about two weeks with the assistance of the manufacturer, Accelerators, Inc.

The necessary parts of an ion implanter are: an ion source, accelerating column, mass separator, and target chamber. Fig. 1 shows how these parts were integrated in the construction of the machine at RCA Laboratories. This implanter is essentially two machines in one: a research and development (R&D) line and a production beam line with a common ion source, accelerating column, and mass separator. Ions can be implanted using one line while work is being setup in the other.

Ion source

The photograph of Fig. 2, taken inside the lead-shielded room, shows the ion source with its controls and the accelerating column. An ion source must provide an intense source of the desired ion, be readily controlled, and remain stable when set. Two ion sources are available that can be attached to the machine. One utilizes a 100-MHz oscillator which ionizes a gas of the desired material in a Pyrex tube with exterior electrodes. The gas from a large bottle is continuously fed into the system through a thermomechanical leak. The ionized gas is pulled from the discharge by a dc voltage and focused magnetically through a small hole into the accelerating column. This form of ion source is easy to use for any material that can be obtained as a gas or vaporized by rf discharge. For non-gaseous materials, the material is placed in a heated chamber, and the vapor is ionized by an electron stream. By proper choice of either of these two sources, ions of most elements can be produced. All the source controls are at +300kV with respect to ground and are cantilevered from the grounded support at the wall of the lead-shielded room (Fig. 2). Thus, all the equipment outside of the lead-shielded room is at ground potential. The controls of the ion source are driven by servo motors at ground potential through 2-1/2 foot-long plastic rods passing along the accelerating column. Controls for the servo motors are at the main control panel.

Accelerating column

The accelerating column consists of two rows of accelerating rings—one to accelerate the ions and the other row,