

PAGE: 1

PRINT DATE: 09/12/88

FAILURE MODES EFFECTS ANALYSIS (FMEA) NUMBER: P7-2B-CRW8-X

SUBSYSTEM NAME: SIDE HATCH JETTISON

REVISION : 09/12/88

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CLASSIFICATION                      NAME                      PART NUMBER  
SRU                      :              VENT SEVERANCE INSTALLATION              V070-553413

QUANTITY OF LIKE ITEMS: 1

DESCRIPTION/FUNCTION:

THE VENT SEVERANCE ASSEMBLY CONSISTS OF A CHARGE HOLDER WHICH IS LOADED WITH TWO REDUNDANT LINEAR SHAPED CHARGES (LSC). UPON DETONATION, THE DUAL LINEAR SHAPED CHARGES CUT THE ACCESS PLATE IN THE CREW MODULE ON THE ORBITER 576 BULKHEAD FOR CONTROLLED DEPRESSURIZATION OF THE MODULE, PRIOR TO THE INITIATION OF THE CREW ESCAPE SYSTEM.

PAGE: 2

PRINT DATE: 09/12/

FAILURE MODES EFFECTS ANALYSIS (FMEA) NUMBER: P7-2B-CRWS-X

SUMMARY

SUBSYSTEM NAME: SIDE HATCH JETTISON

ITEM NAME: VENT SEVERANCE INSTALLATION

FMEA NUMBER	ABBREVIATED FAILURE MODE DESCRIPTION	CIL FLG	CRIT	HZ FL
P7-2B-CRWS-01	NO OUTPUT OR FAILS OFF	X	1R2	
P7-2B-CRWS-02	STRUCTURE OR INSULATION FAILURE	X	1 1	
P7-2B-CRWS-03	NO OUTPUT OR FAILS OFF	X	1 1	

PAGE: 8

PRINT DATE: 09/12/88

FAILURE MODES EFFECTS ANALYSIS (FMEA) NUMBER: P7-2B-CRWB-02

REVISION: 09/12/88

SUBSYSTEM: SIDE MATCH JETTISON

ITEM NAME: VENT SEVERANCE INSTALLATION

FAILURE MODE: 1 1

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FAILURE MODE:  
FAILURE TO SEVER PLATE

MISSION PHASE:

RTLS RETURN TO LAUNCH SITE  
TAL TRANS ATLANTIC ABORT  
AOA ABORT ONCE AROUND  
DO DE-ORBIT

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

CAUSE:

OVERSTRENGTH MATERIAL, INCORRECT MACHINING/MANUFACTURING

CRITICALITY 1/1 DURING ANY MISSION PHASE OR ABORT? YES

AOA ABORT ONCE AROUND  
DO DE-ORBIT  
RTLS RETURN TO LAUNCH SITE  
TAL TRANS ATLANTIC ABORT

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

PASS/FAIL RATIONALE:

A)

B)

C)

METHOD OF FAULT DETECTION:  
NONE

CORRECTING ACTION: NONE  
NO CORRECTING ACTION POSSIBLE.

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- FAILURE EFFECTS -  
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PAGE: 9

PRINT DATE: 09/11/8

FAILURE MODES EFFECTS ANALYSIS (FMEA) NUMBER: P7-2B-CRWS-02

(A) SUBSYSTEM:  
PLATE FAILS TO SEVER.

(B) INTERFACING SUBSYSTEM(S):  
LOSS OF VENTING FUNCTION RESULTING IN AN INABILITY TO DEPRESSURIZE THE CREW MODULE IN PREPARATION FOR SIDE HATCH JETTISON. DURING GROUND EMERGENCY EGRESS COULD RESULT IN FAILURE OF OVERHEAD WINDOW TO DROP OPEN DUE TO HIGHER PRESSURE IN CREW MODULE.

(C) MISSION:  
NONE

(D) CREW, VEHICLE, AND ELEMENT(S):  
JETTISON OF HATCH WITHOUT DEPRESSURIZATION COULD RESULT IN STRUCTURAL DAMAGE TO CREW MODULE, AS WELL AS INJURY TO CREW.

