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SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 07-1B-SW3-X

SUBSYSTEM NAME: CREW STATION AND EQUIPMENT - SLIDEWIRE
REVISION : 1 01/01/87

		PART NAME / VENDOR NAME	PART NUMBER / VENDOR NUMBER
LRU	:	EVA SLIDEWIRE ASSEMBLY (CFE)	M072-544700
■ LRU	:	NASA EVA SLIDEWIRE ASSY (GFE)	SED39119279-301
■ SRU	:	SLIDEWIRE STOP (GFE)	SD039119277-001
SRU	:	EVA SLIDEWIRE - STOP (CFE)	V617-544723-001
SRU	:	EVA SLIDEWIRE - STOP (CFE)	V617-544723-002

■ EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

QUANTITY OF LIKE ITEMS: 4
TWO STOPS PER SLIDEWIRE ASSEMBLY

CFE = CONTRACTOR FURNISHED EQUIPMENT
GFE = GOVERNMENT FURNISHED EQUIPMENT

FUNCTION:
SLIDEWIRE STOP (ONE NEAR EACH END OF SLIDWIRE) LIMITS TRAVEL OF SLIDER AND EVA CREWMEMBER ALONG PAYLOAD BAY. STOP ALSO PROVIDES FOR RETENTION OF EVA CREWMEMBER ON SLIDEWIRE SHOULD END FITTING BREAK.

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 07-1B-SW3-X

SUMMARY

SUBSYSTEM NAME: CREW STATION AND EQUIPMENT - SLIDEWIRE
LRU :EVA SLIDEWIRE ASSEMBLY (CFE)
ITEM NAME: EVA SLIDEWIRE - STOP (CFE)

FMEA NUMBER	ABBREVIATED FAILURE MODE DESCRIPTION	CIL FLG	CRIT	HZD FLG
07-1B-SW3-01	STOP DEBONDED	X	1R2	

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SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 07-1B-SW3-01

REVISION: 5 01/01/87

SUBSYSTEM: CREW STATION AND EQUIPMENT - SLIDEWIRE
LRU :EVA SLIDEWIRE ASSEMBLY (CFE) CRITICALITY OF THIS
ITEM NAME: EVA SLIDEWIRE - STOP (CFE) FAILURE MODE:1R2

FAILURE MODE:
STOP DEBONDED

MISSION PHASE:
OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
: 103 DISCOVERY
: 104 ATLANTIS

CAUSE:
TEMPERATURE, EXCESSIVE LOAD, MANUFACTURING DEFECT

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:
A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
ATTENUATION OF SYSTEM WOULD BE LOST CAUSING INCREASED SHOCK LOADS ON MECHANISM SHOULD THE SYSTEM BE REQUIRED TO STOP A CREWMEMBER MOVING PARALLEL TO SLIDEWIRE.

(B) INTERFACING SUBSYSTEM(S):
POSSIBLE HIGHER SHOCK LOADS.

(C) MISSION:
NO EFFECT ON MISSION.

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 07-1B-SW3-01

(D) CREW, VEHICLE, AND ELEMENT(S):
INCREASED LOAD ON CREWMEMBER TETHER DUE TO LOSS OF SLIDEWIRE ATTENUATION. NO EFFECT ON VEHICLE. POSSIBLE LOSS OF CREWMEMBER AS RESULT OF SECOND ASSOCIATED FAILURE.

(E) FUNCTIONAL CRITICALITY EFFECTS

- DISPOSITION RATIONALE -

■ (A) DESIGN:
1.4 MINIMUM SAFETY FACTOR (2.3 BY TEST FOR THE CFE SLIDEWIRE & 3.8 FOR THE GFE SLIDEWIRE) FOR SINGLE CREWMEMBER INDUCED LOADS CREATED BY MANEUVERING MAXIMUM OF 4 FPS PARALLEL TO SLIDEWIRE (FOR THE CFE SLIDEWIRE) AND 4 FPS IN ANY DIRECTION (FOR THE GFE SLIDEWIRE). SLIDEWIRE STOP HAS LOAD CAPABILITY EQUAL TO THE END FITTING (1452 LBS FOR THE CFE SLIDEWIRE & 2350 LBS FOR THE GFE SLIDEWIRE). MAXIMUM INDUCED OPERATING LOAD FOR THE GFE SLIDEWIRE IS 680 LBS.

■ (B) TEST:
QUALIFICATION TESTS: 100 LOAD (OPERATIONAL) CYCLES PARALLEL TO THE SLIDEWIRE AT AMBIENT TEMPERATURE, -210 DEG F AND +210 DEG F. ADDITIONAL TESTING OF THE GFE SLIDEWIRE INCLUDED: DYNAMIC LOAD TESTING - (60 OPERATIONAL LOAD CYCLES) OF SLIDEWIRE ASSEMBLY AT MAXIMUM CREWMEMBER INDUCED LOADS (550 LBS MASS TRANSLATING 4 FPS PERPENDICULAR TO SLIDEWIRE MIDPOINT); ULTIMATE LOAD TEST - OF BOND STRENGTH RESULTED IN BREAKING OF KEVLAR CORD AT 2350 LBS (EXCEEDING RATED 2100 LBS CORD STRENGTH).

