BELLCOMM, INC.
955 L'ENFANT PLAZA NORTH, S.W. WASHINGTON, D. C. 20024

B70 10015

SUBJECT: The Effect of a Revised Final Phase Table on Entries - Case 310

DATE: October 6, 1970

FROM: S. B. Watson

MEMORANDUM FOR FILE

MSC Program Change 288 changed three constants in the Apollo entry guidance, specifically in the final phase reference table, F1. The purpose of this change was to flatten the G-V profile during the final phase which begins at velocities slightly below circular satellite speed.

VREF FPS	F1, ∂R/∂A NM/FPSS	
	Old Value	New Value
15951	-0.3605	-0.75
18357	-0.4956	-1.00
20829	-0.6483	-1.00

To verify the effect, the Apollo 14 state vector at 400,000 ft altitude was used in simulating entries with and without the change. Ranges of 1250 NM, 1450 NM, 1650 NM, and 1850 NM were chosen. All of the entries came within 2 NM of the target. The effect on the commanded roll angle for the 1250 NM case is shown in Figure 1. The accompanying EMS traces (Figures 2-5) show that the change does indeed smooth the G profile. The following is a summary of the minimum and peak final phase G load experienced with the two tables.

N79-71904

(NASA-CR-114033) THE EFFECT OF A REVISED FINAL PHASE TABLE ON ENTRIES (Bellcomm, Inc.) 8 p

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(CODE)
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FACILITY FORM

Range, NM	Minimum G		Maximum Final Phase G	
	Old Table	New Table	Old Table	New Table
1250	1.3	1.5	4.5	3.2
1450	0.5	0.5	6.4	5.2
1650	0.3	0.3	5.7	5.1
1850	0.2	0.2	4.2	4.1

