Guidelines for Acquiring FUV Detector Calibration Data

Date:	November 14, 2000
Document Number:	COS-11-0026
Revision:	Initial Release
Contract No.:	NAS5-98043
CDRL No.:	

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Letter	ECO No.	Description	Check	Approved	Date
-		Initial Release			

Original Release Name	Date
Drawn: E. Wilkinson	11-14-00
Reviewed:	
Approved:	

THE UNIVERSITY OF COLORADO
At Boulder
The Center for Astrophysics and Space Astronomy

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Size	Code Indent No.	Document No.	Rev
A		COS-11-0026	-
Scale: N/A			

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1. INTRODUCTION

The purpose of this document is to provide meaningful guidelines to the University of California, Berkeley Experimental Astrophysics Group (EAG) for acquiring the calibration data used to demonstrate that the detector performance meets the requirements presented in the Statement of Requirements for the HST/COS FUV Detector (COS-08-0003).

The scope of this document is limited to data acquired for the sole purpose of demonstrating performance. This document does not address requirements that can be demonstrated through either inspection or analysis. Specifically, this document pertains to:

1. Resolution data
2. Stability data
3. Detection quantum efficiency data
4. Flat field data
5. Dark count rate data
6. Localized anomalies
7. Maximum and local count rate data
8. Live time performance data
9. Lifetime data

It is assumed that all data taken to demonstrate detector performance will be done so in accordance with the Performance Verification Plan (COS-UCB-006).

2. DATA ACQUISITION GUIDELINES

2.1 HARDWARE CONFIGURATION SENSITIVE DATA

The following configurations are defined to be sensitive to hardware configuration:

- Imaging performance in the x and y axes (SoR 3.7 & 3.8)
- Resolution as a function of input count rate
- Imaging stability over a wide range of temperature (SoR 3.15 & 3.16)
- Flat fields (SoR 3.8.2)

2.2 HARDWARE CONSTRAINTS FOR PERFORMANCE VERIFICATION

The performance criteria listed in Section 2.1 is governed by the analog sensor section of the FUV system, including:

- BBA
- Anodes
- Amplifliers
- Time-to-digital convertors
- Interconnecting H/W and harnesses

All perfomance verification data shall be collected with the analog sensor section selected for flight in its flight configuration. The remainder of the detector system shall be as flight-like as possible. The complete verification system configuration shall be recorded and included in the verification best reports.

The stim pulses must be ON during all these tests. A minimum of 1000 events must be in each stim pulse image.

2.3 HARDWARE CONFIGURATION INDEPENDENT DATA

These data are those which can be acquired in any hardware configuration with all programmable settings at flight values. This includes the following types of data:

- Detection quantum efficiency data (SoR 3.5)
- Dark count rate data (SoR 3.9)
- Localized anomalies (SoR 3.10)
- Maximum and local count rate data (SoR 3.11 & 3.12)
- Live time performance data (SoR 3.13)
- Lifetime data (SoR 3.14)

In these cases the hardware may be configured appropriately to measure the performance characteristic under test. When appropriate, non-flight hardware may be used.

2.4 DATA CONFIGURATION

Data which are in the form of an image should be delivered to CU/CASA in a fits format. The specific format is not important, so long as a description of the format is provided. Data which are in the form of an image include all resolution data, stability data, flat field data, and dark count rate.

In the special case of the flat field data, which is especially voluminous, multiple data files (on order 1 – 10 Mb per file) are preferable to a single data file of extraordinary size. A coherent naming convention should be used and a list of all the files and a brief description should also be provided.

The remaining data may be provided in tabular form with the raw data achived and delivered to CU/CASA. Again, a coherent naming convention should be used and a list of all the files and a brief description should also be provided.

Whenever possible ALL CALIBRATION DATA should be taken in time tag format.