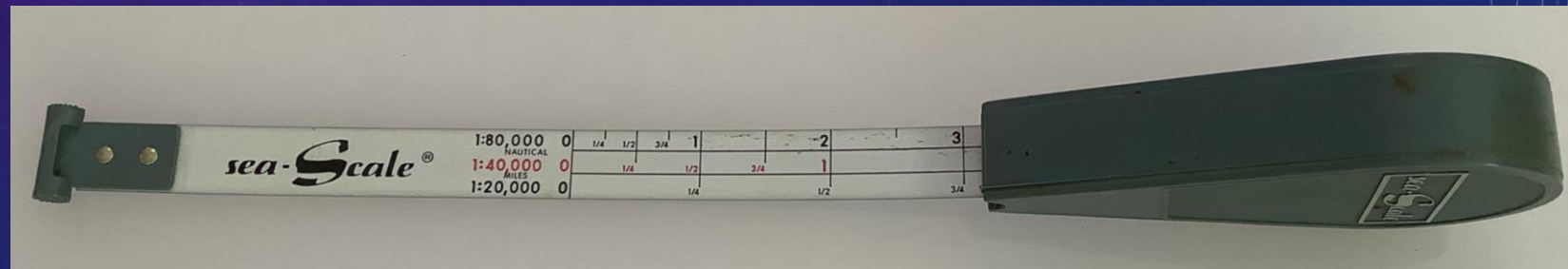
- String
- Traditional Rulers
- Tape Measures
- Roller Rulers
- Fixed Scale Map Rulers



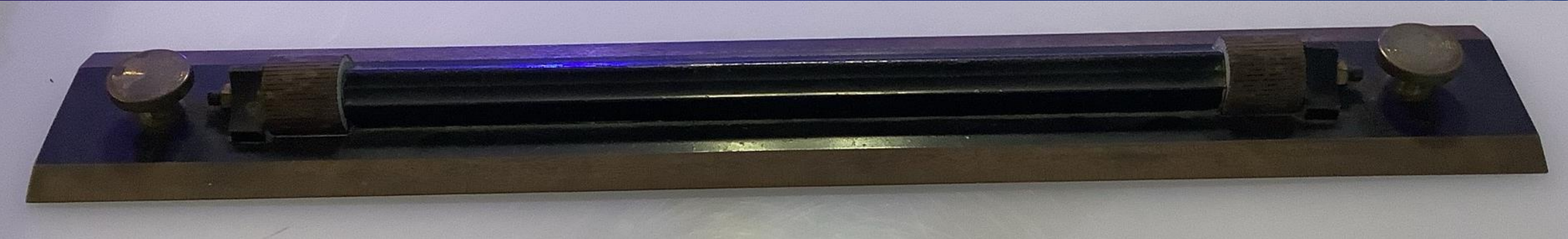
TRADITIONAL RULERS



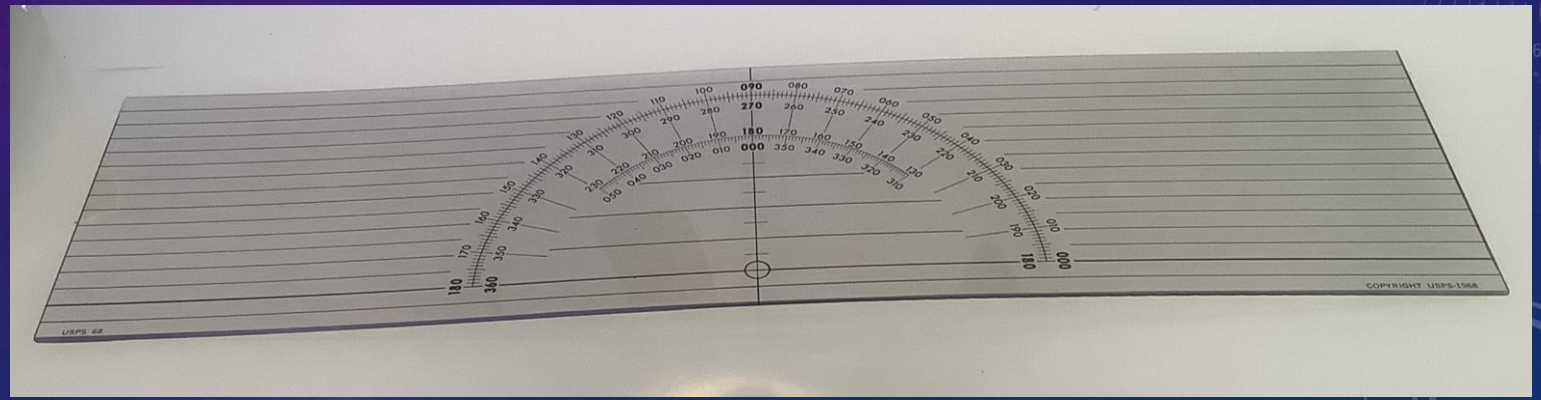
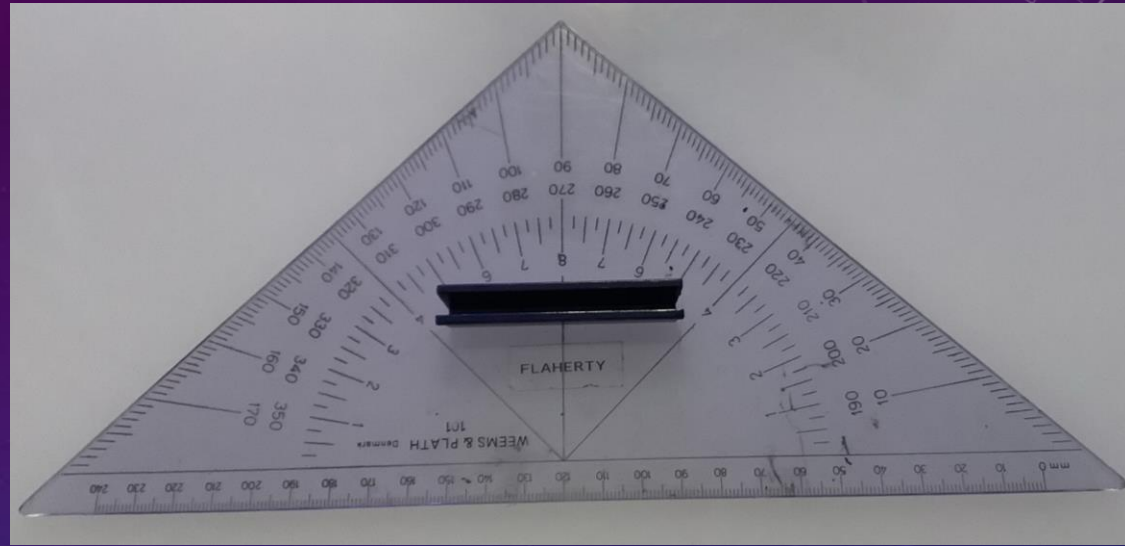
TAPE MEASURES



PARALLEL RULES



PROTRACTORS



THE USPS COURSE PLOTTER

The USPS Course Plotter is designed to measure courses and bearings on charts and plotting sheets with a minimum of lost time and motion. This instrument is similar to the Air Force, Navy, and Weems plotters, all of which have stood the test of time in plotting courses and bearings on small plotting tables, and are ideally suited for use in small boats.

INSTRUCTIONS FOR USE

(1) **MEASURING COURSES AND BEARINGS**
Place either of the long edges, or any one of the parallel lines, along the course or bearing to be measured. Slide the plotter along this line until the central point (or bull's eye) of the protractor is over a meridian. The true course or bearing is read on the protractor scale where it intersects that meridian. Read courses and bearings in the N.E. and S.E. quadrants on the outer scale; read courses and bearings in the S.W. and N.W. quadrants on the inner scale.

(2) **USING THE AUXILIARY PROTRACTOR SCALE**
Whenever the course or bearing to be measured is nearly North or South, and it is difficult to slide the plotter's bull's eye to a meridian, the auxiliary protractor scale should be used. Instead of using the vertical meridians of longitude as the reference lines, the auxiliary scale uses the horizontal parallels of latitude. Slide the plotter's bull's eye to a parallel and read the direction from the proper auxiliary scale.

(3) **DRAWING A COURSE OR BEARING FROM A POINT**
When plotting a course (or bearing), one edge of the plotter intersects the point from which the course line is drawn, and the plotter's bull's eye and the course angle on the protractor scale are aligned over a meridian (or parallel when the auxiliary scale is used). Put your pencil on the given point; keep one edge of the plotter against your pencil and slide the plotter until both the bull's eye and the course (or bearing) are aligned over a meridian. When the plotter is properly positioned, draw the course (or bearing) line along the edge of the plotter in the proper direction. If you prefer, the plotter may first be oriented by aligning the bull's eye and the course (or bearing) reading over a meridian, then positioned by sliding it up or down until the edge intersects the point from which the line is to be drawn.

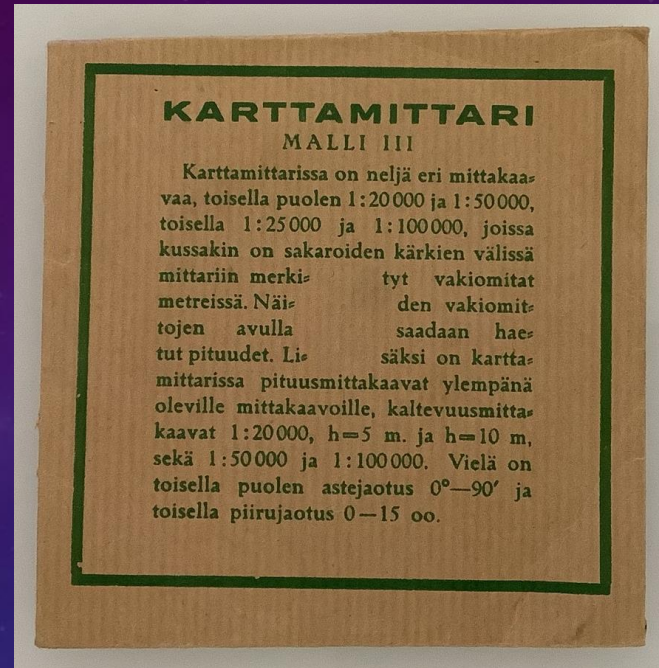
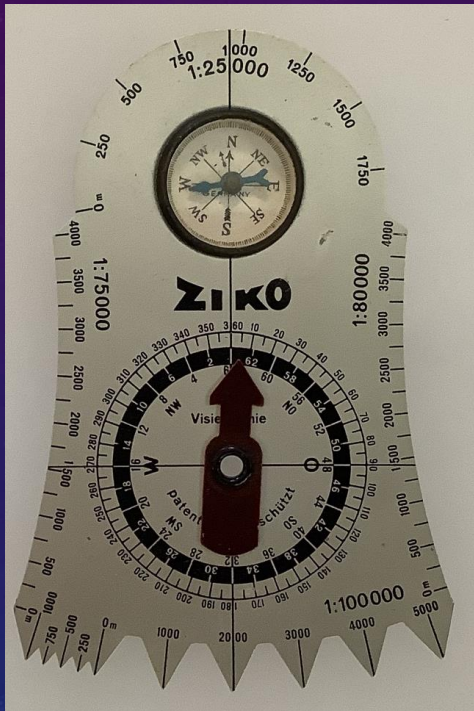
(4) **MOVING A LINE PARALLEL TO ITSELF**
When, as in advancing a line of position, it is required to move a line parallel to itself, the parallel lines on the plotter are used. Determine the distance the line is to be moved and place the point of your pencil at that distance. Slide the plotter to the pencil and align it with the original line of position, using the parallel lines as guides. If it should be necessary to advance a line more than the width of the plotter, an additional line may be drawn parallel to the first and the line moved in two steps.

