PAGE: 1 PRINT DATE: 04/07/89

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 07-1B-SW1-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)	SE039119279-301
■ SRU	:	SLIDEWIRE CABLE - SLIDER (GFE)	SD039119276-001
SRU	:	EVA SLIDEWIRE - SLIDER (CFE)	V617-544720-001
SRU	:	EVA SLIDEWIRE - SLIDER (CFE)	V617-544720-002
■ SRU	:	SLIDEWIRE CABLE - CORD (GFE)	2123/6

■ EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

QUANTITY OF LIKE ITEMS: 2
ONE EACH SIDE OF PAYLOAD BAY

CFE = CONTRACTOR FURNISHED EQUIPMENT
GFE = GOVERNMENT FURNISHED EQUIPMENT

FUNCTION:
PROVIDES TETHER RESTRAINT FOR EVA CREWMEMBER IN PAYLOAD BAY AND ALLOWS 49 FT. MOVEMENT ALONG BAY BETWEEN END STOPS. ONE SLIDEWIRE IS INSTALLED ON EACH SIDE OF VEHICLE.

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

SUMMARY

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

FMEA NUMBER	ABBREVIATED FAILURE MODE DESCRIPTION	CIL FLG	CRIT	HZD FLG
07-1B-SWI-01	BROKEN CORD, BROKEN SLIDER	X	1/1	

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 07-1B-SW1-01

REVISION: 7 01/01/87

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

CRITICALITY OF THIS FAILURE MODE:1/1

FAILURE MODE:
BROKEN CORD, BROKEN SLIDER

MISSION PHASE:
OO ON-ORBIT

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

CAUSE:
EXCESSIVE LOAD

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) N/A
B) N/A
C) N/A

PASS/FAIL RATIONALE:
A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF SAFETY RESTRAINT FOR EVA CREWMEMBER.

(B) INTERFACING SUBSYSTEM(S):
POSSIBLE DAMAGE TO EQUIPMENT IN PAYLOAD BAY, POSSIBLE INTERFERENCE WITH CLOSING PAYLOAD BAY DOOR.

(C) MISSION:
POSSIBLE LOSS OF MISSION OBJECTIVE.

(D) CREW, VEHICLE, AND ELEMENT(S):
POSSIBLE INJURY/LOSS OF CREWMEMBER. POSSIBLE NEED TO RETRIEVE

CREWMEMBER BY MANEUVERING ORBITER.

(E) FUNCTIONAL CRITICALITY EFFECTS

- DISPOSITION RATIONALE -

■ (A) DESIGN:
1.4 MINIMUM DESIGN 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 2 FPS PERPENDICULAR TO SLIDEWIRE MIDPOINT AND 4 FPS PARALLEL TO SLIDEWIRE (FOR THE CFE SLIDEWIRE) AND 4 FPS IN ANY DIRECTION (FOR THE GFE SLIDEWIRE). SLIDEWIRE CORD HAS MINIMUM DESIGN BREAKING STRENGTH OF 2100 LBS. (SAFETY FACTOR OF 3.35).

■ (B) TEST:
QUALIFICATION TESTS: 100 LOAD (OPERATIONAL) CYCLES PARALLEL TO THE SLIDEWIRE AT AMBIENT TEMPERATURE, -210 DEG F AND +210 DEG F. ADDITIONAL TESTING INCLUDED: DYNAMIC LOAD TESTING - (60 MAXIMUM OPERATIONAL LOAD CYCLES) OF SLIDEWIRE ASSEMBLY AT MAXIMUM CREWMEMBER INDUCED LOADS (550 LBS MASS TRANSLATING 4 FPS PERPENDICULAR TO SLIDEWIRE MIDPOINT EQUAL TO 800 LBS TENSILE LOAD); ULTIMATE LOAD TEST - (2350) OF SLIDEWIRE CORD SUBSEQUENT TO DYNAMIC LOAD CYCLE TESTING; MATERIAL PASSED CREW COMPARTMENT ACCEPTABILITY TESTING - FOR TOXICITY, OFF-GASSING (VCM) AND FLAMMABILITY; FLEXURE AND ABRASION RESISTANCE TESTING - AT AMBIENT TEMPERATURE, -300 DEGREES F, & +360 DEGREES F. INCLUDED 100 CYCLES OF SLIDER UNDER 15 LB LOAD, 100 CYCLES OVER SHARP EDGE (0.040 INCH RADIUS) AND 90 DEGREE BENDS OVER 0.040 INCH RADIUS.

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

ACCEPTANCE TESTING: LOADING OF THE CFE SLIDEWIRE ASSEMBLY TO 800 LBS & THE GFE SLIDEWIRE ASSEMBLY TO 820 LBS, WHICH IS 130% OF THE MAXIMUM INDUCED LOAD OF ONE CREWMEMBER TRANSLATING PARALLEL TO SLIDEWIRE AT 4 FPS AT AMBIENT TEMPERATURE. PROOF LOAD TEST OF GFE SLIDER TO 200 LBS IN ALL DIRECTIONS.

OMRSD: VISUAL INSPECTION OF SLIDEWIRE PRIOR TO ORBITER PROCESSING FACILITY (OPF) FINAL PAYLOAD BAY DOOR CLOSURE FOR EACH FLIGHT.

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

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

ASSEMBLY/INSTALLATION
DETAIL PARTS, FITTINGS, SLIDEWIRE MATERIALS AND MANUFACTURING VERIFIED BY VISUAL INSPECTION OF THE GFE SLIDEWIRE ASSEMBLY. ASSEMBLY OF ALL DETAIL PARTS VERIFIED BY VISUAL INSPECTION. INSTALLATION OF THE GFE SLIDEWIRE ASSEMBLY VERIFIED BY VISUAL INSPECTION. VISUAL INSPECTION OF THE SLIDEWIRE CORD FOR DAMAGE VERIFIED BY QUALITY AND FABRICATION VERIFIED BY INSPECTION.

CRITICAL PROCESSES
DRY FILM LUBE APPLICATION OF THE SLIDEWIRE ASSEMBLY VERIFIED BY INSPECTION.

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

NONDESTRUCTIVE EVALUATION:
THE GFE SLIDEWIRE ASSEMBLY PROOF TEST OF SLIDEWIRE ASSEMBLY TO 820 LBS 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
THE SLIDEWIRE WITH THE BROKEN CORD WILL NO LONGER BE USABLE. WORST CASE, THE CREWMEMBER WILL BECOME SEPARATED FROM THE ORBITER AND BE FREE FLOATING IN SPACE. EVA TASK AT THE TIME OF THE FAILURE WILL HAVE TO BE TERMINATED UNTIL THE FREE-FLOATING CREWMEMBER CAN BE RESCUED. OVERALL LENGTH OF EVA WILL BE INCREASED.

CREW ACTION
THE REMAINING CREW WOULD HAVE TO MANEUVER THE ORBITER OVER TO THE FREE-FLOATING CREWMEMBER TO A POSITION WHERE HE COULD GRAB SOME STRUCTURE IN THE PAYLOAD BAY. THEN, THE CREWMEMBER COULD TETHER HIMSELF TO THE OTHER SLIDEWIRE RECOGNIZING THAT TWO MEN SIMULTANEOUSLY UTILIZING THE SLIDEWIRE EXCEEDS THE DESIGN ENVELOPE AND CONTINUE WITH THE EVA. THE CREW WOULD ALSO BE REQUIRED TO CONFIGURE THE SLIDEWIRE SAFE FOR PAYLOAD BAY DOOR CLOSING.

CREW TRAINING
STANDARD CREW TRAINING 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

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 07-1B-SW1-01

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 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		