**ENTRY NO. 99**

NAME OF MACHINE: NIH, TCC CS-30

INSTITUTION: National Institutes of Health Clinical Center

ADDRESS: NIH, Bldg. 10, Rm 1C401, Bethesda, Maryland 20892

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IN CHARGE: Ron Finn REPORTED BY: Paul Plascjak

## HISTORY AND STATUS

DESIGN, date: Model tests:

ENG DESIGN, date: TCC model CS-30

CONSTRUCTION, date: Factory tests: March 1985

FIRST BEAM, date (or goal): Accepted: March 1986

MAJOR ALTERATIONS:

COST, ACCELERATOR:

COST, FACILITY, total:

FUNDED BY: National Institutes of Health

## ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS: ENGINEERS: 4

TECHNICIANS: CRAFTS: support

GRAD STUDENTS involved during year:

OPERATED BY: Research staff or: x Operators

OPERATION: 45 hr/wk. On target: hr/wk

TIME DISTR. in house: 100% %, outside: %

BUDGET, op & dev:

FUNDED BY: National Institutes of Health

## RESEARCH STAFF, not included above

USERS, in house: PET Facility ~~outside~~: Nuclear Med.

GRAD STUDENTS involved during year:

RESEARCH BUDGET, in house:

FUNDED BY: National Institutes of Health

## MAGNET

POLE FACE, diameter (compact): 96.5 cm, R-extraction: 42 cm

R injection: cm

GAP, min: 5 cm, Field: 19.5 kG

max: 10 cm, Field: 12 kG at $0.2 \times 10^6$ Ampere turns

AVERAGE FIELD at R ext: 16. kG

B max/<B>:

NUMBER OF SECTORS: compact: 3, separated: Spiral, max: deg

SECTOR ANGLE (SSC): deg

TRIMMING COILS: Harmonic Coils

3 inner, 3 outer

CONDUCTOR, material and type: Copper, Hollow

STORED ENERGY (cryogenic): MJ

POWER: main coils: 60 max kW: current stability: $5 \times 10^{-4}$

trimming coils: max kW: current stability:

WEIGHT: Fe: 20 tons: coils: 2.5 tons

COOLING system: chilled, deionized water

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

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

## ACCELERATION SYSTEM

DEES, number: 2 angle: 81 deg

BEAM APERTURE: 1.9 cm; DC Bias: 1.5 kV

TUNED by, coarse: Shorting Plane fine: Capacitor

RF: 13.5 to 27.5 MHz, stable ±: $1 \times 10^{-4}$

Orb F: 14.4 to 27.1 MHz

HARMONICS, RF/Orb F, used: 1st

DEE–Gnd, max: 32 kV, min gap: 1.0 cm

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

ENERGY GAIN, max: 100 kV/turn

RF PHASE, stable to ±: deg

RF POWER input, max.: 70 kW

FREQUENCY MODULATION, rate: /s

modulator, type:

beam pulse, width:

## VACUUM SYSTEM

OPERATING PRESSURE: $3 \times 10^{-5}$ Torr or mbar

PUMPS, No, Type, Size: 1, Oil Diffusion, 10"

## ION SOURCES

Cold Cathode (1)

## INJECTION SYSTEM

## EXTRACTION SYSTEM

Electrostatic Deflector, Magnetic Channel (2)

## FACILITIES FOR RESEARCH

SHIELDED AREA, fixed: 90 m²; movable: 0 m²

TARGET STATIONS: 1 internal, 3 ext. in 1 rooms

STATIONS served at same time, max: 1

MAG SPECTROGRAPH, type:

COMPUTER model:

OTHER FACILITIES:

Isotope Production Hot Cells

## CHARACTERISTIC BEAMS

| PARTICLE | ENERGY (MeV) Goal | Achieved | CURRENT (pμA) Internal | External |
|---|---|---|---|---|
| Protons | | 26.5 | 200 | 60 |
| Deuterons | | 14.8 | 300 | 100 |
| 3-Helium | | 38.1 | 140 | 60 |
| 4-Helium | | 29.6 | 100 | 40 |
| SECONDARY | | | (part/s) | |
| | | | | |
| | | | | |

## BEAM PROPERTIES

| | MEASURED | | CONDITIONS | | |
|---|---|---|---|---|---|
| PULSE WIDTH | RF deg | | pμA of | MeV | ions |
| PHASE EXC. max | RF deg | | pμA of | MeV | ions |
| EXTRACT eff | 70 % | 60 | pμA of 26.5 | MeV | H+ ions |
| RESOL ΔE/E | 0.5 % | 0.2 | pμA of 14.8 | MeV | d+ ions |
| EMITTANCE | | | | | |
| (π mm-mrad) | 25 ~~axial~~ Horiz | | pμA of 26.5 | MeV | H+ |
| | 10 ~~rad~~ Vert | 2. | | | |

## OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS: SOLID STATES PHYSICS:

BIOMEDICAL APPLICAT.: ISOTOPE PRODUCTIONS: 100%

50% Radiopharmaceutical Production

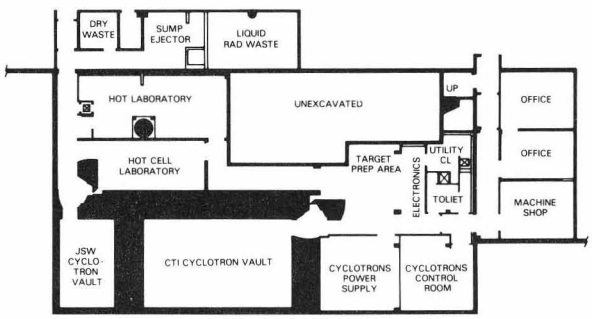
50% " Development

## REFERENCES/NOTES


1) IEEE Trans. Nucl. Sci. NS-14, 70-71 (1967)

2) IEEE Trans. Nucl. Sci. NS-16, 500-503 (1969)


## PLAN VIEW OF FACILITY, COMMENTS, ETC.




NIH CYCLOTRON FACILITY B-3 LEVEL