



GTI: Good Time Intervals

Each Chandra event file contains one or more auxiliary blocks which include the good time intervals. In the case of ACIS, there is one GTI per CCD. GTIs are table of sorted START and STOP times in units of seconds. For pipeline-produced data, the GTIs give the time periods when the mission time line parameters fell within acceptable ranges (see "[ahelp_mtl](#)" and the [MTL dictionary entry](#) for more information). Additional temporal filtering by the user - such as to remove background flare events - can further restrict these periods; the data subspace of a file (see "[ahelp_subspace](#)" and the [subspace dictionary entry](#)) lists the GTI filters that have been applied to it.

The GTIs for pipeline-produced ACIS data are computed in two stages.

Stage 1:

The tool `acis_build_chip_gti` is used to compute the initial set of GTIs for each CCD that is active during an observation. These GTIs include the entire duration of an observation. Only frames that are identified as having been dropped are excluded from the GTIs. The START and STOP times for each GTI are aligned with the start and stop times of the corresponding frame of data. The START and STOP times for a given frame can differ from one CCD to another because the read-out times of the CCDs may be staggered. The GTIs may also differ from CCD to CCD because a frame of data may be dropped for one CCD, but not another. The output GTIs are appended to a Level 1 ACIS event-data file. One FITS extension is appended for each active CCD.

Stage 2:

A refined set of GTIs is obtained by using the file `mtl1.fits` and the tool `mtl_build_gti`. The set of criteria used by `mtl_build_gti` is defined by the GTI limit file in the CALDB. These criteria may include (but are not limited to)

- The first one or two frames, which do not contain useful science data,
- The quality and type of the aspect solution,
- Gaps in the aspect solution,
- The motion of the optical axis,
- The angles between the optical axis and the limb of the Sun, the limb of the Earth, the limb of the Moon, and the direction of motion of the spacecraft,
- The temperatures of various portions of the telescope and the optical bench,
- The number of events telemetered relative to the number of threshold crossings, and
- The reaction-wheel speed.

The union of these GTIs and the GTIs produced by `acis_build_chip_gti` are used to produce the file `flt1.fits` with the tool `acis_merge_gti`. The file `flt1.fits` has a separate extension for each active CCD. Since the START and STOP times produced by the tool `mtl_build_gti` are not necessarily aligned

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with the start and stop times of a frame, the GTIs in the file `flt1.fits` may have START and STOP times that occur in the middle of a frame. This misalignment means the actual exposure for a CCD can differ from the value recorded in the exposure keyword for the CCD. The value in the keyword is based on the sum of the GTIs (i.e. may contain partial frames). However, the actual exposure for a timed-exposure mode observation contains only full frames. When the data are filtered using the GTIs in the file `flt1.fits`, either all or none of the events are copied to the file `evt2.fits` because all of the events in a single frame for a CCD are assigned the same time. The difference between the actual and effective exposures should be negligible except in the very rare case where a significant fraction of the frames have GTIs with START or STOP times in the middle of the frame. If a user is concerned that the value in the keyword EXPOSURE for their observation is inaccurate, then they should contact the [Helpdesk](#). The GTIs in the file `flt1.fits` are appended to the Level 2 ACIS event-data file.

Custom GTIs:

Users can customize their GTIs by using the tools [mtl_build_gti](#) and/or [dmgti](#). Please refer to the [ahelp](#) files for these tools for more information. There is [a basic example of how to use dmgti](#) in the [Introduction to the Data Model thread](#).

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URL:
<http://cxc.harvard.edu/ciao3.4/dictionary/gti.html>
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