

STATEMENT
S 40200V R9 OF 45

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : SEPARATION MECHANISMS-MECH FMEA NO 02-3A -U2 -1 REV:10/09/87

ASSEMBLY : UMBILICAL SEPARATION SYSTEM

P/N RI : V401-565302

P/N VENDOR:

QUANTITY : 6

: THREE PER SIDE

VEHICLE	102	103	104
EFFECTIVITY:	X	X	X
PHASE(S):	PL	LC X CO	DO LS

CRIT. FUNC: 1
CRIT. HDW: 1-

REDUNDANCY SCREEN: A- B- C-

PREPARED BY:

DES R. H. YEE

REL M. B. MOSKOWITZ

QE E. M. GUTIERREZ

APPROVED BY:

DES *R.H. Yee* 10/1/87

REL *M.B. Moskowitz*

QE *E.M. Gutierrez* 10/6/87

APPROVED BY (NASA):

SSM

REL *[Signature]* 10-22-87

QE *[Signature]* 10-22-87

ITEM:

DEBRIS CONTAINER, UMBILICAL

FUNCTION:

CONTAINS POST-SEPARATION FRANGIBLE NUT FRAGMENTS.

FAILURE MODE:

STRUCTURAL FAILURE

CAUSE(S):

CORROSION, DEFECTIVE PART/MATERIAL OR MANUFACTURING DEFECT, FAILURE/
DEFLECTION OF PARTS

EFFECT(S) ON:

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

(A) NONE.

(B) FRAGMENTS MAY DAMAGE ADJACENT EQUIPMENT AND STRUCTURE.

(C) POSSIBLE LOSS OF MISSION.

(D) POSSIBLE LOSS OF CREW/VEHICLE.

DISPOSITION & RATIONALE:

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

(A) DESIGN

SAFETY FACTOR EQUAL TO OR GREATER THAN 1.4; A286 CRES WRAPPED WITH KEVLAR FABRIC; DESIGNED FOR REUSE (5 FLIGHTS); GN2 PURGE PROTECTION FROM CRYO PUMPING OR ICE; DESIGN STRESS ANALYSIS REPORT SD77-SH-0178.

(B) TEST

QUALIFICATION/CERTIFICATION TESTS: SYSTEM QUALIFIED (TO CONTAIN DEBRIS AND GAS PRESSURE) AS PART OF THE ORBITER/EXTERNAL TANK (ET) UMBILICAL (MPS CLUSTER) SEPARATION SYSTEMS CERTIFICATION/VERIFICATION TESTING PER CR-45-565330 AND TAR-STS-82-0146 (LO2-SIDE; 26 TESTS TOTAL - INCLUDES 1 QUALIFICATION/CERTIFICATION TEST AND 25 DEVELOPMENT TESTS; STS-2 CONFIGURATION) AND BY SIMILARITY TO V070-565341 - TESTED PER CR-45-565330 AND TAR-STS-82-0508 (LH2-SIDE; 23 TESTS TOTAL - INCLUDES 4 QUALIFICATION/CERTIFICATION TESTS AND 19 DEVELOPMENT TESTS; STS-1 CONFIGURATION).

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DEVELOPMENT TESTS: DUAL BOOSTER PYRO FIRINGS (3 CONTAINERS PER MPS CLUSTER); CRYOGENIC CHILL-DOWN AND SOAK; SIMULATED FEED LINE FLOW, PRESSURES, AND RETRACTION; GN2 PURGE ATMOSPHERE. 27 PYRO TEST FIRINGS (USING DEBRIS CONTAINER) AT SOS COMPANY (SOS TEST REPORT 8444).

OMRSD: VISUALLY INSPECT AFTER EACH FLIGHT (PRIOR TO FERRY FLIGHT) FOR EVIDENCE OF DISTORTION, CRACKS OR VISUAL DEFECTS (FROM DEBRIS IMPACT OR PYRO OVERPRESSURE). REPLACED AFTER EVERY FIFTH FLIGHT.

(C) INSPECTION

RECEIVING INSPECTION

HARDWARE INSPECTED IN ACCORDANCE WITH QUALITY PLANNING REQUIREMENTS-DOCUMENT (QPRD). RAW MATERIAL IS VERIFIED FOR PROPER TYPE AND LOT NUMBER IS RECORDED WHEN FABRICATED AT THE DETAIL LEVEL.

ASSEMBLY/INSTALLATION

ALL HARDWARE IS VERIFIED FOR PREVIOUS INSPECTION OF PROPER PROCESSES AND FABRICATION PRIOR TO ASSEMBLY. ASSEMBLY IS PER MLC SPECIFICATION AND PLANNING DOCUMENT WITH INSPECTION VERIFICATION. PLANNING IS IDENTIFIED AS SAFETY CRITICAL. ALL CAUTION NOTES ARE FLAGGED AND ADHERED TO. TORQUE REQUIREMENTS PER SPECIFICATION ARE VERIFIED AND RECORDED.

NONDESTRUCTIVE EVALUATION

NONDESTRUCTIVE TESTING (NDT) PENETRANT INSPECT MACHINED COMPONENTS FOR FLAWS PER MTO501-508, CLASS 1.

(D) FAILURE HISTORY

THERE HAS BEEN ONLY ONE FAILURE OF CONTAINER WITHOUT WRAP (V070-565341) IN WHICH TWO LH2 AFT CONTAINERS FRACTURED AS A RESULT OF NONSYNCHRONOUS FIRING OF THE REDUNDANT PYROS WHICH MOVED ONE OF THE PYROS AND CAUSED IT TO FIRE AGAINST THE INNER WALL OF THE DEBRIS CONTAINER. FOUR WRAPS OF KEVLAR ON THE OUTSIDE OF THE DEBRIS CONTAINER WERE ADDED TO PROTECT AGAINST FUTURE OCCURRENCES (REF. CAR NO. 01F056). NO FAILURE HISTORY WITH CURRENT DESIGN (V401-565302).

(E) OPERATIONAL USE

NONE.