Introduction

As part of a design study for a 300 - 1000 Bev synchrotron a conference was held during the first two weeks of April, 1961, at the Brookhaven National Laboratory for the purpose of discussing the design of linear accelerators suitable for use as injectors. Since it appears that injectors for 300 to 1000 Bev machines must provide protons in the 2 to 10 Bev range, and since the largest proton linac constructed to date operates at less than 70 Mev, the design study involves a considerable extrapolation of existing practice.

Important contributions to the linear accelerator conference were made by speakers from the Argonne National Laboratory, the Brookhaven National Laboratory, Michigan State University, the Midwestern Universities Research Association, Stanford University and Yale University. New ideas from the Lawrence Radiation Laboratory also were presented by one of the above speakers. Minutes of the conference sessions were taken by Dr. A. van Steenbergen, who has prepared the compilation that follows. It is our hope that this document will be useful as a guide to all groups interested in the design of high-energy linacs.

Primary conclusions of the conference were:

1) A 2 to 10 Bev linear accelerator delivering about 20 ma of protons can be designed with information presently available. Its characteristics can be tailored to fit the requirements of a 300 - 1000 Bev synchrotron.

2) The section of the linac between about 150 Mev and about 400 Mev, if designed by existing methods, will operate rather inefficiently and will require a disproportionate amount of rf power. This situation is not disastrous since the inefficient section is not a major fraction of the linac. The problem does, however, merit attention and will receive study during the coming months.

Several new ideas and developments were introduced at the conference. New ideas for drift-tube shaping and new methods for calculation of drift tube contours were presented by Beringer and Gluckstern of Yale and Mills of MURA. New advances in the study of linac phase oscillations were discussed by Teng of Argonne and Mills of MURA. Blosser of MSU outlined the characteristics of a 200 Mev cyclotron suitable for an injector for a linac.

The other speakers accumulated data and experience from which it seems reasonable to conclude that available electrical and mechanical linac design, rf power sources, vacuum technique and ion sources are adequate for the purpose in hand.