ENTRY NO. 47

NAME OF MACHINE ....INS(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 .....$0.4M (1980).....
FUNDED BY .....Japanese Government.....

RESEARCH STAFF, not included above

USERS, in house .....6..... outside .....10.....
GRAD STUDENTS involved during year .....2.....
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 ~~min~~ ..10.. cm, Field ....12..... kG } at .0.2 x 10^6
AVERAGE FIELD at R ext .....16..... kG } Ampere turns
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^{-6}/10.....
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 POWEP 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..... m^2; movable .....0..... m^2
TARGET STATIONS .....6..... in .....4.....
STATIONS served at same time, max .....1.....
MAG SPECTROGRAPH, type .....
COMPUTER model .....PDP-11/34 & LeCroy 3500.....
OTHER FACILITIES ...Isotopes production.....
.....Neutron therapy.....
.....PIXE & Proton CT / Microbeam .....

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
P		26		70
d		14		150
^{3}He		38		70
α		28		50
SECONDARY		(part/s)		
	Be (d,n)		$\bar{E}n$=6MeV	

BEAM PROPERTIES

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

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS ..... SOLID STATES PHYSICS 20%....
BIOMEDICAL APPLICAT..60%.... ISOTOPE PRODUCTIONS10%....
....Development 10%.....
.....

REFERENCES/NOTES

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

PLAN VIEW OF FACILITY, COMMENTS, ETC.