



**COS**  
*Monthly Status Review*



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**COS**  
**Monthly Status Review**  
**December 6, 2000**  
**NASA/GSFC**

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*Cosmic Origins Spectrograph*  
*Hubble Space Telescope*

John Andrews  
December 6, 2000



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## *Monthly Status Review*



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### Agenda

Progress Summary Since Last Monthly	J. Andrews
Optics Development Status	J. Andrews
Optics Test Status	S. Osterman
UCB FUV Detector Programmatic Status	J. Andrews
UCB FUV Detector Technical Status	O. Siegmund
CU Software Activities Status	K. Brownsberger
Schedules	J. Andrews
Upcoming Events/Activities	J. Andrews
CU Issues & Resolution Plan	J. Andrews
STScI Presentation	T. Keyes
BATC Presentation	P. Volmer
Financial Splinter	GSFC/Ball/CU



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### **Progress Summary Since Last Monthly**

- Completed G140L No. 2 grating tests.
- JY has completed G225M gratings.
- Held FUV detector PER on 11/8/00 at UCB.
- Completed TDC qualification testing at UCB.
- Began staking and conformal coating UCB's flight PWAs.
- Continued detector T-V test preparation at CU.
- Successfully completed DCE/MEB interface tests.



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## **Optics Development Status - NUV Mirrors**

- Tinsley:
  - All flight NUV optics delivered, coated, and now at Ball.
  - All spare NUV optics were delivered on 11/7/00 and are now at GSFC awaiting coating.



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### Optics Development Status - Gratings

- Present grating delivery plan (changes since last month in red/bold):

Item	Delivery Date	Coating Dates at GSFC	Test Dates	Planned Test Location
G140L	Done	Done	<b>Done</b>	CU
G160M	12/11/00	12/00	<b>1/01-3/01</b>	CU
G140L-Blazed	<b>TBD</b>	<b>TBD</b>	<b>TBD</b>	CU
G185M	Done	In process	<b>1/01</b>	GSFC
G225M	<b>12/11/00</b>	<b>12/00</b>	<b>1/01</b>	GSFC
G285M	12/11/00	<b>1/01</b>	<b>2/01</b>	GSFC
G230L	2/01	2/01	2/01	GSFC

- GSFC is working on G185M coating optimization now.
- CU is still awaiting GSFC's G185M test procedure for review and approval!!!



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## **COS FUV Grating Test Status 12/06/2000**

- G130M Gratings
  - Testing and data analysis has been completed for both gratings. Calibration reports have been released for both gratings.
  - Both gratings are satisfactory in all respects.
  - G130M-B appears to have slightly better performance.
- G140L Gratings
  - Testing and data analysis has been completed for both gratings.
  - G140L-B is satisfactory in all respects. G140L-C has slightly lower efficiency, but is otherwise acceptable.
- Grating Test Facility
  - Facility is ready for G160M gratings.

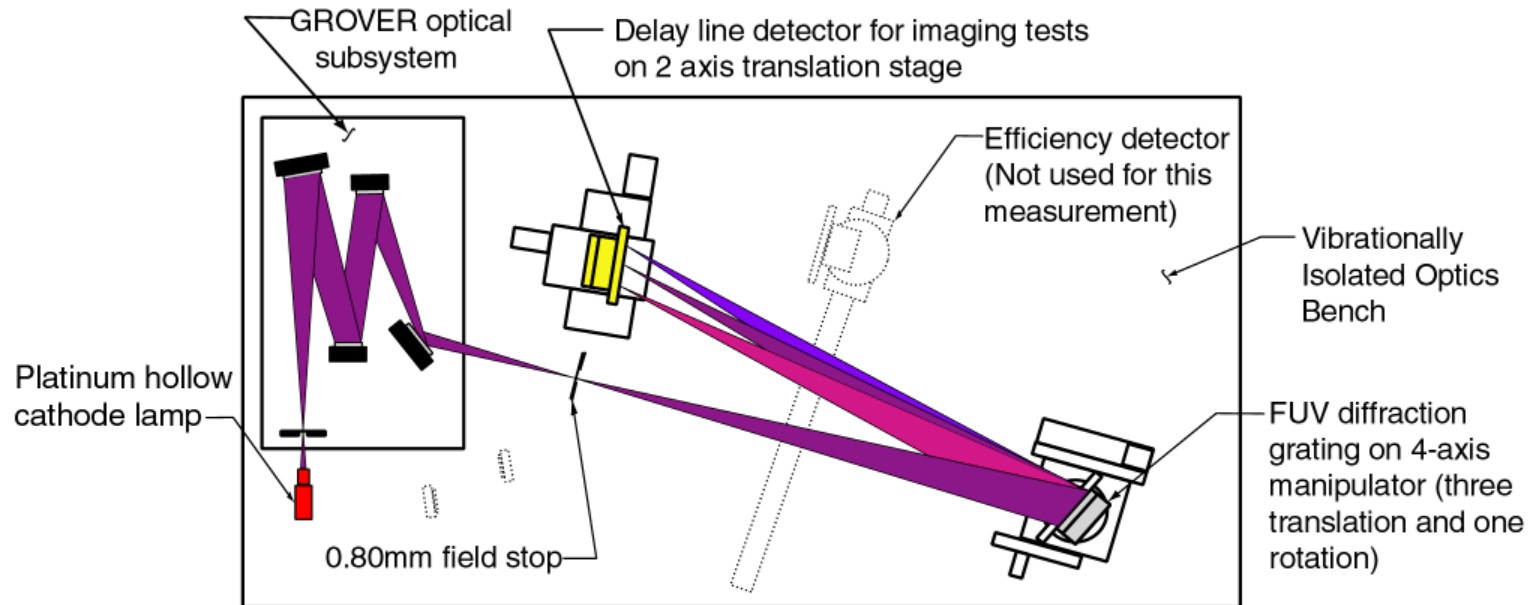


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### Cosmic Origins Spectrograph Grating Imaging Test Setup

Grating is illuminated by a broad spectrum UV light source (platinum hollow cathode lamp) via the GROVER optical system which provides an aberrated beam identical to the HST optical train. All testing is performed in the CASA/ARL vacuum test facility.

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### G140L Laminar Test Results (1/5)

#### First Order Grating Efficiency

Wavelength (Å)	G140L-B First Order Grating Efficiency	G140L-C First Order Grating Efficiency	Requirement
1066 (Ar)	---	0.047	---
1164 (Kr)	0.269	0.256	---
1236 (Kr)	0.327	0.313	0.25
1304 (O)	0.339	0.326	0.25
1470 (Xe)	0.327	0.312	0.24
1565 (CO)	0.309	0.296	0.24
1734 (CO)	0.286	0.269	0.24
1935 (CO)	0.255	0.238	0.24

#### Multi-Order Grating Efficiency

Spectroscopic Order	G140L-B Efficiency (1470Å)	G140L-C Efficiency (1470Å)
1	0.327	0.312
-1	0.306	0.324
0	0.033	0.048
-3	0.031	0.029
2	0.003	0.003
-2	0.003	0.005



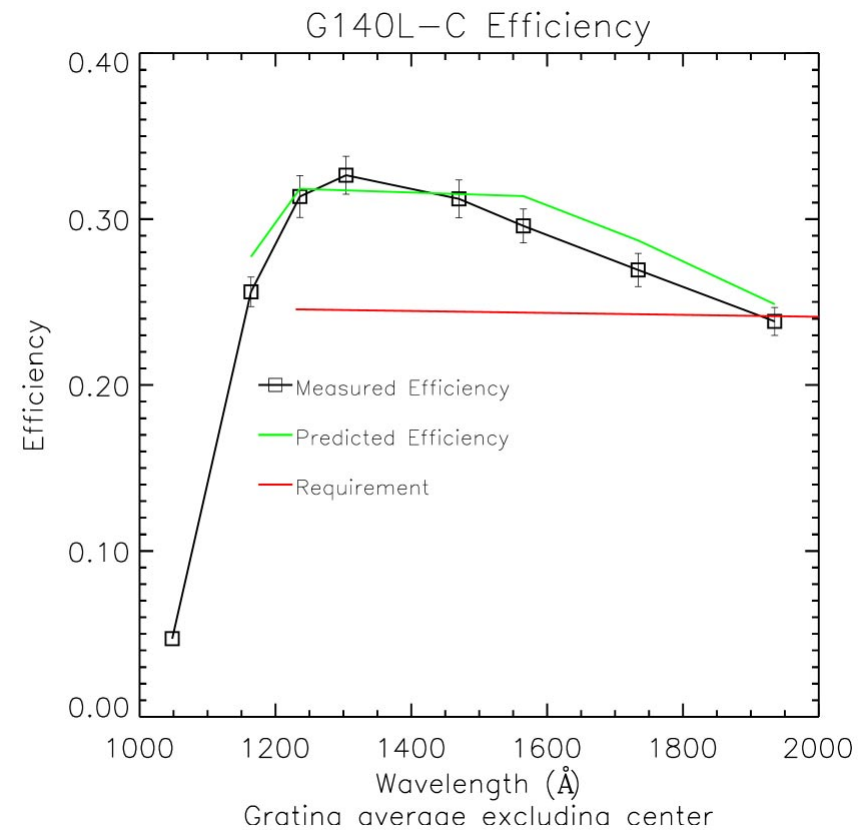
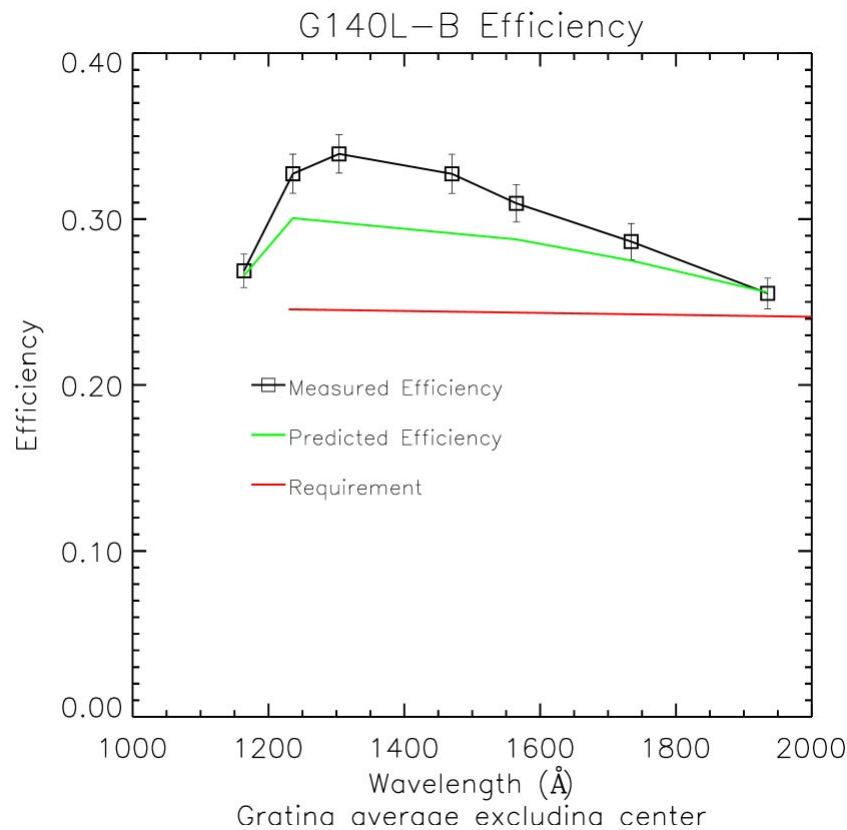


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### G140L Laminar Test Results (2/5)

### Grating Efficiency vs. Wavelength





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### G140L Laminar Test Results (3/5)

### Resolution and Scatter

#### G140L-B Resolution

Wavelength	FWHM (mÅ)	Resolution $\lambda/\Delta\lambda$
1219.49Å	0.444Å	2750
1378.96Å	0.499Å	2760
1524.73Å	0.647Å	2360

#### G140L-C Resolution (Prelim)

Wavelength	FWHM (mÅ)	Resolution $\lambda/\Delta\lambda$
1219.49Å	0.394Å	3100
1378.96Å	0.384Å	3590
1524.73Å	0.419Å	3640

Note - Optimum focus not achieved with G140L-B due to time constraints. Similar imaging was obtained with G140L-C at the same location, suggesting that G140L-B could be focused as well as G140L-C.

