THE CCDs AT ESO: A SYSTEMATIC TESTING PROGRAM

T. M. C. Abbott

European Southern Observatory

It is incumbent upon ESO to ensure that its CCDs perform according to advertised specifications (Abbott 1994). We describe a systematic, regular testing program for CCDs which is now being applied at La Silla. These tests are designed to expose failures which may not have catastrophic effects but which may compromise observations.

At the time of writing we at ESO offer 12 CCDs for use by visiting astronomers (Abbott 1994). Supporting all of these CCDs poses some unusual problems. ESO serves a very broad community and the astronomers who use our CCDs range in ability from those quite new to the field to those with many years of experience in the use of modern, state of the art detectors. To protect the former and assist the latter, we must make a concerted effort to regularly investigate the quality of the data delivered, whether or not any problems are known. To that end, we have instigated a systematic program of standard CCD tests at ESO, La Silla.

Currently, we test one CCD each week. These tests are not intended to be as thorough as be performed in a specialized CCD lab; instead, they should expose as many problems as possible with minimal technical intervention and under the simple setups available at the telescope.

For each test, we obtain the following information:

a) A map of hot pixels, from a set of nine bias frames, and a map of traps and other defects, from a set of nine low-count-level images (of order a few hundred electrons per pixel). A 16-point transfer curve (Janesick et al. 1987), from a set of 16 pairs of flatfields with exposure levels ranging over the full digital dynamic range and using a stable light source.

b) The mechanical shutter delay and two 16-point linearity curves, expressed as count rate versus true exposure time, from the same data as the transfer curve.

c) The bulk CTE (from the EPER method, (Janesick et al. 1987)

d) A map of the dark current.

e) The amplitudes and frequencies of any interference patterns, from a Fourier analysis of bias frames.

f) A map of the shutter pattern across the CCD, obtained from analysis of a flatfield obtained with multiple shutter cycles.

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g) The current bias and clock voltage settings.

All images include bias overscan regions in both dimensions, cover the entire light-sensitive, unbinned area of the CCD and are collected under the same circumstances as normal observing.

The light source used to obtain the flat fields may be either a preflash LED or a beta light. To avoid possible radiation hazards, we are in the process of replacing the beta lights with compact packages of battery-powered LED regulated by feedback from a photo-diode. These are small enough to fit within a normal filter wheel in most La Silla instruments and exhibit a flux variation of 0.2% per degree C.

We extract the required information from the test data set using IDL or MIDAS. We use IDL to develop algorithms and for free-form investigation of the data when necessary. The most common reduction algorithms have been incorporated into the MIDAS CCD context (MIDAS 1994) to provide standard methods of data reduction both within ESO and at other institutions. The raw and reduced test data are to be made available to the community online (ESO 1994).

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