High Resolution Camera
High Energy Astrophysics Division
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MEMORANDUM

March 9, 2000

From: Stephen Murray
To: HRC Team, Cal Team
Subject: Ghost Images in HRC-I
Re:
Cc: File

There seems to be a small amount of confusion regardng the presence (or absence) of misplaced events in HRC-I images that result in what are called "ghost" images. The HRC-I raw images contain about 1.5-2% of the events from a central concentrated source that are mislocated. Typically these events are displaced in the detector negative u-axis direction by about 1/2 of a tap spacing.The root cause of these events being misplaced is not competely understood, but it appears that these are events where some form of saturation has occurred that results in an unusual charge distribution being recorded at the detector readout. Whether this is an electronics effect or a physical effect at the MCP is not known. However, the event screening algorithm that was developed to reduce charged particle background in the HRC does an excellent job of surpressing these "ghost" image events. In fact, based on tests with 3C273 the upper limit on misplaced events in the core image is about 0.1% of the total event flux when the data are screened. This is also evident in the images from the Vela pulsar (PSR0833-45), particularly the second observation (OBSID00364) where the jet and "ghost" are not co-aligned as shown below in Figure 1

Figure 1: The image on the left is not screened and shows both the jet (diagonal) and the "ghost" (vertical). The image on the right is screened and shows only the jet.

The point-like source in Vela has about 70,000 events in the core, the jet (south-west) has about 800 events (about 1.1% of the core), while the "ghost" (south) has about 1000 events. In the screened image, the upper limit to the "ghost" is no more than 120 events as expected based on previous screening tests.