(5) **CELESTIAL LINES OF POSITION**
Plot the azimuth line as a bearing by placing the pencil point on the AP or DR position and slide the plotter until the bull's eye and the azimuth angle (Zn) are on the same meridian. Draw the azimuth line toward the body. If the intercept is "away", extend the azimuth line for enough away from the body to plot the intercept. After the intercept has been plotted, place the pencil point on this plot and slide the plotter against the pencil so that the center vertical (OX) line coincides with the azimuth line. Draw the LCP.

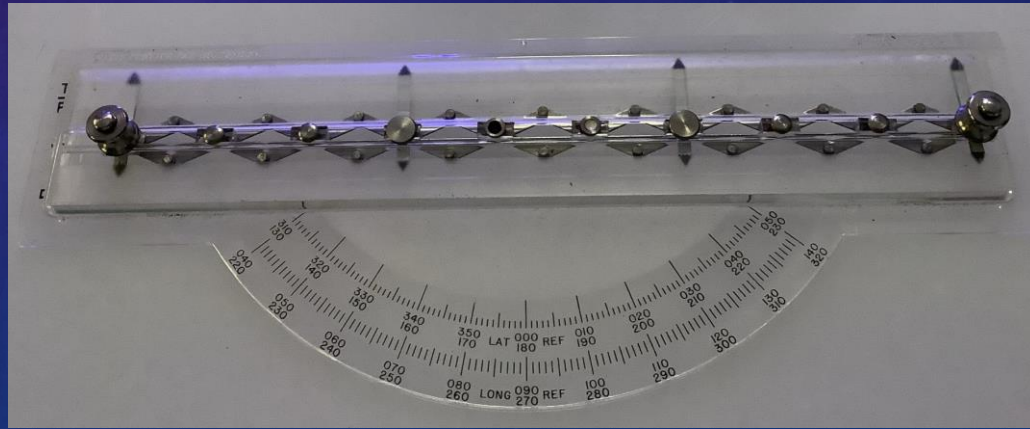
(6) **EXTENDING A COURSE LINE**
When it is desired to extend a course line beyond the end of the plotter, spread your dividers three or four inches and place both points on the course line and against the edge of the plotter. The plotter can then be moved easily, using the divider points as guides, lengthening the course line the desired amount. NOTE: As in paragraph (2), the auxiliary protractor scale should be used in any use of the plotter where a course or bearing (azimuth) is nearly North or South.

COPYRIGHT USPS - 1968

FIXED SCALE MAP RULERS

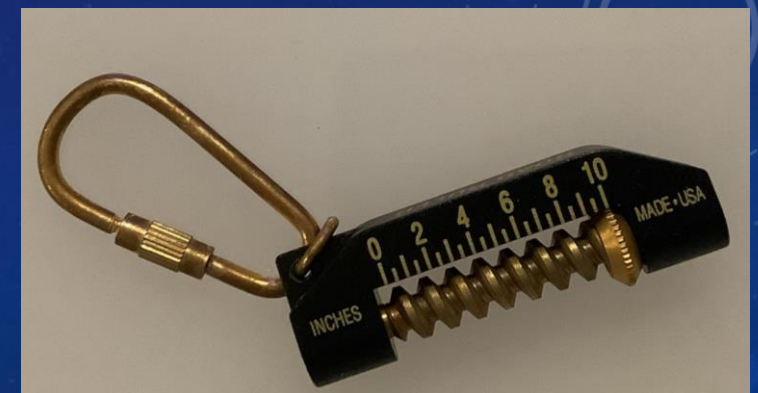
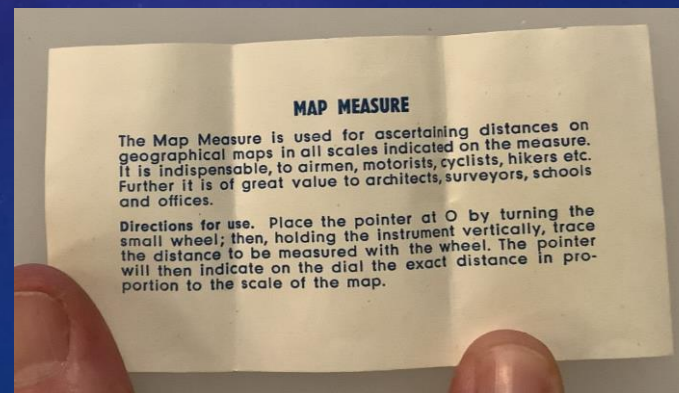
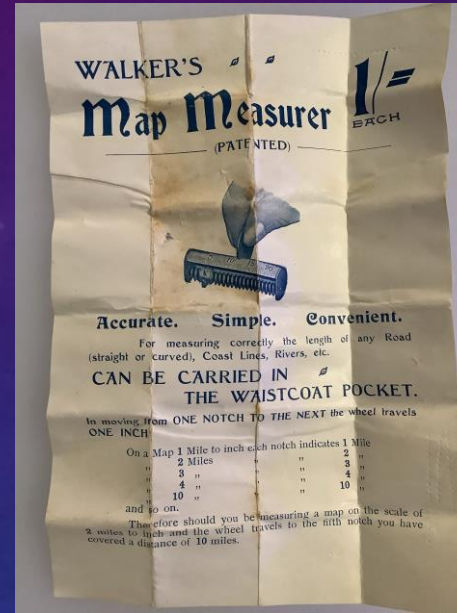
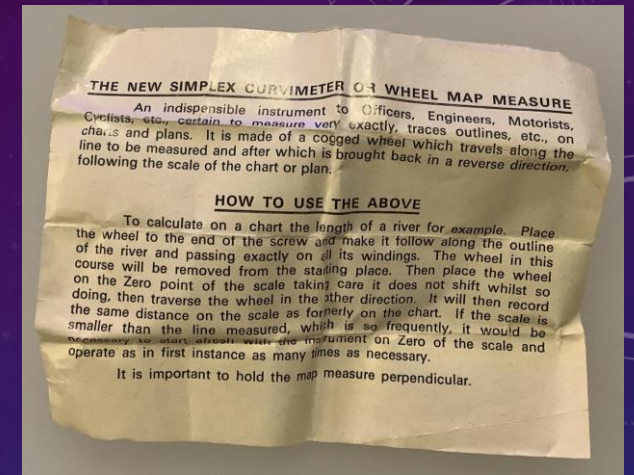
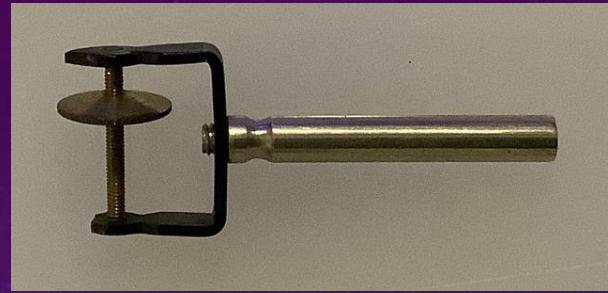


DIVIDERS

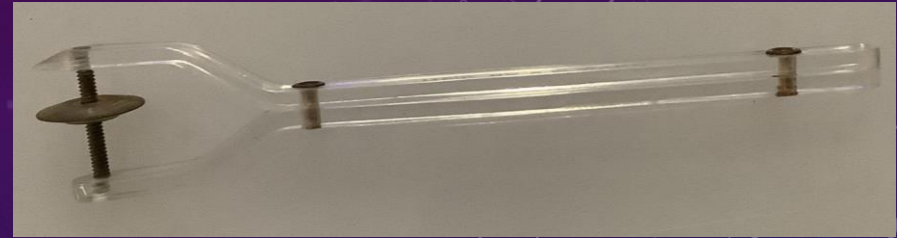
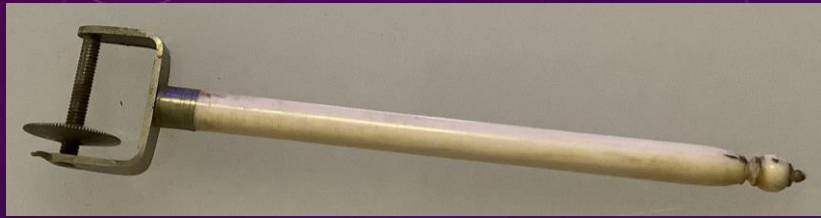


OPISOMETERS

- An opisometer is a small device for measuring the lengths of features and distances on maps that include a bar code scale diagrams.
- Opisometers are made up of a milled wheel set on a screw and held by a handle.
- The wheel traces a route on the map and then is wound backwards on the scale diagram to reveal the scaled distance traveled by the wheel.



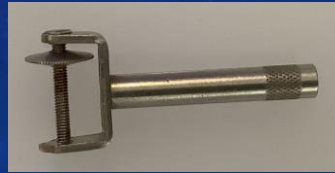
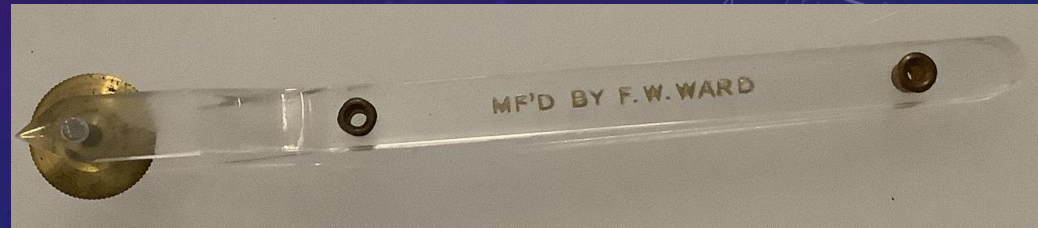
OPISOMETERS



(1) **STARTING POSITION**—Handle perpendicular to map, wheel at a stop against side with pointer, pointer on one terminal of line to be measured. Roll wheel along line, being careful to cover exactly all curves and turns. Stop when second terminal is reached.

(2) **TO GET DISTANCE**—Back wheel up along Graphic Scale on map — repeating across length of scale as necessary until wheel comes to a stop against side with pointer. As wheel approaches pointer, use left side of scale only, to arrive at smaller distance units without interpolation.

Your care in exactly following irregularities of the line on the map determines the accuracy of your measurement.