#### Grating Scatter

Grating ID	Source Wavelength (Å)	Source Counts (background corrected)	Scatter Wavelength (Å)	Scatter Counts (background corrected)	Scatter/Å
G140L-B	1139.9-1189.9	42621	1139.9± 4.0 Å	3.0/8.0Å	$8.8 \times 10^{-6}$
G140L-C	1141.1-1191.1	37212	1140.1± 3.4 Å	2.9/6.8Å	$1.1 \times 10^{-5}$



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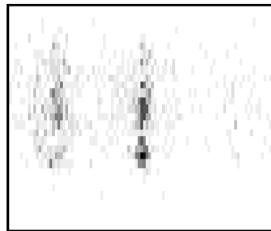
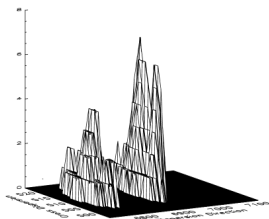
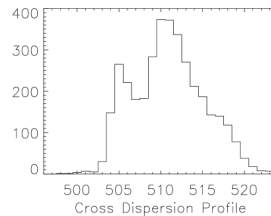
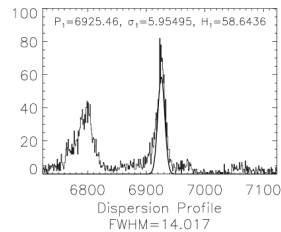
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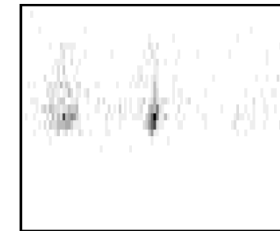
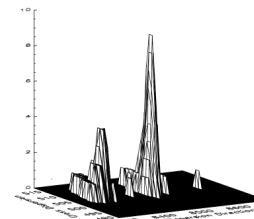
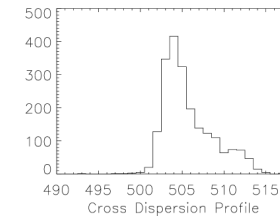
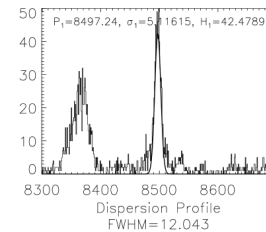
## G140L Laminar Test Results (4/5)

### Grating Resolution Test Images - 1219.5Å

G140L-B



G140L-C



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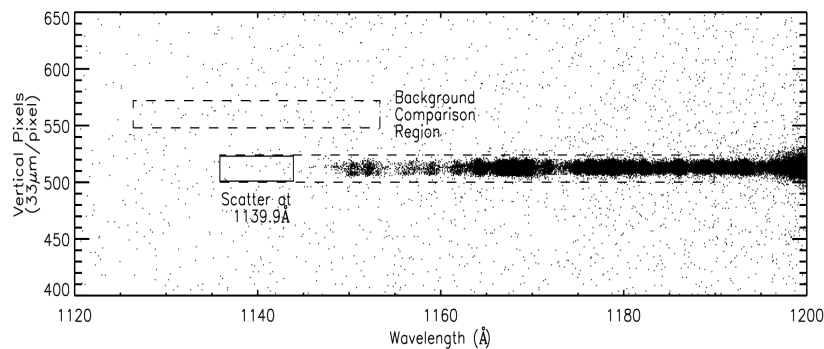
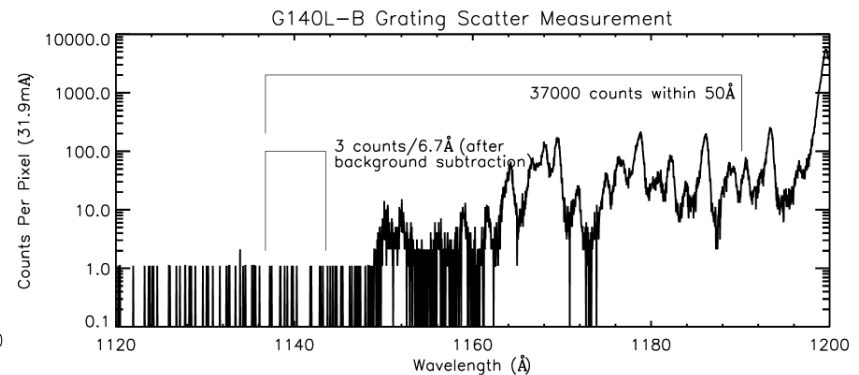
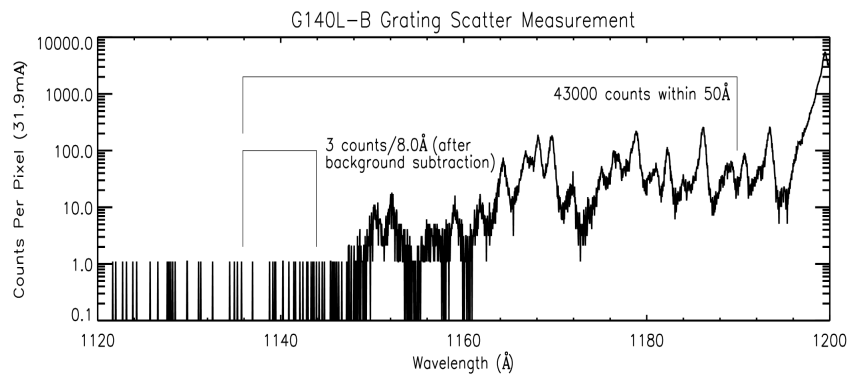
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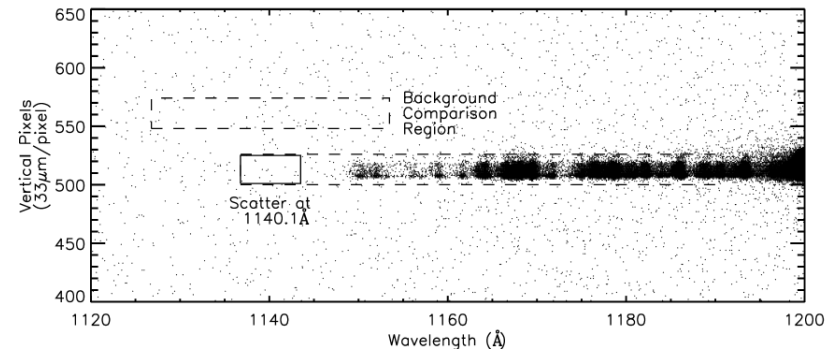
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### G140L Laminar Test Results (5/5)

### Grating Scatter at $1140\text{\AA} \pm 50\text{\AA}$



$8.8 \times 10^{-6} / \text{\AA}$  over  $\pm 50\text{\AA}$



$1.1 \times 10^{-5} / \text{\AA}$  over  $\pm 50\text{\AA}$

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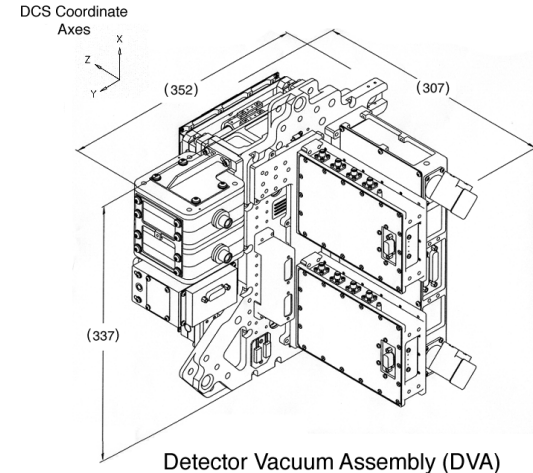
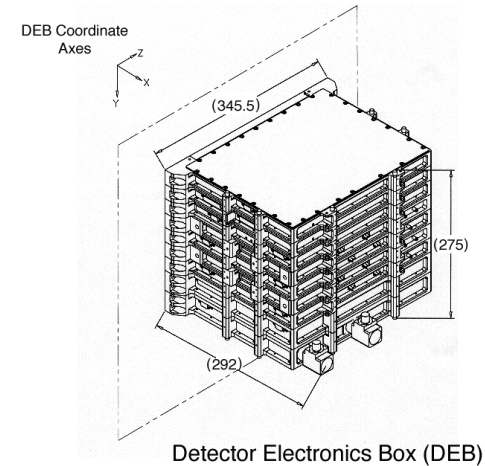


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## Overview of FUV Detector Assemblies

- **DEB - (Detector Electronics Box)**
  - DCE (Detector Control Electronics))
  - TDCs (Time-to-Digital Converters)
  - HVPS (High Voltage Power Supply)
  - LVPC (Low Voltage Power Converter)
- **DVA - (Detector Vacuum Assembly)**
  - VHA (Vacuum Housing Assembly)
    - Detector Door Mechanism
    - Ion Pump Assembly
  - DBA (Detector Backplate Assembly)
    - Amplifiers
    - HVFM (High Voltage Filter Module)





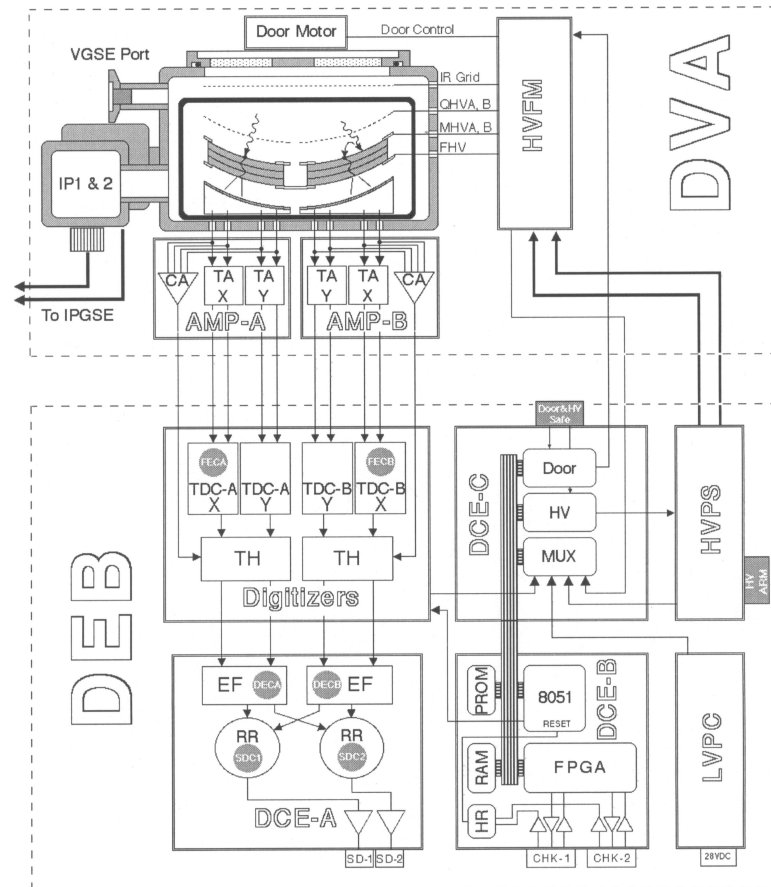
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## FUV Detector Subsystem Block Diagram

- UCB is under contract to deliver 1 flight FUV detector subsystem and 1 flight-spare detector subsystem.



