FAILURE MODE EFFECTS ANALYSIS/CRITICAL ITEMS LIST

FMEA NUMBER: EDFT-05-STBD7-6	ORIGINATOR: JSC	PROJECT: DTO 671
PART NAME: CSI SUBCARRIER ASSEMBLY	LRU PART NUMBER: SED39128554-401	QUANTITY: 1
PART NUMBER: SED39128560-301	LRU PART NAME: BAY 7 STBD INSTALLATION	SYSTEM: EDFT-05
DRAWING: SEE P/N	SUBSYSTEM: N/A	EFFECTIVITY: STS-80

CRITICALITY:

CRITICAL ITEM? YES X NO ____

CRITICALITY CATEGORY: 1R/2

REDUNDANCY SCREENS:

A - Pass
B - Pass
C - Pass

FUNCTION: The ORU grid latch assembly is the active CSI mechanism which allows removal and installation of an ORU onto an ORU grid for on-orbit grasp and handling. It incorporates 4 spring loaded pawls activated by an over-center mechanism. An inhibit to prevent shaft rotation and hold the handle in the closed position is also incorporated.

FAILURE MODE: Inadvertent release.

(a) Inadvertent release of latch pawl.
(b) CSI inadvertently opens.

CAUSE: Contamination, piece part failure, galling

FAILURE DETECTION: Visual

REMAINING PATHS: (a) Remaining latch pawls, 2nd spring in linkage
(b) Latch - redundant lock.

EFFECT/MISSION PHASE: EVA

CORRECTIVE ACTION: None.

-FAILURE EFFECTS-

END ITEM: None for single failure.

(a) The ORU remains restrained to grid by 3 remaining latch pawls if a pawl fails.
(b) For inadvertent opening of the latch, redundant lock on latch handle prevents it's rotation.

INTERFACE: N/A

MISSION: None

CREW/VEHICLE: If two failures were to occur there will be the possibility of having loose equipment in the PLB (600 lbs). This could cause significant damage to the Orbiter.

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HAZARD INFORMATION:

HAZARD: YES ____ NO X

HAZARD ORGANIZATION CODE: N/A

HAZARD NUMBER: N/A

TIME TO EFFECT: Minutes

TIME TO DETECT: Seconds

TIME TO CORRECT: Immediately

REMARKS:

-RETENTION RATIONALE-

(A) DESIGN: The CSI latch is a three position latch (open, soft capture and hard capture). The 4 latch pawls are driven into position by two drive linkages that are actuated by the latch handle. Springs in the linkage (4 total) prevent the linkage from being jammed if one of the pawls does not move from the soft capture to the locked position. The springs also ensure that there is positive engagement of the latch pawl to the ORU grid. The latch is designed to the requirements specified in JSC-33481,"Certification and Acceptance Requirements Document, Orbital Replacement Unit Simulator and Carrier Assembly for the Detailed Test Objective 671 Program". Redundant spring loaded lock on latch handle prevents inadvertent handle rotation.

(B) TEST: Applicable Requirements per JSC-33481

Acceptance: Functional performed at predelivery acceptance, preinstallation acceptance and pre/post environmental test.

1) Soft capture force to place active CSI mechanism to the passive CSI.
2) Torque required to activate and deactivate mechanism during EVA.
3) The CSI active mechanism shall interface with the passive CSI on the OTD/TERA

Qualification

Thermal Vacuum Test: Performed as specified in the CARD. Installation/removal of latch assembly functionally verified at minus 100 degrees F and 1 x 10-5 Torr.

Protoflight Vibration Test: Performed to the following levels for a duration of 1 minute in each axis:

X AXIS	Y AXIS	Z AXIS
20 - 80 HZ +3.0 db/oct	20 - 45 Hz +10 db/oct	20 - 45 Hz 0.009 g2/Hz
80 - 350 Hz 0.04 g2/Hz	45 - 600 Hz 0.06 g2/Hz	45 - 70 Hz +12 db/oct
350-2000 Hz - 3db/oct	600 - 2000Hz - 6db/oct	70 - 600 Hz 0.05 g2/Hz
		600-2000Hz -6db/oct
6.1 Grms overall	7.7 Grms overall	7.0 Grms overall

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C) INSPECTION: • All latch components are individually verified to generally clean. The CHIA subcarrier assembly is to be visually clean at predelivery acceptance and pre-installation acceptance.
- Test and Quality Assurance surveillance is required at all tests and inspections.
- Discrepancy reports are required to be written on all non-compliances.

(D) FAILURE HISTORY: None

(E) OPERATIONAL USE:

1) Operational Effect - Subcarrier/ORU or cable caddy free of on-orbit restraint. Vehicle damage will likely occur.
2) Crew Action - Crew must verify that Subcarrier/ORU or cable caddy is secure prior to on-orbit operations.
3) Crew Training - Crew trained in proper operation of CSI during WETF training.
4) Mission constraint - none
5) In-flight checkout - Proper securing of passive and active CSI halves during EVA operations, as specified in the EVA checklist.