

# Notice of Errors in CalDB 4.4.1 ACIS T\_GAIN files for May 1 - July 31, 2010

19 April 2011

## Summary:

There is an error in the time-dependent gain correction (TGAIN) which affects observations taken from 01 May 2010 - 31 July 2010. You are receiving this message because you are the PI of an observation from that time period.

A correction to the TGAIN will be released in CalDB 4.4.3, expected within one week of this message. **ADDENDUM 4/26/11: CalDB 4.4.3 has indeed been released on 26 April 2011, with the correction to this issue.**

## Technical Details:

An error has been found in two ACIS T\_GAIN files that were released with CalDB 4.4.1 in December 2010. The files are the interpolating T\_GAIN files applicable to OBS\_IDS taken during the May 1 through July 31, 2010 period. The archive remains unaffected at this point because these observations have not undergone a reprocessing by the Data System. However, any users who have reprocessed one of these datasets in CIAO 4.3 with CALDB 4.4.x by running the `acis_process_events` tool or the `chandra_repro` script will have imparted a small error in their T\_GAIN corrections.

The error occurs because the two T\_GAIN files, namely

<i>acisD2010-05-01t_gainN0006.fits</i>	<i>CTI_APP = PPPPPBPBPP</i>	<i>FI chips and BI chips CTI-corrected</i>
<i>acisD2010-05-01t_gainN0005.fits</i>	<i>CTI_APP = PPPPPNPNPP</i>	<i>FI chips CTI corrected, BI uncorrected</i>

have incorrect values for the EPOCH1 and EPOCH2 header keywords. These values are off by approximately -2%, and are used to set the interpolation limits (in seconds) of the DELTPHA1 and DELTPHA2 values whence the PHA corrections are derived. The resulting error is systematic, but less than 1/2% except at the lowest PHA values, where the ADU "bit" noise in the PHA values becomes significant. Nominally these errors should be corrected before imaging spectral analysis, however the extent of the affect depends on the spectral range. Energies below 1 keV are more significantly affected.

The affect on order-sorting of GRATING/ACIS-S observations has been found to be insignificant.

Grating energies/wavelengths are not affected by T\_GAIN errors.

A correction will be possible with the release of CalDB 4.4.3, expected within one week of this message.

The corrected T\_GAIN files, namely

*acisD2010-05-01t\_gainN0006\_revA.fits*

*acisD2010-05-01t\_gainN0005\_revA.fits*

will be included in that release. **Addendum: CalDB 4.4.3 was released 26 April 2011.**

## Illustration of the T\_GAIN errors:

Estimates of the net absolute and relative errors in the PHA systemmatically generated by the EPOCH value errors are given in Figures 1a&b and 2a&b below. As the outlying traces indicate, these are systematic errors that occur for each position on the ACIS array as a function of the PHA value. The green (ACIS-I) and blue (ACIS-S) traces are the error curves corresponding to the respective aimpoint

positions. The relative errors are less than 1/2% in all cases except when the ADU noise becomes significant, i.e., when an error of 1ADU is greater than 1/2% of the PHA value.

