

ENTRY No. 94

NAME OF MACHINE CS-15 (Cyclotron Corp.) DATE
INSTITUTION Franklin McLean Memorial Research Institute, University of Chicago
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IN CHARGE P.V. Harper, M.D. REPORTED BY C.J. Armstrong, RT.

HISTORY AND STATUS

DESIGN, date 1966 Model tests 1968
ENG DESIGN, date 1968
CONSTRUCTION, date 1969
FIRST BEAM, date (or goal) 1969
MAJOR ALTERATIONS None
COST, ACCELERATOR 240,000
COST, FACILITY, total 490,000
FUNDED BY DOE

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 3 ENGINEERS 1
TECHNICIANS 1 CRAFTS 1
GRAD STUDENTS involved during year 1
OPERATED BY Research staff or 2 Operators
OPERATION 15-20 hr/wk, On target 6-8 hr/wk
TIME DISTR. in house 95% Outside 5%
BUDGET, op & dev
FUNDED BY

RESEARCH STAFF, not included above

USERS, in house 4 outside 1
GRAD STUDENTS involved during year
RESEARCH BUDGET, in house
FUNDED BY

MAGNET

POLE FACE, diameter (compact) 81.28 cm, R extraction cm
R injection cm
GAP, min 5.08 cm, Field 20 kG
max 10.16 cm, Field 12 kG at 2X10^5
AVERAGE FIELD at R ext 16 kG Ampere turns
B max/

NUMBER OF SECTORS {compact 3} Spiral, max deg
SECTOR ANGLE (SSC) deg
TRIMMING COILS 2

CONDUCTOR, material and type Aluminum, Pancake
STORED ENERGY (cryogenic) MJ
POWER: main coils 58 max, kW; current stability 3X10^4 of 1 max.
trimming coils max, kW; current stability
WEIGHT: Fe 7 tons; coils tons
COOLING system H2O, 3 gpm
ION ENERGY (bending limit) E/A = a^2/a^2 MeV/amu
(focusing limit) E/A = q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 2; angle 120 deg
BEAM APERTURE 5 cm; DC Bias 0-4 kV
TUNED by, coarse Grid dip fine Volt ratios
RF 12 to 25 MHz, stable +/- 1X10^-4
Orb F to MHz
HARMONICS, RF/Orb F, used
DEE - Gnd, max kV, min gap cm
STABILITY, (pk-pk noise)/(pk RF volt) < 1%
ENERGY GAIN, max kV/turn
RF PHASE, stable to +/- deg
RF POWER input, max kW
FREQUENCY MODULATION, rate /s
modulator, type
beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 1X10^-3 - 10^-7 Torr or mbar
PUMPS, No, Type, Size 1 - 10 inch oil diffusion pump
2 - 21 CFM Mechanical pumps

ION SOURCES

One, P.I.G. Source

INJECTION SYSTEM

Unavailable

EXTRACTION SYSTEM

Electro-static-Harmonic

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 12 m^2; movable m^2
TARGET STATIONS 4 in 2 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type
COMPUTER model None
OTHER FACILITIES

CHARACTERISTIC BEAMS

Table with columns: PARTICLE, ENERGY (MeV) Goal, Achieved, CURRENT (pA) Internal, External. Rows for Proton, Deuterons, Helium.

SECONDARY

(part/s)

BEAM PROPERTIES

MEASURED CONDITIONS
PULSE WIDTH RF deg pA of MeV ions
PHASE EXC, max RF deg pA of MeV ions
EXTRACT eff 60-70% .25 pA of 15 MeV H+ ions
RESOL delta E/E % pA of MeV ions
EMITTANCE
(pi mm. mrad) { .50 axial } pA of MeV ions
{ .50 rad }

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
* BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS 95%
* Neutron Therapy

REFERENCES/NOTES

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS