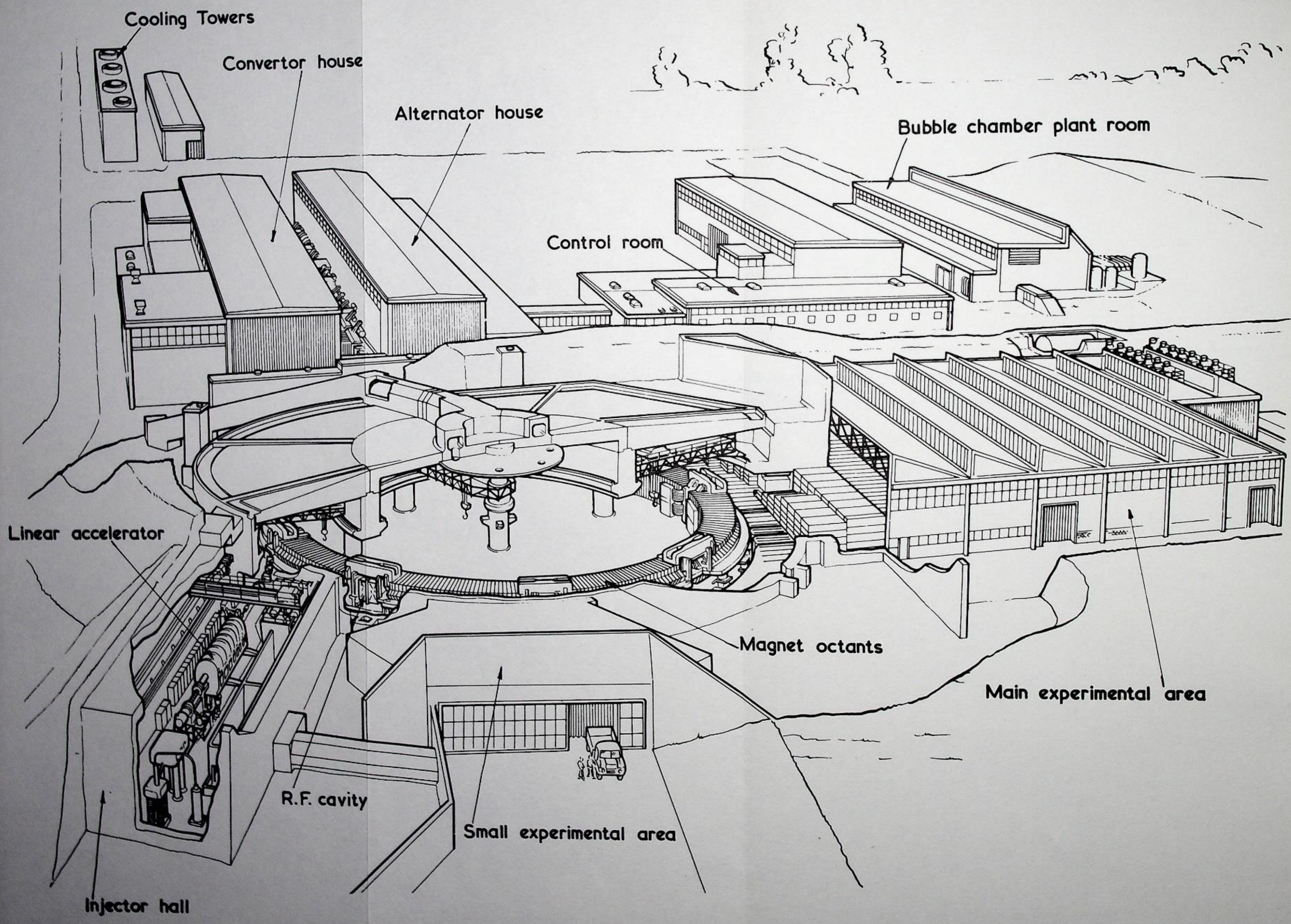
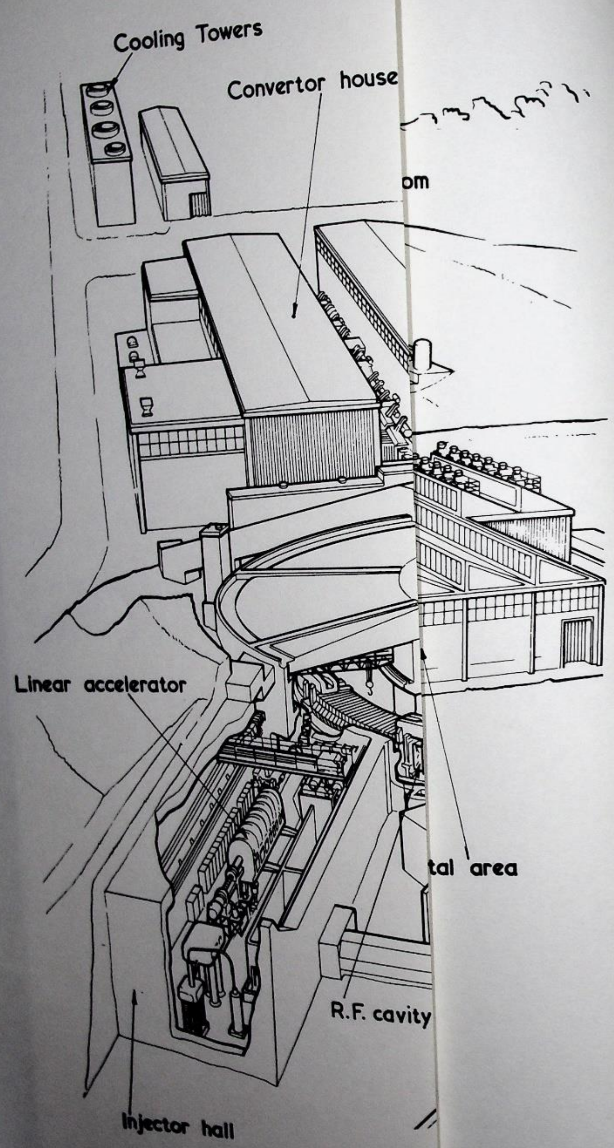


