

# **Jefferson Lab Alignment Group**

## **DATA TRANSMITTAL**

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**DATE:** 3<sup>rd</sup> Dec 1999

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**Checked:** # : 564

### **DETAILS:**

Attached are three pages relating to the surveys performed on the Hall A superharp /BPM assemblies from March 31<sup>st</sup> to December 3<sup>rd</sup>, 1999.

The first page is a table analyzing the results. The first section of the table gives information on the control points used in the theodolite surveys. An "X" indicates the control point was used and held fixed, a "F" indicates that the point was floated vertically.

The "Theodolite Survey" part of the table shows the angles of each spectrometer, the overall standard error of the adjustment ("FAK"), and the individual standard errors of the X coordinate for tooling balls 1b and 2b. For simplicity, only the X coordinate of the superharps is given; tooling ball 'a' is beam right, 'b' is center, and 'c' is beam left. The numbers shown represent the X position (in mm) of the tooling ball with respect to its ideal location (a negative X indicating it is located to the beam right). The values for the last survey (E120399) appear to be in good agreement with previous results, and should provide a good indication of the current position of the superharps.

The "Optical Tooling" results show the location of tooling ball B on each of the superharps relative to a single line of sight defined by control points located close to the beamline (HSA0006 and HSA0008). These surveys were generally carried out within a day of the corresponding theodolite survey. A systematic offset can be noticed between the results for 1b and the theodolite results, possibly due to the orientation of the line of sight.

The second page is a graph of the X locations from the optical tooling and theodolite surveys. Some trends can be seen in this data, where the theodolite and optical tooling surveys generally follow each other. The exception to this is at E091099. Here the theodolite survey does not appear to have any problems, but the optical tooling survey did not contain the necessary checks, such that the results may be in doubt.

The final page contains the full results of the theodolite surveys - DZ, DX and DY. The averages of each component are shown together with the residuals from the overall averages.

No conclusions are reached here. It seems that spectrometer position alone is not the only cause of differences. Other factors such as vacuum of the target, cooldown and temperatures should also be considered.