



## Verification/Ground Support

Bob Goeke

*Cosmic RAY Telescope for the Effects of Radiation*



## Division of Responsibilities

- Science and Functional Performance: Project Scientist
- Quality & Reliability: Project MA
- Interfaces & Environments: Project Engineer
  - Plan is documented in 32-01206
    - *Each item in each ICD is listed in verification matrix*
    - *Each item has its own (to-be-written) Procedure and resulting report -> filed in CRaTER database*
  - Environments are covered by a separate matrix in Plan

Cosmic **RA**y Telescope for the **E**ffects of **RA**diation

# Data Interface Verification Matrix



## 1.1 Verification Matrix

All paragraph references are to the Data ICD, 32-02001 Rev. A (aka 431-ICD-000104). The test methods are denoted as **I**(inspection), **A**(nalysis), **D**(emonstration), and **T**(est)

Reference	Title	I	A	D	T	Comment
2	1553 Bus Protocol					(title)
2.1	Transfer Formats			x		
2.2	Mode Codes		x	x		
2.3	Unused Subaddresses		x	x		
2.4	Status Word Flags			x		
2.5	Data Bus Control					S/C requirement
2.6	Error Recovery					S/C requirement
2.7	Data Word Order			x		
3	Commends					(title)
3.1	Packet Description					S/C requirement
3.1.1	Primary Header Format					Ops requirement
3.1.2	Secondary Header Format					Ops & S/C requirement
3.2	1 Hz Reference					S/C requirement
3.3	Command Timing					S/C requirement
3.4	Command Application Format			x		
3.5	Command Descriptions					(explanatory text for para 3.4)
4	Telemetry					(title)
4.1	MIL-STD-1553 Packet Description					(explanatory text)
4.1.1	Primary Header Format	x				
4.1.2	Application ID Assignments	x				
4.1.3	Secondary Header Format	x				
4.1.4	Telemetry Flow Control			x		
4.1.5	1553 Primary Science Data Retrieval					S/C requirement
4.1.6	Telemetry Timing					S/C requirement
4.1.7	Telemetry Application Data Format					(title)
4.1.7.1	Primary Science	x				
4.1.7.2	Secondary Science	x				
4.1.7.3	Housekeeping	x				
4.2	Telemetry Description					(explanatory text for para 4.1.7.3)
4.3	Data File Formats					S/C requirement
4.3.1	Science Data Format					S/C requirement
4.3.2	Housekeeping Data Format					S/C requirement