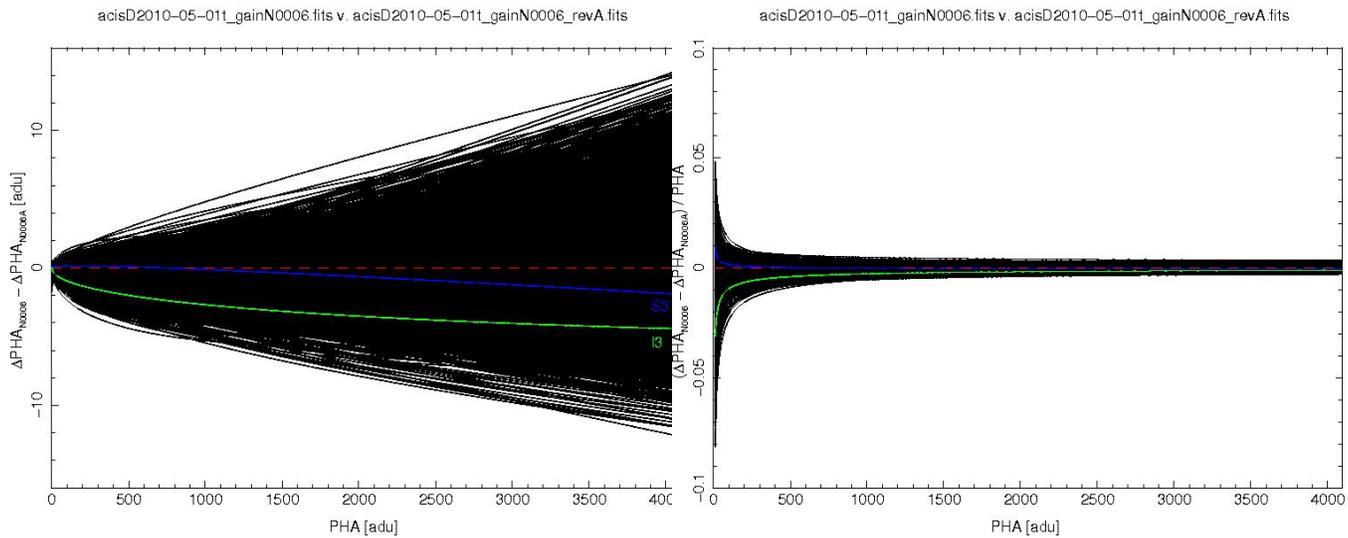


Fig. 1a: The absolute error in the interpolated PHA correction (in ADU) for every position of ACIS, as a function of PHA, for the two *N0006* files. The colored traces represent the error versus PHA for the ACIS-I aimpoint (GREEN) and the ACIS-S aimpoint (BLUE).

Fig. 1b: The relative error versus PHA value for the data given in Fig 1a. The green (ACIS-I) and blue (ACIS-S) traces again represent the systematic errors relevant to the aimpoint positions. Note that the relative error is less than 1/2% for ALL traces except where the ADU "bit" noise becomes significant.

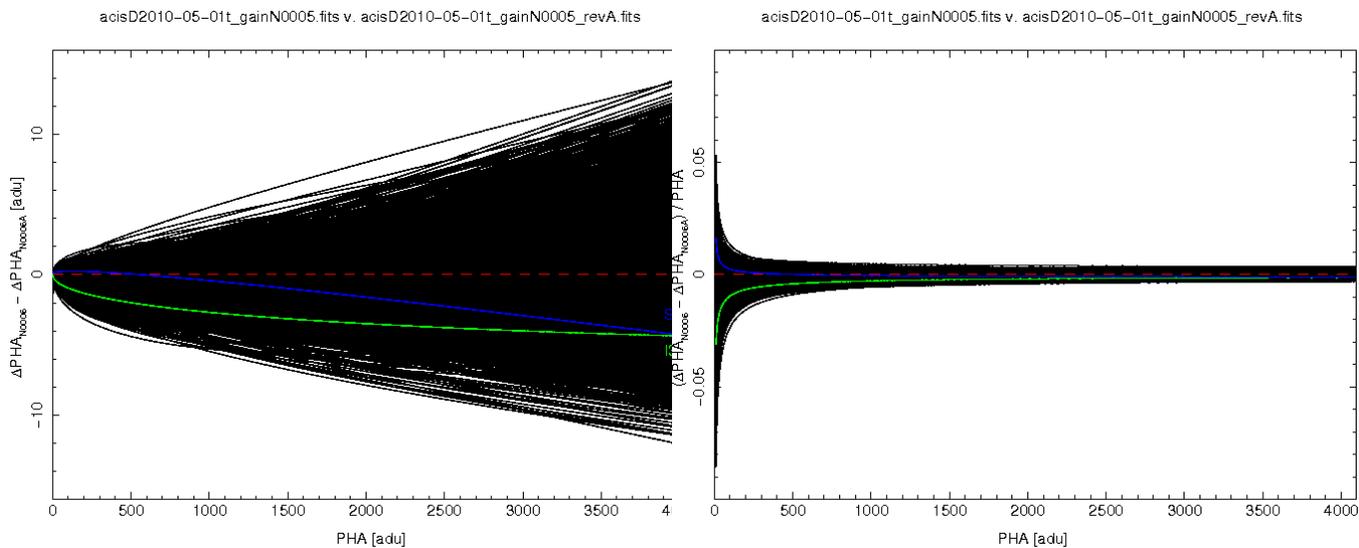


Fig. 2a: The absolute error in the interpolated PHA correction (in ADU) for every position of ACIS, as a function of PHA, for the two *N0005* files. The colored traces represent the error versus PHA for the ACIS-I aimpoint (GREEN) and the ACIS-S aimpoint (BLUE). Note that the blue trace is different than in Fig 1a; this is because the *N0005* BI chips data are NOT CTI-corrected.

Fig. 2b: The relative error versus PHA value for the data given in Fig 2a. The green (ACIS-I) and blue (ACIS-S) traces again represent the systematic errors relevant to the aimpoint positions.

While these errors are less than 1/2% for most photon energies, they are systematic errors. They give an absolute miscalculation of the PHA for a given position and PHA value for ACIS. Hence, these errors should nominally be corrected by reprocessing all affected datasets with the appropriate corrected T\_GAIN file.

The Chandra CalDB Manager regrets this error, and apologizes for any inconvenience or hardship caused by it. Measures have been taken to prevent this problem in future T\_GAIN releases.

Please contact the CXC Helpdesk if you have questions: <http://cxc.harvard.edu/helpdesk/>