and PANDIRA and a suitable geometry of the core was selected. To minimize variation in magnetic length during the ramping process, shape of the poles at entry and exit have been chosen to be a cosine hyperbolic function. Eddy currents generated in the core due to temporal variation of magnetic field are minimized by using 0.35 mm thick CRGO silicon steel laminations as the core material.

One dipole magnet based on this design has been fabricated and tested at different field levels. Field mapping of the magnet was carried out with an indigenously developed equipment which has a facility to move the Hall probe with an accuracy of 20 microns. The magnet has been characterized to have the required good field region and constant magnetic length during field ramping.

For convenience in fabrication, the magnet was assembled from 24 small arc shaped blocks. One such block has 158 laminations of 570 mm x 790 mm and 5 pieces of smaller size laminations (to make a sector type block). To achieve the required field uniformity over good field region, the pole gap was kept uniform to an accuracy of 50 microns in the assembled condition. This required strict tolerances at various stages of fabrication such as die punch fabrication, lamination punching and assembly of laminations. Each magnet has two coils made of hollow OFHC copper conductors (15 mm x 15 mm cross section with a 10 mm inner diameter) to carry the magnetizing current. The coils have three pancakes, each having 10 turns insulated through Kapton tape. The magnetic field of 1.3 Tesla was produced by passing a current of 1000 A through each coil. The heat produced due to passage of current through the coils is removed by flowing low conductivity water through them at 100 psi. The laminations for the remaining five magnets are ready and their assembly is in progress.

RF Power Source

The Indus-I Synchrotron Radiation System requires two RF cavities, one in the synchrotron for acceleration of electrons and compensation of energy loss due to synchrotron radiation and the other in the storage ring Indus-I to replenish energy loss due to synchrotron radiation. Both these cavities will have an operating frequency of 31.613 MHz and will be fed by two 12 kW RF power sources.

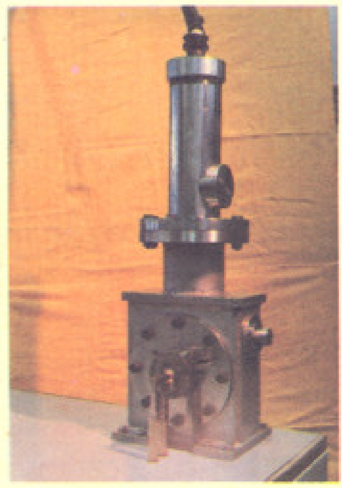
The power source for the synchrotron cavity has been developed. It mainly consists of a frequency synthesizer, a 200 W solid state amplifier and a power amplifier. The signal from a frequency synthesizer with a frequency stability of 10^{-7} is boosted to a level of 200 W by an indigenously built solid state amplifier. The power amplifier developed in-house using an indigenously manufactured BEL 15000 CX tetrode tube further amplifies the 200W signal to the required 12 kW power level. The power amplifier operates in a class C grid driven configuration. The entire amplifier has been assembled in a copper shielded box for good RF grounding and shielding. The plate of the tetrode is connected to a 7 kV, 4 A, series regulated DC power supply which has been designed to give a voltage regulation of better than 0.1% and a ripple less than 0.01%. A 1 kV, 100 mA regulated power supply has also been built to feed the screen grid of the tetrode. The power amplifier and its control system have been tested to the full power with a dummy load.

Rotating Anode X-ray Generator

Rotating anode x-ray generators are high intensity laboratory x-ray sources which provide photon flux many times that of a conventional sealed x-ray tube. These are in great demand in the country for several applications such as EXAFS, X-ray topography, powder diffraction studies etc.

A prototype rotating anode x-ray generator (RAX - 5V) of 5 kW power has been developed at CAT under a project sponsored by the Board of Research in Nuclear Sciences (BRNS). This will shortly be installed at the Physics Department, Vikram University, Ujjain, for detailed performance evaluation.

In the generator, x-rays are produced by the impact of a 20-60 keV electron beam on an anode rotating at a speed of 3000 RPM. The anode made of OFHC Copper can be directly used as an x-ray target to produce characteristic x-rays of 1.54Å or can be used to produce other wavelengths by coating it with other target materials. To minimize movement of the photon source in operating conditions the anode is dynamically balanced. It is cooled by chilled water to avoid heating due to electron beam which dissipates upto 5 kW of power. The electron gun, of a modified Pierce design, has an oxide coated tungsten filament mounted in a specially designed focussing cathode to produce a line source at the anode. The anode and the electron gun are housed in a chamber evacuated to a pressure less than 10^{-6} torr. X-rays are extracted through two Be windows, one providing a line source and the other a fine spot source. For stability of the photon flux, power supply for the cathode has been designed to give a voltage regulation of 0.1%.



X-ray tube assembly