

aerospace notes

FLIGHT DYNAMICS

Moving astronauts use up fuel

The movements of crewmen in a spaceship bound for a distant planet could seriously disturb the craft's stability and direction, causing significantly higher fuel consumption, according to a study by the Martin Marietta Corp., Denver, Colo.

Using mathematical modeling and a computer, Martin researchers have been working for about two years in an attempt to describe any conceivable movement a man could make in a weightless environment. Part of the work is being supported by NASA for the Apollo Applications Program.

The numerical data compiled, Martin says, will enable mission directors to determine more precisely the fuel requirements for long-term space flights and to evaluate spacecraft systems such as attitude control motors.

PROPULSION

Operational resistojets for ATS

Resistojet electric engines—so named because they use electric resistance to heat liquid ammonia propellant—will be used to keep the next two Applications Technology Satellites anchored in orbit. The engines on ATS-D and -E will be the first full-scale electric thrusters used on operating NASA satellites.

Resistojets develop very low thrust, but work for a long time on small amounts of fuel. In the ATS satellites they will each produce from 10 to 20 millionths of a pound of thrust. The satellites are expected to have lifetimes of from two to three years.

ATS-D is scheduled for launch late this year and ATS-E in 1969. A test resistojet was flown on ATS-3, launched last Nov. 5.

SATELLITE COMMUNICATIONS

Firms join to build Canadian comsat

Two Canadian firms and a United States one have joined forces in hopes of getting Canada its own synchronous communications satellite.

With Hughes Aircraft Co. of California serving as consultant, Canadair Ltd. of Montreal will design the satellite, while Northern Electric Co., Montreal, will develop its electronics. So far the three companies have gotten as far as agreeing in principle to establish a working group. The Canadair synchronous satellite is part of an overall space communications system that has already been proposed both to extend present microwave facilities and to update facilities in sparsely settled northern areas.

AIR SAFETY

Electroluminescence lights aircraft

Helicopters and other aircraft are now being outfitted with an electroluminescent lighting system which reportedly will permit pilots to see a plane's shape up to three miles away in dusk or darkness.

Called Capsul, the system consists of electroluminescent material encased in a protective covering, according to Atkins & Merrill, Inc., of Sudbury, Mass.

The material is easy to see and follow in flight, Air Force pilots report. It has been flown more than 300 hours on F-4C jet fighters, on hundreds of runs up to twice the speed of sound, and subjected to violent rainstorms and desert sun without notable deterioration.

MATERIALS TESTING

Clicks tell a tail's tale

When an airplane's tail is about to drop off as a consequence of metal fatigue, it makes soft, high-pitched clicking noises, according to a research team at the Imperial College of Science in London. The engineers are trying to develop an early warning system by listening to the clicks with ultrasonic sensing devices.

Though the clicks are so high-pitched that no human ear can detect them, when amplified and electronically reduced in frequency they sound like the rustling of metal foil, the team reports. At present the investigators are listening to clicks made by pieces of metal glued together with epoxy resins and then shaken to the point of fatigue.

The technique could also be used for testing the pressure vessels of nuclear power stations before they go into action, says the team. A vessel would be pressurized in a trial run and click-seeking instruments would be clamped on it. Clicks would sound an alarm.

INFORMATION RETRIEVAL

NASA writes a thesaurus

A preliminary edition of a new thesaurus has been published by NASA to provide a standard list of terms for indexing and retrieving documents in the space agency's scientific and technical information system.

Containing some 15,000 cross-referenced terms, the thesaurus is based on data developed by NASA during 1962-66, as well as lists and thesauri supplied by other Government agencies.

VACUUM DEPOSITION

Building diamonds on the moon

A diamond as big as a grapefruit could be grown in a laboratory using the almost perfect vacuum of the moon, according to a graduate student at the University of California at Los Angeles.

But he's going to try the method on earth, even though the best vacuum he can achieve, while only one trillionth of sea-level air pressure, is still a thousand times greater than the pressure on the moon.

Working with Nobelist Willard F. Libby, Patrick H. Payton will start with a one-carat cut diamond and spray it with carbon vapor in a vacuum. The researchers believe that success hinges on starting with a perfect diamond and generating a vapor capable of depositing single atoms on the diamond's surface.

If he can increase the diamond's size by 10 percent, Payton says, he will be satisfied.

16 march 1968/vol. 93/science news/257