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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 (517) 253-2264.

Sincerely yours,

GARY E. SHOFFNER

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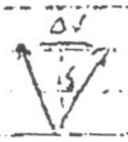
$\Delta V = 2V_\infty$ $S = \delta$ — rotation of the relative velocity vector — note that the initial velocity is changed in magnitude.

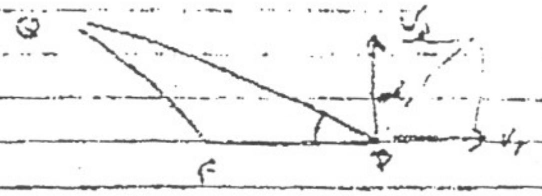


21 March 1960

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

Given 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 → fixes the $\bar{V}_{EP}$ & orbit

3. Calculate a from T_F

4. Calculate e from a

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

6. Compare computed V_{RO} with assumed V_{RO} ← [illegible] 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 $\bar{V}_{RM}$

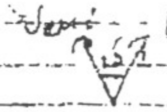
9. Repeat 2-7 until

$T_L + T_F$ as time of launch from Mars

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

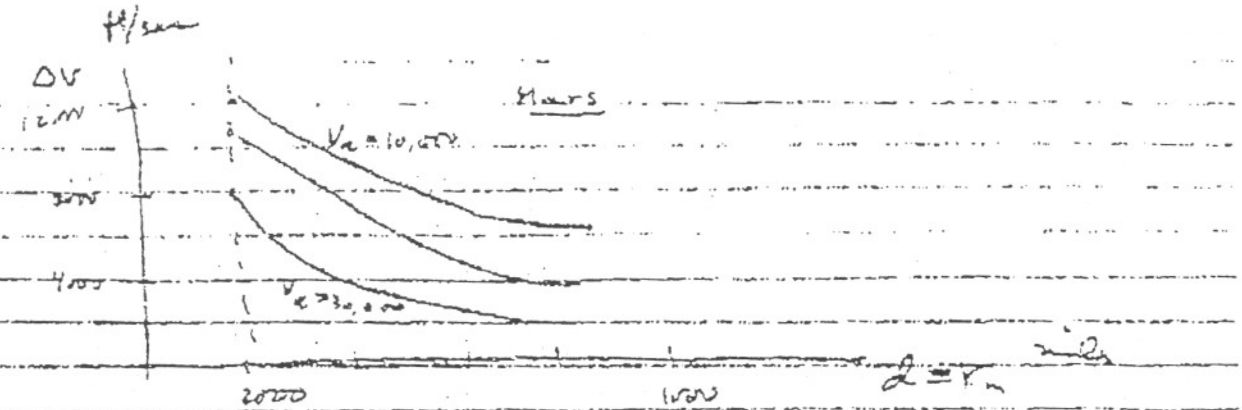
10. Inbound Velocity Vector V_{RM_i}

Outbound Velocity Vector V_{RM_o}



$$\sin \delta = \frac{|V_{RM_o} \times V_{RM_i}|}{V_{RM}^2}$$

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



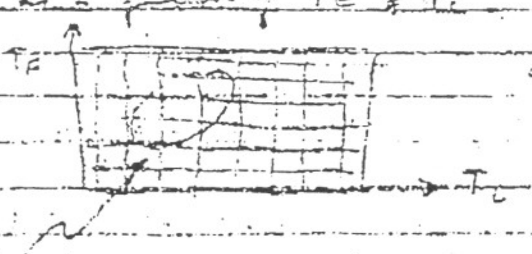
Possible to get both Venus & Mars in 18 years in 1955-50 [illegible]
with about 16,000 ft/sec & return to earth

[illegible] Friday [illegible] — be able to describe the [illegible] for a calculation.

23 March

[illegible] all possible paths to Mars & Venus
as a function of T_E & T_C

Trying this now on 704



Contours of Constant [illegible] Velocity or Arrival Velocity
Can then pick a time when conditions are most favorable.

Still have to worry about where you fire it
(injection from lower altitude might be profitable.

[illegible] year periodicity of Earth, Venus & Mars — like [illegible] frequency

Synodic Period [illegible]

Time to repeat relative position   2.5 years E-M
1.7 years E-Venus
~6 years for EVM.