TA - Timing Amplifier  
CA - Charge Amplifier  
TDC - Time-to-Digital Converter  
TH - Threshold Ckt  
EF - Event Formatter  
RR - Round Robin Arbitrator

FEC - Front End Counter  
PRC - Preamp Reset Counter  
DEC - Digitized Event Counter  
SDC - Science Data Counter  
HR - Hardware Reset Ckt

GG 11/99



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### UCB FUV Detector Status - Electronics Summary

ACTIVITY	Electronic Board								
	Amps	HVFM	HVPS	LVPC	DCE-A	DCE-B	DCE-C	TDC-X	TDC-Y
Parts List	C	C	C	C	C	C	C	C	C
Schematic	C	C	C	C	C	C	C	C	C
Parts Stress Analysis	C	NA	NA	NA	NA	C	C	C	C
Worst Case Analysis	NA	NA	NA	C	NA	C	C	C	C
Board Thermal Analysis	C	<b>S</b>	<b>S</b>	<b>S</b>	C	C	C	C	C
Release Layout	C	C	C	C	C	C	C	C	C
Board Fabrication	C	C	C	C	C	C	C	C	C
Kit Parts	C	C	C	C	C	C	C	C	C
Board Coupon Testing	C	C	C	C	C	C	C	C	C
Stuff Boards	C	C	C	C	C	C	C	C	C
Board Workmanship Acceptance	C	C	C	C	C	C	C	<b>C</b>	<b>C</b>
Board Engineering Acceptance	C	C	C	C	C	C	C	C	C
Engineering Test & Acceptance	C	C	C	C	C	C	C	<b>C</b>	<b>C</b>
Temperature Cycle Test	C	C	C	C	C	C	C	<b>C</b>	<b>C</b>
Voltage Margin Test	C	NA	NA	NA	C	C	C	<b>C</b>	<b>C</b>
Final Acceptance Test	C	C	C	C	<b>C</b>	<b>C</b>	<b>C</b>	<b>C</b>	<b>C</b>
Staked/Conformal Coated	C	C	<b>C</b>	<b>C</b>	NS	NS	NS	NS	NS
Legend	C = Complete		NA = Not Applicable		S = Started		NS= not started		

Changes since last MSR in red/bold

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### UCB FUV Detector Status - Actels

ACTIVITY	DCE A		DCE-B	TDC-X	TDC-Y
	Counter	Round Robin	CPU	X	Y
Initial ACTEL Design	C	C	C	C	C
ACTEL Peer Review	C	C	C	C	C
End-to-end System Simulation	C	C	C	C	C
GSFC Review	C	C	C	C	C
FPGA tests with ETU electronics	C	C	C	C	C
Release ACTEL schematic/burn	C	C	C	C	C
Legend	<i>C = Complete</i>	<i>NA = Not Applicable</i>	<i>S = Started</i>	<i>NS = Not Started</i>	





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### UCB FUV Detector Status - Systems

- Documentation Update:
  - No changes to report this month
- Mass and Power Updates (changes in red/bold):

	Mass (Kg)			Power (W)		
	Current Estimate	SoR Allocation (1)	Margin	Current Estimate	SoR Allocation (1)	Margin
DVA	19.43	21.5	9.6%	4.59	-	-
DEB	13.46	15.3	12%	<b>47.42</b>	-	-
Harness	2.7	3.4	20.5%	-	-	-
Total	35.59	40.2	11.5%	<b>52.01</b>	53.0	<b>1.73%</b>

Notes: (1) SoR Revision B allocations

- Latest UCB power numbers are actuals measured on flight PWAs. The numbers come from Revision D of the UCB Power Budget Report (UCB-COS-RPT-1015).



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## UCB FUV Detector Status - PER Summary

- The Pre-Environmental Review (PER) for the COS FUV detector subsystem was held at UCB on November 8, 2000.
- The review team was chaired by Dr. Randy Kimble of NASA/GSFC.
- 20 RFAs were generated and the team is working now to close them out.



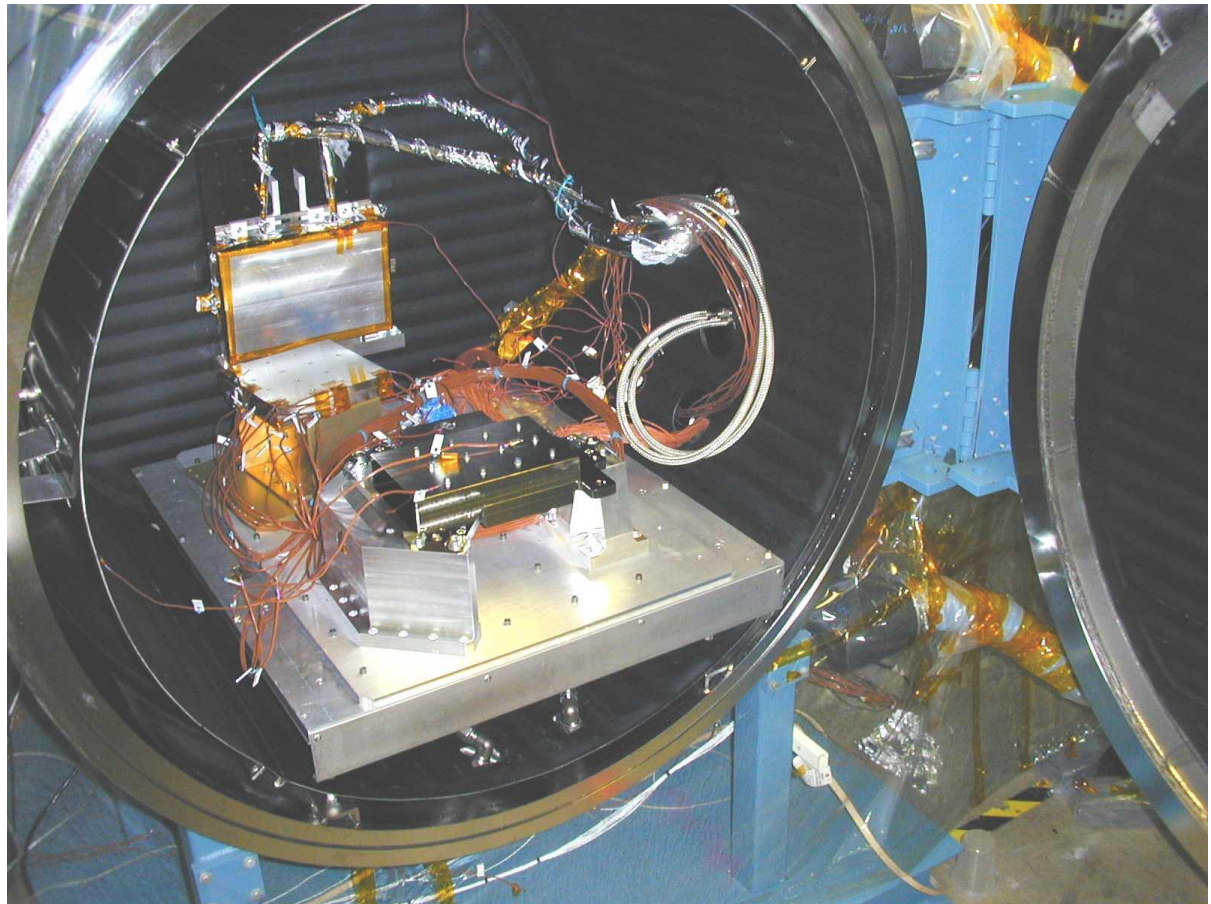
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### UCB FUV Detector Status - Thermal-Vac Test Preparation

- Thermal-vacuum testing of the flight FUV detector has been baselined to occur at CU.
- CU is working with UCB to define and develop test cabling and UV light source.
- Per GSFC's request (PER RFA no. 12) a test readiness review will be held before the test. (Can be done in conjunction with January 01 MSR)





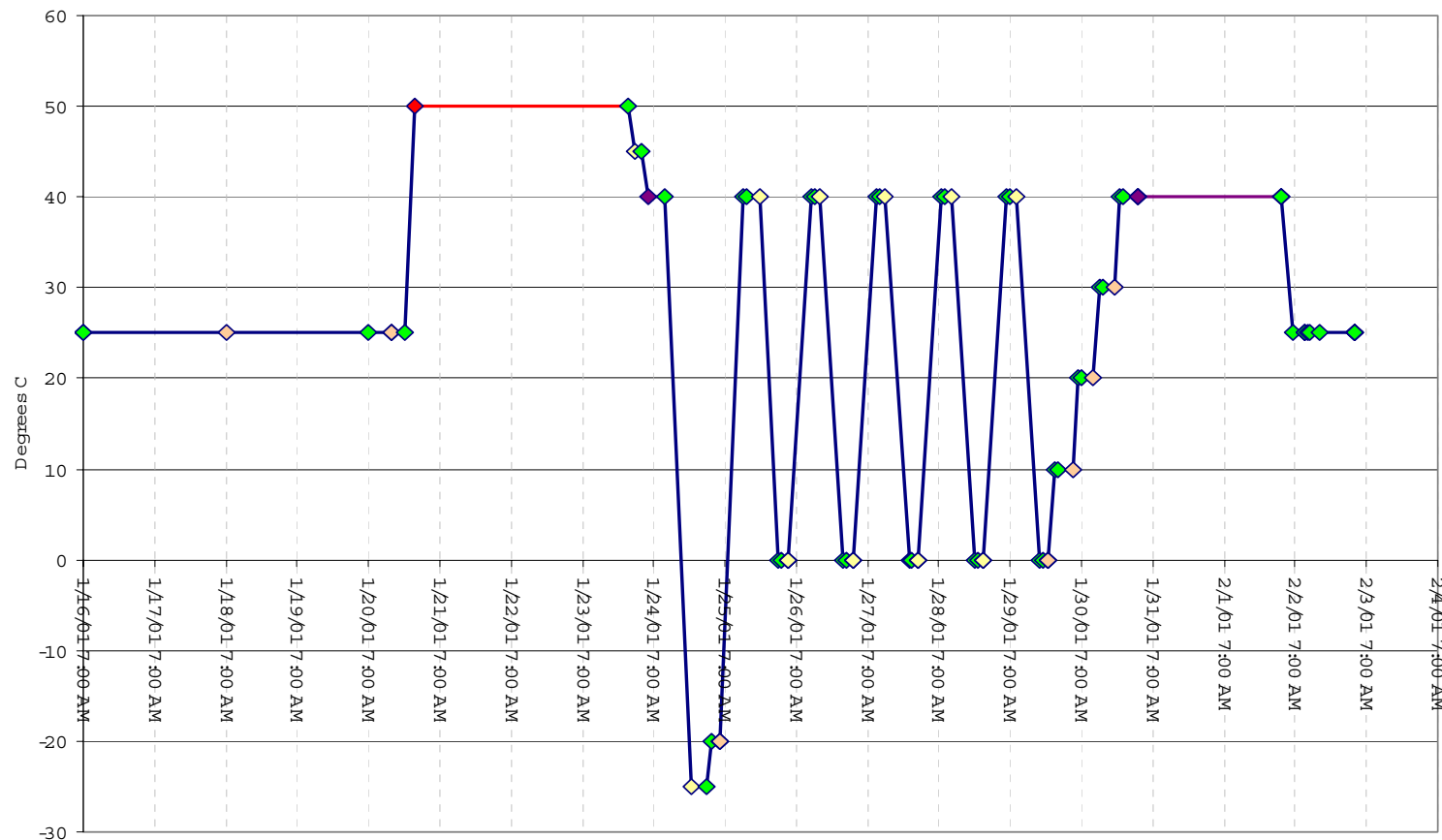
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### COS FUV Detector T-V & Cleanliness Test Profile



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### UCB FUV Detector Status - Schedule Overview

October Tracking Milestones	Status
DBA/DEB system characterization started	On-going
November Tracking Milestones	Status
Complete Flight Detector Photocathode deposition & QE test	Delayed to December
Complete DBA/DEB system characterization	On-going
Complete staking and conformal coating of all DEB No. 1 PWAS	Started
December Tracking Milestones	Status
FUV #1 system vibration test	Slipped into January
FUV #1 EMI/EMC test	Slipped into January

Forecast flight system delivery to Ball:

This month = 3/22/01

Last month = 3/7/01

Spare detector completion:

This month = 7/31/01

Surrogate detector delivery to Ball:

This month = 2/2/01

Last month = 2/2/01

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## **UCB FUV Detector Status - Pre-Environmental Review**

- Very successful Pre-Environmental Review held at UCB on 11/8/2000.
- 20 RFA's generated at review.
- 4 are closed out
- 2 sent to GSFC to close out
- 14 in process of being closed out
- No Mission-critical items identified
- Some extra testing and DEB certification has had a slight schedule impact





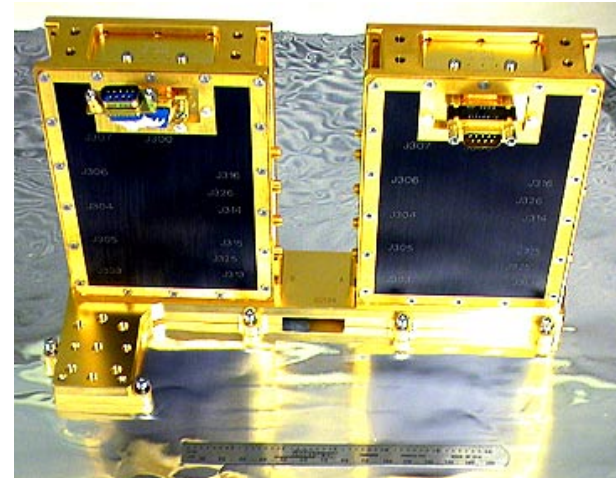
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### UCB FUV Detector Status - Electronics

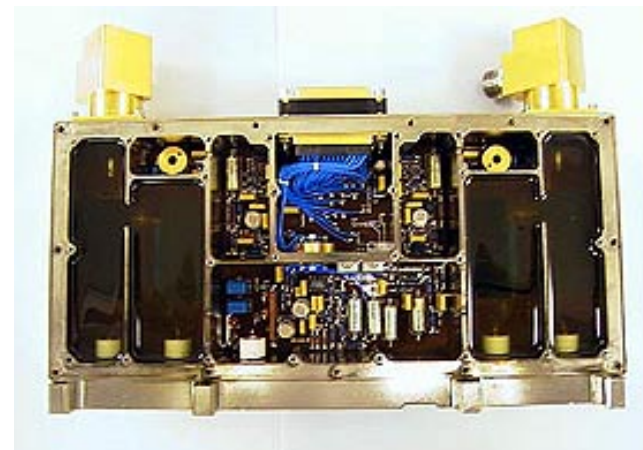
- Power systems (HVPS, LVPC, HVFM)
  - All coated, staked, vac baked & certified.
- Amplifiers
  - All amps tested, coated & staked. 2 vac baked and certified, all complete this week
- Flight Harnesses
  - 2 sets complete, vac baked & certified.



