of the rocket opens. Therefore the speed of the satellite will be slightly greater than that of the rocket shell, which will trail after it. The shell is not expected to remain in orbit long because of its "aerodynamically unclean" shape.

The Navy exhibited a model of the satellite during the International Instrument-Automation Conference and Exposition held recently in New York by the Instrument Society of America. The exhibit was a shiny, magnesium alloy globe of about 20 inches in diameter; it had four radio aerials, each about 3 feet in length, and a few tiny windows. The vehicle will weigh about 21 pounds when it is fully loaded. Half of the weight will consist of a radio transmitter and other instruments that have been designed and built by Project Vanguard scientists at the Naval Research Laboratory.

A plastic cut-away model of the satellite's interior showed (i) a 10-milliwatt "minitrack" transmitter that will be used to track the vehicle from ground stations; (ii) pressure, erosion, and temperature gages that will measure space conditions; (iii) a meteorite collision microphone that will detect collisions between the satellite and tiny solid particles; and (iv) "Lyman-Alpha" equipment for measuring the ionization produced by great solar flares on the face of the sun.

Moonwatch Program

The Smithsonian Astrophysical Observatory has announced that the first alert for volunteer artificial satellite observers will be held before the end of the year. On one evening, the date of which will be made public only a few days beforehand, all observing teams will be manning their stations and will be expected to report what they see, if anything, to the observatory at Cambridge, Mass. A study of the reports will help to decide which stations should be designated as strategic. J. Allen Hynek, associate director of the observatory, is in charge of the tracking program, and Armand N. Spitz is coordinator of visual satellite observations.

The volunteer observing program, in which amateur astronomers and other active watchers of the sky are invited to participate, has been designated "Moonwatch." Those selected will have to be on duty approximately three consecutive evenings a month. Anyone interested in volunteering should communicate with the observatory in Cambridge.

The satellite will be observable only in twilight hours, and the first alert will be held in the evening, beginning a few minutes after sunset. The observations will continue until the end of astronomical twilight, 1½ or 2 hours later. Later alerts will be held during morning twilight, so that volunteer observers can become accustomed to reporting to their stations in the middle of the night and continuing to observe until sunrise.

The visual satellite observing program is one of the most valuable single operations in the artificial satellite effort. In order to make the studies of the earth and the atmosphere which have been established as the goal of the project, very accurate measurements of the satellites in orbit must be obtained. These will be made by a series of specially designed telescopic cameras, placed at carefully selected points throughout the world. The cameras must be directed to the area where the satellite can be found. They are not designed to do the finding but rather to make extremely precise measurements of the satellite's position and motion, very small changes in which will provide the data required for the scientific studies. Those operating the telescopic cameras must have knowledge of the orbit in advance so that the instruments can be trained on the correct region of the sky.

In the early days of any satellite in orbit it is expected that data will be obtained from the radio devices developed for this purpose by the Naval Research Laboratory. However, the radio in a satellite will not last more than 2 or 3 weeks, and the only way to be sure that the satellite is not lost is to rely on Moonwatch volunteers. These nonprofessional observers will send information to Cambridge; there the data will be fed to computers to produce a predicted orbit. With this knowledge, the special satellite telescopes can be aimed for effective use.

There are already about 35 stations in the Moonwatch program, and it is hoped that eventually there will be several times this many. The first station was set up in Silver Spring, Md. It was built at the home of G. R. Wright, chairman of the National Advisory Committee for Visual Satellite Observations.

A number of observing teams have gained the support of civic-minded business and professional organizations in establishing their satellite stations. In Phoenix, Ariz., the station will be located on the top of the skyscraper building of the Valley National Bank. Carl Bimson, president of the bank, has announced that the entire cost of building, equipping, and maintaining the Moonwatch program would be borne by the bank as a public service.

At Sacramento, Calif., members of the Institute of Navigation at Mather Air Force Base have declared their intention to set up and equip a satellite station. In Denver the Moonwatch activities will be sponsored by the Denver Museum of Natural History. In St. Louis, H. C. Grigg, president of the 7-Up Company, has announced that he will construct a complete station on the roof of his building and will equip the Moonwatch team with whatever they require for their observing program.

The basic equipment for a station includes a 25- to 35-foot pole and crosspiece to serve as a meridian marker, a radio, a tape recorder, and a very simple telescope. The brightness of the satellite will range from scarcely naked-eye visibility to between 8th and 9th magnitude, averaging about magnitude 7.

Radio Signals from Mars

The Navy has announced the first detection of radio waves from Mars. They were picked up with a 600-inch radiotelescope at the Naval Research Laboratory in Washington, D.C., by the same team that earlier this year detected radio emissions from Venus.

The radio emissions that were recorded from Mars indicate that the planet's average temperature is slightly lower than the freezing point of water. The signals, which were picked up on two clear nights in the week of 9 Sept. when Mars was at a point nearest the earth, were measured at a wave length of 3 centimeters.

Blood Velocity in the Aorta

A method for measuring, in animals, the velocity with which blood is ejected at a given instant from the heart into the aorta has been developed at the National Heart Institute, National Institutes of Health, Bethesda, Md., by Donald L. Fry, Alexander J. Mallos, and Alfred G. Casper of the Clinic of General Medicine and Experimental Therapeutics. This advance, which will soon be applied to human beings, may make it possible for scientists to calculate the power output of the heart and from this to judge the reserve power of the hearts of both normal persons and heart patients.

The new technique, which measures blood velocity in the aorta itself, is known as "a catheter tip method for the measurement of instantaneous aortic blood velocity." A detailed description of the work appeared in the September issue of *Circulation Research.*

Global Flight to Determine the Earth's Magnetic Field

A world-circling scientific expedition, directed by the Air Research and Development Command to determine more accurately the shape of the earth's magnetic field, took off recently in a Boeing KC-97 from L. G. Hanscom Field in Bedford, Mass. The expedition was a joint under-