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**Trend Analysis
List**

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Preface

Revision 01 of this document is being released for CDR.

1 Introduction

The flight hardware for the Cosmic Ray Telescope for the Effects of Radiation (CRaTER) instrument on the Lunar Reconnaissance Orbiter (LRO) is composed of a single assembly incorporating both radiation detector and all associated power, command, data processing, and telemetry electronics. The available instrument housekeeping data is defined by the **Spacecraft to CRaTER Data ICD**, 431-ICD—000104.

2 Voltage and Current Monitors

2.1 Input Power

Input 28VDC bus power will be monitored. We expect variations as a function of bus voltage, but – at a given voltage – the power numbers should be stable. Prior to orbiter integration the data will be collected manually. After integration the power numbers will be derived from spacecraft housekeeping if available.

2.2 Internal Measurements

The following parameters will be monitored. The detector bias currents are expected to vary significantly as a function of temperature, but should be stable with time.

Word in packet	Data Description	Reference in Data ICD
7	+5VDC Digital Monitor	4.2.10
8	+5VDC Analog Monitor	4.2.11
9	-5VDC Analog Monitor	4.2.12
10	+2.5VDC Internal Reference	4.2.13
11	Detector D1 Bias Current Monitor	4.2.14
12	Detector D2 Bias Current Monitor	
13	Detector D3 Bias Current Monitor	
14	Detector D4 Bias Current Monitor	
15	Detector D5 Bias Current Monitor	
16	Detector D6 Bias Current Monitor	
17	Thin Detector Bias Voltage Monitor	4.2.15
18	Thick Detector Bias Voltage Monitor	

3 Thermal Monitors

The following temperatures will be monitored to look for trends in the instrument thermal gradients. Since the instrument has only one operating mode, the gradients should be constant for a given external environment.

Word in packet	Data Description	Reference in Data ICD
22	Telescope Temperature	4.2.18
23	Analog Board Temperature	
24	Digital Board Temperature	
25	Power Supply Temperature	
26	Bulkhead Reference Temperature	

4 Science Data Monitors

The noise performance of the detectors can be crudely monitored by looking at the detector singles rates. On the ground one would expect average numbers to be 1 or fewer counts per second. On orbit – during solar-quiet times – the average would be around 3 counts per second.

Word in Packet	Relative Bit Position	Data Description	Reference
14		Detector D1 Singles Counter	4.2.3
15		Detector D2 Singles Counter	
16		Detector D3 Singles Counter	
17		Detector D4 Singles Counter	
18		Detector D5 Singles Counter	
19		Detector D6 Singles Counter	