



COS
Monthly Status Review
September 17, 2002
Ball



COS
Monthly Status Review



Agenda

Progress Summary Since Last Monthly	J. Andrews
COS I&T Preparation & Support	J. Andrews
GN2 Alignment Update	J. Green
UCB FUV Detector Technical Status	O. Siegmund
UCB FUV Detector Programmatic Status	J. Andrews
Software/Ops	J. Andrews
Schedules	J. Andrews
Descope Report	J. Andrews
Upcoming Events/Activities	J. Andrews
CU Issues & Resolution Plan	J. Andrews
STScI Presentation	K. Sembach
BATC Presentation	R. Higgins
Financial Splinter	GSFC/Ball/CU



Progress Summary Since Last Monthly

- Supported FUV-01 integration at Ball.
- Continued ground calibration planning.
- Commenced FUV-02 final assy. in preparation for upcoming qualification test program.
- Supported NUV/FUV GN2 alignment checks at Ball.



COS I&T Preparation and Support

- CU and UCB supported the integration and installation of FUV-01 into COS.
- CU is supporting the NUV/FUV GN2 alignment activities that are now ongoing.
- CU has agreed to write the COS TV/TB test procedure.

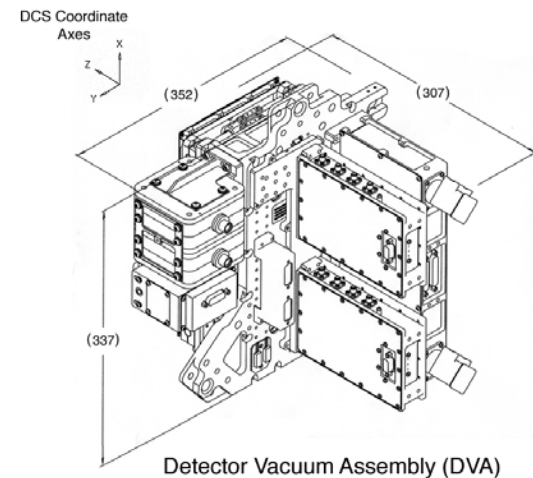
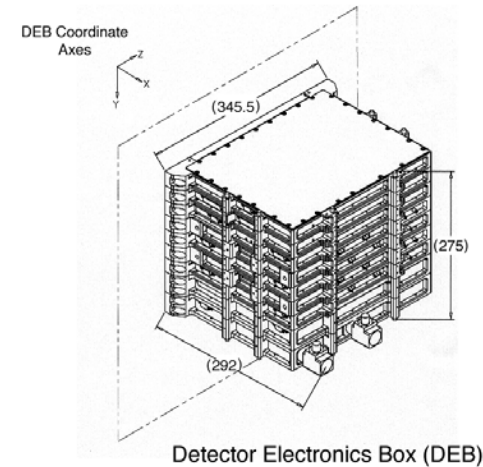


Nitrogen Testing of COS

- Under N₂ purge and with FUV detector door closed, end-to-end testing of COS with RASCAL was performed.
- RASCAL spectra in NUV channels indicated residual aberrations in end-to-end system and input misalignments.
- Cal-lamp spectra in NUV showed small, in-focus spots.
- Follow up measurement of RASCAL indicated systemic misalignments of several optics and of the RASCAL/COS interface.
- Kevin Redman is realigning RASCAL tomorrow.
- Insufficient testing of FUV system to date to make any meaningful conclusions.

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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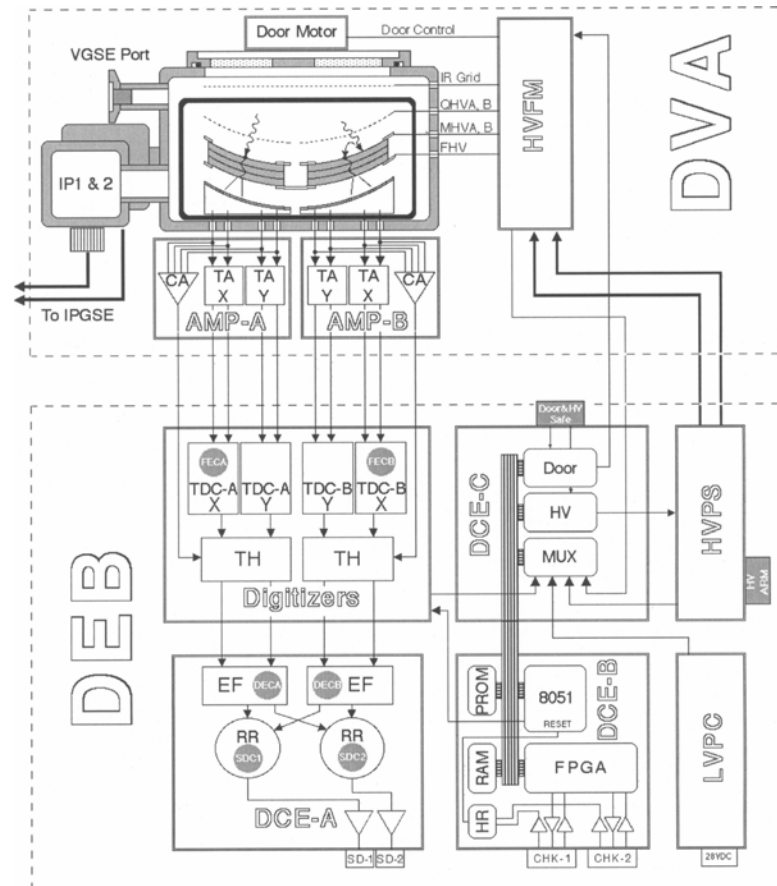
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FUV Detector Subsystem Block Diagram

- UCB is under contract to deliver 1 flight FUV detector subsystem (FUV-01) and 1 flight-spare detector subsystem (FUV-02).



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



FUV Detector Overview

- FUV-01 was delivered to Ball on Wednesday, July 31st.
- FUV-01 was successfully mated to and tested with the MEB.
- FUV-01 DVA was successfully mounted into the optics bench.
- FUV-02 is in assembly now at UCB and will undergo environmental testing in October.



