An approximate value for the longitude will be known; assume two values for the longitude, one a few (1 to 5) minutes greater than the approximate value, and one a few minutes less. Work out the R.A. of moon's bright limb for these two values, and find by proportional parts what alteration must be applied to the smaller longitude in order that the right ascension by formula may agree with the right ascension by observation.

The smaller longitude so corrected is the longitude required. *Great care must be taken to apply the signs strictly according to the rules of algebra.*

As regards the accuracy of a longitude by moon culminations, an error of a second of time produces about 30 seconds' error in the longitude. We may assume in the ordinary case an error of $\frac{1}{3}$ second and a resulting error of 10 seconds of longitude. As a rule, only about eight observations can be taken in a month, so that after a month's work the mean of the results would be about 3 or 4 seconds in error, or say nearly 1 minute of arc.

(8) **Longitude by Altitudes of the Moon.**—A fair method, but one not often used. For the details see 'Manual of Surveying for India.' An error of a second of time in an altitude will produce at least 30 seconds of time in longitude, sometimes considerably more. An error of 1 second in zenith distance produces at least 2 seconds of time in longitude. With a small theodolite we may expect an error in time of $\frac{1}{3}$ second and in arc (after four altitudes on two faces) of 5 seconds, so that the resulting error will be about $\sqrt{10^2 + 10^2}$, say 14 seconds of time.

(9) **Lunar Distances.**—A rough method; the observations cannot be taken with a theodolite.

(10) **Eclipses of Jupiter's Satellites.**—A very rough method.

These last two methods should never be used by the topographical surveyor or explorer.

NOTE.—It is of great importance that the explorer and surveyor should have clear ideas on the subject of the relative accuracy of the different methods available for determining longitude.

It should be understood that where longitude can be carried along by a triangulation, this should always be done. Excellent results also can be got by telegraphic signals; the longitude of Mandalay was thus determined by Colonel Hobday, with an error of only 1·2 seconds of arc. (Such accuracy cannot, however, be always expected.)

Table showing the Terminal Error in Longitude which might be expected after a March of 300 miles in a Hilly Tropical Country.

	Method.	Probable error in longitude.
Relative Methods	1. Triangulation	100 yards to $\frac{1}{4}$ mile
	2. Telegraph	$\frac{1}{8}$ to $\frac{1}{4}$ mile
	3. Latitudes and azimuths (N. and S.) ...	$\frac{1}{2}$ mile
	4. Chronometers (5)	1 mile
Absolute Methods	5. Occultation	$\frac{1}{4}$ mile
	6. Moon photographs (1 plate)	1 mile
	7. Moon culminations (8 nights)	1 mile
	8. Moon altitudes (1 night)	4 miles
	9. Lunar distance	10 miles
	10. Eclipses of Jupiter's Satellites	over 10 miles