Amplifiers



HVPS



HVFM

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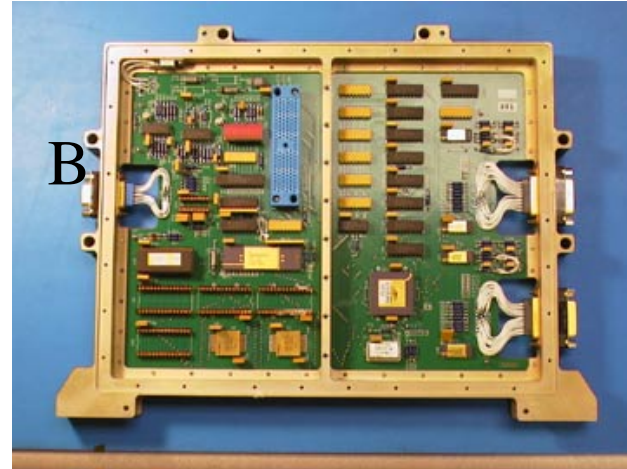
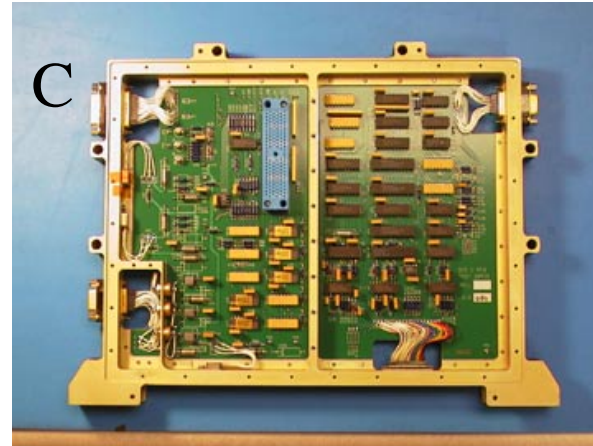
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### UCB FUV Detector Status - Electronics cont.

- DCE - A,B,C, 2 sets, in house
  - Both DCE sets, voltage & frequency margins done, thermal soak & thermal cycle tested, POR tests in progress.
  - #1 DCE has 900+Hrs burn-in and #2 DCE has 800+ hours.
  - PROMS due 12/4



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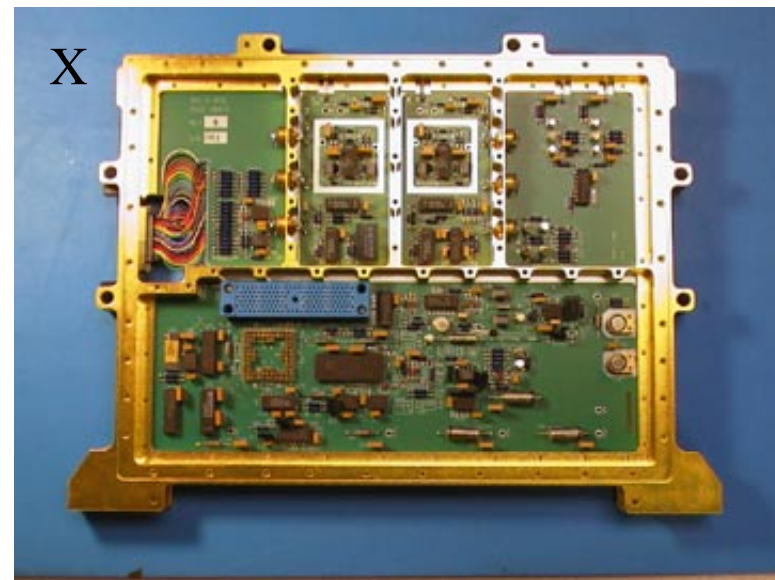
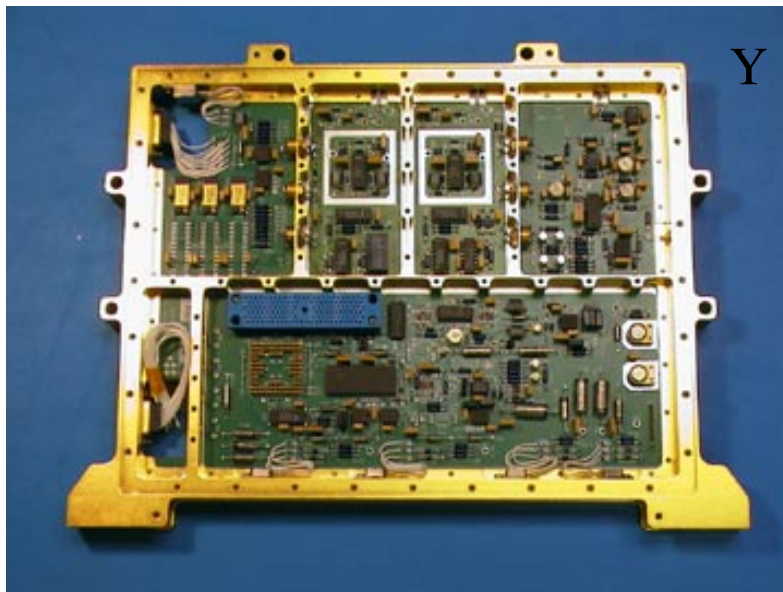
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### UCB FUV Detector Status - Electronics cont.

- 4 X and 4 Y flight TDC's fully functional
  - Voltage margin & frequency margin tests done
  - Thermal cycle and acceptance tests done. Coat and stake this week
- Flight TDC's have been giving excellent performance on FUV01, & BBA1



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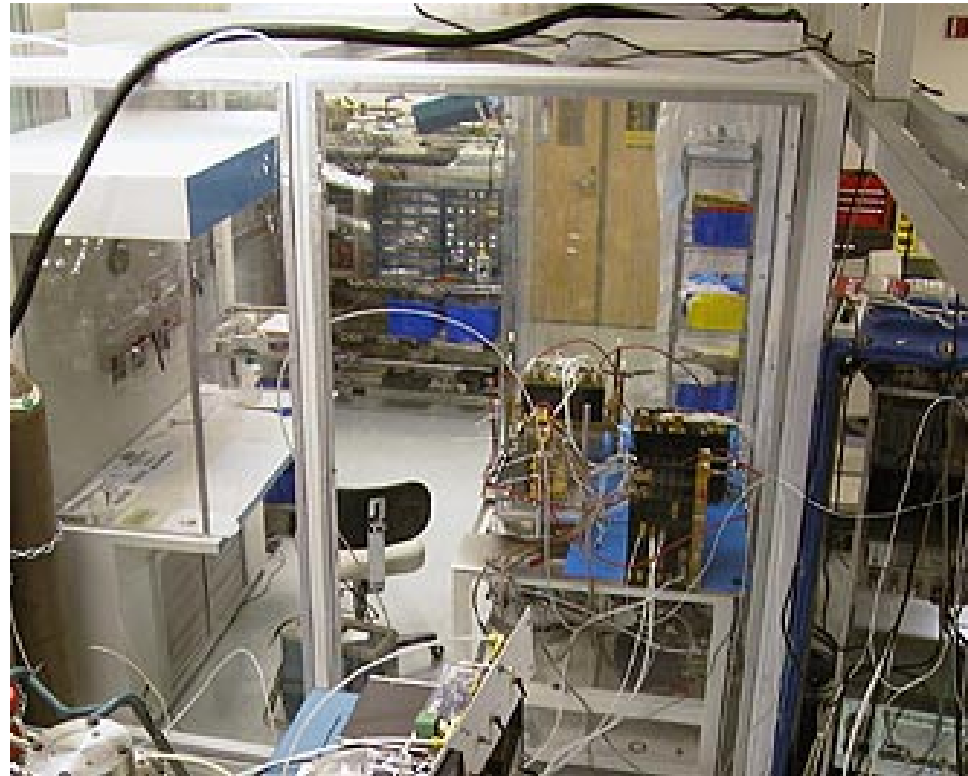
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### UCB FUV Detector Test Status

- BBA#1 (**Flight spare**) in final metrology. Pre-cathode test verification next week.
- **FUV01 Flight** detector & flight DEB on one tank doing Pre-cathode test verification.
- FUSE full system removed until BBA#3 work resumes



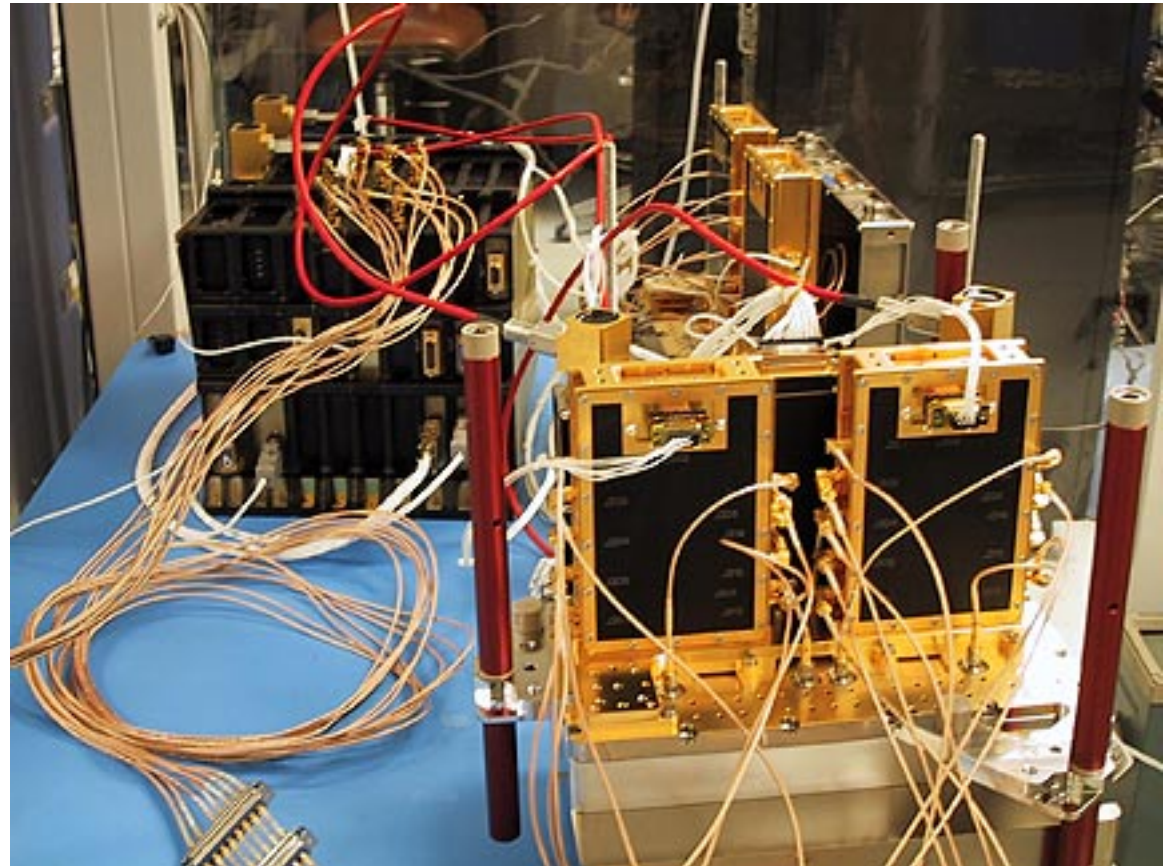


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## UCB FUV Detector Status - Flight Detector

**Flight detector re-integrated after metrology. Attached to flight DEB and tests being run for pre-cathode deposition verification tests. Resolution is the same, Excellent! Throughput, slit mask, local rate, flat field and stability tests to be run this week.**