WAYWISERS



Surveyor and waywiser are shown at the head of Ogilby's 'The Road from London to Holyhead' map. c1698

- The first England and Wales road atlas was published in 1675. This seminal work, Britannia, comprised 100 maps and was created by map maker John Ogilby. It was the first to use a scale of one inch to the mile and to use the Statute mile of 1760 yards. Each vertical strip map in the atlas showed compass orientation and distances in miles and furlongs. Such accurate measurements had been made possible by surveyors measuring the roads. A favoured and accurate method was walking the ground with a surveyor's measuring wheel, otherwise known as a perambulator or waywiser. Paying homage, both man and instrument were depicted in Ogilby's Britannia, shown on the frontispiece and on two maps within <https://threepointsofthecompass.com/planning-3/map-measurers/>



Face of surveyor's waywiser

CHARTOMETER

- Chartometers are similar to opisometers, but have a dial and pointer to provide the scaled distance measurement immediately
- Englishman Edward Russell Morris, of the Morris Patents Engineering Works, High Street, Birmingham, began manufacture of his 'Patent Chartometer' in the 1870s, the chartometer design was patented in 1873.
- Morris was a member of the Institute of Civil Engineers from 1880 and designed and manufactured map measurers in a range of sizes, this is possibly the largest he produced



Morris's Patent Chartometer and scale cards with leather bound wooden case



Face of Chartometer without scale card inserted. Revolution counter can be seen to the right of the pointer axis.



6 inch to the mile scale card measures furlongs. Five turns of the dial will indicate 40 furlongs, or five miles. Dials are 2" / 50mm diameter



Scale cards for Morris's Patent Chartometer

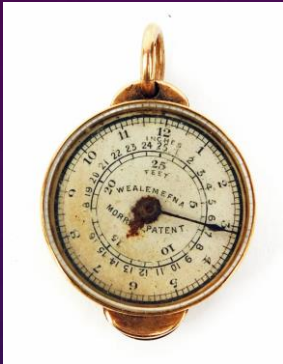
ADDITIONAL MORRIS CHARTOMETERS



WEALEMEFNA WATCH FOB CHARTOMETERS



Just 26mm wide



Gold plated
Wealemfena

Designed to hang from the end of a gentlemen's watch chain.

The measurer will measure lines on maps or anything else, by holding it in the hand, face toward you, then wheeling forward.

Each complete rotation of the larger blue hand measures 12 inches and moves the smaller hand forward one digit of the inner circle on the paper dial. One inch of measurement is registered on the outer marked circle, showing eighth of an inch graduations.



Newspaper advertisement for Morris's 'Wealemfena', a 'bijou' map measurer. The Graphic, 1880



Original Wealemfena

It has an odd name. The English Mechanic and World of Science: Vol. 33, London, 1881, informs us that Morris created a wholly original name in an attempt to outwit his imitators, also declining to disclose the actual origin of the word.

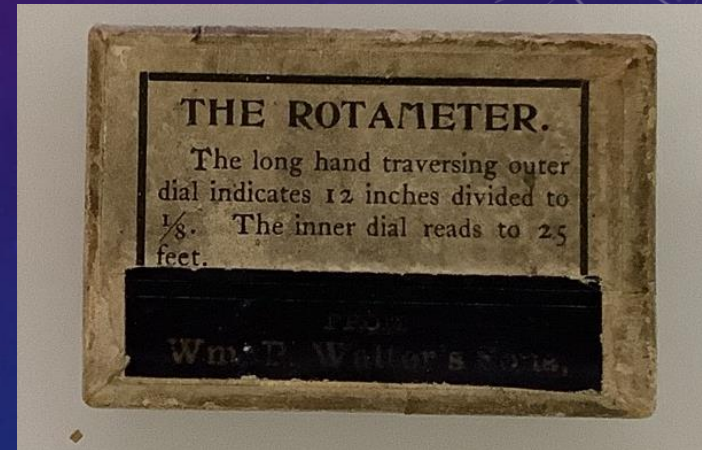
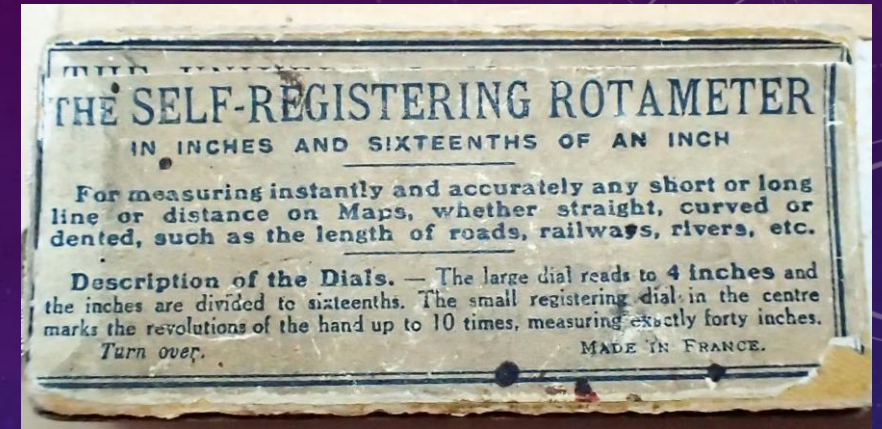


Knockoff Rotameter

WAELEMEFNA CHARTOMETERS



OTHER ROTAMETERS



CURVIMETERS

Lots of overlap between military and commercial devices

Wider variety of analog curvimeters devices than digital ones

Materials vary from steel, brass, nickel and chrome plate, gold, silver, aluminum, cardboard, paper, bone and various plastics

Made world wide, basic design set in WWI, unchanged until after WW2 with the introduction of plastics

Extra functions include: compass, magnifier, mirror, calculator, light, thermometer, calendar, watch fob

Audible devices were made so users didn't have to closely watch a opisometer wheel turn

CURVIMETER: MECHANICAL NO HANDLES SINGLE DIAL



MILE DIAL
 For measuring distances in miles on charts.

DIRECTIONS: Return dial to 0 by pushing return button located on top instrument. Have indicating line perpendicular to chart directly over point of departure; run wheel over chart, following closely the course to be measured and stop when indicating line points to destination. Dial will indicate distance in miles. Read scale that corresponds to scale on chart.

JOHN E. HAND & SONS CO.
 Phila., Pa.

**THE BUX
 MAP MEASURE**

The measure is marked for scale 1" to 1 mile. For $\frac{1}{2}$ " to 1 mile simply multiply the reading by 2; for 4 miles to 1" multiply by 4 etc

Before commencing a reading it is essential to see that the dial is at zero then to wheel the instrument lightly but firmly along the route in the direction indicated by the arrow on the case.

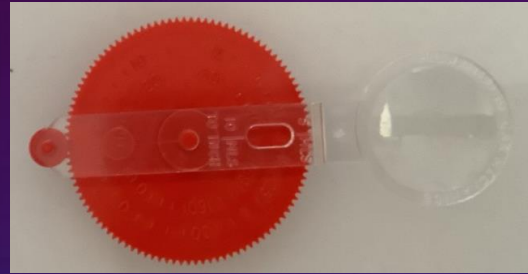


MAP MEASURE 62 0335

MAP MEASURE 1000 INCHES-FULL SIZE INCHES & TENTHS 62 0335



CURVIMETER: MECHANICAL NO HANDLES SINGLE DIAL



TO USE ROLLA-MAP RULER:
 Turn small rubber wheel until zero (0) on graduated disc appears in window at arrow. To measure distance between two points on map hold Rolla-Map Ruler lightly with rubber wheel touching one point on map. (USE NO PRESSURE.) Move Rolla-Map Ruler along road, following turns and bends as closely as possible, to other point on map. Read distance, in inches, in window at arrow. Refer to scale of miles on map to convert distance to miles. Rolla-Map Ruler may be used to measure circumference of circles, ovals, and irregular shapes.

COPYRIGHT 1955 PATENT PENDING

Continental Utility Products Co.
 Hebron, Illinois

DECIMAL EQUIVALENTS

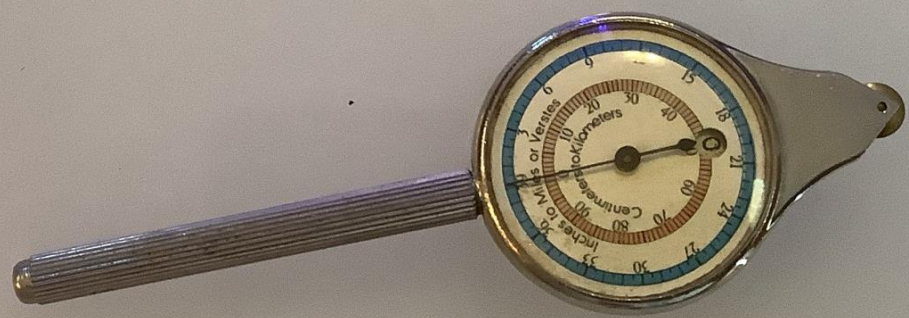
1/32	0.03125	5/32	0.15625	17/32	0.53125	25/32	0.78125
1/16	0.06250	3/16	0.18750	9/16	0.56250	13/16	0.81250
3/32	0.09375	11/32	0.34375	19/32	0.59375	27/32	0.84375
1/8	0.12500	5/8	0.37500	5/8	0.62500	7/8	0.87500
5/16	0.31250	13/16	0.81250	13/16	0.81250	29/32	0.90625
3/16	0.18750	7/16	0.43750	11/16	0.68750	15/16	0.93750
7/32	0.21875	15/32	0.46875	23/32	0.71875	31/32	0.96875
1/4	0.25000	1/2	0.50000	3/4	0.75000	1	1.00000

DESIGNED BY G. L. COLLIER & SONS, HAYWOOD, ILL.

CURVIMETER: MECHANICAL NO HANDLES COMBINATION COMPASS



CURVIMETER: MECHANICAL WITH HANDLE COMBINATION COMPASS



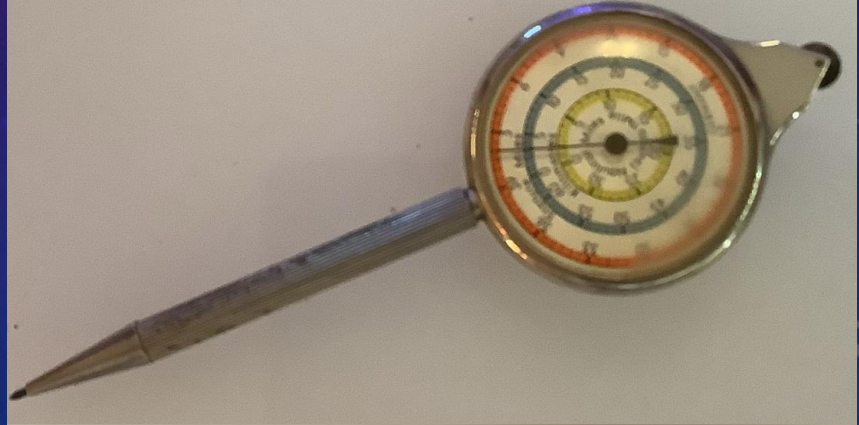
The ENBECCO „MOTORWAY“ combined Self Registering Map Measure or Opisometer, and compass, comprising and easily read on blue for inches to miles or inches to versts and 6 centimeter scales on red for centimetres to kilometres. The inch scale reads to 39 inches for each complete revolution of the needle, and the centimetre scale reads to 100 centimetres for each complete revolution of the needle. The Self Registering indicator reads 0 to 4 thus showing complete revolutions of the needle up to five, and enabling total readings of 195 inches, and 500 centimetres. The magnetic compass for map orientation has a dial divided every two degrees and figured every 20 degrees.

