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JUN 4 1962

Dr. Wernher von Braun
Director, Marshall Space Flight Center
National Aeronautics & Space Administration
Huntsville, Alabama

Subject: C-5 Definitive Contract Schedules

References: (1) TWK from Mr. Rosen to Dr. von Braun dtd Jan. 5, 1962
(2) Ltr to Canright, dtd Jan. 17, 1962, signed by Dr. Lange

Dear Dr. von Braun:

Your letter of May 18 raises valid questions with respect to the design, operation, manufacturing, scheduling and use of the three stages of the C-5 launch vehicle. A major effort is under way, coordinated by Dr. Shea, to define the mission mode for manned lunar landing -- an effort that enjoys strong participation from your Center, along with other Centers and elements of our organization. Completion of this work, which all of us urgently desire, will produce definite answers to the questions you raise. However, we cannot afford to delay arriving at firm contracts with the major producers of the C-5 until our program is completely defined.

In the absence of complete guidelines, there is a tendency on the part of both the contractors and Centers to provide for all eventualities. Recent cost estimates from our major contractors give evidence that this process of expansion has proceeded at an alarming rate. In one case, the latest cost estimate is more than double the contractor's original proposal. Now, it is true that the design detail and scope of each stage of the C-5 has been evolving, but the basic concept of each stage has not changed materially. The increased costs being quoted are completely out of consonance with the design change that characterizes the early phase of any development program. We must keep our cost base for the C-5 within bounds, and we must do this at the earliest possible date. The guidelines given you in our TWK of January 5 (ref. 1), and the goals set by you in Dr. Lange's letter of January 17 (ref. 2), must be maintained to the fullest extent possible.

No program is completely defined until it is finished. In the absence of complete definition, we must make assumptions based on the best knowledge available at any given time. In doing so, we should be able to correctly assess the greater share of our program and be prepared to modify the lesser part if our assumptions later prove invalid. Only through this method can an evolving program proceed on a firm basis.

In order to assist you in arriving at firm contracts by the desired dates, we suggest the following assumptions as being most logical in the present situation. It should be kept in mind that these assumptions may change. However, they permit establishing a cost base from which the effect of changes can be evaluated. Our comments follow the format of your letter.

Design Problem Areas

Questions 1, 2 & 3: Assume that the S-IVB will be used primarily as the third or escape stage of the C-5 with a single restart in orbit. The same S-IVB could also serve as the second stage of the proposed C-1B launch vehicle. Our recent study shows that a single configuration of the S-IVB having propellant capacity of 230,000 pounds and a diameter of 260 inches can satisfy all presently planned uses of this stage. Assume further, for purposes of contract, that any provisions to adapt the stage for earth orbit rendezvous would be added later by amendment if needed. Subsidiary elements of the design should follow readily from the assumptions made above.

Question 4: Assume that the C-5 guidance module will be required only for guidance of the booster to injection for escape. Total stay time in earth orbit should be planned as less than six hours. Arrangements to insure compatibility with the over-all Apollo guidance being developed by M.I.T. should be continued.

Operational Problem Areas

Question 5: Provisions for a high density (salvo type) launch rate are inherent in the mobile launch concept. Assume, however, that the high density launch rate is not presently required, but is available for future growth.

Manufacturing Problem Areas

Questions 6 & 7: Location of facilities for the S-II fabrication has been resolved, and facility modifications at Michoud are proceeding. Although regrettable delays have been incurred, it does not appear that these delays now prejudice our ability to arrive at firm contracts.

Program and Phasing Problem Areas

Question 8: Assume that the C-1B, if authorized, would replace the C-1 early in calendar year 1966. In order to provide for this eventuality, C-1B flights would start early in CY 1965.

Question 9: At this point in time, the best index of funding for the C-5 is the authorization bill recently passed by the House of Representatives. This bill should be used as a basis of planning until our appropriation has progressed further through the Congress.

M to Dr. von Braun
Subj: C-5 Definitive Contract Schedules

It should be recognized that the degree of definition that presently exists for the Saturn C-1 is significantly beyond that required to arrive at firm contracts for the C-5. The C-1 design is nearing completion. The C-5 will not reach a parallel status for at least a year or more. Completion of the design cannot be taken as a requirement for firm contracting.

From a purely engineering point of view, your recommendation to delay arriving at firm contracts may have merit. From a management point of view, it is a step that our program cannot afford. I propose, therefore, that we retain the originally planned dates for arriving at definitive contracts with the major C-5 contractors: Boeing, North American and Douglas.

Sincerely,

Original signed by
D. B. Holmes

D. Brainerd Holmes
Director of Manned Space Flight

Prepared by ML(MWR:pbm) 6/4/62

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