ENTRY NO. 110 NAVAL RESEARCH LABORATORY CYCLOTRON DATE 7/24/78

NAME OF MACHINE

INSTITUTION NAVAL RESEARCH LABORATORY, Radiation Technology Division

ADDRESS Washington, D.C. 20375, USA

TEL TELEX

IN CHARGE Rollon O. Bondelid REPORTED BY Rollon O. Bondelid

HISTORY AND STATUS

DESIGN, date 1) Model tests 1)

ENG DESIGN, date 1963-1964

CONSTRUCTION, date 1965-1967

FIRST BEAM, date (or goal) int. 1967 ext. 1968

MAJOR ALTERATIONS 2)

COST, ACCELERATOR $ 1.8 10^6

COST, FACILITY, total $ 6.0 10^6

FUNDED BY U.S. Navy Department

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 0 ENGINEERS 4

TECHNICIANS 6 CRAFTS 2

GRAD STUDENTS involved during year 3

OPERATED BY Research staff or Operators

OPERATION 52 hr/wk. On target 50 hr/wk

TIME DISTR. in house 60 %, outside 40 %

BUDGET, op & dev

FUNDED BY Office of Naval Research & Users

RESEARCH STAFF, not included above

USERS, in house 11 outside 3

GRAD STUDENTS involved during year 3

RESEARCH BUDGET, in house 725 k

FUNDED BY Office of Naval Research

MAGNET

POLE FACE, diameter (compact) 19.3 cm, R-extraction 80 cm

R injection cm

GAP, min 19 cm, Field 22.7 kG

max 71 cm, Field 12.7 kG } at Ampere turns

AVERAGE FIELD at R ext 17 kG

B max/<B> 1.3

NUMBER OF SECTORS { compact 3 / separated } Spiral, max 30 deg

SECTOR ANGLE (SSC) deg

TRIMMING COILS Harmonic correction; 3/sect

10 circular coils

CONDUCTOR, material and type

STORED ENERGY (cryogenic) ~6.5 MJ

POWER: main coils 800 max kW: current stability $5 \cdot 10^{-5}$

trimming coils 350 max kW: current stability

WEIGHT: Fe 250 tons: coils 45 tons

COOLING system Demineralized water

ION ENERGY (Bending limit) E/A = q^2/A^2 MeV/amu

(Focusing limit) E/A = 75 q/A MeV/amu

ACCELERATION SYSTEM

DEES, number 1 angle 180 deg

BEAM APERTURE 4.5 cm; DC Bias 0 kV

TUNED by, coarse fine VC, auto

RF 7.5 to 22.5 MHz, stable ± 10^{-6}

Orb F 1.5 to 22.5 MHz

HARMONICS, RF/Orb F, used 1,3

DEE–Gnd, max 70 kV, min gap 1 cm

STABILITY, (pk-pk noise)/(pk RF volt) 0.005

ENERGY GAIN, max 100 kV/turn

RF PHASE, stable to ± 3 deg

RF POWER input, max. 300 kW

FREQUENCY MODULATION, rate /s

modulator, type

beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 10^{-5} Torr or mbar

PUMPS, No, Type, Size 2 diffusion 30", 32"

(32 k & 50 kl/s)

ION SOURCES

Hot filament

INJECTION SYSTEM

EXTRACTION SYSTEM

Electrostatic with magnetic channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 868 m^2; movable m^2

TARGET STATIONS 4 in 3 rooms rooms

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type

COMPUTER model SEL 32/55

OTHER FACILITIES Double focusing 2.75 m beam analyzing magnet; provision for 11 beam paths, 8 with analyzed beam; beam pickoff unit for T.O.F. measurements

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p	70	52	30	10
d	40	40	30	12
α	78	78	30	10
^{3}He	120	90		
SECONDARY			(part/s)	

BEAM PROPERTIES

MEASURED		CONDITIONS			
PULSE WIDTH .5	RF deg	pμA of	MeV	ions	
PHASE EXC. max 30	RF deg	pμA of	MeV	ions	
EXTRACT eff 40	%	pμA of	MeV	ions	
RESOL ΔE/E	%	pμA of	MeV	ions	
EMITTANCE					
(π mm-mrad)	axial	pμA of	MeV		
	rad				

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 0 SOLID STATES PHYSICS 40%

BIOMEDICAL APPLICAT. 60% ISOTOPE PRODUCTIONS 0

REFERENCES/NOTES

1) Horizontal median plane version of ORIC

2) Conversion to RCA 4648 power tetrode from RCA 6949 in late 1976. New computer installed July 1976.

PLAN VIEW OF FACILITY, COMMENTS, ETC.