**Cosmic RAY Telescope for the Effects of Radiation**



THE AEROSPACE CORPORATION



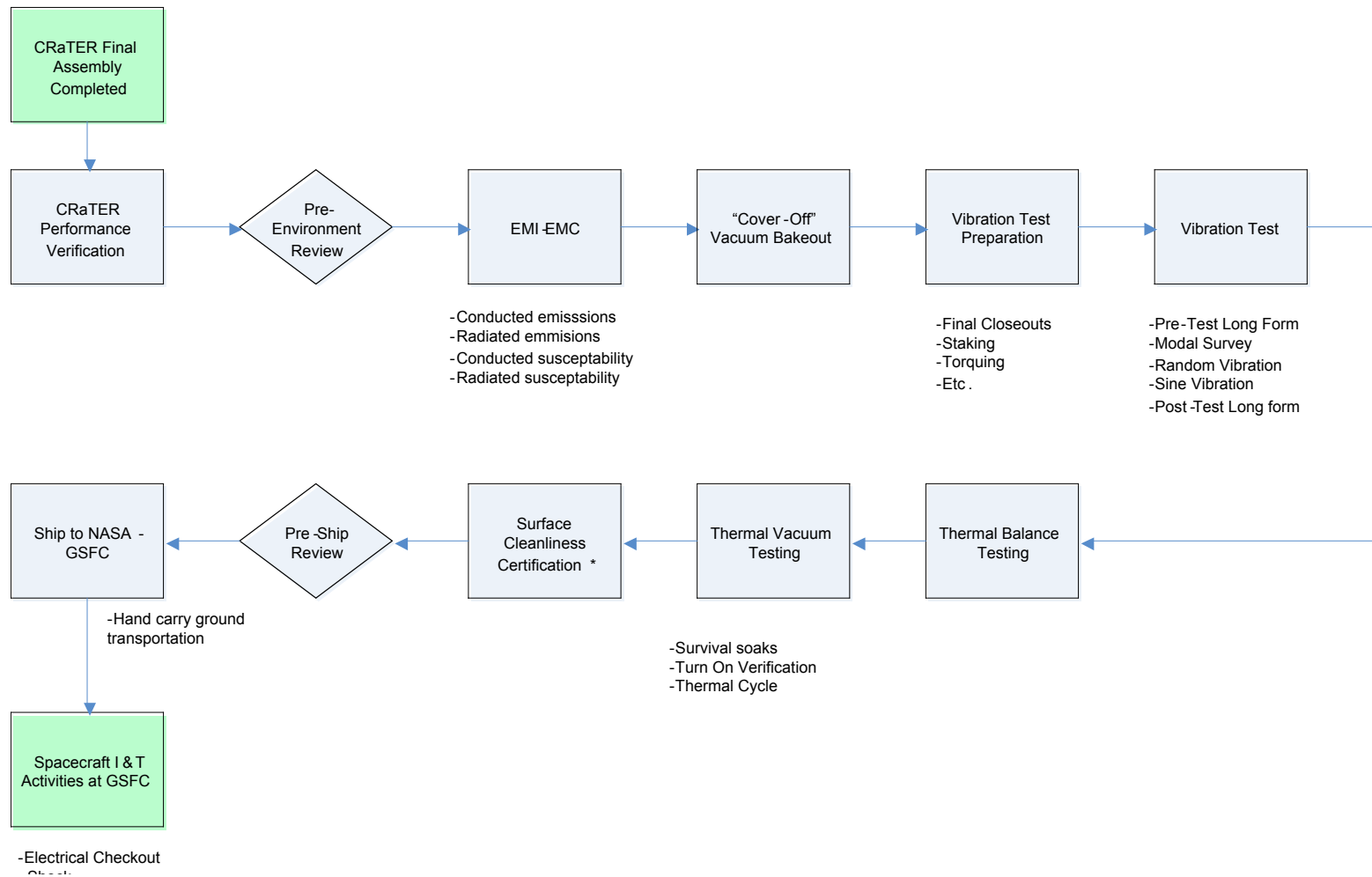
# Protoflight Test Program

32-01206.01	Rev 04	6/20/06	Environmental Verification Test Matrix																			
Test Item Description	Assembly No.															Remarks						
Observatory					T				T						4						Reference Only	
Flight Unit	32-10000	200Hz	NR	27 g		14grms	8 g		NR	A	T	T	+50/	+40/	8	T	I		T	T	EMC by similarity	
Flight Spare											T	I	-40	-40		T	T		T	T	Thermal Balance by similarity	
Telesc.	32-10100																		T			
Telesc. Spare																			T			
Electr. Box	32-10200																					Listed for ref. only
Engineering Unit										T										T	T	
Verification Plan Ref.		9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.11	9.10	10.2.1	19.2.2		8.1			3.7.2	3.7.3			
		Mechanical and Structural										Thermal Vacuum				Electrical		Performance				
Legend:	A = Analysis										Temperature Units = °C											
	I = Inspection																					
	NR = Not Required																					
	T = Test																					

Cosmic RAY Telescope for the Effects of Radiation



## Environmentals Flow Chart



*Cosmic RAY Telescope for the Effects of Radiation*



## MGSE: Gas Purge

- All sensitive equipment (*e.g.*, telescope, detectors) will be stored under clean, low-humidity conditions (*e.g.*, active desiccation, purging)
- Flight units will have provision for clean, dry nitrogen purging
- Purge flow will be monitored with a thermistor flow indicator

