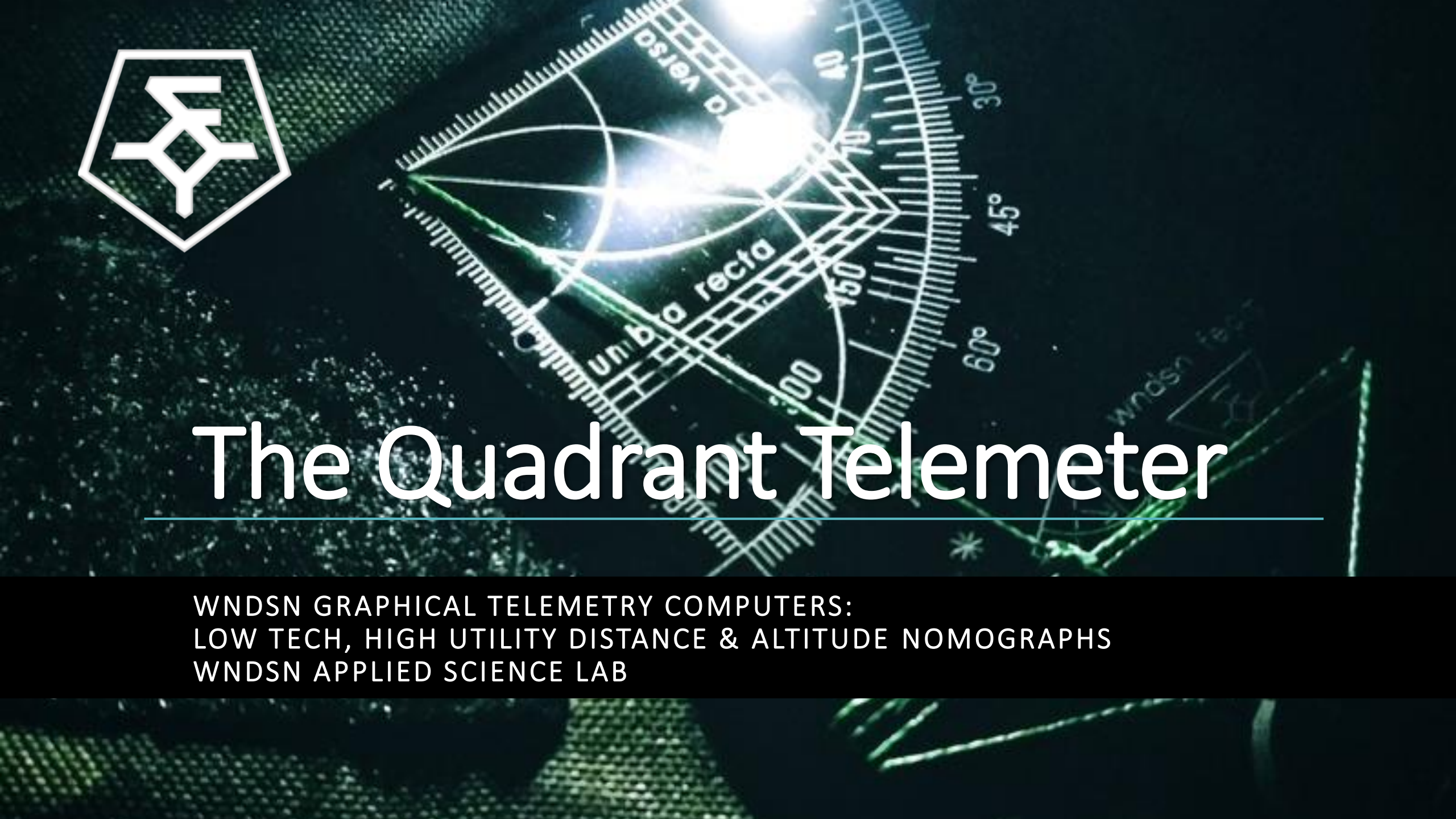
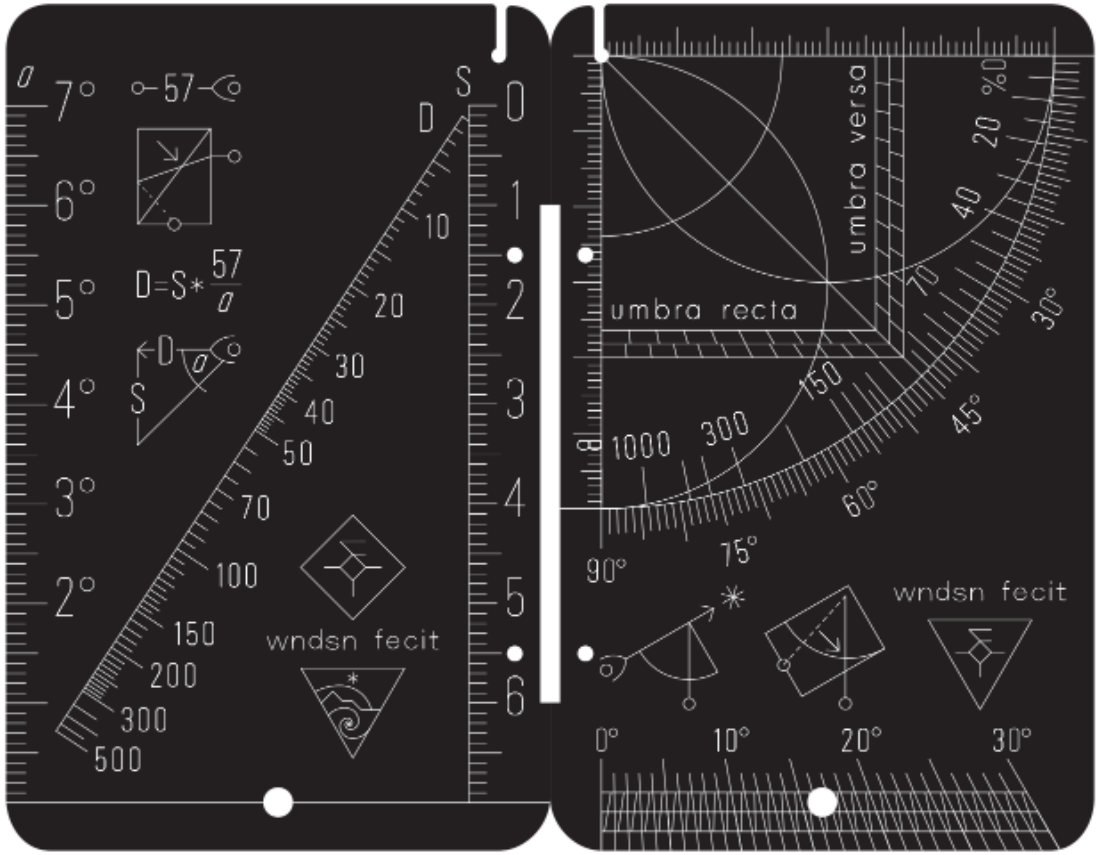


