

# Aerospace Notes

Gathered at the Los Angeles meeting of the American Institute of Aeronautics and Astronautics

## COMMUNICATIONS

### Artificial ionosphere

Creation of an artificial ionosphere for use in a communications system that would be independent of perturbations, as well as of the frequency and distance limitations of conventional systems, is being investigated by engineers with the U.S. Army Electronics Command at Ft. Monmouth, N.J.

The man-made ionosphere would be produced by rocketing a payload of cesium-aluminum which would explode at a height of about 60 miles, the "E" region of the atmosphere. The cloud could then be incorporated into an elaborate system including tropospheric scattering, ionospheric scattering, meteor trails and the natural E layer. Such a system could be used for ranges of up to 1,400 miles without skip and despite adverse propagation conditions, according to Edward L. Blackwell.

For frequencies around 30 megacycles, 30 pounds of cesium-aluminum has produced a cloud that would support transmission for up to two hours, Blackwell says. The signal scattered extends up to 700 or 800 miles.

## OCEANOGRAPHY

### Control of research subs

A Government agency similar to the Federal Aviation Agency should be established to regulate the manufacture and operations of deep submersible vehicles, says the chief pilot of Lockheed Aircraft Corp.'s research submarine, Deep Quest.

There have been no casualties yet, Lawrence A. Shumaker says, but "there have been some near misses."

Besides certifying vehicle safety, the Agency would be responsible for licensing of operators and instructors, traffic control, regulation of equipment moored to the ocean bottom, control of undersea navigation aids and certification and placement of undersea habitations. Shumaker makes it clear that he is not advocating Government control of the exploration and exploitation of inner space—the "wet NASA" idea—but only that the Government carry out its traditional responsibility for the safety of its citizens.

## SPACE NAVIGATION

### Gemini sextant found accurate

The hand-held sextant tested aboard Gemini 12 has been correlated with experiments aboard a flight simulator and the space agency's Convair 990 jet research aircraft, and found to be excellent in accuracy as a space navigation instrument.

In space, the total error in using the device (the combined error due to the astronaut's inaccuracies, the distortions of the spacecraft window and the sextant itself) had a standard deviation of less than 10 second of arc. Vehicle motions, space helmet visors and other distractions had little effect on accuracy, according to Donald W. Smith of NASA's Ames Research Center.

A simulation of one sample mission using the sextant—a return from Mars—indicated that the reentry corridor would be missed about 2,500 times in a million. Reducing sextant error to only five seconds of arc would reduce the number of misses to 110 in a million.

## REENTRY

### Protection for nuclear satellites

Special insulation, heat shielding and shockproof capsules will be needed in the future for reentering satellites and spacecraft equipped with nuclear power supplies, partly to prevent radiation leaks and partly to enable recovery of the radioactive element, according to a team of space researchers.

Any reentry of a nuclear power source sooner than 10 times the isotope half-life (by which time its radioactivity has dropped to about .001 of its original level) probably represents a radiation hazard. Thus a fuel element capsule must be strong enough so that fuel is not released even on hitting hard rock, according to M. J. Brunner, C. V. Dohner and R. L. Lawit of General Electric Co., Philadelphia.

The fuel elements are not only dangerous, they are valuable, the engineers point out. In fact, a five-kilowatt reactor fueled with plutonium 238 would require about a year's production of the isotope, making its recovery almost imperative. Para-wings or other large-scale recovery techniques might be used. In addition, the engineers recommend research to select a proper thermal insulation material for the fuel capsule. Two likely candidates are woven graphite fiber and a transpiration-cooled material with a coolant held in place by a second substance which serves as a matrix.

## INFRARED

### Thermal mapper charts forest fires

An airborne thermal mapping device, successfully tested recently over forest fires in Idaho and Montana, can pinpoint hotspots and small blazes that might otherwise be overlooked, and can record the image either on film or video tape.

Developed by the Bendix Corp.'s Aerospace Systems Division in Ann Arbor, Mich., the infrared device can detect temperature differences under one degree F.

Other uses for the instrument include location of possible sources of water pollution by mapping temperature variations in currents, early detection of crop disease, spotting of geothermal energy sources and exploration for oil and gas.

In fighting forest fires, the device enabled mapping of the fire from an altitude of 6,000 feet, despite dense smoke that completely obscured the ground.

## SPACE MEDICINE

### Orbital research hospital

An orbiting research hospital, designed to offer a weightless environment unobtainable on earth, has been proposed for development by the 1980s.

A space ambulance, designed to keep vibration and acceleration loads to a minimum, would be used to send patients into orbit, according to D. J. Jones and B. D. Newsome of General Dynamics' Convair Division.

Many physiological changes could be produced in a zero-gravity environment, say the scientists, including changes in circulation, heart loads, fluid balance, glucose utilization, muscle tone, cell growth and tissue repair.