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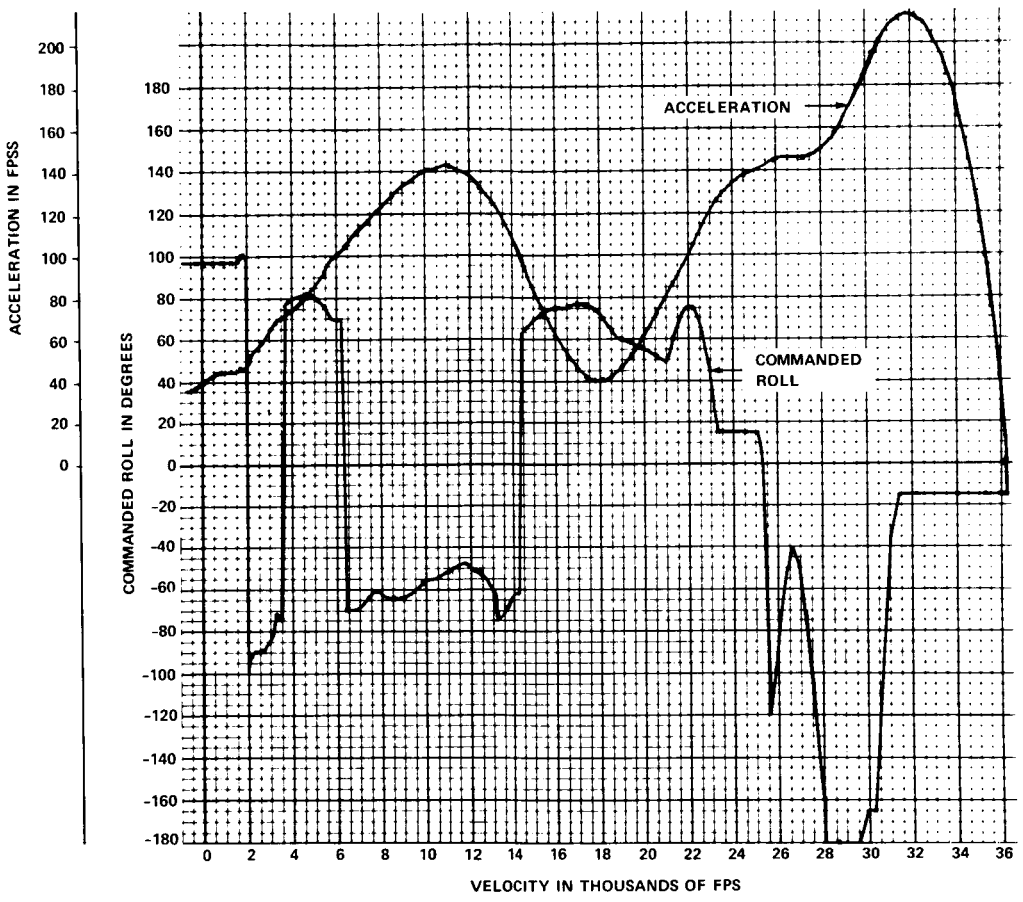
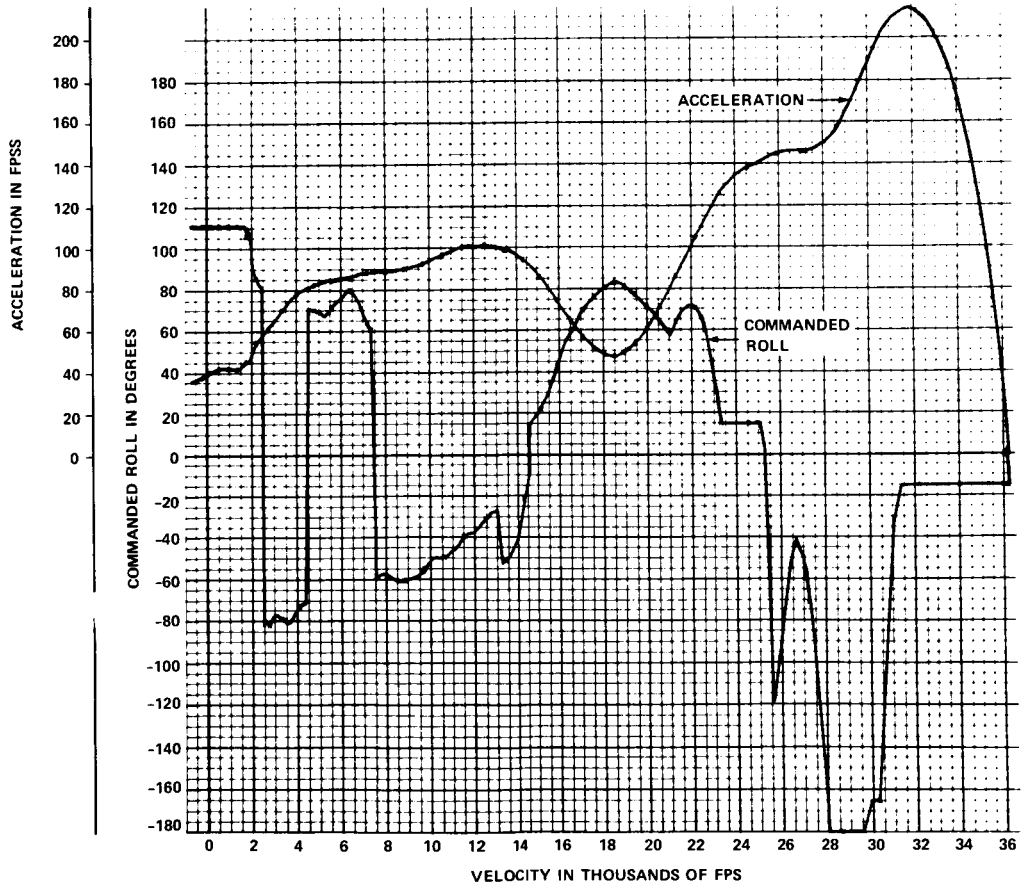
Attachments

