NICMOS SMOV Update
September 17 2009

Agenda

1. Recent & Upcoming Activities
2. NICMOS SMOV Program Status
3. Recent Results and Analysis
   - DC Transfer Test (G. Schneider)
Recent Activity:

• September 02 NCS set-point changed from 72.4 to 75 K

• Tuesday September 15 (Day 258)
  — 11406 DC Transfer Test [Activation and verification of Functionality and Operability of Detectors and Readout Electronics Chains]

Planned activities:

— 1140719 262:23:54:12 – 263:00:05:45 Filter Wheel Test (uplink)
— 1140730 263:00:17:06 – 263:02:14:05 Filter Wheel Test (TBD)
— 11947A1 263:18:30:53 – 263:20:02:49 Dark Monitoring

— Starting after 1140730: SAA Darks & Autoflush mode
# NICMOS SMOV Status

<table>
<thead>
<tr>
<th>Activity</th>
<th>Prop ID</th>
<th>Title</th>
<th>PI</th>
<th>Visits Done</th>
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<td>Dark Monitoring (C17 Cal Program)</td>
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SMOV 11406 “DC TRANSFER FUNCTION” TEST

• Verify Functionality and Operability of Detectors and Readout Electronics Chains

• Re-Test Multiaccum (non-destructive readout) Timing Pattern Generation & Execution

• Confirm On-range Digitization with A-to-D Converter Offsets

• Confirm/Re-characterize Linearity of “Dark” Response With Bias Voltage

• Evaluate long term stability of “nominal” Bias Voltage at FPA and Impact Detector Gains (Comparison with SMOV 3B, epoch 2002 DC Transfer Test and SLTV “C&G” Test Run 6)

• Re-Test DMA Transfer to Image Scratchpad and Scratchpad to Science Data Store

• Re-Test Shared Image Buffer Management and Date Transfer from SI through (new) SDF

• First-look at Detector Reset Gradient Signatures at Higher Operating Temperature

• Freebie: Test Operability of Pupil Alignment Mirror in Focus and Tilt (Limited Range)

SUMMARY: ALL TEST OBJECTIVES MET – ALL DETECTOR OPERATIONS APPEAR NOMINAL
SUMMARY:

1) ALL TEST OBJECTIVES MET

2) ALL DETECTOR AND IMAGE DATA FLOW OPERATIONS APPEAR NOMINAL

3) NO A-to-D ZERO POINT OFFSET ADJUSTMENTS NEEDED

4) BIAS VOLTAGES HAVE DECLINED BY approx. 21 mV AT ALL 3 FPAS SINCE MARCH 2002 (Calibration issue only – previously “characterized” by STScI as “Temp from Bias”)

5) NICMOS READY TO PROCEED WITH:
   A) STIMULATED EMISSION (LAMP FLAT) TESTS
   B) DARK CURRENT SIGNATURE CHARACTERIZATION/CALIBRATION

6) N.B: The PAM MOVED IN FOCUS AD TILT AS COMMANDED (PAM1<->PAMI)
SMOV 11406 “DC TRANSFER FUNCTION” TEST

- Raw A-to-D Counts (FPA median) vs. Commanded Bias Voltage by Readout Number
- Counts Dependent Upon: Bias Voltage and Temperature
- Test Commanded Bias Voltage Increment: appx 0.1V steps (~ 7.5 LSB per 100 mV)
- Normal Ops Commanded Bias Voltage 0.6V (appx 0.5V at detector)

PERFORMANCE: NOMINAL AND AS EXPECTED

Note: @ 0.6V, appx (+560 | +510) ADU = 0.01 V for (Cam1/2 | 3)
SMOV 11406 “DC TRANSFER FUNCTION” TEST

- Raw A-to-D Counts (FPA median) Repeatability at 0.6V Bias Voltage by Readout Number
- Dispersion ~ few hundred ADUs at Read 0 -- (FPA’s reset clocking between exposures)
- But Dispersions with Reads Tracks as DC Offset on Reads Following Initial

PERFORMACE: NOMINAL AND AS EXPECTED
SMOV 11406 “DC TRANSFER FUNCTION” TEST

- Comparison to SM3B at Nominal Commanded DC Offset Voltage (0.6V)
- SMOV4 Observed Counts LESS than Expected with Temperature Change (Only)

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<th>SMOV3B</th>
<th>SMOV4</th>
<th>SM3B Tm</th>
<th>SM4 Tm*</th>
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1) Extrapolation from change in NCS control set point (72.4K to 75K)
2) Delta(ADU) = +300 ADU/K for temperature only dependence
3) Delta(ADU) = +560 ADU/-10mV (C1|C2) for bias voltage only dependence

“Expected” (dT) – SMOV4 = +1152 ADU == 20.5 mV drop since 2002

NOTE: STScI has noticed a decline in the A-to-D reported Raw Read 0 (“bias read”) counts over time which was postulated as due to a drop in the detector temperature not reported by the FPA mounting cup temperature sensor(s). This, however, is very likely actually due to a slight rise in time of the bias reference voltage at the detectors by about 0.02 Volts (not due to a thermal decoupling of the temperature sensors in the FPA flight mounts (mounting cups).
SMOV 11406 “DC TRANSFER FUNCTION” TEST

Read Zero (Bias Read) Subtracted Dark Frames @ 0.6V Commanded Bias Voltage

CAMERA 1
CAMERA 2
CAMERA 3

Click on images to play through sequential Read N – Read 0 Frames

“Shading “ Signatures and Amp Glow VERY Similar to Cy 11-16

...LET’S GET SOME PHOTONS!