The Quadrant Telemeter

WNDSN GRAPHICAL TELEMETRY COMPUTERS:
LOW TECH, HIGH UTILITY DISTANCE & ALTITUDE NOMOGRAPHS
WNDSN APPLIED SCIENCE LAB

Quadrant Telemeter 7x7x500q90i30



What does it do?

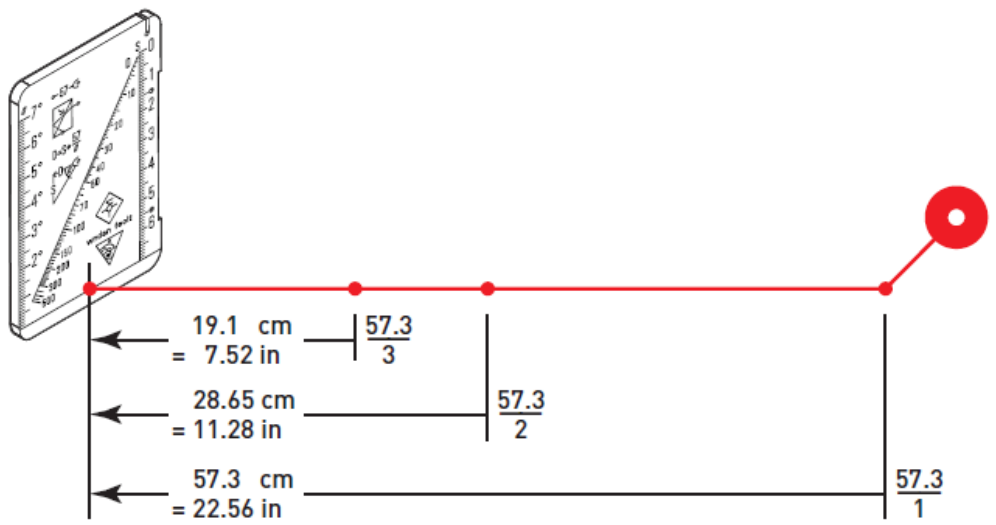
- The Wndsn Quadrant Telemeter (qTM) is **a low tech, naked-eye observational instrument for measuring angles via various inputs and sighting methods**. In addition, the qTM is a graphical, analog computer providing functions to directly process or convert the acquired values. The qTM allows to **measure angular size and compute distance, height or depth of object, slope, altitude, or elevation**, it provides an inclinometer as well as scales for the computation of sine, cosine, and tangent for a given angle.
- A tool for makeshift **navigation, surveying, and rangefinding**, the double-sided qTM enables the user to do more than merely guessing distances. It works by finding an object of known size, or distance, or angle, and measure with the appropriate scales and utilize the baked-in trigonometry to find the desired value by aligning the provided string across the respective scale.
- Its purpose is to help **navigate using known landmarks or astronomical features**, to get a "second opinion" to cross-check values obtained with different means, or in emergency situations when other methods fail or are unavailable.

