

DIRECTIONS FOR READING INCLINATION AND DIRECTION OF DRILL HOLES FROM GLASS TUBES
USED IN TESTS WITH THE MAAS DRILL HOLE COMPASS.

Clamp the horizontal circle at 0° so that the vertical circle is parallel to the cross-piece above the instrument. Insert the glass tube so that it is right side up, as it was in the drill hole. If the tube is wrong side up the etching cannot be read as accurately and the apparent direction will be wrong. Place the goniometer so that the cross-thread is exactly on a level with the eye and wedge a yard stick or any stick one or two inches wide across a window on the same level as the cross-thread. Stand directly behind the vertical circle and look toward the yard stick in the window so that the line of sight is ~~parallel~~ perpendicular to the vertical circle and the thread is between the eye and the glass tube and exactly on line between the eye and the stick.

1. TO DETERMINE INCLINATION.

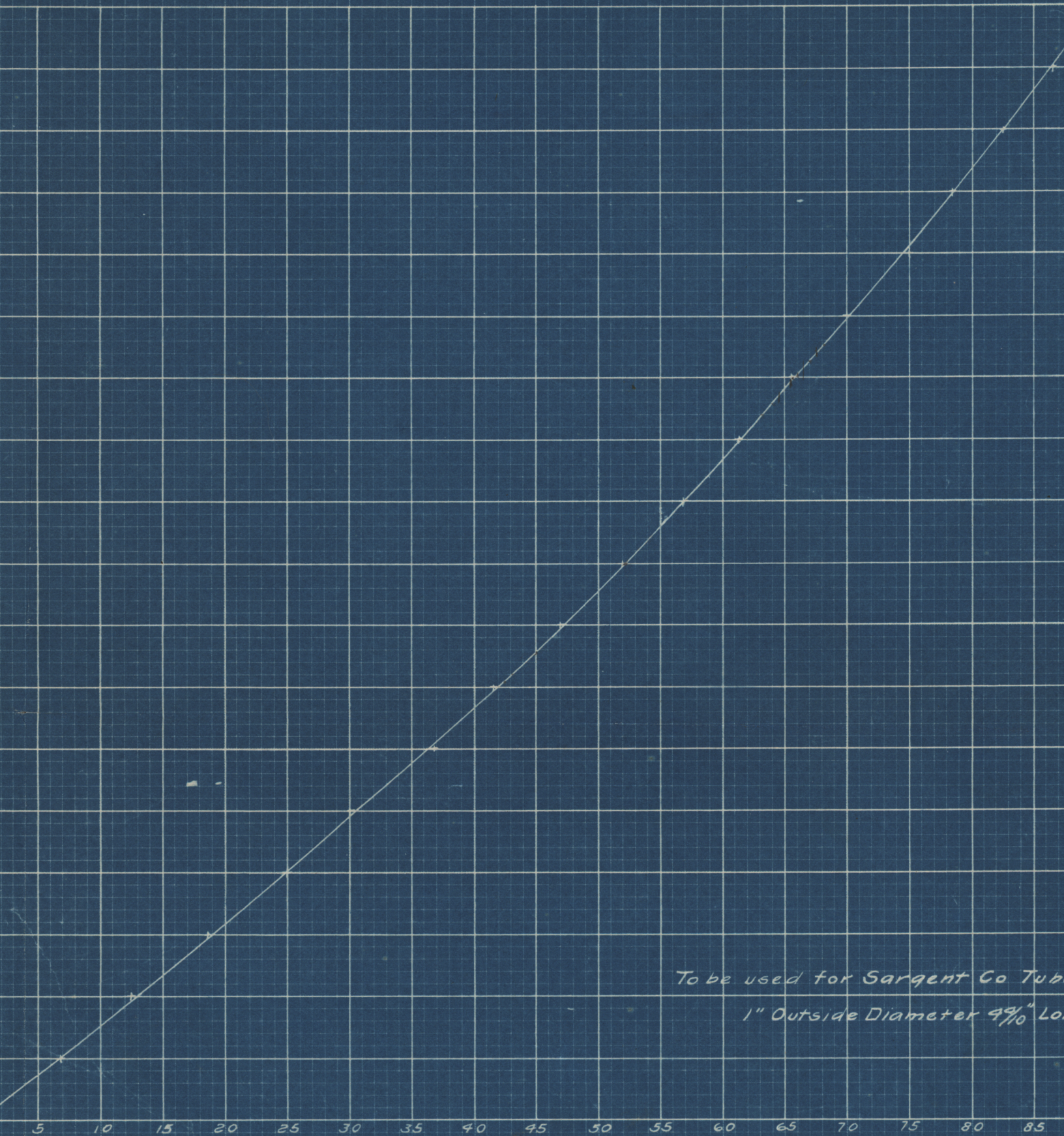
Twist the glass tube until the etching shows the dip to be to the right of the observer, that is, in the plane of the vertical circle. This can be done accurately by turning the tube until the etching appears to be only one line when the eye is on the same level, and then turning the vertical circle until the etching is parallel to the cross-thread. When adjusted correctly the lower edge of the etching will show as a clear white line just below the cross-thread. This may be done more accurately by tipping the whole instrument sideways (so that the upper end of the tube moves up and sideways towards the lower end) until the refracted image of the yard stick seen through the tube is parallel to and exactly behind the etching and cross-thread. By tipping in this way the etching appears as a straighter, clearer line. The apparent inclination of the drill hole can now be read on the graduated circle. Repeat this observation, twisting the tube so as to dip in the opposite direction, and average the two readings. This will give the inclination uncorrected for capillarity. The actual angle of dip of the drill hole is the ordinate of the curve of correction at the point where the abscissa is the observed angle. In other words, to determine the correct angle of inclination read along the bottom of the curve to the right to the observed angle, thence up to the curve, and then horizontally across to the left hand scale, which gives the actual angle.

