

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : ACTUATION MECH-PBD FMEA NO 02-4B -109 -2 REV:03/08/88

ASSEMBLY : PBD ACTUATION CRIT. FUNC: 1R
 P/N RI : V070-594274-001 CRIT. HDW: 3
 P/N VENDOR: VEHICLE 102 103 104
 QUANTITY : 8 EFFECTIVITY: X X X
 : 4 PER SIDE PHASE(S): PL LO OO X DO LS

REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS
 PREPARED BY: APPROVED BY: APPROVED BY (NASA):
 DES M. A. ALLEN DES *[Signature]* SSM *[Signature]* 3/12/88
 REL M. B. MOSKOWITZ REL *[Signature]* REL *[Signature]*
 QE W. J. SMITH QE *[Signature]* QE *[Signature]*

ITEM:

ROLLER GUIDE, FORE/AFT ALIGNMENT, AFT END OF DOOR

FUNCTION:

ENGAGES WITH HOOK ON AFT BULKHEAD TO ALIGN DOOR IN FORE AND AFT DIRECTION.

FAILURE MODE:

STRUCTURAL FAILURE

CAUSE(S):

MANUFACTURING DEFECT, MATERIAL DEFECT, IMPROPER RIGGING/ADJUSTMENT, EXCESSIVE LOADING, FATIGUE, VIBRATION, CORROSION

EFFECTS ON:

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

(A, B) INCREASE LOAD ON REMAINING THREE FORE/AFT ALIGNMENT ROLLER BRACKETS AT AFT END OF DOOR.

(C, D) NO EFFECT ON MISSION, CREW OR VEHICLE. POSSIBLE LOSS OF CREW/VEHICLE IF THREE OF ONE GANG OF FOUR ROLLER GUIDES ARE LOST.

FAILS REDUNDANCY SCREEN "B" SINCE A FAILURE OF ONE OR MORE OF THE EIGHT ROLLER GUIDES CANNOT BE VISUALLY DETECTED FOR A STRUCTURAL FAILURE IN FLIGHT.

DISPOSITION & RATIONALE:

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

(A) DESIGN

ROLLER DESIGNED WITH POSITIVE MARGIN OF SAFETY FOR ALL DESIGN LOAD CONDITIONS WHICH INCLUDE BULKHEAD LATCHING WITH MAXIMUM STRUCTURAL AND THERMAL DISTORTION AND FLIGHT LOADS. MATERIAL UTILIZED, A286 CRES, IS ACCEPTABLE AS INSTALLED TO STRESS AND GALVANIC CORROSION REQUIREMENTS. LOAD INDUCED IN PASSIVE ROLLER IS LIMITED THROUGH ACTION OF THE DOOR MOUNTED PASSIVE STOP.

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(B) TEST

QUALIFICATION TESTS: THE QUALIFICATION ACTUATOR IS CERTIFIED PER CR-29-287-0039-0001D (REF. FMEA/CIL 02-4B-007-3). THE PAYLOAD BAY DOOR LATCHING MECHANISM IS CERTIFIED PER CR-29-594260-001E FOR AFT MECHANISM. SYSTEM QUALIFICATION TESTS ON 15 FOOT PAYLOAD BAY DOOR TEST ARTICLE (087) INCLUDED: ACCEPTANCE - TO CONFIRM ALL COMPONENTS HAVE BEEN ASSEMBLED AND RIGGED PER MLO308-0022; THERMAL CYCLE TEST - CYCLED 5 TIMES BETWEEN +15 DEG F AND +325 DEG F AT DOOR AND BETWEEN -180 DEG F AND +120 DEG F AT AFT BULKHEAD; THE AFT LATCHES WERE CYCLED AT -35 DEG F AND +60 DEG F AT BULKHEAD AND AT +40 DEG F AND +245 DEG F AT DOOR; HUMIDITY TEST - ON AFT LATCH MECHANISM PER MIL-STD-810B, METHOD 507, PROCEDURE IV, CYCLE ONE TIME AT EACH MOTOR CONDITION DURING THE SECOND CYCLE; ORBITAL FUNCTIONS - 3 THERMAL CONDITION WITH SIMULATED THERMAL DISTORTIONS OF BULKHEADS AND SILL LONGERONS; OPERATING LIFE TEST - MECHANICAL SYSTEMS CYCLED 265 TIMES AT AFT BULKHEAD; ACOUSTIC TEST - PER MF0004-014C FOR 5 MINUTES. CERTIFICATION BY ANALYSIS/SIMILARITY - INCLUDED: FUNGUS, OZONE PACKAGING, THERMAL VACUUM, SALT SPRAY, SAND/DUST SHOCK-BASIC DESIGN, ULTIMATE LOADS, ACCELERATION, MARGIN OF SAFETY AND MISSION ACOUSTIC LIFE.

OMRSD: GROUND TURNAROUND INCLUDES MONITORING FUNCTIONAL CHECKS TO VERIFY NO BINDING OR JAMMING AND VISUAL INSPECTION OF HARDWARE TO ENSURE THAT PARTS ARE NOT BROKEN OR DEFORMED.

(C) INSPECTION

RECEIVING INSPECTION

MATERIAL USED IS VERIFIED BY INSPECTION ON MANUFACTURING ORDERS.

CONTAMINATION CONTROL

CLEANLINESS REQUIREMENTS VERIFIED BY INSPECTION. CORROSION PROTECTION PER MA0608-301 PRIOR TO MALCOMIZE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

MACHINING OPERATIONS AND TOLERANCES ARE PER DRAWING AND APPLICABLE MACHINE SPECIFICATION AND VERIFIED BY INSPECTION. ROLLER ASSEMBLY INSTALLATION IS COMPLETE PER DRAWING, VERIFIED BY QUALITY ON MANUFACTURING ORDERS, AND PLANNED SEQUENTIALLY TO MAINTAIN DRAWING CONFIGURATION. FINAL RIGGING ALIGNMENT IS PERFORMED AND SAFETY WIRE INSTALLATION IS VERIFIED BY INSPECTION ON MANUFACTURING ORDER AT THE NEXT APPLICABLE DRAWING.

NONDESTRUCTIVE EVALUATION

PENETRANT INSPECTION OF ROLLER PER MT0501-504 IS REQUIRED AND VERIFIED BY INSPECTION.

CRITICAL PROCESSES

MALCOMIZE HARDNESS COAT IS APPLIED PER MA0111-017, AND VERIFIED BY INSPECTION. APPLICATION OF DRY FILM LUBE LB0140-004 VERIFIED BY INSPECTION ON MANUFACTURING ORDERS.

TESTING

ACCEPTANCE TESTING VERIFIED BY INSPECTION. ROCKWELL HARDNESS TESTING OF MALCOMIZE SURFACE VERIFIED BY INSPECTION.

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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

NONE.