## Agenda

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<th>Presenter</th>
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<td>J. Andrews</td>
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<tr>
<td>Financial Splinter</td>
<td>GSFC/Ball/CU</td>
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</tbody>
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*Cosmic Origins Spectrograph*

*Hubble Space Telescope*  
March 28, 2001
Progress Summary Since Last Monthly (2/28/01)

- CU team members at UCB 2/26 - 3/2 completed detector operations training.
- Completed scrub of flight MCPs.
- Completed deep flat-field of flight FUV detector.
- Continued spare FUV detector processing at UCB.
- Visited JY to assess NUV grating discrepancy.
- Worked to repair CASA’s thermal-vacuum chamber.
Optics Development Status - NUV Mirror Coatings

- All NUV optics have been or are about to be coated
  - Coating complete:
    - NCM1-A, B
    - G185M-1, 2
    - NCM2-1, 2
    - NCM3a, b, c-1, 2
    - G225M-1, 2
  - Awaiting coating:
    - G285M-1, 2
    - G230L-1, 2 (still at JY)
    - G140L Blazed (if we get it)
Optics Development Status - Gratings

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Delivery Date</th>
<th>Coating Dates at GSFC</th>
<th>Test Dates</th>
<th>Planned Test Location</th>
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<tbody>
<tr>
<td>G140L</td>
<td>Done</td>
<td>Done</td>
<td>Done</td>
<td>CU</td>
</tr>
<tr>
<td>G160M</td>
<td>Done</td>
<td>Done</td>
<td>3/01-5/01</td>
<td>CU</td>
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<tr>
<td>G140L-Blazed</td>
<td>TBD</td>
<td>TBD</td>
<td>In Process</td>
<td>GSFC/CU</td>
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<tr>
<td>G185M</td>
<td>Done</td>
<td>Done</td>
<td>Started</td>
<td>GSFC</td>
</tr>
<tr>
<td>G225M</td>
<td>Done</td>
<td>Done</td>
<td>Started</td>
<td>GSFC</td>
</tr>
<tr>
<td>G285M</td>
<td>Done</td>
<td>On hold</td>
<td>4/01</td>
<td>GSFC</td>
</tr>
<tr>
<td>G230L</td>
<td>6/01</td>
<td>6/01</td>
<td>7/01</td>
<td>GSFC</td>
</tr>
</tbody>
</table>
COS FUV Grating Test Status

- **G130M Gratings**
  - Testing and data analysis have 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 have been completed for both gratings.
  - G140L-B is satisfactory in all respects. G140L-C has slightly lower efficiency, but is otherwise acceptable.

- **G160M Gratings**
  - Start of tests deferred while CU facilities and resources are being used to evaluate G185M gratings. Grating now installed in tank and test are in progress.
G185M Grating Issues

• G185M was tested at J-Y and met specifications. It was accepted on the basis of the J-Y test results.
• Flight & spare (G185Ma & G185Mb) were coated with Cr/Al/MgF₂ at GSFC.
• Post coating tests at GSFC indicate that the efficiency of the gratings is substantially below specification. In addition a measurable ghost image is present.
• At last monthly, it was reported that CU test results for G185 were inconsistent with GSFC results. Subsequent tests indicated that the CU test results had an error. CU and GSFC test results are now consistent.
G185M A&B absolute efficiency data

Incidence angle - 34.57 degrees

Cosmic Origins Spectrograph
Hubble Space Telescope

March 28, 2001
COS
Monthly Status Review

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Hubble Space Telescope

March 28, 2001

G225M A grating absolute efficiency

Absolute efficiency (%)

Wavelength (Angstrom)

Monochromator grating 2 blazed at 250 nm
Nonochromator grating 1 blazed at 150 nm

Cosmic Origins Spectrograph
Hubble Space Telescope

March 28, 2001
G185M Efficiency

- Testing of G185M and G225M have been performed at CU and GSFC. G225M has similar problem.
- GSFC results have been confirmed by independent test, test in multiple GSFC set-ups, and confirmed by full E-M simulations of coated gratings. The problem is real.
G185M Grating Issues