Where does it come from?

- The qTM combines **a thousand years of civil engineering, surveying, navigation, and astronomy** in one durable, low tech, high utility instrument that can be brought anywhere, is self-containing, and independent of external, modern technologies.
- Inspired by the medieval **Kamal**, a celestial navigation tool that greatly facilitated latitude sailing, as well as **nomography**, an almost lost art and science invented in the late 19th century to provide engineers with fast graphical calculations of complicated formulas, and adding an important **slide rule** principle, the qTM combines all three techniques in an easy to use and handy measuring and calculating device.
- Additional elements on the naked-eye qTM come from the **sine quadrant**, the main scale of the quadrant contains a **shadow square** and a sexagesimal scale which can be used for performing various **trigonometric calculations** and taking basic surveying measurements.

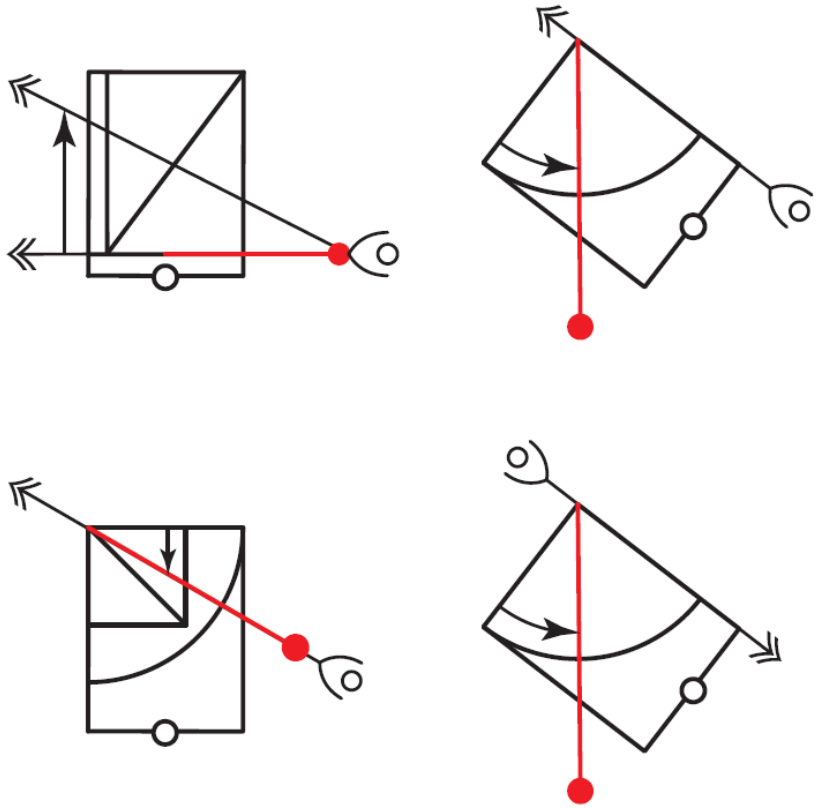
How to start

- To install, **knot the string to the device** through the provided hole. Measure a length of 57.3 cm (22.56 inches) from eye to device.
- Add **additional knots** at 57.3/2 and 57.3/3 cm.
- Make a small loop at the end to **fasten the plumb line weight**.
- For measuring distances, hold onto the string with your teeth or hold the respective knot up to eye level.



And then?

- **Measuring angular size** on the Telemeter (front) scale
- **Sighting the quadrant** alongside the integrated ridges
- **Back-sighting the quadrant** for sun observation
- **Sighting along the string** for shadow square operation



Which function?