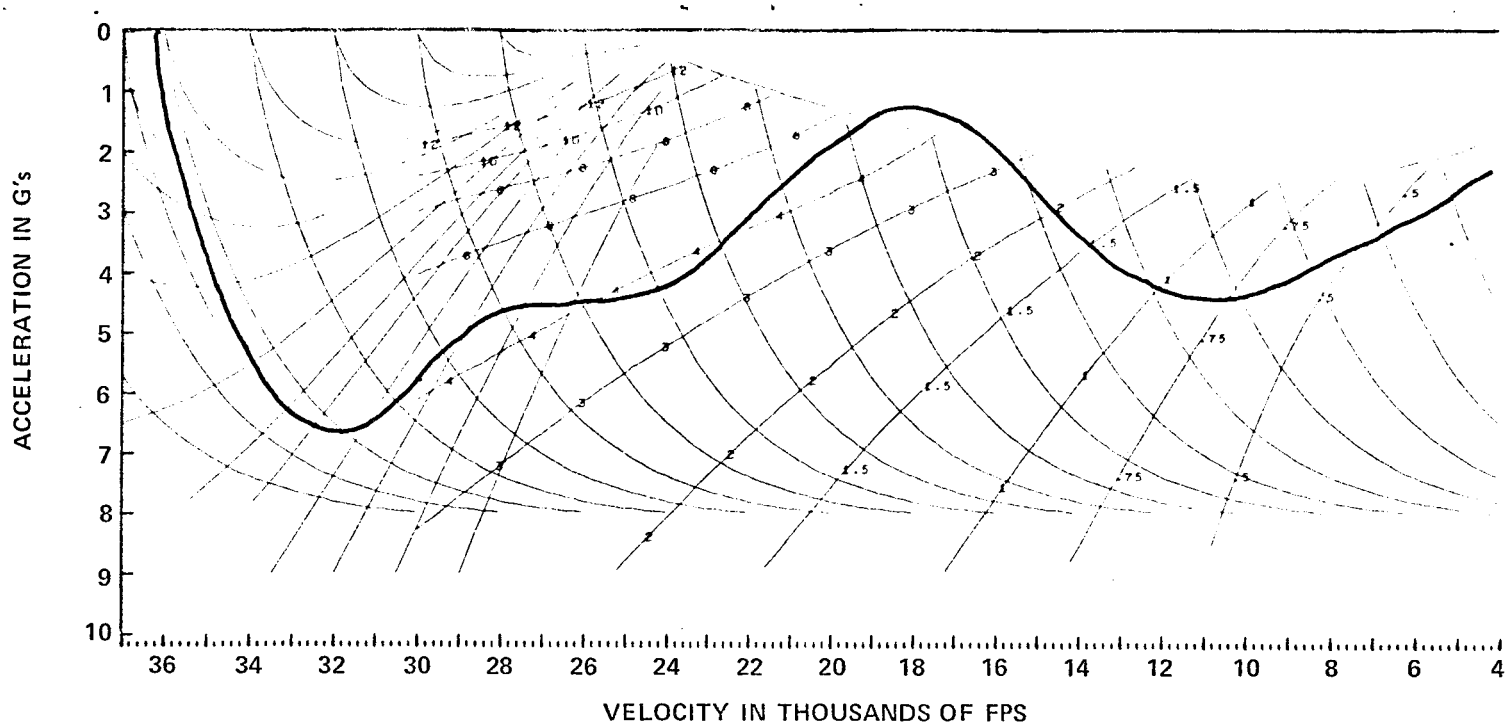


a) OLD F1 TABLE

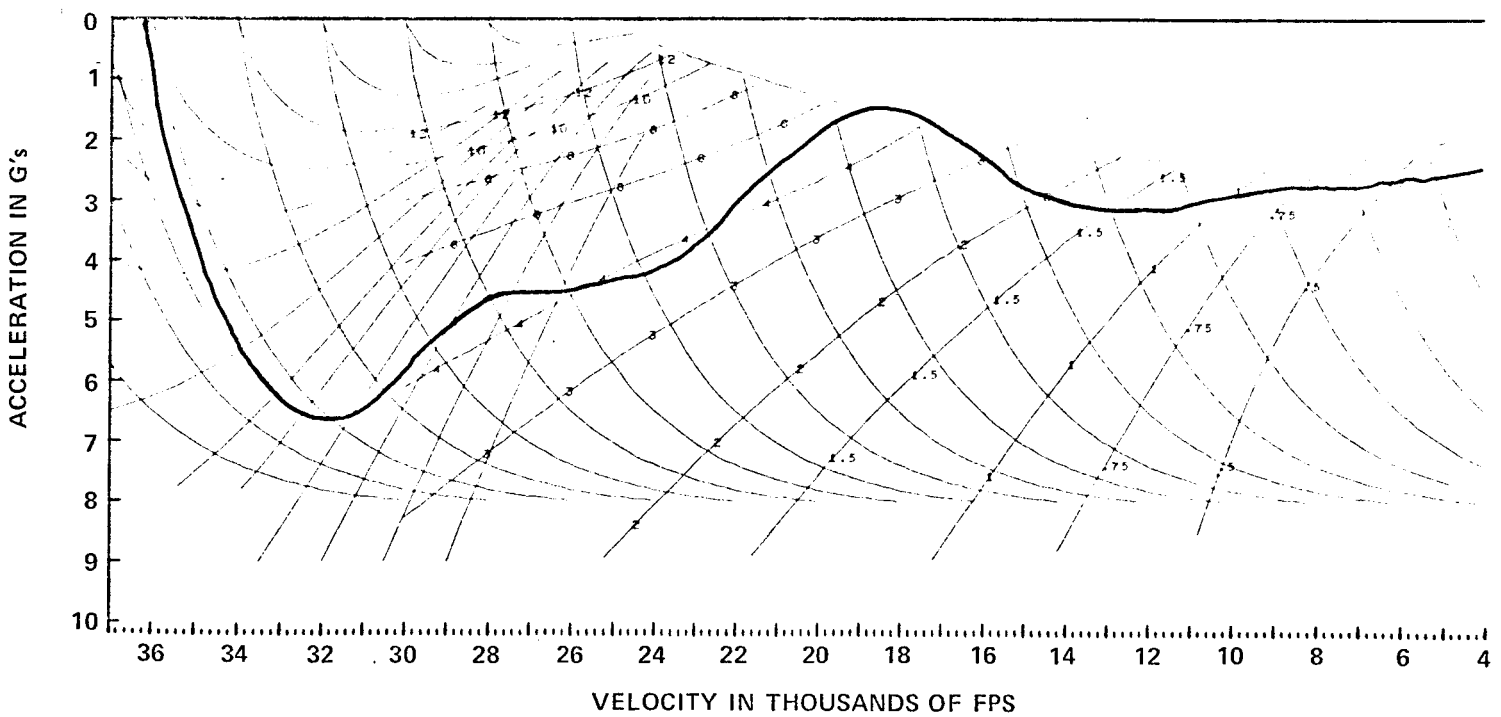


b) NEW F1 TABLE

FIGURE 1 - EFFECT OF OLD AND NEW F1 TABLES ON COMMANDED ROLL AND G LOAD FOR 1250 NM RANGE.