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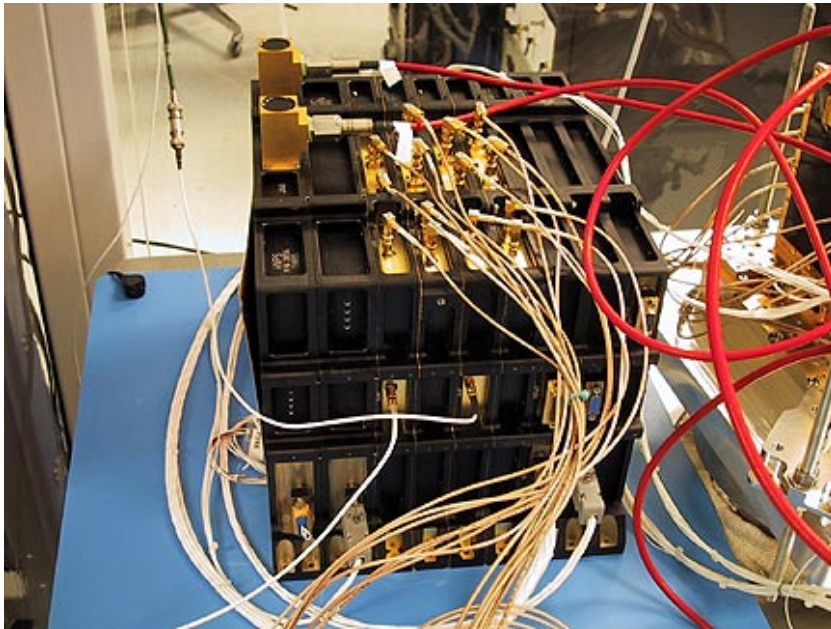


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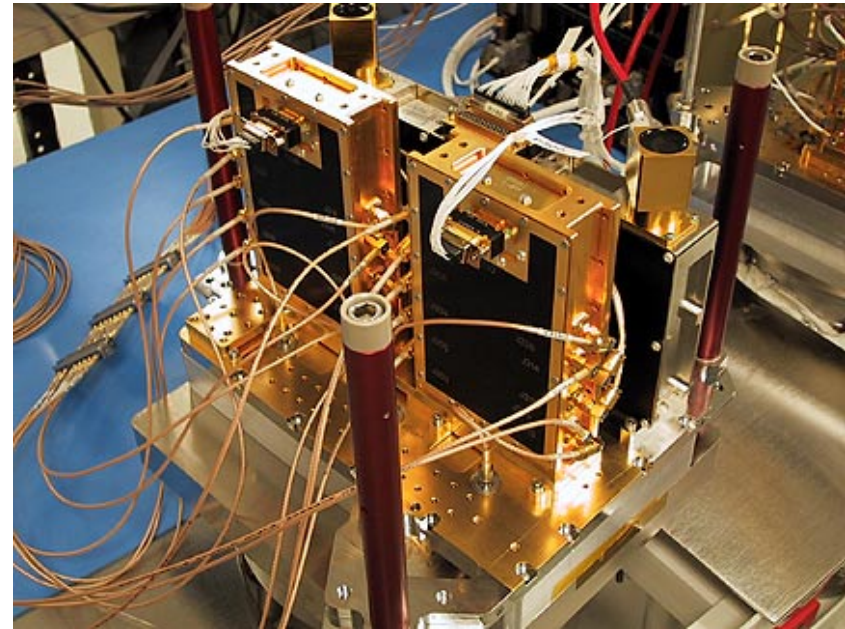


## COS FUV01 Detector System

- Detector DEB



- Detector Head



- Note: MEB- DEB test  
done @ Ball in Nov

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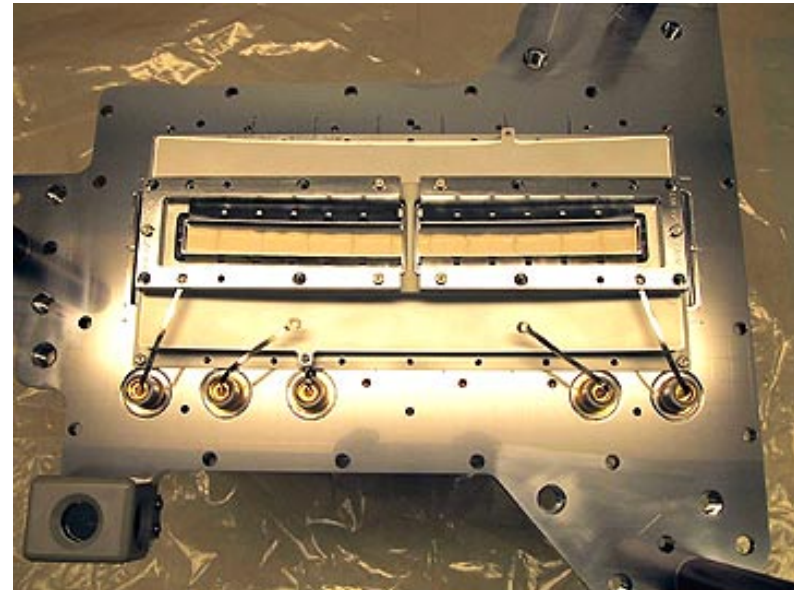
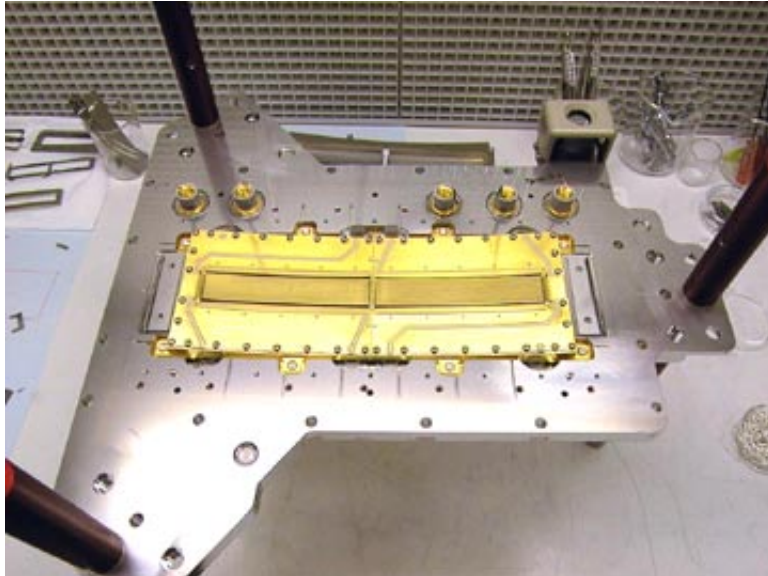


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### UCB FUV Detector Status - Metrology



- BBA #2 initial and final metrology done with DBA
- BBA #1 initial metrology done with DBA, final metrology this week
- About 0.4mm displacement from ideal, also curved displacement
- BBA#1 about 100 $\mu$ m different than BBA#2, shim to equal BBA#2

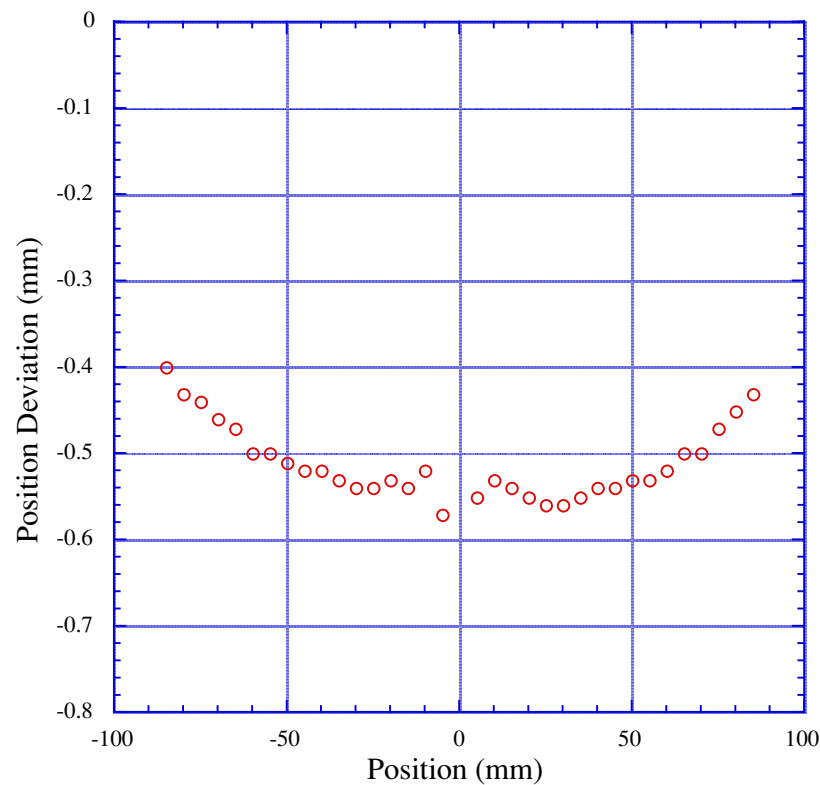


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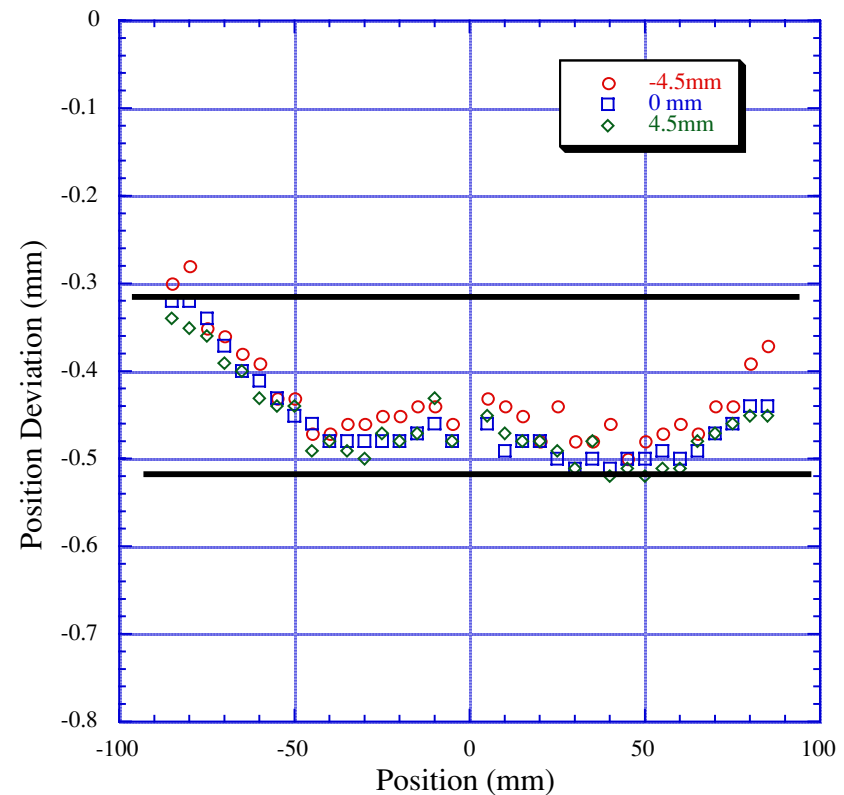
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### UCB FUV Detector Status -Metrology results

- BBA#1



- BBA#2, FUV01







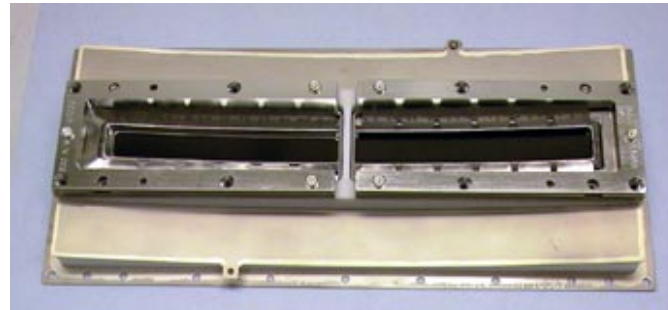
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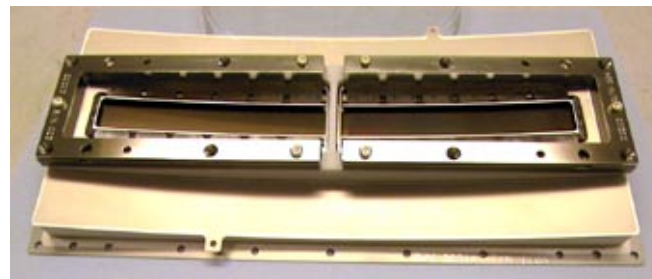


### UCB FUV Detector Status - Flight BBA's

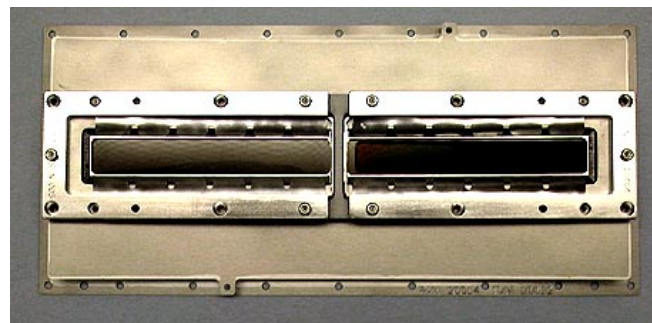
- BBA #1 with new MCP's, scrub done, resolution, & flat field tests done - B side resolution slightly worse.
- BBA #2 Metrology done. Re-Integrated into FUV01 flight detector. Resolution verified with flight DEB.
- BBA #3 rebuilt with new MCP's, resolution tests, gain matching, pending FUV01 & BBA#1.



