

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : P/L RETEN & DEPLOY-MPM PYRO FMEA NO P2-5A- J01-1 REV:08/12/88

ASSEMBLY	: MPM SHOULDER AND PEDESTALS	CRIT. FUNC:	1
P/N RI	: SKD26100104-201	CRIT. HDW:	1
	: MC32S-0021-0001	VEHICLE	102 103 104
QUANTITY	: 4	EFFECTIVITY:	X X X
		PHASE(S):	PL LO OO X DO LS

		REDUNDANCY SCREEN:	A-	E-	C-
PREPARED BY:		APPROVED BY:	APPROVED BY (NASA): 9-12		
DES	R. H. YEE	DES	SSM RWH Thomas Strauss		
REL	M. B. MOSKOWITZ	REL	Va [Signature] 9-10-88		
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ITEM:

RETRACTOR, MANIPULATOR POSITIONING MECHANISM (MPM) JETTISON

FUNCTION:

CONNECTED TO OVER-CENTER LINKAGE AT UPPER PORTION OF MANIPULATOR POSITIONING MECHANISM (MPM); FOUR PER ARM. IF MANIPULATOR CANNOT BE PROPERLY STOWED INTO PAYLOAD BAY TO CLEAR PAYLOAD BAY (PLB) DOORS, RETRACTOR PULLS LINKAGE OVER-CENTER ALLOWING FOR SEPARATION OF UPPER MPM AT THREE LOCATIONS AND UPPER MPM WITH RMS AT SHOULDER LOCATION.

FAILURE MODE:

FAILS TO FUNCTION UPON RECEIVING PRESSURE OUTPUT FROM EITHER OR BOTH (REDUNDANT) PRESSURE CARTRIDGES

CAUSE(S):

DUAL PRESSURE CARTRIDGE FAILURE, STRUCTURAL FAILURE, JAMMED PISTON, GAS BLOWBY, DAMAGED PISTON OR HOUSING SEAL, PISTON REBOUND

EFFECTS ON:

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

(A) LOSS OF FUNCTION.

(B) RESULTANT INABILITY TO CLOSE PAYLOAD BAY DOORS, IF MPM PROTRUDES INTO INNER MOLD LINE (IML) OF DOOR (LOSS OF CAPABILITY TO STOW MPM HAS ALREADY OCCURRED).

(C, D) INABILITY TO DE-ORBIT SAFELY IF PAYLOAD BAY DOOR CANNOT BE PROPERLY CLOSED; POSSIBLE LOSS OF CREW/VEHICLE.

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DISPOSITION & RATIONALE:

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

(A) DESIGN

DESIGN INCORPORATES DUAL (REDUNDANT) PRESSURE CARTRIDGES, A SINGLE 85% CARTRIDGE WILL OPERATE RETRACTOR AGAINST 750 LB AXIAL LOAD SIMULATING OVER-CENTER LINKAGE, BUILT-IN ANVIL TO CREATE A PISTON LOCK AT END OF STROKE, STRUCTURAL INTEGRITY CAPABILITY WHEN ACTIVATED WITH PISTON RESTRAINED.

(B) TEST

QUALIFICATION TESTS: SALT FOG, TEMPERATURE AND PRESSURE CYCLING, SHOCK, TRANSIENT AND RANDOM VIBRATION, HIGH/LOW/AMBIENT FIRING WITH SINGLE AND DUAL CARTRIDGES, MARGIN DEMONSTRATION WITH SINGLE 85% CARTRIDGE, LOCKED SHUT, 50 LB PISTON POST-FIRING LOCK TEST. CR 44-325-0021-0001, QTR (SCOT INC) 6004-201.

ACCEPTANCE TESTS: 100% HYDROSTATIC PROOF PRESSURE TEST OF HOUSINGS (1.2 TIMES NORMAL OPERATING PRESSURE), LEAK TEST (O-RINGS), SHEAR PIN TEST, X-RAY, SHEAR PIN INSTALLATION VERIFICATION. ATP (SCOT INC) 6004-300.

SYSTEM LEVEL TESTS: AMBIENT SIMULATED ZERO-G FIRINGS FOR SHOULDER AND FORWARD PEDESTAL RETENTION FITTING - DUAL CARTRIDGE FIRING. SYSTEM LEVEL: CR 44-000002-001, STS 83-0987.

OMRSD: NONE - HARDWARE INACCESSIBLE INSIDE MPM.

(C) INSPECTION

RECEIVING INSPECTION

RAW MATERIAL IS VERIFIED BY INSPECTION TO ASSURE SPECIFIED SHUTTLE REQUIREMENTS ARE SATISFIED.

CONTAMINATION CONTROL

CONTAMINATION CONTROL AND CORROSION PROTECTION PROCESSES ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

VISUAL INSPECTION, IDENTIFICATION PERFORMED, AND PARTS PROTECTION ARE VERIFIED BY INSPECTION. CARTRIDGE RELATIVE TO HOUSING IS INSPECTED AFTER INSTALLATION TO ASSURE PROPER BACKUP RING SEATING TO PREVENT PRESSURE BLOWBY. SELECTED MANUFACTURING/ASSEMBLY STEPS ARE IDENTIFIED BY NASA QUALITY ASSURANCE AND VERIFIED BY GOVERNMENT INSPECTION AS MANDATORY INSPECTION POINTS (MIPS).

NONDESTRUCTIVE EVALUATION

PARTS ARE X-RAYED TO ASSURE FREEDOM FROM VOIDS AND CRACKS AND TO VERIFY CORRECT ASSEMBLY AND PRESENCE OF ALL DETAILED PARTS. X-RAYS ARE REVIEWED BY VENDOR, DCAS, AND NASA ENGINEERING AND QUALITY.

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CRITICAL PROCESSES

ALL MANUFACTURING PROCESSES, SUCH AS WELDING, HEAT TREATING, PASSIVATION AND ANODIZING ARE VERIFIED BY INSPECTION.

TESTING

ATP IS VERIFIED PER PROCEDURE.

HANDLING/PACKAGING

HANDLING, PACKAGING AND STORAGE ENVIRONMENTS 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.