- Possible explanations:
  - Groove shape changed by coating.
  - Full E-M effect of coatings not appreciated in groove depth optimization.
  - It appears the groove depth is too shallow for maximizing efficiency at correct wavelengths.
  - Simulations indicate that a thicker MgF$_2$ may substantially improve performance. G185M-c will be coated with 650Å of MgF$_2$ (instead of standard 400Å) to test this hypothesis. If this solution works, recoating of new replicas should solve problem.
Solutions (Assuming Groove Depth Hypothesis Correct)

A) Refabricate G185M, G225M, and G285M at J-Y. Install current grating for alignment purposes and swap gratings later.

B) Procure grating from alternate vendor (Hitachi) and swap later. Hitachi is currently preparing a bid for us.

- The PI recommends the allocation of contingency funds to pursue both options. Should have cost/schedule for Hitachi in less than 2 weeks. J-Y currently developing schedule and cost (?) for new NUV masters.
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)
FUV Detector Subsystem Block Diagram

- UCB is under contract to deliver 1 flight FUV detector subsystem and 1 flight-spare detector subsystem.
## UCB FUV Detector Status - Spare Electronics Summary

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>Amps</th>
<th>HVFM</th>
<th>HVPS</th>
<th>LVPC</th>
<th>DCE-A</th>
<th>DCE-B</th>
<th>DCE-C</th>
<th>TDC-X</th>
<th>TDC-Y</th>
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<tbody>
<tr>
<td>Parts List</td>
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</table>

### Legend
- **C** = Complete
- **NA** = Not Applicable
- **S** = Started
- **NS** = not started

Changes since last MSR in red/bold

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**Cosmic Origins Spectrograph**  
**Hubble Space Telescope**  
March 28, 2001
UCB FUV Detector Status - Systems

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

<table>
<thead>
<tr>
<th></th>
<th>Mass (Kg)</th>
<th>Power (W)</th>
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<tbody>
<tr>
<td></td>
<td>Actuals</td>
<td>SoR Allocation (1)</td>
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<tr>
<td>DVA</td>
<td>20.43</td>
<td>21.5</td>
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<td>DEB</td>
<td>14.44</td>
<td>15.3</td>
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<tr>
<td>Harness (est.)</td>
<td>2.7</td>
<td>3.4</td>
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<tr>
<td>Total</td>
<td>37.57</td>
<td>40.2</td>
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Notes: (1) SoR Revision B allocations

- Latest UCB masss & power numbers are actuals measured on the flight system. The numbers come from Revision D of the UCB Mass & Power Budget Report (UCB-COS-RPT-1015, UCB-COS-RPT-1004).
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.
- Test procedure in the final stages of review. Comments have been received from GSFC, Ball, and CU.
- Expect to start TV test on 4/6/01 pending shroud repair.

March 28, 2001
UCB FUV Detector Status - Shroud Repair Status

- Late in the TV test preparation cycle we discovered tank’s shroud leaked when LN2 was pulsed through system (3/14/01). Since system was working nominally just prior to this, we’ve concluded leak has only recently occurred.
- Last week was spent removing shroud, finding leak, attempting repairs and restoring shroud. Efforts were unsuccessfully supported by tank vendor.
- This week GSFC personnel are here to assist in shroud repair and reinstallation into tank.
COS
Monthly Status Review

COS FUV Detector T-V & Cleanliness Test Profile

COS FUV Detector T-V & Cleanliness Test Profile

Cosmic Origins Spectrograph
Hubble Space Telescope
March 28, 2001
### UCB FUV Detector Status - Schedule Overview

<table>
<thead>
<tr>
<th>February Tracking Milestones</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCP Scrub</td>
<td>Complete</td>
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<tr>
<td>Start T-V Tests at CU</td>
<td>Pending shroud fix</td>
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</table>

