

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 02-4B-002-X

SUBSYSTEM NAME: PAYLOAD BAY DOOR MECHANISMS

REVISION : 0 12/15/88 W

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	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
SRU :	CENTERLINE LATCH ASSY	V070-594360

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QUANTITY OF LIKE ITEMS: 4

DESCRIPTION/FUNCTION:

GANGED LATCH SYSTEM CONTAINS A POWER DRIVE UNIT (PDU) MC287-0040 (REF. FMEA/CIL NO. 02-4B-005-1) PROVIDING THE ROTARY MOTION AND DRIVES BELLCRANKS FOR PIVOTING THE HOOKS TO LATCH OR UNLATCH THE RIGHT-HAND DOORS TO THE LEFT-HAND DOORS.

SHUTTLE CRITICAL ITEMS LIST - ORBITER      NUMBER: 02-4B-002-X

SUMMARY

SUBSYSTEM NAME: PAYLOAD BAY DOOR MECHANISMS

ITEM NAME: CENTERLINE LATCH ASSY

FMEA NUMBER	ABBREVIATED FAILURE MODE DESCRIPTION	CIL FLG	CRIT	RCD FLG
02-4B-002-01	FAILS TO ENGAGE	X	1R2	
02-4B-002-03	FAILS TO DISENGAGE	X	2 2	

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTUATION MECH-PBD FMEA NO 02-4B -002 -3 REV:03/08/88

ASSEMBLY :LATCHING MECHANISM PBD CRIT. FUNC: 2  
 P/N RI :V070-594360 CRIT. HDW: 2  
 P/N VENDOR: VEHICLE 102 103 104  
 QUANTITY :4 EFFECTIVITY: X X X  
 PHASE(S): PL LQ OO X DO LS

REDUNDANCY SCREEN: A- B- C-  
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):  
 DES M. A. ALLEN DES *[Signature]* SSM *[Signature]* 3/18/88  
 REL M. B. MOSKOWITZ REL *[Signature]* REL *[Signature]*  
 QE W. J. SMITH QE *[Signature]* QE *[Signature]*

ITEM:  
 LATCH ASSEMBLY, CENTERLINE

FUNCTION:  
 GANGED LATCH SYSTEM CONTAINS A POWER DRIVE UNIT (PDU), MC287-0040 (REF. FMEA/CIL NO. 02-4B-005-1) PROVIDING THE ROTARY MOTION AND DRIVES BELLCRANKS FOR PIVOTING THE HOOKS TO LATCH OR UNLATCH THE RIGHT-HAND DOORS TO THE LEFT-HAND DOORS.

FAILURE MODE:  
 FAILS TO DISENGAGE

CAUSE(S):  
 EXCESSIVE TOLERANCES/WEAR, CONTAMINATION/FOREIGN OBJECT/DEBRIS, FAILURE/DEFLECTION OF INTERNAL PART, IMPROPER RIGGING/ADJUSTMENT, THERMAL DISTORTION

EFFECTS ON:  
 (A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE  
 (A) 4-GANGED LATCH FAILS TO DISENGAGE AND ALLOW OPENING OF PAYLOAD BAY DOORS.  
 (B) NO EFFECT.  
 (C) POTENTIAL LOSS OF MISSION.  
 (D) NO EFFECT ON CREW/VEHICLE.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTUATION MECH-PBD

FMEA NO 02-4B -002 -3

REV:03/03/88

DISPOSITION & RATIONALE:

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A) DESIGN

LATCH AND MECHANISM MATERIALS (6AL-4V TITANIUM, INCONEL 718, A286 CRES) CHOSEN FOR HIGH STRENGTH/LOW WEAR CHARACTERISTICS. LATCH MECHANISM DESIGNED WITH POSITIVE MARGINS OF SAFETY FOR WORST CASE THERMAL CONDITION. LATCH MECHANISM HOOK REACH CAPABILITY EXCEEDS MAXIMUM PREDICTED ROLLER DISTANCE FOR WORST CASE THERMAL CONDITION (TAIL SUN). Y-Z ALIGNMENT ROLLERS ENSURE PROPER CAPTURE ENVELOPE FOR DOOR OVERLAP CASE. ALL LINKAGES DESIGNED WITH DUAL ROTATING SURFACES AND DUAL LOCKING DEVICES ON PIVOT SHAFTS. DESIGN OF THE ACTUATION SYSTEM PERMITS PARTIAL WORKAROUND OF THIS FAILURE MODE BY EXTRAVEHICULAR ACTIVITY (EVA) CREW EXCEPT FOR CERTAIN PAYLOADS WHICH MAY LIMIT ACCESS.