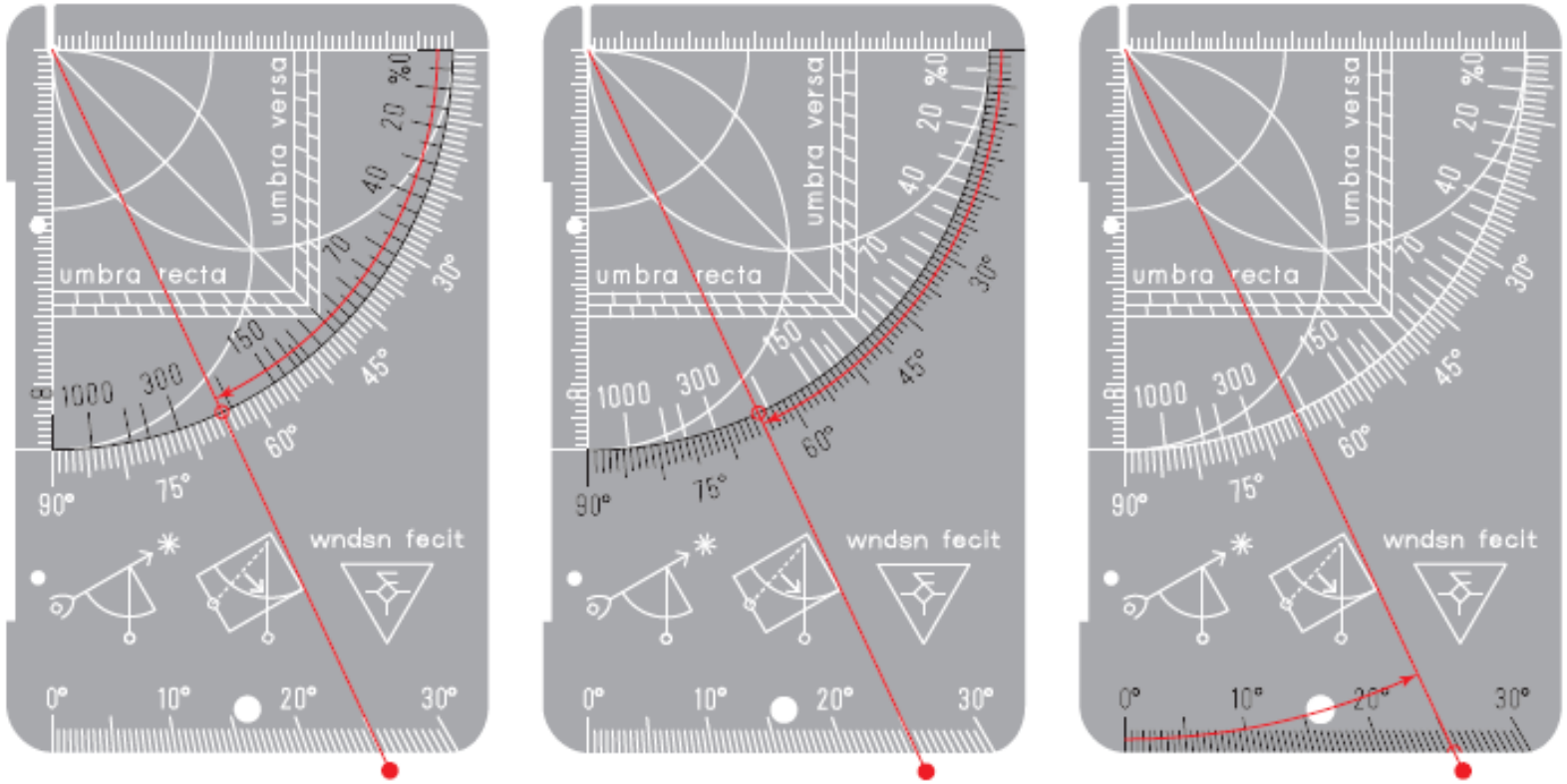
QUADRANT SIDE

- **Measure** angle from vertical
- Measure angle from horizontal
- Measure slope
- **Calculate** sine, cos, tan

TELEMETER SIDE

- **Measure** angular size
- Measure angular distance between objects
- **Calculate** distance or size
- Calculate values from quadrant measurements