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FUV Detector Verification Testing Summary

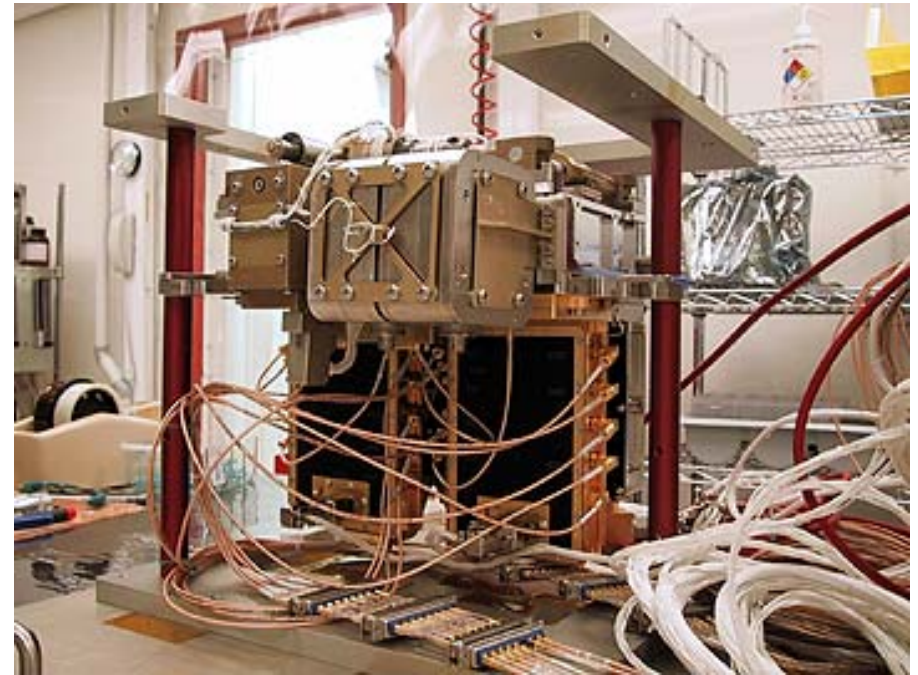
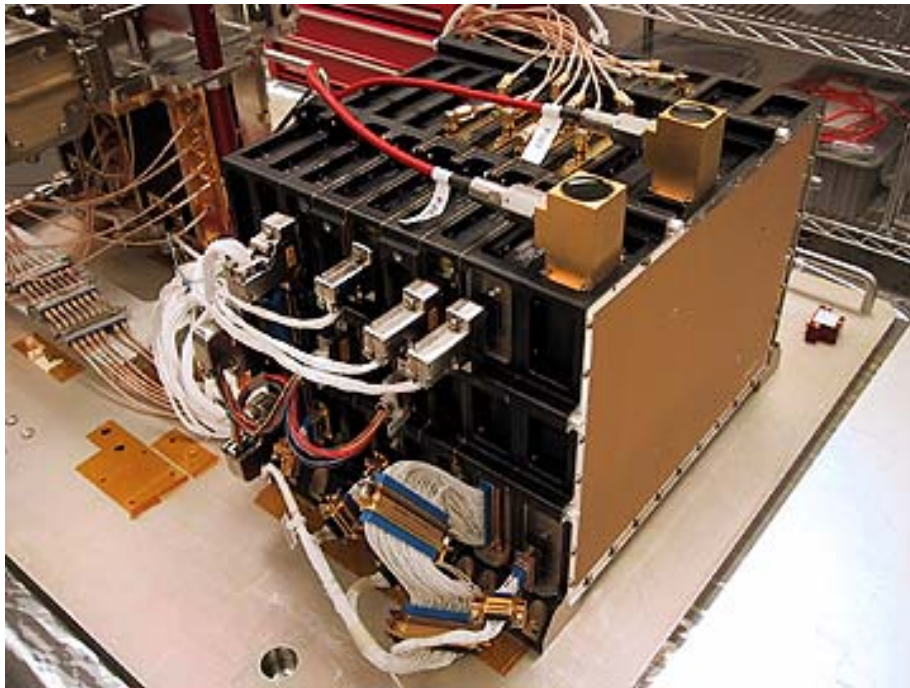
Unit	Functional Testing	Performance Testing	EMI/EMC	Sine Burst	Random Vibe	Thermal-Vac	Contamination Certification
FUV-01 DVA	C	C	@SS	A - C	A - C	@SS	@SS
FUV-01 DEB	C	C	@SS	Q - C	Q - C	@SS	@SS
FUV-01 SS	C	C	C	@Comp	@Comp	8-cycles	C
FUV-02 DVA	P	P	N/R	Q - P	Q - P	@SS	@SS
FUV-02 DEB	C	C	N/R	A - P	A - P	@SS	@SS
FUV-02 SS	P	P	N/R	@Comp	@Comp	8-cycles	P
DVA Surrogate (1)	C	N/R	N/R	C	C	N/R	N/R
DVA Surrogate (2)	C	N/R	N/R	C	C	C	N/R

- C Complete
- @SS At Subsystem
- A Acceptance Levels
- Q Qualification Levels
- N/R Not Required
- P Planned
- (1) Old Door Mechanism
- (2) New Door Mechanism

— DVA-02 to see qual-level vibe at LMMS on Oct-02
 — FUV-02 to see 8 cycle T/V at CU in Oct/Nov-02