- BBA1



- BBA2



- BBA3

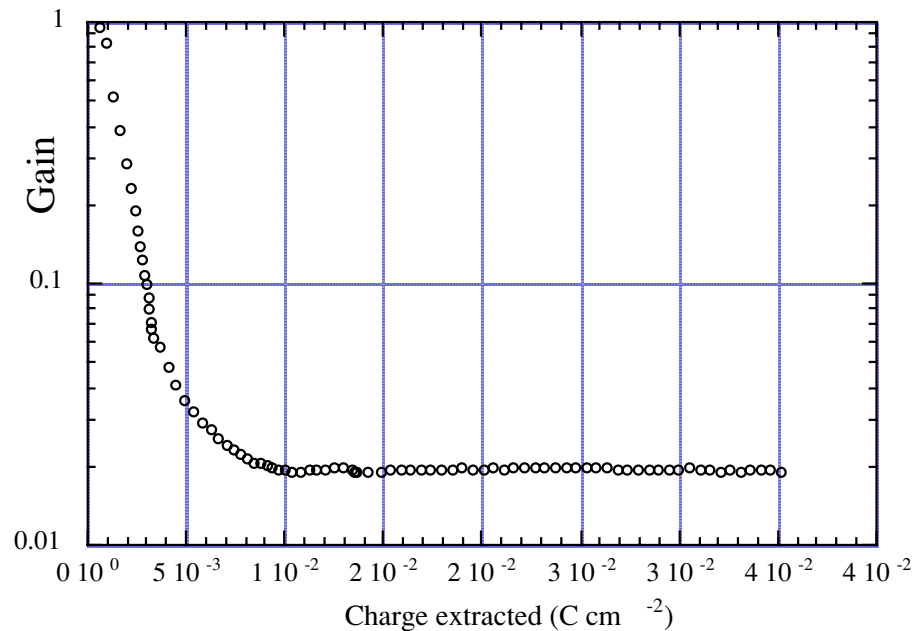


# COS Monthly Status Review

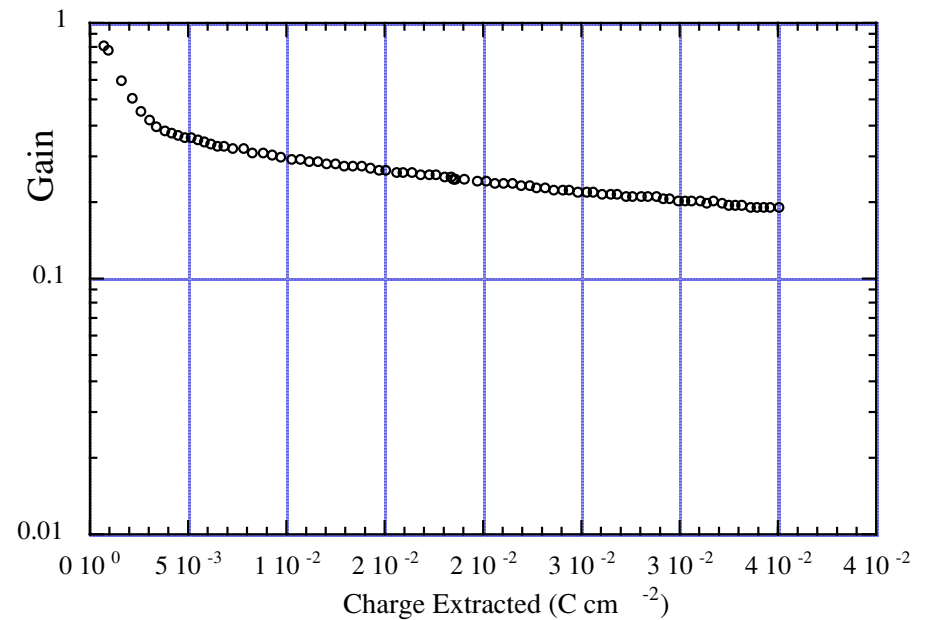
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## BBA#1 Scrub Data

BBA #1 B, not previously scrubbed



BBA #1 A, previously scrubbed



Scrubbing obviously has a lasting effect, the “gas” evolution part of the curve is much reduced.





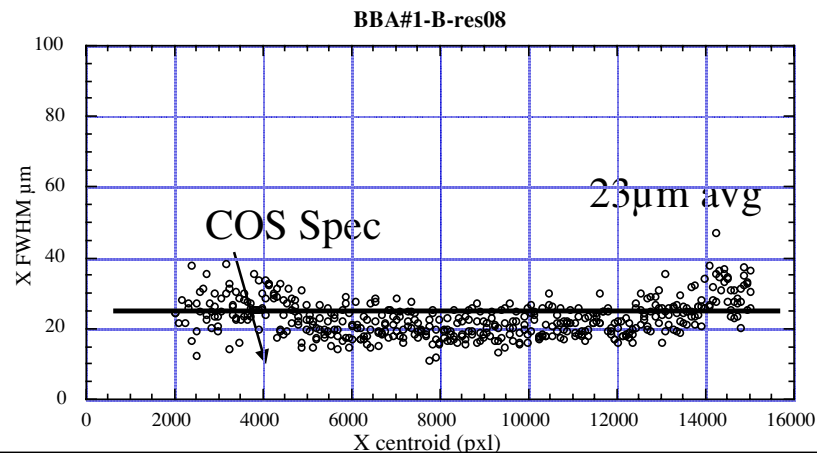
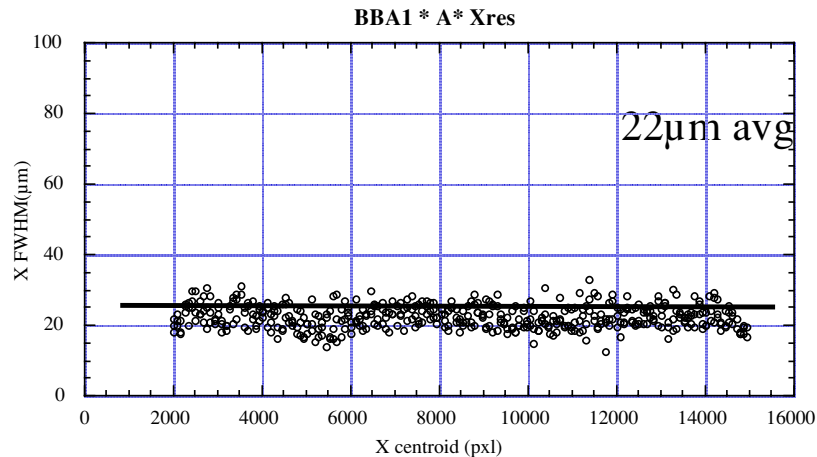
# COS

## Monthly Status Review

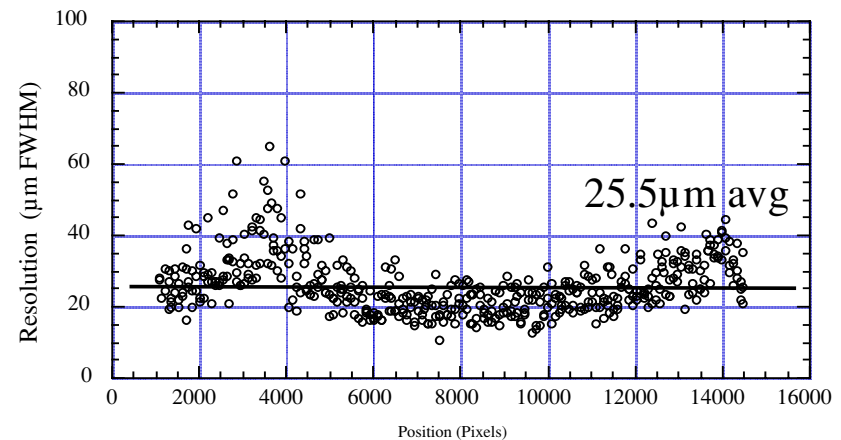
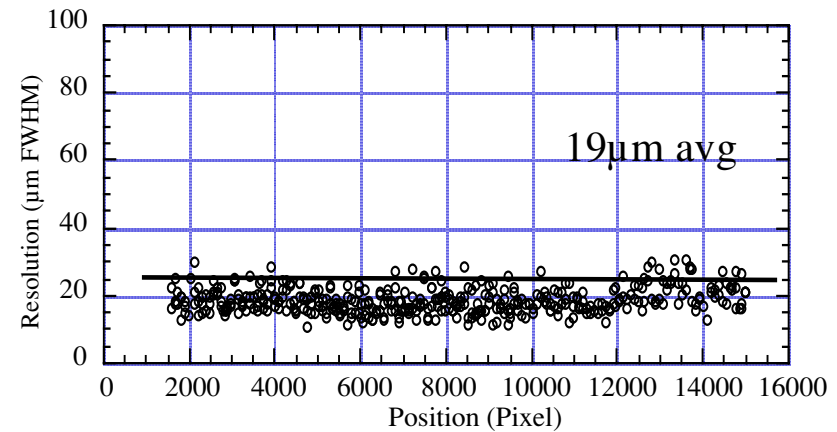
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### BBA#1, X Resolution Measurements

Before scrub



After scrub



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John Andrews  
December 6, 2000



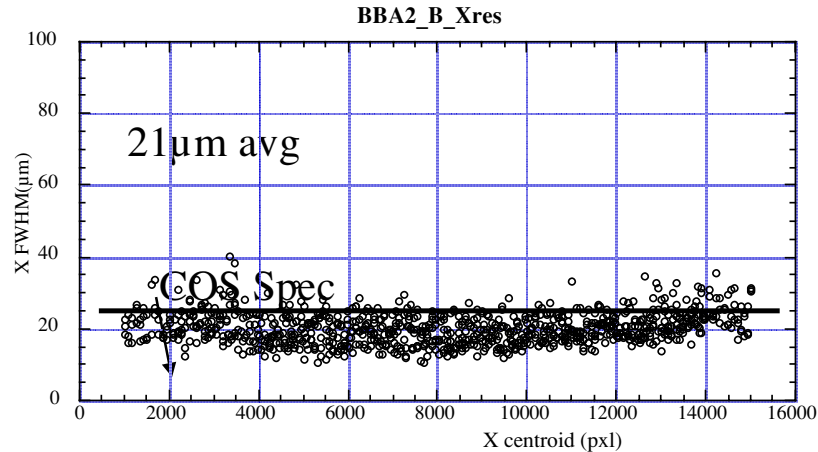
# COS

## Monthly Status Review

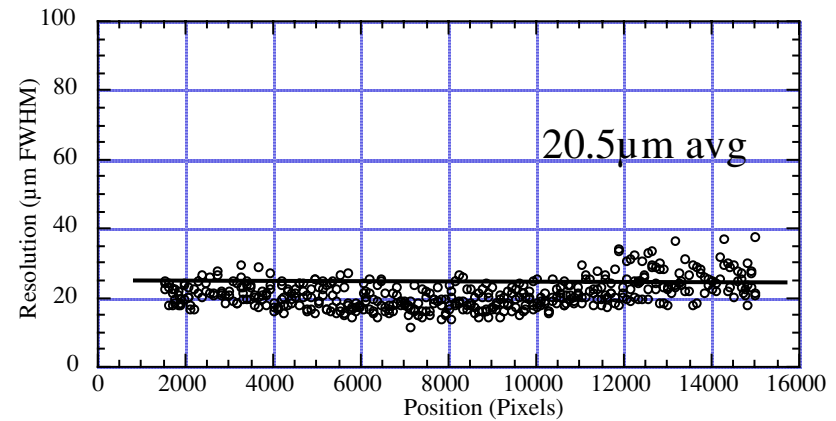
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### BBA#2 X resolution data with Flight TDC's

