

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE

NUMBER: 07-2D-ES1 -X

SUBSYSTEM NAME: CREW ESCAPE - EMERGENCY EGRESS SLIDE

REVISION: 0 09/28/00

PART DATA

PART NAME	PART NUMBER
VENDOR NAME	VENDOR NUMBER
LRU : SLIDE ASSEMBLY	MC623-0015-0023
SRU : INFLATABLE SLIDE	MC623-0015-0022

QUANTITY OF LIKE ITEMS: 1

FUNCTION:

INFLATABLE SLIDE CONSISTS OF INFLATABLE STRUCTURE AND GIRT. FABRIC STRUCTURE PROVIDES SLIDING SURFACE FOR CREWMEMBERS DURING POST LANDING EGRESS FROM SIDE HATCH OPENING 10.5 FEET ABOVE GROUND. SLIDE CAN BE USED FOR CONTINGENCY EGRESS WITH HATCH OPENED OR FOR RAPID EMERGENCY EGRESS WITH HATCH JETTISONED.

REFERENCE DOCUMENTS: D102910 ISI

- APPROVALS -

SAFETY & RELIABILITY ENGR : E. SHVARTZ  
DESIGN ENGINEERING : S. SHARP

USA Orbiter Element

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**FAILURE MODES EFFECTS ANALYSIS FMEA – CIL FAILURE MODE**

**NUMBER: 07-2D-ES1- 02**

**REVISION#: 1 09/02/98**

**SUBSYSTEM NAME: CREW ESCAPE - EMERGENCY EGRESS SLIDE**

**LRU: SLIDE ASSEMBLY**

**CRITICALITY OF THIS**

**ITEM NAME: INFLATABLE SLIDE**

**FAILURE MODE: 1R2**

**FUNCTIONAL CRITICALITY/**

**REQUIRED FAULT TOLERANCE/ACHIEVED FAULT TOLERANCE: 1R/2/1**

**FAILURE MODE:**

SLIDING SURFACE TOO FAST/TOO SLOW

**MISSION PHASE: LS LANDING/SAFING**

<b>VEHICLE/PAYLOAD/KIT EFFECTIVITY:</b>	102	COLUMBIA
	103	DISCOVERY
	104	ATLANTIS
	105	ENDEAVOUR

**CAUSE:**

TOO FAST: DEBONDING OF DECELERATION STRIPS, RAIN, CONTAMINATION

TOO SLOW: MATERIAL DEFECT, CONTAMINATION

**CRITICALITY 1/1 DURING INTACT ABORT ONLY? YES**

LS LANDING SEQUENCE

<b>REDUNDANCY SCREEN</b>	A) PASS
	B) FAIL
	C) PASS

**PASS/FAIL RATIONALE:**

A)

B)

"B" SCREEN FAILS BECAUSE THERE IS NO TEST AVAILABLE TO DETECT FOR THIS FAILURE IN FLIGHT.

C)

**METHOD OF FAULT DETECTION:**

CREW OBSERVATION

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**CORRECTING ACTION:** MANUAL

**CORRECTING ACTION DESCRIPTION:**

FIRST TWO CREW MEMBERS SAFETY ON THE GROUND CAN ASSIST THE REST OF THE CREW.

**REMARKS/RECOMMENDATIONS:**

CREW TRAINING AND PROCEDURES WILL REDUCE INJURIES.

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**- FAILURE EFFECTS -**

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**(A) SUBSYSTEM:**

SLIDE DEGRADATION

**(B) INTERFACING SUBSYSTEM(S):**

NONE

**(C) MISSION:**

NONE

**(D) CREW, VEHICLE, AND ELEMENT(S):**

OTHER SUBSYSTEM FAILURES MUST OCCUR BEFORE USE OF THE EMERGENCY SYSTEM IS REQUIRED. POSSIBLE INJURY TO CREWMEMBERS. POSSIBLE LOSS OF REMAINING CREWMEMBERS IF RAPID EMERGENCY EGRESS IS REQUIRED.

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

AFTER OTHER SUBSYSTEM FAILURES OCCUR REQUIRING THE USE OF THE EMERGENCY SYSTEM, A SINGLE FAILURE OF THE INFLATABLE SLIDE CAN RESULT IN POSSIBLE INJURY/LOSS OF CREW.

