CRaTER Simulator (CRaTER-Lite) - Performance Notes

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Aside from the footprint, there are a few differences in behavior and in the analog telemetry between CRaTER-Lite and the actual CRaTER Instrument. CRaTER-Lite consists of a partially populated digital board, along with an analog board simulator. Many of the housekeeping values are simulated using resistor divider networks. Although the goal was to keep the values functionally similar to the "real" CRaTER, in some cases values are inserted to insure that each channel has a unique identifier.

Some housekeeping channels return actual data; in these cases the data may be slightly different from the actual CRaTER Instrument.

Listed below are typical housekeeping values from CRaTER-Lite:

Item	Typical Value Units	Typical Raw Data Decimal	Comments[a]
28VDC Bus	30 V	3018	actual measurement
5V Digital Monitor	+5 V	2527	actual measurement
+5V Analog Monitor	+5 V	2491	actual measurement
-5V Analog Monitor	-5 V	-2490	actual measurement
Power	3 W	549 (current)	actual measurement *CRaTER (5-6W)
Bias Current D1	0.144 μA	290	set via resistor divider *CRaTER (0 μA)
Bias Current D3	0.159 μA	318	set via resistor divider *CRaTER (0 μA)
Bias Current D5	0.190μA	380	set via resistor divider *CRaTER (0 μA)
Bias Current D2	2.34 μA	468	set via resistor divider
Bias Current D4	2.50 μA	500	set via resistor divider
Bias Current D6	2.75 μA	550	set via resistor divider
Thin Detector Bias Voltage	0.7 V off 72.8V on	7 (off) 728 (on)	set via resistor divider *CRaTER (2.5V off)
Thick Detector Bias Voltage	1.1 V off 221 V on	11 (off) 221 (on)	set via resistor divider *CRaTER (2.5V)
Cal Amplitude	0 V (default)	0	actual measurement
Thin LLD Amplitude	0.048 V (default)	1388	actual measurement
Thick LLD Amplitude	0.048 V (default)	1388	actual measurement
Telescope Temperature	29.2 C	1962	set via resistor divider*
Analog Board Temperature	23.4 C	2018	set via resistor divider*
Digital Board Temperature	25 C	1973	actual measurement
DC/DC Converter Temperature	23.2 C	2020	set via resistor divider*
Bulkhead Temperature	32.2	1930	set via resistor divider*

Item	Typical Value Units	Typical Raw Data Decimal	Comments[a]
Total Dose Monitor (HI Sens): TDMON1	2.10 mRad	1685	set via resistor divider*
Total Dose Monitor (MED Sens): TDMON2	809 mRad	2521	set via resistor divider*
Total Dose Monitor (LO Sens): TDMON3	270 Rad	3299	set via resistor divider*
PRT Reference		4095	typically open (not looped-back)
Purge Flow Rate		2480	set via resistor divider*

a. * marked items differ from the typical measurements of the actual CRaTER Instrument

The behavior of CRaTER-Lite differs slightly when the pulser is used to generate science data:

For CRaTER-Lite, Pulser-High (Cal-High) creates thick detector events, while Pulser-Low (Cal-Low) creates thin detector events. This effect is apparent in both the secondary science (singles-counts) and the primary science data. In order to see events from all detectors, therefore, both Cal-High and Cal-Low must be turned on. (This is in contrast to the actual CRaTER instrument, for which only one of the Cal Pulsers should be activated at any one time.)

As for the actual CRaTER instrument, adjusting the Cal-Amplitude adjusts the amplitude of the events created. However, the CRaTER-Lite amplitudes are different. CRaTER-Lite produces one set of number for the thick detectors (~0.75*Cal-Amplitude), and another set (~0.5*Cal-Amplitude) for the thin. The CRaTER-Lite events are noisier (more variance in the event amplitudes) than the CRaTER instrument. However, the CRaTER singles counts are more consistent, and should always match the Pulser Frequency setting. (NOTE: When in 2KHz mode, there should be 1953 counts/second in S/C Clock mode, 2048 counts/second when in Internal Clock mode.)