Chandra X-ray Center

Time Keywords in Interleaved Data

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Prior to version DS 6.9 of the standard data processing software, there was an error in the pipeline derivation of the DTCOR value, which resulted in incorrect values for the time header keywords. Users working with interleaved data processed before this software version will need to calculate the correct time values and change the header with dmhedit. The processing version is stored in the ASCDSVER header keyword.

More information on each of the keywords is available in "ahelp chandra times". The following equations should be used to determine the correct values:

- *TIMEDEL*

  ```
  TIMEDEL = EXPTIME + 0.04104 s
  ```

  For ACIS observations, the value of TIMEDEL is the duration of a single frame of data (EXPTIME) plus the time it takes to move the data from the imaging region to the frame−store region (0.04104 s).

- *GTI interval*

  ```
  GTI interval = TIMEDEL + FLSHTIME
  ```

  Since all of the events that occur on a CCD during a single frame of an observation are assigned the same time, the good−time intervals (GTIs) should be quantized in units of the length of time between one frame and the next. This time includes the time during which the CCD is collecting data (EXPTIME) plus the time it takes to move the data from the imaging region to the frame−store region (0.04104 s) plus any preflush that occurred before the frame to avoid overwriting data in the frame−store region (FLSHTIME). Often there are no preflushes, in which case, the duration of a single GTI interval = TIMEDEL.

- *ONTIME*

  ```
  ONTIME = Sum of GTIs = GTI interval * No. of frames
  ```

  The total duration of an observation is specified by the keyword ONTIME. Note that an ACIS CCD does not need to be "live" for the entire ONTIME.

- *DTCOR*

  ```
  DTCOR = EXPTIME / (TIMEDEL + FLSHTIME)
  ```

  An ACIS detector is not necessarily active for the entire ONTIME. Data collected during a preflush are discarded onboard. Events that occur during the 0.04104 s it takes to move data from the imaging region to the frame store will have different sky coordinates than the source (see the help file for acisreadcorr). Therefore, these events will be excluded from the spatial regions typically used to extract source events. To account for these "dead" times, the keyword DTCOR is used.

- *LIVETIME*

  ```
  LIVETIME = DTCOR * ONTIME = EXPTIME * No of frames
  ```

  The LIVETIME is the total length of time during which events can be detected from a source. The time intervals associated with preflushes are excluded from the LIVETIME as are the intervals during which a frame is moved from the imaging region to the frame store.

- *EXPOSURE*

  ```
  EXPOSURE = LIVETIME
  ```

  Some tools use the keyword LIVETIME, while others use the keyword EXPOSURE. They should be identically the same.

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