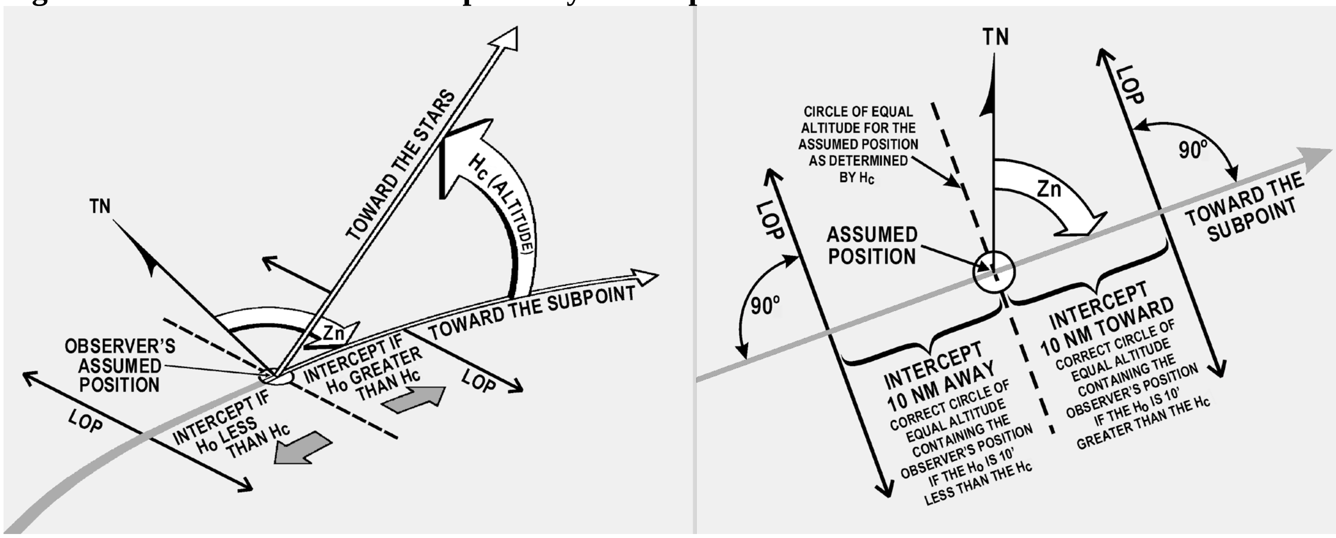
Figure 11.2. Line of Position Computed by Intercept Method.



11.3.2. The calculations may be performed quickly, using a programmable calculator, or they may be extracted from the appropriate volume of Pub. No. 249. This method enables the observer to use any of the navigational bodies available at the appropriate fix time. Here is a brief review:

11.3.2.1. Compute a DR for the time of the position, using preflight or in-flight data.

11.3.2.2. Determine the necessary entering values for the Pub. 249 volume being used (Lat, LHA, Dec contrary or same) and extract all the necessary values of computed altitude (Hc), azimuth angle (Z), etc.

11.3.2.3. After making all the necessary conversions and corrections (Chapter 10), compare the Ho and corrected Hc. This difference is the intercept. If the Ho equals the corrected Hc, then the circle of equal altitude passed through the plotting position. If the Ho is greater than the Hc, the difference is plotted in the direction of the true azimuth (Zn). The Zn represents the azimuth from the observer's position to the subpoint. If the Ho is less than the Hc, plot the difference 180^{o} from the Zn.

NOTE: If HO is MOre, plot TOward the subpoint (HO MO TO)

11.3.2.4. Example: The assumed position is 38^{o} N, 121^{o}30' W for a shot taken at 1015Z on Aldebaran. The Ho is 32^{o}14'. The Hc is determined to be 32^{o}29' and the Zn 120^{o}. A comparison of Ho and Hc determines the intercept to be 15 NM away (15A).