The Map Measurer scales and the compass dial are divided and figured in black.

Instructions for the ENBECCO „MOTORWAY“ Self Registering Map Measurer or Opisometer.

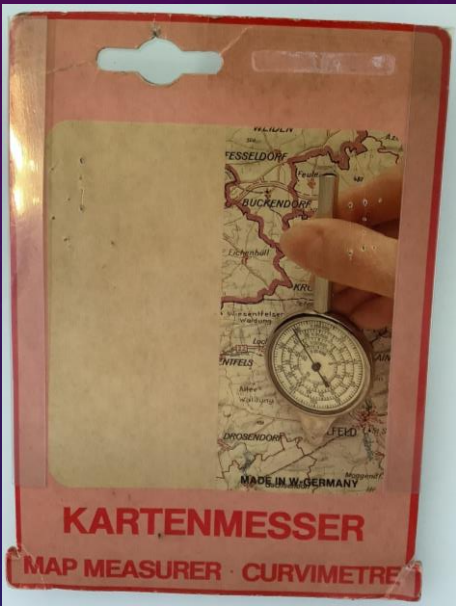
- 1) Set the self registering indicator to 0 and the needle to 39 inches or 0 centimetres by running the small operating wheel round a flat surface.
- 2) Place the small operating wheel on the starting point on your map and carefully run the map measurer along the route you intend to follow. Note the reading of the needle and self registering indicator to obtain total inches or centimetres.
- 3) Ascertain the map scale, miles to an inch, or kilometres to a centimetre, when a simple multiplication will give the miles or kilometres to be travelled, viz., a map scale of 4 miles to one inch with a 10 inch reading on the Opisometer gives 40 miles to travel, or a map scale of 12 miles to one inch with a 21 inch reading on the Opisometer gives 252 miles to travel.
- 4) Total distance travelled can of course be ascertained from the speedometer on a motor vehicle, but cyclists and pedestrians can ascertain the mileage they have covered by carefully retracing their route on a map with the map measurer.

Printed in Germany



CURVIMETER: MECHANICAL NO HANDLES MULTIPLE DIALS

MAP MEASURE
 The Map Measure is used for ascertaining distances on geographical maps in all scales indicated on the measure. It is indispensable, to airmen, motorists, cyclists, hikers etc. Further it is of great value to architects, surveyors, schools and offices.
 Directions for Use. Place the pointer at O by turning the small wheel; then, holding the instrument vertically, trace the distance to be measured with the wheel. The pointer will then indicate on the dial the exact distance in proportion to the scale of the map.



DIRECTIONS
 This measurer will give you a direct reading in nautical miles on virtually any harbor or coastal chart published by the U.S.C. & G.S. Lay a straight edge along the course or line of bearing to be measured. Set the dial at 0° and run the little wheel along the line against the straight edge. Read the mileage directly from the scale that corresponds to the scale of your chart.



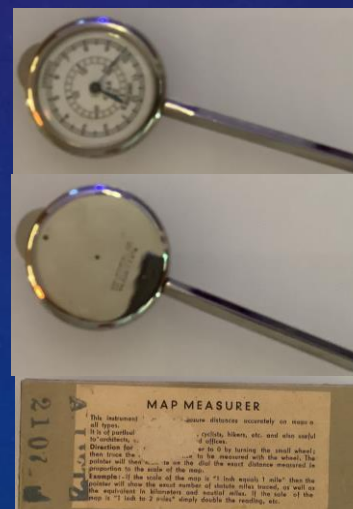
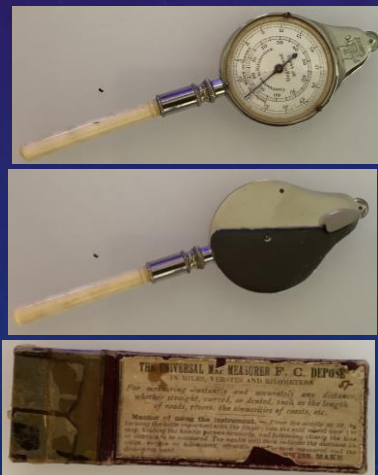
KOENEMAN
ROTAMETER
 #1868 for 1/8" Scale plans



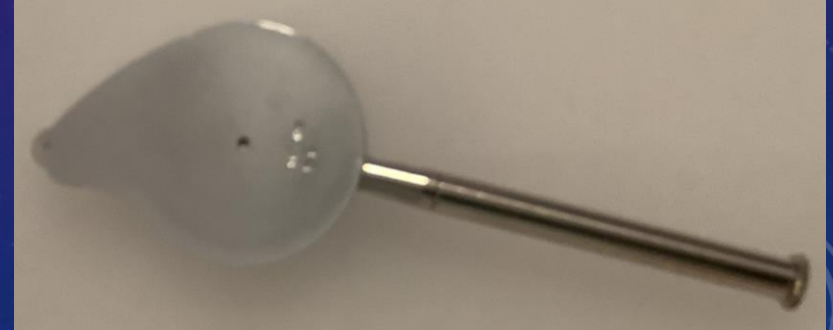
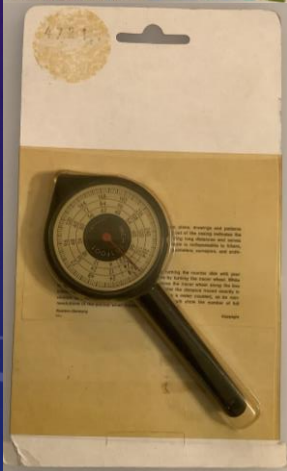
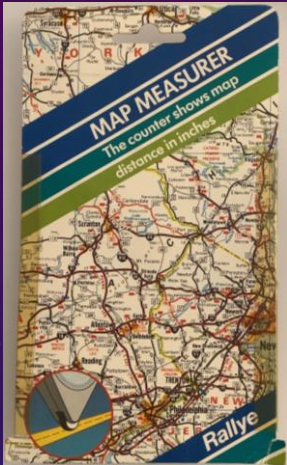
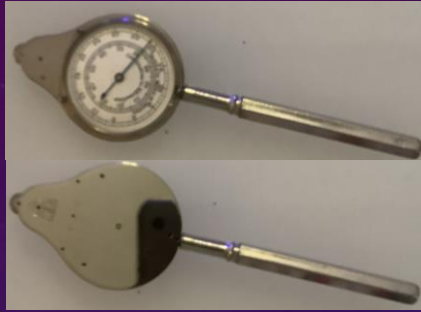
CURVIMETER: MECHANICAL NO HANDLES MULTIPLE DIALS



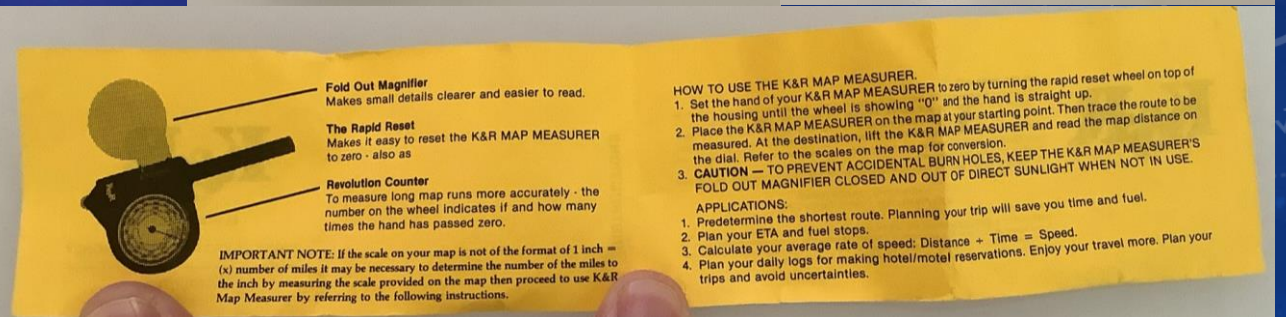
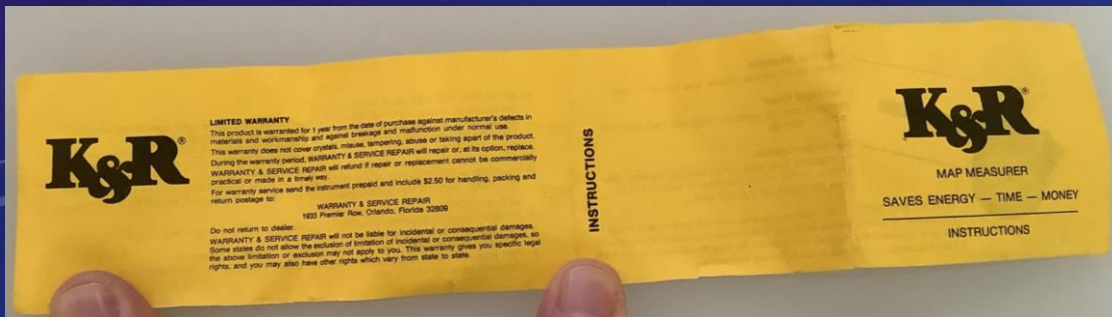
CURVIMETER: MECHANICAL WITH HANDLES SINGLE DIAL



CURVIMETER: MECHANICAL WITH HANDLES SINGLE DIAL



K AND R STYLE MAP MEASURES



K AND R STYLE MAP MEASURES

Silva

Guaranteed Accurate for Life

FEATURES/
CARACTÉRISTIQUES

- 6 Different Scales
- Magnifier
- Vinyl Pouch
- 6 échelles différentes
- Loupe
- Pochette en vinyle

Map Measure

Precision Instrument
Instrument De Précision

Map Measure

Silva
Guaranteed Accurate for Life

For the ultimate in precision and accuracy, the Map Measure features graduation in miles for 1:24,000, 1:62,500 and 1:250,000 U.S.G.S. maps and in kilometers for 1:25,000, 1:50,000 and 1:100,000 scale maps. There are also inch and centimeter graduations for maps of other scales. A revolution counter, a reset wheel, and a folding magnifier provide even more precision. A vinyl storage pouch is also included.

Pour une précision et une exactitude optimales, le mesureur de longueur propose la graduation en miles pour les cartes USGS à échelle de 1:24,000, 1:62,500 ou 1:250,000 U.S.G.S. et la graduation en kilomètres pour les cartes à échelle de 1:25,000, 1:50,000 ou 1:100,000. Le mesureur offre aussi d'autres graduations en pouces et en centimètres pour les cartes dessinées à d'autres échelles. Le compte-tour, le cadran de remise à zéro et la loupe repliable permettent d'obtenir des mesures plus précises encore. Pochette de rangement en vinyle fournie.

