

ENTRY No. 88

NAME OF MACHINE HARWELL VEC DATE June 1989
INSTITUTION Atomic Energy Research Establishment, Nuclear Physics & Instrumentation Division
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IN CHARGE Dr. M. S. Coates REPORTED BY L. Wilkinson/K. J. Howard

HISTORY AND STATUS

DESIGN, date 1961 - 62 Model tests 1961 - 63
ENG DESIGN, date 1962 - 64
CONSTRUCTION, date 1962 - 65
FIRST BEAM, date (or goal) 1965
MAJOR ALTERATIONS None

COST, ACCELERATOR £1.2M
COST, FACILITY, total £1.6M
FUNDED BY U.K.A.E.A.

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
SCIENTISTS 1 ENGINEERS 1
TECHNICIANS 5 CRAFTS 6

GRAD STUDENTS involved during year
OPERATED BY Research staff or Technicians/Operators
OPERATION 40 hr/wk, On target 30 hr/wk
TIME DISTR. in house % , Outside %
BUDGET, op & dev £0.7M
FUNDED BY Customer (User)

RESEARCH STAFF, not included above
USERS, in house 1 outside 7
GRAD STUDENTS involved during year
RESEARCH BUDGET, in house £40K
FUNDED BY U.K.A.E.A.

MAGNET
POLE FACE, diameter (compact) 178 cm, R extraction 30 cm
R injection cm
GAP, min 19 cm, Field 21.6 kG
max 49 cm, Field 13.1 kG } at 55 x 10^6
AVERAGE FIELD at R ext 17 kG } Ampere turns
B max/ <B> 1.3

NUMBER OF SECTORS { compact 3 } Spiral, max 48 deg
{ separated }
SECTOR ANGLE (SSC) deg
TRIMMING COILS 3 harmonics/sector
12 orbits/pole

CONDUCTOR, material and type Cu
STORED ENERGY (cryogenic) MJ
POWER: main coils 300 max, kW ; current stability .2/10^5
trimming coils 650 max, kW ; current stability .1/10^4

WEIGHT: Fe 170 tons ; coils 10 tons
COOLING system Water
ION ENERGY (bending limit) E/A = 86 q^2/a^2 MeV/amu
(focusing limit) E/A = 60 MeV - protons

ACCELERATION SYSTEM
DEES, number 1 ; angle 180 deg
BEAM APERTURE 4.5 cm ; DC Bias 0 kV
TUNED by, coarse MS, fine VC, auto 6

RF 7.5 to 23 MHz, stable ± 1/10^6
Orb F 1x1 to 23 MHz
HARMONICS, RF/Orb F, used 1, 3, 5, 7, 9

DEE - Gnd, max 80 kV, min gap 0.7 cm
STABILITY, (pk-pk noise)/(pk RF volt) 0.001
ENERGY GAIN, max 160 kV/turn

RF PHASE, stable to ± deg
RF POWER input, max 250 kW
FREQUENCY MODULATION, rate /s
modulator, type
beam pulse, width

VACUUM SYSTEM
OPERATING PRESSURE 1 x 10^-6 Torr or mbar
PUMPS, No, Type, Size 2 x 32" and 1 x 24" Oil diffusion

ION SOURCES
P.I.G. with/without filament

INJECTION SYSTEM

Internal P.I.G. source

EXTRACTION SYSTEM

2 channel electrostatic and magnetic channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 360 m^2 ; movable m^2
TARGET STATIONS 8 in 4 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH type
COMPUTER model AMSTRAD PC 1640 HD20

OTHER FACILITIES XY and O area scanning
Various isotope production targets
Various damage study targets Neutron target

CHARACTERISTIC BEAMS

Table with columns: PARTICLE, ENERGY (MeV), CURRENT (pA) Internal, External. Rows include H, alpha, Ni, I, Xe.

SECONDARY Neutrons 4 x 10^12 (part/s/steradian)

BEAM PROPERTIES

MEASURED CONDITIONS
PULSE WIDTH RF deg pA of MeV ions
PHASE EXC, max RF deg pA of MeV ions
EXTRACT eff % 90 pA of 60 MeV ions
RESOL ΔE/E 0.5 % pA of MeV ions
EMITTANCE (π mm. mrad) { axial rad } pA of MeV ions

OPERATING PROGRAMS, time distribution
BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
BIOMEDICAL APPLICAT. 5% ISOTOPE PRODUCTIONS 20%
Damage studies 75%

REFERENCES/NOTES RHEL report NIRL/R/86
Harwell report R5574 (pp5-9)
Proc. Fifth Int. Cyclotron Conference 200, 318 (1969)
IEEE Trans Nucl. Sci. NS-19 no. 2, 101 (1972)

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

