SATELLITES

Courier I-B Launched

New communications satellite, with 20 teletypewriter channels, broadcasts news stories from New Jersey to Puerto Rico. The new moon is nearly jam-proof.

➤ THE THIRD ANNIVERSARY of Russia's launching on Oct. 4, 1957, of the world's first satellite brought no major space effort from Russia. Instead, the U. S. triumphed with an active repeater Courier I-B satellite, a forerunner of world-wide communications by satellites.

The 500-pound sphere, covered with solar cells for power, was launched from Cape Canaveral by a 79-foot Thor-Able-Star rocket. Thus, the U. S.-USSR space score just three years after Sputnik became: 26 successful satellites and two deep space probes by the U. S. vs. six earth satellites, one deep space probe and one impact on the moon by the USSR.

The satellite's first orbit brought a message from President Eisenhower to Secretary of State Christian A. Herter at the United Nations in New York.

As Courier speeds about the earth at 20,000 miles an hour, U. S. Army ground stations at Fort Monmouth, N. J., and Salinas, Puerto Rico, feed messages to it and receive them from it. Courier responds only to coded signals from these ground units. Thus, it is just about jam-proof.

Courier has a small transmitter that continuously radiates a signal to alert the ground stations of its approach. Then the ground station tells Courier to unload its recorded (via magnetic tape) messages.

Radio hams cannot receive Courier's secret microwave signals but may catch its tracking signals at 107.97 megacycles.

Through 20 teletype channels, Courier can sweep over a station and in five minutes receive more than 340,000 words —half the length of the Bible—and at the same time broadcast the same amount. Courier also has the capacity to receive and broadcast speech.

In a demonstration, Courier speeded regular news copy between the ground stations.

Of America's two communications satellites, the new Courier rather than Echo seems more practical to most scientific observers. They say future operational communications systems will almost certainly be patterned after this newer satellite.

The reasons:

1. The balloon-like Echo is so light that even the tiny pressure of sunlight—one-fiftieth of an ounce on Echo's surface—lowers the satellite's orbit 3.5 miles a day. The pressure also changes the shape of the orbit. Thus, Echo-type satellites are short-lived by nature.

2. Ground stations powerful enough to bounce signals off Echo are much more expensive than systems which must have only enough power to reach an active repeater like Courier, which has its own broadcasting system and power source.

3. The big drawbacks of Courier—the short life of its tubes and its need for large amounts of power—are being rapidly attacked and overcome. Tubes with lives of ten years and possibly more are now under development at Bell Telephone Laboratories.

The problem of power is really one of weight. The power sources of satellites are their biggest weight. Dr. John R. Pierce, who proposed communications satellites before Sputnik and is director of research-communications principles at Bell, feels that operational communications satellites must have low-power transmitters.

"We should note that such a low power is made possible only by using a broad-band modulation method, such as wide deviation FM and an FM feedback receiver."

Dr. Pierce has reported that Bell is working on such low-power systems. He now believes that "active satellites appear superior to passive satellites for commercial communications."

After Courier repeater experiments, the Defense Department plans to orbit Advent communications satellites of more advanced capability. The Advent system would employ three 24-hour active satellites.

They would cruise in an equatorial orbit 22,500 miles high at the same rate as the earth rotates. Thus they would seem to stand still.

The three Advents together would be in direct line-of-sight with every point on the globe except small areas of the Arctic and Antarctic. And each satellite would at all times be in line-of-sight with the other two.

Thus micro-wave messages could be relayed almost instantaneously.

• Science News Letter, 78:243 October 15, 1960

ASTRONAUTICS

Sun Pressure on Echo

➤ THE PRESSURE of sunlight pushes the balloon satellite Echo 3.5 miles closer to the earth each day, National Aeronautics and Space Administration scientists have figured from orbital data. They say this means Echo may continue in orbit for a year before dropping into dense enough atmosphere to cause the satellite to burn from air friction.

Without the sun's pressure, the satellite might live 20 years, the scientists say.

Dr. Robert Jastrow and Robert Bryant of NASA's Goddard Space Flight Center say the lowest point in Echo's orbit on Aug. 12, when the satellite went into orbit, was 932 miles. The orbit was nearly circular.

The sunlight has pushed the orbit out of shape and pushed Echo until on Sept. 11 it dropped to 864 miles altitude.

The scientists figure the sun's total force on the 100-foot-diameter Echo is only one-fiftieth of an ounce. But Echo is so light that this pressure creates a considerable downward movement.

Some scientists believe light spacecraft with big sails could move about like sailboats, using the sun's pressure as "wind."

Dr. Jastrow and Mr. Bryant also have found that even the very thin air has a big effect.

The drag holds back the forward rush of the satellite so that gravity's pull lowers it into a smaller orbit. Thus the "slowed" satellite actually gets around the earth quicker because it is traveling a shorter route.

Each week, Echo has taken one second less to go around the earth.

Radio signals are still being bounced off Echo in communications experiments. And Echo is still a sphere. It has only a few wrinkles to show for its many miles.

But scientists believe its gases have leaked out. There just is not enough outside pressure that high up to make Echo collapse.

Because its path is often south of the equator at night and because at other times it is often in the earth's shadow, Echo is not often visible in the United States. But NASA expects it to be visible more often the latter half of October.

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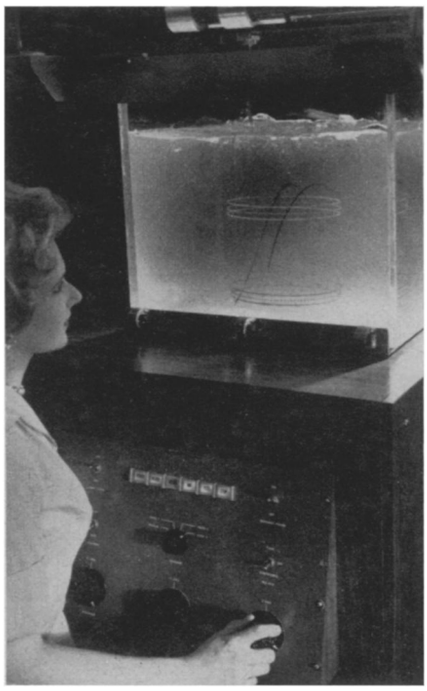

3-D PLOTTER—A three-dimensional plotting device has been developed by Chrysler Corporation Missile Division engineers to record paths of rockets, satellites and aircraft.