FAILURE MODE EFFECTS ANALYSIS/CRITICAL ITEMS LIST

FMEA NUMBER: EC-MUT-02 | ORIGINATOR: JSC | PROJECT: EDFT-04

PART NAME: BALL STACK ASSY | LRU/ORU PART NUMBER: SEG33106880-301, 303, 305, 307 | QUANTITY: 1

PART NUMBER: SEG33107110-701 | LRU PART NAME: MUT | SYSTEM: DTO 671

DRAWING: SEE P/N | SUBSYSTEM: EVA | EFFECTIVITY: STS-76 & SUBSEQUENT

CRITICALITY:

CRITICAL ITEM? YES__X__ NO_____ SUCCESS PATHS: 2
SUCCESS PATH REMAINING: 1

CRITICALITY CATEGORY: 1R/2

REDUNDANCY SCREENS:

A - 1.) C/O PRELAUNCH: PASS
2.) C/O ON ORBIT: N/A for NSTS
B - 3.) DETECTION FLIGHT CREW: PASS
4.) DETECTION GROUND CREW: N/A for NSTS
C - 5.) LOSS OF REDUNDANCY FROM SINGLE CAUSE: PASS

FUNCTION: The debris sleeve on the MUT fits around the ball stack assembly to prevent debris and other foreign objects from lodging in the ball stack assembly. The debris sleeve also serves as a restraint device in case of a failure of the ball stack cable allowing the balls to become free. The debris sleeve is attached at both ends of the ball stack.

FAILURE MODE: Outer debris sleeve fails.

CAUSE: Piece part defect.

FAILURE DETECTION: Visual.

REMAINING PATHS: One - Ball stack cable.

EFFECT/ MISSION PHASE: EVA

CORRECTIVE ACTION: Discontinue use of the MUT.

-FAILURE EFFECTS-

END ITEM: No effect if debris sleeve fails, however the MUT should no longer be used.

INTERFACE: None.

MISSION: Partial loss of remaining DTO objectives.

CREW/VEHICLE : None for a single failure, however, if 2 failures were to occur possible loose ORUs and/or hardware from the ball stack would possibly be free to drift in the cargo bay whether the MUT is used for ORU translation or as a crew restraint device. Loose hardware in the payload bay could either impact the crewmember/vehicle as in the case of translating the ORUs, or could prevent the cargo bay doors from closing. Also the possibility of loose hardware impacting the vehicle during landing exists.

FAILURE MODE EFFECTS ANALYSIS/CRITICAL ITEMS LIST

FMEA NUMBER: EC-MUT-02	ORIGINATOR: JSC	PROJECT: EDFT-04
PART NAME: BALL STACK ASSY	LRU/ORU PART NUMBER: SEG33106880-301, 303, 305, 307	QUANTITY: 1
PART NUMBER: SEG33107110-701	LRU PART NAME: MUT	SYSTEM: DTO 671
DRAWING: SEE P/N	SUBSYSTEM: EVA	EFFECTIVITY: STS-76 & SUBSEQUENT

HAZARD INFORMATION:

HAZARD: YES____ NO__*

HAZARD ORGANIZATION CODE: N/A

HAZARD NUMBER: N/A

TIME TO EFFECT: Seconds.

TIME TO DETECT: Minutes.

TIME TO CORRECT: Immediate.

REMARKS:

-RATIONALE FOR ACCEPTABILITY-

(A) DESIGN: The MUT debris sleeve is designed to withstand a 125 lb tensile load.

(B) TEST: Applicable requirements from JSC 33498A.

Acceptance:

1.) Functional: Verified at Predelivery Acceptance Test, Preinstallation Acceptance and Pre/Post environmental test.

- Debris sleeve was tested to 125 lbs at PDA only.
- Visual Inspection for defects pre/post environmental test.

2.) Environmental: Acceptance Vibration

The MUT is subjected to the following vibration in each axis for a duration of 1 minute per TPS.

20 Hz	0.01 G^2/Hz
20 to 80 Hz	+3.0 dB/octave
80 to 350 Hz	0.04 G^2/Hz
500 to 2000 Hz	-3.0 dB/octave
2000 Hz	0.007 G^2/Hz

load factor 6.1 G rms

Qualification:

1.) Functional: Debris sleeve was load tested to 187.5 lbs. per TPS.
2.) Vibration: N/A
3.) Thermal: Functional verification performed at -100 F and +200 F per TPS.

FAILURE MODE EFFECTS ANALYSIS/CRITICAL ITEMS LIST

FMEA NUMBER: EC-MUT-02	ORIGINATOR: JSC	PROJECT: EDFT-04
PART NAME: BALL STACK ASSY	LRU/ORU PART NUMBER: SEG33106880-301, 303, 305, 307	QUANTITY: 1
PART NUMBER: SEG33107110-701, DRAWING: SEE P/N	LRU PART NAME: MUT SUBSYSTEM: EVA	SYSTEM: DTO 671 EFFECTIVITY: STS-76 & SUBSEQUENT

(C) INSPECTION:

Fabrication - All MUT components are verified to be built to print and generally clean individually. The MUT is verified to be visually clean at preinstallation acceptance.
Test - Quality Assurance surveillance is required at all tests and inspections.

(D) FAILURE HISTORY: This is the first time the MUT has flown and therefore has no failure history. The MUT is similar to the BRT which has successfully flown on STS-69 and STS-72.

(E) OPERATIONAL USE:

1) Operational Effect - For debris sleeve failure there is no effect, unless cable also fails. Possible loose debris in the payload bay.
2) Crew Action - Discontinue use of the MUT. Restow in middeck/Spacehab.
3) Crew Training - Crew trained in proper operation of MUT at WETF.
4) Mission constraint - When fully extended the crew will not continue to pull against the MUT or placed into a singularity.
5) In Flight Checkout - If debris sleeve is torn or damaged, discontinue use of the MUT.

(F) MAINTAINABILITY: The MUT has a shelf life of 5 years. The MUT can be removed and replaced if a failure occurs. No on-orbit repair is planned.

PREPARED BY: M. D. Garner	REVISION:	DATE: 2/22/96