

TAKING THE SIGHT

The sextant measurement of distance can usually be done at any time of the night, as it does not require use of a sharp horizon. If the sextant is preset to the true distance, and star one is centered in the horizon glass, the correct star two will be picked up easily in the index mirror by swinging the arc. The index arm is then adjusted to make the two images land on top of each other, and the sextant distance is read. As soon as this is recorded, measure and record also the approximate altitude of each star, to be used in the correction for refraction.

CLEARING THE SIGHT

Refraction makes each star appear higher in the sky than it really is. The apparent distance between any two stars is thus a little less than the true distance. It seems clear that this refraction error depends in a somewhat complicated way on the positions of the two stars in the sky. For example, think of an observer at 45° N latitude observing Polaris (altitude 45° , azimuth 0°) and another star at altitude 45° and azimuth 90° . If the atmosphere were removed, both stars would drop about one minute in altitude. The apparent distance between them would clearly increase, and clearly by less than two minutes, but the actual change of 1.15 minutes has to come from a calculation.

Table 15-2 gives this refraction correction in a convenient form for star and planet distances.

Example: Suppose the sights were as follows:

Altair - Vega	$34^\circ 10.5'$
Altair	32°
Vega	50°

The top part of Table 15-2 is entered with the two altitudes 32° and 50° , and the figure $x = 1.07$ is taken out with dividers. The bottom part of Table 15-2 is entered with x and the sextant reading, resulting in the refraction correction $R = .8'$ (always +).

sextant distance	Ds	$34^\circ 10.5'$
refraction	R'	$+ .8'$
observed distance	Do	$34^\circ 11.3'$

Comparing this with the known distance, $34^\circ 11.5'$, we find at most a $.2'$ sextant error at this setting.

(NOTE: Problems for Chapter 15 appear on page 86.)