

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTUATION MECH-PBD FMEA NO 02-4B -114 -1 REV:03/08/88

ASSEMBLY : LATCH MECHANISM, CENTERLINE CRIT. FUNC: 1R
P/N RI : V070-594341 CRIT. HDW: 2
P/N VENDOR: VEHICLE 102 103 104
QUANTITY : 16 EFFECTIVITY: X X X
: 1 PER EACH CENTERLINE PHASE(S): PL LO OO X DO LS
LATCH ASSEMBLY

PREPARED BY: REDUNDANCY SCREEN: A-PASS B-N/A C-PASS
DES M. A. ALLEN APPROVED BY: APPROVED BY (NASA):
REL M. B. MOSKOWITZ DES *L. Campbell* SSM *L.C. Moore 3/18/88*
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QE *W.J. Smith* QE *W.J. Smith*

ITEM:
LINK, CENTERLINE

FUNCTION:
DRIVES HOOK TO ENGAGE WITH ROLLER ON OPPOSITE DOOR.

FAILURE MODE:
STRUCTURAL FAILURE

CAUSE(S):
MANUFACTURING DEFECT, FATIGUE, MATERIAL DEFECT, STRESS CORROSION,
EXCESSIVE LOAD

EFFECTS ON:
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE
(A) LOSS OF SINGLE LATCH.
(B,C) ENTRY MAY PROCEED WITH ANY SINGLE LATCH DISENGAGED, REF.
JSC08934.
(D) POSSIBLE LOSS OF CREW/VEHICLE IF MORE THAN ONE CENTERLINE LATCH
FAILS TO LATCH.

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. LINK DESIGNED FOR ALL
FLIGHT LOADS AND ACTUATOR STALL CONDITION. LINK STRENGTH VERIFIED BY
FRACTURE MECHANICS ANALYSIS. ALL MECHANISMS 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 IF PAYLOAD DOES NOT LIMIT ACCESS.

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(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 LATCHING MECHANISM IS CERTIFIED PER CR-29-594360-001E FOR CENTERLINE LATCH MECHANISM. SYSTEM QUALIFICATION TEST ON 15 FOOT PAYLOAD BAY DOOR 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 OF HARDWARE TO INSURE THAT PARTS ARE NOT BROKEN OR DEFORMED AND MONITORING FUNCTIONAL TEST FOR EVIDENCE OF BINDING OR JAMMING.

(C) INSPECTION

RECEIVING INSPECTION

RECEIVING INSPECTION VERIFIES MATERIAL AND PROCESS CERTIFICATIONS.

CONTAMINATION CONTROL

CORROSION PROTECTION VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

MACHINING OPERATIONS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

PENETRANT INSPECTION VERIFIED BY INSPECTION.

CRITICAL PROCESSES

HEAT-TREAT FOR MAXIMUM TENSILE AND CRYOGENIC PROPERTIES VERIFIED BY INSPECTION. APPLICATION OF DRY FILM LUBE VERIFIED BY INSPECTION.

TESTING

ACCEPTANCE TESTING IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING

HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED.

(D) FAILURE HISTORY

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

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(E) OPERATIONAL USE

LATCH TOOLS ARE AVAILABLE FOR EVA WORKAROUND EXCEPT IN THE CASE OF CERTAIN PAYLOADS WHICH LIMIT ACCESS. ABORT DECISION REQUIRED IF DOOR(S) CANNOT BE OPENED.