Bellcomm

955 L'Enfant Plaza North, S.W.
Washington, D. C. 20024

B72 01012

date: January 20, 1972

to: Distribution

from: K. P. Klaasen

subject: AS-511 S-IVB Performance Prediction Compared to AS-510 -- Case 310

MEMORANDUM FOR FILE

(NASA-CR-125726) AS-511 S-4B PERFORMANCE PREDICITON COMPARED TO AS-510 (Bellcomm, Inc.) 4 p

N79-72561

Unclas
00/20 12178

The AS-511 (Apollo 16) launch vehicle operational trajectory shows a predicted second S-IVB burn (translunar injection) duration of 12 sec less than was predicted for AS-510 (Apollo 15). The Apollo 16 predicted burn time is 922 sec versus 934 sec for Apollo 15. The 12-sec decrease in burn duration results from the AS-511 S-IVB stage predicted thrust being about 6350 lb higher than the AS-510 prediction. The higher thrust stems mainly from differing engine characteristics and not from changes in performance prediction methods. The combined effects on second burn duration of other vehicle differences and the different translunar energy (C_3) required is small compared to that of the increased thrust.

The MSFC S-IVB propulsion prediction program was updated after Apollo 15 because of consistently better-than-predicted vehicle performance on past missions. The major update to the program involved I_{sp} prediction. The predicted I_{sp} for AS-510 was 426.683 sec for the second burn. The program update resulted in an increase in predicted I_{sp} of about 1.2 sec. This 1.2-sec increase in I_{sp} results in an .8-sec decrease in TLI burn duration and a payload capability increase of about 450 lb. Previously known engine differences indicated that the AS-511 S-IVB I_{sp} was 1.44 sec higher than AS-510. Thus, the total I_{sp} increase from AS-510 is about 2.65 sec.

K. P. Klaasen

2013-KPK-jab

K. P. Klaasen

(ACCESSION NUMBER) (THRU)
4 none
(PAGES) (CODE)
CR-125726
(NASA CR OR TMX OR AD NUMBER) (CATEGORY)
No. 602(A)
[redacted]

Subject: AS-511 S-IVB Performance Prediction Compared to AS-510 -- Case 310

From: K. P. Klaasen

Distribution List

NASA Headquarters

J. K. Holcomb/MAO
C. M. Lee/MA
A. S. Lyman/MR
R. A. Petrone/MA
W. E. Stoney/MAE

Bellcomm, Inc.

R. A. Bass
A. P. Boysen, Jr.
J. O. Cappellari, Jr.
J. P. Downs
W. G. Heffron
N. W. Hinners
K. E. Martersteck
P. E. Reynolds
I. M. Ross
R. L. Wagner
M. P. Wilson
All Members Department 2013
Central Files
Department 1024 File
Library