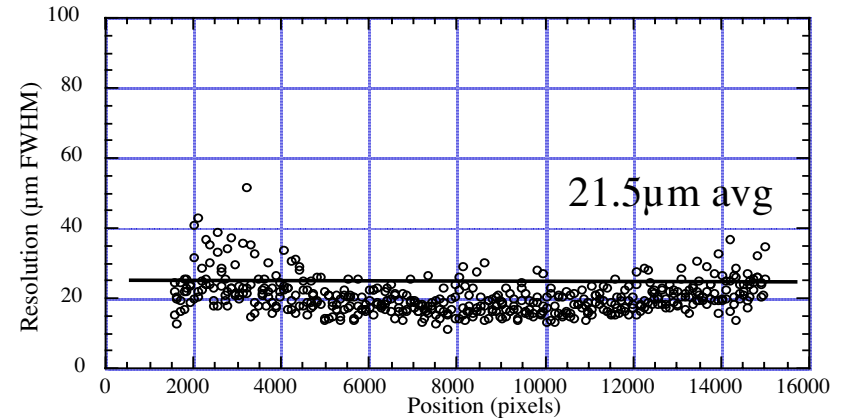
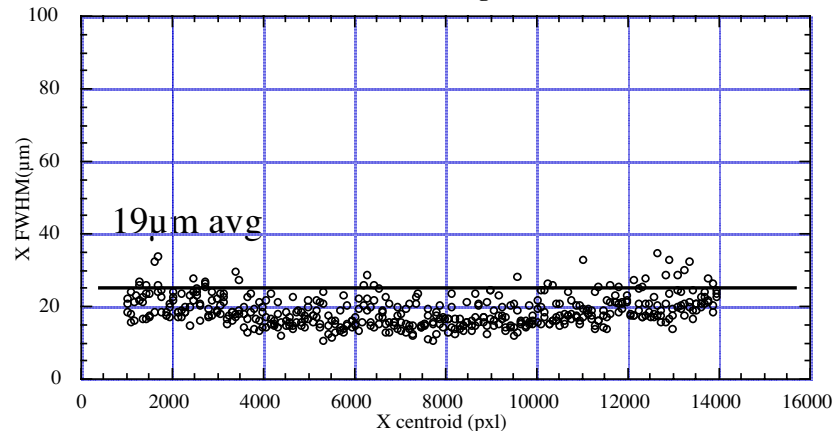
Flight TDC's



Pre-cathode FUV#1 full system



BBA2 \* Side A \* Flight TDC#1



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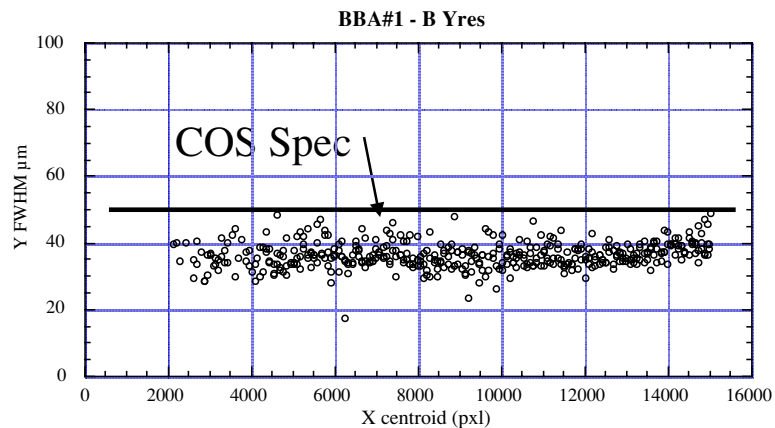
# COS

## Monthly Status Review

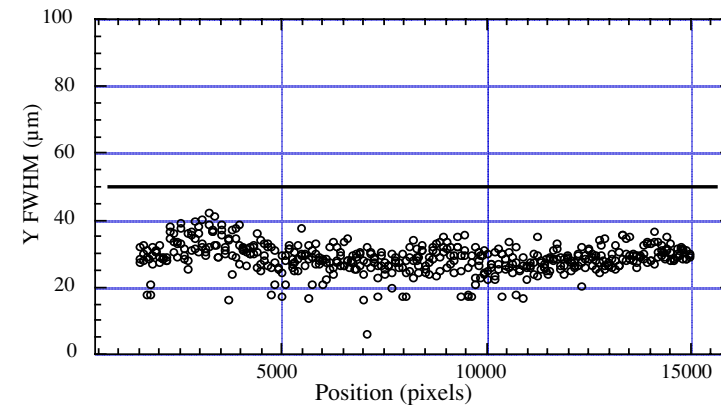
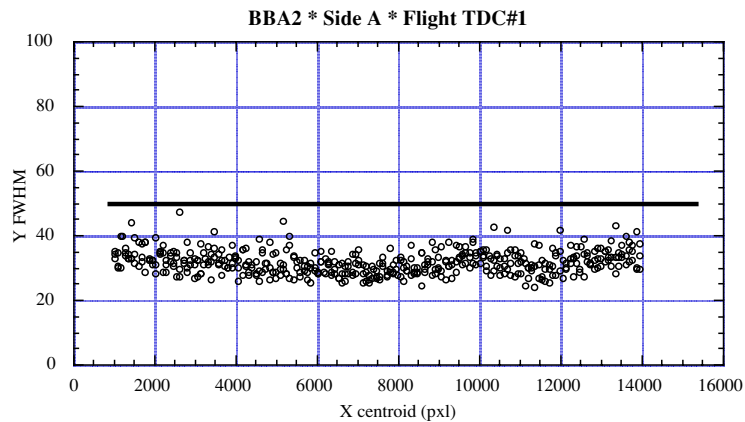
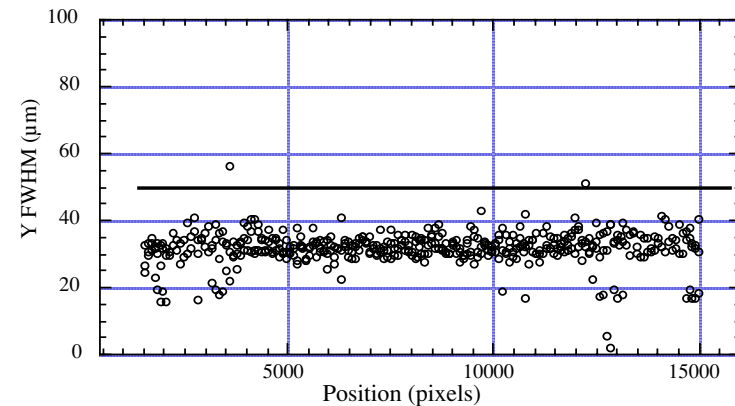
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### FUV01 Y Resolution

#### Flight TDC's



#### Pre-cathode FUV#1 full system



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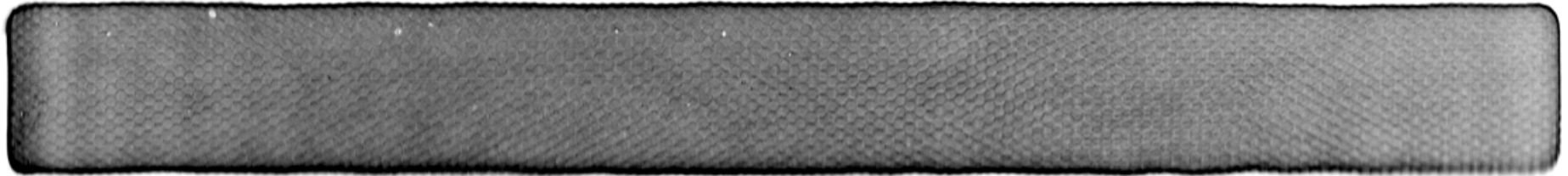


**COS**  
***Monthly Status Review***

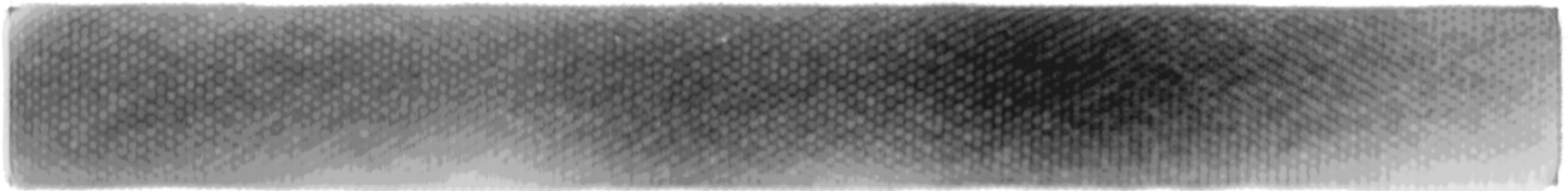


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**Flight BBA#1-B MCP Stack Fixed Pattern Noise**  
**Post scrub data on FUSE electronics**



**Flux map**



**Gain map**

- Multifiber modulation dominates, small Moire at some edges
- “bands” are FUSE electronics nonlinearities

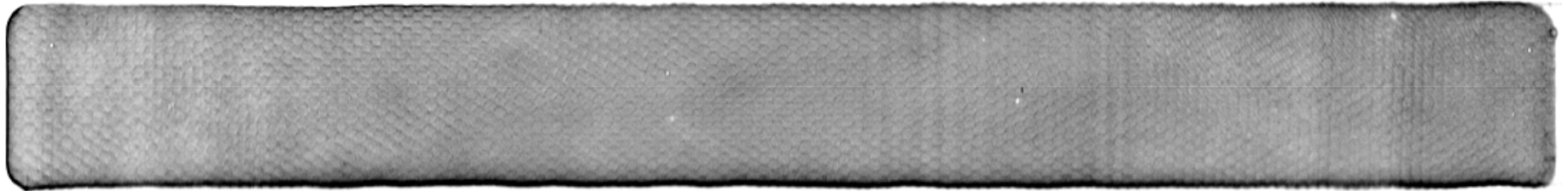


**COS**  
***Monthly Status Review***

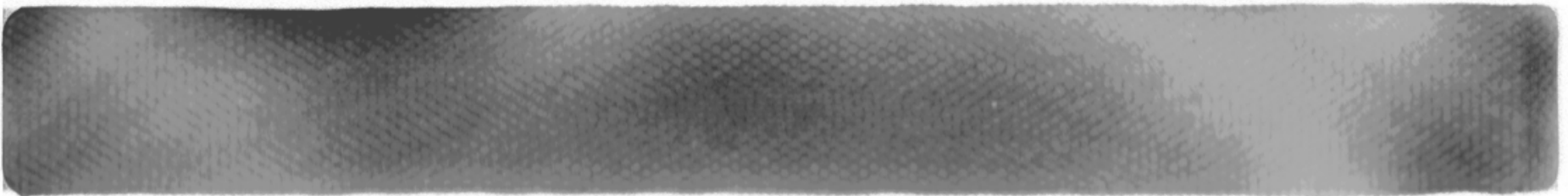


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**Flight BBA#1-A MCP Stack Fixed Pattern Noise**  
**Post scrub data on FUSE electronics**



**Flux map**



**Gain map**

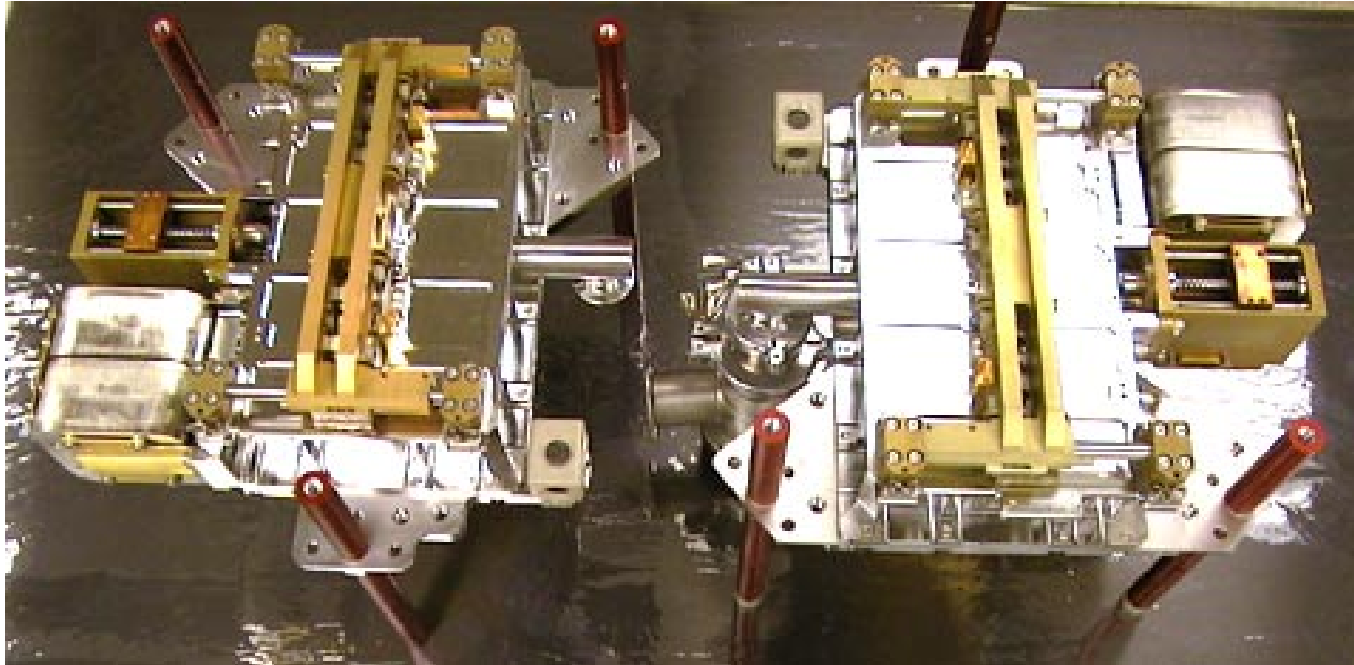
- Multifiber modulation dominates, small Moire at some edges
- “bands” are FUSE electronics nonlinearities



