News of Science

Vanguard I

Vanguard I, the second U.S. satellite, was launched at Cape Canaveral, Fla., on 17 March by the Naval Research Laboratory's Project Vanguard, the Government agency assigned in July 1955 to the U.S. satellite program for the International Geophysical Year. The 3½ pound sphere, which is 6 inches in diameter, is traveling at approximately 18,000 miles an hour in an elliptical orbit that has an apogee of 2513 miles above the earth and a perigee of 407 miles. The figures exceed those for the three previous earth satellites (the two Soviet sputniks and the Army's Explorer I) chiefly because of the small size of the vehicle, which is purely a test sphere and which contains a minimum of instrumentation—two radio transmitters. Vanguard I is not officially an IGY scientific satellite, although Joseph Kaplan, chairman of the U.S. National Committee for the IGY, announced that its launching had been reported to IGY headquarters in Brussels.

Rocket assembly. The purpose of the firing was to test the 72-foot, three-stage Vanguard rocket, which represents a significant technical advance in rocketry. Prime contractor for the Vanguard assembly is the Glen L. Martin Company of Baltimore, Md. The first stage is said to be the first liquid-propelled rocket to have been designed without stabilizing fins or vanes. Most of the new missiles now follow this design. The saving in weight, and therefore in power needed to propel the vehicle into space, is considerable. Great economies of weight have also been made possible by using extremely thin airframes for all three stages. The first-stage engine, as a consequence, requires a thrust of only 27,000 pounds, compared with the more than 80,000 pounds for the modified Redstone used for the first stage of the Army's Jupiter-C, which launched Explorer I. Kurt R. Stehling, head of the Vanguard propulsion group, has said that the combustion efficiency of the three new rocket motors is "near the limit of the theoretically possible."

The first stage, which is 44 feet long and 45 inches across at its widest part, is a descendant of the Viking research rocket. It is manufactured by the General Electric Company. It uses kerosene for its basic fuel and liquid oxygen for oxidizing. The second stage, 31 feet long and 32 inches in diameter, is a descendant of the Aerobee research rocket and is manufactured by the Aerojet-General Corporation of Azusa, Calif. Its 7500 pounds of thrust are produced by a high-energy fuel called unsymmetrical dimethyl hydrazine and an oxidizer of white fuming nitric acid.

After the second stage burns out, it disgorges the third stage and the satellite sphere from its insides. The third stage, which is a solid-propellant rocket manufactured by the Grand Central Rocket Company, accelerates from a speed of 8500 miles per hour to one of 18,000 miles an hour. It develops 2300 pounds of thrust. When the orbiting speed is reached, a spring mechanism separates the burned out third-stage shell from the satellite.

Visual tracking. The shell—a cylinder-like object some 4 feet long and about 22 inches in diameter that weighs approximately 50 pounds—is orbiting behind the 6-inch satellite. The satellite, which circles the earth every 135 minutes, is probably too small for tracking without the aid of a telescope; however, the third stage casing may perhaps be seen with the naked eye at dawn or dusk.

Radio transmitters. The only unusual aspect of the satellite itself is the radio transmission system. One of the two transmitters carried is run by conventional mercury batteries and is designed to put out a continuous 10-milliwatt signal on a frequency of 108 megacycles for about two weeks. However, the second transmitter is operated by a group of six solar batteries distributed over the surface of the satellite in such a way that one or more always will be turned toward the sun when the sphere is on the sunny side of the earth. The satellite's path is so far from the earth that it will be in shadow for less than half of its orbit.

The solar-powered transmitter sends out a signal of 5 milliwatts on a frequency of 108.03 megacycles and is expected to operate for a long time, probably years, until cosmic dust or micrometeorites cause erosion. The solar batteries are the work of Hans K. Ziegler of the Army Signal Engineering Laboratory at Fort Monmouth, N.J., who is one of the German scientists brought to this country after World War II. He developed his battery from a solar battery produced by Bell Telephone Laboratories in 1954 that is now used to boost power on rural telephone lines.

Vanguard launching schedule. John P. Hagen, director of Project Vanguard, has announced that with the success of Vanguard I, the project has cancelled plans for firing another small test vehicle. The next satellite to be sent aloft will be a fully instrumented 21½-pound sphere. With this change in plan, Project Vanguard will attempt the launching of seven research satellites instead of the previously scheduled six.

Columbia Speeds Chemistry Ph.D.

Columbia University announced recently that it is making radical changes in the Ph.D. requirements in chemistry so that a candidate may complete postgraduate work in two years instead of the usual four or more. An accelerated program will begin in September for about 25 freshmen who have demonstrated exceptional ability in chemistry and related sciences in high school and in tests of the College Entrance Examination Board. The group will be admitted with advanced standing in chemistry and will take 144 points of credit instead of the 126 routinely required for graduation. The new program will enable the special students to begin research for the doctorate in the senior year and to eliminate lecture courses in graduate school. Thus they will achieve the Ph.D. after 4 years of college study and 2 years of graduate work.

Recommendations for U.S. Meteorology

The Committee on Meteorology of the National Academy of Sciences–National Research Council, under the chairmanship of Lloyd V. Berkner, president of Associated Universities, Inc., has released a 35-page interim report, *Research and Education in Meteorology,* which contains recommendations concerning the future of U.S. meteorological research. The most important of these recommendations is a proposal for the creation of a National Institute of Atmospheric Research.

Representatives of a dozen of the universities that are most active in meteorology have supported the Committee on Meteorology with the following resolution, which was directed to Detlev W. Bronk, president of the NAS-NRC: