General Electric Company: model of a dual cycle boiling water reactor to be used to power a 180,000-kilowatt plant that the Commonwealth Edison Company, a member of the Nuclear Power Group, proposes to build at the confluence of the Kankakee and Des Plaines rivers 47 miles south of Chicago, Ill. Newport News Shipbuilding and Drydock Company: model of homogeneous reactor developed by the Union Carbide Nuclear Company; model of a Mariner class merchant vessel showing possible utilization of nuclear power for propulsion.

NBS Velocimeter

The National Bureau of Standards has developed an instrument, a velocimeter, that automatically measures the speed of sound in the sea to depths as great as 300 feet and plots the result as a function of depth or time. Martin Greenspan and C. E. Tschiegg of the bureau's Sound Laboratory designed and constructed the instrument under the sponsorship of the Office of Naval Research. Because of its high accuracy and almost instantaneous response, the velocimeter is expected to be a useful addition to underwater signaling and detecting apparatus; it should also prove to be a valuable research instrument in oceanography.

The speed of sound in large natural bodies of water varies from about 4600 to 5140 feet per second. These variations occur with changes in temperature and, to a lesser extent, with changes in water salinity. Sound velocity also increases about 1 foot per second for each 55-foot increase in depth. Several other factors, not all of which are well understood, influence the velocity of sound in the sea. In current practice an estimate of the sound velocity is calculated from the measured temperature and an assumed salinity. The NBS velocimeter, on the other hand, gives an almost instantaneous meter reading of the actual sound velocity.

The instrument consists essentially of a pair of piezoelectric transducers of polarized barium-calcium-lead titanate and a reflector mounted to form a sound path of fixed length. The sending transducer is connected to a pulse generator, and the receiving transducer provides the input for a high-gain pulse-shaping amplifier. The amplifier output retriggers the pulse generator, which then applies another pulse to the sender. The sender in turn produces in the water a sound pulse to actuate the receiver. Thus the system continually regenerates a sound pulse whose repetition rate depends on the time it takes the pulse to move through the water. Since the path length is fixed, the frequency depends only on the speed of sound through the water and on the circuit delays. Any variations in sound velocity are recorded as variations in the operating frequency of the velocimeter.

News Briefs

■ Cecil F. Powell of Great Britain, head of the Bristol University physics department and 1950 Nobel prize recipient, has just returned from a 4-day tour of Soviet nuclear plants. He reports that the 37,000-ton proton synchro-cyclotron on the Volga River is the biggest of its kind in the world. He also reports that Bruno Pontecorvo is working there.

Pontecorvo, born in Italy in 1913, was a naturalized Briton who became senior principal scientific officer at Harwell, a major British nuclear research center. He disappeared while on a holiday in Italy in 1950, then last March he held a press conference in Moscow. He is said to have become a Russian citizen in 1952.

During the recent meeting of the British Association for the Advancement of Science, Powell made known that he had received an invitation to go to Moscow to discuss collaboration in cosmic ray research between Great Britain and the Soviet Union. The proposal for this cooperation came from the Moscow Academy of Sciences.

Powell has expressed interest in the plan. He commented that although there has been a good deal of collaboration with American cosmic ray specialists, little is known of the Soviet work and an exchange of information would be invaluable. Powell, who has been the leader of Britain's study of cosmic rays, is particularly interested in gaining permission to undertake an expedition to the Soviet Arctic.

■ A high-frequency titrimeter for the chemical analysis of complex mixtures has been designed by Andrew Timnick of the Michigan State University chemistry department and Arthur H. Johnson, now with the Bauer and Black Company of Chicago. With the new device analyses can be made without introducing electrodes or electric probes into the solution being studied. The instrument operates in the 100-megacycle-per-second range. Analyses can be carried out on solutions of high concentrations.

■ An electronic instrument that will enable optical scientists to evaluate and grade the performance quality of lenses in objective mathematical terms has been developed experimentally by the Radio Corporation of America. The lens-tester resulted from initial research conducted by Otto H. Schade, R.C.A. engineer who has pioneered in the development of universal ratings and allied test equipment with which the picture quality of all picture-reproducing devices—lenses, motion picture film, TV cameras, and picture tubes—can be determined with scientific objectivity.

Heretofore, the performance quality of any given lens, with regard to sharpness, contrast, and gradation, has been determined solely by visual tests. The R.C.A. device will enable lens manufacturers and users to determine the response characteristics of a lens and compare them with mathematical optimums.

Major components of the lens-tester include a special test drum, a microscope, a multiplier phototube, and an oscilloscope. The test drum has nine groups of high-contrast black-and-white lines of different widths, ranging from 3 per inch for the coarse group to 200 per inch for the finest group. The black lines correspond to 3 to 200 TV lines per millimeter in the image.

To obtain the square wave flux response of a given lens, it is made to view the test drum, which is revolved by a synchronous motor. The lens is also rotated, about its transverse axis, to test its performance off axis. The lens image of the test drum is then scanned by the multiplier phototube through a narrow slit.

For a theoretically perfect lens, the contrast between black and white lines, as measured by the phototube, would be modified only by diffraction effects. With a practical lens, the contrast deteriorates as the line width decreases because of the combined effects of diffraction and aberrations. The line at which the contrast disappears represents zero square wave flux response for the given lens.

■ The surplus of women over men in Sweden dropped from 130 per 1000 in the middle of the 18th century to only 8 per 1000 by 1950 according to a recent publication issued by the Swedish Central Bureau of Statistics. The number of persons over 65 years of age has increased from 6 to 10 percent of the total, while that of persons below 15 has decreased from 33 to 23 percent of the population.

■ Findings that throw considerable light on the nature of the oxygen effect in modifying some of the effects of ionizing radiations on living systems are reported by H. Laser of the University of Cambridge in *Nature* (20 Aug.). The change produced in hemoglobin depended on its initial oxidized or reduced state, and was independent of the presence of oxygen. That is, irradiated hemoglobin becomes oxidized, whereas methemoglobin becomes reduced.

Like hemoglobin, ferrocytochrome becomes oxidized whether irradiated in air