

ENTRY NO. CM7 Date September 1995
 Machine Name TR13
 Manufacturer EbcO Technologies
 Address 7851 Alderbridge Way, Richmond, B.C.
 Canada V6X 2A4
 Tel (604).278-5578 Telex
 Fax (604).278-7230 E-MAIL
 In Charge: Reported by: B. Milton

HISTORY AND STATUS
 DATES: Design 1991 First Machine 1994
 SALES: No. Sold/Operational 2 / 2 Currently Available Yes
 COST: Accelerator Facility

MAGNET
 POLE PARAMETERS:
 Diameter cm R_{extract} 45 cm R_{inject} 2.5 cm
 HILL PARAMETERS: Gap (min) 3.2 cm B_{max} 1.9 T
 (@ AT) Gap (max) 4 cm B_{min} T
 VALLEY PARAMETERS: Gap (min) 10 cm B_{max} .55 T
 (@ AT) Gap (max) 20 cm B_{min} T
 AVERAGE FIELD: _{min} 1.20 T _{max} 1.22 T
 NUMBER OF SECTORS: compact/separated 4 /
 sector angle 40-45 deg. spiral (max) none deg.
 FIELD TRIMMING: Trim Coils none
 Harmonic Coils none
 Other
 CURRENT: Main Coils 475 Amps Stability 0.02%
 Trim Coils none Amps Stability
 Stored Energy (cryogenic) MJ
 WEIGHT: Iron 45 tonnes Conductor
 ION ENERGY: Bending Limit E/A = 18 q²/A² MeV/u
 Focusing Limit E/A = 18 q/A MeV/u

ACCELERATION SYSTEM
 FUNDAMENTAL ACCELERATION:
 Description: 2 pie shape dees with lambda/4 stems
 No. of Gaps/turn 4 dE/dn(max) 0.200 MeV/q
 Voltage (max) 0.050 MV Harmonic f_r/f_{ion} 4
 Freq 73 MHz Power in(max) .015 MW
 Stability: Phase 1 Voltage 10⁻⁴

VACUUM SYSTEM
 OPERATING PRESSURE: 1 x 10⁻⁶ Torr
 PUMPS: (No. and type) 1 cryo pump

ION SOURCE(S)

Type	Intensity (mA)	@	$\epsilon_n = \beta\gamma\epsilon$ (mm mrad)	Ion Species
(a) Cusp	1		0.7	H ⁻
(b)				

INJECTION SYSTEM
 Axial - Spiral Efficiency 12 %

EXTRACTION SYSTEM
 Stripping Efficiency 100 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part. μ A)	Internal	External
(a) H ⁻	13	100	H ⁻	100 p
(b)				

EXTRACTED BEAM PROPERTIES:
 For 100 μ A of 13 MeV/u H⁺ ions
 $\Delta E/E$ 1 % $\Delta\phi$ 30 °rf
 $\epsilon_n = \beta\gamma\epsilon$ x 2 π mm mrad z 2 π mm mrad

REFERENCES/NOTES
 (a)
 (b)

ENTRY NO. CM8 Date September 1995
 Machine Name TR30 + TR30/15
 Manufacturer EbcO Technologies
 Address 7851 Alderbridge Way, Richmond, B.C. Canada V6X
 Tel (604).278-5578 Telex
 Fax (604).278-7230 E-MAIL
 In Charge: Reported by: B. Milton

HISTORY AND STATUS
 DATES: Design 1988-89 First Machine July 1, 1990
 SALES: No. Sold/Operational 2 / 2 Currently Available Yes
 COST: Accelerator Facility

MAGNET
 POLE PARAMETERS:
 Diameter 76 cm R_{extract} 47-66 cm R_{inject} 2.5 cm
 HILL PARAMETERS: Gap (min) 3.5 cm B_{max} 1.9 T
 (@ .9 x 10⁵ AT) Gap (max) 5.2 cm B_{min} 1.3 T
 VALLEY PARAMETERS: Gap (min) 18 cm B_{max} 1.1 T
 (@ .9 x 10⁵ AT) Gap (max) 18 cm B_{min} 0.4 T
 AVERAGE FIELD: _{min} 1.2 T _{max} 1.24 T
 NUMBER OF SECTORS: compact/separated 4 /
 sector angle 32-45 deg. spiral (max) none deg.
 FIELD TRIMMING: Trim Coils none
 Harmonic Coils none
 Other
 CURRENT: Main Coils 500 Amps Stability 0.01%
 Trim Coils Amps Stability
 Stored Energy (cryogenic) MJ
 WEIGHT: Iron 45 tonnes Conductor 1 tonne
 ION ENERGY: Bending Limit E/A = 30 q²/A² MeV/u
 Focusing Limit E/A = 30 q/A MeV/u

ACCELERATION SYSTEM
 FUNDAMENTAL ACCELERATION:
 Description: 2 pie shape dees with lambda/4 stems
 No. of Gaps/turn 4 dE/dn(max) 0.200 MeV/q
 Voltage (max) 0.050 MV Harmonic f_r/f_{ion} 4
 Freq 73, 14 MHz Power in(max) 0.035 MW
 Stability: Phase 1° Voltage 10⁻⁴

VACUUM SYSTEM
 OPERATING PRESSURE: 3 x 10⁻⁷ Torr
 PUMPS: (No. and type) 2 cryo pumps

ION SOURCE(S)

Type	Intensity (mA)	@	$\epsilon_n = \beta\gamma\epsilon$ (mm mrad)	Ion Species
(a) Cusp	7		0.7	H ⁻ , D ⁻
(b)				

INJECTION SYSTEM
 Axial - spiral Efficiency 12 %

EXTRACTION SYSTEM
 Stripping Efficiency 100 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part. μ A)	Internal	External
(a) H ⁻	30	450	H ⁻	450 p
(b)	15	150	H ⁻	150 p

EXTRACTED BEAM PROPERTIES:
 For 400 μ A of 30 MeV/u H⁺ ions
 $\Delta E/E$ 1 % $\Delta\phi$ 30 °rf
 $\epsilon_n = \beta\gamma\epsilon$ x 2 π mm mrad z 2 π mm mrad

REFERENCES/NOTES
 (a) 12th International Cyclotron Conf., B. Milton et al.
 (b) PAC 1991, B. Milton et al.