Failure Modes and Effects Analysis/Critical Items List

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Title: Risk Assessment Executive Summary Report (RAESR) for the USA SAFER

Item Name: Valve Driver Assembly (VDA) Qty: 1 FMEA Number: US-SFR-270

Item Part Number: SED33107325 ORU Name: SAFER

Subsystem Name: Avionics ORU Part Number: SED33105900-311

Function: Provides power/command to thruster solenoid valve and NSI, thruster response feedback to LED thruster cue.

Item Type Designator: C PG/IP Identifier: N/A

Reference Designator/Find No.: N/A Drawing Number: SED33107325

Logistics Control Number: N/A

End Item Name: SAFER

End Item Capability: Six degrees of freedom through 24 thrusters, each rated at 0.8 ± 0.08 lbs. force in vacuum.

End Item Function: Provides emergency EVA self-rescue for separated crewmember.

ISS Zone: EVA Shuttle Zone: EVA

Criticality

ISS Shuttle

Critical Item: Yes: No: X Criticality Category: 1R 1R/3

Success Paths Remaining:

Paths:

Failure (Mode, Cause, Detection, Corrective Action)

Failure Mode: VDA fails to provide adequate output drive signal/power to NSI.

Failure Mode Code:

Failure Cause: EEE part failure, short/open circuit, contamination, software error, radiation event, EMI.

Failure Detection:

Flight: IVA – Limited number of failures can be detected either directly or indirectly during IVA checkout.

EVA - No commanded motion.

Ground: Functional Test.

Time To Detect Quantity: 10 Time To Detect Units: Seconds

Correcting Action: IVA – If a failure is detected during the IVA checkout, the back-up SAFER (if available) will be used.

EVA – Cycle power. If not successful, no other corrective action.

Remarks: None

Failure Effect Phase: EVA Operations Affected Stage(S): EVA Operations

Failure Effect

On ORU/Assembly:

First/Second Failure: Inadvertent EVA crewmember separation.

Third (this) Failure: No commanded motion.

On Subsystem/Next Assembly: None.

On End Item/Segment: Prevents self rescue.

On Crew/ISS: Possible loss of EVA crewmember.

Time To Effect Quantity: 1 Time To Effect Units: Minutes

Redundancy Screen

ISS (Shuttle)

Checkout Pre-Launch (A): Pass

Checkout On-Orbit (B): Pass (partial; detection of some, but not all, of the failure causes is possible)

Detection Flight Crew: Fail Or Detection Ground Crew: Fail

Loss Of Redundancy

From A Single Cause (C): N/A