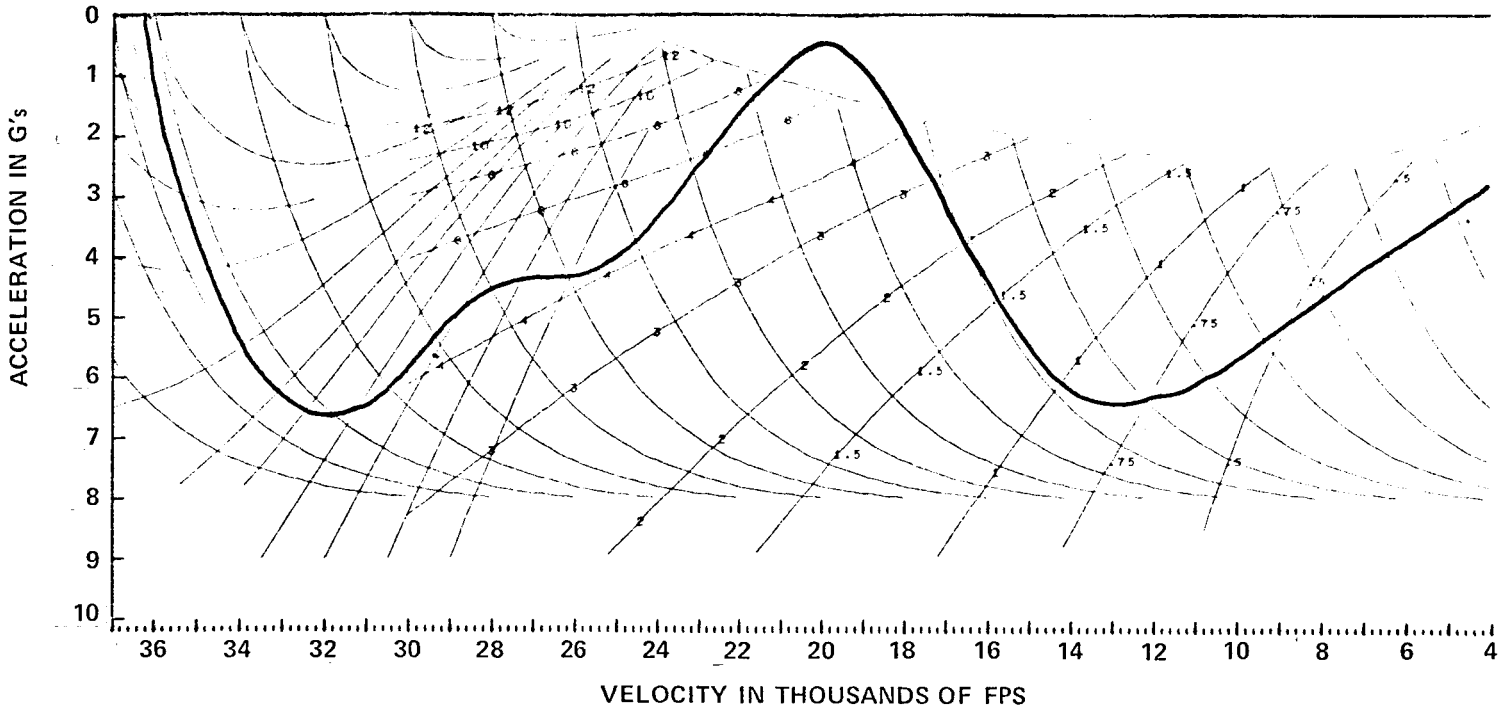


a) OLD F1 TABLE

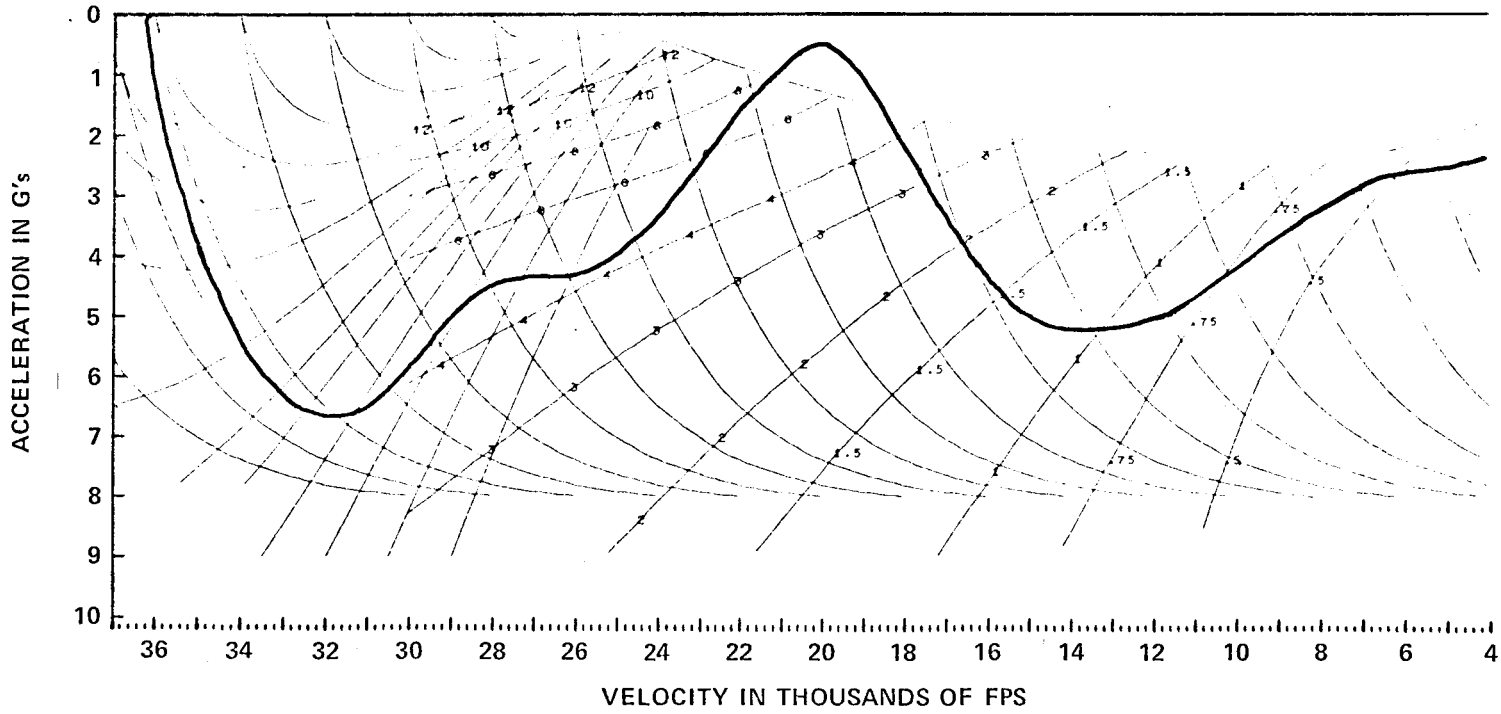


b) NEW F1 TABLE

FIGURE 2 - EFFECT OF OLD AND NEW F1 TABLES ON 1250 NM RANGE.