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**- TIME FRAME -**

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**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL FAILURE MODE  
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**TIME FROM FAILURE TO CRITICAL EFFECT: IMMEDIATE**

**TIME FROM FAILURE OCCURRENCE TO DETECTION: IMMEDIATE**

**TIME FROM DETECTION TO COMPLETED CORRECTING ACTION: N/A**

**IS TIME REQUIRED TO IMPLEMENT CORRECTING ACTION LESS THAN TIME TO EFFECT?  
N/A**

**RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:  
EMERGENCY EGRESS USING SKY GENIE WOULD EXCEED MAXIMUM ALLOWABLE TIME OF  
60 SECONDS.**

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**-DISPOSITION RATIONALE-**

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**(A) DESIGN:**

TECHNOLOGY BASE ESTABLISHED IN COMMERCIAL AIRLINE HARDWARE. SLIDING SURFACE HAS DECELERATION STRIP. ACCEPTABLE FRICTION CHARACTERISTICS OF WET SURFACE VERIFIED. SLIDE MATERIALS CONFORM TO MIL SPEC. REQUIREMENTS.

**(B) TEST:**

ACCEPTANCE TEST INCLUDES TWO DEPLOYMENT CYCLES, ONE EACH MODE. HOWEVER, PERSONNEL WILL SLIDE DOWN TO DEMONSTRATE USEABLE CONDITION IF DEPLOYED SLIDE IS SKEWED.

QUALIFICATION TESTS INCLUDE A TOTAL OF 40 DEPLOYMENT CYCLES FROM SIMULATED ORBITER IN HATCH OPEN AND HATCH JETTISONED MODES. EIGHT EVACUEES WILL USE THE SLIDE IN EACH OF 19 DEPLOYMENTS. IN TWO OF THESE DEPLOYMENTS THE SLIDING SURFACE WILL BE WETTED WITH WATER.

DEVELOPMENT TESTS RESULTED IN ADDITIONAL DECELERATION STRIPS TO REDUCE EXIT VELOCITY OF LIGHTER CREWMEMBERS.

**GROUND TURNAROUND TEST**

ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

**(C) INSPECTION:**

RECEIVING INSPECTION

CERTIFICATION OF PROCESSES AND MATERIALS INCLUDING STRENGTH, COMPOSITION, HEAT TREAT, ANODIZING AND PASSIVIZATION ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

CLEANLINESS OF SIGNIFICANT SURFACES TO LEVEL GC (GENERALLY CLEAN) OF MA0110-301 IS VERIFIED BY INSPECTION.

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**ASSEMBLY/INSTALLATION**

SLIDE SURFACE FABRIC IS VERIFIED PRIOR TO MARK/CUT AND SEW/PRE-CEMENTING INTO SLIDE SURFACE ASSEMBLY. PRESSURIZING COMPONENTS FUNCTIONALLY VERIFIED PRIOR TO ASSEMBLY, VERIFIED BY INSPECTION.

CONFORMANCE OF DETAIL PARTS AND ASSEMBLIES TO DRAWING REQUIREMENTS ARE VERIFIED BY INSPECTION. PARTS PROTECTION AND HANDLING PROVISIONS ARE VERIFIED BY INSPECTION.

**CRITICAL PROCESSES**

THE MIXING AND APPLICATION OF ADHESIVES, BONDING OF SUBASSEMBLIES, ASSEMBLIES AND PANELS ARE VERIFIED BY INSPECTION. BONDING PROCESS CONTROL SAMPLE TESTS ARE VERIFIED BY INSPECTION.

**TESTING**

RESISTANCE OF ELECTRICAL BONDING FOR CONFORMANCE TO MIL-B-50878 IS VERIFIED BY INSPECTION. ATP IS VERIFIED BY INSPECTION.

**HANDLING/PACKAGING**

PROPER LOCATION AND ATTACHMENT OF ALL COMPONENTS, CYLINDER CHARGED TO NORMAL PRESSURE AND PROPER PACKAGING TO LEVEL A OF MIL-STD-794 ARE VERIFIED BY INSPECTION.

**(D) FAILURE HISTORY:**

CURRENT DATA ON TEST FAILURES, FLIGHT FAILURES, UNEXPLAINED ANOMALIES, AND OTHER FAILURES EXPERIENCED DURING GROUND PROCESSING ACTIVITY CAN BE FOUND IN THE PRACA DATA BASE. FAA GENERIC FAILURE DATA DOES NOT INCLUDE SUFFICIENT DETAIL TO CORRELATE WITH THIS FAILURE MODE.

**(E) OPERATIONAL USE:**

OPERATIONAL EFFECT OF FAILURE: POSSIBLE LOSS OF LIFE.

CREW ACTION: NONE.

CREW TRAINING: NOT APPLICABLE.

MISSION CONSTRAINTS: NONE. MISSION WOULD BE TERMINATED PRIOR TO USE OF SLIDE.

INFLIGHT CHECKOUT: NONE.

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**- APPROVALS -**

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EDITORIALLY APPROVED : BNA : J. Kimura 9-3-98  
TECHNICAL APPROVAL : VIA APPROVAL FORM : 96-CIL-032\_07-2D