11.4. Plotting LOP Using Zn Method (Figure 11.3):

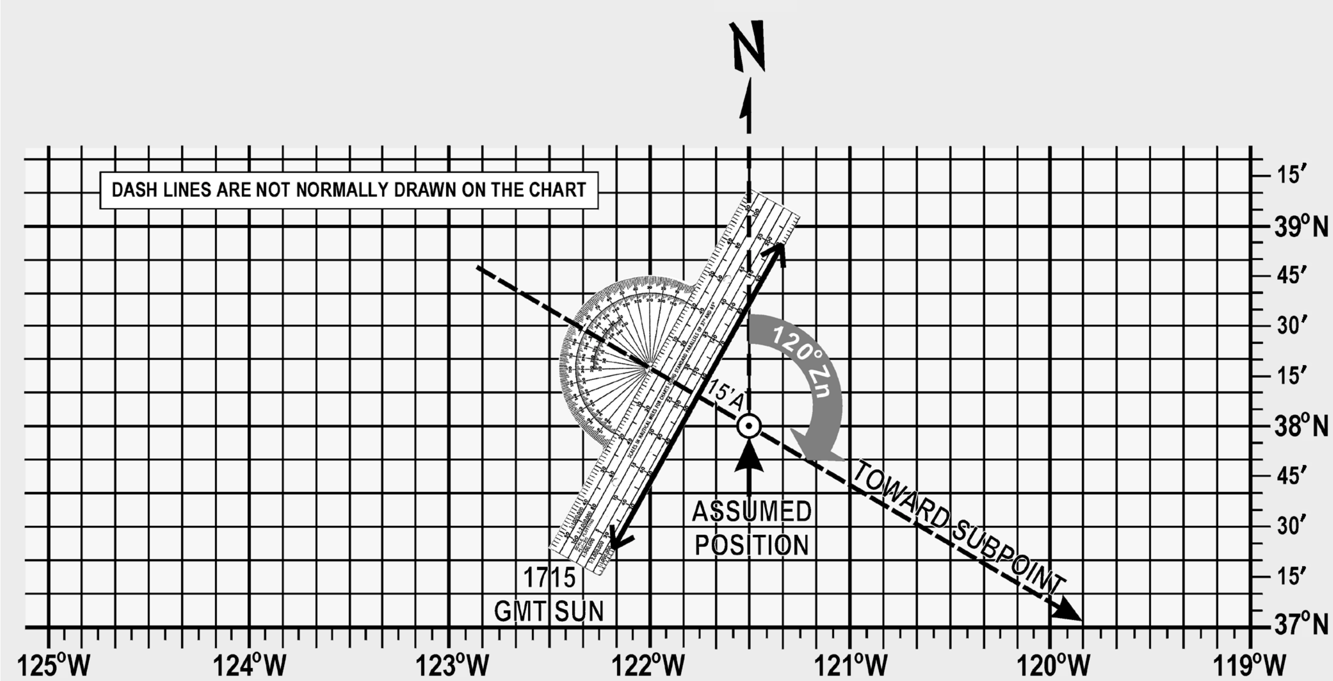
11.4.1. Plot the assumed position and set the intercept distance on the dividers.

11.4.2. Draw a dashed line through the assumed position toward the subpoint.

11.4.3. Span intercept distance along dashed Zn line.

11.4.4. Place plotter perpendicular to Zn.

Figure 11.3. Celestial Line of Position Using True Azimuth Method.



11.4.5. Draw LOP along plotter as shown.

11.5. Plotting LOP Using Flip-Flop Method (Figure 11.4):

11.5.1. Plot the assumed position and set the intercept distance on the dividers.

11.5.2. Measure 120° of the Zn with point A of the dividers on the assumed position and place point B of the dividers down, in this case, away from 120° or in the direction of 300° from the assumed position. Slide the plotter along the dividers until the center grommet and the 100/200-mile mark are lined up directly over point B of the dividers marking the intercept point.

11.5.3. Remove point A of the dividers from the assumed position, keeping point B in place. Flip point A (that was on the assumed position) across the plotter, at the same time expanding the dividers so that point A can be placed on the chart at the 90°/270° mark of the plotter.

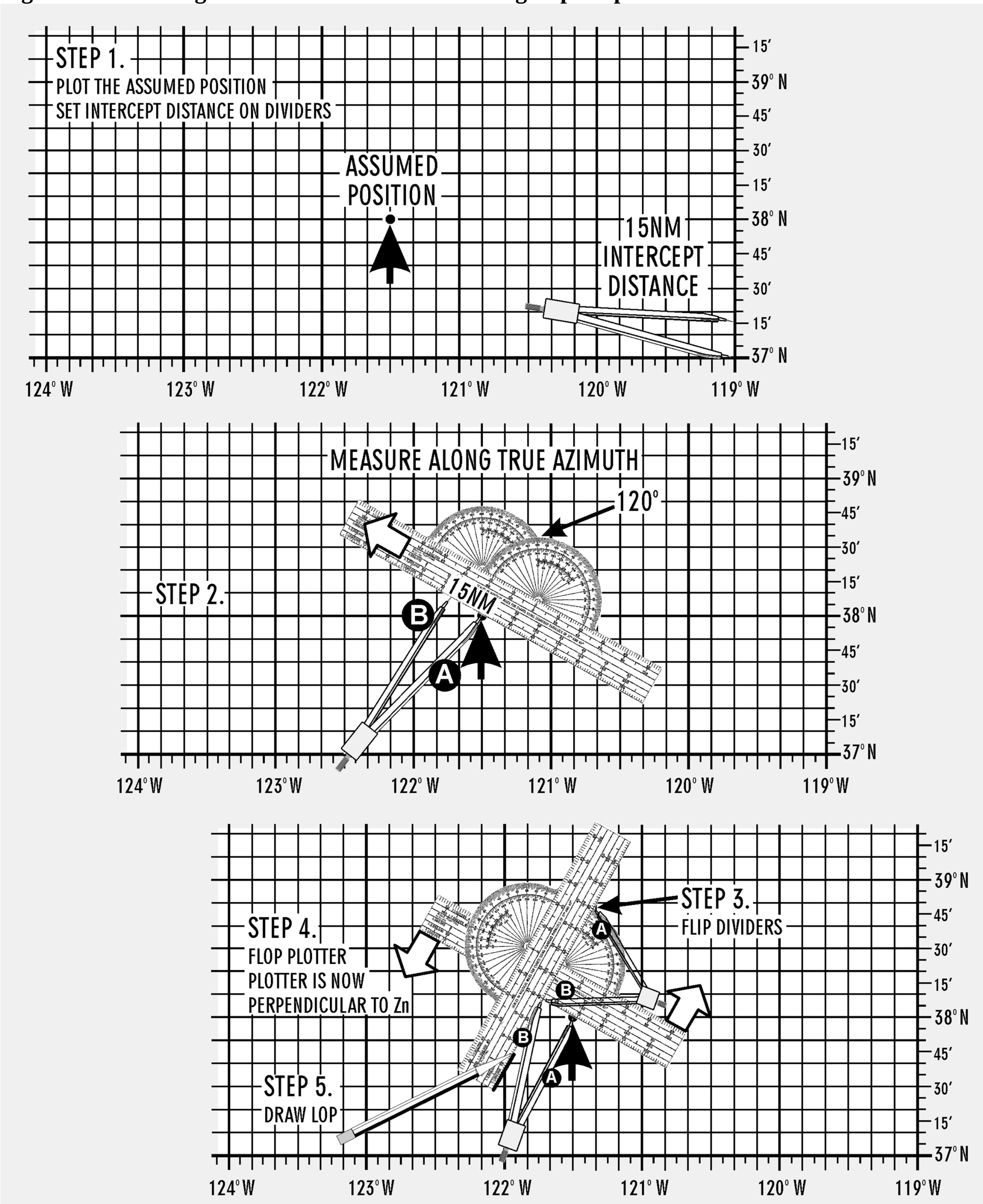
11.5.4. Flop the plotter around and place the straight edge against the perpendicular, which is established by the dividers.

