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To: ACIS Team
From: Fred Baganoff
Subject: Bad Columns and Bad Pixels in the ACIS Flight Focal Plane CCDs
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This memo specifies the locations of all known bad columns and bad pixels in the ACIS flight focal plane CCDs. The locations are given in both detector coordinates and FITS coordinates (see ACIS Memo #124). Only "hot" columns and pixels are considered to be bad; columns and pixels with low quantum efficiency are not included in the tables, since they will not use up telemetry space.

The procedure used to identify hot columns was as follows. For each CCD, ten frames taken with an Fe 55 X-ray source were summed together, then this frame was summed over all rows to produce a one-dimensional plot of the total number of events in each column. Columns with values more than 25% above the average level of the surrounding columns were identified as candidate hot columns. Next, the two-dimensional summed frame was examined by eye in Vista or SAOimage to search for bright columns, either full or partial. If a bright column contained more than a few pixels with values over 25% above the average value of the surrounding columns, then the column was identified as a candidate hot column. Finally the candidate lists generated by these two methods were compared, and columns which appeared in both lists were flagged as hot columns in Table 1. The one-dimensional plots used to identify hot columns are appended to this memo.

Hot pixels were identified using the IDL procedure *hot.pro*, written by Beverly LaMarr. The procedure works as follows. The user is asked to select a CCD and an element (e.g., fluorine). The procedure then searches the database for all partitions of data taken with that combination. Every time the procedure finds such a partition it searches the events list and compiles a histogram of the total number of events in each pixel. The procedure then tests each pixel to see whether the number of events in that pixel was greater than some specified percentage of the total number of frames in the partition. If true, then the position of the pixel and the number of events in it are recorded in a summary file.

Fluorine datasets were used to search for hot pixels. With a fluorine target, a typical pixel received events in only 1–2% of all the frames in a partition. Each partition usually contained about 650 frames. A limit of 3% was used to test for potential hot pixels. This yielded at most one or two hot pixel candidates per CCD. Pixels which appeared in more than one partition were flagged as hot pixels and listed in Table 2. The hot pixels in w203c4r and w193c2 received events in over 70% of the frames in eight or more partitions, while the w140c4r pixels received events in 6–13% of the frames in at least six partitions. The summary file produced by the IDL procedure is appended to this memo.

Table 1: Bad Columns

CCD ID	Type	Position	Detector Coord.	FITS Coord.
w203c4r	FI	I0	71	75
			72	76
			73	77
w193c2	FI	I1	303	510
			409	404
w158c4r	FI	I2	···	···
w215c2r	FI	I3	···	···
w168c4r	FI	S0	···	···
w140c4r	BI	S1	···	···
w182c4r	FI	S2	···	···
w134c4r	BI	S3	496	317
			497	316
			498	315
w457c4	FI	S4	···	···
w201c3r	FI	S5	···	···

Table 2: Bad Pixels

CCD ID	Type	Position	Detector Coord.	FITS Coord.
w203c4r	FI	I0	(303,253)	(510,253)
w193c2	FI	I1	(303,253)	(510,253)
			(409,600)	(404,600)
w158c4r	FI	I2	···	···
w215c2r	FI	I3	···	···
w168c4r	FI	S0	···	···
w140c4r	BI	S1	(383,585)	(430,585)
			(792,351)	(1125,351)
w182c4r	FI	S2	···	···
w134c4r	BI	S3	···	···
w457c4	FI	S4	···	···
w201c3r	FI	S5	···	···