<table>
<thead>
<tr>
<th>March Tracking Milestones</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship flight detector to CU</td>
<td>Slip to 4/2/01</td>
</tr>
<tr>
<td>Start TV test on flight unit</td>
<td>Slip to 4/6/01</td>
</tr>
<tr>
<td>Deposit photocathode on spare MCPs</td>
<td>Pending resolution approval</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>April Tracking Milestones</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>Deliver flight unit to Ball</td>
<td>Slip to 5/7/01</td>
</tr>
<tr>
<td>Start spare DEB/DVA characterization</td>
<td>Complete</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>May Tracking Milestones</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemble spare system in preparation for environmentals</td>
<td>By 6/1/01</td>
</tr>
</tbody>
</table>

Forecast flight system delivery to Ball:
- This month = 5/7/01
- Last month = 4/9/01

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**Cosmic Origins Spectrograph**
**Hubble Space Telescope**

March 28, 2001
COS FUV Detector Systems

- Detector DEB
- Detector Vacuum Assy.

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March 28, 2001
UCB FUV Detector Status - Electronics

- Power systems (HVPS, LVPC, HVFM)
  - All coated, staked, vac baked & certified.
- Amplifiers
  - All 4 amps tested, coated & staked, vac baked and certified.
- Flight Harnesses
  - 2 sets complete, vac baked & certified.
  - Wrapping complete
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Monthly Status Review

UCB FUV Detector Status - Electronics ctd

- DCE - A,B,C, 2 sets, in house
  - Voltage & frequency margins done, thermal soak & cycle tested, POR tests done
  - #1 DCE has 1200+ Hrs burn-in and #2 DCE has 900+ hours.
  - Final PROMS & new boot code installed

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March 28, 2001
UCB FUV Detector Status - Electronics ctd

- 4 X and 4 Y flight TDC’s fully functional
  - Voltage margin & frequency margin tests done
  - Thermal cycle and acceptance tests done.
  - Flight sets coated & staked, vac baked and certified, heat sinks added.
  - Spare sets ready to coat & stake
UCB FUV Detector Test Status

- **FUV02 Flight spare**
  In test with spare DEB. Resolution re-evaluated - looks better. Complete slit test and stability test prior to cathode coating.

- **FUV01 Flight Unit**
  Detector & flight DEB vibration tested, post vibration functionally tested, MCP’s scrubbed, final closeouts done, functionally tested.

- Ready to ship on 4/2/01.

---

*COS*

*Monthly Status Review*

*Cosmic Origins Spectrograph*

*Hubble Space Telescope*

March 28, 2001
FUV02 X resolution measurements

Last data - after Mini-scrub

Now

19µm avg

23µm avg

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Hubble Space Telescope

March 28, 2001
UCB FUV Flight Detector - Test Data Analysis

- It was discovered that a small fraction of all events are duplicates of the previous event, but only on Segment B. The fraction of duplicate events is a function of input event rate (0.2% at 18kHz on both A and B). Problem goes away when there are no events from side A. This has now been traced to the DCE Round Robin ACTEL due to a schematic transcription error at the output of one gate. This was confirmed and fixed on the ETU DCE. **This is currently being left as is - as a small but quantifiable error at high data rates - to avoid an ACTEL change-out.**

- After MCP scrub we had several high voltage shutdown events due to MCP current transients. These are similar to those seen on FUSE, and are detected by the HVI monitor. We realized that our trigger level for these events was set too low, so we changed to an appropriate threshold and have not had a shutdown since. These events do no harm, self quench and are usually initiated by high energy events (cosmics), and we have considerable Lab data. FUSE rate is about 1 shutdown every 2 or 3 months.
High Voltage Transient Characteristics

COS non-trip HVI transient (threshold = 120), event spontaneously decays away

Lab study - HV transient example
Large saturated event and HVI transient
UCB FUV Flight Detector - Scrub Setup

- FUV01 detector with sapphire window diffusers, and DEB in tank with Deuterium scrub lamp external.
Both segments stabilized after about 0.18 C/cm² and required about 20 more high voltage command units to re-establish the nominal operating gain.
FUV01 Full flood Image Fixed pattern noise

