FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 07-2D-ES12 -X

SUBSYSTEM NAME: CREW ESCAPE - EMERGENCY EGRESS SLIDE
REVISION: 2 08/30/90

PART DATA

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: EMERGENCY EGRESS SLIDE SYSTEM	MC623-0015-0007 D102900
LRU	: EMERGENCY EGRESS SLIDE SYSTEM	MC623-0015-0012 D102900-1
SRU	: SLIDE SYSTEM ATTACHMENTS	M072-661651

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
UPPER ATTACH POINTS OF SLIDE SYSTEM ARE ON GIRT PANEL SUPPORT ASSEMBLY. LOWER ATTACH POINTS ARE ON INBOARD STOWAGE CONTAINER COVER. ATTACHMENT TO ORBITER IS WITH TWO QUICK-RELEASE PINS.

QUANTITY OF LIKE ITEMS: 1

FUNCTION:
FOR LAUNCH AND LANDING, SLIDE SYSTEM IS ATTACHED TO ORBITER AT TWO FITTINGS IN MID-DECK FLOOR AND TWO BRACKETS IN SIDEWALL BELOW INGRESS/ EGRESS HATCH. RELOCATION OF SLIDE SYSTEM ON ORBIT REQUIRES REMOVAL OF TWO PIP PINS IN UPPER ATTACHMENTS AND LIFTING SLIDE OUT OF FLOOR FITTINGS. REINSTALLATION OF SLIDE SYSTEM PRIOR TO DEORBIT REQUIRES REPLACING PINS AFTER REPOSITIONING IN FLOOR FITTINGS. ALL FOUR ATTACH POINTS REACT SLIDE SYSTEM LANDING LOADS. SIDEWALL BRACKETS ARE HINGE POINTS FOR ROTATING SLIDE PACK INTO HATCH OPENING, AND RETAIN SLIDE IN PRIMARY OPERATIONAL MODE (HATCH JETTISONED). AFT FLOOR FITTING REACTS Y-DIRECTION LOADS AND FWD FLOOR FITTING REACTS X AND Y-DIRECTION LOADS. AFT BRACKET IN SIDEWALL REACTS Y&Z-DIRECTION LOADS. FORWARD SIDEWALL BRACKET REACTS X, Y AND Z-DIRECTION LOADS.

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE
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REVISION#: 3 09/11/98
SUBSYSTEM NAME: CREW ESCAPE - EMERGENCY EGRESS SLIDE
LRU: EMERGENCY EGRESS SLIDE SYSTEM **CRITICALITY OF THIS**
ITEM NAME: SLIDE SYSTEM ATTACHMENTS **FAILURE MODE:** 1R2

FAILURE MODE:
SLIDE CANNOT BE REINSTALLED ON ORBIT

MISSION PHASE: OO ON-ORBIT

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

CAUSE:
STRUCTURAL DEFORMATION OF CREW CABIN; MISALIGNMENT OF HOLES IN FLOOR OR SIDEWALL ATTACHMENTS, BENT OR DAMAGED ATTACH FITTING.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN
A) FAIL
B) PASS
C) PASS

PASS/FAIL RATIONALE:
A)
FAILURE CAUSED BY ON-ORBIT EVENTS

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF SLIDE SYSTEM ATTACHMENTS FOR LANDING AND PRIMARY OPERATIONAL MODE (HATCH JETTISONED).

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(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 LOSS OF 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 SLIDE SYSTEM ATTACHMENTS CAN RESULT IN POSSIBLE INJURY/LOSS OF CREW.

-DISPOSITION RATIONALE-

(A) DESIGN:
LOCATION OF SLIDE SYSTEM ATTACH POINTS IN CREW MODULE STRUCTURE MINIMIZES EFFECTS OF STRUCTURAL DEFORMATION ON ORBIT. ATTACH FITTINGS ALLOW FOR SOME DIMENSIONAL MISMATCH OF SLIDE SYSTEM AND SUPPORT STRUCTURE. EVALUATION OF TRAINING UNITS PRODUCED DEFLECTION OF SLIDE MOUNTING LUG BETWEEN 0.25 AND 0.75 INCHES UNDER APPLIED FORCE OF 40 LBS. INTERFACE CONTROL TOOL SUPPORTS INITIAL SLIDE INSTALLATION. ANALYSIS INDICATED STRUCTURAL DEFORMATIONS ON ORBIT WOULD NOT AFFECT REINSTALLATION.

(B) TEST:
GROUND TURNAROUND TEST
NONE PERFORMED. CREW MODULE DEFORMATIONS DUE TO ZERO GRAVITY AND 14.7 PSI DIFFERENTIAL PRESSURE CANNOT BE SIMULATED IN GROUND TEST. MEASUREMENT OF ATTACH POINT DIMENSIONS ON ORBIT (DTO) IS RECOMMENDED.

(C) INSPECTION:
RECEIVING INSPECTION
CERTIFICATION OF PROCESSES AND MATERIALS INCLUDING STRENGTH, COMPOSITION, HEAT TREAT AND ANODIZING IS VERIFIED BY INSPECTION.

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

ASSEMBLY/INSTALLATION
METAL FORMING AND RIVET PROCESSING ARE VERIFIED BY INSPECTION. CONFORMANCE OF DETAIL PARTS AND ASSEMBLY TO DRAWING REQUIREMENTS IS VERIFIED BY INSPECTION. PARTS PROTECTION AND HANDLING PROVISIONS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES
PASSIVATION, ANODIZING, AND HEAT TREAT PROCESSES ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
FLUORESCENT PENETRANT INSPECTION OF SPRING PER MIL-I-6866, SENSITIVITY TYPE 1, LEVEL 2, METHOD B PER MIL-I-25135 PRIOR TO PASSIVATION IS VERIFIED BY INSPECTION.

TESTING
IN-PROCESS AND FINAL ATP TESTS ARE VERIFIED BY INSPECTION.

HANDLING/PACKAGING
PROPER PACKAGING TO LEVEL A OF MIL-STD-794 IS 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.

(E) OPERATIONAL USE:
CREW WILL CHECK FOR RELATIVE DISTORTION AND PIN TIGHTNESS PRIOR TO REMOVAL OF SLIDE. IF A PROBLEM EXISTS, A REAL TIME DECISION WILL BE MADE WHETHER TO REMOVE SLIDE. TO REINSTALL SLIDE, CREW COULD USE IFM TOOLS TO ALIGN SIDEWALL BRACKETS OR SLIDE PINS INTO MIDDECK FLOOR FITTINGS. SLIDE SYSTEM COULD BE STOWED IN SLEEP STATION, FOR LANDING. IF EMERGENCY EGRESS IS REQUIRED AFTER LANDING, CREW COULD USE SKY GENIES BUT EGRESS TIME WOULD BE INCREASED. IF CONTINGENCY EGRESS IS REQUIRED, CREW COULD LIFT SLIDE PACK ON TO OPEN SIDE HATCH TO ENGAGE SLIDE SUPPORT LUGS IN HATCH COVER LATCHES.

- APPROVALS -

EDITORIALLY APPROVED	: BNA	: J. Kimura 9-16-98
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 97-CIL-038_07-2D