

ENTRY NO. CM11 Date July 9, 1992  
 Machine Name 480 AVF CYCLOTRON  
 Manufacturer Sumitomo Heavy Industries, Ltd.  
 Address 10-11, Kiba 5-chome, Koto-ku, Tokyo 135, Japan  
 Tel (03)3820-6588 Telex  
 Fax (03)3820-6452 EMAIL  
 In Charge: Reported by: T. Tachikawa

**HISTORY AND STATUS**

DATES: Design First Machine June '85  
 SALES: No. Sold/Operational 1 / 1 Currently Available Yes  
 COST: Accelerator Facility

**MAGNET**

POLE PARAMETERS:  
 Diameter 115 cm R<sub>extract</sub> 48 cm R<sub>inject</sub> cm  
 HILL PARAMETERS: Gap (min) cm B<sub>max</sub> 2.0 T  
 (@ 171,200 AT) Gap (max) 8.6 cm B<sub>min</sub> T  
 VALLEY PARAMETERS: Gap (min) cm B<sub>max</sub> 1.57 T  
 (@ 171,200 AT) Gap (max) 14.1 cm B<sub>min</sub> T  
 AVERAGE FIELD: < B ><sub>min</sub> T < B ><sub>max</sub> 1.66 T  
 NUMBER OF SECTORS: compact/separated 4 /  
 sector angle deg. spiral (max) deg.  
 FIELD TRIMMING: Trim Coils 6 pairs  
 Harmonic Coils 4 pairs  
 Other  
 CURRENT: Main Coils Amps Stability 2x10<sup>-6</sup>  
 Trim Coils Amps Stability 5x10<sup>-4</sup>  
 Stored Energy (cryogenic) MJ  
 WEIGHT: Iron 28 tons Conductor 1 tons  
 ION ENERGY: Bending Limit E/A = q<sup>2</sup>/A<sup>2</sup> MeV/u  
 Focussing Limit E/A = q/A MeV/u

**ACCELERATION SYSTEM**

FUNDAMENTAL ACCELERATION:  
 Description: 27.90° dees with λ/4 cavities  
 No. of Gaps/turn dE/dn(max) 0.099 MeV/q  
 Voltage(max) 0.040 MV Harmonic f<sub>rf</sub>/f<sub>ion</sub> 1  
 Freq 20.4 MHz Power in(max) 0.065 MW  
 Stability: Phase ±1x10<sup>-7</sup> Voltage ±1x10<sup>-3</sup>

**VACUUM SYSTEM**

OPERATING PRESSURE: 2x10<sup>-8</sup> Torr  
 PUMPS: No. and type 2000.1/s. D.P.

**ION SOURCE(S)**

Type	Intensity (mA)	θ (π mm mrad)	ε <sub>n</sub> = βγϵ (π mm mrad)	Ion Species
(a) Livingston				H <sup>+</sup>
(b)				

**INJECTION SYSTEM**

Efficiency %

**EXTRACTION SYSTEM**

Electrostatic + Magnetic Efficiency 75 %

**CHARACTERISTIC BEAMS**

Accelerated Ions	E/A (MeV/u)	Current(part. μA)	
		Internal	External
(a) H <sup>+</sup>	30	200	80
(b)			

**EXTRACTED BEAM PROPERTIES:**

For μA of MeV/u ions  
 ΔE/E % Δφ °rf  
 ε<sub>n</sub> = βγϵ x πmm mrad z πmm mrad

**REFERENCES/NOTES**

(a)  
 (b)

ENTRY NO. CM12 Date July 9, 1992  
 Machine Name 750 AVF CYCLOTRON  
 Manufacturer Sumitomo Heavy Industries, Ltd.  
 Address 10-11, Kiba 5-chome, Koto-ku, Tokyo 135, Japan  
 Tel (03)3820-6588 Telex  
 Fax (03)3820-6452 EMAIL  
 In Charge: Reported by: T. Tachikawa

**HISTORY AND STATUS**

DATES: Design First Machine Feb. '85  
 SALES: No. Sold/Operational 2 / 2 Currently Available Yes  
 COST: Accelerator Facility

**MAGNET**

POLE PARAMETERS:  
 Diameter 180 cm R<sub>extract</sub> 75 cm R<sub>inject</sub> cm  
 HILL PARAMETERS: Gap (min) cm B<sub>max</sub> 2.0 T  
 (@ 263,000 AT) Gap (max) 13.3 cm B<sub>min</sub> T  
 VALLEY PARAMETERS: Gap (min) cm B<sub>max</sub> 1.57 T  
 (@ 263,000 AT) Gap (max) 31.5 cm B<sub>min</sub> T  
 AVERAGE FIELD: < B ><sub>min</sub> T < B ><sub>max</sub> 1.64 T  
 NUMBER OF SECTORS: compact/separated 4 /  
 sector angle deg. spiral (max) deg.  
 FIELD TRIMMING: Trim Coils 10 pairs  
 Harmonic Coils 4 pairs  
 Other  
 CURRENT: Main Coils Amps Stability 2x10<sup>-6</sup>  
 Trim Coils Amps Stability 5x10<sup>-4</sup>  
 Stored Energy (cryogenic) MJ  
 WEIGHT: Iron 120 tons Conductor 6 tons  
 ION ENERGY: Bending Limit E/A = q<sup>2</sup>/A<sup>2</sup> MeV/u  
 Focussing Limit E/A = q/A MeV/u

**ACCELERATION SYSTEM**

FUNDAMENTAL ACCELERATION:  
 Description: 90° -2 dees with λ/4 cavities  
 No. of Gaps/turn dE/dn(max) 0.127 MeV/q  
 Voltage(max) 0.050 MV Harmonic f<sub>rf</sub>/f<sub>ion</sub> 1  
 Freq 13-25 MHz Power in(max) 80 MW  
 Stability: Phase ±1x10<sup>-7</sup> Voltage ±1x10<sup>-3</sup>

**VACUUM SYSTEM**

OPERATING PRESSURE: 2x10<sup>-8</sup> Torr  
 PUMPS: No. and type 2000.1/s. D.P.x2

**ION SOURCE(S)**

Type	Intensity (mA)	θ (π mm mrad)	ε <sub>n</sub> = βγϵ (π mm mrad)	Ion Species
(a) Livingston				H <sup>+</sup>
(b)				

**INJECTION SYSTEM**

Efficiency %

**EXTRACTION SYSTEM**

Electrostatic + Magnetic Efficiency 80 %

**CHARACTERISTIC BEAMS**

Accelerated Ions	E/A (MeV/u)	Current(part. μA)	
		Internal	External
(a) H <sup>+</sup>	70	200	55
(b) H <sup>+</sup>	25	200	100

**EXTRACTED BEAM PROPERTIES:**

For μA of MeV/u ions  
 ΔE/E % Δφ °rf  
 ε<sub>n</sub> = βγϵ x πmm mrad z πmm mrad

**REFERENCES/NOTES**

(a)  
 (b)