

APOLLO APPLICATIONS PROGRAM

Lecture for
Fundamentals of Space Medicine
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OUTLINE

1. Apollo Applications Program Objectives
2. Saturn Apollo Applications Systems
3. Illustrative Missions

The purpose of this outline is to provide a frame of reference for the course, covering manned space flight activities now being planned for the period from the accomplishment of the first manned lunar landing through the early 1970's. The NASA is now defining the Apollo Applications Program to be conducted in this period.

Objectives

The national goal of achieving and maintaining pre-eminence in space is supported by the overall NASA goal to explore and utilize the space environment to advance human knowledge for the benefit of mankind. The key to this goal is, for manned space flight, the development of the capability of men to operate effectively in space for extended periods. The Apollo Program, previously discussed, supports this goal by the development of a set of highly versatile space vehicles, ground systems, and management team, the capability of which will be demonstrated by a manned lunar landing and return -- our first substantial excursion from this planet. After the lunar landing three possible major steps in the manned exploration of space have been suggested: manned space stations, lunar scientific bases and manned planetary missions. We do not presently have the knowledge to commit ourselves to the conduct of any such programs, and the required understanding can only be gained by manned space

experience. The Apollo Applications Program is being planned to provide the bridge of knowledge which will enable the nation to make decisions on the next major U.S. space goals. The Apollo Applications will, as the name implies, use developed and tested Apollo spacecraft and Saturn launch vehicles, thus providing continuity to our efforts without requiring the commitment of major new resources for development. Specific Apollo Applications Program objectives are:

(1) extended manned lunar exploration, up to two weeks on the lunar surface, and four weeks in lunar orbit

(2) manned operations in any earth orbit of up to one year duration

(3) conduct of scientific, technological and applications experiments in the near-earth and lunar environments

Long duration missions are of especial importance since they minimize the cost per man space flight hour, and astronaut time is the limiting resource in most missions.

Systems

Saturn Apollo Systems available to the Apollo Applications Program include two launch vehicles, the Saturn IB and the Saturn V, and the Apollo spacecraft consisting of the Command/Service Module and the Lunar Excursion Module. Apollo missions using these flight elements are supported by the world wide NASA Tracking Network, mission control facilities and launch complexes. This is supported by a nation wide complex of government-industry facilities and skilled manpower. By 1970 the capability will exist to produce and launch more than six Apollo-Saturn space vehicles per year.

Studies have confirmed the feasibility of using this inventory for a variety of proposed Apollo Applications missions without interfering with the Apollo lunar landing goal.

Missions under consideration include:

(1) Low altitude earth orbit missions using both the basic Apollo spacecraft and the spent upper stage of the Saturn IB as laboratories for long duration flight.

(2) Synchronous earth orbit missions for astronomy and communications experiments.

(3) Lunar orbit missions for survey of the entire surface of the moon.

(4) Extended-duration lunar surface missions using two Saturn V rockets and two spacecraft to permit two week excursions on the moon.

Payload performance capabilities are presented, and system modifications currently under study are discussed.

Illustrative Missions

Four missions are outlined as examples of Apollo Applications activity in the early 1970's:

(1) A low altitude long duration earth orbit mission using a Saturn spent stage and Apollo spacecraft. Extended duration is achieved by resupply of the space vehicle by additional Saturn IB-launched Apollo spacecraft.

(2) A 3-man synchronous earth orbit astronomy mission for 45 days at 19,350 n.mi. altitude using a modified Apollo spacecraft launched by a Saturn V.

(3) A 3-man, 28-day lunar polar orbit survey using cameras, radar and surface probes.

(4) A 2-man, 2-week lunar surface mission using two Saturn V launches, the first to deliver a modified Apollo LEM to the surface to serve as a shelter, the second to transport the men to and from the surface. Exploration is conducted using a surface vehicle delivered with the shelter.