

Expected planning

During this coming year we expect to further refine our advanced manned missions analysis of sequential program requirements and systems. This effort will be conducted in order to assess with more accuracy the program resource requirements and cost/effectiveness relationships.

We will continue to work closely in 1967 with the scientific community in the determination of valid scientific objectives. The coming Surveyor and Orbiter missions will provide additional data for site selection from the standpoints of suitability and scientific interest.

As Apollo Applications supporting systems proceed into detailed design and development phases, major concentration will be applied to the definition of the detailed accomplishments of Apollo Applications missions, to a better understanding of the probable effective duration of that phase of the program, and to an actual definition of follow-on phase system options.

As indicated earlier, planning of a lunar scientific exploration program involves a continual adjustment to growth in understanding of the moon itself, to change in emphasis as progress in scientific and space systems technology opens up new fields of opportunity, and to changes in resource availability. It is appropriate, therefore, that we avoid prejudging the total magnitude or span of lunar exploration. Our intent is, instead, one of developing adequate data on a number of paths to support valid decisions at the time that leadtime requires those decisions to be made.

FLIGHT VEHICLES

Flight vehicle studies have stressed three areas critical to future programs. These are Saturn Systems Upgrading/Improvement, Operations Support, and Advanced Vehicle Systems. The dominant element of this study program is examination of the ways and means of exploiting the capabilities of existing Saturn systems and facilities for economic and versatile transportation support of future manned or unmanned programs in the 1970-1980 time period. These studies are in direct support of near- and far-term manned missions planning for earth orbital, lunar and planetary flights.

Saturn systems upgrading/improvement

Exploratory studies of the Saturn I, Saturn V and Saturn Intermediates are being conducted to extend the payload capabilities and provide potential cost effective launch vehicles for future mission requirements. Saturn Intermediates are essentially 2-stage versions of the existing or uprated Saturn V configurations and bridge the payload performance regime between the potential capabilities of the Saturn I systems and the Saturn V.

Upgrading considerations cover large solid rocket motors such as Minuteman, 120-inch, 156-inch and 260-inch diameter motors as well as improved and uprated Saturn engines, advanced upper-stage engine configurations (chemical and nuclear), liquid strap-on pods/engines, increased and new propellant implications, and advanced materials/structural applications. These studies provide guidance for NASA's research and technology efforts as well as providing program-related information such as payload performance, cost projections, development schedules and facility requirements.

It is evident from vehicle studies to date that a wide variety of Saturn vehicle options are possible which can substantially increase the Saturn family's mission performance for future programs. The potential indicated for the Saturn I ranges from the current 40,000 to 110,000 pounds payload in low earth orbit; the Saturn V from the current 280,000 pounds to 700,000 pounds; and the Saturn Intermediates from 110,000 to 260,000 pounds payload in low earth orbit.

Operations support

Supporting studies are being conducted to determine launch facility implications and improved operational concepts for launch of basic and improved Saturn vehicles for future missions and to establish both nonrecurring and recurring facility costs and development schedules accordingly.

Future manned space missions could be dependent in varying degrees on in-orbit propellants transfer, systems assembly, maintenance and checkout, to support both earth orbital missions and orbital launch operations for planetary missions; study of in-orbit propellants transfer is being initiated to determine