ENTRY NO. 57

NAME OF MACHINE: IMS(IKAKEN) Cyclotron
INSTITUTION: The Institute of Medical Science, The University of Tokyo
ADDRESS: 4-6-1 Shirokanedai, Minato-ku, Tokyo 108, Japan
TEL: 03 (446) 6771 TELEX:
IN CHARGE: Akira ITO REPORTED BY: Akira ITO

HISTORY AND STATUS

DESIGN, date: Model tests
ENG DESIGN, date: TCC model CS-30
CONSTRUCTION, date: 1971-1973
FIRST BEAM, date (or goal): Aug., 1973
MAJOR ALTERATIONS: replacement of magnet coil (1976)
COST, ACCELERATOR: about $1M(1973)
COST, FACILITY, total: about $1M(1973)
FUNDED BY: Japanese Government

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS: 1 ENGINEERS:
TECHNICIANS: 3 CRAFTS:
GRAD STUDENTS involved during year:
OPERATED BY: Research staff or Operators
OPERATION: 50 hr/wk. On target: 40 hr/wk
TIME DISTR. in house: 90 %, outside: 10 %
BUDGET, op & dev: $0.14M(1986)
FUNDED BY: Japanese Government

RESEARCH STAFF, not included above

USERS, in house: 6 outside: 10
GRAD STUDENTS involved during year: 0
RESEARCH BUDGET, in house:
FUNDED BY:

MAGNET

POLE FACE, diameter (compact): 96 cm, R-extraction: 42 cm
R injection: cm
GAP, min: 5 cm, Field: 20 kG
max: 10 cm, Field: 12 kG
at 0.2 X 10^6 Ampere turns
AVERAGE FIELD at R ext: 16 kG
B max/<B>: 1.25
NUMBER OF SECTORS: compact 3, separated; Spiral, max: 60 deg
SECTOR ANGLE (SSC): deg
TRIMMING COILS: 2 (inner & outer) /sec.
CONDUCTOR, material and type:
STORED ENERGY (cryogenic): MJ
POWER: main coils: 60 max kW: current stability: 10^{-4}
trimming coils: max kW: current stability:
WEIGHT: Fe: 23 tons: coils: 1 tons
COOLING system: demineralized water
ION ENERGY (Bending limit) E/A: q^2/A^2 MeV/amu
(Focusing limit) E/A: 30 q/A MeV/amu

ACCELERATION SYSTEM

DEES, number: 2 angle: 90 deg
BEAM APERTURE: 4 cm; DC Bias: -1.5 kV
TUNED by, coarse: short bar fine: v.c.
RF: 14 to 26 MHz, stable ± $10/10^6$
Orb F: to MHz
HARMONICS, RF/Orb F, used:
DEE–Gnd, max: 30 kV, min gap: 1 cm
STABILITY, (pk-pk noise)/(pk RF volt): 0.1%
ENERGY GAIN, max: kV/turn
RF PHASE, stable to ±: 5 deg
RF POWER input, max.: 75 kW
FREQUENCY MODULATION, rate: /s
modulator, type:
beam pulse, width:

VACUUM SYSTEM

OPERATING PRESSURE: less than 10^{-5} Torr or mbar
PUMPS, No, Type, Size: One diffusion pomp (30 cm dia)

ION SOURCES

PIG type

INJECTION SYSTEM

Internal only

EXTRACTION SYSTEM

DC deflector + mag-channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed: 330 m²; movable: 0 m²
TARGET STATIONS: 6 in: 4 rooms
STATIONS served at same time, max: 1
MAG SPECTROGRAPH, type:
COMPUTER model: VAX 11/750, PDP-11/34 & Lecroy 3500
OTHER FACILITIES: Isotopes production
Neutron therapy
PIXE & Proton CT / Microbeam

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	ENERGY (MeV) Achieved	CURRENT (pμA) Internal	CURRENT (pμA) External
P		26		70
d		14		150
^{3}He		38		70
α		28		50

SECONDARY: Be (d,n) (part/s) $\bar{E}$n=6 MeV

BEAM PROPERTIES

	MEASURED		CONDITIONS		
PULSE WIDTH	10 RF deg	1	pμA of 28 MeV	α	ions
PHASE EXC. max	RF deg		pμA of MeV		ions
EXTRACT eff.	60 %	100	pμA of 14 MeV	d	ions
RESOL ΔE/E	1 %	1	pμA of 14 MeV	d	ions
EMITTANCE (π mm-mrad)	10 axial, 14 rad	1	pμA of 14 MeV	d	

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS: SOLID STATES PHYSICS: 10%
BIOMEDICAL APPLICAT. 60% ISOTOPE PRODUCTIONS: 20%
Development 10%

REFERENCES/NOTES

1) Y.Yoshida et al. Nucl. Instr. & Meth., vol. 138, pp. 579-788 (1976).

PLAN VIEW OF FACILITY, COMMENTS, ETC.