

ENTRY NO. 93

NAME OF MACHINE U-300  
INSTITUTION Joint Institute for Nuclear Research  
LOCATION Dubna, USSR DATE 1972, same for 1975 \*\*

IN CHARGE G. N. Flerov\* REPORTED by same

**HISTORY AND STATUS**

DESIGN, date 1955 MODEL tests ---  
ENG. DESIGN, date 1956-1958  
CONSTRUCTION, date 1956-1959  
FIRST BEAM date (or goal) int. 1960; ext. 1965  
MAJOR ALTERATIONS none  
OPERATION, 150 hr/wk; On Target 120 hr/wk  
TIME DIST., in house 95 %, outside 5 %  
USERS' SCHEDULING CYCLE \_\_\_\_\_ weeks  
COST, ACCELERATOR \_\_\_\_\_  
COST, FACILITY, total \_\_\_\_\_  
FUNDED BY \_\_\_\_\_

**ACCELERATOR STAFF, OPERATION and DEVELOPMENT**

SCIENTISTS \_\_\_\_\_ ENGINEERS \_\_\_\_\_  
TECHNICIANS \_\_\_\_\_ CRAFTS \_\_\_\_\_  
ADMIN & CLER \_\_\_\_\_ TOTAL \_\_\_\_\_  
GRAD. STUDENTS involved during year \_\_\_\_\_  
OPERATED BY \_\_\_\_\_ Res staff or \_\_\_\_\_ Sp operators  
BUDGET, op & dev \_\_\_\_\_  
FUNDED BY \_\_\_\_\_

**RESEARCH STAFF, not included above**

USER GROUPS, in house \_\_\_\_\_ outside \_\_\_\_\_  
STAFF SCIENTISTS, in house \_\_\_\_\_ outside \_\_\_\_\_  
TOTAL RES STAFF, in house \_\_\_\_\_ outside \_\_\_\_\_  
GRAD STUDENTS involved during year \_\_\_\_\_  
RES. BUDGET, in house \_\_\_\_\_  
FUNDED BY \_\_\_\_\_

**FACILITIES FOR RESEARCH PROGRAMS**

SHIELDED AREA, fixed 1500 m<sup>2</sup>  
movable \_\_\_\_\_ m<sup>2</sup>  
TARGET STATIONS 10 in 7 ROOMS  
STATIONS SERVED AT THE SAME TIME, max 1  
MAG SPECTROGRAPH, type \_\_\_\_\_  
ON-LINE COMPUTER, model \_\_\_\_\_  
FACILITIES for:  
Isotope production \_\_\_\_\_  
Irradiation, Solid State \_\_\_\_\_  
Biological \_\_\_\_\_  
Time-of-Flight Study \_\_\_\_\_  
On-Line Mass Separation \_\_\_\_\_

**NOTATIONS**

**MAGNET**

POLE FACE dia 310 cm; R ext 138 cm  
GAP, min \_\_\_\_\_ cm; Field \_\_\_\_\_ kG  
max 54 cm; Field \_\_\_\_\_ kG } at 0.9 x 10<sup>6</sup>  
AVE FIELD at R max 16.7 kG } A-turns  
CURRENT, STABILITY ± 100 parts/10<sup>6</sup>  
B max/<B> = 1.0  
AVF SECTORS \_\_\_\_\_ SPIRAL, max \_\_\_\_\_ deg  
POLE FACE coil pairs, AVF \_\_\_\_\_ /sec  
Harmonic 4 /sec; Rad Grad \_\_\_\_\_ /sec, or  
\_\_\_\_\_ circular; HEAVY ION, E max = 250 q<sup>2</sup>/A  
WEIGHT, Fe 2090, Cu, or Al 101 tons  
POWER, main coils 500, pole tips 10  
total 510 kW; cooled by H<sub>2</sub>O  
YOKE/POLE area 210 %; θ sec (Sect Mag) \_\_\_\_\_ deg  
TOTAL POWER, installed 2.2 MW  
normal load 1.0 MW  
arc type with  
ION SOURCE, int heated cathode  
ext \_\_\_\_\_

**ACCELERATION SYSTEM**

DEES, number 2, width 180 deg  
BEAM APERTURE 4-14 cm; DC BIAS 0 kV  
TUNED by, coarse MS, fine \_\_\_\_\_  
RF 3 to 6 MHz, stable ± 100 /10<sup>6</sup>  
Orb F 1.5 to 5.6 Mc/s; GAIN 600 kV/t  
HARMONICS, RF/OF, used 1,3  
DEE-Gnd, max 150 kV, x/field, min \_\_\_\_\_ cm,  
STABILITY, (pk-pk noise)/(pk RF volt) \_\_\_\_\_  
RF PHASE stable to ± \_\_\_\_\_ deg  
RF POWER input, max 250 kW  
RF PROTECT curcuit, speed \_\_\_\_\_ μs  
type \_\_\_\_\_

EXTRACT System dc electrostatic with magnetic channel

**SELECTED REFERENCES**

Nucl.Instr.Meth. 93, 3, 557  
(1971)

\* as per cablegram 5/14/75  
\*\*Being converted to U-400, K = 625  
First operation expected 1979.

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CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	$^{12}\text{C}^{2+}$		83
	$^{22}\text{Ne}^{4+}$		182
	$^{40}\text{Ar}^{7+}$		305
CURRENT		( $\mu\text{A}$ )	( $\mu\text{A}$ )
	Internal		
	$^{11}\text{B}^{2+}$		200
	$^{12}\text{C}^{2+}$		200
External			
	$^{22}\text{Ne}^{4+}$		50
	$^{31}\text{P}^{6+}$		15
	$^{40}\text{Ar}^{7+}$		3
		(part/s)	(part/s)
Secondary			
	$^{136}\text{Xe}^{9+}$		$3 \cdot 10^{12}$
HEAVIEST ion	$^{184}\text{W}^{12+}$		$10^{10}$

BEAM PROPERTIES

	Measured	Conditions
Pulse Width	_____ RF deg _____ $\mu\text{A}$ of _____ MeV _____	
Phase Exc, max	_____ RF deg _____ $\mu\text{A}$ of _____ MeV _____	
Extract Eff	25-35 %	50 $\mu\text{A}$ of 182 MeV $^{22}\text{Ne}^{4+}$
Res, $\Delta E/E$	0.4-0.5 %	_____ $\mu\text{A}$ of _____ MeV _____
Emittance	{ 30 axial } 10 $\mu\text{A}$ of 83 MeV $^{12}\text{C}^{2+}$	
	(mm-mrad) { 80 radial }	
VACUUM norm	2 $\mu\text{torr}$	PUMPDOWN time 10 hr

OPERATING PROGRAMS, time dist

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

OTHER FEATURES and OPERATION SUMMARY