

## FAILURE MODES EFFECTS AND CRITICALITY ANALYSIS (FMECA)

Product: SPIRE Instrument Project/Phase: Herschel System/Subsystem/Equipment: DPU Mission phase/Operational Mode: Space Flight				Prepared by: R. Orfei Approved by: Date: 11-07-'01			Document reference: SPIRE-IFS-DOC-000785 Issue: Page of			
Id number	Item/block	Function	Failure mode	Failure cause	Failure effects a. Local effects b. End effects	Severity	Failure detection method/ observable symptoms	Compensation provisions	Correction actions	Remarks
1.001	DPU		Input Power 28V short to Gnd	Connector failure	a. Loss of DPU b. Loss of nominal side, propagation of short to the source	1R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	Further analysis required. LCLs at the power source
1.002			No function	Manufacturing error, part failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.1.001	DC/DC conv. Main		Shorted	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.1.002			Open	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.1.003			Erratic output	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.1.004			No output	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.2.001	CPU		Shorted	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.2.002			Open	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.2.003			Output stuck low	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.2.004			Output stuck high	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.2.005			Output open	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.2.006			Input open	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.3.001	2 Serial I/F to/from DRU		Shorted	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	
1.3.002			Output stuck low	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	
1.3.003			Output stuck high	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	
1.3.004			Output open	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	
1.3.005			Input stuck low	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	
1.3.006			Input stuck high	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	
1.3.007			Input open	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	
1.4.001	Serial I/F to/from MCU		Shorted	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	
1.4.002			Output stuck low	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	
1.4.003			Output stuck high	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	
1.4.004			Output open	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	

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1.4.005			Input stuck low	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	
1.4.006			Input stuck high	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	
1.4.007			Input open	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted HK data from SPIRE	Switch to redundant side	None in SPIRE	
1.5.001	S/C I/F		Shorted	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.5.002			Output stuck low	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.5.003			Output stuck high	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.5.004			Output open	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.5.005			Input stuck low	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.5.006			Input stuck high	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.5.007			Input open	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.6.001	Data RAM 2MB		Shorted	Internal failure	a. Loss of DPU b. Likely loss of nominal side	2R	No housekeeping data from SPIRE	Depending on page failure remedial actions are possible	None in SPIRE	
1.6.002			Open	Internal failure	a. Loss of DPU b. Likely loss of nominal side	2R	No housekeeping data from SPIRE	Depending on page failure remedial actions are possible	None in SPIRE	
1.6.003			Slow transfer of data	Internal failure	a. Loss of DPU b. Likely loss of nominal side	2R	No housekeeping data from SPIRE	Depending on page failure remedial actions are possible	None in SPIRE	
1.6.004			Bit loss	Internal failure	a. Loss of DPU b. Likely loss of nominal side	2R	Corrupted data from SPIRE	Depending on page failure remedial actions are possible	None in SPIRE	
1.7.001	Data EEPROM 1MB		Shorted	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.7.002			Open	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.7.003			Slow transfer of data	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.7.004			Bit loss	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	Corrupted data from SPIRE	Switch to redundant side	None in SPIRE	
1.8.001	Program PROM 32kB		Shorted	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.8.002			Open	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	
1.8.003			Slow transfer of data	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Switch to redundant side	None in SPIRE	

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1.8.004			Bit loss	Internal failure	a. Loss of DPU b. Loss of nominal side	2R	No housekeeping data from SPIRE	Depending on Bit address the instrument could still perform nominally	None in SPIRE	
1.9.001	Program RAM 3MB		Shorted	Internal failure	a. Loss of DPU b. Likely loss of nominal side	2R	No housekeeping data from SPIRE	Depending on page failure remedial actions are possible	None in SPIRE	
1.9.002			Open	Internal failure	a. Loss of DPU b. Likely loss of nominal side	2R	No housekeeping data from SPIRE	Depending on page failure remedial actions are possible	None in SPIRE	
1.9.003			Slow transfer of data	Internal failure	a. Loss of DPU b. Likely loss of nominal side	2R	No housekeeping data from SPIRE	Depending on page failure remedial actions are possible	None in SPIRE	
1.9.004			Bit loss	Internal failure	a. Loss of DPU b. Likely loss of nominal side	2R	No housekeeping data from SPIRE	Depending on page failure remedial actions are possible	None in SPIRE	