Slope, Quadrant, Inclinometer

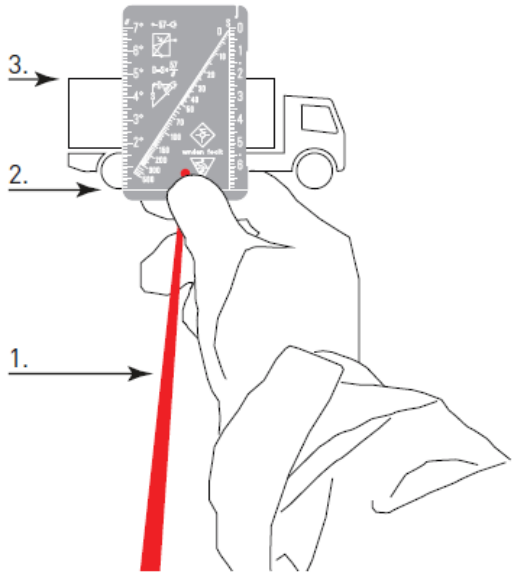


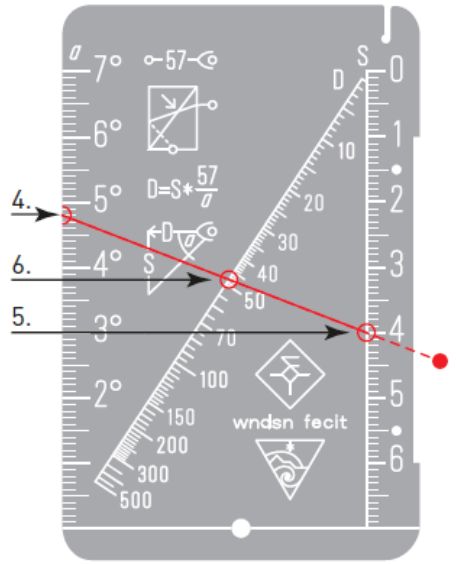
What to find out

DISTANCE, ANGLE, SINE AND COSINE, SUN SIGHTING, LATITUDE

Distance

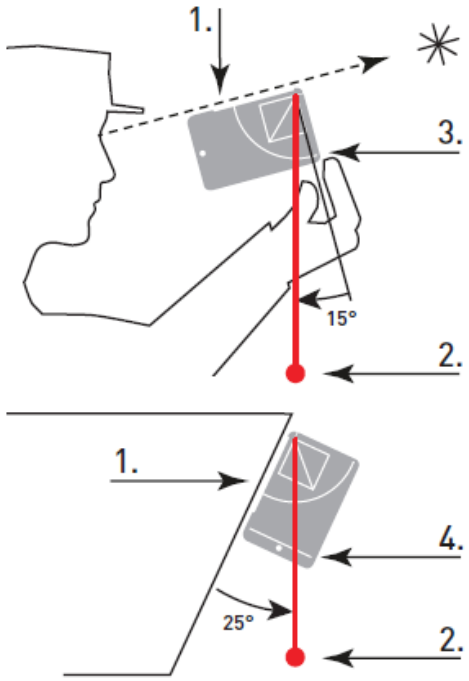
1. **Keep the string taut**, for a distance of 57.3 cm (22.56 inches) from eye to scale
2. **Align the instrument's baseline** to the base of the object to be measured
3. On the α scale, **read the angular size** at the upper bound of the object
4. Object is 4.8° tall
5. Known height is 4 m
6. *D* scale distance is 48 m

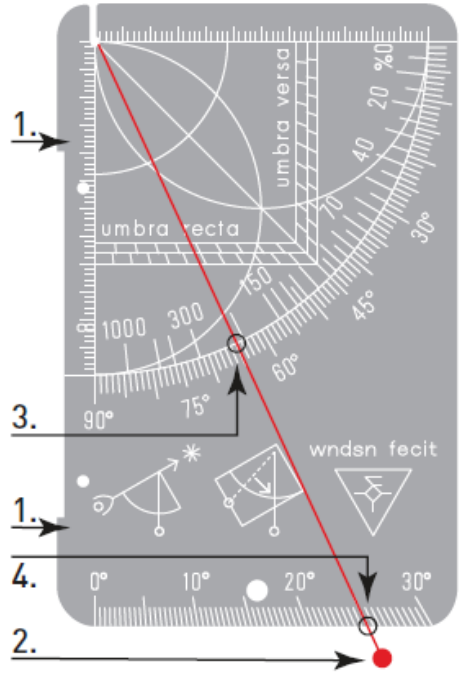




Angle

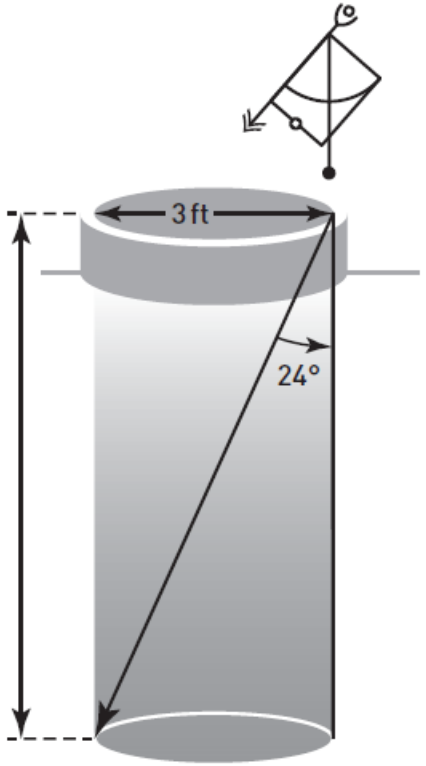
1. **Sighting** edge
2. **Index** string with plumb weight
3. Quadrant scale measures the degrees (or percent) **from horizontal**
4. Inclinometer scale measures the degrees **from vertical**

