



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
GEORGE C. MARSHALL SPACE FLIGHT CENTER  
MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812

March 4, 1970

REPLY TO  
ATTN OF: DIR

Mr. Robert Sherrod  
Secretariat Support Division, XS  
National Aeronautics and Space Administration  
Washington, D. C. 20546

*Rel*

Dear Bob:

First let me thank you for the congratulations on my new appointment as Director of Marshall Space Flight Center.

As to your request for some documents containing my opinion on the "all-up" testing concept, I have to tell you that I could not find anything in writing so far, and I'm reasonably sure that when this concept was introduced I did not write down my opinion.

Our initial planning for the development of the Saturn V followed the development of the Saturn I. The step from the Atlas guided missile which was the biggest rocket at that time with a thrust of about 360,000 lbs. to the Saturn I with a 1.5 million lbs. of thrust to be achieved by a cluster of 8 engines, seemed to us very large. When we started this development in 1958 or early 1959, there was barely any money available and all that the Department of Defense asked the Army to do was to enhance the booster capability of the United States in order to match the Russian's payload capability for spaceflight. It was not determined at that time what second stage would be put on top of this booster. This was only decided when NASA came into the picture, and when Dr. Silverstein made the decision to use liquid oxygen/liquid hydrogen for upper stages -- I think it was late in 1959.

In order to go ahead with the development programs, we decided to launch the first four vehicles off the Saturn I with a dummy as a second stage and also dummy payloads. We believed at that time that the development of a big hydrogen stage would be more difficult, as it turned out to be later on.

The step from the Saturn I to the Saturn V and its foreseeable difficulties, including launching site and ground equipment seemed to us even much more complex, therefore, we also planned a program with the first Saturn V launch having only a live first stage and the upper stages, dummies. The second launch of the Saturn V was then to have the first and second stages live, and the third Saturn V launch was finally to be "all-up," provided that the first two launches were satisfactory. We thought this step approach in development was also more realistic as to the time schedule, because the J-2 engine for the second and third stages appeared to us more complex and difficult in the development, and thus more time consuming than the F-1 engine.

Later on, after we had launched the first Saturn I, it became apparent that flight testing of these configurations with only the first stage live, was unnecessary. As a matter of fact, we would not have launched # 2 and certainly not #3 and #4 if they would not have been very far advanced in assembly by the time we launched the first one.

The development of the J-2 engine and the upper hydrogen stages turned out to be easier than we thought, although as you know, we had our share of difficulties.

When Dr. Mueller took over as the Apollo Program Manager, he took another look at the whole program and he came to the conclusion, encouraged by the first "all-up" Minuteman launch of the Air Force; that the only way to be able to make the lunar landing of this decade actually was to take the risk of launching the first Saturn V "all-up." By the time of this Saturn V launch -- so was his rationale -- we would have flight tested three to four S-IVB Stages on Saturn IB. Therefore, the only problem remaining would be this S-II Stage in case everything else went well. In order to further minimize the risk, a thorough and rigid Component Subsystem Qualification Program was introduced together with a Flight Readiness Test (FRT), a Countdown Demonstration Test (CDDT) and additional management milestones like the Design Criteria Review (DCR), Flight Readiness Review (FRR) and many others.

Although I personally fought in the beginning the "all-up" concept as being too risky, and as to time schedule I considered as the most critical stage development, the S-II (which actually turned out to be the case), I finally agreed with the "all-up" concept especially due to the fact that with the original flight plan concept, we would have had to reconfigure the launch site for every launching. This fact alone would have made the landing on the Moon in this decade doubtful. The more I think of it, as an afterthought,

date?  
1 Feb 61  
Summary  
"Hist.?"  
Tech.  
p. 59

the more this becomes clear to me. There are many other factors which are in favor of an "all-up" concept, such as cost. The risk is not too exorbitant if it is planned right and if the homework is done well.

I know that these short comments are not what you actually want, but I think they might be of some help to you in the absence of documents. However, I will have our people look around here at Marshall, perhaps we will find the minutes of some meeting or some other documents where the "all-up" concept was discussed. If so, we will send you a copy.

Thank you again for your congratulations.

Sincerely,



Eberhard Rees  
Director