Criticality/

Required Fault Tolerance/Achieved Fault Tolerance: 1/1/0

RATIONALE FOR CRITICALITY:  
EFFECT OCCURS AFTER A SINGLE FAILURE.

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TIME FROM FAILURE TO CRITICAL EFFECT: SECONDS

TIME FROM FAILURE OCCURRENCE TO DETECTION: SECONDS

TIME FROM DETECTION TO COMPLETED CORRECTIVE ACTION: N/A

TIME REQUIRED TO IMPLEMENT CORRECTIVE ACTION LESS THAN TIME TO EFFECT? YES

NO CORRECTIVE ACTION FOR DE-ORBIT EMERGENCY EGRESS. ON THE GROUND MAY BE POSSIBLE TO PRY OPEN OVERHEAD WINDOW.

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- DISPOSITION RATIONALE -  
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(A) DESIGN:  
EITHER LINEAR SHAPED CHARGE IS CAPABLE OF CUTTING THE ACCESS PLATE WHEN LOADED TO 85% OF NOMINAL CORE LOADING AT 35 DEGREES F.

(B) TEST:  
QUALIFICATION TEST: TEST FIRINGS AT 10 DEGREE F/AMBIENT/140 DEGREES F MARGIN TEST AT 85% UNDERLOAD AND STRUCTURAL MARGIN TEST AT 115% OVERLOAD.

ACCEPTANCE TEST: TEST COUPON FROM EACH PRODUCTION LOT UTILIZED TO VERIFY MATERIAL TENSILE PROPERTIES. 100% INSPECTION OF ACCESS PLATE

PAGE: 10

FAILURE MODES EFFECTS ANALYSIS (FMEA) NUMBER: P7-2B-CRW6-02

THICKNESS.

(C) INSPECTION:  
RECEIVING INSPECTION  
RAW MATERIAL IS VERIFIED BY INSPECTION TO ASSURE SPECIFIC SHUTTLE  
REQUIREMENTS ARE SATISFIED.

CONTAMINATION CONTROL  
CONTAMINATION CONTROL AND CORROSION PROTECTION PROCESSES CERTIFIED BY  
INSPECTION.

ASSEMBLY/INSTALLATION  
OPERATIONS VERIFIED BY MIPS ON SHOP TRAVELER.

NONDESTRUCTIVE EVALUATION  
ALL CRITICAL DIMENSIONS ARE INSPECTED. PARTS ARE X-RAYED AND N-RAYED TO  
VERIFY CORRECT ASSEMBLY AND PRESENCE OF ALL DETAIL PARTS AND EXPLOSIVES  
X-RAYS AND N-RAYS ARE REVIEWED BY VENDOR, DCAS, NASA QUALITY AND  
ENGINEERING.

CRITICAL PROCESSES  
CRITICAL PROCESSES SUCH AS WELDING, PLATING, HEAT TREATING ARE VERIFIED  
BY INSPECTION.

STORAGE  
STORAGE ENVIRONMENT VERIFIED BY INSPECTION.

HANDLING AND PACKAGING  
HANDLING AND PACKAGING IS VERIFIED BY INSPECTION PER THE REQUIREMENTS  
OF APPLICABLE SPECIFICATIONS.

(D) FAILURE HISTORY:  
NO FAILURE HISTORY.

(E) OPERATIONAL USE:  
NONE.

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- APPROVALS -  
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RELIABILITY ENGINEERING: C. FERRARELLA  
DESIGN ENGINEERING : R. YEE  
QUALITY ENGINEERING : E. GUTIERREZ  
NASA RELIABILITY :  
NASA DESIGN :  
NASA QUALITY ASSURANCE :

: C. F. Ferrarella for RUC 9/12/88  
: R. Yee for RUC 9/12/88  
: E. Gutierrez for RUC 9/12/88  
: NASA RELIABILITY 9-27-88  
: NASA DESIGN 9-27-88  
: NASA QUALITY ASSURANCE 9-27-88  
: RUC