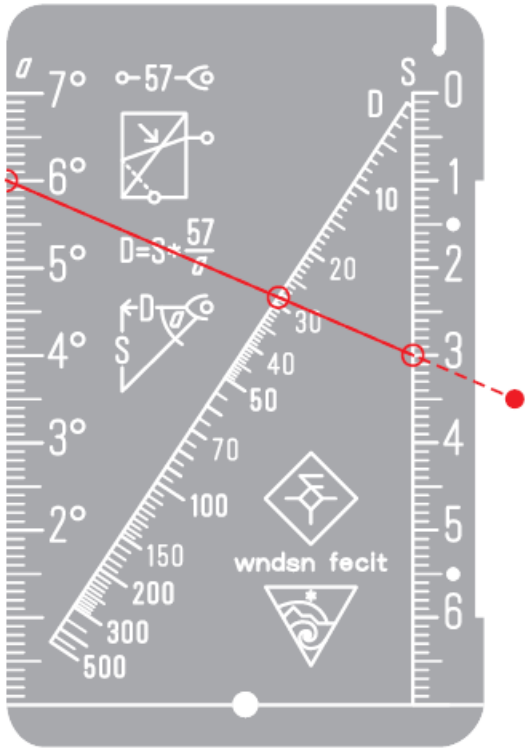




Depth of a Well

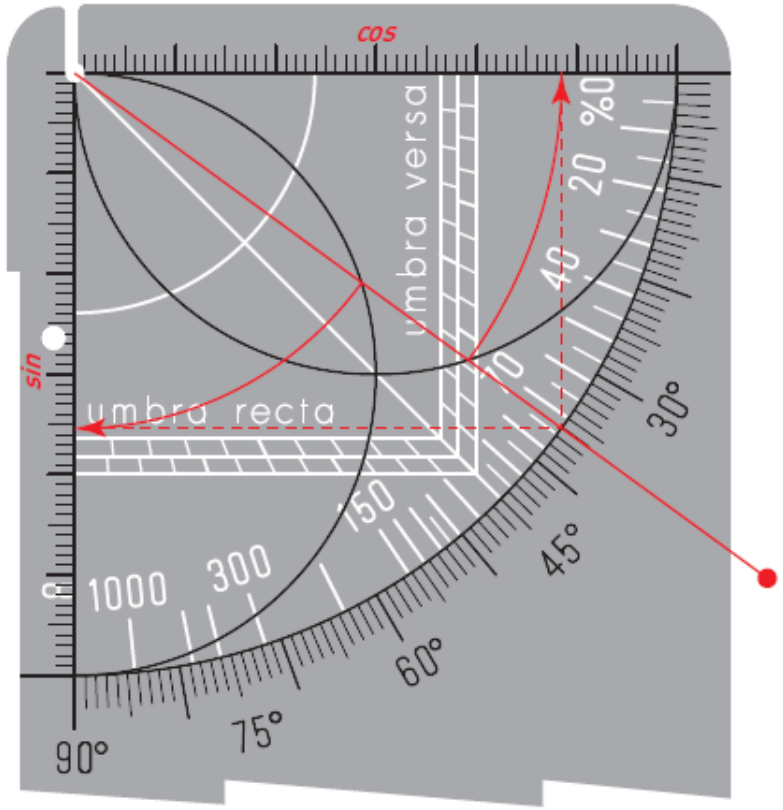
- **Width** at the top: 3 ft
- **Angular width** at the base: 24°
- Using the **Telemeter nomograph**, we input 6° (24°/4) on the α scale; and 3 ft on the *S* scale for a result of 28/4 ft = 7 ft depth of the well.





