

## SECTION 11

### OPERATION

The Nimrod Operating Staff has been built up gradually during the past two years. Engineers and technicians were occupied in the installation, commissioning and operation of equipment, with the long term aim of developing balanced crews, and members of which should be able to operate the accelerator and, in addition, provide a steadily improving coverage for fault diagnosis and first line repair. Experience has now been gained on equipment in all parts of the machine and has necessitated the development of safety, interlocking and operational procedures.

Various items of plant have been running for a considerable time: in particular, the main magnet has been pulsed for many hundreds of hours during periods of magnet and main power plant testing, and also for the magnetic survey. The administration of the magnet room to allow a maximum amount of installation and commissioning work to proceed safely during these periods has been a major problem since hundreds of personnel (staff and contractors) are involved.

Shift work has been adopted as required since the autumn of 1961 and the present staffing position is such that Nimrod could be crewed operationally from the main control room for about 60% of the available time.

Experience in accelerator operation has been gained in the injector room, where 15 MeV beams have been run on 86 days between 1st August, 1961 and 31st December 1962. Initially, installation work was carried out during the day-time and a team consisting of a Duty Officer, Assistant Duty Officer and Duty Technician (with extra support when required) supervised beam operation in the evening. When more reliable beam operation was achieved, it was found necessary to allocate alternate periods to installation and experimental or commissioning work. These periods were not in general of identical length but were based on a weekly module. The injector was manned for 15 hours a day and during an experimental week 12 hours a day for 5 days was scheduled for beam operation. Whenever possible, all other time was used for maintenance, installation or commissioning of plant.

At the end of 1962 the injector was not yet complete as a fully operational machine and close co-operation and liaison was still maintained between Construction and Injector Groups. Generally, all experimental work was carried out using the permanently installed systems if possible but some of the planned facilities were not then available. The machine is expected to increase in reliability when all the designed equipment is in use.

Present experience shows that the percentage of the scheduled hours during which actual running is obtained, increases substantially the longer the machine is kept running - by the end of 1962 the running time had reached 75%. With most equipment on the injector few faults have recurred, having once been rectified, and running time should increase still further as the faults encountered during commissioning are eliminated.

Up to the end of 1962 the injector was operated from the local control room only. Considerable operation experience has been gained which it is anticipated will be of great value when full commissioning and operation take place from the main control room. Some equipment has in fact already been tested and operated from the main control room and installation of the remainder of the control system will proceed steadily to provide operational facilities from either control position.

In an accelerator as large and complex as Nimrod many troubles must arise during construction and commissioning; details of some and how they were overcome are recorded elsewhere in this report. The following general points may be worth mentioning from an operational point of view:-

(a) The cooling water circuits throughout the machine have been a frequent source of trouble. If plant of greater capacity had been installed, with more complete standby and isolating facilities, many of these troubles would have been eliminated.

(b) Since it has often proved difficult for the designer to forecast control cabling requirements well enough in advance to allow the job to be engineered as a whole, it would have helped considerably if main control cable marshalling points had been established in the early stages near the injector control room, in the magnet room and adjacent to the main control room. The installation of the main cable runs could then have been carried out well in advance of the machine requirements.

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