

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE

NUMBER: M8-1SS-M020A-X

Qymb

SUBSYSTEM NAME: MECHANICAL - CREW EQUIPMENT

REVISION: 1

10/23/98

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRJ	:LIGHT WT TOOL STOWAGE ASSY (PORT)	V849-660300-001
LRU	:LIGHT WT TOOL STOWAGE ASSY (STBD)	V849-660300-002
SRU	:DOOR LATCH ASSEMBLY	V849-000400-003

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

LIGHT WEIGHT TOOL STOWAGE ASSEMBLY (LWTSAs) DOOR LATCH

QUANTITY OF LIKE ITEMS: 8
EIGHT

FUNCTION:

THERE ARE TWO LWTSAs, PORT & STARBOARD. EACH LWTSa CONTAINS ONLY ONE DOOR. THIS DOOR CONTAINS FOUR LATCHES THAT KEEP IT IN A CLOSED AND LOCKED POSITION. THESE LATCHES, WHICH CAN BE MANUALLY RELEASED ON ORBIT, ARE SINGLE FAULT TOLERANT. THAT IS, ONLY THREE OF THE FOUR LATCHES ARE REQUIRED TO KEEP THE CLOSED DOOR SECURED.

REFERENCE DOCUMENTS: V849-660300
V849-660195
V849-660200
V849-000400

FAILURE MODES EFFECTS ANALYSIS FMEA -- NON-CIL FAILURE MODE

NUMBER: M8-1SS-M020-03

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REVISION#: 2 10/23/98

SUBSYSTEM NAME: MECHANICAL - CREW EQUIPMENT

LRU: LIGHT WEIGHT TOOL STOWAGE ASSEMBLY

ITEM NAME: DOOR LATCH ASSEMBLY

CRITICALITY OF THIS FAILURE MODE: 1R3

FAILURE MODE:
FAILS TO UNLATCH

MISSION PHASE: OC ON-ORBIT

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

CAUSE:
CONTAMINATION, MECHANICAL SHOCK, MATERIAL DEFECT

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN	A) PASS
	B) PASS
	C) PASS

PASS/FAIL RATIONALE:
A)

B)

C)

METHOD OF FAULT DETECTION:
VISUAL OBSERVATION - AFFECTED LATCH WILL NOT ROTATE OPEN OR HANDLE WILL NOT MOVE IN UP (UNLOCKED) POSITION.

CORRECTING ACTION: MANUAL

CORRECTING ACTION DESCRIPTION:
CREW COULD MANUALLY OVERRIDE A JAMMED CLOSED LATCH BY REMOVING A BOLT ON THE LATCH RECEIVER, USING AN EVA TOOL, AND SLIDING THE LATCH RECEIVER AWAY FROM THE LATCH HANDLE.

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REMARKS/RECOMMENDATIONS:

LATCHES ARE DESIGNED FOR RAPID SEPARATION BETWEEN THE HANDLE AND RECEIVER IN CASE OF JAMMING (CLOSED) BY REMOVING A SINGLE EVA BOLT ON THE RECEIVER. THIS ALLOWS THE LATCH RECEIVER TO MOVE ASIDE AWAY FROM THE LATCH HANDLE. THE SAME DESIGN WILL ALLOW THE RECEIVER TO MOVE BACK TO ITS ORIGINAL POSITION FOR LATCHING A JAMMED LATCH FOR DEORBIT. THE LW TSA CONTAINS TWO TRAYS FOR STOWAGE OF GENERIC TOOLS AND MISSION SPECIFIC TOOLS. IT IS RECOMMENDED THAT THE TOOLS REQUIRED TO REMOVE THIS EVA BOLT ARE READILY AVAILABLE TO THE EVA CREWMEMBER.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF CAPABILITY TO OPEN LW TSA DOOR.

(B) INTERFACING SUBSYSTEM(S):

NO EFFECT ON ORBITER INTERFACING SUBSYSTEMS.

(C) MISSION:

NO EFFECT UNTIL LATCH CANNOT BE REMOVED. THEN, LOSS OF CAPABILITY TO UTILIZE TOOLS CONTAINED WITHIN LW TSA COMPARTMENT MAY AFFECT MISSION COMPLETION.

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

NO EFFECT UNTIL LATCH CANNOT BE REMOVED. THEN, LOSS OF CAPABILITY TO UTILIZE TOOLS CONTAINED WITHIN THE LW TSA COMPARTMENT COULD RESULT IN LOSS OF CREW AND VEHICLE IF CONTINGENCY EVA IS REQUIRED.

(E) FUNCTIONAL CRITICALITY EFFECTS:

FIRST FAILURE (LATCH FAILS TO UNLATCH) - NO EFFECT, SINCE EVA CREW CAN REMOVE AFFECTED LATCH.

DESIGN CRITICALITY (PRIOR TO DOWNGRADE, DESCRIBED IN (F)): 1R2

(F) RATIONALE FOR CRITICALITY DOWNGRADE:

SECOND FAILURE (AFFECTED LATCH CANNOT BE REMOVED) - LOSS OF CAPABILITY TO UTILIZE TOOLS CONTAINED WITHIN LW TSA. INABILITY TO COMPLETE MISSION OBJECTIVES ASSOCIATED WITH THESE ISS TOOLS. - CRITICALITY 2R3 CONDITION
THIRD FAILURE (FAILURE NECESSITATES AN EVA TO CORRECT A CRIT 1 CONDITION) - POSSIBLE LOSS OF CREW AND VEHICLE DUE TO THE INABILITY TO CONDUCT AN

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EMERGENCY EVA BECAUSE EVA TOOLS ARE NOT AVAILABLE FOR USE. - CRITICALITY
1R3 CONDITION

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: DAYS

TIME FROM FAILURE OCCURRENCE TO DETECTION: IMMEDIATE

TIME FROM DETECTION TO COMPLETED CORRECTING ACTION: MINUTES

IS TIME REQUIRED TO IMPLEMENT CORRECTING ACTION LESS THAN TIME TO EFFECT?
YES

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:
CREW HAS AMPLE TIME TO REMOVE JAMMED LATCH BEFORE PROBLEM BECOMES
CRITICAL TO MISSION SUCCESS OR CATASTROPHIC TO CREW/VEHICLE SAFETY.

HAZARD REPORT NUMBER(S): FF-09

HAZARD(S) DESCRIPTION:
INABILITY TO SAFELY PERFORM EVA.

- APPROVALS -

SS & PAE ENGINEER	:	M. W. GUENTHER	:	<i>M. W. Guenther</i>
DESIGN ENGINEER	:	S. L. SHARP	:	<i>S. L. Sharp</i>