6. REFRACTION AND DIP

The refraction correction R_o, in degrees, for a standard temperature of 10° C and pressure of 1010 mb, for altitudes greater than 15° may be represented by

$$R_o = 0^\circ.0162/\tan H$$

where H is the apparent altitude in degrees. For altitudes less than 15°, R_o may be calculated from the expression

$$R_o = (0.5743 + 0.0705H + 0.00007H^2)/(1 + 0.505H + 0.0845H^2)$$

Alternatively R_o may be calculated for any altitude from a single formula (see paper by G. G. Bennett, 1982, *J. Inst. Nav.*, vol. **35**, p. 255)

$$R_o = 0^\circ.0167/\tan(H + 7.31/(H + 4.4))$$

An approximate expression for the correction f for a non-standard temperature T in degrees Celsius (°C) and pressure in millibars (mb) is given by

$$f = 0.28P/(T + 273)$$

The total refraction $R = R_o f$ should be subtracted from the apparent altitude H to give the observed altitude H_O.

If a marine sextant is used a correction D_h in degrees for the dip of the horizon must be subtracted from the sextant altitude. D_h is given by

$$D_h = 0^\circ.0293\sqrt{h}$$

where h is the height of the observer above the horizon in metres.

For a bubble sextant $D_h = 0$.