# 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-320
**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**

| | | | | ISS | Shuttle |
|---|---|---|---|---|---|
| **Critical Item:** | **Yes:** _____ | **No:** X | **Criticality Category:** | 1R | 1R/3 |
| **Success Paths:** | | | **Success Paths Remaining:** | | |

**Failure (Mode, Cause, Detection, Corrective Action)**

**Failure Mode:** HCM grip sends erroneous commands to thrusters.
**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 – Erratic/no thruster response to control inputs.
**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 unsuccessful, 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: Crewmember unable to automatically arrest uncommanded rotation.
**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):** | N/A | | |
| **Detection Flight Crew:** | | Pass | **Or** | **Detection Ground Crew:** Fail |
| **Loss Of Redundancy From A Single Cause** | **(C):** | N/A | | |