ENTRY NO. 35

NAME OF MACHINE NIRS Isochronous Cyclotron DATE 7/21/78

INSTITUTION National Institute of Radiological Sciences

ADDRESS 4-9-1, Anagawa, Chiba, JAPAN

IN CHARGE T.Hiramoto REPORTED by H. Ogawa

HISTORY AND STATUS

DESIGN, date _____ MODEL tests _____

ENG. DESIGN, date _____

CONSTRUCTION, date _____

FIRST BEAM date (or goal) Dec. 1973

MAJOR ALTERATIONS _____

OPERATION, 44 hr/wk; On Target _____ hr/wk

TIME DIST., in house _____ %, outside _____ %

USERS' SCHEDULING CYCLE _____ weeks

COST, ACCELERATOR _____

COST, FACILITY, total _____

FUNDED BY Government

ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS 2 ENGINEERS 3

TECHNICIANS 6 CRAFTS _____

GRAD STUDENTS involved during year _____

OPERATED BY _____ Res staff or _____ Operators

BUDGET, op & dev _____

FUNDED BY _____

RESEARCH STAFF, not included above

USERS, in house _____ outside _____

GRAD STUDENTS involved during year _____

RES. BUDGET, in house _____

FUNDED BY _____

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 376 m^2

movable _____ m^2

TARGET STATIONS 7 in 4 rooms

STATIONS served at same time, max _____

MAG SPECTROGRAPH, type _____

COMPUTER, model _____

OTHER FACILITIES Isotope production

Neutron Therapy

REFERENCES/NOTES

Commercial: CGR-MEV
Model-930

MAGNET

POLE FACE diameter 215 cm; R extraction 92 cm

GAP, min 16.6 cm; Field 16.5 kG
max 40.5 cm; Field 8.6 kG
AVERAGE FIELD at R ext 14 kG
} at 0.28 X 10^6 ampere turns

CURRENT STABILITY ± 20 parts/10^6; $B_{max}/\langle B \rangle$ _____

NUMBER OF SECTORS 4 ; SPIRAL, max 53 deg

POLE FACE COIL PAIRS: AVF _____ /sec;

Harmonic correction 2 per sector

Rad grad _____ /sec or Circ coils 12

WEIGHT: Fe 200 tons; Coils _____ tons

CONDUCTOR, Material and type Cu, hollow

STORED ENERGY _____ MJ

COOLING SYSTEM Demineralized water

POWER: Main coils 225 max, kW

Trimming coils 75 max, kW

YOKE/POLE AREA 115 %

SECTOR ANGLE (Sep Sec) _____ deg

ION ENERGY (Bending limit) E/A = ~90 q^2/A^2 MeV

(Focusing limit) E/A = _____ q/A MeV

ACCELERATION SYSTEM

DEES, number 2 angle 86 deg

BEAM APERTURE 3.8 cm; DC BIAS 0 kV

TUNED by, coarse MP fine MP

RF 10.6 to 22.0 mHz, stable ± ≤ 1 /10^6

Orb F 5.3 to 22.0 mHz; GAIN, max 140 kV/turn

HARMONICS, RF/Orb F, used 1, 2

DEE-Gnd, max 50 kV, min gap _____ cm

STABILITY, (pk-pk noise)/(pk RF volt) 0.001

RF PHASE stable to ± 0.5 deg

RF POWER input, max 160 kW

RF PROTECT circuit, speed ~1 μsec

Type Ignitron crowbar

FREQUENCY MODULATION, rate _____ /sec

MODULATOR, type _____

BEAM PULSE, width _____

VACUUM SYSTEM

PUMPS, No., Type, Size _____

2 × 22″ Diffusion pumps

OPERATING PRESSURE 1~2 μTorr,

PUMPDOWN TIME _____ hrs

ION SOURCES/INJECTION SYSTEM

Hot filament for light ions,
Penning for heavy ions

EXTRACTION SYSTEM

Electrostatic deflector, magnetic channel

CONTROL SYSTEM

ENTRY NO. 35 (cont.)

CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	p		8-70
	d		16-43
	$^4He^{++}$		32-86
	$^3He^{++}$		66-100
CURRENT		(μA)	(μA)
Internal			
External	p		20
	d		40
	$^4He^{++}$		20
	$^3He^{++}$		20
		(part/s)	(part/s)
Secondary			

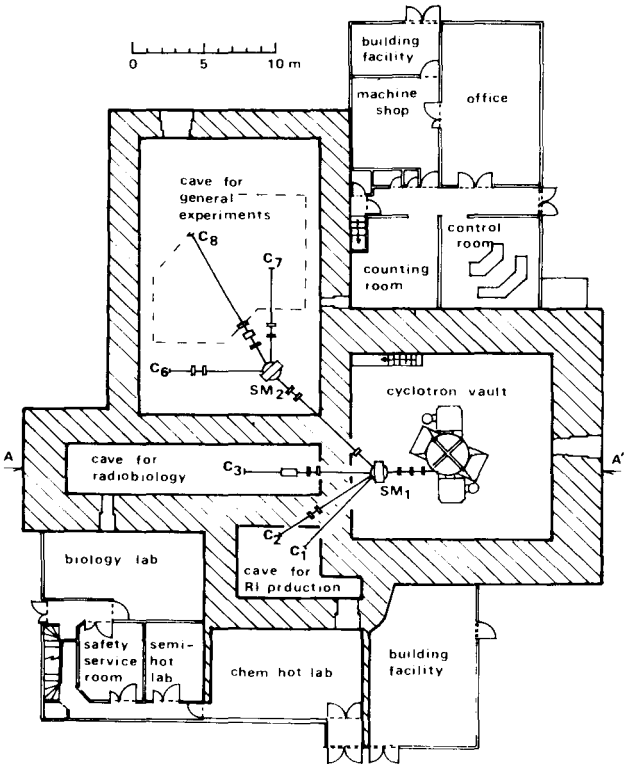
BEAM PROPERTIES

	Measured		Conditions		
Pulse Width	____ RF deg	____ μA of	____ MeV	____	
Phase Exc, max	____ RF deg	____ μA of	____ MeV	____	
Extract Eff	80 %	35 μA of	30 MeV	d	
Res, ΔE/E	____ %	____ μA of	____ MeV	____	
Emittance					
(mm-mrad) { ____ axial, ____ radial }	____ μA of	____ MeV	____		

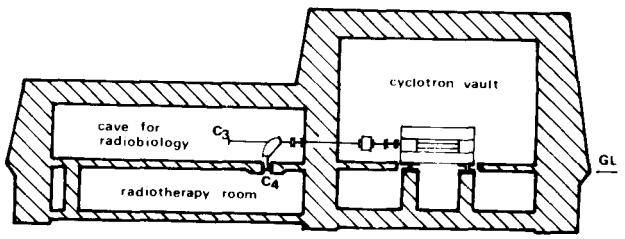
OPERATING PROGRAMS, time dist

Basic Nuclear Physics	____ %
Solid State Physics	____ %
Bio-Medical Applications	67 %
Isotope Production	33 %
Development	____ %
	____ %
	____ %

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, OPERATION SUMMARY, ADDITIONAL REFERENCES



1st floor



cross section (A-A')