ACCEPTANCE TESTS: ACCEPTANCE TESTING INCLUDED PROOF LOADING THE CFE SLIDEWIRE ASSEMBLY TO 800 LBS & THE GFE SLIDEWIRE ASSEMBLY TO 820 LBS, WHICH IS 130% OF THE INDUCED LOAD OF ONE CREWMEMBER TRANSLATING PARALLEL TO THE SLIDEWIRE AT 4 FPS AT AMBIENT TEMPERATURE.

CERTIFICATION TESTS: ROCKWELL DOES NOT ASSUME RESPONSIBILITY FOR CERTIFICATION OF THE GFE SLIDEWIRE ASSEMBLY.

OMRSD: VISUAL INSPECTION OF STOP PRIOR TO FINAL ORBITER PROCESSING FACILITY (OPF) PAYLOAD BAY DOOR CLOSURE.

■ (C) INSPECTION:
RECEIVING INSPECTION
RAW MATERIALS AND PROCESS CERTIFICATIONS VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
PART CLEANLINESS VISUALLY VERIFIED BY INSPECTION PRIOR TO INSTALLATION.

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 07-1B-SW3-01

CORROSION PROTECTION OF THE CFE SLIDEWIRE ASSEMBLY VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
ASSEMBLY OF ALL DETAIL PARTS VERIFIED BY INSPECTION. COMPLETE ASSEMBLY/INSTALLATION OF THE CFE SLIDEWIRE ASSEMBLY VERIFIED BY QUALITY AND CUSTOMER. DETAIL PARTS, FITTINGS, SLIDEWIRE MATERIALS AND MANUFACTURING OF THE GFE SLIDEWIRE ASSEMBLY VERIFIED BY VISUAL INSPECTION. INSTALLATION OF THE GFE SLIDEWIRE ASSEMBLY VERIFIED BY VISUAL INSPECTION.

CRITICAL PROCESSES
BONDING OF THE SLIDEWIRE ASSEMBLY VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
PENETRANT INSPECTION OF THE SLIDEWIRE STOP VERIFIED BY INSPECTION.
PROOF TEST OF THE GFE SLIDEWIRE ASSEMBLY TO 820 LBS VERIFIED BY INSPECTION.

TESTING
PROOF LOADING OF THE CFE SLIDEWIRE ASSEMBLY VERIFIED BY INSPECTION.
ATP OF THE GFE SLIDEWIRE ASSEMBLY VERIFIED BY INSPECTION.

HANDLING/PACKAGING
HANDLING AND PACKAGING REQUIREMENTS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:
NO FAILURE HISTORY.

(E) OPERATIONAL USE:
OPERATIONAL EFFECTS OF FAILURE
THIS FAILURE BY ITSELF WOULD NOT LEAVE THE CREWMEMBER SEPARATED FROM THE ORBITER AND FREE-FLOATING. THIS WILL BE A LOSS OF REDUNDANCY IN THE SLIDEWIRE RESTRAINT SYSTEM. THE NEXT FAILURE WOULD CAUSE THE CREWMEMBER TO BECOME SEPARATED FROM THE ORBITER. OVERALL LENGTH OF THE EVA WILL BE INCREASED DUE TO LESS FLEXIBILITY AS A RESULT OF ALTERNATE TETHER CONFIGURATIONS.

CREW ACTION
THE CREWMEMBER WOULD HOOK HIS SAFETY TETHER TO THE OTHER SLIDEWIRE RECOGNIZING THAT TWO MEN USE OF A SLIDEWIRE EXCEEDS THE DESIGN ENVELOPE. NO ACTION WILL BE REQUIRED TO CONFIGURE THE SLIDEWIRE SAFE FOR PAYLOAD BAY DOOR CLOSING.

CREW TRAINING
STANDARD CREW TRAINING INCLUDES TETHER MANAGEMENT BUT GENERALLY NOT TWO-CREWMEMBERS PER SLIDEWIRE. THIS TRAINING ALSO TEACHES THE CREW TO MOVE UNDER COMPLETE CONTROL AT ALL TIMES DURING EVA. FREE-FLOATING IS

NOT SUGGESTED OR PRACTICED. THIS MINIMIZES THE CHANCE OF THE CREWMEMBER GAINING ENOUGH MOMENTUM TO OVERLOAD THE SLIDEWIRE AND BECOME SEPARATED FROM THE ORBITER.

MISSION CONSTRAINTS
EVA TASKS AND HARDWARE WILL BE DESIGNED SO THAT POSITIVE CREWMEMBER RESTRAINT AIDS WILL BE PROVIDED AT ALL WORKSITES AND EVA TRANSLATION PATHS.

INFLIGHT CHECKOUT
THE EVA CREWMEMBERS WILL INSPECT THE EVA SLIDEWIRE AT THE TIME OF ITS USE. THIS WILL MINIMIZE THE EFFECT OF FAILURES WHICH COULD HAPPEN DURING ASCENT OR PRE-EVA ON ORBIT ACTIVITY.

- APPROVALS -

RELIABILITY ENGINEERING	M. B. MOSKOWITZ	
DESIGN ENGINEERING	J. M. HAMADA	
QUALITY ENGINEERING	M. SAVALA	
NASA RELIABILITY		
NASA SUBSYSTEM MANAGER		
NASA QUALITY ASSURANCE		4/25/89