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BY FACSIMILE AND MAIL

David J. Cowan
3780 Wilshire Boulevard
Suite 910
Los Angeles CA 90010

Re: *Minovitch v. Battin* (LASC Case No. BC 224528)

Dear Mr. Cowan:

Attached is a copy of three pages of notes taken by then-student Walter Hollister during a March 21, 1960 class taught by Dr. Battin at MIT. The third page of the notes contains the following statement made by Dr. Battin during the lecture:

> Possible to go to both Venus & Mars in 18 years in 1965 or so with about 16,000 ft/sec & return to earth.

I assume you and your client will understand the significance of Professor Hollister authenticating these notes as a contemporaneous record of Dr. Battin's statements to his Astronautical Guidance class in March 1960.

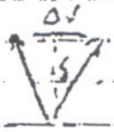
I would like to suggest that your consultant also examine and test these notes while he is at the Draper Laboratory to examine the other materials. I understand Professor Hollister is willing to make them available for that purpose on reasonable notice. I have not talked to him, but I understand he can be reached at his office at (617) 253-2264.

Sincerely yours,

GARY E. SHOFFNER

G:\2211\00510

$\Delta V = 2V_\infty \sin\delta$ — rotation of the relative velocity vector; note that the initial velocity is changed in magnitude.

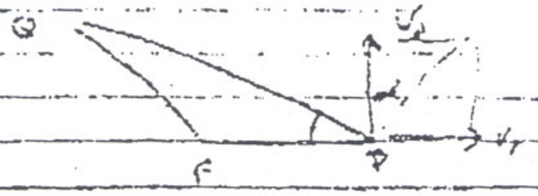


4 March 1960

Problems.

#1 Let V_r & V_θ be the polar coordinate components of velocity of the vehicle at point P.
Show that for the minimum energy path:

$$\frac{V_r}{V_\theta} = \tan\left(\tfrac{1}{2}\angle FPQ\right)$$



$\alpha = \frac{1}{2}\angle QPF$

#2 P 37 Eq. 2.2-8 factor of r_2 in denominator
$r_2(1+\cos\theta)$

#3 Trajectory calculation in R-219 is wrong
don't use slide rule.

Round trip trajectory calculation

Hohmann T = there is one a if you go on a direct ellipse
two values if you take a loop to get there.
← two-way trip

Round trip

1. Assume a value for T_L, V_{RO} ← initial cond.

2. Guess at value of T_F or fixes the Δ_{φ} to hold

3. Calculate a from T_F

4. Calculate e from a

5. Determine $\bar{V}_{SP}$, V_{EP}, $V_{REO} = V_{SP} - V_{EP}$

6. Compare computed V_{RO} with assumed V_{RO} ≠ not match V_{RE}

7. If different change T_F & repeat

8. Calculate $\bar{V}_{SQ}$ V_{MQ} & $\bar{V}_{RM} = V_{SQ} - V_{MQ}$

↖ relative to Mars V_{ce}

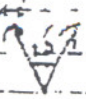
9. Repeat 2-7 with

$T_L + T_F$ as time of launch from Mars

$|V_{RM}|$ are the departure velocity magnitude
varies only rotation the relative velocity with

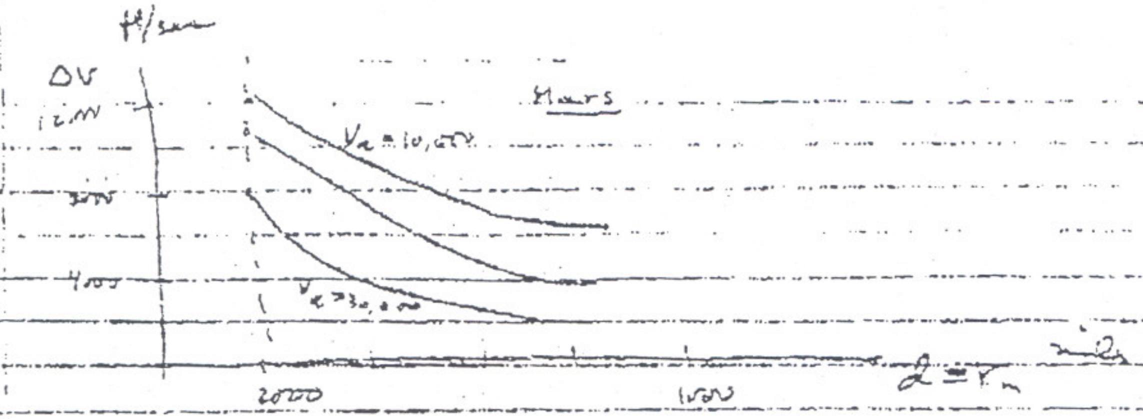
10. Inbound Velocity Vector V_{RM_i}

Outbound Velocity Vector V_{RM_O}

Vspri V_{RM_i} 

$$\delta = \cos\delta = \frac{V_{RM_i} \times V_{RM_O}}{V_{RM}^2}$$

$$d = \frac{\mu_M}{V_{RM}^2}(\csc\delta - 1)$$

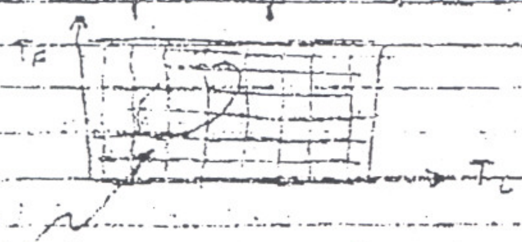


Possible to get both Venus & Mars in 1.8 years in 1955-50 with about 16,000 ft/sec & return to earth

Doing Fishing ... [illegible] ... unable to describe the [illegible] for a calculation

23 March

Examine all possible paths to Mars & Venus as a function of T_E & T_L



Doing this now on 704

Entering & exiting ... velocity ... arrival velocity
Can then pick a time when conditions are most favorable

Still have to worry about where you fire it
Ejection from Venus' orbit might be prohibitive.

6 year periodicity of Earth, Venus & Mars
Like [illegible]

Synodic Period

Time in upset relative position 2.5 years E M
1.7 years E Venus
~6 years for E V M