SPACE

Satellites Collide

➤ TWO UNMANNED U.S. satellites hurtling through space at five miles per second collided last year but survived the crash and are still operating, it was disclosed recently.

The disclosure was made by Dr. Hilliard W. Paige, vice president of General Electric Co., at the 17th Astronautical Congress in Madrid.

It was the first known case of a collision in what could be described, he said, as "outer space in a rush hour."

The announcement was the most sensational of the opening day of the Congress, being attended by 1,200 scientists from 30 countries.

Speaking before a capacity audience, which included Queen Frederika of Greece, her daughter Princess Sophia and son-in-law Prince Juan Carlos, Dr. Paige spoke on the subject: "Recent flight experience of earth-orbiting gravity gradient stabilizing systems."

He said that in March 1965, the U.S. Naval Research Laboratory launched two gravity-stabilized satellites into a 600-kilometer orbit from a single booster.

"Almost two months later, these two satellites drifted together and collided in what is probably the first man-made collision in space," Dr. Paige said. "After colliding, both satellites were quickly re-stabilized by their gravity gradient systems.

Now, 18 months after launch, both of these satellites are still stabilized in orbit."

Dr. Paige also said a simple gravity-powered "space anchor" for keeping satellites pointed toward the earth has proven itself to be effective, reliable, and capable of long lifetime.

The gravity gradient stabilization system has been successfully used in five satellites. The first such satellite, launched by the Naval Research Laboratory into an orbit 370 miles high in January, 1964, is still being stabilized by the system. "This spacecraft has the second best record for long life operation of an earth-pointing gravity gradient stabilized satellite. The longest record is still held by the moon," Mr. Paige remarked.

The "space anchor" characteristics of the gravity gradient stabilization system depend on the fact that a long object in orbit will tend to point its long axis toward the earth. This is because earth's gravity acts more strongly on one end of the long satellite. Scientists at General Electric's Valley Forge Space Technology Center outside Philadelphia have made use of this principle, which also keeps one side of the moon pointed toward earth.

In contrast to other types of satellite stabilization systems with as many as 30,000 separate parts using gas jets and flywheels to achieve earth-pointing, this gravity gradient system uses less than 50 parts. "We are firmly convinced that gravity gradient stabilization systems are indeed an effective answer to the problem of obtaining long life and reliable operation," Mr. Paige said. "The components are simple in concept and design. Cost is relatively low. Delivery time is short."

The basic gravity gradient system consists of extendable rods on the satellite that are stowed inside it during launch from earth. Once in orbit, the long rods spring out from the satellite. On the end of each rod is a special "damper" that uses the earth's magnetic field to stop the pendulum-like oscillations of the gravity stabilized spacecraft.

When the first satellite with this system was put into orbit in 1964, it swung back and forth like a pendulum forty-five degrees on either side of the vertical. "Within three days," Mr. Paige reported, "the magnetically-anchored gravity gradient system reduced these oscillations to less than five degrees. Today, 32 months after launch, the latest information from orbit confirms that oscillations are still below this value."

In March 1965, two more gravity gradient satellites were launched by the Naval Research Laboratory with the same rocket. One of the satellites stabilized pointing outward into space instead of toward the earth. Upon radio command from the ground, the gravity gradient rods were retracted into the spacecraft, causing it to flip over. The rods were then extended again to stabilize the satellite.

PUBLIC SAFETY

Pilot Foolishness Cited In Small Plane Mishaps

➤ THE VAST majority of general-aviation accidents ending in death can be put down to "horseplay, foolishness and lack of respect for nature," the Federal Aviation Agency reported in Oklahoma City.

From close scrutiny of recent fatal crashes, the FAA's Office of Aviation Medicine has concluded that the accident rate in the general-aviation category (excluding military and most commercial flights) is about 20 times greater than the actual risk of flying in any other category.

Only 5% to 15% of the crashes were caused by structural failures, said the report—"a credit to the products of the aviation industry."

But for pilots the FAA had no such commendation. Most of the remaining 85% to 90% of the accidents were caused by human shortcomings in three areas: horseplay, which the FAA calls "unrestrained exuberance" (buzzing, for example); foolishness, the height of which is taking a drink before a flight; and lack of respect for nature, such as pushing on through bad weather conditions—a kind if "get-there-itis," the FAA said.