



MIT Kavli Institute



Chandra X-Ray Center

MEMORANDUM

June 19, 2007

To: Jonathan McDowell, SDS Group Leader
From: Glenn E. Allen, SDS ACIS Scientist
Subject: ACIS Bad-pixel STATUS Bits
Revision: 1.11
URL: http://space.mit.edu/CXC/docs/docs.html#bpixbits
File: /nfs/cxc/h2/gea/sds/docs/memos/memo\_bpix\_status\_bits\_1.11.tex

The thirty-two bits of the column STATUS of an ACIS bad-pixel file (e.g. \*\_bpix1.fits) are used to describe why a pixel or column is designated as "bad." Events that occur on a bad pixel have a STATUS bit set to one in the Level 1 event data file and are excluded from the Level 2 event data file.

Unless otherwise indicated, the descriptions in the table below apply to TIMED mode observations. For continuous-clocking mode observations, bad pixels (and columns) are considered bad columns.

1 STATUS bits

Table 1

Table with 3 columns: STATUS Bit, Integer Representation, and Condition(s) for which the STATUS bit is set to one. It lists four conditions for bits 0, 1, 2, and 3.

a This integer representation is appropriate for machines that use the "big-endian" convention for byte strings, where the first byte of the string is assumed to contain the highest-order bits.

Table 1 cont.

STATUS Bit	Integer Representation <sup>a</sup>	Condition(s) for which the STATUS bit is set to one
4	16	The <a href="#">bias value for the pixel is 4094</a> , which indicates that a bias-parity error occurred for the pixel.
5	32	This bit is used to identify the columns along the outer edge of a CCD at <a href="#">CHIPX = 1 and 1024</a> . No events can be reported for these columns. See Table 2.
6	64	For TIMED mode observations, this bit is used to identify the rows along the outer edge of a CCD at <a href="#">CHIPY = 1 and 1024</a> . No events can be reported for these rows. See Table 2.
7	128	This bit is <a href="#">reserved for users</a> to identify pixels that they want to exclude.
8	256	For TIMED FAINT, TIMED VFAINT, and continuous clocking mode observations, this bit is used to identify the <a href="#">eight pixels that surround a bad pixel</a> (and a pixel in a bad column). See Table 2.
9	512	For TIMED VFAINT mode observations, this bit is used to identify the rows and columns that are immediately adjacent to the outer edge of a CCD. (i.e. <a href="#">CHIPX = 2 and 1023 and CHIPY = 2 and 1023</a> ). See Table 2.
10	1024	This bit is used only for TIMED VFAINT mode observations. It is used in a similar fashion as bit 8. For a bad pixel (or a pixel in a bad column), this bit is set to one for the <a href="#">sixteen pixels that surround the eight pixels for which bit 8 is set to one</a> . See Table 2.
11	2048	This bit is used to identify the columns at the mid-chip node boundary (i.e. <a href="#">CHIPX = 512 and 513</a> ). The events reported for these columns are often produced by cosmic rays instead of X rays.
12	4096	This bit is used to identify the columns at the quarter-chip node boundaries (i.e. <a href="#">CHIPX = 256, 257, 768, and 769</a> ). The events reported for these columns are often produced by cosmic rays instead of X rays.
13	8192	This bit is used to identify the region (if any) affected by the <a href="#">“FEP0” problem</a> .
14	16384	This bit is used to identify pixels that are found to be <a href="#">“hot”</a> for the entire duration of an observation.
15	32768	This bit is used to identify pixels that are unusable for part of an observation because the pixel had a <a href="#">cosmic-ray “afterglow.”</a> The start and stop times of the afterglow are recorded in the bad-pixel file.
16	65536	This bit is used to identify a pixel which the tool <code>acis_build_badpix</code> found to have a <a href="#">bias value that is either too low or too high</a> compared to the median bias value of the column in which the pixel is located.
17–31	...	Unused.

<sup>a</sup> This integer representation is appropriate for machines that use the “big-endian” convention for byte strings, where the first byte of the string is assumed to contain the highest-order bits.

Table 2

STATUS Bit	Integer Representation <sup>a</sup>	Additional condition(s) for which the STATUS bit is set to one <sup>b</sup>
0	1	None.
1	2	None.
2	4	None.
3	8	None.
4	16	None.
5	32	Obsolete. Do not use.
6	64	Obsolete. Do not use.
7	128	None.
8	256	Only set the STATUS bit to one if one or more of the STATUS bits 0–4, 7, and 13–16 are set to one.
9	512	Obsolete. Do not use.
10	1024	Obsolete. Do not use.
11	2048	None.
12	4096	None.
13	8192	None.
14	16384	None.
15	32768	None.
16	65536	None.
17–31	...	...

<sup>a</sup> This integer representation is appropriate for machines that use the “big-endian” convention for byte strings, where the first byte of the string is assumed to contain the highest-order bits.

<sup>b</sup> If no additional conditions are specified, then set this STATUS bit to one if the condition(s) in Table 1 are satisfied. Otherwise, the conditions in both Tables 1 and 2 must be satisfied before the STATUS bit is set to one.