A Scales in miles and kilometers
1:24,000 1:25,000
1:62,500 1:50,000
1:250,000 1:100,000
Échelles en miles et en kilomètres
1:24,000 1:25,000
1:62,500 1:50,000
1:250,000 1:100,000

B Inches & centimeters
revolution counter
Compte-tour en pouces
et en centimètres

C Rapid pointer reset
Pointeur à remettre à zéro rapide

D Magnifier
Loupe

E Vinyl pouch
Pochette en vinyle

JOHNSON
OUTDOORS

Made in France
Fabriqué en France

NAV rep
Map Measurer

Printed in France
Imprimé en France

See us
Voir nous

à l'in

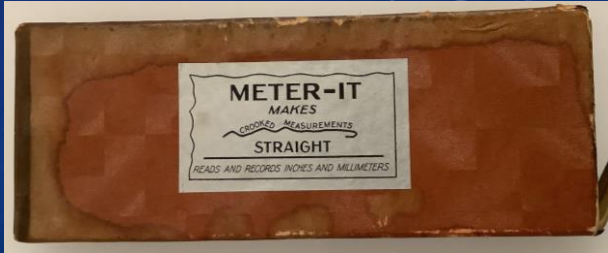
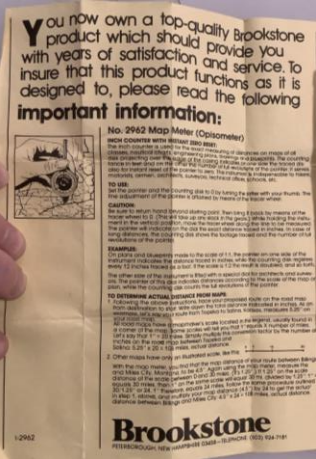
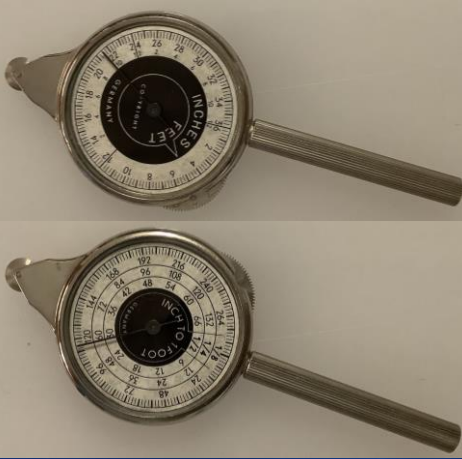
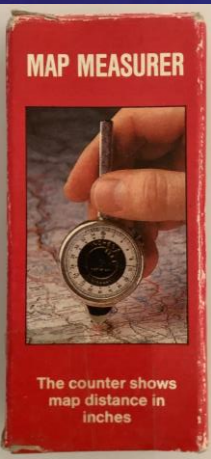
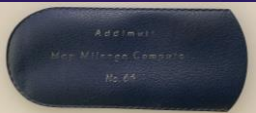
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ITEM# 2804205
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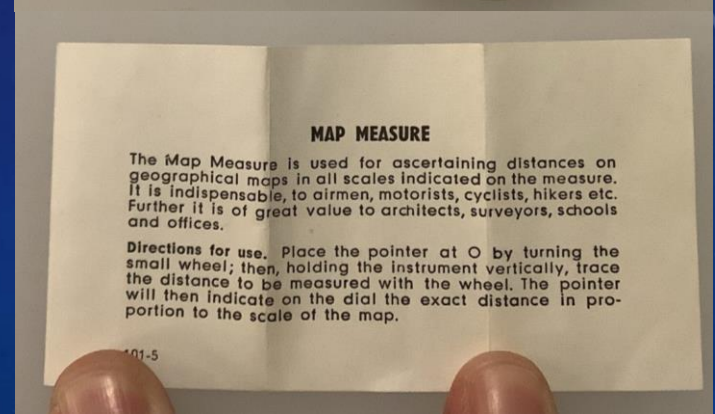
OUTDOOR SERIES • SÉRIE DE PLEIN AIR



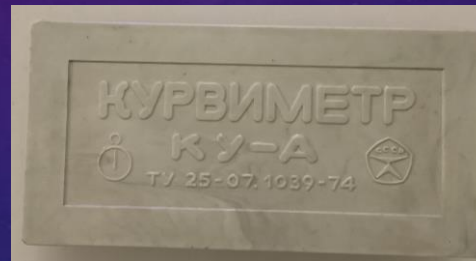
CURVIMETER: MECHANICAL WITH HANDLES MULTIPLE DIALS



CURVIMETER: MECHANICAL WITH HANDLES MULTIPLE DIALS



CURVIMETER: SOVIET CURVIMETERS



1. The PEDOMETER functions just like a Pendulum and must therefore always be carried in a Perpendicular position when in use.
2. It should be suspended from the Belt or to a side Pocket always remembering that it is the movement of the leg which operates the PEDOMETER.
3. Before use, set the hand of the PEDOMETER to Zero - by turning the screw in the centre at the back of the Case.
4. Then adjust the PEDOMETER to your pace length which normally is 25 1/4". This is done by turning the Knurled Knob on the top of the PEDOMETER and a brass Plate Calibrated in Feet indicates the pace length. So be sure and set it to your correct pace length.
5. If it is found that the distance you have covered does not correspond exactly to the reading, on the PEDOMETER it means your Pace adjustment has not been correctly made.
6. Do not take the PEDOMETER to pieces.



FRIEBERGER PRÄZISIONSMECHANIK KRIVKOMER MAP MEASURES (EAST GERMAN)



Křivkometrem 78 měří rychle a jistě vzdálenosti na mapách a výkresech.
Obsluha: krátkým stlačením knoflíku na horním konci rukojeti se nastaví ručka na nulu a potom se oběžné kolečko vede po čáře libovolné křivosti, která má být měřena. Na oboustranném dělení může být ručkou odečtena hledaná vzdálenost podle měřítka.

FPM G 10-161-1 3 2 16 4 85 20 1603 M (p) G-7/005/85

Křivkoměr 78

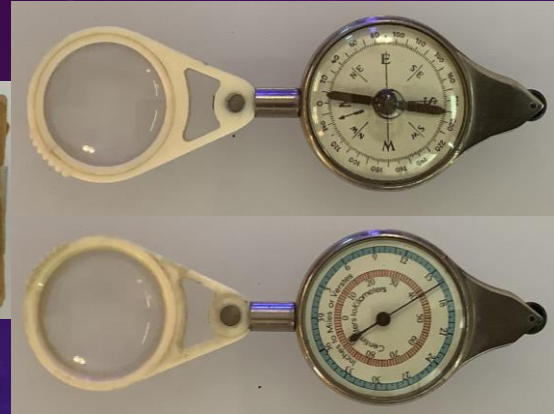
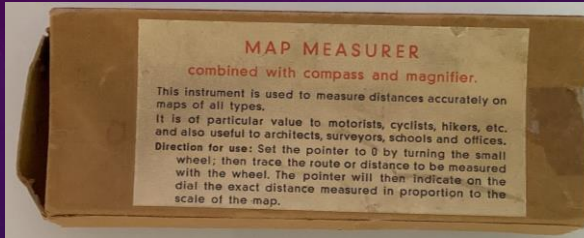
s tlačítkem pro nulovou polohu
Číslo podle číselníku: 13 87 62 29
VEB FREIBERGER PRÄZISIONSMECHANIK
9200 Freiberg, Hainichener Strasse 2a
Německá demokratická republika



Měřítka
1 : 30 000
1 : 50 000
1 : 100 000
1 : 120 000
1 : 200 000
1 : 600 000



EXTRA FEATURES



MAP MEASURE KEY TAG
Accurately measures the distance between two points on any road map.

INSTRUCTIONS:

1. Set zero to arrow.
2. Roll small wheel along map from starting point to destination.
3. Distance in inches multiplied by scale on map equals distance in miles.
4. One revolution of large disc equals 4", two revolutions equal 8", etc.

Discs are molded of DuPont nylon . . . the miracle, wear-resistant material from which gears and other precision parts are made.



EXTRA FEATURES



BMW Map Measuring Tool Instructions

The map-measuring tool has 5 modes. Scroll through the 5 modes by pressing the white "=" button on the keypad.

Mode 1 - Time

The Time Mode is the default mode and is indicated by the round clock icon in the upper left-hand corner of the display. If you are in another mode, simply press the white "=" button on the keypad until you are in the clock mode. The tool will automatically return to the clock mode if no buttons are pushed within 2 minutes. To switch between 12hour and 24hour format press the "CE" button. To view time on other cities, press the code for that city and the time will change to that city.

12:06 40

Mode 2 - Calculator

From any mode, press the white "=" button on the keypad until you are in the Calculator Mode. The small calculator icon shown on the top center of the screen indicates the calculator mode.

525.35

Mode 3 - Countdown Timer

From any mode, press the white "=" button on the keypad until you are in the Countdown Timer Mode. The small "CT" shown on the upper right-hand of the screen indicates the countdown timer mode. The first "0" will flash, awaiting your input. Using the keypad input the desired count down time in the "hour-minute-second" format and press the "CE" button to start and stop the count down timer. When "0" seconds is reached, the display will flash "00-00-00" for 30 seconds.

00:00 00

Mode 4 - Temperature

From any mode, press the white "=" button on the keypad until you are in the Temperature Mode. The small temperature icon shown on the top center of the screen indicates the temperature mode. To switch between Fahrenheit and Celsius press the "CE" button.

67.7°F

Mode 5 - Time Setting

When setting the clock for the first time or after battery placement you must select a time zone. Select a code for the city in your time zone from the list below or on the inside cover of the tool. Using a pointed object press the gray RESET Button on the back of the tool, the display will begin in the Honolulu time zone at 12:00 AM. Input the code on the keypad for the city in your time zone and press "CE" to confirm. The clock will switch to your time zone.

12:06 40

(continued on reverse side)

Code	Time Zone	Code	Time Zone	Code	Time Zone	Code	Time Zone
0	Denver	4	Karachi	8	Paris		- Los Angeles
1	Sydney	5	Bangkok	9	Cairo		x Tokyo
2	Wellington	6	Hong Kong		• Chicago		+ Moscow
3	Honolulu	7	London		+ Rio de Janeiro		AC/ON New York

Setting the time. Make sure you are still in Mode 5, the Time Setting Mode is indicated by the round clock icon in the upper left-hand corner of the display and the flashing first digit of the time. Using the keypad input the desired time in the "hour-minute-second" format (Example - "09-30-00" for 9:30). To switch between AM and PM press the "CE" button.

Map Distance Measurement

The following two examples use a map scale of 1:24,000 (1 inch measured = 24,000 inches in real life), and 1" :10 mi. (1 inch = 10 miles in real life).

(1) **1:24,000 Scale** - Press the blue SCALE Button in any mode. Zero flashes waiting for an entry of "24000". After "24000" is entered, press "=" to confirm. To measure, press the blue MEASURE Button, and press "CE" to select either KM or MILE. Place the measuring wheel at the starting position, on the map, and roll the wheel to the destination. Read the distance in the display. If your scale is 1:50,000 enter "50000", if 1:1,000 enter "1000", ...etc. The default scale is 1:100,000, even when "0" is entered.