COS FUV Detector Systems

- Detector DEB
- Detector Head





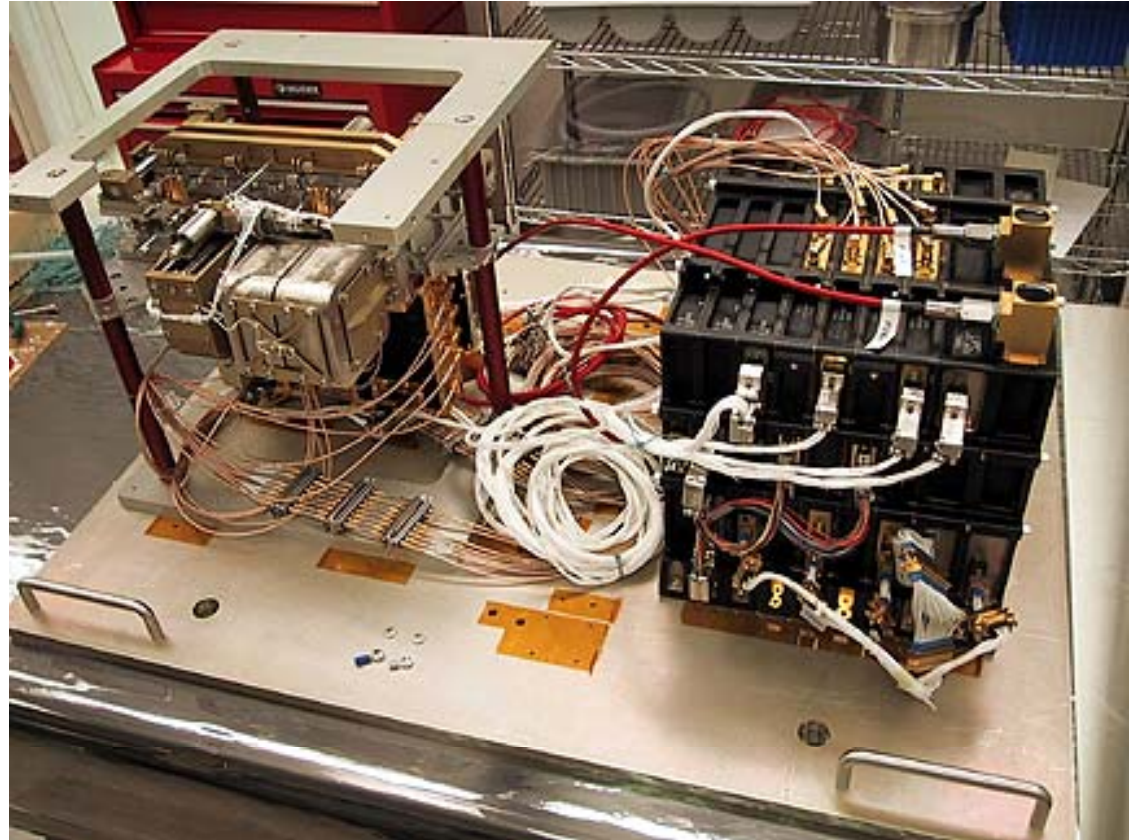
Flight FUV01 Detector System

Completed thermal vacuum
at CU, delivered to Ball 7/31.

Post delivery functional tests
nominal.

Cleanliness certification at
Ball completed successfully.

Alignment tests in progress.





Retrofit and Commissioning steps for FUV01

- Replace broken FUV01 grid frame - DONE
- Acceptance vibration test (Z - axis) - DONE
- Full set of detector functional tests - DONE
- Check of detector QE performance - DONE
- Re-scrub detector and functional test - DONE
- Check of detector QE performance - DONE
- Ship to CU --- Thermal vacuum test - Arrived 7/19, begun cycles 7/23
- Thermal vacuum finished successfully 7/29, including:
 - Door ops with 4 HOP firings, hot & cold soaks, plus 2 temp cycles
- Cleanliness certification at CU
- **Delivered to Ball - 7/31, functional test completed - OK**
- **Repeated cleanliness certification at Ball - OK**
- **Alignment tests in progress at Ball**



UCB FUV02, Flight Backup Detector, Status

- **DEB** - All boards have been cleaned, coated, staked, and vacuum baked.
- **Harnesses** - Cleaned and vacuum baked/certified.
- **Vacuum Housing Assembly (VHA)**
 - Previously completed alignment tests at Ball.
 - New door assembly completed and tested at UCB during the last month
 - Ion grid installed and VHA vacuum verified with ETU DBA
- **Brazed Body Assembly and Detector Backplate Assembly.**
 - BBA opened and MCP's cleaned prior to new cathode deposition.
 - MCP's re-installed and functionally tested successfully
 - Installed new QE grid and magnetic shield, functionally tested successfully
 - DBA installed into VHA and successfully pumped with ion pumps
 - Ready for functional test and MCP scrub
- **Test vacuum tank**
 - has been fully commissioned to support FUV02

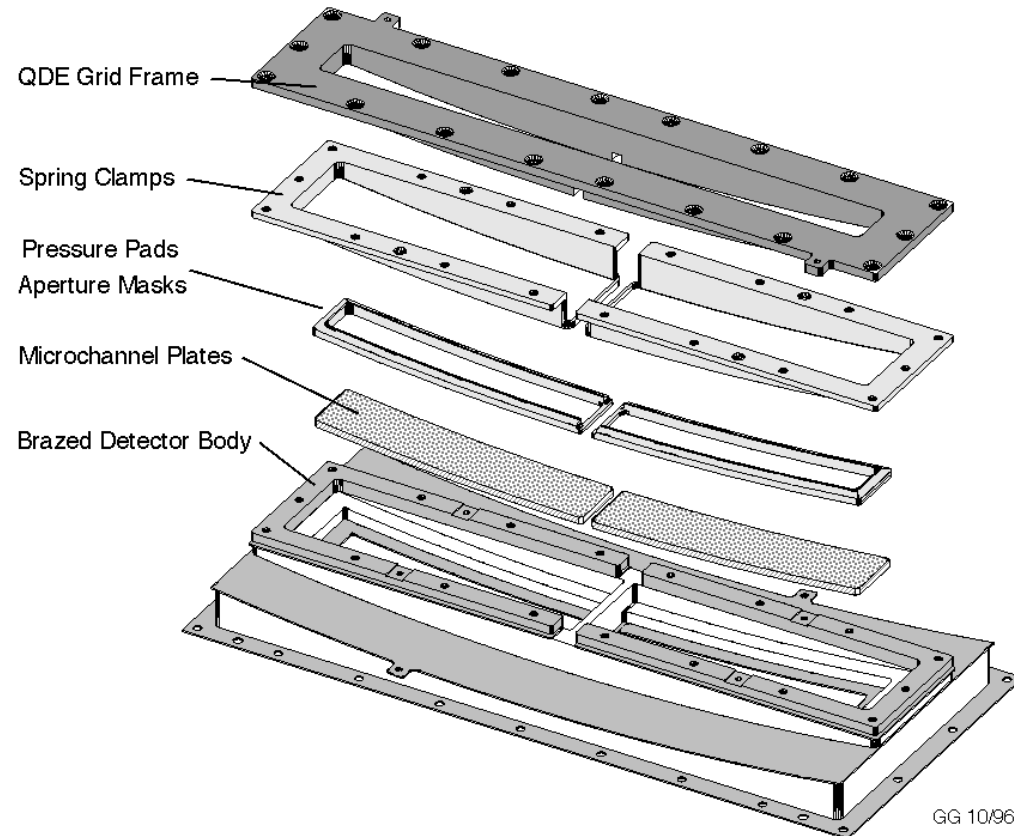


Detector Brazen Body Assembly Design

FUV01 QE Grid

Mounts to top of detector
Frame is PEEK insulator
Grids are electroformed Ni
One grid on each segment
Used to enhance QE by 30%
-1500v bias to MCP
Bias can be turned off
Ramps with MCP HV

