



THE MODEL 200-90 HP PRODUCTION ION IMPLANTER (TM)

GENERAL DESCRIPTION

The Model 200-90 HP is a compact, self-contained, simple-to-operate, complete ion implantation system designed for dedicated high-volume production use. The system uses a unique, field proven, AI exclusive hybrid scanning technique,* electrostatic scanning in one direction, mechanical in the other, to provide a throughput capability unequaled by systems of conventional design. At typical MOS dose levels, e. g., 2×10^{12} ions/cm², the system will automatically process over 2,000 2-inch wafers** per 8-hour shift, all of which will be held within a $\pm 2\%$ uniformity tolerance. At the dose level of 5×10^{14} ions/cm² using only 25 μ A boron ions, the implant time per 2-inch wafer is approximately one minute.

The operational simplicity of the system is such as to permit its operation by a production worker with a few hours training. Once turned on, the operator's only function is to load and unload wafers at the completion of each batch.

PERFORMANCE SPECIFICATIONS

The Model 200-90 HP production system is guaranteed to meet or exceed the following specifications:

1. Energy: 20 - 200 keV continuously variable
2. Beam current (at maximum energy):

Boron	40 μ A
Phosphorus	40 μ A

* Patent Pending

** 3-inch wafer capability available

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3. Integrator accuracy: 0.02%
4. Pumpdown time of chamber to operating vacuum: Less than 8 minutes
5. Dose uniformity: Nonuniformity will be less than $\pm 2\%$ on a 2-inch wafer
6. Dose reproducibility: $\pm 2\%$, wafer to wafer and batch to batch

FACILITIES REQUIREMENTS

1. Power: 208/220 V $\pm 5\%$ single phase or three phase, 100 amperes with neutral, 50 - 60 Hz
2. Water lines: Four 3/8" polyflow water-in lines
Four 3/8" copper water-out lines
3. Water: 5 GPM @ 60° F - 80° F
4. Nitrogen: Dry, water pumped, 2 - 5 PSI for backfilling chamber and system as required
5. Air: Dry air, 80 - 100 PSI for operation of electropneumatic valves
6. LN₂: 10 liters/hour (during operation)

PHYSICAL DATA

Approximate outline dimensions (see attached drawing):

Length: 9 1/2 feet

Width: 5 feet

Height: 9 feet 5 inches

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MAJOR COMPONENTS

1. Implanter Frame Assemblies

The Implanter is constructed on a frame assembly made of tubular aluminum. Each frame is caster mounted and is supplied with adjustment pads for leveling and permanent installation. The system is fully enclosed and houses the power supplies, vacuum pumps, and interconnecting cables necessary for system operation. Services terminations are provided on the frame enclosures and hinged doors and removable panels are supplied for access during maintenance.

2. Accelerator and High Voltage Terminal

The 200-keV accelerator and HV terminal are vertically mounted. The accelerator consists of a high voltage terminal and supplies, 200-keV accelerating column with cryopump and LN₂ controller and cold cathode source.

The high voltage terminal is furnished with all of the supplies necessary for operation of the cold cathode ion source. Source lifetime is greater than 100 hours at specified current. All power supplies required for beam extraction and focusing are supplied.

In addition, the terminal is equipped with two, mechanical-leak, gas handling assemblies and corrosion resistant regulators as required to provide individual control of gases. Roughing valves are included on each gas system to permit gas line evacuation.

3. High Voltage Power Supply

The high voltage power supply furnished with the system is a high-frequency, regulated supply designed and manufactured by Accelerators.

