SPACE

Astronauts' Recovery

➤ MORE THAN ONE out of every ten men rocketed into space will need to use the emergency recovery system.

The high probability of 12% failure can be reduced to 2% if advanced techniques in space sciences can insure less malfunctioning than now expected.

The most critical malfunction is the launch pad explosion, Drs. R. L. Gervais and M. C. Johnson of Douglas Aircraft Company's missile and space systems division reported.

They told the American Astronautical Society meeting in Washington, D. C., that the rocket acceleration required to overcome the launch pad explosion problem increases with the size of space vehicles. Such high acceleration may be dangerous to man both physically and psychologically.

When a booster system explodes, vast amounts of energy are released and shock waves occur. If the space vehicle is still attached to the booster rocket, the shock wave and overpressure can damage it and fatally injure the astronaut. Therefore the spacecraft must be removed quickly from the booster by an automatic system of abort rockets.

The relative positions of the fuel and oxidizer tanks are important in booster explosions. Other considerations are the kind of fuel and oxidizer used, their mixing rate and ignition delay.

Explosion problems become less critical as the booster gains altitude because there is less atmospheric pressure and less fuel.

Less serious types of failures on manned space flight are a loss of thrust so the rocket does not achieve its scheduled height, or failure of upper stages of a rocket to fire. In both cases, abort recovery action is needed to get the astronaut safely back to earth.

Other failures are due to guidance, control and cabin malfunction. If the malfunction or failure is confined to the spacecraft, manual rather than automatic abort may be preferable.

• Science News Letter, 81:86 February 10, 1962

Astronauts Given Award

➤ THE FIRST two United States astronauts, U.S. Navy Cmdr. Alan B. Shepard Jr. and U.S. Air Force Capt. Virgil I. Grissom, were awarded jointly the Flight Achievement Award by the American Astronautical Society at its meeting in Washington, D. C.

The award, "presented annually to the pilot or crew who, by outstanding ability and courage, has personally extended the frontiers of flight from the earth's environment into space," was given earlier to two pioneer pilots of the X-15 rocket plane.

In 1958 Capt. Iven C. Kincheloe, U.S. Air Force, received the award posthumously, after he had been killed while testing special aircraft in preparation for the X-15. A. Scott Crossfield won the award in 1959 for the early testing of the X-15. No award was given in 1960.

Two other awards, given at the meeting, were the Space Flight Award, received by Dr. Fred L. Whipple, director of the Smithsonian Astrophysical Observatory, Cambridge, Mass., and the Melbourne W. Boynton Award for space medicine, received by a Navy physician, Capt. Ashton Graybiel of the Naval Aviation Medical Center, Pensacola, Fla.

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SPACE

Effect of Weightlessness

➤ ASTRONAUT John H. Glenn Jr.'s experience in weightlessness during his coming orbital flight will not be long enough to cause him any undue stress such as that suffered by Cosmonaut Titov, a U.S. Air Force expert reported.

"Experiments by the Russians with animals and men as well as our own experiments indicate that man can pretty well tolerate, with little, if any discomfort, a period of four to five hours in a weightless or zero-g environment," Col. John Paul Stapp, U.S. Air Force School of Aviation Medicine, Brooks Air Force Base, Texas, and internationally known authority on zero-g research, told SCIENCE SERVICE. Glenn's scheduled three whirls around the earth will take about four and a half hours.

A longer period in weightlessness may result in nausea and other physical discomfort such as that Titov experienced in his 25 hours in space. These discomforts are similar to the effects of motion-sickness which some people suffer from traveling in a boat, car or plane. In such motion sickness, the movement of the vehicle is the cause of stress; but in the free-floating space environment, it is the motion of the astronaut, his own movements, which apparently are the cause of discomfort, Col. Stapp explained.

Man will have to go a week or more in the zero-g environment of space before the physiological effects can be estimated with necessary certainty, Col. Stapp said. Space sickness from weightlessness, like motion sickness, may have no lasting effects. However, the knowledge that it will not hurt him to be weightless will not prevent an astronaut from suffering discomfort in such an environment any more than the knowledge that sailing a boat is not physically harmful can prevent seasickness.

One way to prevent space sickness is to avoid motion of the head, Dr. Stapp said. Titov, it is believed, was instructed to restrict head movements when he reported discomfort during his orbit.

Whether drugs can be effective in counteracting this space stress will depend largely on just what the effects of weightlessness for extended periods prove to be. But whatever the consequences, aerospace medical experts, Col. Stapp among them, are confident that weightlessness will pose no barrier to manned space exploration that cannot be overcome.

• Science News Letter, 81:86 February 10, 1962

SPACE

U.S. Space Program Now Four Years Old

➤ THE UNITED STATES space age is four years old. And soon thousands will look expectantly from Cape Canaveral beach to see Astronaut John H. Glenn Jr.'s "big "firecracker," the Atlas rocket, usher in the U.S. man-in-space age.

It all began on Jan. 31, 1958, when Explorer I, first successfully launched U.S. satellite, zoomed more than 1,000 miles into the sky from Cape Canaveral, Fla., to discover the Van Allen radiation belt, believed the most important discovery of the International Geophysical Year. Explorer I is still circling the earth.

Sixty-five launches sent U.S. satellites into space, the majority from the now world-famous Cape. Of these launches, 62 hurled satellites into earth orbit while three sent payloads traveling around the sun. Some launches sent more than one satellite or probe aloft at a time, bringing the total number of successful earth-orbiting satellite packages to 66, the National Aeronautics and Space Administration told SCIENCE SERVICE.

One of the solar satellites is the Ranger III, launched on Jan. 27, which passed the moon by 22,862 miles.

USSR has had 16 launches, many of them spectacular, including two manned orbital shots, two solar probes and one lunar impact vehicle.

The U.S. space probes and satellites have added greatly to man's scientific knowledge and his understanding of the world he lives in. Cloud covers of the earth and hurricanes have been photographed, the shape of the earth has been more closely determined and the "stuff" and radiation in the atmosphere and outer space have been analyzed. Navigation and long-range communications will be greatly improved by satellite science.

The Mercury man-in-space program has had its tryouts in suborbital shots of animals and astronauts. The dress rehearsal for Astronaut Glenn's orbital flight, scheduled to last three round trips, was the one-orbit flight by the space chimp Enos last November.

• Science News Letter, 81:86 February 10, 1962