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-

taking of the ARDC, the Strategic Air Command (SAC), and the University of Chicago. The global flight was proposed by John A. Simpson and Peter Meyer of the Enrico Fermi Institute for Nuclear Studies.

With scientists of ARDC's Air Force Cambridge Research Center accompanying a selected crew from SAC's Second Air Force, the KC-97 flew a 1500-pound cosmic-ray meter on the 90,000-mile trip in order to measure the intensity of cosmic rays at the equator. From these measurements the shape of the magnetic field, far out from the earth's surface, will be determined.

Assumptions regarding the pattern of the magnetic field above the ionosphere have been based on measurements made on the surface of the earth. Heretofore it has been assumed that this pattern projected outward into space substantially as it existed on earth. Studies of cosmic rays, however, which are influenced by the earth's magnetic field as far out in space as 4000 miles, have given definite indication that the magnetic field is "twisted" and has a pattern that varies from the previous assumption. The measurements obtained during the special flight are expected to permit fairly accurate mapping of the outer magnetic equator. The information gained is expected to be of great help to many agencies who will be using geophysical data during the forthcoming International Geophysical Year.

Effort to Determine the Amount of Matter in Space

A group of investigators from Stanford University are setting up a radio listening post at the southern tip of South America in a new attempt to learn more about conditions in outer space. Ernst Gehrels, a graduate student in Stanford's Radio Propagation Laboratory, has gone to Punta Arenas, Chile, where he will install and operate the receiving equipment. Robert A. Helliwell, a member of the technical panel on ionospheric physics for the International Geophysical Year, is directing the project with support from the Office of Naval Research.

Gehrels will attempt to detect specific signals from the Navy's radio transmitter at Annapolis, Md. These will be commonly used low-frequency signals of around 20 kilocycles, ordinarily reflected back to earth by the ionosphere some 60 miles aloft. Gehrels will be located as near as possible to the point of a signal's return to earth from its take-off point at Annapolis.

The Stanford group's theory is that some of this signal energy penetrates the ionosphere and escapes into outer space. But when there is sufficient ionized matter in space, the escaping signal energy is believed to come under control of the earth's magnetic field, which focuses it and gradually bends it back toward earth. The signal's looping path through space is estimated to be 40,000 miles long and to rise 15,000 miles above the earth. The Stanford experiment may lead to a better estimate of the amount of matter in space.

Varying Incidence of Heart Disease

The Public Health Service has reported wide variations in mortality rates from coronary heart disease in different parts of the United States, with rates twice as high in some states as in others. A survey has been made that is an initial step in a nationwide study of variations in the incidence of heart disease. The survey is described by Philip E. Enterline and William H. Stewart in the 20 Sept. issue of *Public Health Reports,* Public Health Service journal.

Improved methods of reporting causes of death, which became effective in 1949, and population data from the national census of 1950 have provided information for a more accurate study of coronary heart disease rates than has been previously possible. The recent study showed that coronary heart disease causes about a third of all deaths among white males in the age group 45 to 74, and about a fifth among men 35 to 44. The rates among white females were somewhat lower. The lowest death rate for coronary heart disease among white males of all ages in 1950 was in New Mexico, 191.1 per 100,000 population. Arkansas had a rate of 201.2 and Kentucky 211.2.

Rates for white males were highest in New York, Rhode Island, and the District of Columbia (Washington, D.C.): 393.8, 364.3, and 344.3 per 100,000, respectively. For white females the differences in death rates from coronary heart disease in different areas were even greater—83.4, 87.8, and 89.0 in New Mexico, Arizona, and Nebraska, as compared with 217.4, 176.6, and 175.6 in New York, New Jersey, and Rhode Island.

News Briefs

■ The Radiological Institute of Freiburg University, Freiburg, Germany, has reported that the level of radioactivity detected in some grain fields and pastures increased during July and August and reached a level that, if maintained, would be dangerous to human beings. The radioactivity was particularly serious on high ground, and at about 4000 feet it was 10 times as strong as in the valleys. The radioactivity of milk from cows grazing on the heights in the Black Forest was about 5 times as strong as that from cows in the plains.

■ A long-distance call to London by Cleo F. Craig, president of American Telephone and Telegraph Company, inaugurated the world's first transoceanic telephone cable system on 25 Sept. Ceremonies were held in New York, London, and Ottawa. Construction of the phone link, which can carry up to 36 conversations simultaneously, was undertaken 2 years ago by A. T. and T., the British Post Office, and the Canadian Overseas Telecommunication Corporation. The principal underwater section of the system crosses the Atlantic between Clarenville, Newfoundland, and Oban, Scotland.

■ The U.S. Atomic Energy Commission has announced that it proposes to waive its statutory rights to inventions or discoveries resulting from the use of certain materials made generally available by the commission. Notice of the proposed policy and of the materials involved appeared in the *Federal Register* for 18 Sept. The published notice gives opportunity to the public to comment within 30 days after the date of publication.

■ Ground was broken last month for Canada's first nuclear power plant, which will be the plant at Des Joachims on the Ottawa River about 20 miles north of the present atomic research plant at Chalk River. The $15-million installation will have a capacity of about 20,000 kilowatts by 1958. It is not expected to produce power at an economically competitive cost, but it is designed to give scientists an opportunity to learn how to do so.

Scientists in the News

THOMAS F. GALLAGHER of the Sloan–Kettering Institute for Cancer Research delivered the first of the New York Academy of Medicine's Harvey Society lectures. He discussed "Steroid hormone production and metabolism in man." Other lectures have been scheduled as follows: 11 Oct., DAVID BODIAN of Johns Hopkins University, "Physiologic aspects of infectious processes in poliomyelitis"; 15 Nov., ERWIN CHARGAFF, professor of biochemistry at Columbia University, "Of nucleic acids and nucleoproteins"; 20 Dec., FRANCIS D. MOORE, Mosely professor of surgery at Harvard University and surgeon-in-chief for Peter Bent Brigham Hospital, "Metabolism in trauma; the meaning of definitive surgery"; 17 Jan., A. M. PAPPENHEIMER, JR., professor of microbiology at New York University College of Medicine, "Hypersensitivity of the de-