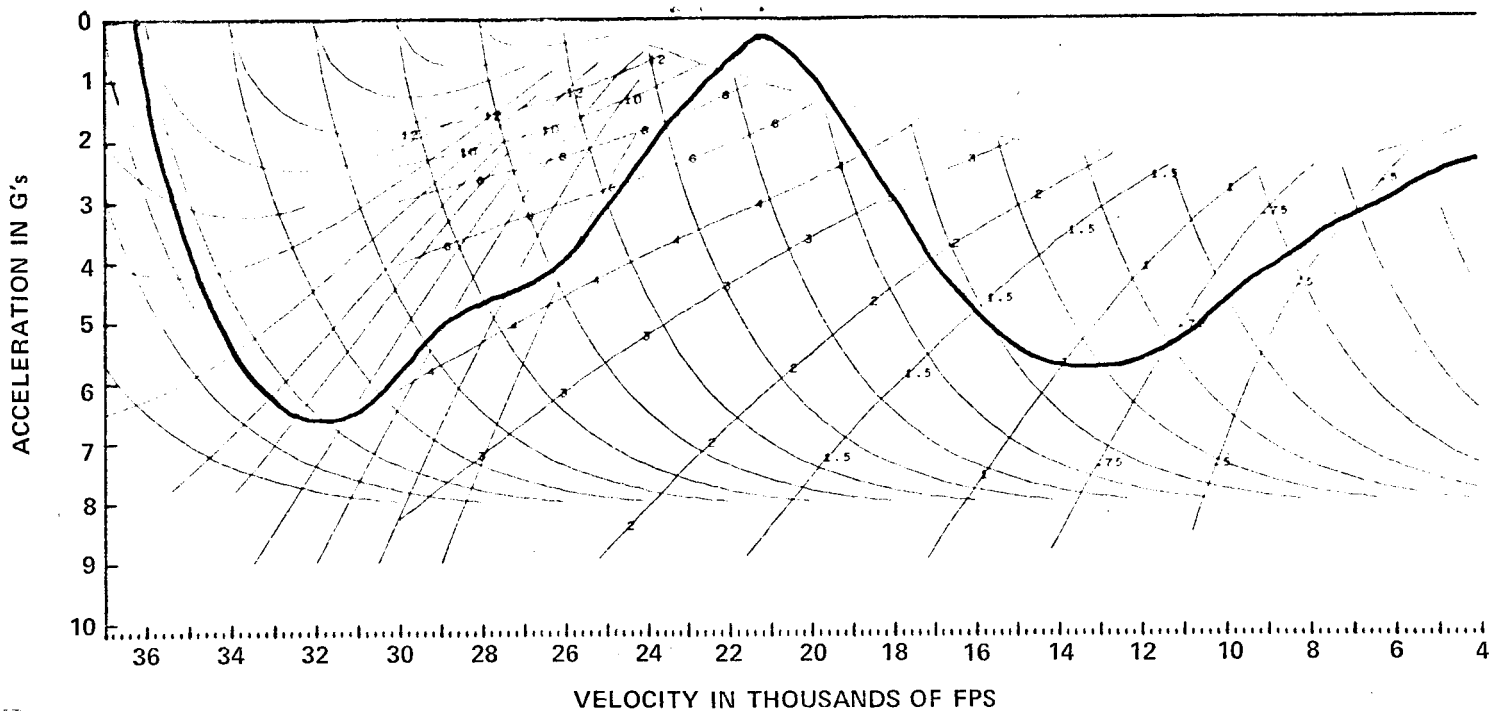


a) OLD F1 TABLE

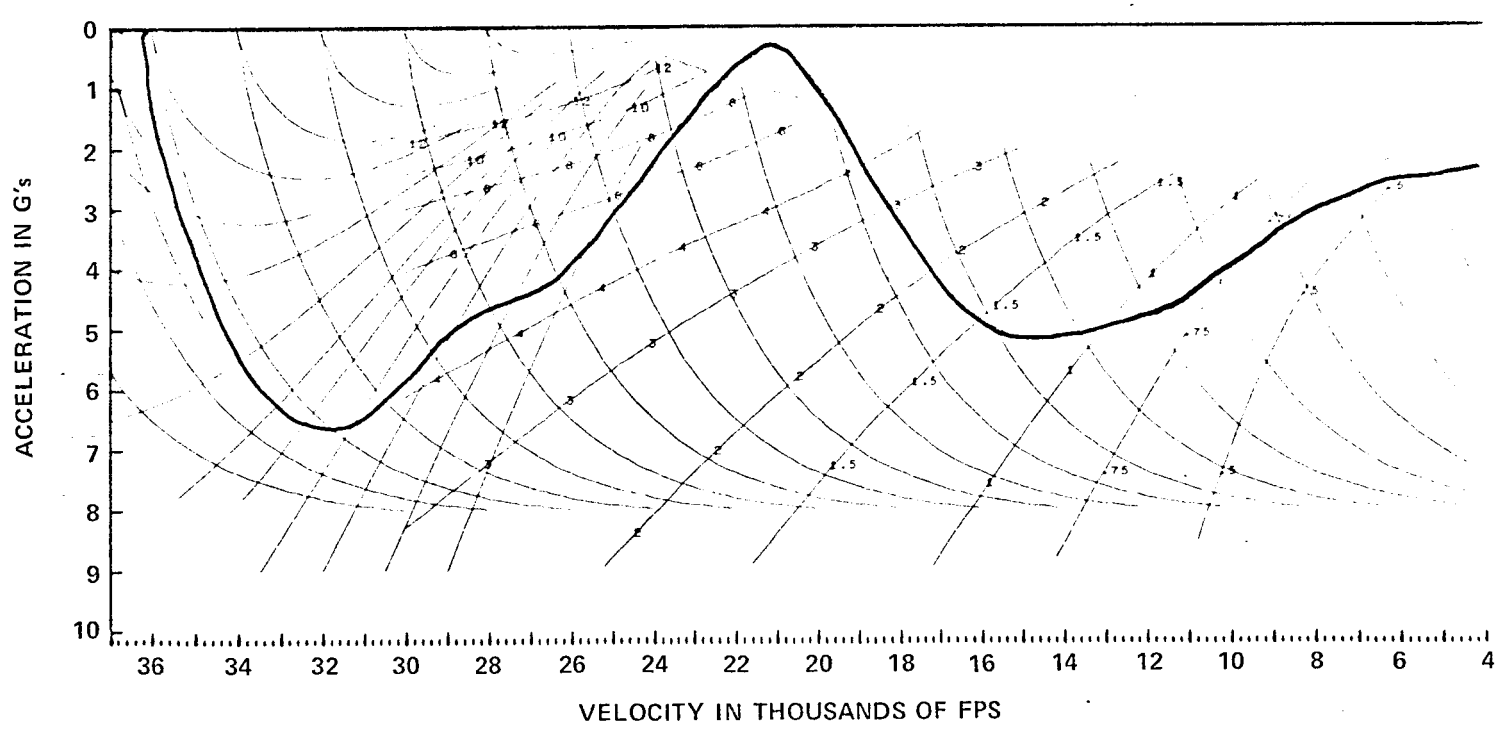


b) NEW F1 TABLE

FIGURE 3 - EFFECT OF OLD AND NEW F1 TABLES ON 1450 NM RANGE.

