

capability wherever it is determined that higher efficiency or economy will result.

The Air Force has considered the feasibility of launching satellite and space vehicle boosters at sea and agrees that a sea launch is feasible although as booster size increases the feasibility becomes less credible. We note that at the present time no approved Air Force (or national requirement) for a sea launch satellite exists. For some applications, such as probes, sounding rockets, and small payload low altitude satellites, sea launchings offer some advantages. For larger space boosters (Thor class and larger) factors of cost, effectiveness, technical difficulty, and availability of existing land facilities reduce the advantages that might possibly be derived from sea launches. All test objectives of the present military space programs can be met through use of already established land based complexes.

Viewing future development test requirements for vehicles utilizing nuclear propulsion, toxic higher impulse chemical fuels, and extremely large boosters, more remote siting than of present test launching facilities may be required. In such case, these might be more economically supported from remote island locations rather than sea-based launches. Most advantages cited in favor of equatorial launches are expected to gradually diminish as we overcome the problem of limited booster thrust capability. Prediction of a capability to maneuver in space would also reduce requirements for a highly mobile launch point. Although safety is a strong advantage to a sea launch capability, it is expected that emphasis on this factor will also be diminished as reliability of conventional rocket booster vehicles increases. Our experience with over water ranges using seaborne tracking stations where island instrumentation is not available has shown that problems of stabilization and accurate positioning of these sensors have resulted in significantly higher initial and operating costs than land bases having the same capability.

Question 4. When the preliminary space research of other Services is assigned to the Air Force for development, whose budget should carry the burden of this research?

Answer: If a specific space program is assigned to the Air Force for *development*, regardless of where the responsibility for *operational* employment is assigned, the Air Force would budget for the full cost of development. If the other Services pursue a program of space research through the *preliminary phases* these Services would budget for such preliminary phases. However, these Services are not precluded from issuing cross-Service orders to the Air Force to support the preliminary phases utilizing funds budgeted and provided them for such purposes.

Question 5. When the Air Force is assigned development of space projects, to what extent does it plan to subcontract to Army and Navy facilities to insure that existing personnel and facilities are not left idle?

Answer: When the Air Force is assigned development of a space project, consideration will be given to the capabilities within the Air Force as well as those under the cognizance of other Government agencies. In the past, the Air Force has used the facilities of the Army and Navy as well as other Government facilities to insure effective and economical use of available Federal resources. The Air Force plans to continue this policy.

Question 6. The next question is hypothetical, but it has some current parallels. Suppose that the Von Braun team and facilities were still under control of the Army, and that in the absence of NASA, the Department of Defense set a requirement for a Saturn booster. Presumably the Air Force would be assigned this development project. Would it (a) subcontract to the Army, (b) take over the Von Braun team and facilities, or (c) turn the assignment over to some private contractor, or (d) build new facilities of its own?

Answer: Rather than alluding to a hypothetical situation, it is felt that the Air Force can be more responsive to the committee and the subject matter of ABMA and the Saturn project by briefly reviewing the series of events preceding the actual transfer. These events were as follows:

a. In a memorandum from the Secretary of Defense to the Chairman, Joint Chiefs of Staff, dated 18 September 1959, the Air Force was assigned responsibility for the development, production and launching of space boosters and the necessary systems integration incident thereto except for such research and development conducted by ARPA.

b. In view of the then current discussions concerning the future of the ABMA and having been assigned the primary responsibility for military space boosters, the Air Force recommended that responsibility for the ABMA be assumed by the Air Force.