z whereby the circle actually traced by the instrument differs from the true co-latitude circle, and secondly the watch error.

From the latitude stars combined with z just obtained we shall compute our error in assumed latitude:

1. Reduce the observed times of transit to sidereal times T.
2. The sidereal time of transit T must now be corrected for

(a) level,
(b) watch rate,
(c) diurnal aberration, if the observation is considered to have been taken with sufficient accuracy to warrant it.

Correction for Level. — The correction for level in seconds of time $= E_h$, (4)

Where $E = \frac{1}{15 \cdot \cos \phi_0 \cdot \sin A}$ (5)

and $\varepsilon = \frac{w - e}{2} .d$ for all Time stars (6)

$\varepsilon = \frac{n - s}{2} .d$ for Latitude stars east of south (6′)

$\varepsilon = \frac{s - n}{2} .d$ for Latitude stars west of south (6″)

if the level divisions are numbered in both directions from the middle.

If the level divisions are numbered continuously from one end of the level to the other, with the zero at the eye end, the level readings must all be referred to some one reading c_0, the centre of the bubble, and the formula then becomes

$\varepsilon = \left(c_0 - \frac{w + e}{2}\right) .d$ for E Time stars (7)

$\varepsilon = \left(\frac{w + e}{2} - c_0\right) .d$ for W Time stars (7′)

$\varepsilon = \left(c_0 - \frac{n + s}{2}\right) .d$ for Latitude stars east of south (7″)

$\varepsilon = \left(\frac{n + s}{2} - c_0\right) .d$ for Latitude stars west of south (7‴)

Three-figure logarithms are sufficient.

Correction for Watch Rate.—If the watch rate is not zero the chronometer correction changes during the progress of the observation. To reduce each observed time of transit across the horizontal wire to what it would have been if the rate had been zero (and the correction equal to the correction which actually existed at the mean epoch of the set) apply the correction

$R = (T - T_0) r_h$ (8)

in which T_0 is the mean of the observed times T and r_h is the