

Failure Modes and Effects Analysis/Critical Items List

Document Number: JSC-38378 **Document Rev. No.:** C **Document Date:** 8/26/97
Title: Risk Assessment Executive Summary Report (RAESR) for the USA SAFER

Item Name: Hand Controller Module (HCM) **Qty:** 1 **FMEA Number:** US-SFR-350
Item Part Number: SED33106098 **ORU Name:** SAFER
Subsystem Name: HCM **ORU Part Number:** SED33105900-311
Function: Converts mechanical motion into electrical commands in order to control electronic logic.

Item Type Designator: C **PG/IP Identifier:** N/A
Reference Designator/Find No.: N/A **Drawing Number:** SED33106098
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			
Critical Item: Yes: _____ No: <u> X </u>	Criticality Category:	ISS	Shuttle	
Success Paths:	Success Paths Remaining:	1R	1R/3	

Failure (Mode, Cause, Detection, Corrective Action)

Failure Mode: HCM sends erroneous AAH commands.
Failure Mode Code:
Failure Cause: Switch Failure, EEE part failure, short/open circuit, contamination, software error, radiation event, EMI.
Failure Detection:
 Flight: IVA – IVA checkout.
 EVA – Uncommanded motion. AAH/Thruster LEDs remain illuminated after switch release.
 Ground: Functional Test.
Time To Detect Quantity: 10 **Time To Detect Units:** Seconds
Correcting Action: IVA – If failure is detected during IVA checkout, use back-up SAFER if available.
 EVA – Cycle power. Deactivate AAH.
Remarks: Although not nominally trained for operation without AAH, the crewmember can still reach structure with AAH deactivated.
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: Impairment of self-rescue capability.
On Subsystem/Next Assembly: None.
On End Item/Segment: Software will disable AAH. Possible loss of mission objectives if SAFER required for EVA.
On Crew/ISS: None.
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: Pass (partial) **Or** **Detection Ground Crew:** Fail
Loss Of Redundancy From A Single Cause (C): N/A