

**ENTRY NO. 78**

NAME OF MACHINE ..... **AMERSHAM INTERNATIONAL CYCLOTRON NO. 1**  
 INSTITUTION ..... **AMERSHAM INTERNATIONAL**  
 ADDRESS ..... **WHITE LION ROAD, AMERSHAM, BUCKS, ENGLAND.**  
 TEL (02404) 4488 ..... TELEX ..... **83141 ACTIVA G**  
 IN CHARGE **DEWI M LEWIS** ..... REPORTED BY ..... **DEWI M LEWIS**

**HISTORY AND STATUS**

DESIGN date ..... 1962 ..... Model tests .....   
 ENG DESIGN date ..... (PHILIPS)  
 CONSTRUCTION date ..... 1963-65  
 FIRST BEAM date (or goal) ..... 1965  
 MAJOR ALTERATIONS ..... Computer control 1975  
 ..... Full automation (without operator) 1977  
 COST ACCELERATOR ..... £.35M (1965 price)  
 COST FACILITY total ..... £.50M (1965 price)  
 FUNDED BY ..... United Kingdom Atomic Energy Authority  
**ACCELERATOR STAFF, OPERATION AND DEVELOPMENT**  
 SCIENTISTS ..... 1 ..... ENGINEERS ..... 1  
 TECHNICIANS ..... 2 ..... CRAFTS .....  
 GRAD STUDENTS involved during year .....  
 OPERATED BY ..... Research staff or ..... Operators  
 OPERATION ..... 165 hr/wk. On target ..... 155 hr/wk  
 TIME DISTR. in house ..... % outside   
 BUDGET, op. & dev. ....  
 FUNDED BY **Amersham International Pharmaceuticals Division**

**RESEARCH STAFF**, not included above

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

**MAGNET**

POLE FACE, diameter (compact) ..... 140 ..... cm, R-extraction ..... cm  
 R injection ..... cm  
 GAP, min ..... 16 ..... cm, Field ..... 18 ..... kG  
 max ..... 30 ..... cm, Field ..... 12 ..... kG } at  $50 \times 10^6$   
 AVERAGE FIELD at R ext ..... 15 ..... kG } Ampere turns  
 B max / < B > ..... 1.5  
 NUMBER OF SECTORS { compact ..... 3 } Spiral, max ..... 48 deg  
 { separated ..... }  
 SECTOR ANGLE (SSC) ..... deg  
 TRIMMING COILS .....

CONDUCTOR, material and type ..... Aluminium  
 STORED ENERGY (cryogenic) ..... MJ  
 POWER: main coils ..... 140 ..... max kW: current stability .....  
 trimming coils ..... max kW: current stability .....  
 WEIGHT Fe ..... 73.6 ..... tons coils ..... 6.4 ..... tons  
 COOLING system ..... Closed loop demineralised water  
 ION ENERGY (Bending limit) E/A = ..... 30 ..... q<sup>2</sup>/A<sup>2</sup> MeV/amu  
 (Focusing limit) E/A = ..... q/A MeV/amu

**ACCELERATION SYSTEM**

DEES, number ..... 1 ..... angle ..... 180 ..... deg  
 BEAM APERTURE ..... 3.5 ..... cm; DC Bias ..... 75 ..... kV  
 TUNED by, coarse ..... MS ..... fine ..... MP  
 RF ..... 10 ..... to ..... 21 ..... MHz, stable  $\pm 50 \times 10^{-5}$   
 Orb F ..... to ..... MHz  
 HARMONICS, RF/Orb F, used ..... 1 .....  
 DEE-Gnd, max ..... 50 ..... kV, min gap ..... cm  
 STABILITY, (pk-pk noise)/(pk RF volt) ..... 10 .....  
 ENERGY GAIN, max ..... 100 ..... kV/turn  
 RF PHASE, stable to  $\pm$  ..... deg  
 RF POWER input, max. .... 100 ..... kW  
 FREQUENCY MODULATION, rate ..... 6000 ..... /s  
 modulator, type ..... Thyatron, Crowbar  
 beam pulse, width .....

**VACUUM SYSTEM**

OPERATING PRESSURE .....  $5-10 \times 10^{-6}$  ..... Torr or mbar  
 PUMPS, No, Type, Size ..... 1 oil diff pump 5000 l/sec

**ION SOURCES**

PIG Filament Source (modified)

**INJECTION SYSTEM**

**EXTRACTION SYSTEM**

**FACILITIES FOR RESEARCH**

SHIELDED AREA, fixed ..... m<sup>2</sup>, movable ..... m<sup>2</sup>  
 TARGET STATIONS ..... in ..... rooms  
 STATIONS served at same time, max .....  
 MAG SPECTROGRAPH, type .....  
 COMPUTER model ..... D G NOVA 2, ROCKWELL microcomputer  
 OTHER FACILITIES .....

**CHARACTERISTIC BEAMS**

PARTICLE	ENERGY (MeV)		CURRENT ( $\mu$ A)	
	Goal	Achieved	Internal	External
p	27	27	600	-
d	16	15	1600	-

SECONDARY

(part/s)

**BEAM PROPERTIES**

MEASURED	CONDITIONS	
	RF deg	$\mu$ A of ..... MeV ..... ions
PULSE WIDTH	RF deg	$\mu$ A of ..... MeV ..... ions
PHASE EXC, max	RF deg	$\mu$ A of ..... MeV ..... ions
EXTRACT eff	%	$\mu$ A of ..... MeV ..... ions
RESOL $\Delta E/E$	%	$\mu$ A of ..... MeV ..... ions
EMITTANCE		
( $\pi$ mm-mrad)	axial	$\mu$ A of ..... MeV
	rad	

**OPERATING PROGRAMS**, time distribution

BASIC NUCLEAR PHYSICS ..... SOLID STATES PHYSICS .....  
 BIOMEDICAL APPLICAT. .... ISOTOPE PRODUCTIONS ..... 100%

**REFERENCES/NOTES**

- 1)
- 2)

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

ISOTOPE PRODUCTION MACHINE (commercial)

- Remote controlled targetry
- Mini computer control since 1974 with no operator attendance
- Automatic target change with no operator attendance since 1977