2. TO DETERMINE DIRECTION OF DRILL HOLE.

Clamp the vertical circle at 90° so that the tube is vertical, with the goniometer, yard stick, etc, arranged as before. If the dip is steep, twist the tube until the low point of the etching is directly away from the eye. Tip the vertical circle backward until the plane of the etching is horizontal, that is, until the etching appears as one line, and then twist the tube until the etching is exactly parallel to the cross-thread. Place the goniometer on a table with the vertical circle still tipped back at the same angle and place a right angle triangle with one side against the horizontal cross-piece above the instrument and the other side extending out horizontally at right angles to the cross-piece. Turn the instrument on the horizontal circle until the North-South marks on the tube are in line with the edge of the triangle, using the small hand wheels on each side of the goniometer if necessary to bring the tube directly beneath the edge of the triangle. If the instrument cannot be turned far enough on the horizontal circle to set the North-South marks in line with the triangle, they may be set in line with the cross-piece itself or with one edge of a ruler 2" or 3" wide laid against the cross-piece. The bearing of the drill hole from North or South may then be read directly on the horizontal circle by the pointer in front of the vertical circle if the North-South marks were set in line with the triangle, or by the pointer at the side of the vertical circle if the marks were set in line with the ruler or with the cross-piece. To determine whether the bearing is Northeast, Northwest, Southeast, or Southwest take the tube out of the goniometer and observe roughly which way it shows the drill hole to dip. Turn the instrument 180° on the horizontal circle and repeat this operation, turning the whole instrument end for end when sighting at the etching, thus keeping the thread between the eye and the tube. Average the two readings to determine the true direction of the hole, thus minimizing instrumental and personal errors.

If the dip is low, clamp the horizontal circle at 0° , but instead of setting the vertical circle at 90° set it at the observed angle of inclination of the drill hole before correcting for capillarity. Place the goniometer on a level with the eye and sight towards the yard stick as before, twisting the tube until the etching appears as one line when the eye is exactly on the same level. Place the goniometer on a table and turn on the horizontal circle until the North-South marks are in line with the edge of the triangle held against the cross-piece as before. The pointer at the side of the vertical circle will then give the bearing from North or South. Repeat with the tube dipping in the opposite direction and average the readings.

*Table of Correction
for
Error due to Capillarity in Testing Drill Holes*



*To be used for Sargent Co Tub
1" Outside Diameter $\frac{9}{10}$ " Lo*

Angle Etched on Tube

