PRINT DATE: 09/28/00

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 **VENDOR NAME**	**PART NUMBER** **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 — E. Shvartz 9-28-00
DESIGN ENGINEERING : S. SHARP — Steven Sharp 9-28-00
USA orbiter Element — Suzanne Little 9/28/00

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE
NUMBER: 07-2D-ES1- 03

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:
DEPLOYS IN UNUSABLE POSITION

MISSION PHASE:
LS LANDING SEQUENCE

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

CAUSE:
HIGH WIND, GIRT TORN, INFLATION HOSE MISROUTED (IMPROPER PACKING), GIRT RETAINING PIN RELEASED.

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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CORRECTING ACTION: MANUAL

CORRECTING ACTION DESCRIPTION:
USE DESCENT DEVICE (SKY GENIE) THROUGH SIDE HATCH OR OVERHEAD WINDOW. FIRST CREWMEMBER CAN REPOSITION SLIDE FOR REMAINING CREW. ATTEMPT TO REPOSITION SLIDE FROM CABIN TO USABLE CONDITION.

- FAILURE EFFECTS -

(A) SUBSYSTEM:
SLIDE UNUSABLE.

(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 DUE TO UNSUCCESSFUL EGRESS ATTEMPT. 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

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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?
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:
TECHNOLOGY BASE ESTABLISHED IN COMMERCIAL AIRLINE HARDWARE. PROVEN COMPONENTS IN INFLATION, AIR CONTAINMENT AND SUPPORT SYSTEMS. FACTOR OF SAFETY 1.4 MINIMUM, POSITIVE MARGINS FOR ALL COMPONENTS.

(B) TEST:
ACCEPTANCE TESTS INCLUDE TWO DEPLOYMENT CYCLES, ONE EACH MODE. HOWEVER, THESE DEPLOYMENTS REPRESENT NOMINAL CONDITIONS (NO HIGH WIND).

QUALIFICATION TESTS INCLUDE A TOTAL OF 40 DEPLOYMENT CYCLES FROM SIMULATED ORBITER SIDE HATCH IN HATCH OPEN AND HATCH JETTISONED MODES. ELEVEN OF THESE TESTS ARE PERFORMED IN 25 KNOT WIND CONDITIONS WITH WIND DIRECTION AT 45 DEGREE INCREMENTS AROUND ORBITER. NINE OF THE ELEVEN TESTS ARE WITH RH MAIN GEAR COLLAPSED.

QUALIFICATION/ACCEPTANCE TESTS OF SLIDE FABRIC MATERIALS WERE PERFORMED AT WSTF.

PERIODIC MAINTENANCE INCLUDES INFLATION TEST AND REPACK AFTER 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

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

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 INDICATES APPROXIMATELY 65 FAILURE INCIDENTS IN 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.

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NUMBER: 07-2D-ES1- 03

- APPROVALS -

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