

ENTRY NO. FM-8

NAME OF MACHINE Harwell Synchrocyclotron DATE July 1978
INSTITUTION AERE, Harwell (UKAEA)
ADDRESS Didcot, Oxon, England

IN CHARGE C. Whitehead REPORTED by C. Whitehead

HISTORY AND STATUS

DESIGN, date 1946 MODEL tests 1947-48
ENG. DESIGN, date 1947-49
CONSTRUCTION, date 1948-49
FIRST BEAM date (or goal) December 6, 1949
MAJOR ALTERATIONS New RF System & Dee
1969
OPERATION, 60 hr/wk; On Target 50 hr/wk
TIME DIST., in house 80 %, outside 20 %
USERS' SCHEDULING CYCLE 11 weeks
COST, ACCELERATOR _____
COST, FACILITY, total _____
FUNDED BY UKAEA

ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS 1 ENGINEERS 1
TECHNICIANS 4 CRAFTS 4
GRAD STUDENTS involved during year None
OPERATED BY _____ Res staff or _____ Operators
BUDGET, op & dev _____
FUNDED BY UKAEA

RESEARCH STAFF, not included above

USERS, in house 3 outside 2
GRAD STUDENTS involved during year 1
RES. BUDGET, in house _____
FUNDED BY UKAEA

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed _____ m²
movable _____ m²
TARGET STATIONS 9 in 5 rooms
STATIONS served at same time, max 2
MAG SPECTROGRAPH, type _____
COMPUTER, model DDP516, plus CAMAC
OTHER FACILITIES _____

REFERENCES/NOTES

MAGNET

POLE FACE diameter 280 cm; R extraction 122 cm
GAP, min 20 cm; Field _____ kG } at _____ X 10⁶
max 30 cm; Field _____ kG } ampere turns
AVERAGE FIELD at R_{ext} 16 kG
CURRENT STABILITY ±1.50 parts/10⁶; B_{max}/(B) 1.03
NUMBER OF SECTORS /; SPIRAL, max / deg
POLE FACE COIL PAIRS: AVF / /sec;
Harmonic correction /
Rad grad _____ /sec or Circ coils _____
WEIGHT: Fe 600 tons; Coils 60 tons
CONDUCTOR, Material and type Copper
STORED ENERGY _____ MJ
COOLING SYSTEM Oil
POWER: Main coils 350 max, kW
Trimming coils - max, kW
YOKE/POLE AREA _____ %
SECTOR ANGLE (Sep Sec) _____ deg
ION ENERGY (Bending limit) E/A = 160 q²/A² MeV
(Focusing limit) E/A = _____ q/A MeV

ACCELERATION SYSTEM

DEES, number 1 angle shaped deg
BEAM APERTURE _____ cm; DC BIAS 1.5 kV
TUNED by, coarse _____ fine _____
RF 25 to 20 MHz, stable ± _____ /10⁶
Orb F _____ to _____ MHz; GAIN, max _____ kV/turn
HARMONICS, RF/Orb F, used First
DEE-Gnd, max 35 kV, min gap _____ cm
STABILITY, (pk-pk noise)/(pk RF volt) _____
RF PHASE stable to ± _____ deg
RF POWER input, max 20 kW
RF PROTECT circuit, speed _____ μsec
Type _____
FREQUENCY MODULATION, rate _____ /sec
MODULATOR, type _____
BEAM PULSE, width _____

VACUUM SYSTEM

PUMPS, No., Type, Size 3 Oil Diffusion
60cm
OPERATING PRESSURE 10 μTorr,
PUMPDOWN TIME 4 hrs

ION SOURCES/INJECTION SYSTEM

Calutron

EXTRACTION SYSTEM

Magnetic regenerator
CONTROL SYSTEM _____

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CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	p	160	160
	d	85	85
	α	170	170
	^3He	222	222
CURRENT Internal		(μA)	(μA)
	p	10	12
	d	10	35
	α	10	1
External	p		0.3
	d		0.3
		(part/s)	(part/s)
Secondary			

BEAM PROPERTIES

	Measured	Conditions
Pulse Width	RF deg	μA of MeV
Phase Exc, max	RF deg	μA of MeV
Extract Eff	3-5 %	5 μA of 160 MeV p
Res, $\Delta E/E$	%	μA of MeV
Emittance	(mm-mrad) { axial } μA of MeV	
	{ radial }	

OPERATING PROGRAMS, time dist

Basic Nuclear Physics	20 %
Solid State Physics	5 %
Bio-Medical Applications	5 %
Isotope Production	%
Development	%
Reactor	70 %
	%

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, OPERATION SUMMARY, ADDITIONAL REFERENCES