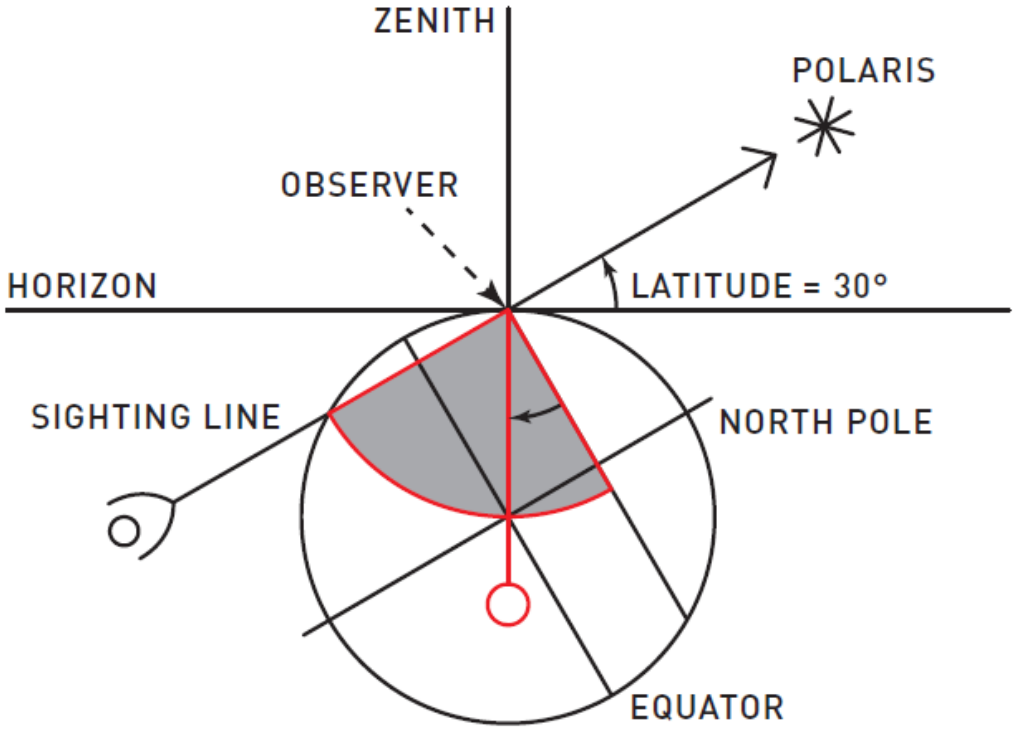
Finding Sine and Cosine

- **Method 1**: Using the **angle scale** and following a vertical or horizontal line respectively to the sexagesimal scale; compare the red, **dashed** line.
- **Method 2**: Using the **sine and cosine arcs**, and rotating the string from the intersection to the sexagesimal scale; compare the red, **solid** arcs.
- Top scale:
  - cos(36°) ≈ 48/60 = 0.8
- Left-hand scale:
  - sin(36°) ≈ 35/60 = 0.58



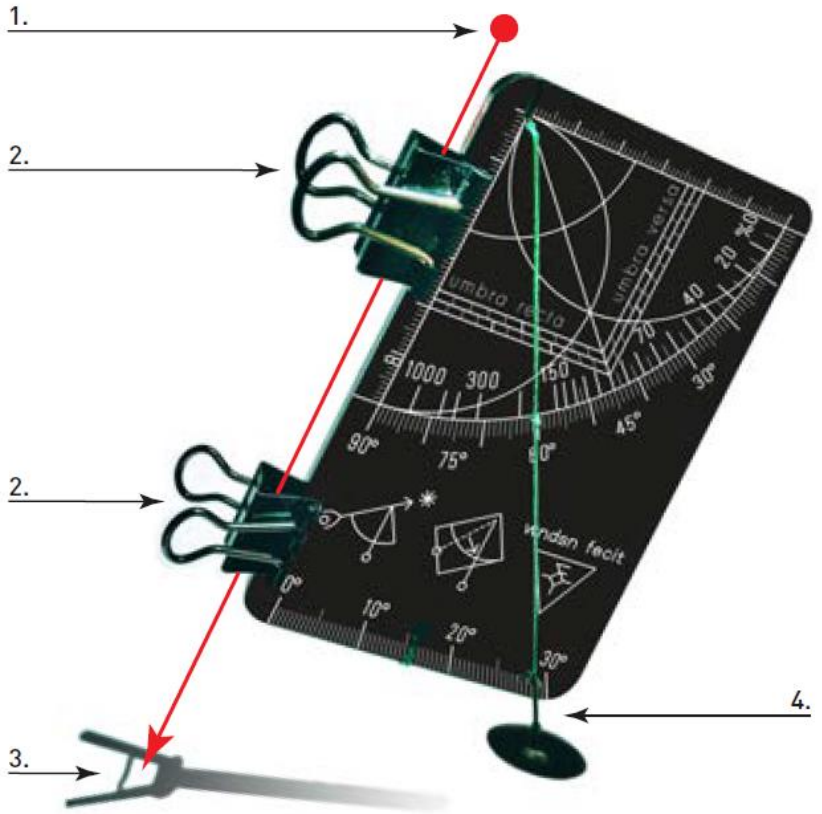
Local Latitude

- The latitude is the **angle between the plumb line** (which extends into the zenith) **and the perpendicular** to the sighting line; zero on the quadrant.
- **Polaris**, the sighted star, is measured at 30° from the horizon.



Sun (Back-)Sighting

1. **Roughly align** the instrument so that the sun is in the direction alongside the sighting edge.
2. Rotate and tilt the instrument in order for the **sunlight to fall through the holes** of both binder clips.
3. **Align the shadows** of the two clips so that the shapes are perfectly on top of each other.
4. **Read the altitude** of the sun where the string crosses the degree scale.



