PAGE: 1 PRINT DATE: 04/07/89

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 07-1B-SW5-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	:	EVA SLIDEWIRE - YOKE (CFE)	V617-544701-001
SRU	:	EVA SLIDEWIRE - YOKE (CFE)	V617-544701-002
SRU	:	EVA SLIDEWIRE - LINK (CFE)	V617-544702-001
SRU	:	EVA SLIDEWIRE - LINK (CFE)	V617-544702-002

■ EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

QUANTITY OF LIKE ITEMS: 4
TWO LINKS/TWO YOKES PER SLIDEWIRE ASSEMBLY

CFE = CONTRACTOR FURNISHED EQUIPMENT
GFE = GOVERNMENT FURNISHED EQUIPMENT

FUNCTION:
LINKAGE AUTOMATICALLY DEPLOYS/RETRACTS EVA SLIDEWIRE ASSEMBLY AS PAYLOAD BAY DOORS OPEN AND CLOSE.

EXPEDITE PROCESSING

PRINT DATE: 04/07/89

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 07-1B-SW5-X

SUMMARY

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

FMEA NUMBER	ABBREVIATED FAILURE MODE DESCRIPTION	CIL FLG	CRIT	HZD FLG
07-1B-SW5-01	BROKEN, DISCONNECTED, OR JAMMED DEPLOYMENT LINK OR YOKE	X	1/1	

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 07-1B-SW5-01

REVISION: 6 01/01/87

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

CRITICALITY OF THIS FAILURE MODE:1/1

FAILURE MODE:
BROKEN, DISCONNECTED, OR JAMMED DEPLOYMENT LINK OR YOKE

MISSION PHASE:
OO ON-ORBIT

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

CAUSE:
CONTAMINATION, DEBRIS, STRUCTURAL DEFORMATIONS, ADVERSE TOLERANCE ACCUMULATION

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:
POSSIBLE DAMAGE TO SLIDEWIRE DEPLOYMENT MECHANISM.

(B) INTERFACING SUBSYSTEM(S):
POSSIBLE DAMAGE TO PAYLOAD BAY DOOR, RADIATOR, PAYLOADS, DOOR LINKAGE, THERMAL INSULATION, ELECTRICAL CROSSOVER CABLES, FREON LINES, AND KU-BAND ANTENNA. POSSIBLE INTERFERENCE WITH CLOSING/OPENING PAYLOAD BAY DOORS.

(C) MISSION:
POSSIBLE DEGRADATION OF MISSION CAPABILITY, RECYCLING OF PAYLOAD BAY

DOORS, OR CONTINGENCY EVA MAY BE REQUIRED TO CLEAR JAM. DAMAGE TO RADIATORS/FREON LINES AND ELECTRICAL LINES MAY REQUIRE EARLY MISSION TERMINATION.

(D) CREW, VEHICLE, AND ELEMENT(S):
POSSIBLE LOSS OF CREW/VEHICLE IF PAYLOAD BAY DOORS CANNOT BE CLOSED.

(E) FUNCTIONAL CRITICALITY EFFECTS

- DISPOSITION RATIONALE -

■ (A) DESIGN:
1.4 MINIMUM SAFETY FACTOR (2.3 BY TEST FOR THE CFE SLIDEWIRE & 3.5 FOR THE GFE SLIDEWIRE) FOR SINGLE CREWMEMBER INDUCED LOADS CREATED BY MANEUVERING MAXIMUM 4 FPS PARALLEL TO SLIDEWIRE (FOR THE CFE SLIDEWIRE) AND 4 FPS IN ANY DIRECTION (FOR THE GFE SLIDEWIRE). DEPLOYMENT LINKS OF THE SLIDEWIRE ASSEMBLY HAVE QUICK DISCONNECT PINS (REQUIRING CONTINGENCY EVA) NEAR PAYLOAD BAY DOOR HINGE LINE. MAX TORQUE REQUIRED TO OPERATE THE CFE SLIDEWIRE MECHANISM (60 INCH-LBS) IS NEGLIGIBLE COMPARED TO AVAILABLE DOOR DRIVE TORQUE (6200-10,000 INCH-LBS).

■ (B) TEST:
QUALIFICATION TESTS: OPENING/CLOSING SIMULATED PAYLOAD BAY DOOR, USING MINIMUM EVA SLIDEWIRE ASSEMBLY OPERATING TORQUE VALUES AT AMBIENT TEMPERATURE, -100 DEG F, AND +250 DEG F. FUNCTIONAL TEST AND CLEARANCE CHECK WITH CYCLING THE PAYLOAD BAY DOORS FROM A CLOSED POSITION TO 45 DEGREES OPEN POSITION PERFORMED DURING THE GFE SLIDEWIRE ASSEMBLY INSTALLATION. ELECTRICAL BOND BETWEEN THE GFE SLIDEWIRE ASSEMBLY LINKAGE AND ORBITER STRUCTURE VERIFIED BY TEST AT ASSEMBLY INSTALLATION.