Original Buckbee-Mears mesh,
several wires broke in final test.
Can be removed or installed without
disturbing MCP's
Access by removing DBA &
magnetic shield from VHA





Flight and Flight Backup Grid Installation

Flight Grids on 30% Glass Filled PEEK Frames

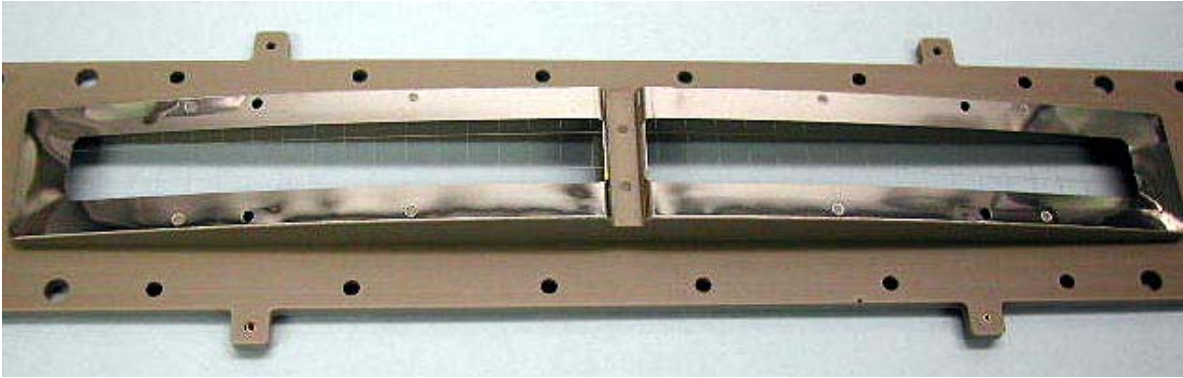
Grid lifetest program was successful in verifying the robustness of the new grids
(Included three thermal cycle tests and three vibrations)

Made **2** flight grid assemblies on 30% glass filled PEEK frames, Stork-Veco mesh
Epoxy cured at room temp, with thorough post cure grid microscopic examination **Both have undergone :-**

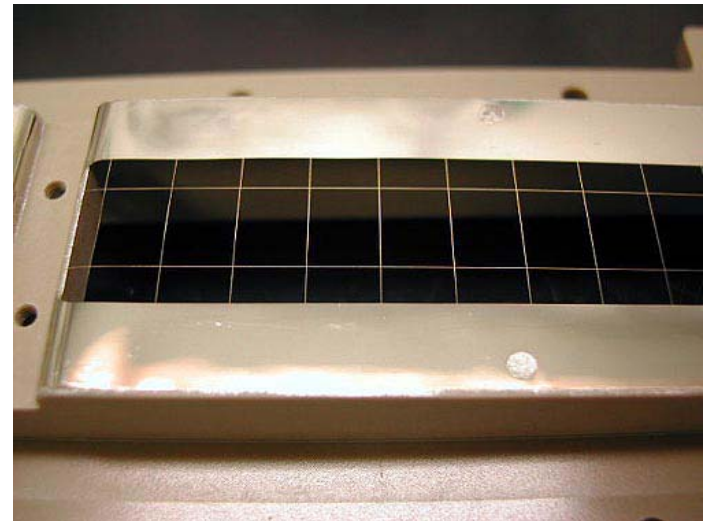
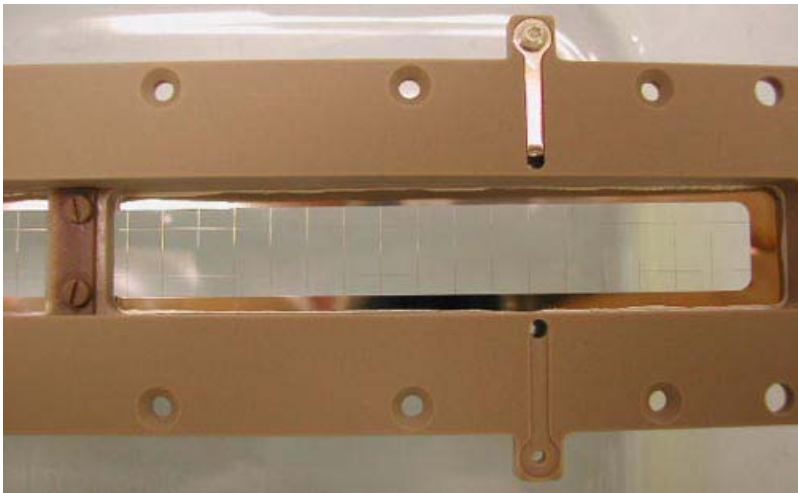
- Field emission tested on a detector successfully
- Completed thermal cycles, -25°C to +50°C,
- Inspection and field emission test
- Vibration test
- Inspection and field emission test

