CRaTER Pre-Ship Review
(I-PSR)

Qualification/Functional Testing
Bob Goeke

January 3-4, 2008
Qual Test/Vibration -- SN2

- Vibration Tests (32-06050.0102) -- 9/25-26/07
  - Sine; Loads - Sine Burst; Random -- all to ProtoFlight Levels

Figure 1.
Accelerometer 01 Location: Telescope. A single axis accelerometer was also placed here.

Cosmic Ray Telescope for the Effects of Radiation
Appendix O.
CRaTER, Low Level Sine Sweep Post Vibe, Z-Axis.

Level: 100 %  Control Peak: 0.422741 gn  Full Level Time: 00:03:19  Sweep Type: Logarithmic
Frequency: 1996.093872 Hz  Demand Peak: 0.500000 gn  Time Remaining: 00:00:00  Sweep Rate: 2 Oct/Min

Data saved at 03:27:06 PM, Tuesday, September 25, 2007  Report created at 03:27:08 PM, Tuesday, September 25, 2007

Cosmic Ray Telescope for the Effects of Radiation
Qual Test/Vibration -- SN2

- No exceptions to success criteria
  1. Complete testing to limit levels with the appropriate test factor.
  2. No structural degradation after test.
  3. No unexplained frequency shifts more than 5% between pre and post test.
  4. No Visible damage that is a result of the test environment.
  5. Pass all functional performance testing performed during and upon completion of the test.
Qual Test/TV -- SN2

• Thermal-Vacuum Testing -- 9/27-10/5/07
  – +40C Hot soak/turn on/Long Form Functional
  – -40C Cold soak/turn on/Long Form Functional
  – 7 more +40/-40 cycles with instrument always on; Short Form Functionals

• Success defined by no significant shifts in parameters given in Trend Analysis List
  – Sole variance was increase in noise of detector D6 from 0.7 ADU rms to 1.6 ADU rms
  – Limit in LFF for shifts is 0.3 ADU rms
  – Limit in SFF for absolute value is 2.0 ADU rms
  – Science requirement is 8 ADU rms maximum
CRaTER T-Vac Setup

- Vacuum Chamber is a 2’x2’x2’ stainless steel chamber
- Interface plate to drive the spacecraft interface temperatures
- TQCM in chamber to monitor bakeout
- Cobalt 60 source for use during long form functional tests
- Power source and spacecraft simulator feed through in chamber
Thermal-Vacuum Timeline

Notes:

a) Temperatures shown are for the internal CRA TER reference location
b) Programmed slop rate of interface plates is 0.2C/minute
c) Dwell times start when the ref. temperature is within 2C of target
d) Except as shown, instrument operates (and is monitored) in transitions

CRA TER Thermal-Vacuum Temperature Profile w/o Thermal Balance
32-06005.0102 Rev. 01 9/6/07
32-06005.0102 Rev. 02 9/20/07

Cosmic Ray Telescope for the Effects of Radiation
Qual Test/EMC -- SN2

- EMC/EMI Tests (32-06050.0301) -- 10/15-23/07
  - CE01: minor limit failure
Qual Test/EMC -- SN2

- EMC/EMI Tests (32-06050.0301) -- 10/15-23/07
  - CE03: minor limit failure
Qual Test/EMC -- SN2

- RE02: major limit failure
Qual Test/EMC -- SN2

- Made change to SN1 (not yet buttoned up): removed bus voltage/current housekeeping telemetry sense points.
- Reran RE02 with SN1
  - RE02: less bad limit failure
Qual Test/EMC -- SN2

- Completed remaining EMC tests with SN1
  - CS01, CS02, CS06 passed
  - RS06: instrument fails in 240 - 1230 MHz range when exposed to launch site environment
  - RS06: instrument passes when exposed to LRO operational environment
Qual Test/Vibration Retest

- Retest consisted of one axis (Z) random vibration at 10.1 grms
  - passed

Qual Test/Thermal-Vac Retest

- Retest consisted of one +40/-40 thermal-vacuum cycle
  - included hot/cold survival soak and turn-on
  - Long Form Functionals both hot and cold
  - passed
Cosmic Ray Telescope for the Effects of Radiation