**ENTRY No.** 93

NAME OF MACHINE Biomedical cyclotron DATE 7-10-78
INSTITUTION University of California - Center for the Health Sciences
ADDRESS Los Angeles, CA 90024 - USA
TEL ..... TELEX .....
IN CHARGE N.S. Mac Donald Ph-D REPORTED BY N.S. Mac Donald Ph-D

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**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 D.O.E.

**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
max 10 cm, Field 12 kG
at $2 \cdot 10^5$ 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 3/sect
.....
CONDUCTOR, material and type .....
STORED ENERGY (cryogenic) ..... MJ
POWER : main coils 30 max, kW ; current stability $3 \cdot 10^{-5}$
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 $\pm$ $10^{-5}$
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) 1.7 / 12 kV
ENERGY GAIN, max ..... kV/turn
RF PHASE, stable to $\pm$ ..... deg
RF POWER 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 ..... m² ; movable ..... m²
TARGET STATIONS 1 in 1 rooms
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 | ..... pμA of ..... MeV ... ions |

**OPERATING PROGRAMS,** time distribution
BASIC NUCLEAR PHYSICS .. SOLID STATES PHYSICS ....
BIOMEDICAL APPLICAT. .... ISOTOPE PRODUCTIONS 100%
.....
.....

**REFERENCES/NOTES**

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

- 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.