

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTUATION MECH-PBD FMEA NO 02-4B -403 -2 REV:03/08/88

ASSEMBLY : PAYLOAD BAY DOOR, LEFT SIDE CRIT. FUNC: 1
P/N RI : V070-594302 CRIT. HDW: 1
P/N VENDOR: VEHICLE 102 103 104
EFFECTIVITY: X X X
QUANTITY : 4 PHASE(S): PL LO OO X DO LS

PREPARED BY: REDUNDANCY SCREEN: A- E- C-
DES M. A. ALLEN APPROVED BY: APPROVED BY (NASA):
REL M. B. MOSKOWITZ DES *D. Campbell* SSM *R.C. Moore 3/18/88*
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ITEM:

STRUCTURE, PASSIVE SHEAR FITTING, ROLLER AND CLAW

FUNCTION:

REACTS TORSIONAL LOADS ON MID FUSELAGE BY TRANSFERRING FORE AND AFT SHEAR LOADS BETWEEN LEFT AND RIGHT PAYLOAD BAY DOORS AT CENTERLINE JOINT. ENGAGES WITH CLAW FITTING ON RIGHT DOORS.

FAILURE MODE:

STRUCTURAL FAILURE

USE(S):

CORROSION, DEFECTIVE PART/MATERIAL OR MANUFACTURING DEFECT, EXCESSIVE LOAD, FATIGUE, FAILURE/DEFLECTION OF INTERNAL PART

EFFECTS ON:

(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE

(A, B) DEGRADED SHEAR TRANSFER CAPABILITY BETWEEN PAYLOAD BAY DOORS. INCREASED LOAD ON OTHER THREE FITTINGS. NO ANALYSIS EXISTS TO SUPPORT CAPABILITY OF THREE FITTINGS ADEQUATELY CARRYING LOAD.

(C, D) DEGRADED TORSIONAL STRENGTH/STIFFNESS OF MID-FUSELAGE. POSSIBLE LOSS OF CREW/VEHICLE.

DISPOSITION & RATIONALE:

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

(A) DESIGN

ROLLER SUPPORT BRACKET AND ATTACHMENTS TO PAYLOAD BAY DOOR HAVE POSITIVE MARGINS OF SAFETY FOR ALL LOADING CONDITIONS. DESIGN ULTIMATE LOAD IS 1.4 TIMES LIMIT LOAD. MATERIAL IS 6AL-4V TITANIUM CHOSEN FOR HIGH STRENGTH/LOW WEAR.

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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 (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 MFO004-014C 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 ENSURE THAT PARTS ARE NOT BROKEN OR DEFORMED AND MONITORING FUNCTIONAL TESTS FOR EVIDENCE OF BINDING OR JAMMING. PROPER FUNCTION OF THE COMPONENTS IS VERIFIED PERIODICALLY AS PART OF THE MAINTENANCE SAMPLING PROGRAM.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIALS AND PROCESSES CERTIFICATIONS VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

ASSEMBLY IS PERFORMED IN CLEAN ENVIRONMENT VERIFIED BY INSPECTION. CORROSION PROTECTION VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

INSTALLATION OF THREADED FASTENERS IS PER SPECIFICATION, BUT FINAL TORQUE IS ACCOMPLISHED AT INSTALLATION AND ADJUSTMENT ON VEHICLE AND IS VERIFIED BY INSPECTION. ALL DETAILS ARE VERIFIED BY INSPECTION PRIOR TO ASSEMBLY. ASSEMBLY IS VERIFIED BY INSPECTION. DETAIL HARDWARE IS FABRICATED ON INDIVIDUAL MANUFACTURING ORDERS, IS VERIFIED BY INSPECTION, AND MACHINED PER SPECIFICATION.

NONDESTRUCTIVE EVALUATION

PENETRANT INSPECTION IS VERIFIED BY INSPECTION.

CRITICAL PROCESSES

HEAT TREATING IS VERIFIED BY INSPECTION.

TESTING

ATP IS VERIFIED BY INSPECTION.

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HANDLING/PACKAGING

HANDLING AND PACKAGING REQUIREMENTS 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

NONE.