

## A New FES Calibration

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By popular demand, we present the results of a complete reanalysis of the FES photometric calibration. The details of the analysis will be presented in the next newsletter.

The new FES photometric calibration is more complex than previous calibrations (see Holm and Rice, 1981, NASA IUE Newsletter 15, p. 74). This has become necessary due to the degradation of the FES sensitivity with time and the need to scale FES magnitudes accurately to V magnitudes using improved color terms. Note that virtually every term and coefficient have been modified. We have defined the following three-step procedure to convert FES counts to V magnitudes.

1. Correct the FES counts for the non-linear decrease in sensitivity:

$$CC = \frac{\text{FES CTS}}{0.98568 + 0.00791 (T - 1978.0) - 0.00396 (T - 1978.0)^2}$$

2. Compute the color-correction term:

$$\text{COLOR} = -0.271087 (B - V) - 0.063880 (B - V)^2 + 0.137764 (B - V)^3$$

3. Compute the V magnitude:

$$V = -2.5 \log \frac{CC}{1 - 1.2 \times 10^{-4} CC^{0.781}} + \text{COLOR} + K$$

where K = 11.16 for underlap mode  
K = 16.52 for overlap mode  
CC = CC/4 for slow track

The term in the denominator is the dead-time correction, especially important for bright stars.

4. Our estimate of the errors, based on the FES calibration data base of 3870 observations taken from scripts and photometric catalogues, are the following (values for the old Holm and Crabb calibration applied to the same data base are given in parentheses):

Average error - underlap	0.00 mag	(-0.075 mag)
overlap	0.00	(-0.06)
RMS error - underlap	0.07	(0.095)
overlap	0.06	(0.10)