AI power supplies have been designed especially for ion implantation systems and provide low peak-to-peak ripple at a very low stored energy factor. This coupled with precise regulation ensures the stability



necessary for beam purity and, therefore, reproducible implants. Since the high frequency design greatly reduces the stored energy found in most supplies, overall system reliability is greatly increased. Specifications for the supply are as follows:

- a. High voltage output: 20 - 200 kV continuously variable
- b. Output current: 1.5 mA
- c. RMS ripple: 0.05% at full voltage and full load
- d. Stability: 0.1%
- e. Isolation transformer: 1 kVA
- f. Insulation: Oil

4. Implanter Pumping Systems

The Implanter is furnished with two identical high-speed oil diffusion pumping systems with automatic LN₂ fillers; one located at the accelerator just following the accelerating column, the other near the chamber. All system gate valves, vent and roughing valves are electro-pneumatically operated and chamber valves are automatically sequenced during batch cycling.

All gate valves are interlocked to close automatically in the event of power or vacuum failure.

The chamber pumping system is fully automated to sequence through its pumpdown and vent cycles automatically. Manual override is provided so that each valve can be individually operated. The target chamber ion gauge is supplied with its own controller.

5. Controls

Set up controls for the Implanter are mounted on the main frame of the system. Operator (process) controls are located near the processing chamber.

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6. Analyzing and Switching Magnet

The Implanter is furnished with a homogeneous field, double focusing, analyzing magnet with a mass x energy product of 7.5 at 90 degrees. (Magnets for analyzing arsenic are available at additional cost.)

7. Beam Line Components

The beam line is made up from the following components: bellows assemblies, drift tubes, variable slit assembly, 7° neutral beam trap, vertical scanning system, roughing valve, automatic gate valves, lens and beam shutter.

8. Processing Chamber

The stainless steel chamber furnished with the Implanter is equipped with a continuous rotation, double-deck carousel designed to accommodate 60 2-inch wafers per loading (40 3-inch wafers optional). During implants, the carousel rotates at approximately 100 RPM to provide a sweeping action of the wafer across the beam generated by the vertical electrostatic scanner. During operation the operator presets the desired dose charge into the integrator, starts the carousel rotation and then pushes the implant button. Delay is built into the start circuit to allow the carousel to reach full RPM before the beam strikes the wafer.

The chamber is also equipped with a beam defining aperture and a secondary electron suppressor that are located just in front of the carousel.

9. Current Integrator

The integrator has 15 ranges from 2×10^{-9} amperes to 2×10^{-2} amperes and a presettable 4-decade LED digital readout which can be preset. When a preset dose is reached, gate functions are generated by the integrator that intercepts the beam.

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INSTALLATION

1. Technical Supervision

As part of the Standard Conditions of Sale, Accelerators, Inc. provides the technical supervision required for the installation and acceptance testing of the accelerator at Purchaser's site. The service will be rendered after the site is prepared for the installation and at a time convenient to both the Purchaser and Accelerators, Inc. Accelerators, Inc. will furnish a list of items which are required to be completed or on hand at the time of installation.

2. Site Preparation

The Purchaser will provide the personnel, facilities and equipment necessary to move the accelerator and its components into location and to assist in assembling it. The Purchaser will also provide such personnel (e. g., plumbers, electricians, technicians) as required to carry out the installation under local working and safety rules.

Facilities which are part of the building, such as electrical conduits, junction boxes, disconnects, water drains and piping, will also be furnished by the Purchaser.

