**ENTRY NO.** 98

NAME OF MACHINE Biomedical cyclotron DATE 7/10/78

INSTITUTION University of California - Center for the Health Sciences

ADDRESS Los Angeles, CA 80024 - USA

TEL TELEX

IN CHARGE N.S. Mac Donald Ph-D. REPORTED BY N.S. Mac Donald Ph-D

**HISTORY AND STATUS**

DESIGN, date CS-22 Cyclotron Corporation, 1970

ENG DESIGN, date

CONSTRUCTION, date

FIRST BEAM, date (or goal) 3/15/71

MAJOR ALTERATIONS None

COST, ACCELERATOR

COST, FACILITY, total $ 700,000

FUNDED BY AEC, University

**ACCELERATOR STAFF, OPERATION AND DEVELOPMENT**

SCIENTISTS 1 ENGINEERS 2

TECHNICIANS 2 CRAFTS

GRAD STUDENTS involved during year 1

OPERATED BY X Research staff or Operators

OPERATION 50 hr/wk. On target 24 hr./wk

TIME DISTR. in house 100 % Outside %

BUDGET, op & dev

FUNDED BY

**RESEARCH STAFF,** not included above

USERS, in house 3 outside 2

GRAD STUDENTS involved during year 1

RESEARCH BUDGET, in house

FUNDED BY D.O.E.

**MAGNET**

POLE FACE, diameter (compact) 97 cm, R extraction 40.5 cm

R injection cm

GAP, min 5 cm, Field 20 kG
min 10 cm, Field 12 kG
at $2.10^5$ Ampere turns

AVERAGE FIELD at R ext 16 kG

B max/ < B > 1.25

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

SECTOR ANGLE (SSC) deg

TRIMMING COILS 3/sect

CONDUCTOR, material and type

STORED ENERGY (cryogenic) MJ

POWER: main coils 30 max, kW; current stability $3.10^{-5}$

trimming coils max, kW; current stability

WEIGHT: Fe 24 tons; coils tons

COOLING system

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 180 deg

BEAM APERTURE 4 cm; DC Bias 2.5 kV

TUNED by, coarse straps fine VC, auto

RF 12 to 25 mHz, stable ± $10^{-5}$

Orb F to mHz

HARMONICS, RF/Orb F, used

DEE—Gnd, max 25 kV, min gap 1 cm

STABILITY, (pk-pk noise)/(pk RF volt) 17./12 kV

ENERGY GAIN, max kV/turn

RF PHASE, stable to ± deg

RF POWEP input, max 150 kW

FREQUENCY MODULATION, rate /s

modulator, type

beam pulse, width

**VACUUM SYSTEM**

OPERATING PRESSURE Torr or mbar

PUMPS, No, Type, Size

**ION SOURCES**

Penning cold cathode

**INJECTION SYSTEM**

**EXTRACTION SYSTEM**

DC electrostatic, mag. channel

**FACILITIES FOR RESEARCH**

SHIELDED AREA, fixed $m^2$; movable $m^2$

TARGET STATIONS 1 in

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type

COMPUTER model

OTHER FACILITIES Isotope production
Irradiation, solid state

**CHARACTERISTIC BEAMS**

| PARTICLE | ENERGY (MeV) Goal | Achieved | CURRENT (pμA) Internal | External |
|---|---|---|---|---|
| p | 22.1 | 22.1 | 100 | 52 |
| d | 12.2 | 12.2 | 750 | 75 |
| $^3$He | 31.6 | 31.6 | 90 | 50 |
| α | | | 95 | 55 |
| SECONDARY | | (part/s) | | |
| | | | | |
| | | | | |

**BEAM PROPERTIES**

| | MEASURED | CONDITIONS |
|---|---|---|
| PULSE WIDTH | RF deg | pμ A of MeV ions |
| PHASE EXC. max | RF deg | pμ A of MeV ions |
| EXTRACT eff | 60-70 % | 100 pμ A of 22 MeV p ions |
| RESOL ΔE/E | % | pμ A of MeV ions |
| EMITTANCE (π mm. mrad) | axial, rad | pμ A of MeV |

**OPERATING PROGRAMS,** time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS

BIOMEDICAL APPLICAT ISOTOPE PRODUCTIONS

**REFERENCES/NOTES**

**PLAN VIEW OF FACILITY, COMMENTS, ETC.**

- Principal use: preparing radionuclides for the nuclear medicine clinic of the hospital and for research in biology and medicine.

- Quantitative analysis of $^{18}O$ in small water samples of biological origin by proton activation to $^{18}F$ are routine.