

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : CREW MODULE SEALS FMEA NO 01-4 -QS40 -1 REV:03/29/82

ASSEMBLY : STAR TRACKER
P/N RI :
P/N VENDOR: M83248/1-432
QUANTITY : 2

VEHICLE: 102 103 104
EFFECTIVITY: X X X
PHASE(S): PL LO X OO X DO X LS

CRIT. FUNC: 1R
CRIT. HDW: 3

PREPARED BY:
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REDUNDANCY SCREEN: A-FAIL B-FAIL C-PASS
APPROVED BY:
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ITEM:

SEAL, STAR TRACKER BOOM

FUNCTION:

THESE SEALS PREVENT 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 SINGLE SEAL HAS NO EFFECT. LOSS OF REDUNDANT SEAL WOULD RESULT IN THE LOSS OF CREW MODULE CONSUMABLES.

(B) FAILURE OF A SINGLE SEAL HAS NO EFFECT. LOSS OF REDUNDANT SEAL WOULD RESULT IN THE LOSS OF CREW MODULE CONSUMABLES.

(C) FAILURE OF A SINGLE SEAL HAS NO EFFECT. LOSS OF THE REDUNDANT 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 HAS NO EFFECT. LOSS OF THE REDUNDANT 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

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(A) DESIGN

THE SEALS ARE STANDARD FLUOROCARBON ELASTOMER (VITON) O-RINGS IN PARALLEL GROOVES WITH SCRAPER RING TO PROTECT SEALS FROM CONTAMINATION. SURFACE FINISH OF BOOM IN CONTACT WITH SEALS MINIMIZES INSTALLATION DAMAGE. EITHER SEAL PREVENTS LEAKAGE OF CREW MODULE ATMOSPHERE BY SEALING INTERFACE BETWEEN OUTER SURFACE OF STAR TRACKER BOOM AND BORE OF SUPPORT COLLAR ADJACENT TO NAVIGATION BASE.

(B) TEST

ACCEPTANCE TESTS: LEAK TEST BETWEEN SEALS USING TEST KIT C70-0749 IS PERFORMED WHEN STAR TRACKER BOOM AND NAVIGATION BASE ARE INSTALLED IN VEHICLE. CREW MODULE HIGH PRESSURE TEST IS PERFORMED AT 14.7 PSID AND LOW PRESSURE TEST AT 3.2 PSID TO VERIFY ALL PRESSURE CABIN PENETRATIONS.

QUALIFICATION TESTS: QUALIFICATION TESTS WERE NOT PERFORMED - CERTIFICATION IS BASED ON ACCEPTANCE TESTS AND SEAL MATERIALS DATA. OMRSD: PRESSURE TEST TO 15 PSID +/- 1.0 PSI BETWEEN SEALS AFTER REMOVAL AND REINSTALLATION OF STAR TRACKER BOOM. GROUND TURNAROUND INCLUDES PRE-LIFTOFF PRESSURIZATION TEST AT 2 PSID; HOWEVER, IT IS UNLIKELY TO DETECT COLLAR SEAL LEAKAGE.

(C) INSPECTION

RECEIVING INSPECTION

RECEIVING INSPECTORS INSPECT FOR DAMAGE AND WORKMANSHIP AND VERIFY SINGLE PIECE MOLDED CONSTRUCTION. RECEIVING INSPECTORS CHECK IDENTIFICATION AND WALL CROSS-SECTIONAL DIAMETER ON A S-3 SAMPLING BASIS. IT ALSO VERIFIED THAT SUPPLIER SUBMITTED REQUIRED REPORTS.

CONTAMINATION CONTROL

RECEIVING INSPECTORS VISUALLY INSPECT SEAL FOR CLEANLINESS. INSPECTORS ALSO VERIFY, BEFORE INSTALLATION, THAT THE SEAL AND SEALING SURFACE ARE CLEAN, PER MAO106-328.

ASSEMBLY/INSTALLATION

THE SEALS ARE INSTALLED PER MAO106-328. INSPECTORS VERIFY THAT THE SEAL AND THE SEALING SURFACE ARE NOT DAMAGED BEFORE INSTALLATION.

TESTING

INSPECTORS VERIFY LEAK TEST BETWEEN SEALS, USING TEST KIT C70-0749 OR EQUIVALENT PER VO70-331440 DRAWING REQUIREMENTS AT EACH INSTALLATION/RE-INSTALLATION OF STAR TRACKER BOOM. INSPECTORS ALSO VERIFY CREW MODULE HIGH PRESSURE TEST TO 14.7 PSID AND LOW PRESSURE TEST TO 3.2 PSID.

HANDLING/PACKAGING

THE RECEIVING INSPECTORS VERIFY THAT THE SEAL IS INDIVIDUALLY PACKAGED WITH PART NUMBER, MANUFACTURER NAME, COMPOUND NUMBER AND CURE DATE. RECEIVING INSPECTORS ALSO VERIFY THAT THE SEAL IS PACKAGED IN A WAY THAT WILL PROTECT IT DURING STORAGE.

(D) FAILURE HISTORY

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

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(E) OPERATIONAL USE

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

01-4-56