

Subject: survey results of other horns
From: Lynn Baker <lab5@cornell.edu>
Date: 12/16/2012 08:51 PM
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Mike, Phil, Denis,

Attached is the results of the survey done on 2 Nov 2012. We surveyed all of the horns except the radar horns. Each horn was surveyed multiple times to minimize the y error reported by Netrology by adjusting the turret position. Note that the y position reported by Netrology is the center of the target circle, not necessarily the horn phase center. If the y tilt is zero then the two are the same.

The results reported are based on fitting the surveyed position of the secondary targets to the videogrammetry results from 28 June 2004. Doing the identical calculation, both in Mathematica, using the secondary reference used during the survey only changes the results by (-.028", -.008", -.021") in position and (-.005°, .006°) in x,y tilt.

Another small difference is using Netrology and Mathematica to do nominally the same calculation. Netrology reported the fitted center of the target circles based on the old secondary reference and its internal calculations. Doing the same calculation with Mathematica yields slightly different results. The difference is (-.041", .063", .004"). I looked at this and can't find any problem with the Mathematica calculations. Netrology does include scaling in its fits and I did not in my Mathematica code. The reported scaling factor from Netrology is too small to cause these differences. The scaling factor it reports would only account for something like .010" or less.

In the last report I reported the difference between Mathematica using the videogrammetry data and Netrology using the old reference data. That comparison combines the two effects just discussed. To conclude, the error bars on reported positions should probably be +/-1 mm. That is small enough to have a negligible effect on performance.

Reviewing the position errors for each horn:

S-band wide: The errors are small in position and modest in tilt. These results are much better than the results in Phil's records for this horn on 2 May 2004, especially in z. There must have been an adjustment done after that survey.

L-band: The x and z errors are larger than optimum although at this wavelength probably not effecting the performance too much. The y tilt is a little large but probably still not significant. The x,z errors are similar to what is reported in Phil's records for 28 April 2004, noting that his numbers are corrections and the table here is errors, so the signs are opposite.

C-band: The x,y errors are small for this wavelength. The z error is a

little larger but modest and is close to the value in Phil's records for 2 May 2004. The tilts are modest.

X-band: The position errors are modest for this wavelength and quite close to Phil's records for 2 May 2004. The x tilt is small, the y tilt is larger but not too bad.

C-band high: Not sure which C-band to compare to in Phil's records. The x error is a bit large for this wavelength, the y,z errors are modest. The tilts are modest.

ALFA: The x error is $-.741''$, Phil's notes state that the center of ALFA wants to be $1.063''$ downhill (- in x) from nominal center. The correction would then be $-.322''$ which is close to the correction value listed in Phil's notes. The z error is modest for this wavelength and very close to the value in Phil's notes. The tilts are modest.

S-band high: The position errors are small. The x error is very close to the value in Phil's notes for 2 May 2004. The z error is similar in magnitude but has the opposite sign then to now. The tilts are modest.

Conclusions: The errors seem quite stable over the last 8 years and there is not much to be concerned about. If anything needs adjusting it is the L-band x,z errors but they have been about the same for 8 years. There seems to be a consistent bias in the x tilts. They are all negative and cluster around $-.4$ degrees. It is not a large error but might indicate a mistake in data analysis back in 2004. I have double checked this part of the new analysis and can't find any problems.

Regards,
Lynn

—Attachments:—

survey_report_2nov2012.txt

2.3 KB