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

OMRSD: SLIDEWIRE ASSEMBLY AND LINKAGE OPERATIONALLY VERIFIED PRIOR TO EACH FLIGHT DURING PAYLOAD BAY DOOR OPEN/CLOSE TEST. INSTALLATION OF QUICK DISCONNECT PINS VERIFIED BY VISUAL INSPECTION OF YOKE/LINK ASSEMBLY VERIFIED BY INSPECTION PRIOR TO ORBITER PROCESSING FACILITY (OPF) PAYLOAD BAY DOOR CLOSURE. FUNCTIONAL AND CLEARANCE CHECK PERFORMED WHENEVER THE CFE EVA OPERATIONAL SLIDEWIRE MISSION KIT IS INSTALLED.

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

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

ASSEMBLY/INSTALLATION
ASSEMBLY OF ALL DETAIL PARTS VERIFIED BY INSPECTION. ELECTRICAL BOND BETWEEN THE CFE SLIDEWIRE ASSEMBLY LINKAGE AND ORBITER STRUCTURE VERIFIED DURING ASSEMELY INSTALLATION. SPOT TIE OF QD PINS PER ML0303-0013 VERIFIED BY INSPECTION. RADIATOR CLEARANCE IN THE CLOSED POSITION, FORWARD AND AFT. FUNCTIONAL AND CLEARANCE CHECK OF THE CFE SLIDEWIRE ASSEMBLY PER DRAWING VERIFIED BY QUALITY AND CUSTOMERS. DETAIL PARTS, FITTINGS, SLIDEWIRE MATERIALS AND MANUFACTURING VERIFIED BY VISUAL INSPECTION OF THE GFE SLIDEWIRE ASSEMBLY. INSTALLATION OF THE GFE SLIDEWIRE ASSEMBLY VERIFIED BY VISUAL INSPECTION.

NONDESTRUCTIVE EVALUATION
PENETRANT INSPECTION OF LINKS AND YOKES VERIFIED BY INSPECTION.

TESTING
FUNCTIONAL AND CLEARANCE CHECK PERFORMED WHENEVER THE EVA SLIDEWIRE MISSION KIT IS INSTALLED.

HANDLING/PACKAGING
HANDLING AND PACKAGING REQUIREMENTS VERIFIED BY INSPECTION.

■ (D) FAILURE HISTORY:
CAR 11F008: DURING EVA PROCEDURES ON STS-11 (OV099, FLT 4), CREWMEMBER REPORTED THAT THE STARBOARD FORWARD QUICK RELEASE PIN OF THE OPERATIONAL EVA SLIDEWIRE MECHANICAL LINKAGE WAS LOOSE; FAILURE CAUSED BY AN INADVERTENT PULL ON THE PUSH-PULL TYPE T-HANDLE UNLOCKING THE DETENT BALLS AND DISENGAGING THE PIN FROM THE LINKAGE HOLE; ENGINEERING ORDER M072-544700 REV A, SEQ. 07 CHANGED EVA SLIDEWIRE INSTALLATION DRAWING TO REQUIRE EACH QUICK DISCONNECT PIN SPOT-TIED TO EACH SLIDEWIRE MECHANICAL LINKAGE.

(E) OPERATIONAL USE:
OPERATIONAL EFFECTS OF FAILURE
THIS FAILURE COULD PREVENT CLOSING OF THE PAYLOAD BAY DOORS IF THE BROKEN OR DISCONNECTED LINK AND/OR YOKE JAMMED AGAINST STRUCTURE AS THE DOORS WERE CLOSED. IF THE FAILURE WAS NOT RECOGNIZED EARLIER, A CONTINGENCY EVA IMPLEMENTED AT THE END OF THE MISSION WOULD REQUIRE A MISSION EXTENSION.

CREW ACTION
PAYLOAD BAY DOORS COULD BE RECYCLED TO CLEAR THE JAM, IF NOT SUCCESSFUL A CONTINGENCY EVA COULD BE PERFORMED TO CLEAR THE PAYLOAD BAY DOOR JAM. THE EVA CREWMEMBERS WOULD DISCONNECT THE LINK AND YOKE BY REMOVING THE QUICK DISCONNECT PINS WHICH SECURE ONE END OF THE LINK

AND IF REQUIRED WOULD REMOVE THE NUTS AND BOLTS WHICH SECURE THE YOKE. THEN, THE SLIDEWIRE WOULD BE SECURED FOR PAYLOAD BAY DOOR CLOSING.

CREW TRAINING
STANDARD CREW TRAINING INCLUDES USE OF THE TOOLS REQUIRED FOR THIS CREW ACTION.

MISSION CONSTRAINTS
NONE IDENTIFIED.

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		4-26-89
NASA SUBSYSTEM MANAGER		
NASA QUALITY ASSURANCE		9/25/89