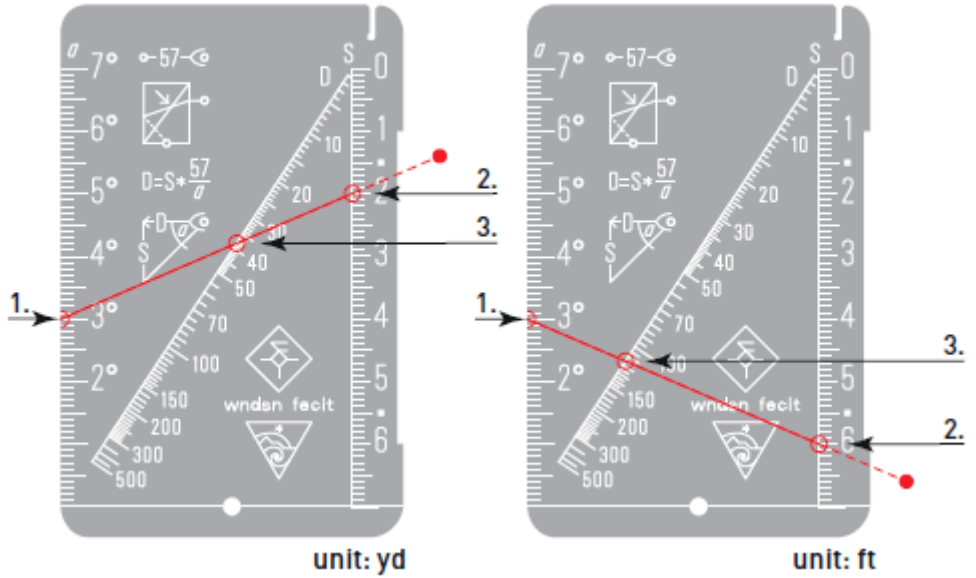
Input and output

UNITLESSNESS, SCALE JUMPS

Unitlessness

- Wndsn Telemeters are unitless, which means that **you can input your data in the unit you prefer**, and get the output in the same unit.

1. Input as angular size
2. Absolute size in unit of choice
3. Result in that same unit



Powers of 10 and Scale Jumps

- If the input is **off the scale**: shift power of 10.
- If the input is **too low or high** on a scale: shift power of 10.
- If powers of 10 are impractical: divide or multiply by an **arbitrary factor** to jump scales.
- If powers of 10 are impractical: divide or multiply by an **equal factor** on both sides.

Improving accuracy

OF READING

- Always make an **estimation and an approximation**, at least of the order of magnitude expected.
- Instead of attempting to read the exact value, which may be obscured by the string, **establish the range of values the measurement is between**. By “bracketing” the measurement in such a way, we can achieve higher accuracy by exactly determining **what our value is *not***.

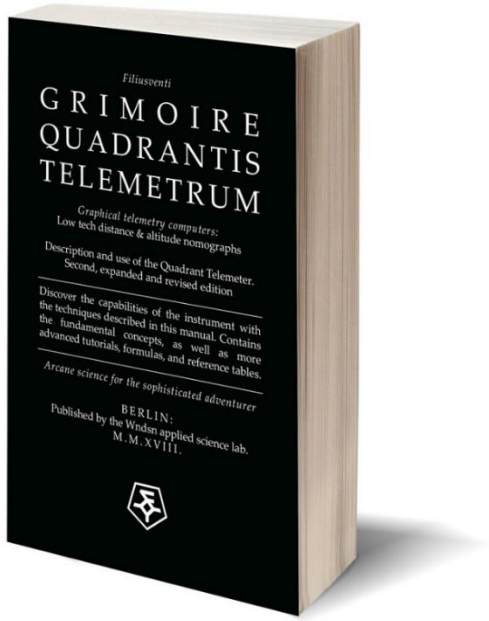
OF MEASUREMENT

- Make sure that the length of the string translates to the **exact distance** of 57.3 cm (22.56 inches) from eye to scale.
- Find **as large an object as possible** to measure.
- Ensure **good contrast and visibility** of the features of the object to be measured.
- Get a **stable rest** for the holding hand.

What to get

QUADRANT TELEMETER

THE MANUAL



What now?

- Buy the Quadrant Telemeter
- Buy the printed manual
- Visit the Telemeter supersite
- Follow Wndsn on Instagram
- Follow Wndsn on Facebook
- Subscribe to email updates
- Contact Wndsn

About Wndsn

- Wndsn's Applied Science Lab, based in Berlin, develops and manufactures that which can't be improvised; **measurement, navigation, and surveying instruments informed by the motto *"Ex Mensura, Scientia"*** - knowledge from measurement.
- Wndsn produces archival quality products that are designed with intent by combining techniques proven over centuries; **arcane science meets cutting edge contemporary methods,** resulting in iconic, timeless, high-utility designs.
- In addition to **custom-built instruments and tools, metrology & illumination solutions**, Wndsn creates expedition mementos and morale patches to celebrate cross-disciplinary exploration in the spirit of the Renaissance. Wndsn morale patches are acutely designed - **no line is left to randomness, no element is mere filler**. They serve as infographics, how-tos for the Wndsn tools, magic sigils, as well as functional markers.