2.7 Match Launch Time with Time Launch Site Crosses Orbital Plane (Continued)

$$- \left(\frac{\theta_t}{360°}\right) \dot{\Omega}_t - \left(\frac{\theta_f}{360°}\right) \dot{\Omega}_f$$

$$\pm \sin^{-1} \left(\frac{\tan L_L}{\tan i}\right) + \delta\, 180° \;] \;\}$$

An estimate of the number of revolutions required for the desired launch site may be obtained by dropping all of the perturbing terms, and assuming circular orbits with transfer by Hohmann ellipse. In this case,

$$n = \frac{t_{2f} + t^* - t_{ascent}}{\tau_w} - \frac{1}{2} \sqrt{\frac{a^3_t}{a^3_w}}$$

$$- \frac{(\Omega - \Lambda_L) \pm \sin^{-1}\left(\frac{\tan L_L}{\tan i}\right) + \delta\, 180°}{\Omega_e \;\tau_w}$$

2.8 Iterate on Altitude of Waiting Orbit

The procedure is repeated with new orbital parameters obtained from the new $a_w = r_{pt}$ and the associated t_{ascent}. Eventually, the parameters which meet the timing and geographic requirements will be found.

2.9 Solve for Maneuver Positions and Launch Azimuth

These positions are references to geocentric equatorial coordinates as used in Figure 2-7.

Latitudes and longitudes are obtained simply by spherical trigonometry.

(a) Injection into Final Orbit

As given by the Handbook, "the angle from the ascending node to the radius at which transfer into the final orbit occurs (projected along the equator of a non-rotating earth) is