SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTUATION MECH-PBD FMEA NO 02-4B -109 -1 REV:03/08/88

ASSEMBLY :PBD ACTUATION
P/N RI :V070-594274-001
P/N VENDOR:
QUANTITY :8
:FOUR PER SIDE

CRIT. FUNC: 1
CRIT. HDW: 1

VEHICLE	102	103	104
EFFECTIVITY:	X	X	X

PHASE(S): PL LO OO X DO LS

REDUNDANCY SCREEN: A- B- C-

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ITEM:
FORE/AFT ALIGNMENT ROLLER, AFT END OF DOOR

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

FAILURE MODE:
FAILS TO ENGAGE

CAUSE(S):
ADVERSE 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,B) POSSIBLE INTERFERENCE WITH CLOSING AND LATCHING OF AFT END OF DOOR.

(C) ENTRY MAY PROCEED WITH ONE OF AFT BULKHEAD LATCH GANGS DISENGAGED, HOWEVER VEHICLE IS UNSAFE IN DESCENT PHASE IF ONE CENTERLINE LATCH GANG IS DISENGAGED.

(D) POSSIBLE LOSS OF CREW/VEHICLE IF CENTERLINE LATCHES CANNOT BE LATCHED.

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. EXTRAVEHICULAR ACTIVITY (EVA) CREW MAY PROVIDE PARTIAL WORKAROUND IF PAYLOAD DOES NOT LIMIT ACCESS.

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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 ML0308-0022; 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 CONDITIONS WITH SIMULATED THERMAL DISTORTIONS OF BULKHEAD 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. PROPER FUNCTION OF THE COMPONENTS IS VERIFIED PERIODICALLY AS PART OF THE MAINTENANCE SAMPLING PROGRAM.

(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 PER LB0140-004 VERIFIED BY INSPECTION ON MANUFACTURING ORDERS.

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

(E) OPERATIONAL USE
THERMAL CONDITIONING OF VEHICLE CAN BE DONE TO ATTEMPT TO ALLEVIATE PROBLEM.