



Cycle 25 COS NUV MAMA Fold Distribution

Thomas Wheeler¹ and Alan Welty¹

¹Space Telescope Science Institute, Baltimore, MD

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ABSTRACT

We summarize the Cycle 25 COS/NUV fold distribution for the Cosmic Origins Spectrograph's (COS) MAMA detector on the Hubble Space Telescope. The detector micro-channel plate's health state is determined and the results presented.

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1. Introduction

The performance of the NUV MAMA microchannel plate is monitored using a MAMA fold distribution analysis procedure that provides a measurement of the distribution of charge cloud sizes incident upon the anode giving some measure of change in the pulse-height distribution of the MCP and, therefore, MCP gain. The goal is the continued monitoring of the NUV MAMA detector and comparing the results with previous results to detect trends or anomalous behaviors. All visits of this program, Proposal 14943, were executed on 2018 May 1. The program is based upon Cycle 24, Proposal 14526.

2. Analysis and Results

The engineering telemetry was examined (voltages, currents, temperatures, relay positions, and status) for agreement with predicted values and previous ground and on orbit test data. MAMA time-tag image data were used to construct a histogram of the number of counts for each fold. The results are compared and combined with previous test results (Figure 1). Post-test, a dark exposure was taken during which the counters were cycled. Results are plotted in a histogram and compared with earlier results (Figure 2).

The procedure for obtaining the COS MAMA detector fold data and the data analysis process is completely described in COS TIR 2010-01 (Wheeler & Sahnou 2010).

3. Summary

No anomalous behavior was detected. The COS NUV MAMA detector's micro-channel plate continues to perform as expected. The combined ground testing including SMGT and on-orbit fold distribution for the NUV MAMA detector are shown. No significant changes or shifts in fold numbers have occurred. The NUV detector does exhibit a known high-count rate caused by window phosphorescence that has slightly decreased since the execution of this test in Cycle 24, one year earlier.

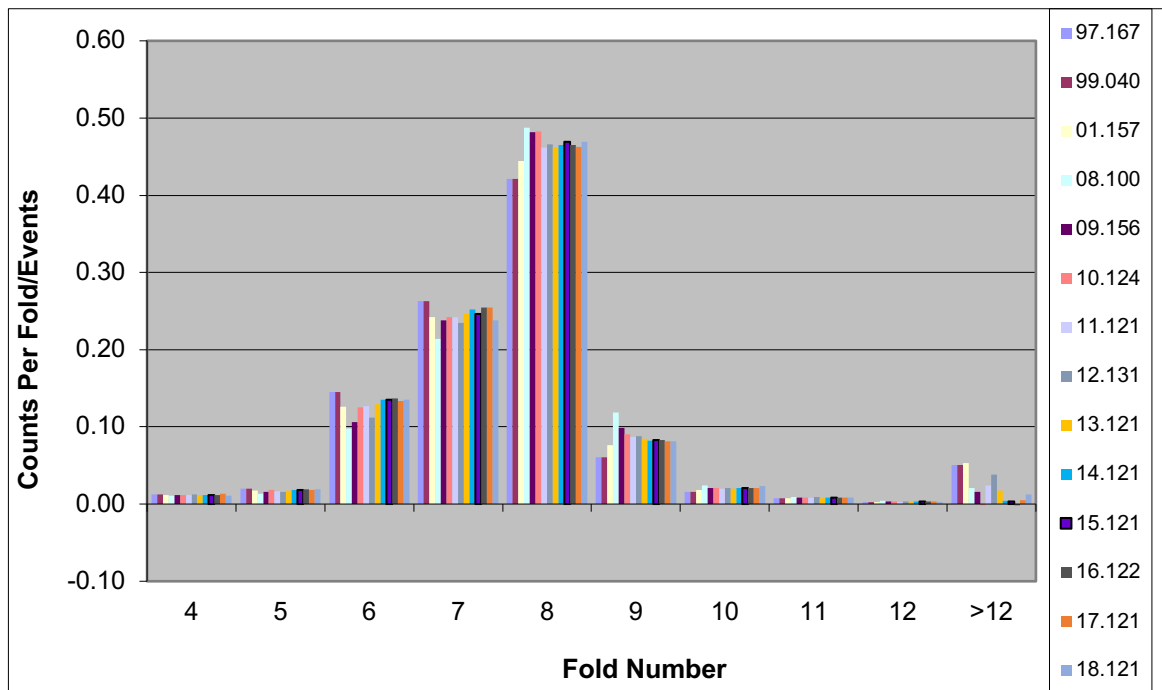


Figure 1: Normalized counts per fold event vs. fold number.

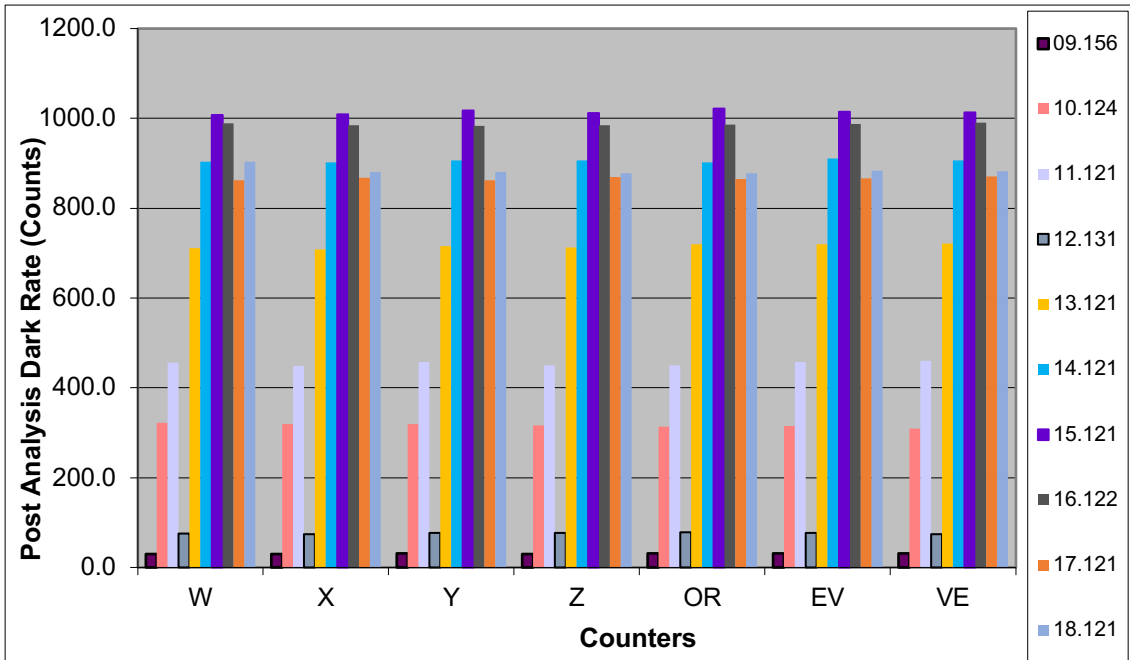


Figure 2: Post analysis dark rate vs. count type.

4. Change History for COS ISR 2019-13

Version 1: 3 June 2019 – Original Document

Version 2: 21 August 2019 – Corrected an error in the layout of the document

5. References

Wheeler, T., & Sahnou, D. 2010, COS TIR 2010-01, “COS SMOV4 NUV MAMA Fold Analysis”