

Technology Notes

SPACE MEDICINE

How Dangerous Is a Vacuum?

For how many seconds can a spaceman survive if his spacecraft or spacesuit should suddenly lose pressure? Chimpanzees have recovered without any noticeable brain damage or other residual effects after as long as three and a half minutes in the near vacuum of a simulated 150,000 feet, where pressure is only about 0.0013 that at sea level.

For almost three years, scientists at Holloman Air Force Base, N.Mex., have been trying to provide the National Aeronautics and Space Administration with some kind of timetable for lifesaving in case of explosive decompression in space. Breathing pure oxygen, the chimps began their test chamber "flights" at 35,000 feet, equivalent to Apollo spacesuit pressure of 3.5 pounds per square inch. Then the scientists pulled the cork, sending the pressure plummeting for from 5 to 210 seconds, after which the pressure was restored.

While the time of "useful consciousness" varied from 3.6 seconds to 29.7 seconds in different animals, a direct ratio was found between the time spent in near vacuum and the time of total impairment and total behavior repair. The chimps who lasted three and a half minutes without permanent effects took four hours to recover.

CRYOGENICS

New Space Insulation Could Save LOX

A new way of insulating tanks for liquid oxygen and other supercold fluids in space may cut heat absorption up to 90 percent, possibly enabling man to stay longer in space.

With present insulation techniques, an inner and outer shell are separated either by a vacuum, like a Thermos bottle, or by layers of some insulating material such as a fiber-like material or aluminized plastic. Tests by Aerojet-General Corp., Downey, Calif., have shown that by installing a series of heat-reflective shells within a vacuum zone, heat absorption can be held to a consistent 1 percent, compared to a range of from 1 to 10 percent with fiber or plastic insulation.

ROCKET ENGINEERING

Modular Rocket Motor is Quickie Kit

A reusable, modular rocket motor that can be used at thrust levels from 10,000 to 45,000 pounds by simply screwing on additional segments has been developed for the Air Force by Lockheed Propulsion Co., Redlands, Calif.

In assembly, metal chamber segments are threaded together with huge wrenches, then lined with a continuous sleeve of phenolic insulation sealed at the ends to prevent combustion gases from flowing between the insulation and the chamber wall. Propellant cartridges, in either 10,000- or 15,000-pound-thrust modules, are then inserted into the chamber from the nozzle end, just as in muzzle loading a gun. A three-segment motor has been assembled in the field in 51 minutes.

COMMUNICATIONS

Safer Talk With New Military Radio

A military voice communications system which offers complete privacy even if some units have been captured has been successfully tested over both land and sea.

Called RASCAL (Random Access Secure Communications Anti-jam Link), the system reportedly can cover a 50-mile range with less than one watt of radiated power. Each RASCAL receiver has its own "address." To contact another station, the operator selects the code of the day, then punches out the desired numerical four-digit address on a push-button panel.

Besides providing "an impressive degree of resistance to all known jamming techniques," RASCAL has been operated on the same frequencies as the North Island Naval Air Station tower control and San Diego Airport approach control, with neither party experiencing interference.

NOISE ABATEMENT

Toward Softer Jet Engines

Three-year studies of noise abatement in jet engine design will be made for the National Aeronautics and Space Administration by the Boeing and Douglas aircraft companies.

Main focus of Boeing's \$7.5 million contract will be an effort to keep fan and compressor noise from propagating forward, by choking the air flow to the engine inlet. Goal of the program is a noise cut of 15 decibels, equivalent, says NASA, to moving the noise source about five times as far away.

Douglas will spend \$3 million in an attempt to reduce fly-over noise level on the ground by 7 to 10 decibels, by acoustic treatment of fan inlet and discharge ducts.

Both companies will develop and test modified engine nacelles suitable for presently operational aircraft. The contracts extend through actual flight testing.

ATOMIC POWER

Record Amount of Uranium Shipped

A record \$75 million worth of enriched uranium was shipped from Atomic Energy Commission plants in 1966, evidence of the rapid growth of the atomic power industry both here and abroad.

"Orders for nuclear generating stations placed in 1966 far surpassed expectations," said S. R. Sapirie, manager of the AEC's Oak Ridge operations. "In 1966 this country's nuclear generating capacity was slightly more than one million kilowatts; by 1980 we believe this capacity will exceed 100 million kilowatts."

Enriched uranium is shipped from the AEC gaseous diffusion plants at Oak Ridge, Tenn., and Portsmouth, Ohio, to private firms in the form of uranium hexafluoride (UF₆) for fabrication into reactor fuel elements.