11.5.5. Draw LOP along the plotter as shown.

11.6. Summary of Intercept Method. When using the intercept method, remember:

11.6.1. For some assumed position near the DR position, find the Hc and Zn of this body for the time of the observation. This is done with the aid of celestial tables, such as Pub. No. 249, or a programmable calculator.

Figure 11.4. Plotting Celestial Line of Position Using Flip-Flop Method.



11.6.2. Obtain needed corrections, sextant correction, refraction, etc., and apply these to the Hc by reversing the sign (remember, we are striving to derive a precomputed value to ensure the correct body is shot). Measure the altitude (Ho) of the celestial body with the sextant and record the midtime of the observation.

11.6.3. Find the intercept, which is the difference between Ho and Hc. Intercept is toward the subpoint if Ho is greater than Hc and away from the subpoint if Ho is smaller than Hc.

11.6.4. From the assumed position, measure the intercept toward or away from the subpoint (in the direction of Zn or its reciprocal) and locate a point on the LOP. Through this point, draw the LOP perpendicular to the Zn.

11.7. Additional Plotting Techniques. The preceding techniques involve the basic plotting procedures used on most stars and the bodies of the solar system. However, there are certain techniques of plotting that are peculiar to their own celestial methods; for example, the plotting of LOPs obtained by using Polaris, which is discussed later. Also, certain precomputation techniques lend themselves more readily to other plotting techniques, such as preplotting the true azimuths or plotting the fix on the DR computer.

11.7.1. These last plotting techniques are discussed in Pub. No. 249 in the section on precomputation.

11.7.2. Other special techniques are discussed in the section on curves, in which the celestial observation is plotted on a graph rather than on the chart.

Section 11B—Interpretation of an LOP

11.8. Basics. Navigation has two aspects—the mechanical and the interpretive. The mechanical aspect includes operation and reading of instruments, simple arithmetical calculations, plotting, and log keeping. The interpretive aspect is the analysis of the data that have been gathered mechanically. These data are variable and subject to error. You must convert them into probabilities as to the position, track, and GS of the aircraft and the direction and speed of the wind. The more these data are subject to error, the more careful the interpretations must be and the less mechanical the work can be. LOPs and fixes especially require careful interpretation. It is convenient to think of a fix as the true position of the aircraft and of the LOP as a line passing through this position, but these definitions are optimistic. It is almost impossible to make a perfect observation and plot a perfect LOP. Therefore, an LOP passes some place near this position, but not necessarily through it and a fix determined by the intersection of LOPs is simply the best estimate of this position on the basis of one set of observations. Thus, in reality, a fix is a most probable position (MPP) and a LOP is a line of MPP.

11.8.1. The best interpretation of LOPs and fixes means they are used, to the best advantage, with DR. But good interpretation cannot compensate for poor LOPs, nor can good LOPs compensate for careless DR. To get good results, every precaution must be taken to ensure the accuracy of LOPs and exact DR calculations.

11.8.2. Intelligent interpretation requires fine judgment, which can only be acquired from experience. You can be guided, however, by certain well-established, though flexible, rules.