The 7GeV Proton Synchrotron, NIMROD



NATIONAL INSTITUTE FOR RESEARCH IN NUCLEAR SCIENCE

NIMROD

A 7 GeV Proton Synchrotron

(Part 1)

Edited by

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March 1965.

EDITORS' NOTE

This is the first part of a comprehensive report on the design, construction, commissioning and operation of Nimrod. The amount of information which is worth recording is too extensive to include in one document and also, to publish at least part of the report comparatively quickly, it was necessary for authors of individual sections to make contributions long before the commissioning of the machine was complete.

Work on the report was initially started with the object of producing a "progress report" covering all aspects of the work on Nimrod during the five years from the original decision to build the machine in 1957 up to the end of 1962. It soon became obvious that the report provided an opportunity (possibly the only opportunity) to record the work involved in designing and building the machine in some detail. Consequently it was decided to modify the original conception of a comparatively brief progress report to that of a much more comprehensive and detailed document which would allow the publication of all development, measurement and testing work of a sufficiently interesting or unusual nature, and allow a description of the methods used in overcoming any difficulties peculiar to the construction of Nimrod. (Previously published work, or work about to be published, is generally not recorded in detail but is covered by lists of references.)

This decision meant that the dividing line at the end of 1962 need no longer be strictly adhered to but, in order to complete the first part of the report, writing had to proceed to a conclusion as quickly as possible and the final document is still influenced by the earlier progress report scheme and does mainly describe work on the machine up to the end of 1962.

The second part of the report (to be published later) will cover all aspects of the work on each section of the machine which were not described in the first part; i.e., it will mainly be concerned with the period: January 1962 to October 1964 (including the achievement of the design intensity of 10^{12} protons per pulse in August 1964) and will describe the problems and achievements of the final commissioning of the machine, targetting, the external beam and the experimental area facilities.

B. G. Loach
B. Southworth

Rutherford High Energy Laboratory.
11th March, 1965

ACKNOWLEDGEMENT

It is impossible to acknowledge adequately all individual contributions in the case of a complex project such as Nimrod, which has occupied many years and involved many people at different stages of the work. However, lists of staff who collectively contributed to the various main sections of the project will be given in part 2 of this report. The following had major responsibility for the preparation of part 1 of the report:-

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The editors would like to thank all those concerned for their assistance and patience during the long drawn-out task of preparing this report.

FOREWORD

The Nimrod project like all other accelerator projects, was never more than a means to an end. It was specified in 1956 in very simple terms, after much discussion by many physicists who craved for up-to-date facilities for high energy research, as a source of at least 10^{11} protons per second with at least 6.5 GeV kinetic energy. The sights were subsequently raised to 5 x 10^{11} protons per second, at 7 GeV. Strictly speaking, therefore, the real story began only in February 1964, 6½ years after construction started, when the reliability and intensity of Nimrod justified its scheduled operation for research.

But for the many physicists, engineers, technicians and craftsmen who struggled during those years with the many problems discussed in this report, Nimrod necessarily seemed very much an end in itself. In all work of this kind, done against a ruthless timetable, it is difficult to find time or energy for recording properly the way in which the problems have been tackled. When the job is done, everyone is anxious to adapt himself to his real work of operating, developing, or exploiting the monster he has helped to create. It often happens, therefore, that only brief outlines of the highlights are put on record. This is a pity, because the future exploitation of such a valuable and complicated instrument as a high energy accelerator, eventually by people who played little or no part in its original design or construction, could be greatly aided by full and professionally prepared records. Similarly, there would be much in such records to help engineers and physicists working on similar problems in other projects - not only for high energy physics, because accelerators cover a wide range of engineering and technology.

For these reasons, I am sure that this report will be valuable to many people, and the Editors and contributors deserve our thanks for their hard work in preparing it. I hope that the report will also serve as a tribute to the hundreds of members of the Nimrod project teams who contributed so much during 6 years to the successful completion of a major enterprise.

T. G. Pickavance
Director, Rutherford Laboratory.

C O N T E N T S

SECTION 3. INJECTION SYSTEM

SECTION 4: MAGNET AND ASSOCIATED SYSTEMS

SECTION 5: MAGNET POWER SUPPLY

SECTION 6: R.F. SYSTEM

SECTION 7: EXTRACTION SYSTEMS AND INTERNAL TARGETS

SECTION 8: VACUUM SYSTEM

SECTION 9: CONTROL SYSTEM

SECTION 10: ANCILLARY PLANT

SECTION 11: OPERATION

REFERENCES

ILLUSTRATIONS

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