SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :CREW MODULE SEALS   FMEA NO 01-4 -CS24 -1   REV:03/29/88

ASSEMBLY :SIDE HATCH   CRIT. FUNC: 1
P/N RI :V070-332556-001   CRIT. HDW: 2
P/N VENDOR: VEHICLE: 102 103 104
QUANTITY :1   EFFECTIVITY: X X X
PHASE(S): PL LO X OO X DO X LS

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

PREPARED BY:		APPROVED BY:	APPROVED BY (NASA):
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ITEM:
SEAL, SIDE HATCH WINDOW ASSEMBLY

FUNCTION:
THIS SEAL PREVENTS LEAKAGE OF CREW MODULE ATMOSPHERE.

FAILURE MODE:
LEAKAGE

CAUSE(S):
CRACKS, LOW TEMPERATURE, MATERIAL DEGRADATION

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

(A) FAILURE OF THE SINGLE SEAL WOULD RESULT IN LEAKAGE OF CREW MODULE CONSUMABLES.

(B) FAILURE OF THE SINGLE SEAL WOULD RESULT IN THE LOSS OF CREW MODULE CONSUMABLES.

(C) FAILURE OF THE SINGLE SEAL WOULD RESULT IN LOSS OF CREW MODULE CONSUMABLES, HOWEVER, THIS WOULD NOT EXCEED THE MAKEUP CAPABILITY OF THE ARPCS BUT WOULD POSSIBLY RESULT IN EARLY TERMINATION OF MISSION.

(D) FAILURE OF SINGLE SEAL AND AN ADDITIONAL SEAL FAILURE WITHIN THE CREW MODULE COULD RESULT IN A LEAK RATE EXCEEDING THE ARPCS MAKEUP CAPABILITY RESULTING IN LOSS OF CREW/VEHICLE.

REDUNDANCY SCREENS: SEAL FAILS SCREENS "A" AND "B" BECAUSE LEAK TEST OF EACH SEAL INDIVIDUALLY IS NOT FEASIBLE.

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

(A) DESIGN
THE SINGLE SEAL IS AN O-RING FACE SEAL INSTALLED IN A DOVETAIL GROOVE IN REDUNDANT WINDOW PANE RETAINER. THE SEAL IS ADJACENT TO STRUCTURAL ATTACH BOLTS OF WINDOW ASSEMBLY TO HATCH STRUCTURE. SEAL IS COMPRESSED UNTIL METAL TO METAL CONTACT IS OBTAINED AT WINDOW TO HATCH INTERFACE. SEAL MATERIAL IS FLUOROCARBON ELASTOMER (VITON).

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(B) TEST

ACCEPTANCE TESTS: THE CREW MODULE IS PRESSURE TESTED AT 14.7 AND 3.2 PSID.

QUALIFICATION TESTS: QUALIFICATION TESTS OF SIDE HATCH STRUCTURE PER S104013 INCLUDED LEAK RATE AND OUTER HATCH MOVEMENT, CYCLING TEST; DE ULTIMATE STATIC INTERNAL AND EXTERNAL PRESSURE LOADING TESTS; LIMIT PRESSURE AND OUTER HATCH MOVEMENT, CYCLING TEST.

OMRSD: NO TEST IS CAPABLE OF DETECTING SINGLE SEAL FAILURE. CREW MODULE PRE-LIFTOFF PRESSURE TEST AT 2 PSID WOULD PROBABLY NOT DETECT LEAKAGE ACROSS DUAL SEAL FAILURES.

(C) INSPECTION

RECEIVING INSPECTION
RECEIVING INSPECTORS CHECK FOR CORRECT IDENTITY AND FOR DAMAGE, VERIF THAT SUPPLIER SUBMITTED REQUIRED REPORTS AND VERIFY PARTS ARE PROPERL PACKAGED TO PREVENT DAMAGE DURING STORAGE.

CONTAMINATION CONTROL
CLEANLINESS IS MAINTAINED PER MA0110-311. WINDOWS ARE VERIFIED TO BE VISIBLY CLEAN PER MA0110-301 JUST PRIOR TO AND JUST SUBSEQUENT TO ASSEMBLY. INSPECTORS ALSO VERIFY, BEFORE INSTALLATION, THAT THE SEAL SURFACE AND VITON SEAL ARE CLEAN, PER MA0106-328.

ASSEMBLY/INSTALLATION
SEALS ARE INSTALLED PER MA0106-328. PRIOR TO INSTALLATION AN INSPECTI IS PERFORMED TO VERIFY THAT THE SEALING SURFACE IS NOT DAMAGED. INSPECTORS ALSO VERIFY THE VITON SEAL SURFACE TO BE FREE OF DEFECTS, BLEMISHES AND IRREGULARITIES PER DRAWING REQUIREMENTS, BEFORE INSTALLATION. SEALING SURFACES OF RETAINER ASSEMBLY, BEFORE SEALING T O-RING AND CREW MODULE, ARE PROTECTED PER MA0106-328.

TESTING
THE ACCEPTANCE LEAK TEST IS WITNESSED AND VERIFIED BY INSPECTION.

HANDLING/PACKAGING
THE SUPPLIER PACKAGES DETAIL SEALS PER MK0116-001 REQUIREMENTS AND IDENTIFIES BY PART NUMBER.

(D) FAILURE HISTORY

THERE HAVE BEEN NO ACCEPTANCE TEST, QUALIFICATION TEST, FIELD OR FLIGH FAILURES ASSOCIATED WITH THIS FAILURE MODE.

(E) OPERATIONAL USE

IF INTERFACE LEAKAGE OCCURS, CREW MODULE CONSUMABLES CAN BE MONITORED AND ASSESSED FOR FEASIBILITY OF CONTINUING THE MISSION PER CABIN LEAK PROCEDURES AND FLIGHT RULES.