

Answer 3. Yes. NASA has a reasonable expectation that it will be able to release uprated Saturn I launch vehicles and spacecraft for AAP Earth orbit flights in 1968.

(a) The orbital workshop is an important step in developing the capabilities for long duration space flight; it should be prosecuted even if delayed somewhat.

Question 4. The PSAC report infers that NASA should use the Titan III/MOL for flights up to 60 days' duration and develop a more permanent ground-built space station for longer flights. Please comment on this proposal discussing also what studies NASA has made concerning use of the Titan III/MOL and the relative launch vehicle and development costs involved?

Answer 4. During the past year NASA has considered carefully whether the Titan IIIM launch vehicle or the Titan IIIM-MOL system should be used in the post-Apollo nonmilitary manned space flight program in lieu of the uprated Saturn I-Apollo system. The key questions have been:

1. Possible use of the Titan IIIM instead of the uprated Saturn I to launch the Apollo system.
 - (a) Would it be technically feasible?
 - (b) Would it be less expensive?
 - (c) What would be its advantages and disadvantages?
2. Possible use of the Titan IIIM-MOL system in place of the uprated Saturn I-Apollo system:
 - (a) Could essentially the same objectives be accomplished?
 - (b) Would it be less expensive?
 - (c) What would be the advantages and disadvantages?

Several specific possible programs and alternatives were studied in some depth by NASA, with the collaboration of the Department of Defense in providing data and cost estimates with respect to the Titan IIIM and MOL systems. Ground rules for performance and cost comparisons were worked out jointly by NASA and DOD. In the studies, NASA used without modification or independent validation the technical data and cost estimates on the Titan IIIM and the MOL systems provided by DOD.

These studies have led to the following main conclusions with respect to the questions listed above:

1. With respect to the possible use of the Titan IIIM instead of the uprated Saturn I to launch the Apollo system:

(a) The use of the Titan IIIM to launch the Apollo system appears to be technically feasible, but its feasibility would have to be confirmed by further ground and flight testing. Use of the seven-segment Titan IIIM from ETR would provide capabilities approaching but not equal to those of the uprated Saturn I-Apollo system. The low orbit payload performance penalty would be about 10 percent per launch. At least 3½ years would be required for systems integration, facility modifications at ETR, and flight qualification of the Titan IIIM-Apollo configuration.

(b) Funding requirements for the first several years for programs using the Titan IIIM would be substantially higher than for corresponding alternative programs using the Saturn IB-Apollo system because of the nonrecurring