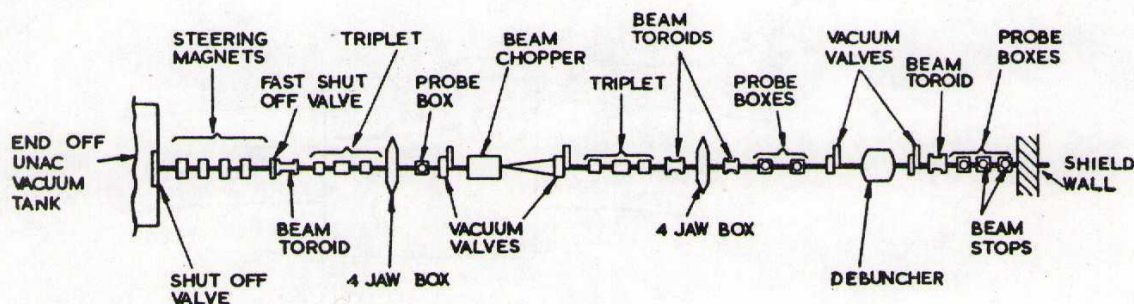


NIMROD INJECTOR: HIGH ENERGY DRIFT SPACE AND ACHROMATIC INFLECTOR SYSTEM

After being accelerated to 15 MeV in the Linear Accelerator, the proton beam is conveyed about 65 ft. along the High Energy Drift Space (HEDS) before entering the Achromatic Inflector System. The HEDS provides room for the Debuncher (Technical Leaflet A3) and other equipment (such as apertures, quadrupole focusing magnets etc.) serving to adjust the 15 MeV beam so that an increased percentage is 'accepted' by the synchrotron.



Steering Magnets: These are used to position the beam along the centre of the flight tube (aluminium pipe pumped to very low pressure).

Beam Toroids: These are current transformers for measuring the beam intensity. (Technical Leaflet A2)

Triplet: A triplet consists of a symmetrical arrangement of three quadrupole focusing magnets. Each triplet approximates to a thin focusing lens.

Probe Boxes: These allow targets, apertures etc. to be introduced into the beam path.

Beam Chopper: This is a pulsed high voltage deflector which enables the beam pulse length to be reduced down to 1 μ s.

Four Jaw Boxes: These are aperture defining plates which can be operated from the control room to control the beam size vertically and/or horizontally.

Vacuum Valves: The vacuum valves enable items of equipment which need attention, to be let up to atmospheric pressure while the rest of the Injector remains pumped down.

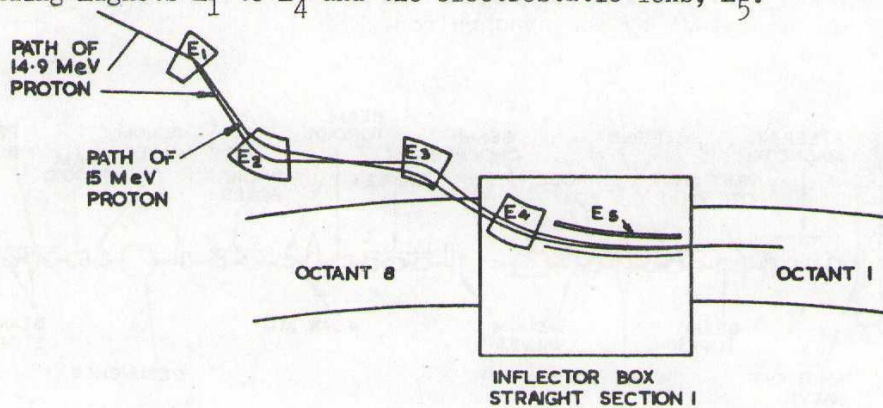
Beam Stops: These are graphite plates which can shut off the full aperture of the flight tube to prevent beams being passed into unprepared equipment or areas.

Shield Wall: The radiation shield wall allows personnel to work in the Magnet Room while the Injector is operating with 15 MeV beams.

Achromatic Inflector System

The beam must be kept small and the inflector lip made very thin to enable as much beam as possible to enter the magnet ring and to circulate without loss. For this reason the final bend in the inflector system is achieved by means of an electrostatic field between two curved electrodes. The earthed electrode completely surrounds the high voltage one to avoid any effect on the beam already circulating in the Magnet ring.

An overall deflection of 25° is needed to introduce the 15 MeV beam tangentially into the ring. The inflector system, which achieves this, consists of four bending magnets E_1 to E_4 and the electrostatic lens, E_5 .



The system is designed to be 'achromatic' so that protons of slightly different energies which enter E_1 along the same path, will enter the synchrotron along the same path. The system can be adjusted to give a large variation in the radial position of the injected beam, while still maintaining the achromatic property. Injection takes place while the magnet field is rising. The rising field shrinks the orbit of the beam and it misses the inflector on subsequent revolutions.