First has been installed on FUV01 and second has been installed on FUV02

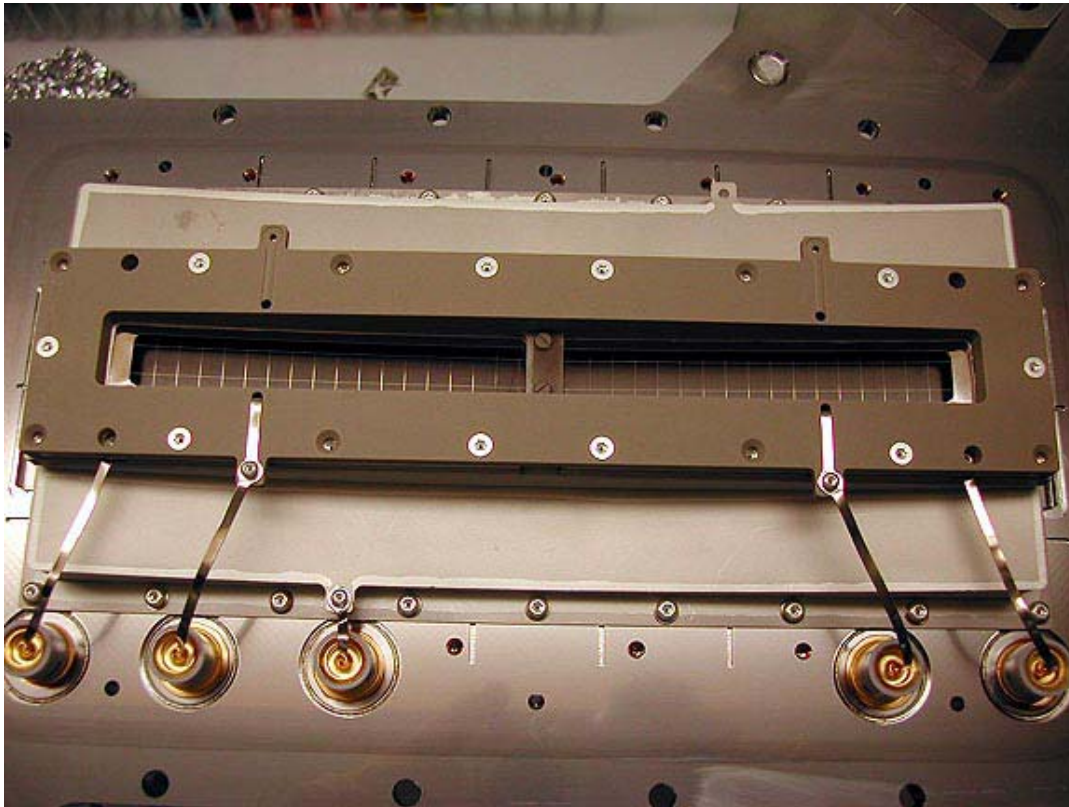
Flight Grid Solution



**Stork-Veco mesh
on 30% glass filled
PEEK frame**



FUV02 detector with QE grid installed



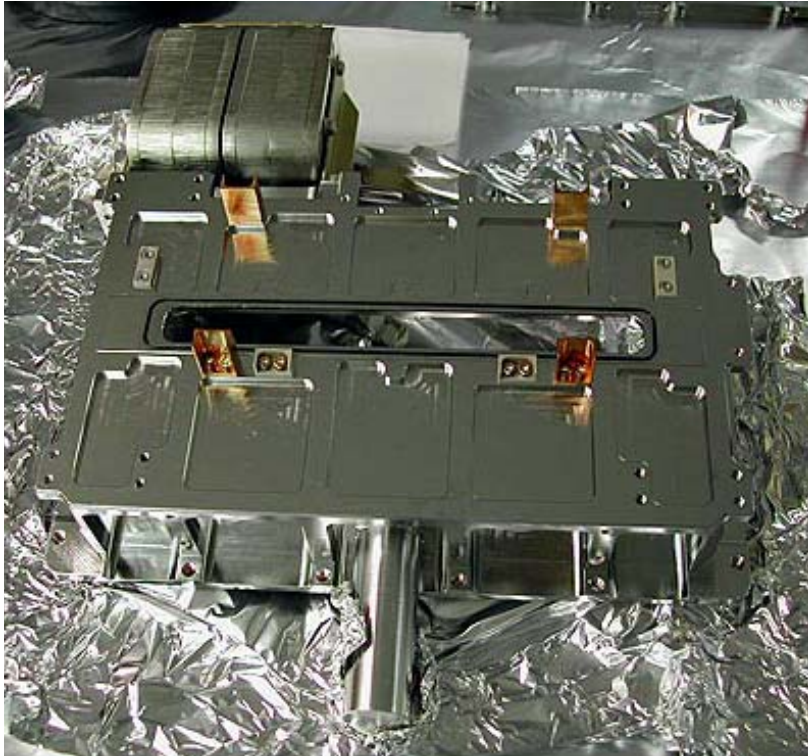
Background is low ---
<10 events sec each side

