SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTUATION MECH-RADIATORS FMEA NO 02-4G -156 -1 REV:03/07/88

ASSEMBLY :RADIATOR DEPLOYMENT CRIT. FUNC: 1R
P/N RI :MC203-0002-0012,19,32,39 CRIT. HDW: 2
P/N VENDOR:T01P31094 TULSA DIV VEHICLE 102 103 104
QUANTITY :12 EFFECTIVITY: X X X
:SIX PER SIDE PHASE(S): PL LO OO X DO LS
:THREE PER PANEL

REDUNDANCY SCREEN: A-FAIL B-FAIL C-PASS

PREPARED BY:		APPROVED BY:		APPROVED BY (NASA):	
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ITEM:
BEARING, HINGE FITTING

FUNCTION:
ATTACHES DEPLOYABLE RADIATOR PANEL TO PAYLOAD BAY DOOR. ALLOWS ROTATION OF RADIATOR TO EXPOSE UNDER SURFACE FOR MAXIMUM COOLING CAPABILITY. INCORPORATES DUAL ROTATING SURFACE.

FAILURE MODE:
FAILS TO ROTATE

CAUSE(S):
ADVERSE TOLERANCES/WEAR, CONTAMINATION/FOREIGN OBJECT/DEBRIS, CORROSION, DEFECTIVE PART/MATERIAL OR MANUFACTURING DEFECT, EXCESSIVE LOAD

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

(A) LOSS OF CAPABILITY TO DEPLOY/STOW RADIATOR.

(B) REDUCED COOLING CAPABILITY IF RADIATOR CANNOT BE DEPLOYED. INTERFERENCE WITH PAYLOAD BAY DOOR CLOSING IF RADIATOR CANNOT BE STOWED.

(C) RESTRICTED MISSION IF RADIATOR CANNOT BE DEPLOYED WHEN REQUIRED.

(D) POSSIBLE LOSS OF VEHICLE/CREW IF RADIATORS CANNOT BE STOWED RESULTING IN INTERFERENCE WITH CLOSING OF PAYLOAD BAY DOORS.

FAILS REDUNDANCY SCREEN "A" SINCE THERE ARE NO TURNAROUND TESTS FOR FIRST FAILURE OF A BEARING WHICH FAILS TO ROTATE AND FAILS SCREEN "B" SINCE FAILURE OF ONE SURFACE OF THE HINGE BEARING FAILURE CANNOT BE DETECTED IN FLIGHT.

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DISPOSITION & RATIONALE:
(A)DESIGN (B)TEST (C)INSPECTION (D)FAILURE HISTORY (E)OPERATIONAL USE

(A) DESIGN
HINGE DESIGNED WITH POSITIVE MARGIN OF SAFETY FOR ALL DESIGN LOAD CONDITIONS WHICH INCLUDE RADIATOR DEPLOY/STOW WITH MAXIMUM STRUCTURAL DISTORTION AND FLIGHT LOADS. MATERIAL UTILIZED, 2024 ALUMINUM IS ACCEPTABLE AS INSTALLED TO STRESS AND GALVANIC CORROSION REQUIREMENTS. ALL ROTATING JOINTS EMPLOY DUAL ROTATING SURFACES TO PRECLUDE JAMMING DUE TO SINGLE SURFACE TO SURFACE BINDING. RIGGING/ADJUSTMENT CONTROLLED (REF. ML0308-0023). DESIGN OF HINGE FITTING PERMITS PARTIAL WORKAROUND OF THE FAILURE MODE BY EXTRAVEHICULAR ACTIVITY (EVA) CREW IF PAYLOAD DOES NOT LIMIT ACCESS AND IF RADIATORS ARE FULLY DEPLOYED.

(B) TEST
QUALIFICATION TESTS: QUALIFICATION TESTS OF RADIATOR DEPLOYMENT MECHANISM ON FORWARD 15 FT. PAYLOAD BAY DOOR TEST ARTICLE (087) INCLUDE LIFE CYCLES, OPERATION WITH SIMULATED THERMAL DISTORTIONS OF HINGE LINE, AND VIBRO-ACOUSTIC. DEPLOYABLE RADIATORS RIGGED PER CONTROLLED SPECIFICATION ML0308-0023. OPERATION OF RADIATOR MECHANISMS VERIFIED IN CHECKOUT AT KSC WHICH INCLUDES RADIATOR FUNCTIONAL CHECK.

OMRSD: NO PRACTICAL OMRSD TEST TO DETECT FIRST FAILURE.

(C) INSPECTION

RECEIVING INSPECTION
MATERIAL IS VERIFIED BY PHYSICAL/CHEMICAL PROPERTIES BY CERTIFICATION IN RECEIVING INSPECTION.

CONTAMINATION CONTROL
HINGE ASSEMBLY IS PROTECTED TO PRECLUDE CONTAMINATION WHILE IN PICKUP FIXTURE AND DURING SHIPMENT.

ASSEMBLY/INSTALLATION
HINGE FITTING COMPLIANCE TO ENGINEERING DRAWING IS VERIFIED BY INSPECTION. INSTALLATION OF BEARINGS INTO RADIATOR FITTINGS IS ACCOMPLISHED PER MATERIAL PROCESSING PROCEDURE (MPP), AND TESTED RELATIVE TO PROOF LOAD AND TORQUE. WITNESSED AND VERIFIED BY INSPECTION. LOCATION AND FINAL INSTALLATION OF HINGE ASSEMBLY CONTROLLED BY FINAL ASSEMBLY JIG TOOL LOCATORS, AND VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
MACHINED DETAILS ARE SUBJECTED TO PENETRANT INSPECTION, VERIFIED BY INSPECTION.

CRITICAL PROCESSES
HEAT TREATING IS VERIFIED BY INSPECTION.

TESTING
ROTATIONAL AND AXIAL MOVEMENT IS VERIFIED BY INSPECTION.

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.