MIT
Center for Space Research **Chandra X-Ray Center**

MEMORANDUM
February 18, 2005

To:	CXC DS
From:	Glenn Allen, SDS for the ACIS Background Working Group
Subject:	acis_make_bkgd
Revision:	1.0
URL:	http://space.mit.edu/CXC/docs/memo_acis_make_bkgd_1.0.ps
File:	/nfs/cxc/h2/gea/sds/docs/memos/memo_acis_make_bkgd_1.0.tex

1 acis_make_bkgd

1.1 Description

Ideally, when users perform spectral analyses of ACIS data, they should estimate their background using data from nearby, on-chip, source-free regions. However, in some cases it is not possible or convenient to do so. For example, some observations are performed on large diffuse sources that fill the entire field of view. For such observations, it is possible to estimate the shape of the background using data from other ACIS observations. The calibration team has prepared some event data files to use for this purpose. The tool acis_make_bkgd is designed to use these calibration files to create background event data files that can be used when performing spatial and spectral analyses of large diffuse sources.

1.2 Parameters

1. infile,f,a,“”,,,“Input event file with WCS information”
2. outfile,f,a,“”,,,“Output background event file name”
3. bkgdfile,f,a,“CALDB”,,,“Input background event file name (CALDB | ⟨filename⟩)”
4. acaofffile,f,a,“”,,,“Input aspect camera offset file”
5. gtifile,f,a,“)infile”,,,“Input GTI file”
6. clobber,b,h,“no”,,,“Overwrite output event file if it already exists?”
7. verbose,i,h,0,0,5,“Amount of messages produced (0=none, 5=most)”
8. mode,s,h,“ql”,,,“q=query for required parameters, h=do not query and l=save values used”

1.3 Input

1. A Level 1, 1.5 or 2 event data file (acis*evt1.fits, acis*evt1a.fits, or acis*evt2.fits)
2. A background event data file (e.g. acis7sD2000-12-01bkgrndN0002.fits)
3. An aspect camera offsets file (e.g. pcad*asol1.fits)
4. A good-time interval (GTI) file (e.g. the acis*evt2.fits or acis*flt1.fits)

1.4 Output

1. A background event data file where the sky coordinates have been recomputed to be consistent with the tangent plane and GTIs used for the input event data file.

1.5 Processing

1. Verify that the specified input files exist. If the parameter clobber = "no," then verify that the output file does not exist.
2. Read the WCS information from the input event data file.
3. Determine which CCDs were active for the observation by parsing the keyword DETNAM in the header of the input event data file. It the keyword is missing, then use the column CCD_ID in the EVENTS extension of the input event data file.
4. Begin a loop over each active CCD. Hereafter, the CCD_ID number of the CCD being processed is referred to using the variable i.
5. Read the set of GTIs used for CCD_ID i.
6. If the parameter bkgdfile = "CALDB," then identify the input background event data file to use.
7. Read the background event data for CCD_ID i.
8. For each background event j,

   i Randomly select a TIME t from set GTIs.

   ii Determine the aspect properties appropriate for TIME = t.

   iii Use the DETX and DETY coordinates of the background event, the randomly selected aspect parameters and the WCS information from the input event file to compute the new sky coordinates of the background event.

9. step09 Write the data to the output background event data file.
10. End a loop over each active CCD.
11. TIME sort the output file.

1.6 TBD

- How do me make sure that the CTI, tgain and gain files match?
- Can we tweak the output file to have the appropriate normalization (e.g. by adjusting the keyword EXPOSURE)?
- Do we need to fix other columns in the output file?
- Do we need to fix keywords (e.g. FILTER) in the output file?