(B) TEST

QUALIFICATION TESTS: THE ACTUATOR IS CERTIFIED PER CR-28-287-0040-0001H (REF. FMEA/CIL NO. 02-4B-005-1). THE PAYLOAD BAY DOOR (PBD) LATCHING MECHANISM IS CERTIFIED PER CR-29-594360-001E FOR CENTERLINE LATCH MECHANISM. SYSTEM QUALIFICATION TEST ON 15 FOOT PBD TEST ARTICLES (087) INCLUDED: ACCEPTANCE - TO CONFORM ALL COMPONENTS HAVE BEEN ASSEMBLED AND RIGGED PER MLO308-0022. ORBITAL FUNCTIONS - 3 THERMAL CONDITIONS WITH SIMULATED THERMAL DISTORTIONS OF BULKHEADS AND SILL LONGERONS AND ONE CENTERLINE OVERLAP AND ONE CENTERLINE GAP TEST. OPERATIONAL LIFE TESTS - A TOTAL OF 360 CYCLES WERE CONDUCTED ON THE FORWARD AND 334 CYCLES WERE CONDUCTED ON THE AFT CENTERLINE LATCHES. ACOUSTIC TESTS - PER MF0004-014C SPEC. CERTIFICATION BY ANALYSIS/SIMILARITY - HUMIDITY, FUNGUS, OZONE, PACKAGING, THERMAL VACUUM. SALT SPRAY, SAND/DUST, SHOCK-BASIC DESIGN ULTIMATE LOADS, ACCELERATION, MARGIN OF SAFETY AND MISSION ACOUSTIC LIFE.

ACCEPTANCE TESTS: THE CENTERLINE LATCHING MECHANISMS WERE RIGGED PER CONTROLLED SPECIFICATION MLO308-0022. OPERATION OF LATCHES ARE VERIFIED DURING CHECKOUT AT KSC WHICH INCLUDES PAYLOAD BAY DOOR FUNCTIONAL AND FINAL CHECKOUT PRIOR TO FLIGHT.

OMRSD: GROUND TURNAROUND INCLUDES VISUAL INSPECTION FOR EVIDENCE OF BINDING OR JAMMING DURING DUAL MOTOR RELEASE FUNCTIONAL CHECK.

(C) INSPECTION

RECEIVING INSPECTION

RECEIVING INSPECTION VERIFIES MATERIAL AND PROCESS CERTIFICATIONS.

CONTAMINATION CONTROL

CLEANLINESS VERIFICATION OF MATING SURFACE IS PERFORMED PRIOR TO INSTALLATION.

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SUBSYSTEM :ACTUATION MECH-PBD

FMEA NO 02-4B -002 -3

REV:03/08/88

**ASSEMBLY/INSTALLATION**

DETAIL HARDWARE FABRICATION IS VERIFIED AND INSPECTED ON INDIVIDUAL PLANNING DOCUMENTS. THREADED FASTENER INSTALLATION INCLUDING TORQUE, LOOP PIN INSTALLATION AND SAFETY WIRING OF REQUIRED FASTENERS VERIFIED BY INSPECTION. INSTALLATION IS A SAFETY CRITICAL OPERATION AND ADHERED TO. FINAL RIGGING, ALIGNMENT, AND SHIMMING ARE PER MLO SPECIFICATION AND VERIFIED BY INSPECTION. LUBRICANT APPLICATION VERIFIED BY INSPECTION.

**NONDESTRUCTIVE EVALUATION**

PENETRANT INSPECTION IS VERIFIED BY INSPECTION.

**CRITICAL PROCESSES**

HEAT TREATMENT IS VERIFIED BY INSPECTION.

**TESTING**

ACCEPTANCE TESTING VERIFIED BY INSPECTION.

**HANDLING/PACKAGING**

HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED BY INSPECTION.

**(D) FAILURE HISTORY**

THERE HAVE BEEN NO ACCEPTANCE TEST, QUALIFICATION TEST, FIELD OR FLIGHT FAILURES ASSOCIATED WITH THIS FAILURE MODE.

**(E) OPERATIONAL USE**

THERMAL CONDITIONING OF VEHICLE CAN BE DONE TO ATTEMPT TO ALLEVIATE PROBLEM. ABORT DECISION REQUIRED IF DOOR(S) CAN NOT BE OPENED.