Pulse heights/ gain good
Gain map OK

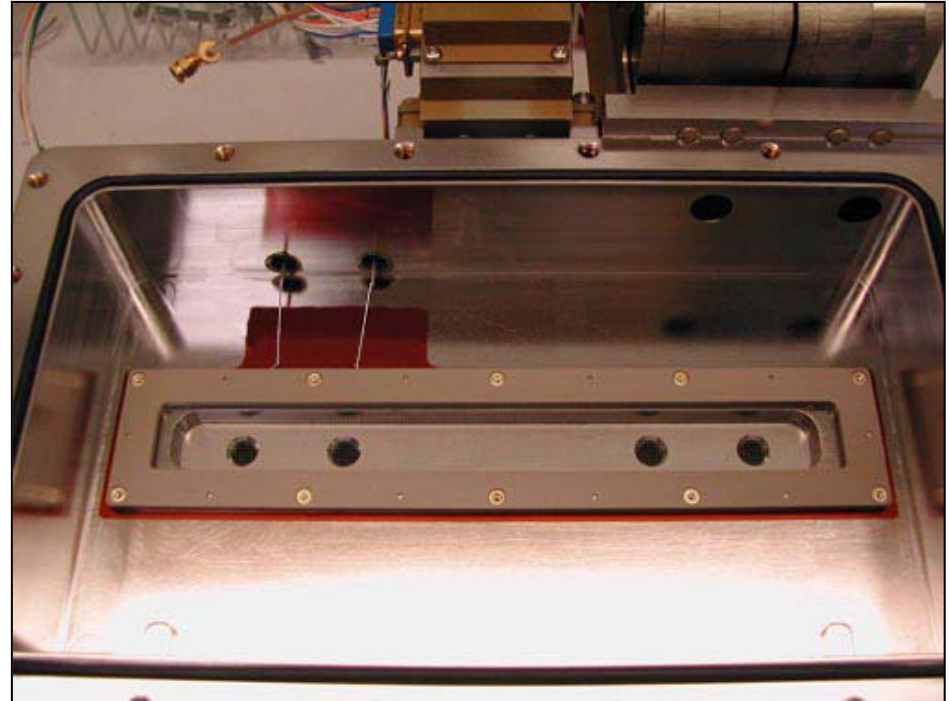
Flat field similar to FUV01



FUV02 VHA with ion pumps

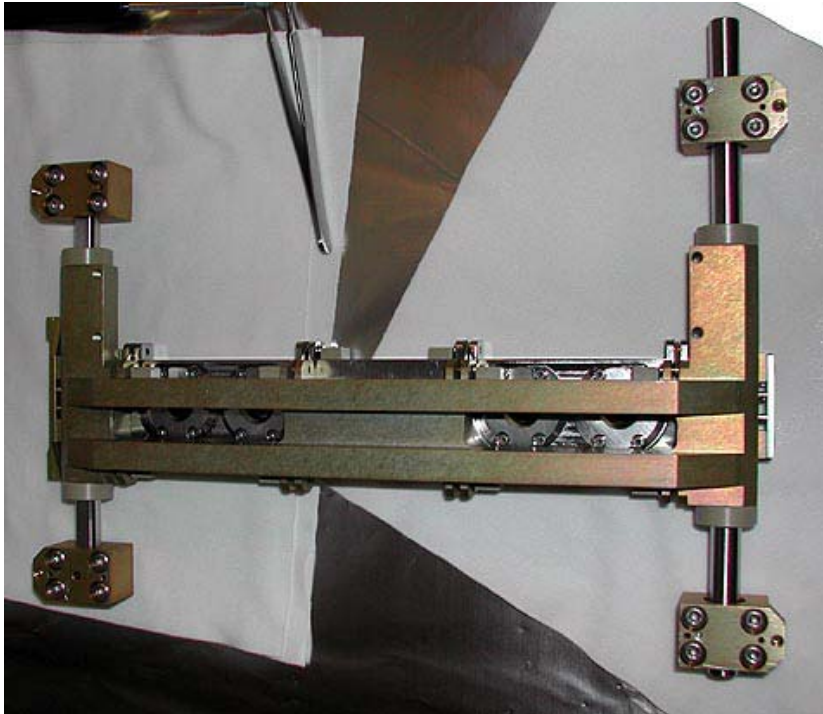


FUV02 VHA internal layout

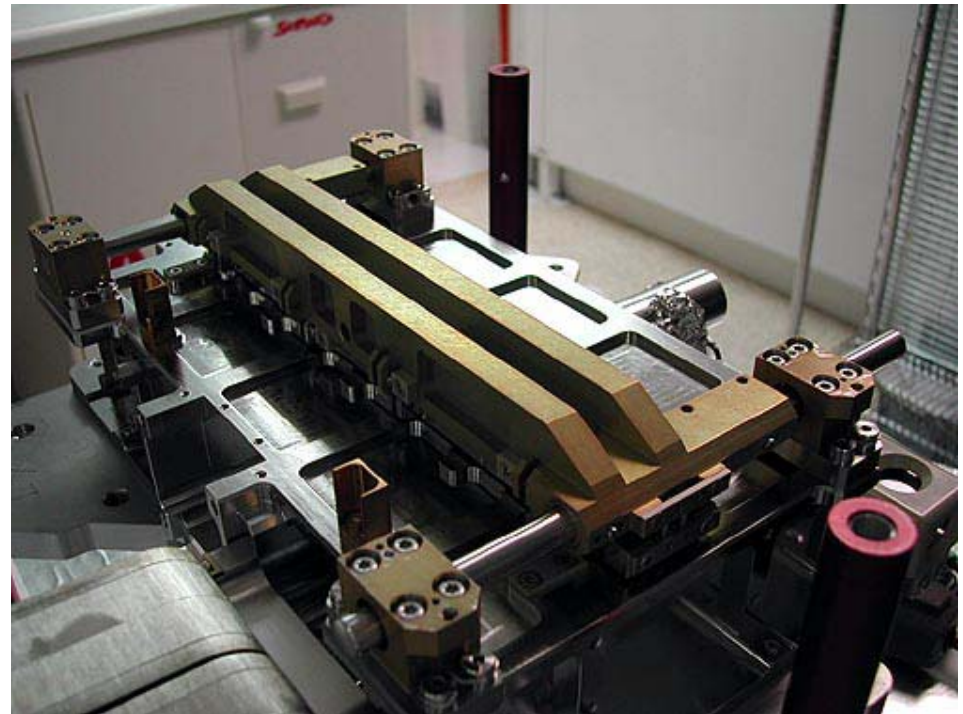




FUV02 door component assembly



FUV02 door installed onto VHA

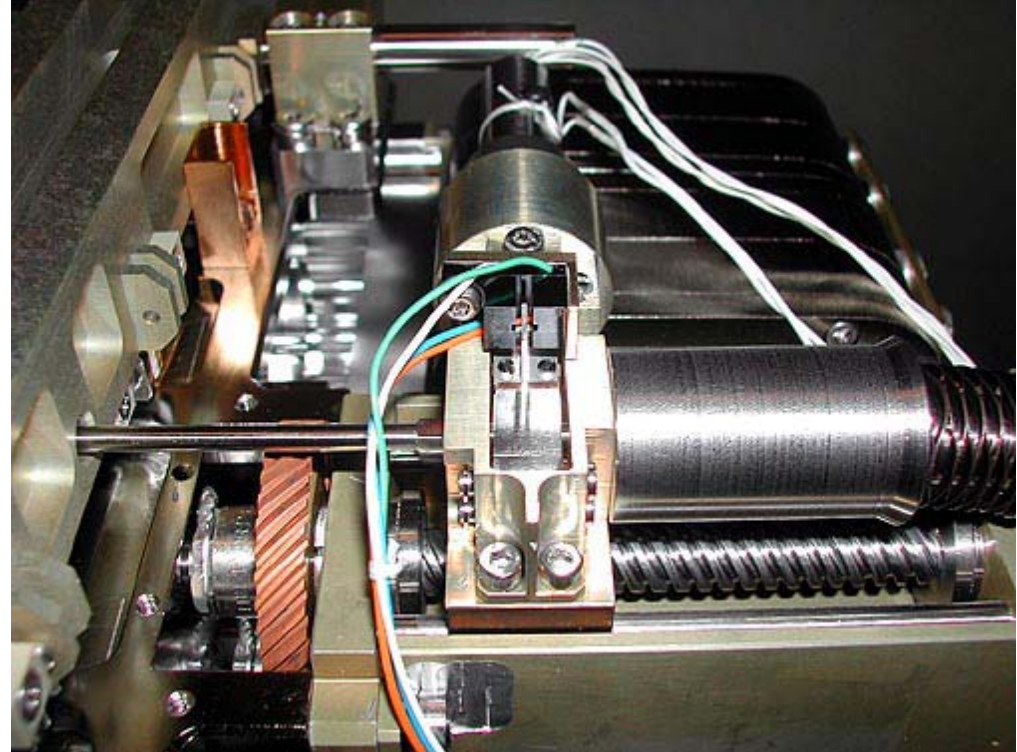




HOP assembly



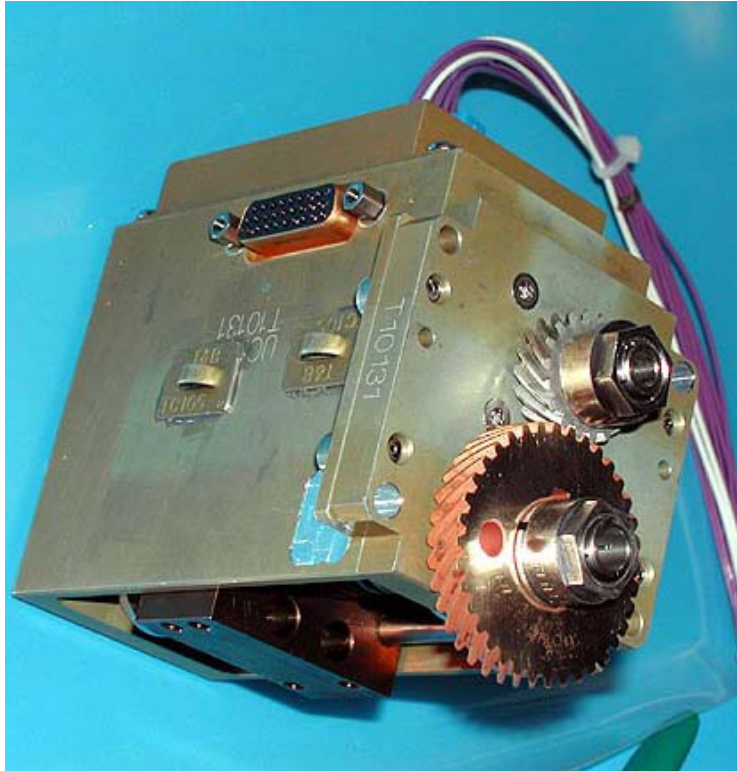
HOP assembly attached to motor and door



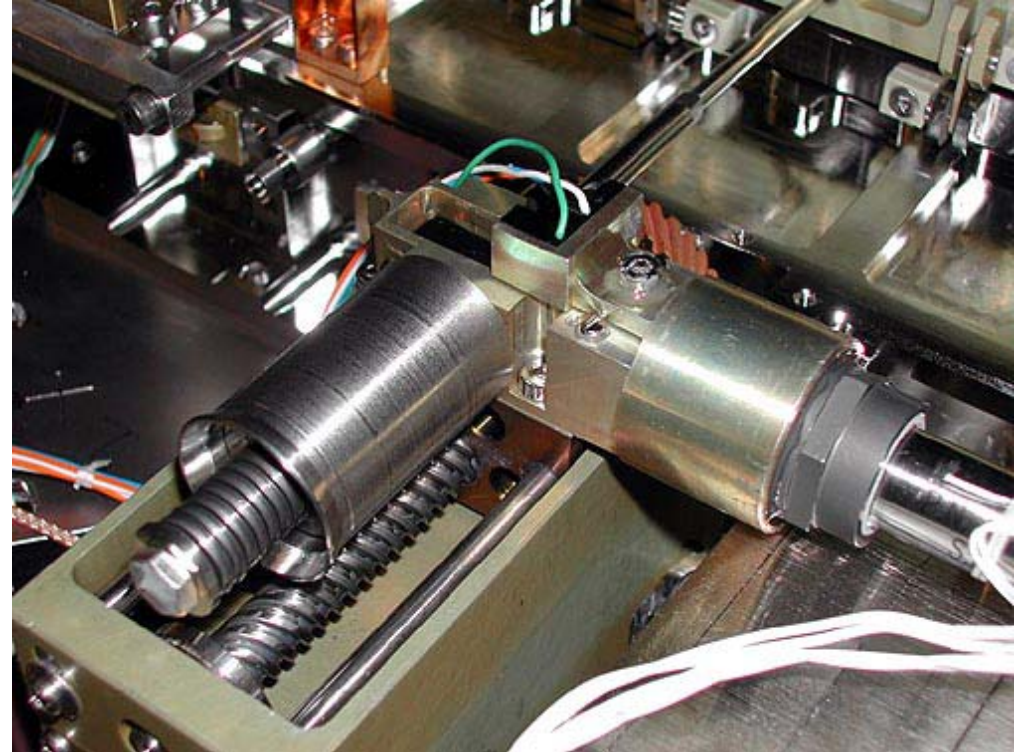


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Motor drive assembly



Motor assembly attached to HOP and door



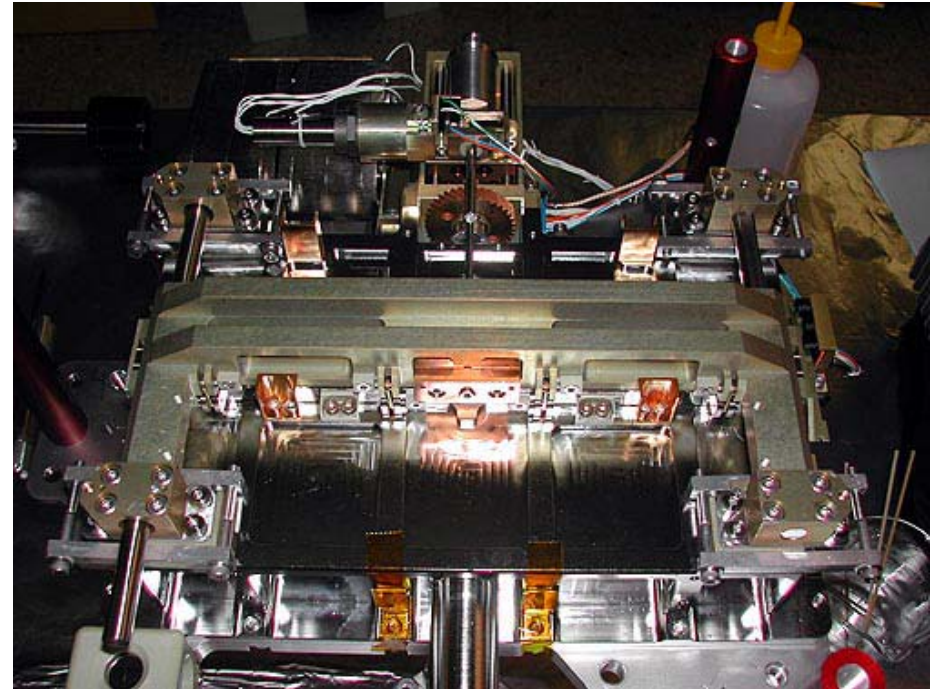
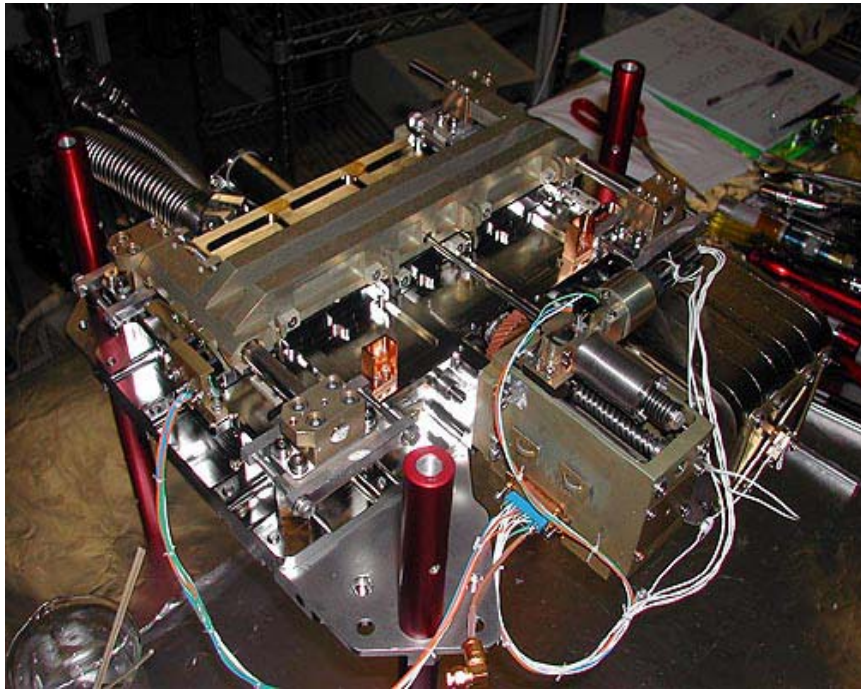


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FUV02 VHA completed assembly





UCB FUV02, Flight Backup Detector, Next Actions

- **Install into test chamber and perform functional test.**
- **Perform deep MCP scrub.**
- **Post scrub functional test.**
- **Deposit photocathodes (CsI on both sides)**
- **Re-install in test chamber, perform QDE test**
- **Mini scrub**
- **QDE calibration and full functional test, including flat field**
- **Vibration test and post vibration functional**
- **Pack and ship to CU**
- **Thermal vacuum test at CU**
- **Cleanliness certification and delivery to Ball**



Software/Ops Update

- FUV detector table-top electrical integration successfully completed.
