

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE

NUMBER: 02-5E-L02 -X

| **SUBSYSTEM NAME:** PAYLOAD RETEN & DEPLOY - LATCHES**REVISION:** 3

01/17/01

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	: LIGHTWEIGHT LONGERON LATCH	V073-544100
LRU	: MIDDLEWEIGHT LONGERON LATCH	V073-544230
LRU	: SUPER MIDDLE WT LONGERON LATCH	V073-544530
SRU	: MOTOR/BRAKE ASSEMBLY SPERRY	MC287-0054-0001 2960614-021

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

| MOTOR/BRAKE ASSEMBLY

QUANTITY OF LIKE ITEMS:

40 MAX

| TWO MOTORS PER LATCH ASSEMBLY

FUNCTION:

LIGHTWEIGHT, MIDDLEWEIGHT OR SUPER MIDDLEWEIGHT LONGERON LATCH REACTS FLIGHT LOADS ON PAYLOAD HORIZONTAL TRUNNION HELD BETWEEN TWO SPHERICAL HALF BEARINGS. REDUNDANT MOTORS ACT THROUGH A DIFFERENTIAL AND GEARBOX TO DRIVE THE LINKAGES AND HOOK. THE MOTORS INCORPORATE INTEGRAL BRAKE MECHANISMS AND ARE CONTROLLED BY POSITION SWITCHES LOCATED WITHIN THE LATCH. TWO A/C PHASES ARE REQUIRED TO LIFT THE BRAKE AND POWER THE MOTOR. THERE ARE NO SINGLE FAILURE MODES WHICH WOULD ALLOW A FREE WHEELING MOTOR AFTER APPLICATION OF POWER.

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

NUMBER: 02-5E-L02- 01

REVISION#: 3 01/17/01

SUBSYSTEM NAME: PAYLOAD RETEN & DEPLOY - LATCHES

LRU: LIGHT, MIDDLE, SUPER MIDDLE WT LONGERON LATCH

CRITICALITY OF THIS

ITEM NAME: MOTOR/BRAKE ASSEMBLY

FAILURE MODE: 1R3

FUNCTIONAL CRITICALITY/

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

FAILURE MODE:

LOSS OF OUTPUT

MISSION PHASE:

OO ON-ORBIT

DO DE-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:

102 COLUMBIA

103 DISCOVERY

104 ATLANTIS

105 ENDEAVOUR

CAUSE:

CONTAMINATION/FOREIGN OBJECT/DEBRIS, DEFECTIVE PART/MATERIAL OR
MANUFACTURING DEFECT, ELECTRICAL FAILURE-OPEN, SHORT, ETC., FAILURE/
DEFLECTION OF INTERNAL PART, BRAKE FAILS TO DISENGAGE

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN

A) PASS

B) PASS

C) PASS

PASS/FAIL RATIONALE:

A)

B)

C)

CORRECTING ACTION: AUTOMATED

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
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CORRECTING ACTION DESCRIPTION:

NO CREW ACTION IS REQUIRED FOR THE FIRST FAILURE. ACTIVE REDUNDANT MOTOR IS AVAILABLE FOR LATCH/UNLATCH OPERATION AT SINGLE MOTOR SPEED. SECOND FAILURE WILL REQUIRE CREW TO PERFORM EXTRAVEHICULAR ACTIVITY (EVA) PROCEDURES FOR MANUAL LATCH OPEN/CLOSE.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

FIRST FAILURE - LATCH OPERATES AT SINGLE MOTOR SPEED. SECOND FAILURE - LOSS OF CAPABILITY TO OPERATE LATCH.

(B) INTERFACING SUBSYSTEM(S):

FIRST FAILURE - NO EFFECT OTHER THAN INCREASED TIME TO OPEN OR CLOSE LATCH. SECOND FAILURE WILL RESULT IN LOSS OF ABILITY TO DRIVE LATCH OPEN OR CLOSED.

(C) MISSION:

FIRST FAILURE - NO EFFECT. SECOND FAILURE WILL RESULT IN A POSSIBLE LOSS OF MISSION DUE TO INABILITY TO RELEASE OR RESTRAIN PAYLOAD.

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

FIRST FAILURE - NO EFFECT. SECOND FAILURE WILL RESULT IN POSSIBLE LOSS OF CREW/VEHICLE DURING ENTRY DUE TO UNRESTRAINED PAYLOAD.

(E) FUNCTIONAL CRITICALITY EFFECTS:

LOSS OF LATCH OPERATION IN MID-TRAVEL POSITION COULD RESULT IN UNRESTRAINED PAYLOAD DURING ENTRY/LANDING WHICH COULD LEAD TO LOSS OF VEHICLE AND/OR CREW.

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

(F) RATIONALE FOR CRITICALITY DOWNGRADE:

CRITICALITY IS DOWNGRADED FROM THE DESIGN CRITICALITY, 1R/2, TO 1R/3 DUE TO CONSIDERATION OF THE EVA OPERATIONAL WORKAROUND CAPABILITY. WITH EVA CAPABILITY BUILT IN, THE CREW CAN OPEN OR CLOSE LATCHES MANUALLY.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: DAYS

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- APPROVALS -

S&R ENGINEER
DESIGN ENGINEER

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