



Fermilab

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Alignment Check for MI8 Collimators

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Abstract

A simple alignment check of the MI8 collimators relative to their installed positions has been performed. Horizontal and vertical measurements compared the location of moving vs. fixed portions of the collimator system. Distances were established after final alignment and before motors were engaged. Measurements were repeated before beam returned at the end of the Spring 2006 facility shutdown. They can serve as a quick check that the system has been returned to its non-intercepting (centered) location which can be performed at any time.

Introduction

Collimators were installed at the MI836 and MI838 cell to allow the scraping of halo from the Booster beam. Positioning or repositioning of the collimators in the beam halo only requires a precision of 1/4 to 1/2 mm so one can employ simple means to achieve adequate alignment after a failure in order to continue with operations. The Alignment Group provided a precision placement of each device and can do so again, but the schedule implications of that operation encouraged us to employ the obvious, simple checks described below. Consult Reference [1] for a description of the alignment effort. The Alignment Group can provide measurement results.

Measurements

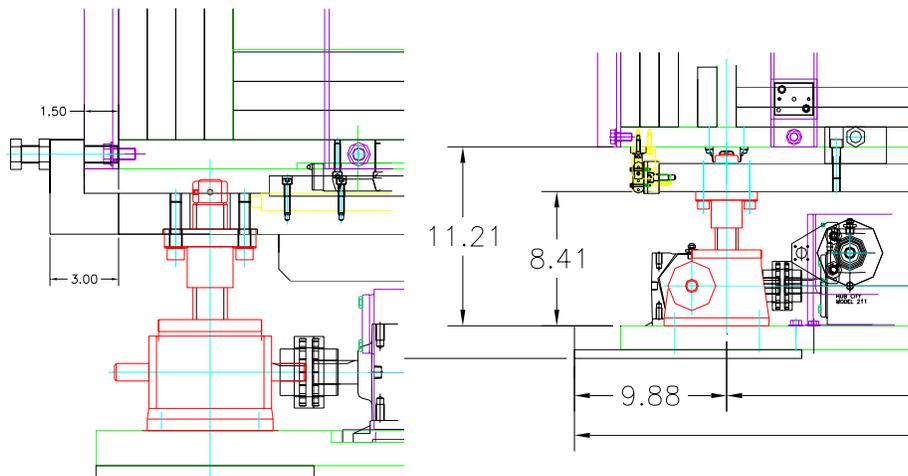


Figure 1. Support Plate Details showing locations for quick check measurements.



White Line shows location of measurement in Horizontal and Vertical Quick Check

The horizontal distance is measured as indicated by the 3.00" dimension which represents the distance from the Absorber Weldment plate -- MD-374684 -- to the bracket which holds the bolt for the travel hard limit. (Liner Alignment Block -- MB-374725) which is attached to the Horizontal Support Plate -- ME-374681. The vertical distances were measured as indicated by the 11.21" dimension which is the length from the top of the base plate to the bottom of the Absorber Weldment plate. A measurement was made of each length on the upstream and on the downstream of each collimator. Horizontal measurements were "A" upstream and "B" downstream while vertical measurements were "C" upstream and "D" downstream.

	MI836 US	MI836 DS	MI838 US	MI838 DS
Measurements in Inches	Collimator 1	Collimator 2	Collimator 3	Collimator 4
BCB&DC 5/1/06				
Vertical to plate top US	12.5625	12.375	12.3125	12.375
Vertical to plate top DS	12.5	12.375	12.3125	12.4375
Top Plate 1.25 Thick				
A	3.037	3.0065	2.978	3.002
B	3.056	2.996	2.98	3.001
C	11.3125	11.125	11.0625	11.125
D	11.25	11.125	11.0625	11.1875
Alignment Crew 5/1/06				
C	11.292	11.147	11.134	11.102
D	11.292	11.117	11.119	11.13
BCB&DEJ 5/17/06				
A	3.028	2.9945	2.9775	2.9935
B	3.082	2.9945	2.9775	3.0075
C	11.28775	11.1315	11.1315	11.1315
D	11.28775	11.1315	11.1315	11.1315

Table 1: Quick Check Measurements for May 2006

On May 1, Bruce Brown and Dave Capista recorded the horizontal and vertical offsets shown in Table 1. A ruler was used for vertical measurements which were read to 1/16". A digital caliper (using the end measurement rather than the jaws) was used for the

horizontal measurement. The same day, the alignment crew used stick micrometers to check the vertical measurements. Agreement was good to about 1/16", as expected. Following this, Al Legan commissioned the motion systems. Brian Kramper provided the data in the motor position table at the end of reference [1]. Note that these results employed the limit switches and we could expect to re-establish the absolute location with respect to limit switches as was done when that table was created. On May 17th, the positions were again checked with the results shown in Table 1. The agreement is to about 0.01" except in one case where it is still adequate.

Summary

The LVDT position readout is available to reposition the collimators. If the LVDT's are working, we will use them. If the limit switches are undisturbed, we can use them. But, if required, these simple measurements are sufficient to re-establish the collimator location adequately to run beam without waiting for an alignment crew.

Acknowledgments

I would like to thank the alignment crew as well as Dave Capista and Dave Johnson for measurement assistance. I thank Vladimir Sidorov for his excellent collimator design and for assistance with illustrations.

References

[1] Vladimir Sidorov et al., **Mechanical Design of the MI8 Collimators**, Beams-doc-2287, June 2006