

Transmission through LEBT and Tank #1

L. Blumberg

March 1973

Collider Accelerator Department
Brookhaven National Laboratory

U.S. Department of Energy

USDOE Office of Science (SC)

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The object of the study period was to improve the beam transmission through the low energy beam transport system and Tank #1. The amplifiers from the 200 MeV emittance unit were acquired for this study so this unit was removed from the injection area, and renovated prior to the study period.

The computer programs written in FOCAL for the Swiss PDP8L were received and used for data analysis. ^{Two} consecutive 8 hour study periods were managed for the beam studies.

^{4 hours of the first} The first 8 hour period was taken up with initial equipment turn on and with trouble shooting of the data taking equipment and the associated software. This was necessary since it had not been possible to run the emittance equipment until beam on prior to the study period. During the next 4 hours

qualitative emittance data was taken using the manually operated ^{connected to VB#1 emittance unit} RESOPS unit to determine the best operating conditions for the source magnet, anode pulser and extractor with the quadrupole

plet set to theoretical settings obtained from two dimensional calculations. None of the source parameters had a large effect on

The conditions considered for a 150 mA beam current at VB#1. The only parameter that appears to affect the simultaneity in any way was the extractor voltage which was finally set to 40KV compared with ~30KV used prior to this study period. The source parameters used for the remainder of the study period were as follows:

Bochert-Walton High Voltage	= 764 KV.
Extractor Voltage	= 40 KV
Source filament current	= 40 A
Source discharge magnet	= 1.3 A
Source anode pulser	= 320 V
Beam current in VB#1	= 150 mA.
LEBT quadrupoles Q1 and Q3	= 255 A
BT quadrupole Q2	= 265 A.

During the second & low period the LEBT steering was adjusted to centre the beam at VB#4 with the LEBT aperture out. With the beam centred at VB#4 it was off centre in VB#5 (immediately in front of Tank #1) suggesting that there is some misalignment in the later part of the LEBT line. Tank #1 was then turned on and a 60 mA beam current obtained for 100 mA at the input to the Tank with only Beamchamber #2 on. This was achieved by setting LEBT quadrupoles to give a matched beam at the input to the Tank as calculated and reported in Berkeley papers. At this point a fault occurred in Anode Pulser #1 so the second Anode pulser was brought into operation after running the gas pressure to zero. This operation caused a movement of

In position which necessitated readjustment of the beam steering. The next shift tried to cause a further lift of the beam by repeating the above steps but were unsuccessful. They then recorded emittance values at VB#1, 4, 5 and 10 MeV for the previously determined settings with the matched input beam and with buncher #1 energized.

The next shift put the LEBT aperture in and adjusted the quadrupole triplet upstream of the aperture to improve beam transmission through the aperture. This did not affect the beam position at VB#4 or 5 but the transmission through Task #1 was improved as 58 mA of 10 MeV beam went was obtained for 80 mA at the input.

Then buncher #1 was turned on and a ^{10 MeV} beam current of 60 mA obtained for 75 mA at the input to the Task.

Emittances were recorded at VB4, 5 and 10 MeV for LEBT aperture in and one and two bunchers energized. The data is summarized in the following table which gives ^{best} 10 MeV emittance of 6 cm mrad un-normalized. A specimen set of also was taken with the RESOPS unit for future reference purposes.

800% EFFICIENCIES AT LOCATIONS GIVEN IN COLUMN

800% EFFICIENCIES AT LOCATIONS GIVEN IN COLUMN										BPM CURRENT			LEFT	DRUM#	DRUM#							
VEIH	VEIV	VEIV	VEIH	VEIV	VEIH	VEIV	VEIH	VEIV	VEIH	VEIV	IN	IN	IN	AP.	#1	#2						
E	PRE	E	PRE	E	PRE	E	PRE	E	PRE	E	PRE	E	PRE	STATUS	STATUS	STATUS						
12.8	6.79	24.3	0.97	13.6	0.185	11.0	0.56	12.1	0.53	13.3	0.53	7.5	11.3	5.1	0.76	140	125	100	60	OUT	OFF	ON
21.8	0.63	26.1	1.05	9.4	0.38	11.1	0.45	13.9	0.56	13.5	0.54	6.8	1.02	5.9	0.88	150	85	85	58	IN	OFF	ON
-	-	-	-	7.0	0.22	10.0	0.40	12.6	0.51	15.2	0.61	6.00	0.70	5.80	0.87	140	75	75	60	IN	ON	ON

* INCLUDES ALL EXHAUST AT VEIH LOCATION.