NATIONAL INSTITUTE FOR NUCLEAR SCIENCE.

A contract worth considerably more than half a million pounds has been placed with British Brown-Boveri Limited by the Governing Board of the National Institute for Research in Nuclear Science. It covers the supply and installation of the complete electric converting plant for the 7,000 million electron volts Proton-Synchrotron being built on a site adjacent to the Atomic Energy Research Establishment at Harwell. Brown, Boveri & Co., Limited, Switzerland, are to design the plant and to supply from their Baden Works approximately three-quarters of the machinery required whilst the balance will be manufactured under the firm's licence at a British Works. The converters, which consist of 96 single-anode type grid controlled mercury arc steel tank rectifiers/inverters, are fed by two motorised flywheel driven 60,000 kVA alternators to be supplied by a British firm under a separate contract and co-ordination of design of the complete power plant is Brown-Boveri's responsibility.

The plant must be capable of feeding into the magnet coils of the Proton-Synchrotron a continuous series of direct current impulses rising to a value of 8,000 amps.; the maximum pulse pressure being 18,000 volts, and the repetition rate 26—28 pulses per minute. The extensive control system *inter alia* provides for the recovery of the electrical energy stored in the magnet at the end of each pulse and initially supplied by the alternators via the rectifiers whereby the latter, working as inverters, convert the direct current flowing back from the magnet into alternating current, which in turn is fed back into the alternators and stored as kinetic energy. Thus the net electric energy to be supplied from an outside source is relatively low and just sufficient to compensate the losses of the power plant and magnet.

The power plant is a major part of the Proton-Synchrotron of which the main component is a magnet ring, 120 feet in diameter, weighing over 6,000 tons. Protons injected into the ring shaped high vacuum tube are accelerated in a circular orbit until they have acquired a total energy of the order of 7,000 million electron volts when they are allowed to strike target atoms.

The Proton-Synchrotron ranks amongst the world's largest accelerators in operation or now being built. Brown-Boveri's acquired knowledge and experience in designing and manufacturing the power plant for the 25,000 million electron volts Synchrotron for the European Council's Nuclear Research Establishment at Geneva (CERN) have been decisive in securing the contract for the Harwell converting plant. Whilst the CERN Synchrotron has a magnet ring of about 600 feet diameter, the pulse frequency is 12 per minute. For the Harwell accelerator, with a pulse frequency of 28 per minute, the energy required to charge the magnet is higher than for the CERN installation.

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