# COS *Monthly Status Review*



## UCB FUV Detector Status - Detector Vacuum Assembly



- VHA #1 and #2 vacuum verified and operated with ion pumps
- VHA #1 and #2 doors operation verified
- VHA's ready for detector integration

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John Andrews  
December 6, 2000





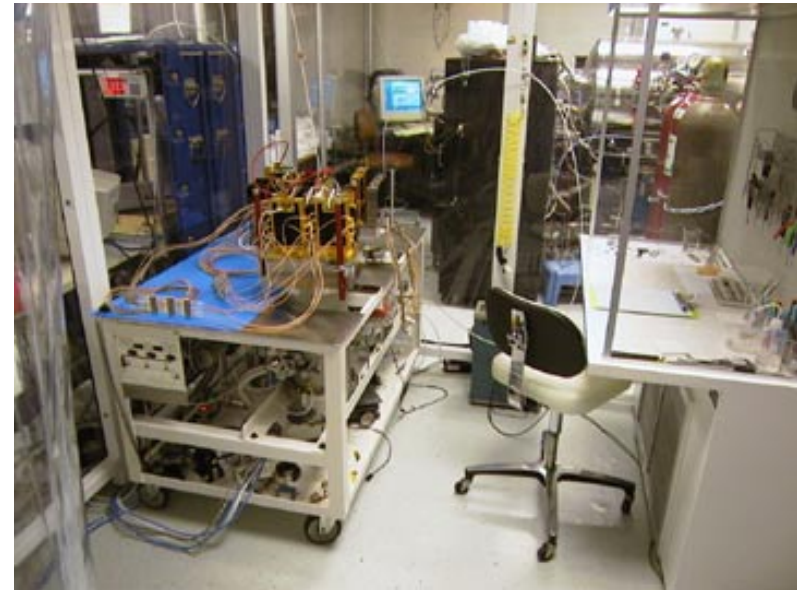
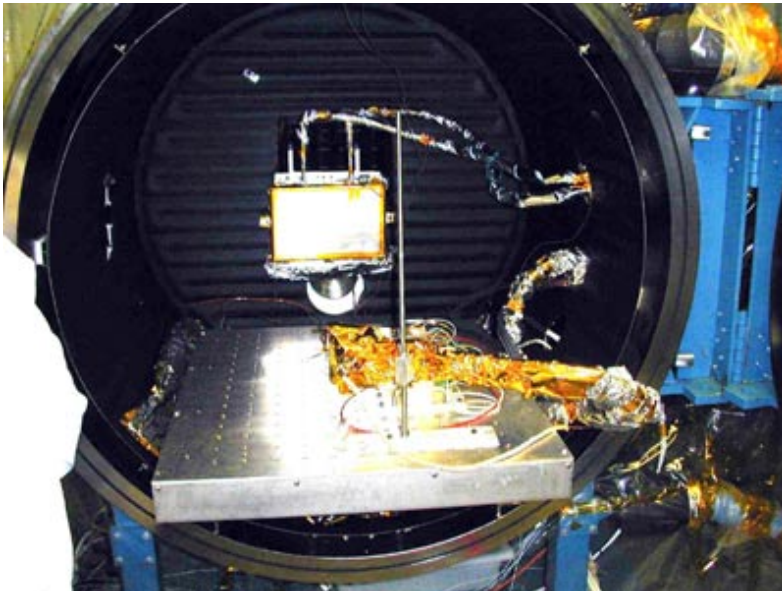
# COS

## Monthly Status Review



### UCB FUV Detector Status - Facilities

- FUV detector system TV will be done in Colorado tank. TV hardware in process - cables/connectors defined & being made or prepared, plate mount design done & being reviewed at CU.



#### Detector system test cleanroom

- Detector test tank facility in clean tent accommodates two full COS detector systems, currently FUV01 flight detector and BBA#1 tests



# COS

## *Monthly Status Review*



### **UCB FUV Detector Status -Near term tasks**

- Finish pre-cathode performance verification on flight detector .
- Perform vacuum deflection tests on DBA/DVA.
- Coat cathode onto flight detector after performance verification approved by CU, approval scheduled for Dec 13th.
- Measure QDE of flight detector cathodes.
- Flight detector vibration test
- Continue preparations for Thermal Vacuum at CU.
- Coat cathode onto flight spare detector after performance verification approved by CU.
- Deliver flight spare system to Ball in Jan 01 for tests with MEB simulator and UV focus/alignment test.





**COS**  
*Monthly Status Review*



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## **UCB FUV Detector Status -Milestones for next Month**

- FUV #1 system vibration test completed
- FUV #1 EMI/EMC testing started



# COS *Monthly Status Review*



## CU Software/Operations Efforts

- GSE Software Development at CASA-ARL
  - COS Science Data Index and Analysis Software - a.k.a. "CEDAR"
  - Website gives full details for CEDAR: <http://cos-arl.colorado.edu/CEDAR/>
    - CEDAR and TAACOS software efforts presented at ADASS Conference in Boston.
    - Automatic 'spectral line recognition' function added to CEDAR – to enhance the data analysis package.
    - CEDAR currently being used to analyze data for FUV Detector performance verification.
    - CEDAR Build III development is progressing – with the previously unavailable DM-06 information now being provided by Ball. Completion of Build III is expected by early February. The CEDAR lead developer, Stéphane Béland, is currently working on both CEDAR and on the CALCOS-GSE software effort.



# COS

## *Monthly Status Review*



## CU Software/Operations Efforts

- COS Target Acquisition Simulation Software - a.k.a. "TAACOS"
- Website gives full details for TAACOS: <http://cos-arl.colorado.edu/TAACOS/>
  - TER: "TAACOS Phase I Report for the NUV Channel" released.
  - TER: "Recommended TA FSW and Operations Changes" in signature cycle.
  - TER: "TA Subarrays and Simulated Detector Summaries" in development.
  - TER: "Recommended initial values for TA FSW Parameters" in development.
  - Recommended changes and modifications to TA FSW being discussed and ratified during as-needed COWG telecons.
  - Further TAACOS simulations, modifications and/or enhancements are on indefinite hold. The TAACOS lead developer, Dr. Steven Penton, is currently finishing the remaining TAACOS reports – and beginning work on the CALCOS-GSE software.



# COS

## *Monthly Status Review*



### CU Software/Operations Efforts

- COS Science Data “Ground Support” Calibration Software - a.k.a. "CALCOS-GSE”
- Website (to be developed) will give full details of CALCOS-GSE efforts: <http://cos-arl.colorado.edu/CALCOS/>
  - Current Draft of AV-03 being used as a SW development guide for CALCOS-GSE development.
  - AV-03 algorithms being verified for feasibility, accuracy and “programmability” by Penton and Béland.
  - CALCOS-GSE Development Plan currently being prepared by Béland. Draft release of Development Plan slated for this week.



# COS

## *Monthly Status Review*



## **Assistance with FSW Development Efforts at UCB**

- DCE FSW Documentation Efforts
  - Website gives full details of DCE Documentation efforts:  
<http://cos-arl.colorado.edu/DCE/>
- DCE BOOT FSW:
  - MEB-DCE Interface Testing (using the COS test bench and the DCE ETU) was held at Ball from Nov. 8<sup>th</sup> – 14<sup>th</sup>. Testing was a tremendous success – with ALL of the interactions between the CS-DCE FSW and the DCE BOOT FSW tested and verified. No problems were found with the DCE BOOT Code (v.1.08) – but two small changes were made at the request of Ball & GSFC. DCE BOOT Code was incremented to v.1.09 – with the intent that this would be the flight version.
  - Testing was so successful that the possibility of bringing the DCE ETU back to Ball in January for ongoing CS-DCE FSW and DCE FSW testing is being explored. Note: The DCE ETU is used routinely at UCB for FUV Detector test and development – so as long as the absence of the DCE ETU will not negatively impact the FUV Detector schedule, all parties agree that this is a very worthwhile activity to continue.



# COS

## *Monthly Status Review*



## **Assistance with FSW Development Efforts at UCB (cont.)**

- DCE BOOT FSW:
  - Formal DCE BOOT Code testing with v.1.09 was conducted at UCB from Nov. 15<sup>th</sup> – 17<sup>th</sup>. All DCE BOOT FSW Requirements were verified – and no known problems exist with this version.
  - In order to maintain the FUV Detector development schedule – and per prior agreement with UCB – on Nov. 17<sup>th</sup> UCB was given the ‘go ahead’ to burn the flight DCE PROM with v.1.09. As such, UCB has subsequently directed UTMIC to burn a flight DCE PROM with this version of the DCE BOOT FSW.
  - As has been noted previously, given the rapid development & test schedule we’ve undertaken with the ‘late change’ to the DCE FSW development program, coupled with the limited opportunities there have been to test the DCE BOOT code on a FULL detector system – there remains a chance that we may yet uncover a problem in the BOOT code that requires a fix. If such a scenario presents itself, we will have to pull the flight PROM from the DCE, and burn a new version of the code.



## COS *Monthly Status Review*



### **Assistance with FSW Development Efforts at UCB (cont.)**

- DCE OPERATE FSW:
  - The first versions of the DCE OPERATE Code were delivered in early November. In fact, as part of the MEB-DCE Interface Testing – a version of this OPERATE Code was copied into the CS EEPROM – and successfully uploaded to the DCE, per the planned methodology for flight operations.
  - Weekly DCE OPERATE Code telecons began on Nov. 28<sup>th</sup> – and will continue during the month of December, culminating in what will likely be a two-day code review in early January.
  - A full week of DCE OPERATE Code testing has been set aside for Dec. 11<sup>th</sup> – 15<sup>th</sup> at UCB. UCB is providing both hardware and personnel to assist in exercising all aspects of OPERATE Code functionality. The possibility of a second week of this kind of testing (if necessary) at UCB in early January is currently being explored.
  - With the aggressive review and test schedule for the DCE OPERATE Code – it looks extremely promising that the code will be ready to support FUV Detector Thermal-Vac performance and qualification testing in mid-January.



# COS

## *Monthly Status Review*



### COS Schedule for CU

- The detailed CU schedule is available as a separate hand-out.

Task	Status
G160M/G140L – Blazed Grating Testing	Awaiting JY deliveries
CEDAR Software Development	Ahead of schedule, awaiting external inputs
TAACOS Software Development	Complete
G140L Gratings & Testing	Complete, units delivered to Ball
JY Deliveries	Presented earlier
Tinsley	Effort completed





# COS

## *Monthly Status Review*



### **Upcoming Events/Activities**

- Pick up G160M and G225M gratings from JY.
- Continue FUV detector T-V test preparations at CU.
- Release AV-03 for signature cycle.
- Burn, install, test flight EEPROM with W. Clement's flight DCE boot code.
- Deposit photocathode on flight detector's MCPs.
- Install and test W. Clement's flight operate code.
- Start FUV detector environmental tests.
  - EMI/EMC ~ 1/9/01 at EMCE
  - Vibe tests ~ 1/18/01 at NASA/Ames
  - Thermal-vacuum ~ 2/20/01 at CU/CASA



**COS**  
*Monthly Status Review*



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## Questions, Issues & Resolution Plan

- None