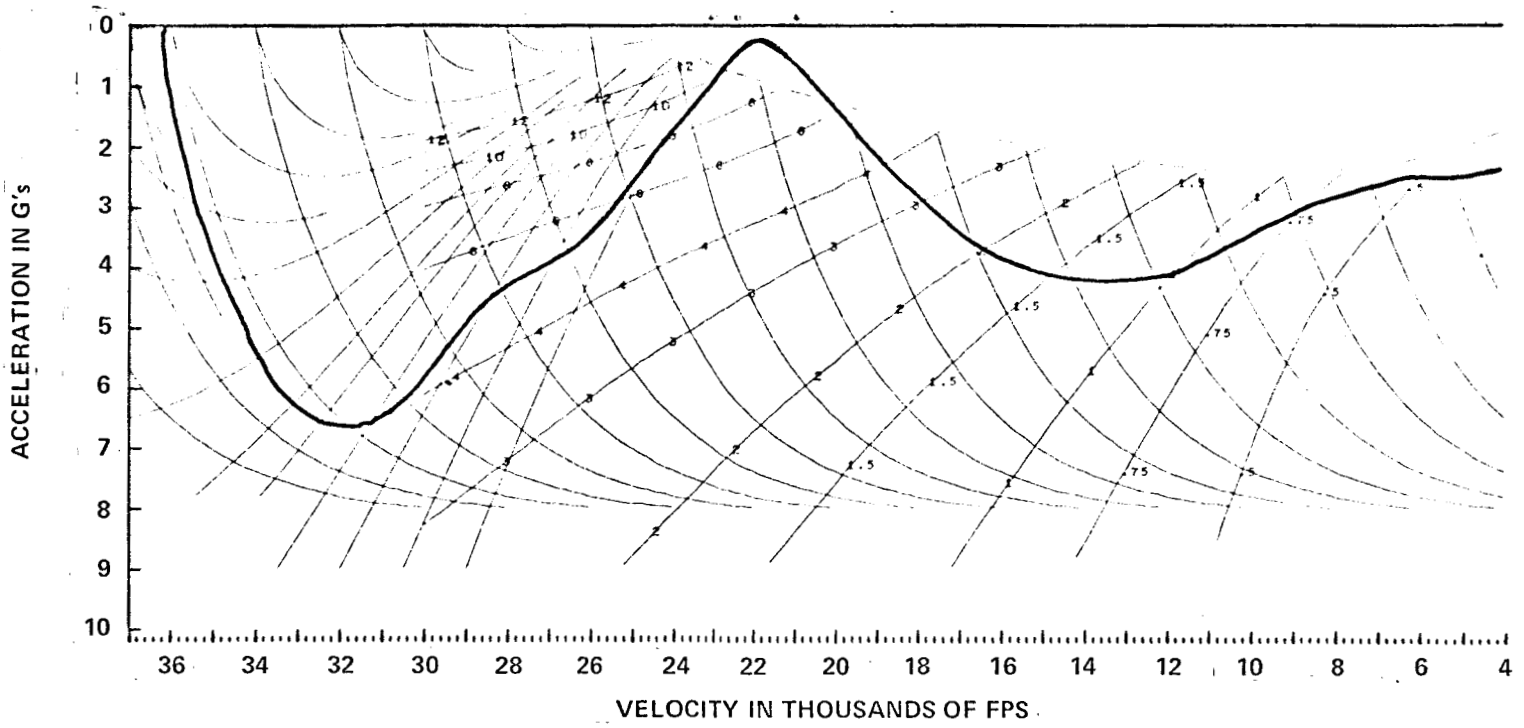


a) OLD F1 TABLE

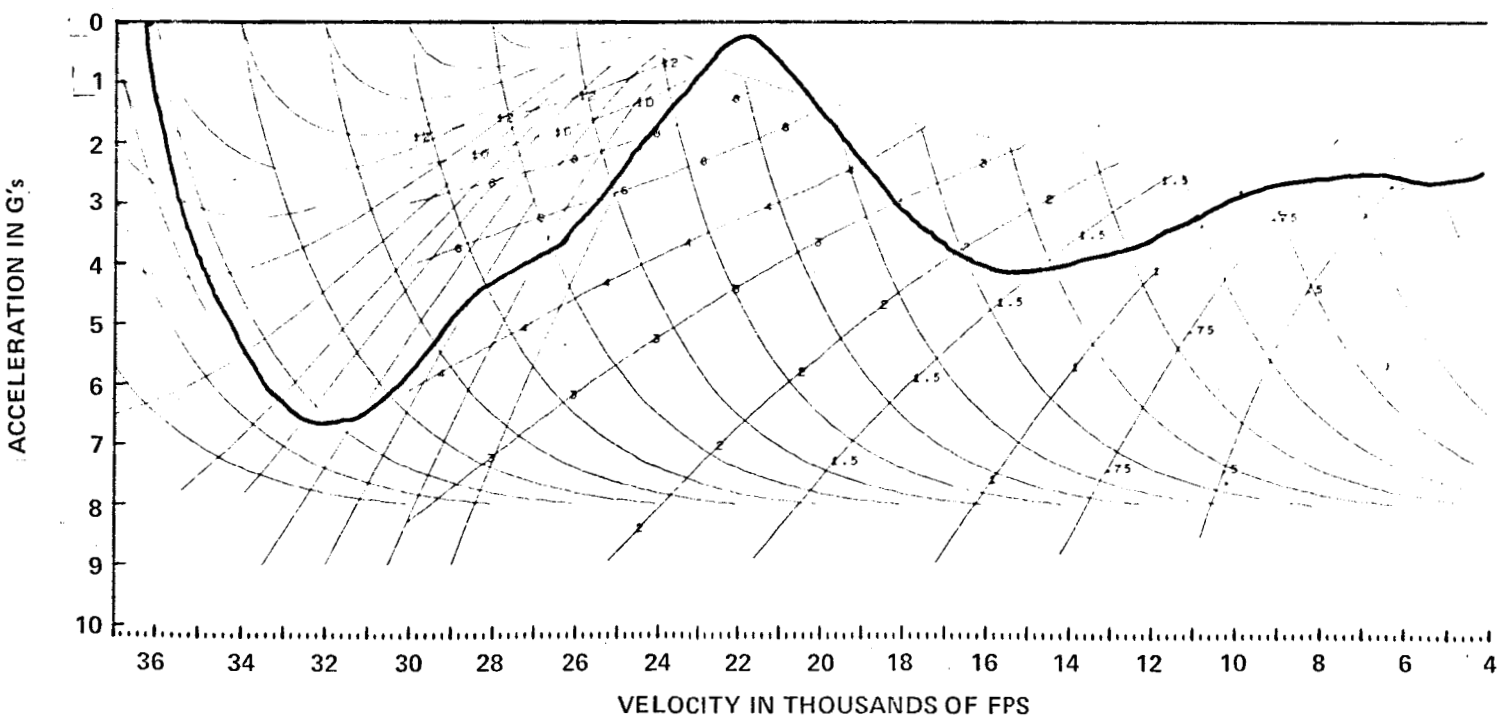


b) NEW F1 TABLE

FIGURE 4 - EFFECT OF OLD AND NEW F1 TABLES ON 1650 NM RANGE.



a) OLD F1 TABLE



b) NEW F1 TABLE

FIGURE 5 - EFFECT OF OLD AND NEW F1 TABLES ON 1850 NM RANGE.

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From: S. B. Watson

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