- Brownsberger and Beland continue their presence at Ball supporting the SW/OPS efforts.
- CEDAR has been stable for some months and is supporting GN2 alignments at Ball.



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COS Schedule for CU/UCB

Task	Status
CALCOS Software Development	On-going. Completion by ~ TV-2 mos
Cal/FF SS Retest	10/02
Complete FUV-02	Deliver 11/02
Complete COS TV/TB Plan	12/02



COS Descope Issues **(No Changes Since Last MSR)**

- The COS IDT has been asked to develop and track a descope plan which, if implemented, can be used to control future cost growth and/or schedule difficulties.
- At the beginning of the COS development effort, late CY97 and early CY98, we prepared and presented several descope options. At that time we descope the following:
 - Reduced the MEB SRAM buffer memory
 - Fewer NUV/FVU optics/grating spares
 - No parallel technology path for NUV gratings
 - Reduced I&T/calibration effort
 - Baselined environmentals at GSFC



COS Descope Tracking List

Candidate De-Scope	Trigger Date	Resource Saved*	Impacts
Eliminate FUV Detector detailed resolution tests	Implemented	2 weeks	Knowledge of detector
Eliminate FUV Detector detailed QE tests	Implemented	2 weeks	Knowledge of detector
Eliminate FUV Detector deep FF tests	Implemented	3 weeks	Knowledge of detector
Make DCE Op Code non-uploadable	Too late	---	Higher risk, Ops
Early transition of FSW to Code 582	Too late	---	Ops
