

ENTRY No. 11 The  
 NAME OF MACHINE Cyclotron Corporation CP-42 DATE  
 INSTITUTION TRIUMF  
 ADDRESS 4004 Westbrook Mall, Vancouver, B.C. V6T 2A3  
 TEL (604) 222-1047 TELEX 04-508503  
 IN CHARGE J.J. Burgenjón REPORTED BY Z. Gelbart

**HISTORY AND STATUS**

DESIGN, date Mid. 1977 Model tests  
 ENG DESIGN, date Mid. 1977  
 CONSTRUCTION, date September 1978  
 FIRST BEAM, date (or goal) July 1979  
 MAJOR ALTERATIONS Target cave completed  
 October 1985

COST, ACCELERATOR Can. \$ 2,500,000  
 COST, FACILITY, total  
 FUNDED BY Atomic Energy of Canada Ltd., Radio-Chemical Co.

**ACCELERATOR STAFF, OPERATION AND DEVELOPMENT**  
 SCIENTISTS ENGINEERS 2  
 TECHNICIANS 7 CRAFTS

GRAD STUDENTS involved during year  
 OPERATED BY Research staff or X Operators  
 OPERATION 100 hr/wk, On target 80 hr/wk  
 TIME DISTR. in house % Outside %  
 BUDGET, op & dev Can. \$ 600,000  
 FUNDED BY AECL Radio-Chemical Co.

**RESEARCH STAFF**, not included above  
 USERS, in house outside used for  
 GRAD STUDENTS involved during year Radio-Isotope  
 RESEARCH BUDGET, in house Production for AECL and  
 FUNDED BY Positron Emission Tomograph

**MAGNET**

POLE FACE, diameter (compact) 120 cm, R extraction 28-52 cm  
 R injection cm  
 GAP, min 5 cm, Field 24 kG }  
 max 12 cm, Field 16 kG } at 92,400  
 AVERAGE FIELD at R ext 18.4 kG } Ampere turns  
 B max/ <B> 1.3  
 NUMBER OF SECTORS { compact 3 } Spiral, max 64 deg  
 { separated }  
 SECTOR ANGLE (SSC) deg  
 TRIMMING COILS

CONDUCTOR, material and type Hollow copper  
 STORED ENERGY (cryogenic) MJ  
 POWER: main coils 100 max, kW; current stability 10<sup>-5</sup>  
 trimming coils max, kW; current stability  
 WEIGHT: Fe 35 tons; coils 3 tons  
 COOLING system chilled recirculated water  
 ION ENERGY (bending limit) E/A = 42 q<sup>2</sup>/a<sup>2</sup> MeV/amu  
 (focusing limit) E/A = q<sup>2</sup>/a<sup>2</sup> MeV/amu

**ACCELERATION SYSTEM**

DEES, number 2; angle 90 deg  
 BEAM APERTURE 1.8 cm; DC Bias 1.5 kV  
 TUNED by, coarse fine Dee capacitor  
 RF to 26.8 MHz, stable ± 0.5 KHz  
 Orb F to 26.8 MHz  
 HARMONICS, RF/Orb F, used 1  
 DEE - Gnd, max kV, min gap 0.5 cm  
 STABILITY, (pk-pk noise)/(pk RF volt) 10<sup>-4</sup>  
 ENERGY GAIN, max 100 kV/turn  
 RF PHASE, stable to ± deg  
 RF POWER input, max 100 kW  
 FREQUENCY MODULATION, rate /s  
 modulator, type  
 beam pulse, width

**VACUUM SYSTEM**

OPERATING PRESSURE 6 x 10<sup>-6</sup> Torr or mbar  
 PUMPS, No, Type, Size  
 Four 30 cm DIA diffusion pumps  
 L.N.-cooled "cold-finger"

**ION SOURCES**

...PIG...

**INJECTION SYSTEM**

**EXTRACTION SYSTEM**

H<sup>-</sup> stripping foil

**FACILITIES FOR RESEARCH**

SHIELDED AREA, fixed 94 m<sup>2</sup>; movable m<sup>2</sup>  
 TARGET STATIONS 9 in 2 rooms  
 STATIONS served at same time, max 1

MAG SPECTROGRAPH, type  
 COMPUTER model  
 OTHER FACILITIES

**CHARACTERISTIC BEAMS**

PARTICLE	ENERGY (MeV)		CURRENT (pμA)	
	Goal	Achieved	Internal	External
H <sup>-</sup>	11-42	11-42	200	
H <sup>+</sup>		12-41		200

**SECONDARY**

(part/s)

**BEAM PROPERTIES**

MEASURED CONDITIONS  
 PULSE WIDTH .40 RF deg .200 μA of .42 MeV H<sup>+</sup> ions  
 PHASE EXC, max RF deg μA of MeV ions  
 EXTRACT eff 100 % μA of MeV ions  
 RESOL ΔE/E % μA of MeV ions  
 EMITTANCE  
 (π mm. mrad) { 40 axial } μA of MeV ions  
 { .4 rad }

**OPERATING PROGRAMS**, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS  
 BIOMEDICAL APPLICAT. 7% ISOTOPE PRODUCTIONS 93%

**REFERENCES/NOTES**

1) G.O. Hendry et al. "Design and Performance of a compact H<sup>-</sup> Cyclotron", Proc. 9th Int. Conf. on Cyclotrons, p.125 (1981)

**PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS**