

ENTRY NO. 52

NAME OF MACHINE Minicyclotron MC-40 DATE 1978-08-08
INSTITUTION Instrument AB Scanditronix
ADDRESS Husbyborg, S-755 90 Uppsala, Sweden

IN CHARGE Stig Lindbäck REPORTED by Stig Lindbäck

HISTORY AND STATUS

DESIGN, date 1974 MODEL tests 1974
ENG. DESIGN, date 1974-1975
CONSTRUCTION, date 1974-1975
FIRST BEAM date (or goal) 1976
MAJOR ALTERATIONS _____
OPERATION, _____ hr/wk; On Target _____ hr/wk
TIME DIST., in house _____ %, outside _____ %
USERS' SCHEDULING CYCLE _____ weeks
COST, ACCELERATOR _____
COST, FACILITY, total _____
FUNDED BY _____

ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS _____ ENGINEERS _____
TECHNICIANS _____ CRAFTS _____
GRAD STUDENTS involved during year _____
OPERATED BY _____ Res staff or _____ Operators
BUDGET, op & dev _____
FUNDED BY _____

RESEARCH STAFF, not included above

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

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed _____ m²
movable _____ m²
TARGET STATIONS _____ in _____ rooms
STATIONS served at same time, max _____
MAG SPECTROGRAPH, type _____
COMPUTER, model _____
OTHER FACILITIES _____

REFERENCES/NOTES

x) Data refer to original model MC-35, which has now been boosted to the MC-40 version.

MAGNET

POLE FACE diameter 130 cm; R extraction 50 cm
GAP, min 10 cm; Field 21.3 kG } at _____ x 10⁶
max 18 cm; Field 13.2 kG } ampere turns
AVERAGE FIELD at R ext 17.9 kG
CURRENT STABILITY 10 parts/10⁶; B_{max}/(B) 1.19
NUMBER OF SECTORS 3; SPIRAL, max 45 deg
POLE FACE COIL PAIRS: AVF _____ /sec;
Harmonic correction 4 per valley
Rad grad _____ /sec or Circ coils 10
WEIGHT: Fe 57 tons; Coils 2.5 tons
CONDUCTOR, Material and type Cu
STORED ENERGY _____ MJ
COOLING SYSTEM Demineralized water
POWER: Main coils 120 max, kW
Trimming coils 10 max, kW
YOKE/POLE AREA 106 %
SECTOR ANGLE (Sep Sec) _____ deg
ION ENERGY (Bending limit) E/A = 40 q²/A² MeV
(Focusing limit) E/A = _____ q/A MeV

ACCELERATION SYSTEM

DEES, number 2 angle 90 deg
BEAM APERTURE 2 cm; DC BIAS 0 kV
TUNED by, coarse Mov. short fine Var. cond.
RF 12 to 27 mHz, stable ± 1 /10⁶
Orb F 6 to 26.8 mHz; GAIN, max 176 kV/turn
HARMONICS, RF/Orb F, used 1,2
DEE-Gnd, max 44 kV, min gap _____ cm
STABILITY, (pk-pk noise)/(pk RF volt) < 1/1000
RF PHASE stable to ± 0.5 deg
RF POWER input, max 60 kW
RF PROTECT circuit, speed 5 μsec
Type Crowbar
FREQUENCY MODULATION, rate _____ /sec
MODULATOR, type _____
BEAM PULSE, width _____

VACUUM SYSTEM

PUMPS, No., Type, Size 2 Diffusion pumps,
each 40 cm, 1 rough pump
OPERATING PRESSURE 5 μTorr,
PUMPDOWN TIME 0.5-1 hrs

ION SOURCES/INJECTION SYSTEM

Internal, cold cathode

EXTRACTION SYSTEM

Electrostatic deflector + mag. foc. channel

CONTROL SYSTEM

Conventional

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CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)	
ENERGY	p	9-40		
	d	4.5-20		
	He-3	7-53		
	α	9-40		
CURRENT		(μA)	(μA)	
	Internal	p	>500	
		d	>500	
		α	>100	
	External	p	100	
		d	100	
α		50		
Secondary		(part/s)	(part/s)	

BEAM PROPERTIES

	Measured	Conditions
Pulse Width	RF deg	μA of MeV
Phase Exc, max	RF deg	μA of MeV
Extract Eff	%	μA of MeV
Res, ΔE/E	%	μA of MeV
Emittance		
(mm-mrad)	{ axial } { radial }	μA of MeV

OPERATING PROGRAMS, time dist

Basic Nuclear Physics	%
Solid State Physics	%
Bio-Medical Applications	%
Isotope Production	%
Development	%
	%
	%

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

Changing of operation mode (first or second harmonic) is done completely from control desk without mechanical movements of the ion source. The ion source cathodes are exchangeable without breaking the main vacuum.

Highly automated and stable RF-system with an extensive interlock system providing detailed indications on system status.

Remotely adjustable deflector with temperature monitored septum to avoid overheating.

The first MC-40 cyclotron will be shipped late fall 1978 from the factory in Uppsala and installed at the Medi-Physics Inc. plant close to Chicago in the U.S.A.

A second MC-40 will be installed at the EURATOM research laboratory in Ispra, Italy in the beginning of 1980.