aerospace

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POST-APOLLO

Lunar orbiting station

Skylab, an earth-orbiting station planned for 1972 and 1974, could be a prelude for a lunar-orbiting station around 1975.

Harold E. Bauer and Doyle E. Lockwood of McDonnell-Douglas in Huntington Beach, Calif., reported on studies of possible lunar station techniques.

A lunar station, they say, could be launched on two Saturn 5 rockets. The first would carry the basic station module and air lock and the second would deliver the crew in an Apollo command and service module, carrying as well an experiment and logistics module.

Docking procedures already carried out with lunar modules provide the experience necessary for assembling the components of the lunar station in space.

A 90-day lunar mission—which would require little redesign from Skylab—would be useful in many ways, Bauer and Lockwood say. An infrared radiometer would detect thermal anomalies on the moon, as well as possible mineralized zones, surface thermal conductivity and bulk density. An infrared interferometer would examine chemical composition, and an infrared spectrometer could be used to identify lunar surface elements. Photographic and other observations could be made.

ZERO GRAVITY

Vaccine manufacture

Zero-gravity conditions provide a more desirable environment than gravity conditions for a number of industrial processes, and important commercial benefits could accrue from a space station program, Dr. Carl Kober of Martin-Marietta in Denver, reports.

Although many of the ideas he has come up with would not survive cost-effectiveness analysis, Dr. Kober suggests many would—including biochemical and chemical processes.

Of particular interest, he says, is the manufacture of vaccines, which are produced on earth in situations in which zero-gravity effects are approximated: in chicken eggs or in oxygen bubble chambers filled with liquid nutrients, for instance.

In space, however, under conditions of actual zero gravity, vaccines should grow much faster and provide a higher yield. The reason is that oxygen, after injection in a liquid culture medium, would have no buoyancy and would thus be perfectly distributed throughout the medium.

MODULES

Composite space station

The orbiting space station of the late 1970's is likely to be a composite of a number of modules, some of them actually attached to the station, others in free flight.

Walter W. Withee of General Dynamics/Convair in San Diego says the modules will probably be launched separately for later docking at the station or for free flight. A space station would have a highly scientific orientation, and each module would serve a particular scientific purpose. One, for example, might be a module designed to study earth resources, another a space-biology module, another a biomedicine and biotechnology module and a fourth an astronomy module.

Any given module might operate docked to the space station as a kind of extra room. Or it might be in free flight, but serviced periodically by a shuttle from the station or from earth (SN: 6/13, p. 580).

EARTH STATION

Habitability a problem

A large and complex earth-orbiting space station manned by as many as 20 to 30 astronauts is a possibility for the late 1970's or early 1980's. But the crew might continuously occupy such a station for as long as a year, and a serious problem would be the lack of variety in living conditions. Such lack of variety creates fatigue as well as other mental and physical problems.

The National Aeronautics and Space Administration asked the industrial design firm Loewy/Snaith, Inc., of New York City, to come up with ideas that might solve this problem. The firm, consulting with psychologists, psychiatrists and sociologists, produced a number of ideas that were reported by Fred Toerge and Charles A. O'Donnell.

Some of the suggestions include designing sections of the station that would be radically different from each other so as to provide variety analogous to earth-scale changes. Sounds, lights and other sensory stimuli would be varied. Shapes of rooms, and textures of their walls and ceilings would change from one part of the station to another.

The report also suggests making the station a kind of organic entity so as to avoid a slum area cluttered with garbage—which instead would be recycled. The surface skin of walls could be shed when it grows soiled, they suggest.

SPACE SHUTTLE

Safety problems

The reusable space shuttle (SN: 5/23, p. 508) will use many of the tried techniques of the Apollo program. Nevertheless, the design of the earth-to-orbit transportation system poses safety and abort problems yet to be worked out, says John W. Griswold of Boeing Co., Seattle, Wash.

One of the most dangerous periods will be at launch, when the manned orbiter, weighing 778,000 pounds, will ride pickaback on the 2,722,000-pound manned or unmanned booster. Provision for escape during launch emergencies will be complicated by several factors. The crew and passengers will not be wearing pressure suits, separation of the two vehicles is difficult and present designs do not include a launch escape tower, as does the Apollo system to separate the crew from the booster stages in emergencies.