A segment, Slice = spectrograph slit height

B segment, Slice = spectrograph slit height
FUV01 Full flood Image - Gain Map

A segment, Slice = spectrograph slit height

B segment, Slice = spectrograph slit height
FUV01 Segment B Fixed Pattern Noise

B segment, MCP multifiber boundaries dominate FPN
FUV01 Segment A Fixed Pattern Noise

A segment, MCP multifiber boundaries dominate FPN
A few small MCP dead spots visible
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Monthly Status Review

UCB FUV01 Detector Thermal Vac Test, & FUV02 checkout

• FUV01 detector system Thermal Vac test scheduled for Colorado tank.
• Will deliver FUV01 4/3/01, and do post delivery checkout

FUV02 Detector system Tests
• Full detector system with spare DEB established in UCB test tank facility in clean tent with COS GSE. Undergoing final tests before cathode deposition.

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Hubble Space Telescope

March 28, 2001
UCB FUV Detector Status - Near term tasks

- Pack FUV01 flight detector
- Ship FUV01 to Colorado April 2nd
- Install FUV01 into CU tank and perform Thermal Vac test
- Perform FUV01 cleanliness certification in CU tank
- Complete FUV02 + DEB performance tests
- CsI coat FUV02
GSE Software Development

CEDAR, TAACOS, CALCOS-GSE, Keywords & SDF

http://cos-arl.colorado.edu/CEDAR/
http://cos-arl.colorado.edu/TAACOS/
http://cos-arl.colorado.edu/CALCOS/
http://cos-arl.colorado.edu/Keyword/

Highlights:
• CEDAR: Second-Round of Simulated SDF Data, produced from TAACOS output, was provided to STScI to help them maintain their “Back-End Systems” development schedule.
• TAACOS: All TAACOS Reports released or in signature cycle – except possible “LATBD” FSW Recommendations. Recall, “LATBD” is the placeholder for the TA FSW procedure that might be needed to autonomously correct for OSM1 position errors.
Implementation of Algorithms described in AV-03

- **Thermal Correction (TC) Algorithm:**
  - Move location of events according to the location of the Stim pulses from data relative to reference frame (shift/stretch of image data).
  - Re-centering of Stim pulse is done to within ±0.2 pixels

- **Geometric Correction (GC) Algorithm:**
  - Used Pinhole and Slit data to determine Integral Non-Linearity (INL) map along dispersion and cross-dispersion direction.
  - Apply INL map to event location to remove variations in the plate scale of the detector that occur on scales > 1mm. \(1\sigma = 0.6\) pixel
  - Different algorithms have been used to verify the concepts. \(1\sigma = 0.25\) pixel

- **Flat Field Data:**
  - The post-scrub deep-flat-field data will be used (after TC and GC) to generate the Data Quality Lookup Table
Integral Non-Linearity Data

INL in X
Row 10

Surface Plot of INL in X

INL in Y
Column 72

Surface Plot of INL in Y

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March 28, 2001
Sample Geometric Correction (Segment A)

Thermally Corrected

Thermally and Geometrically Corrected

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Hubble Space Telescope

March 28, 2001
Residual INL from Slit Data after correction with Pinhole INL Map
Pixel to Pixel Count Distribution in Deep Flat Field (Segment A)

Pixel to Pixel Count Histogram

$1\sigma = 22\text{cpp }= 14\%$

Counts per Pixel (cpp)
FUV Detector FSW Development

DCE Flight Software Development and Test

http://cos-arl.colorado.edu/DCE/

Highlights:

• Minor fix to OPERATE Code – In v1040, “Stim Pulse” SW Status Bits now reported correctly after using the DCE OPERATE command LFSAFE.
• DCE “OPERATE” Component Testing to be completed by 3/30/2001. As-run Procedures to be circulated for signature in early April.