*This is unchanged since PDR*

Cosmic **RAY** Telescope for the Effects of **R**adiation



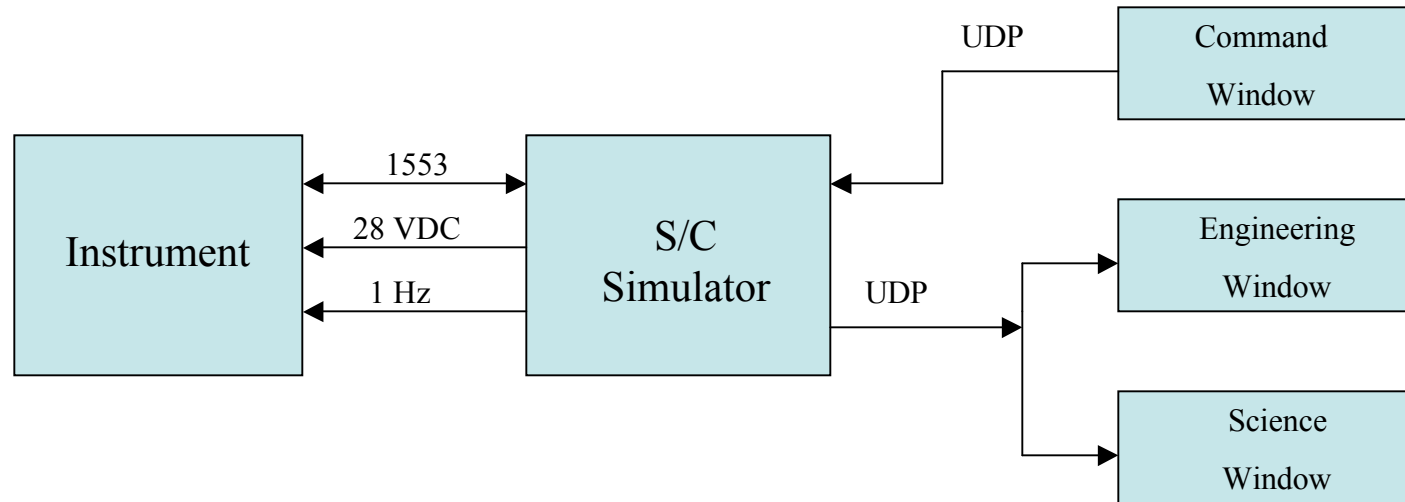
## Test Facilities

EMC: Chomerics, Woburn, MA  
Vibration: Draper Labs, Cambridge, MA  
Thermal-Vac: MIT/MKI, Cambridge, MA  
Acoustics: GSFC (at Observatory level)  
Shock: GSFC (at Observatory level)

*This is unchanged since PDR*

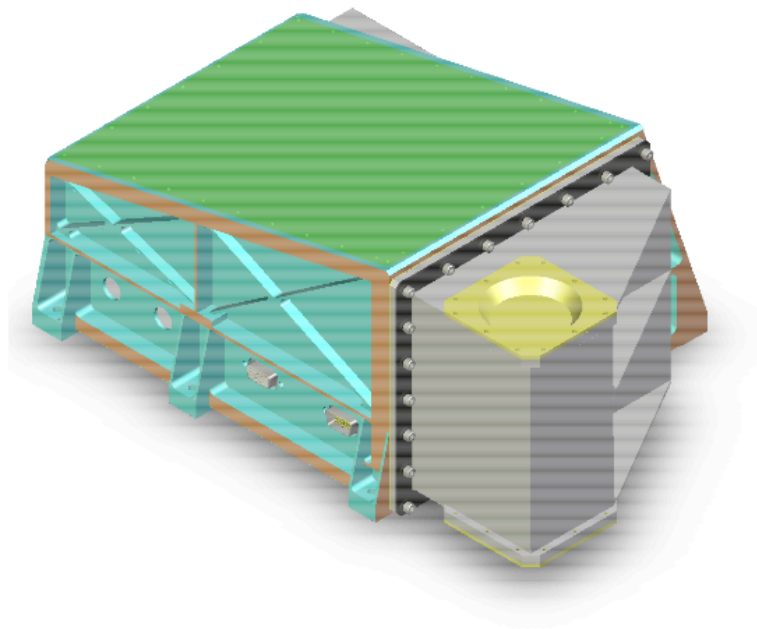
Cosmic **RAY** Telescope for the Effects of **R**adiation

## EGSE: Command and Data Simulator



- Simulator consists of a 1553-to-ethernet packet converter, a 28 VDC power supply, and a 1 Hz sync pulse source.
- Single UDP socket for commands; multiple UDP connections for telemetry.
- Software for commands, engineering, and science resides on available workstations.
- Simulator code in C; packet processing and archiving in PERL; science processing in IDL
  - Simulator, packet, and archiving code exists
  - Science processing is a work in progress





*Cosmic RAY Telescope for the Effects of Radiation*