Remove Redundant Cal/FF Elements	Too late	---	Higher risk, Ops
Remove/reduce memory	Too late	---	Ops
Remove NUV gratings from OSM2	Too late	---	Degraded science
Drop NUV channel	Too late	---	Degraded science
Remove NCM3 optics	Too late	---	Degraded science, Ops
Eliminate Aperture Mechanism	Too late	---	Ops, Obs. Efficiency, higher risk
Drop all Accum mode processing w/ Doppler	Too late	---	Degraded science
Drop spare FUV detector	Too late	---	Higher risk
Drop OSM1 capability (don't cover λ gap)	Too late	---	Degraded science
Reduce S/N requirement to 30 (no FF lamp)	Too late	---	Degraded science
Relax NUV resolution requirements below 20k	Too late	---	Degraded science
Remove on-orbit change-out capability	Too late	---	Higher risk
Drop dispersed light TA	Too late	---	Ops
No Ion Gauge	Too late	---	Higher risk, Ops
No external shutter	Too late	---	Ops
Change MSRs to QSRs	TBD	\$	Save trees
Eliminate Mechanism Lifetime tests	Too late	---	Higher risk
Reduce CDRLs	TBD	\$	Unknown
Drop G140L blazed effort	Implemented	---	Missed opportunity for improved science
Reduce G160M image testing	Too late	---	Higher risk

*The IPT has not yet done a detailed analysis to quantify actual \$ or time to be saved.



Upcoming Events/Activities

- Continued support of I&T activities.
- Re-test of Cal/FF subsystem.
- Continued COS TV and calibration planning.
- Complete assembly of FUV-02.
- Commence FUV-02 environmental testing.
- Deliver FUV-02 to CU.



Issues

- None