Cosmic Origins Spectrograph
Hubble Space Telescope

March 28, 2001
Calibration/Flat-Field Subsystem Activities at CU

- CU and Ball have worked out a plan where CU will assemble, align, and optically test the COS calibration/flat-field subsystem.
- This effort will be lead by Dr. Steve Osterman.
- The effort will take place in CASA’s cleanroom where the FUV grating tests were done.
- The activities will start this summer/fall (after completion of G160M grating test) with a Cal/FF platform delivery to Ball in TBD (schedule uncertainties due to impacts of bench rework).
COS Schedule for CU

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

<table>
<thead>
<tr>
<th>Task</th>
<th>Status</th>
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<tbody>
<tr>
<td>G160M/G140L – Blazed Grating Testing</td>
<td>G160M testing delayed to late March by G185M issue. G140L-Blazed efforts TBD</td>
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<tr>
<td>CEDAR Software Development</td>
<td>Build 3 completion in early March</td>
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<tr>
<td>TAACOS Software Development</td>
<td>Complete</td>
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<tr>
<td>CALCOS software development</td>
<td>On-going</td>
</tr>
<tr>
<td>JY Deliveries</td>
<td>G230L – slipped to 6/01</td>
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<tr>
<td>Calibration Planning &amp; Implementation</td>
<td>AV-03 released</td>
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<tr>
<td>Cal/FF SS Optical Integration</td>
<td>Starting summer ‘01</td>
</tr>
</tbody>
</table>
COS Descope Issues

• 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 descoped 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
  – Baseline environmentals at GSFC
# COS Monthly Status Review

## COS Descope Tracking List

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

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

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*Cosmic Origins Spectrograph*

*Hubble Space Telescope*

March 28, 2001
Upcoming Events/Activities

• Complete TV tank repairs.
• Ship flight FUV detector to CU.
• Finalize/implement NUV grating recovery plan.
• Complete G160M-a optics testing.
• Start and finish FUV detector TV test.
• Continue processing spare FUV detector at UCB.
Questions, Issues & Resolution Plan

• None
COS Status - STScI

Topics

- General support
- CEDAR
- Front end development status
- Back end development status
General support

- Berkeley: 26 Febr - 2 March
  - FUV detector TV prep

- Science team meeting: 5 March

- FUV detector TV Boulder: April
  - schedule TBD
CEDAR

- IDT quick-look data analysis software
- Expect to use for detector TV in April
- Installed @ STScI 13 March w/ no problems
- Accessible to COS STScI team w/ partial data archive (slit masks, a few flat fields)
Front-end development

- **Phase 1 (1/1/00 – 6/30/00)**
  - Macro Development
  - Reconfigurations
- **Phase 2 (7/1/00 – 12/31/00)**
  - NUV Timetag Mode + Darks
  - FUV Timetag Mode + Darks
- **Phase 3 (1/1/01 – 6/30/01)**
  - FUV & NUV Accumulation Science Exposures
  - FUV & NUV Target Acquisition Exposures
  - FUV & NUV Target Peakup Exposures
- **Phase 4 (7/1/01 – 12/31/01)**
  - Aperture Alignment Exposures
  - OSM1 Focus Alignment Exposures
  - OSM1 Rotation Alignment Exposures
  - OSM2 Rotation Alignment Exposures
  - FUV & NUV Flat Field Lamp Calibration Exposures
Front-end development

остоянка системы и тестирование работы на расписании

ожидается доступности FSW для тестирования на Ball

магнар требования проекта для целевого приобретения

предпринимаются основные требования работы для целевого приобретения

COWG & развитие начато
Back-end development

Thermal-Vac Data Processing Effort

- Discussion of status & dependencies in splinter mtg Tuesday 3/27
- Deliverables to STScI postponed ~3 months from MOU dates due to slips in FSW/hardware schedule
- STScI OPUS/HDA CDR delayed ~3 months
Ops bench hardware-generated test data critical for beta-release of TV data processing software
- Beta now 1 Oct 01
  - Enables timely feedback from IDT to STScI

Integrated SI hardware-generated test headers, images remain critical path item for final delivery of software to IDT