

ENTRY No. CU70

NAME OF MACHINE KCCH-CYCLOTRON DATE  
INSTITUTION KOREA CANCER CENTER HOSPITAL, KAERI  
ADDRESS 215-4 GONGNEUNG-DONG DOBONG-KU, SEOUL  
TEL. 924-2501 TELEX KCCHOSP. K27764  
IN CHARGE REPORTED BY CYCLOTRON LAB., KCCH

### HISTORY AND STATUS

DESIGN, date '82. 4. Model tests  
ENG DESIGN, date '83. 1.  
CONSTRUCTION, date '84. 5.  
FIRST BEAM, date (or goal) '86. 1. 25.  
MAJOR ALTERATIONS

COST, ACCELERATOR 3,280,000 US \$  
COST, FACILITY, total about 8,000,000 US \$  
FUNDED BY KOREA CANCER CENTER HOSPITAL

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT  
SCIENTISTS 2 ENGINEERS 3  
TECHNICIANS 3 CRAFTS

GRAD STUDENTS involved during year  
OPERATED BY Research staff or 6 Operators  
OPERATION 50 hr/wk, On target 18 hr/wk

TIME DISTR. in house 100 % , Outside %  
BUDGET, op & dev 200,000 \$/yr  
FUNDED BY KOREA CANCER CENTER HOSPITAL

RESEARCH STAFF, not included above  
USERS, in house 2 outside  
GRAD STUDENTS involved during year

RESEARCH BUDGET, in house NOT DECIDED  
FUNDED BY  
MAGNET

POLE FACE, diameter (compact) 143 cm, R extraction .57 cm  
R injection cm  
GAP, min 11 cm, Field 20.5 kG  
max 19.7 cm, Field kG } at 2.88x10<sup>5</sup>

AVERAGE FIELD at R ext 17.6 kG } Ampere turns  
B max/ <B> 1.18

NUMBER OF SECTORS { compact 3 } Spiral, max 55 deg  
SECTORED ANGLE (SSC) deg  
TRIMMING COILS 10 pairs

CONDUCTOR, material and type Hollow Cu  
STORED ENERGY (cryogenic) MJ  
POWER: main coils 126 max, kW ; current stability 1x10<sup>-5</sup>  
trimming coils 10 max, kW ; current stability 1x10<sup>-5</sup>

WEIGHT: Fe 88.2 tons ; coils 3.8 tons  
COOLING system .90 L/min, T=18-20°C  
ION ENERGY (bending limit) E/A = .50 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 2 cm ; DC Bias 10 kV  
TUNED by, coarse coaxial step, fine movable flap  
RF 15.5 to 26.8 MHz, stable ±  
Orb F 7.75 to 26.8 MHz

HARMONICS, RF/Orb F, used 1,2  
DEE - Gnd, max .40 kV, min gap 2 cm  
STABILITY, (pk-pk noise)/(pk RF volt) 10<sup>-3</sup>  
ENERGY GAIN, max 160 kV/turn  
RF PHASE, stable to ± 10 deg  
RF POWER input, max 60 kW  
FREQUENCY MODULATION, rate /s  
modulator, type  
beam pulse, width

VACUUM SYSTEM  
OPERATING PRESSURE 5x10<sup>-6</sup> Torr or mbar  
PUMPS, No, Type, Size  
Diffusion pumps, 2, DIFC400 (BALZERS)  
4000 L/sec

ION SOURCES  
P. I. G. COLD CATHODE

### INJECTION SYSTEM

#### EXTRACTION SYSTEM

Electrostatic Deflector + Electromagnetic Channel  
FACILITIES FOR RESEARCH  
SHIELDED AREA, fixed 180 m<sup>2</sup> ; movable 25 m<sup>2</sup>  
TARGET STATIONS 4 in 2 rooms  
STATIONS served at same time, max

MAG SPECTROGRAPH, type  
COMPUTER model PDP 11/23+

OTHER FACILITIES  
NEUTRON THERAPY (NT 50)  
MEDICAL MICROTRON (MM 22)

#### CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (pμA)	
	Goal	Achieved	Internal	External
Proton	50	50.5	130	85 μA
Deuteron				
He-3	not tested yet			35 μA
He-4	48	48	60	35 μA

SECONDARY (part/s)

#### BEAM PROPERTIES

MEASURED	CONDITIONS	
	RF deg	μA of MeV ions
PULSE WIDTH		
PHASE EXC, max	RF deg	μA of MeV ions measured
EXTRACT eff	65 %	70 μA of 50, 5 MeV H <sup>+</sup> ions yet
RESOL ΔE/E	1.1 %	70 μA of 50, 5 MeV H <sup>+</sup> ions

EMITTANCE  
(π mm. mrad) { .13 axial } ... 10 μA of 50, 5 MeV proton ions  
{ .14 rad }

OPERATING PROGRAMS, time distribution  
BASIC NUCLEAR PHYSICS .. SOLID STATES PHYSICS  
BIOMEDICAL APPLICAT. .... ISOTOPE PRODUCTIONS 2hr/day  
NEUTRON THERAPY ..... 8hr/day

REFERENCES/NOTES  
1) KAERI/RR-495/85  
2) SCANDITRONIX TECHNICAL SPECIFICATION NOTE

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