1.12 ACIS Sensitivity to Visible-Band Radiation

Light detection efficiency tests of the ACIS flight instrument have been made using four different light sources. At the Lincoln Lab instrument thermal vacuum test external 880 and 660 nm as well as internal 660 nm led sources were used. At XRCF the internal (LED) source and an external "flashlight" were used. At ISIM and TRW thermal vacuum testing only the internal source was used.

Qualitatively all the tests produce the same pattern of spatial response nonuniformity across the focal plane. This is especially true for the 660 nm light source(s). There is no indication that the instrument response to light at 660 nm has changed in any way between April 1997 and May 1998. Because the spatial response features reproduce under all test scenarios (at least for 660 nm) the inference is that these features are not caused by nonuniformities of the light source. However, uncertainties in illumination pattern and intensity introduce a considerable error in determination of numeric result. ACIS memo PS-136 and PS-137 describe the Lincoln Lab test which is the source of the quantitative results.

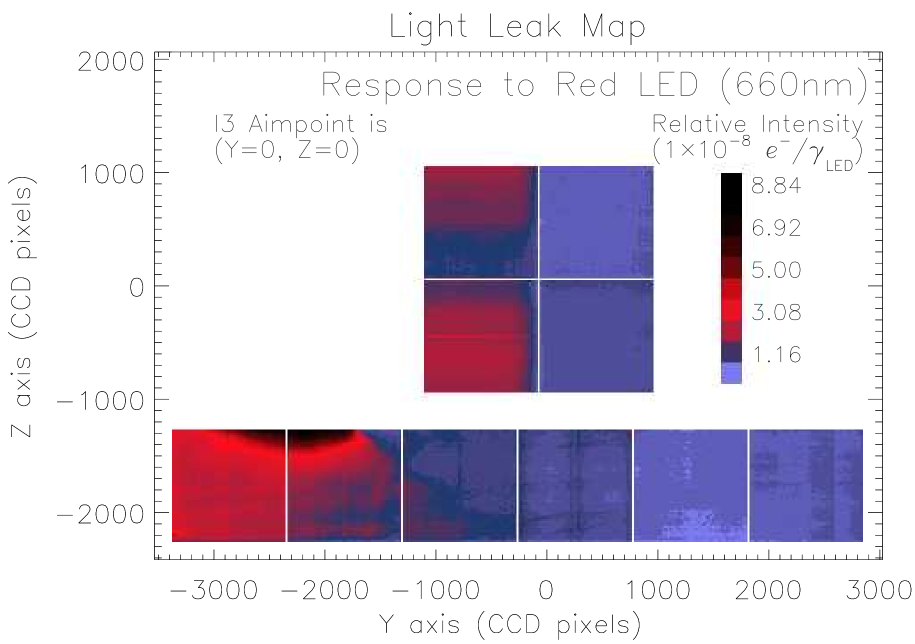
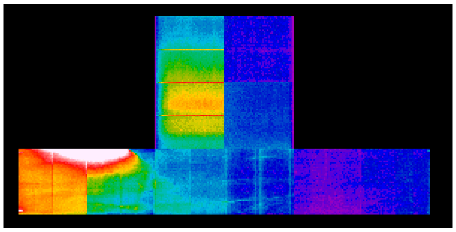


Figure 1.118: ACIS Responsivity at 660nm as measured at the Lincoln Laboratory Thermal Vacuum Test

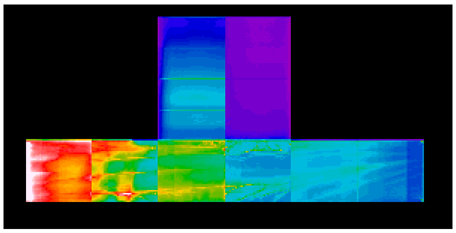
Figure 1.119 shows the spatial variation in light sensitivity observed in various tests. The most noticeable feature in this figure is a "leak" in the region between S0, S1 and I2 with an order of magnitude enhanced response. Also evident, especially in the S array, are features clearly attributable to wrinkles in the blocking filter. Another constant result is the relative insensitivity of I1 and I3 relative to adjacent I0 and I2.

Figure 1.118 shows the responsivity (in electrons per pixel per incident photon at 660nm) measured during the ACIS instrument thermal vacuum test at MIT Lincoln Laboratorties in April, 1997.

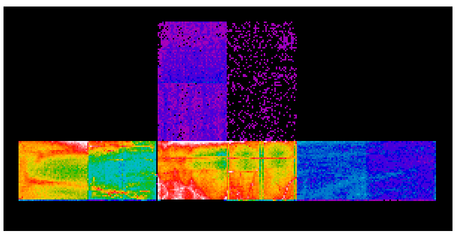
ACIS Light Leak Tests



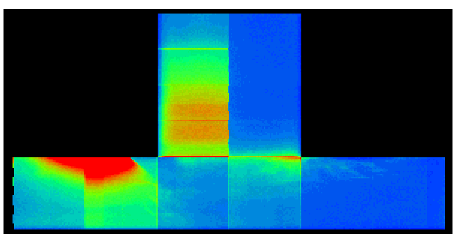
Lincoln Lab Red LED (660 nm)



Lincoln Lab IR LED (880 nm)



XRCF Flashlight



Ball Internal LED

Figure 1.119: Focal plane composite images for various light leak tests. Color scale is for qualitative comparison only. Note similarity of all 660 nm led images (both external and internal mounted sources).