

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

E. Shvartz 9-28-00
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FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE

NUMBER: 07-2D-ES1- 04

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:

PREMATURE DETACHMENT

MISSION PHASE:

LS LANDING SEQUENCE

VEHICLE/PAYLOAD/KIT EFFECTIVITY:

102	COLUMBIA
103	DISCOVERY
104	ATLANTIS
105	ENDEAVOUR

CAUSE:

GIRT FABRIC DEFECT/TEAR, GIRT RETAINING PIN FAILURE, ADHESIVE CRYSTALLIZATION/FAILURE.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? YES

LS LANDING SEQUENCE

REDUNDANCY SCREEN

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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NUMBER: 07-2D-ES1- 04**

CORRECTING ACTION: MANUAL

CORRECTING ACTION DESCRIPTION:

USE DESCENT DEVICE (SKY GENIE) THROUGH SIDE HATCH OR OVERHEAD WINDOW.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

SLIDE DETACHES FROM ORBITER.

(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 CREWMEMBER IF SLIDE DETACHES WITH CREWMAN ON IT. 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.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: IMMEDIATE

TIME FROM FAILURE OCCURRENCE TO DETECTION: IMMEDIATE

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TIME FROM DETECTION TO COMPLETED CORRECTING ACTION: N/A

**IS TIME REQUIRED TO IMPLEMENT CORRECTING ACTION LESS THAN TIME TO EFFECT?
NO**

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

-DISPOSITION RATIONALE-

(A) DESIGN:

PROVEN COMPONENTS IN RELEASE SYSTEM. CREW RELEASE LINE IS PROTECTED/
HIDDEN. FACTOR OF SAFETY 1.4 MINIMUM WITH POSITIVE MARGINS ON ALL
COMPONENTS. MATERIALS COMPLY WITH MIL SPEC. REQUIREMENTS.

(B) TEST:

ACCEPTANCE TESTS INCLUDE TWO DEPLOYMENT CYCLES, ONE EACH MODE.
OPERATION OF THE SLIDE DETACH FEATURE IS VERIFIED AFTER EACH DEPLOYMENT.

QUALIFICATION TESTS INCLUDE 40 DEPLOYMENT CYCLES FROM SIMULATED ORBITER
SIDE HATCH IN HATCH OPEN AND HATCH JETTISONED MODES, INCLUDING 20 CYCLES
WITH EVACUEES. IN TWO CYCLES, REENTRY BY CLIMBING UP THE SLIDE WILL BE
DEMONSTRATED.

PERIODIC MAINTENANCE INCLUDES INFLATION TEST AND REPACKING EVERY 18
MONTHS PER ISI DOCUMENT 35-D102900.

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.

ASSEMBLY/INSTALLATION

PIECE PARTS VERIFIED BY INSPECTION. MOUNTING AND SUPPORT HARDWARE INTO
SLIDE SURFACE ASSEMBLY. PRESSURIZING COMPONENTS FUNCTIONALLY VERIFIED
PRIOR TO ASSEMBLY, VERIFIED BY INSPECTION.

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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 INDICATES APPROXIMATELY TEN FAILURE INCIDENTS IN THIS FAILURE MODE FOR APPROXIMATELY 3000 DEPLOYMENTS.

(E) OPERATIONAL USE:

OPERATIONAL EFFECT OF FAILURE: POSSIBLE LOSS OF LIFE.

CREW ACTION: BRING SKY GENIE DOWN FROM FLIGHT DECK AND EGRESS USING CARABINERS.

CREW TRAINING: CREW IS TRAINED IN ABOVE PROCEDURE.

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

INFLIGHT CHECKOUT: NONE.

- APPROVALS -

EDITORIALLY APPROVED
TECHNICAL APPROVAL

: BNA
: VIA APPROVAL FORM

: J. Kumura 9-3-98
: 96-CIL-032_07-2D