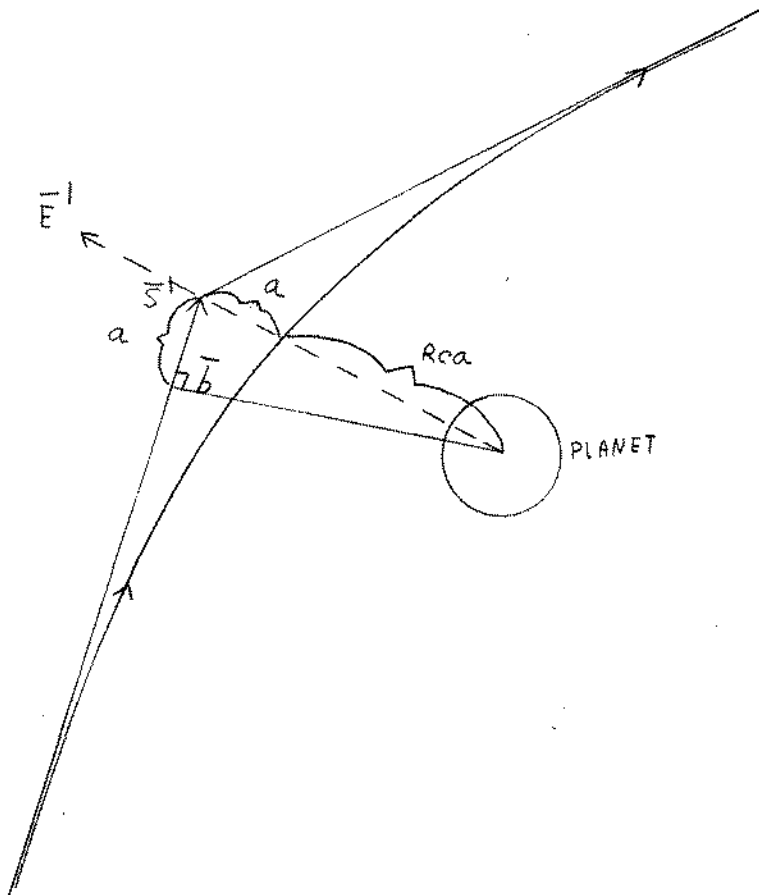April 16, 1962

Mr. Michael Minovich
580 Gayley Avenue
Zone 24
Los Angeles, California

Dear Mike:

As you may recall in our last conversation, we promised to send you the necessary formulas for converting your output vectors near the planet to the parameters $\overline{b} \cdot \overline{T}^1$ and $\overline{b} \cdot \overline{R}^1$. These two quantities are absolutely necessary in checking the accuracy of your conic program, and are defined below.

$$\overline{b} = (a + R_{ca}) \overline{E}^1 - a \overline{S}^1$$

where,

$$a = \frac{\mu}{V_\infty^2}$$

μ = gravitational constant of target

V_∞ = hyperbolic excess speed

R_{ca} = distance of closest approach from center of planet

a = major-semi axis of hyperbola

$\overline{b}$ = impact parameter, directed from center of planet perpendicular to incoming asymptote $(\overline{S}^1)$

$\overline{S}^1$ = a unit vector having the direction of the <u>incoming</u> asymptote or hyperbolic excess velocity

$\overline{E}^1$ = a unit vector directed from center of planet toward closest approach

$\overline{p}^1$ = unit vector normal to ecliptic or Earth's equatorial plane (up), whichever is the most convenient

$$\overline{T}^1 = \frac{\overline{S}^1 \times \overline{p}^1}{\left| \overline{S}^1 \times \overline{p}^1 \right|}$$

$$\overline{R}^1 = \overline{S}^1 \times \overline{T}^1$$

The quantities needed are $\overline{b} \cdot \overline{T}^1$ and $\overline{b} \cdot \overline{R}^1$, the projection of the impact parameter $(\overline{b})$ onto the unit vectors $\overline{T}^1$ and $\overline{R}^1$ respectively.

Your friend,

JET PROPULSION LABORATORY

Gene Bollman

Gene Bollman

P.S.   If there are any questions, don't hesitate to call me at SY 0-6811, Ext. 1316.