(2) **1 inch = 10 miles Scale** - First, we must change 10 miles to inches, so that both sides of the "=" are the same units. With some calculation, 1 mile = 63,360", so we can say 10 miles = 633,600". Now, replace 10 miles with 633,600". The new scale is 1" :633,600" (1:633,600). Press the blue SCALE Button in any mode. Enter "633600" and confirm by pressing "=" . To measure, press the blue MEASURE Button, and press "CE" to select either KM or MILE. Now the map measurer is ready to measure.

To re-measure using the last entered scale, press the blue MEASURE BUTTON again, even after scrolling to another mode. The map measurer remembers the value. Use the examples above to help you determine the value to enter. Remember, the scale should always start with a "1" (1:50).

Light

Press and hold the blue LIGHT button on the back of the tool to turn the light ON, releasing the button will turn the light OFF.

Compass

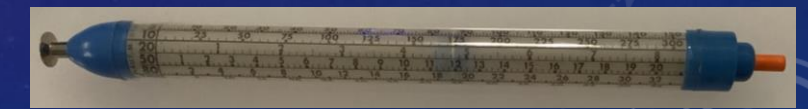
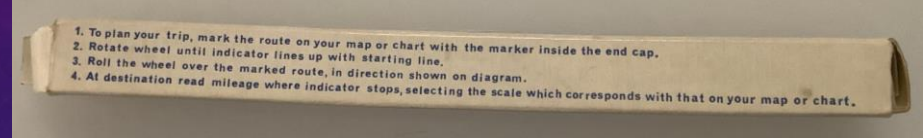
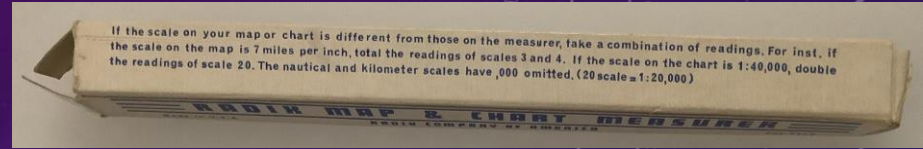
View the compass on the backside of the map tool.

Battery

The tool uses two AG10 batteries (included)



PEN STYLE CURVIMETERS



DIRECTIONS
INSTRUCTIONS FOR USING THE MILE-O-GRAPH

1. Turn knob until the scale is the same as that on your map. For instance if the scale on your map is 4 miles per inch, turn knob until the 4 appears in the scale box.
2. Turn wheel until white pointer lines up with the starting line.
3. Holding the MILE-O-GRAPH in vertical position, roll the wheel along the route to be measured, noting that pointer moves up on the scale.
4. When you reach the destination, the pointer will indicate the exact mileage.

If the distance exceeds the mileage on the scale, the white pointer disappears and a yellow pointer appears at the starting line. In this case your distance is the mileage indicated by the yellow pointer, plus the last mileage figure (extreme right) on the scale.

If the scale on your map is different from any of the scales on the MILE-O-GRAPH, a combination of readings can be taken. For instance if the scale on your map is 3.2 miles per inch, you take the mileage indicated on scale 3 and then you turn the knob to scale 2 and add up the two readings.

THE MILE-O-GRAPH AS A MEASURING INSTRUMENT
Turn Knob until scale 1 appears. The distance measured is indicated in inches and fractions.

MILE-O-GRAPH INC.
117 LIBERTY STREET NEW YORK 6, N. Y.

ROLLER RULER



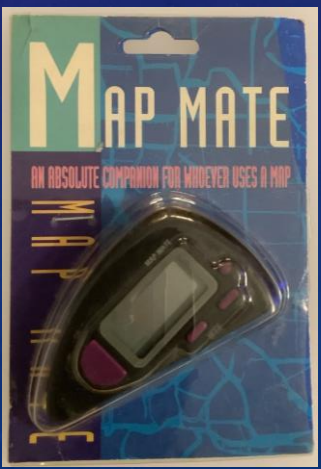
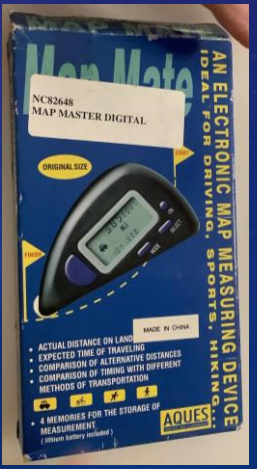
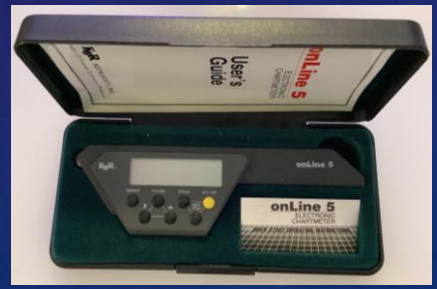
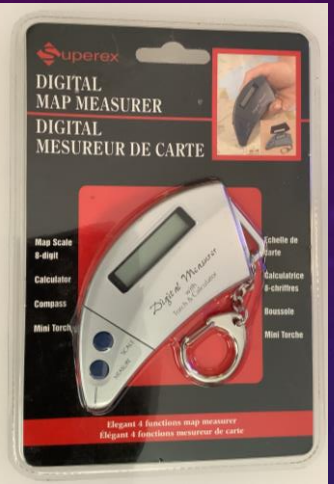
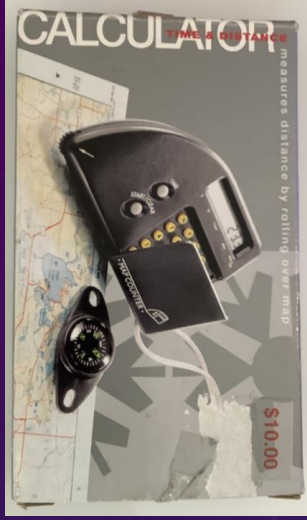
"The Pencil with a Brain"

Take Advantage of Its Thousand-and-One Uses

- Hold the Way You Hold a Pencil. Tilt as though writing a letter—holding at proper angle is important to accuracy.
- Start on Zero. Moving indicator must point to zero on Inch-ometer on Roller Rule's side, and zero must also be indicated on head's "fractional meter" when you start to measure. The gold stripe across top of head must then fall directly on starting point of surface to be measured.
- "Roll the Head." That's all there is to operating Roller Rule. Roll the head over surface being measured.
- Stop at "Point-of-Contact." Be sure that tire on head rests on finishing point before taking reading.
- Inches Recorded on Inch-ometer. Measure anything, rolling head to right. Inch-ometer records 36 inches in one direction. For measuring greater distances simply reverse motion of head when 36 is reached, reversing each 36 inches as you continue.
- Measures Fractions of an Inch. Fractions are shown on head. Line under head indicates eighths of an inch as you roll. Each complete revolution of head is 2 inches. When "1" shows on head an odd inch is recorded. Inch-ometer, when "0" shows on head an even inch is recorded. (Allow $\frac{5}{8}$ -inch for wall or similar corners.)
- Measures Curves, Straightaways, Etc. Use for tailoring measurements, pipes, and boilers, and so on, as well as flat surfaces.
- Gripper Prevents Slipping and Marring. The tiny rubber tire around head grips any surface for accuracy and will not mar fine surfaces, such as furniture and glass. (Extra tires available, 2 for 10c prepaid.)
- Pencil Propels, Repels and Expels. This is an all-quality writing instrument that firmly grips standard leads, and provides spacious eraser-topped chamber for extra leads. Note: Lead is manipulated by bottom metal tip, not by head. (Over)

AUTOMATIC
Roller Rule
MEASURING - MATHEMATICAL-
WRITING INSTRUMENT

CURVIMETERS: DIGITAL



CURVIMETERS: AUDIBLE



THE CLICKER  **MAP ROUTE MEASURER**

Pat. No. 422611

No. 1458 as shown **6d.** each

Where you can't use a ruler use the "CLICKER" AN INGENUOUS DEVICE DISTANCES ON ANY MAP BEING CIRCLES CORNERS ETC MEASURED ACCURATELY

6" each

No. 1459 Retails **9d. each.** Similar to above but with heavier Caps, Eraser and Quality Pocket Clip, Chromium Plated.

No. 1460 **1/- each** With Bakelite handle and Chromium Plated Safety Cap.

New Style Wheel and Spring. Boxed Individually.

ALL 3 STYLES COUNT THE MILES on Mainroads, Coastlines and Byroads.

Also useful as a pocket inch measurer.

Just the Gadget for Motorists, Cyclists, Walkers, and many others.

MADE IN ENGLAND.

THE "CLICKER" ROUTE MEASURER AND COMBINED PROPELLING PENCIL

No. 1461

1/6 each **PATENT No 422611**

MAKES AN EXCELLENT POCKET INCH RULE.



INSTRUCTIONS.

When in General Use. Remember, small disc exactly 1 inch in circumference and 4 clicks always means one revolution of wheel — i.e. 1 inch has been covered — therefore when any measurement is required on paper or elsewhere, a complete turn of the disc (which is 4 clicks) means 1 inch; two turns or 8 clicks 2 inches, and so on. Thus in carrying a "Clicker" you have **A RULE ALWAYS AT HAND.**

Scaled Road Maps. Distances from point to point can easily be measured and accurately obtained by holding "Clicker" nearly upright in right hand. Place disc at any starting point desired and run it over the road to be measured, count number of clicks given between any two points and you have the distance in miles, however crooked the road or coast line. As wheel has an eccentric movement it can be pulled, pushed in any direction without lifting it off map. It is not necessary to press heavily. Holes synchronise with clicks and indicate starting point.

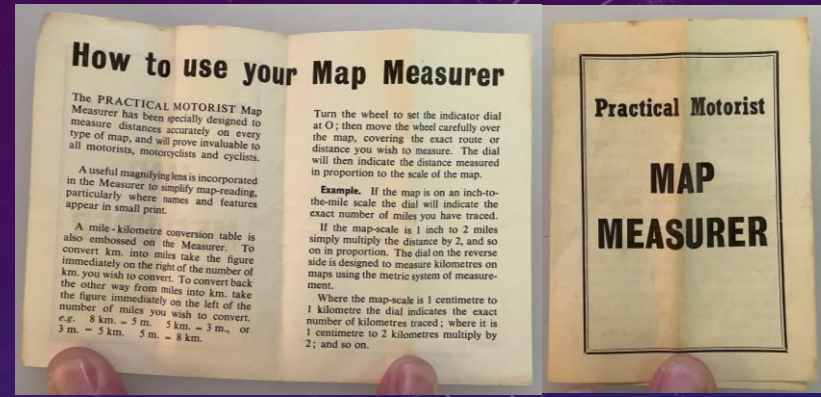
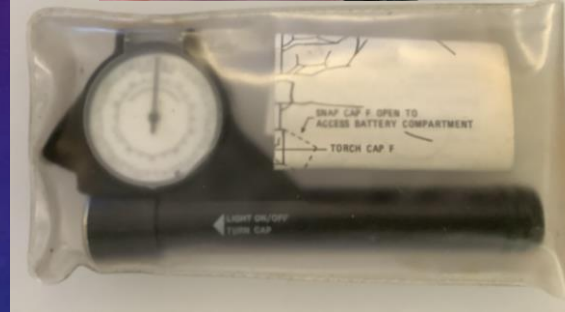
Examples for Maps.