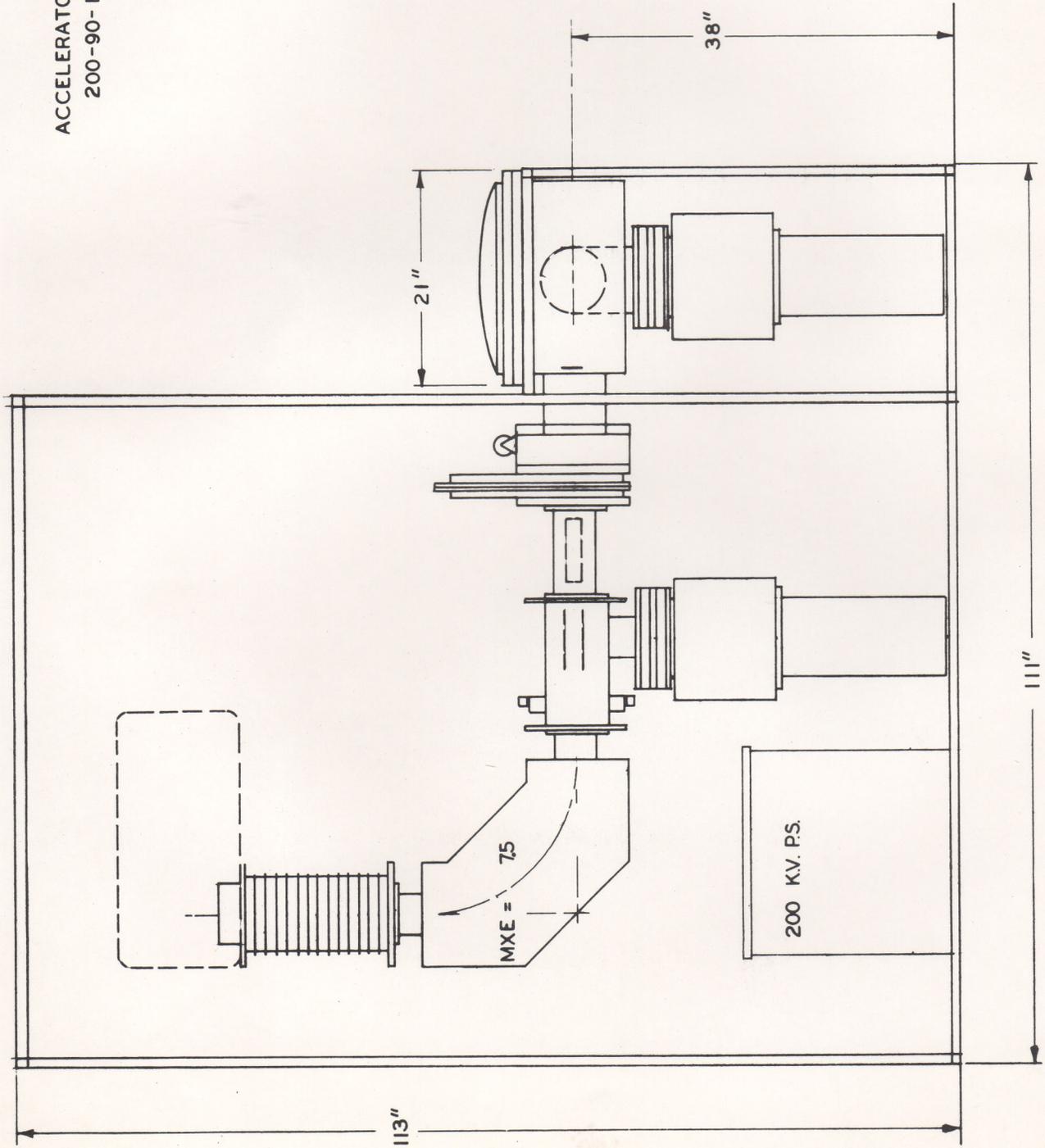
ACCEPTANCE BY PURCHASER

After the specified system has been installed at the Purchaser's site, it will be operated to demonstrate the performance as specified in the above Performance Specifications. This demonstration will form the basis of acceptance by the Purchaser.

WARRANTY AND CHANGES

Accelerators, Inc. guarantees that the equipment described in this specification is in accordance with the warranty included in Accelerators, Inc. Standard Conditions of Sale. Changes in this specification that could affect the performance or installation requirements of the equipment will be made only by mutual agreement between Accelerators and the Purchaser, with appropriate changes in price. Otherwise, Accelerators reserves the right to incorporate without notice any changes and/or improvements it may consider necessary.

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200-90-HP



NOTE: FRAME WIDTH 68".



200 keV IMPLANTER 
Model 200-90