

**ENTRY NO:** C50  
**Date:** 03 Feb 2005 17:00:55  
**Machine Name:** Oak Ridge Isochronous Cyclotron (ORIC)  
**Institution:** Oak Ridge National Laboratory  
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**Person in Charge of Cyclotron:** B. Alan Tatum  
**Person Reporting Information:** B. Alan Tatum  
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#### History

**Designed by:** ORNL  
**Construction Dates:** 1959-1962  
**First Beam Date:** 1963

#### Characteristic Beams

ions	energy(MeV/N)	current(pps)	power(w)
proton	52	$9.38 \times 10^{13}$	
deuteron	25	$9.38 \times 10^{13}$	
alpha	25	$1.56 \times 10^{13}$	

#### Transmission Efficiency (source to extracted beam)

**Typical (%)**: 55  
**Best (%)**: 85

#### Emittance

**Emittance Definition:**  
**Vertical (pi mm mrad)**: 1-2  
**Horizontal (pi mm mrad)**: 1-2  
**Longitudinal (dE/E [%] x RF[deg.])**:

#### USES

**Basic Research (%)**: 70  
**Development (%)**: 10  
**Therapy (%)**: 0  
**Isotope Production (%)**: 0  
**Other Application (%)**: 0  
**Maintenance (%)**: 10  
**Beam Tuning (%)**: 10  
**Total Time (h/year)**: 1500

#### TECHNICAL DATA

##### (a)Magnet

**Type:** Conventional Isochronous  
**Kb (MeV)**:  
**Kf (MeV)**:  
**Average Field (min./max. T)**: 1.92  
**Number of Sectors**: 3  
**Hill Angular Width (deg.)**:  
**Spiral (deg.)**: 30  
**Pole Diameter (m)**: 1.93  
**Injection Radius (m)**:  
**Extraction Radius (m)**: .81  
**Hill Gap (m)**: .19  
**Valley Gap (m)**: .71  
**Trim Coils**  
**Number**: 10x2  
**Maximum Current (A-turns)**: 7200  
**Harmonic Coils**  
**Number**: 4xNsectorsx2  
**Maximum Current (A-turns)**:  
**Main Coils**  
**Number**: 1x2  
**Total Ampere Turns**: 1,600,000  
**Maximum Current (A)**: 5000  
**Stored Energy (MJ)**:  
**Total Iron Weight (tons)**: 200  
**Total Coil Weight (tons)**: 9  
**Power**  
**Main Coils (total KW)**: 1750  
**Trim Coils (total, maximum, KW)**: 250  
**Refrigerator (cryogenic, KW)**:

##### (b)RF

##### Acceleration

**Frequency Range (MHz)**: 6.8-20.1  
**Harmonic Modes**: 1,3  
**Number of Dees**: 1  
**Number of Cavities**: 1  
**Dee Angular Width (deg.)**: 180  
**Voltage**  
**At Injection (peak to ground, KV)**:  
**At Extraction (peak to ground, KV)**: 80  
**Peak (peak to ground, KV)**: 80  
**Line Power (max, KW)**: 200  
**Phase Stability (deg.)**: +/-1  
**Voltage Stability (%)**: 0.05

##### (c)Injection

**Ion Source**: Penning  
**Source Bias Voltage (kV)**:  
**External Injection**:  
**Buncher Type**:  
**Injection Energy (MeV/n)**:  
**Component**:  
**Injection Efficiency (%)**:  
**Injector**: none

##### (d)Extraction

**Elements, Characteristic**: Electrostatic Deflector, Coaxial Magnetic Channel, Ironcompensated Lower Magnetic Channel  
**Typical Efficiency (%)**: 55  
**Best Efficiency (%)**: 85

##### (e)Vacuum

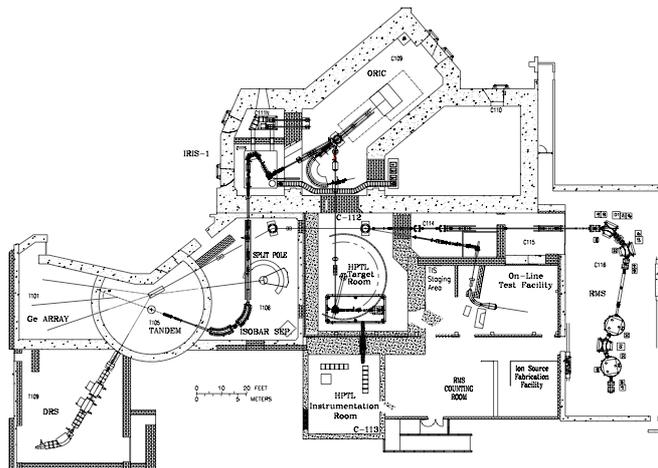
**Pumps**: 3 diffusion, 1 cryogenic  
**Achieved Vacuum (Pa)**:  $2.66 \times 10^{-4}$

#### REFERENCES

#### EXPERIMENTAL FACILITIES

Recoil Mass Spectrometer (RMS),  
Daresbury Recoil Separator (DRS), Enge Spectrograph, two  
general purpose end  
stations, On-Line Test Facility (OLTF), and High Power  
Target Laboratory  
(HPTL)

#### COMMENTS



##### (b)RF

##### Acceleration