When Scale is 1 inch to 1 mile ... 2 clicks = $\frac{1}{2}$ mile : 4 clicks = 1 mile : 8 clicks 2 miles and so on.

When Scale is $\frac{1}{2}$ inch to 1 mile ... 2 clicks = 1 mile : 4 clicks = 2 miles : 8 clicks 4 miles and so on.

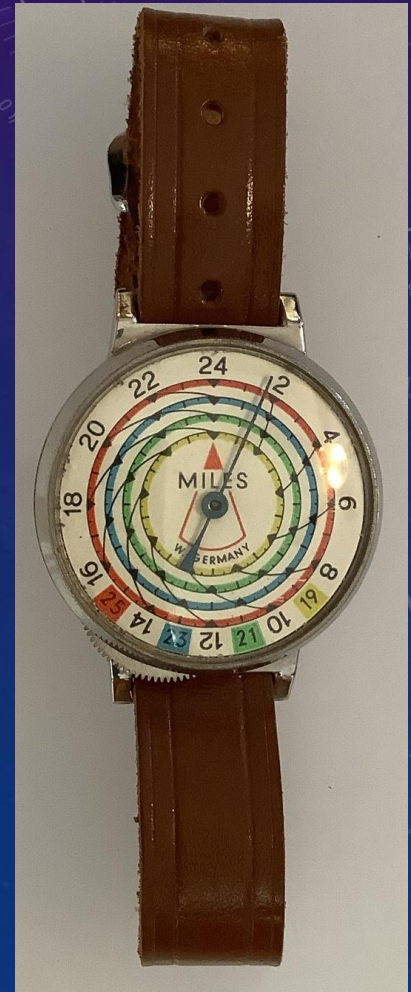
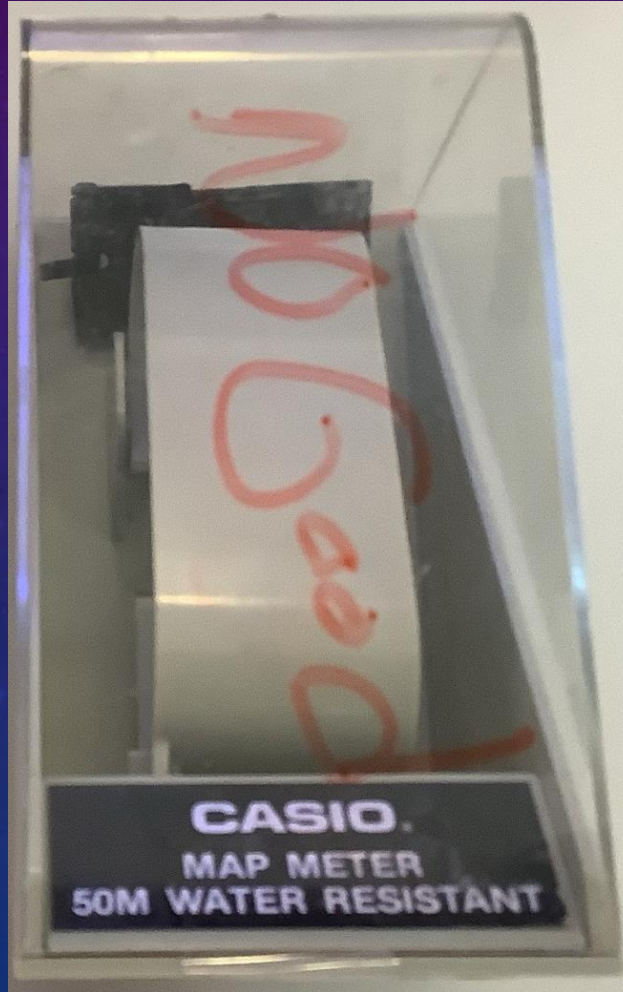


CURVIMETERS: AUTOMOTIVE



CURVIMETERS: WEARABLE

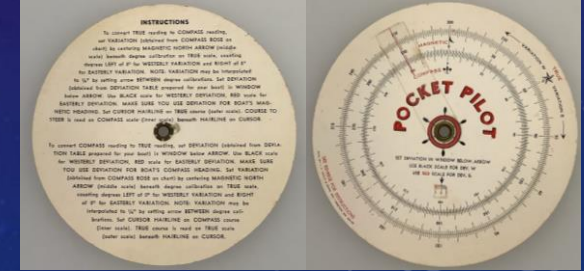
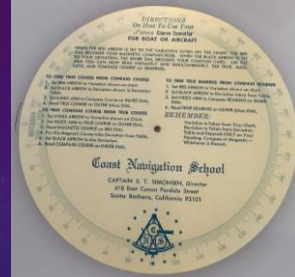
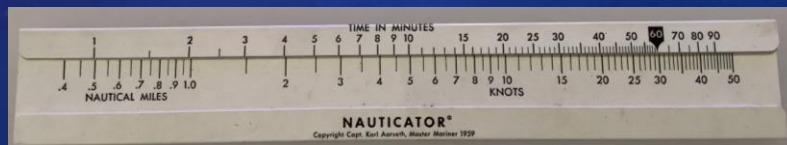
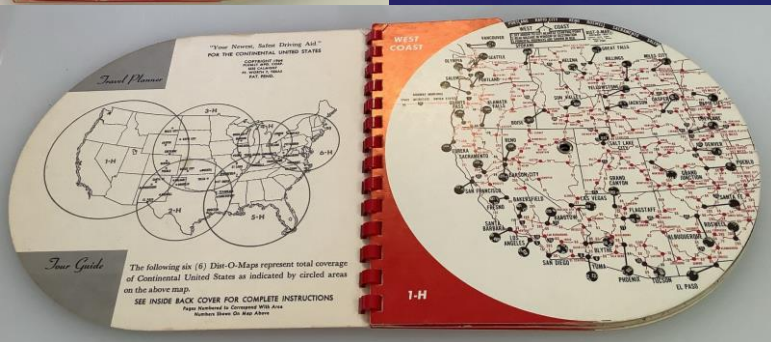
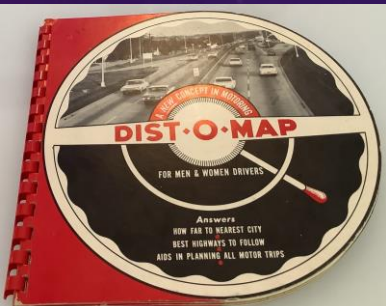
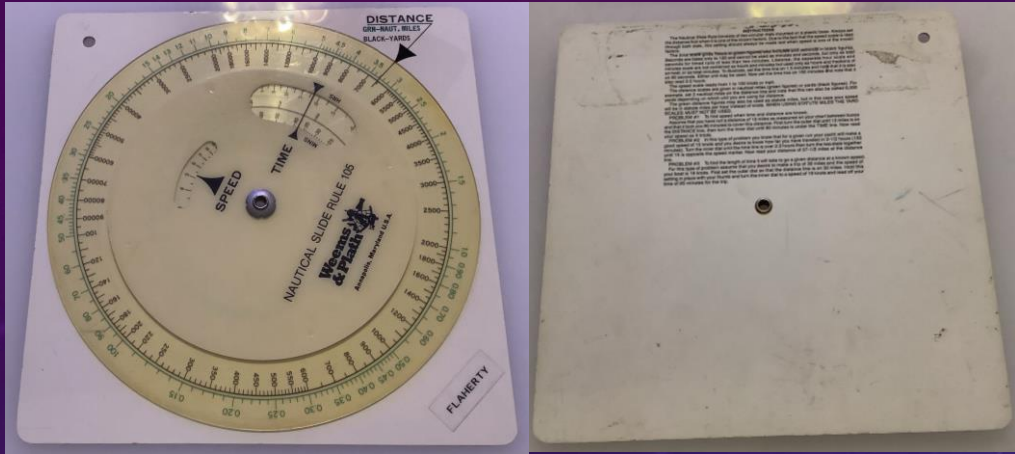
- Watch
- Watch Style
- Watch Fob
- Belt Clip



