A GUIDE TO THE LE CCF

PART I: CCF STATUS

1. Scope of this document

We intend to give some information to the EXOSAT observers on the way to use the Low Energy Telescope Current Calibration File to process scientific data. For the layout of the CCF we refer to the EXOSAT Observers Guide Part III (the Final Observation Tape Handbook, referred to below as "the FOTH"), section 3.7.1, Rev.1.

This document gives an overview of what is in and what is missing from the current CCF (sic!), what should be intended by "current data", whether the data are preliminary or final and includes a few suggestions on how to use the data.

It is intended to follow both with update notes (when changes to the CCF content will be made) and with specific documents concerning:

- the CMA effective area (in preparation)
- the CMA point spread function
- the CMA sum signal and its use
- the PSD effective area
- the PSD point spread function
- the PSD energy resolution
- the grating

2. The "current" calibration data

This document refers to the CCF contained in the latest FOT's produced at the time of writing this note.

An overview of the content of such files (for both LE telescopes) is given in Table 1 and taken from the file header (described in the FOTH, Section 3.6).

The overall SHF key is the time from which the data are valid and refers to the beginning of the mission (early experiment switch on).
For the grating the analysis of the ground calibration data is still in progress at Utrecht.

7. A note on interpolation

Observatory software uses a cubic spline interpolation for all the dependencies of one parameter from any other and a simple two-dimensional interpolation for positional dependency. Different interpolation procedures could have been used in the generation of the different data types. We plan to include information on this in the specific documents referred to in Section 1.

8. Linearisation Coefficients

These coefficients are not part of the CCF. The actual numbers and the procedure used for the linearisation are not relevant for the general observer.

For general information we provide here a brief description of what is done and what is not done in the linearisation and also indications on the origin and status of the coefficients themselves.

The linearisation corrects for:

- the gross geometric distortion (eg. the "curved edges").
- the central channel distortion (the "cross" seen on unlinearised images).
- the "channel 22" bar (the horizontal bar seen on unlinearised images).
- the pulse height dependent effects (disabled for the CMAs).
- the temperature zooming.

The linearisation does NOT correct for (see also R.J. Blissett, EXOSAT LE Automatic Analysis supplementary notes EX.9.3/83/160/RJB/SA):

- de-blurring (fluctuations of the pointing position, see FOTH 3.4.1, 3.8.4).
- the central hot spots (see section 3, data type CG).
the defects in filters 6 (LE1), 2 and 3 (LE2) (ring-like features on the upper left edge).

- the diagonal (radial) streaks visible in long exposures.

- the "dent" in the point spread function due to the partial flap obscuration.

- the elongation of the point spread function for UV sources with Filter 2.

- the diagonal (tangential) bar occasionally occurring in LE1 in the lower left quadrant.

The linearisation coefficients used by the FOT production software were generated using data taken on the ground (Long Beam Tests) with the following exceptions:

- the central channel distortion coefficients for the CMA's are based on Fe55 illuminations (filter wheel source) taken in flight during the early phase.

- the gross distortion coefficients for LE1 CMA (not calibration on the ground) are based on a 50-point raster scan done in flight. They will be good in the central area covered by the raster scan, but the errors could be larger in the outer part of the field of view.

All the sets of coefficients (with the exception of the central channel correction for LE2 PSD, which are now of academic interest only) were considered final at the time they were generated. For LE1 PSD (which is now operated at a reduced gain) an evolution can however be expected.