DR Hatford

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NATIONAL INSTITUTE FOR RESEARCH IN NUCLEAR SCIENCE

GOVERNING BOARD

Progress at the Rutherford Laboratory

Note by T. G. Pickavance

1. Proton Linear Accelerator

The polarised ion source has been installed and has been under test on the machine since the beginning of February. A beam of 10^8 protons per second has been achieved, at 30 MeV but beyond Tank III, with a polarisation of at least 30%. The equipment operates very reliably and the results are already nearly up to expectation; it is hoped eventually to achieve 40% polarisation with 3.10^8 protons per second. This project was initiated after the P.L.A. was handed over to the Institute. The comparable project at the University of Minnesota has so far achieved 1.2×10^6 protons per second at 10 MeV, which corresponds in the case of the Minnesota machine to no more than 5×10^4 protons per second at full energy.

The accelerator is now operated on a two-shift schedule at 30 MeV, 5 days per week for experiments and two for maintenance and development. This is an increase of 40% in effective running time over the previous schedule. The active users of the machine include teams from:

A.E.R.E., Harwell
A.W.R.E., Aldermaston (occasionally)
Westfield College, London
King's College, London
University College, London
Oxford University
Exeter University
Rutherford Laboratory

In addition we have a research student from Queen's University, Belfast, working full time for his Ph.D., and we have agreed to accept teams from Queen Mary College, London, and Manchester University. There are now 45 visiting physicists engaged in the research programme, and 5 qualified nuclear research workers in the resident N.I.R.N.S. team.

2. Nimrod

Magnet model VI, which was made from nine production magnet blocks and was used for establishing the final design of components, has been dismantled and the nine blocks have been installed in the Nimrod magnet room. All the magnet blocks are now in their final positions. Some coil conductors have been installed in all the octants. Throat and lip conductors have been installed in four, and end conductors are being installed in two.

All the 96 excitron sets have been received from Switzerland and have been installed in the converter room. Much of the associated electronics control gear has been delivered and is being installed. Both 60 MVA alternators have been completed by the English Electric Company and are on test at the factory. Components of the two driving motors have been manufactured, and one of the flywheels has been delivered. Four of the main rectifier transformers have been delivered.

Manufacture of the pole-face correction windings has been started by Marston Excelsior Ltd.

A contract has been placed for the manufacture of the final version of the radiofrequency drive chain for the accelerator unit.

The radiofrequency liner of the injector has been installed. A Q value of 90% of the theoretical value has been obtained. The whole of the linear accelerator, with the exception of the drift tubes, has been evacuated to a satisfactory pressure. More than half of the drift tubes have been delivered and are being installed. The radiofrequency power source for the injector has been tested at 600 KW and is expected to produce the necessary 1.5 MW.

The prototype outer vacuum vessel octant has been delivered and installed in a test bay which has now been fully equipped with pumping units, jigs and control equipment for testing all the vessels. The prototype appears to be satisfactory apart from certain dimensional errors; it is not intended to be installed in the accelerator, but may be rectified later and kept as a spare. Evacuation tests have been started. The first production outer vessel octant and the prototype inner vessel octant are being manufactured. The vacuum vessels are still the most difficult problem on the project and may cause further delay on the overall time programme. Several senior staff of the laboratory have been freed from some of their other duties to enable them to spend more time at the factory of Marston Excelsior Ltd., and the firm's organisation has been strengthened after discussion with the new Managing Director. Joint technical teams have been formed, staffed by the firm and the Rutherford Laboratory, and a senior member of the firm's staff has been placed in charge of production full time. It is hoped to substitute a fixed price contract for the present development contract very soon.

3. Auxiliary equipment

Most of the electrical and mechanical equipment to be supplied by the Institute for the National Hydrogen Bubble Chamber has arrived and is being installed. Many of the main components of the bubble chamber proper have been delivered and are being installed under the supervision of the university staff who have been in residence at the Rutherford Laboratory for several months.

Some of the components of the heavy liquid bubble chamber have been ordered and work has started on the building.

The initial set of beam transport and analysis equipment has been specified in more detail, and engineering work is progressing on the main components.

Work is being done at several universities, aided by E.M.R. agreements, and also at A.E.R.E. on apparatus for nuclear research, including Cerenkov counters, spark chambers and a liquid helium bubble chamber.

Arrangements have been made through the Authority to use development work sponsored by C.V.D., and agreement has been reached with the A.E.R.E. for collaboration in long range electronics research and development on instrumentation for nuclear research. An electronics group is being set up within the Rutherford Laboratory for short-term development and support for nuclear research teams.

4. Buildings

Most of the Nimrod buildings are complete, and the remainder are ready for installation of plant. The restaurant and a heavy physics laboratory have been approved by the Treasury and are being designed. Building construction continues to lag behind staff numbers, and accommodation is generally overcrowded and uncomfortable.

5. Administrative matters

The staff transfer exercise was satisfactorily completed in January. The great majority of the staff working on Institute matters at the Rutherford Laboratory accepted transfer to Institute employment.

All other administrative matters relevant to this report have been covered in papers to the Personnel Committee and the General Purposes Committee which Board Members already have.

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