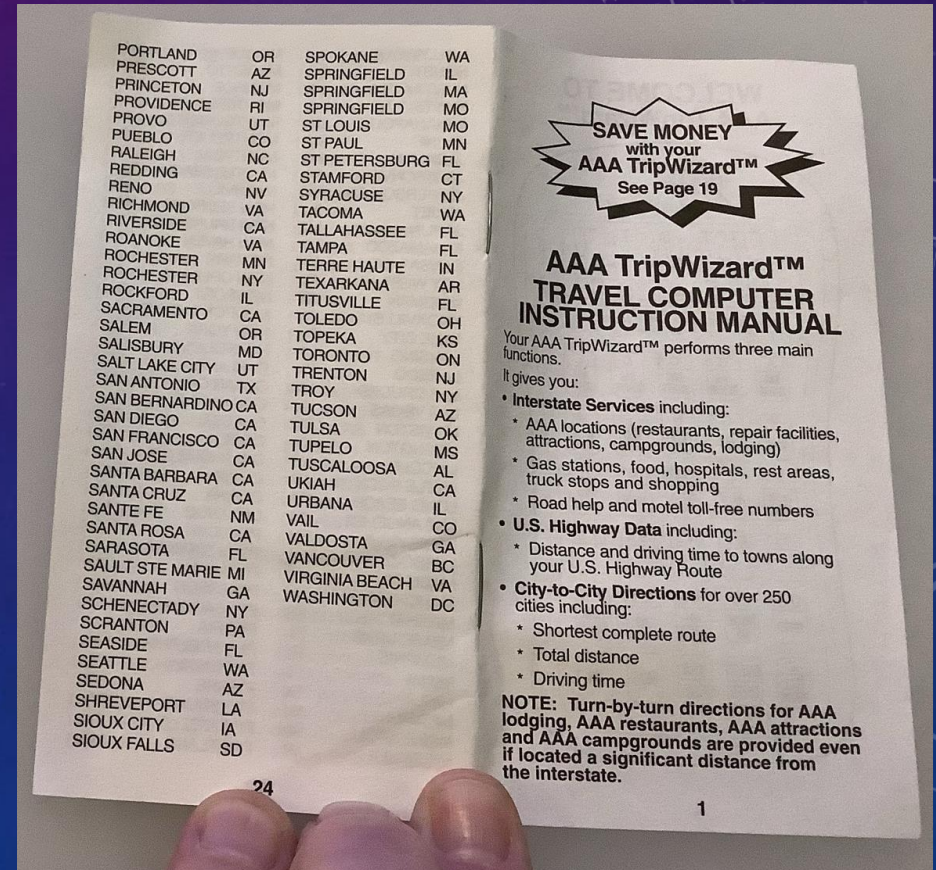
CURVIMETER: TOYS



MAP COMPUTERS: ANALOG



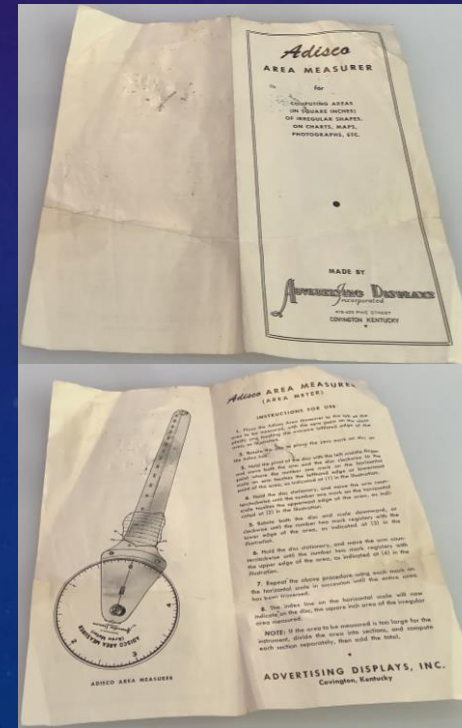
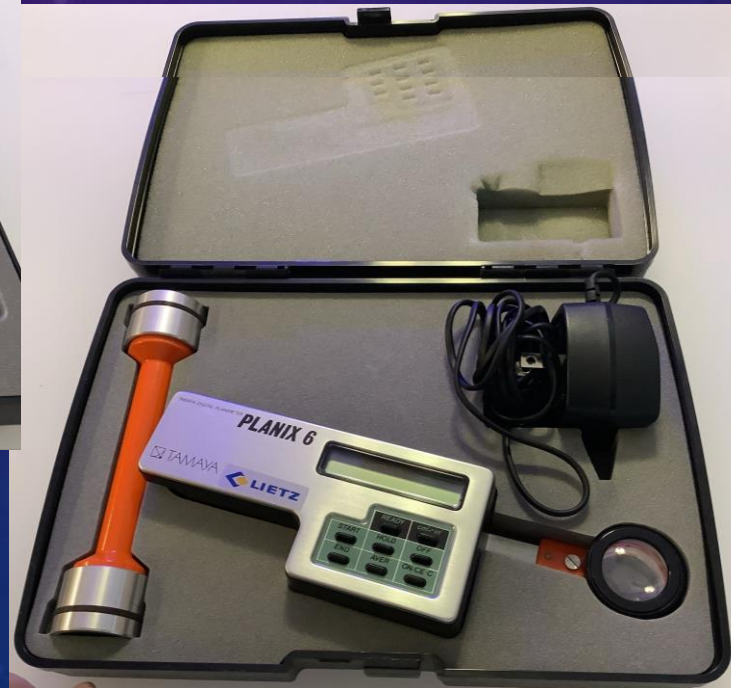
MAP COMPUTERS: DIGITAL



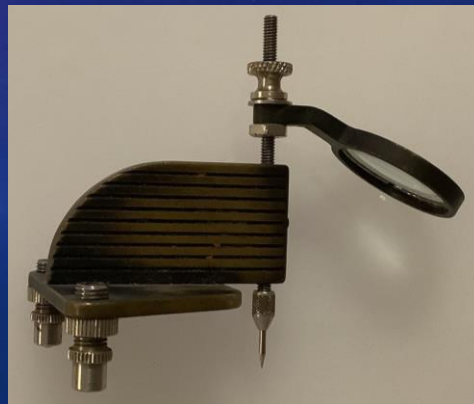
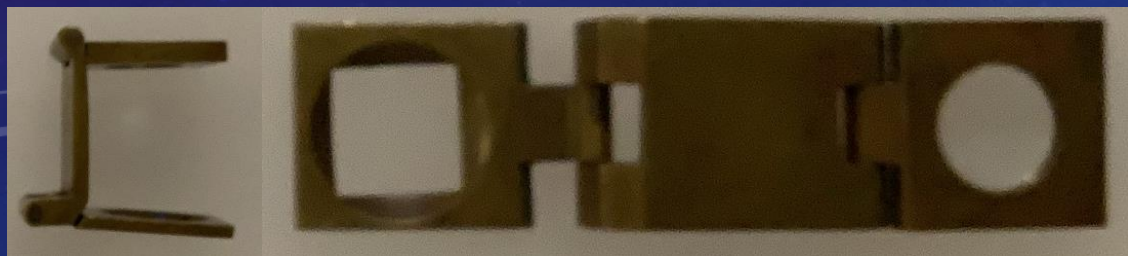
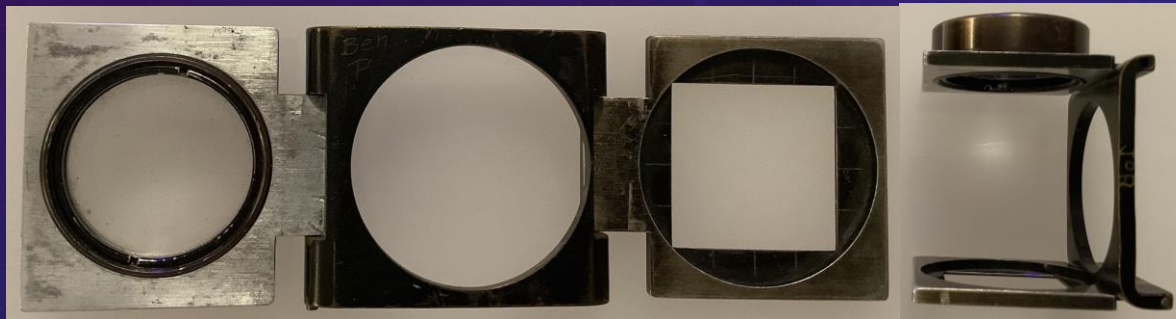
POLAR PLANIMETER

- Planimeters are used to measure enclosed areas on maps and charts
- The polar planimeter measures areas by tracing the outline. It consists of 2 arms, one with a pin to fix it to the map surface and the other with a tracing point. A wheel records the tracing point's movement and the area is read off of the dial
- Invented by Jakob Amsler in 1854 at the University of Schaffhausen, Switzerland
 - Analog
 - Digital

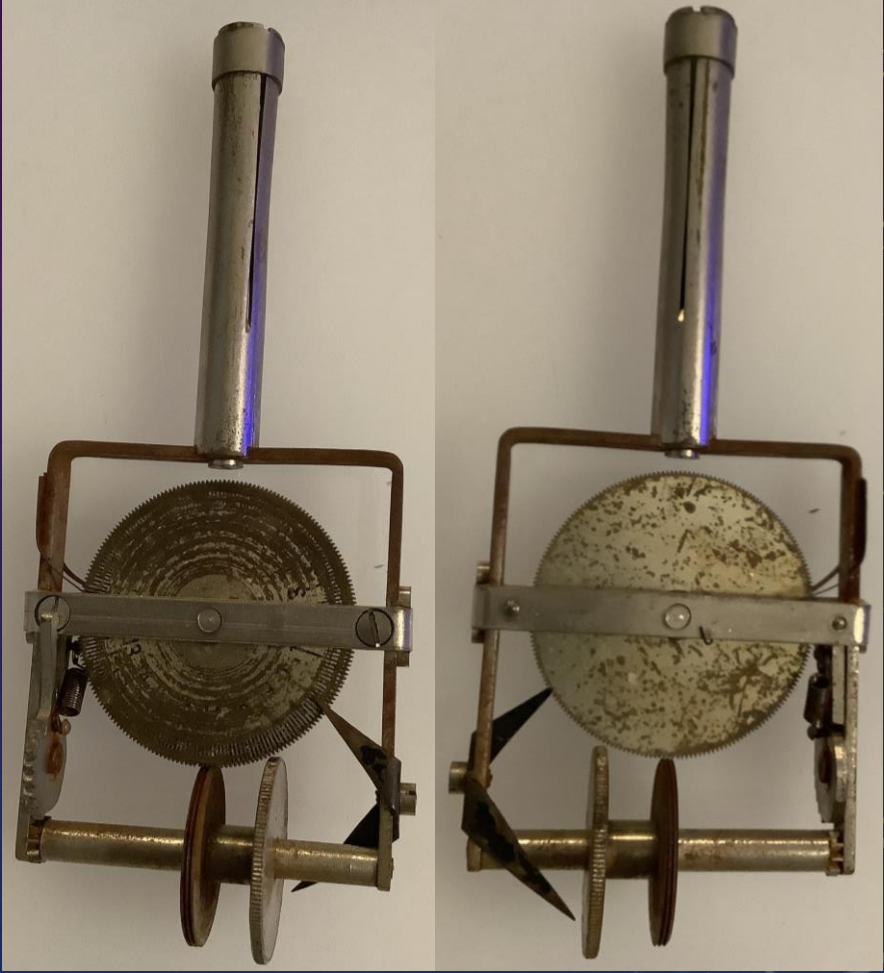
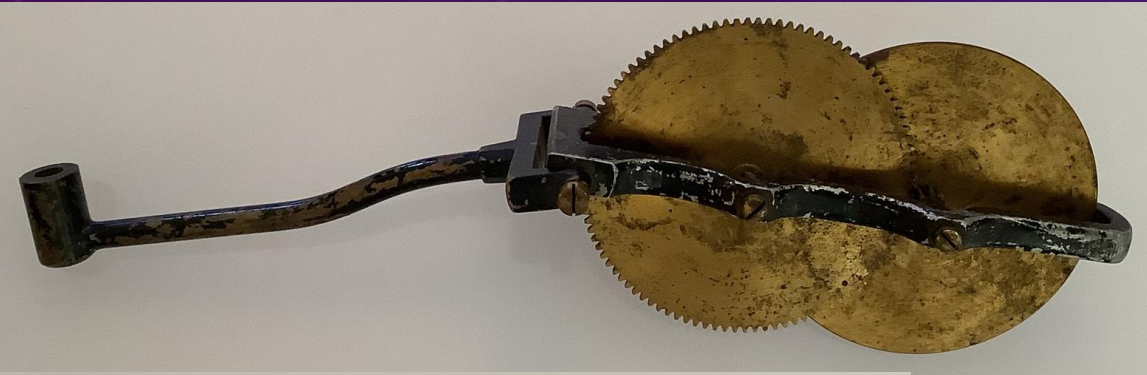
PLANIMETERS AND AREA MEASURES



MAP MAGNIFIERS



FABRIC MEASURES?



LINKS AND SOURCES

- <https://threepointsofthecompass.com/planning-3/map-measurers/>
- Books
 - Story of Maps by Lloyd Brown
 - History of Cartography series by University of Chicago Press

LESSONS LEARNED

- Need better lighting to photograph map measures
- Need a database to manage descriptions, photos, and catalog map measures
- Don't back up the chair when you drop one on the floor

- RIP



60 year old Du Pont luggage tag
plastic doesn't age well

THE END



I have still have 2 Cutie Computers available if anyone wants one?

