

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE**NUMBER: 03-1-0772 -X****SUBSYSTEM NAME:** MAIN PROPULSION**REVISION:** 1

11/08/00

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	: MOUNT ASSEMBLY, LH2 RECIRC BOEING	V070-415335

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
MOUNT ASSEMBLY, LH2 RECIRCULATION RETURN LINE

REFERENCE DESIGNATORS:**QUANTITY OF LIKE ITEMS:** 24**FUNCTION:**

PROVIDES SUPPORT TO LH2 RECIRCULATION RETURN LINE AND RESTRAINS LINE AXIAL MOVEMENT AND SLIPPAGE BY ADJUSTING FRICTIONAL RESISTANCE (50 TO 100 LBS) BETWEEN LINE AND MOUNT ASSEMBLY. THE 50 TO 100 POUND FRICTIONAL RESISTANCE REQUIREMENT IS ACCOMPLISHED BY INSTALLING SHIMS.

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SUBSYSTEM NAME: MAIN PROPULSION

LRU: LH2 RECIRC MANIFOLD MOUNT ASSEMBLY

CRITICALITY OF THIS

ITEM NAME: LH2 RECIRC MANIFOLD MOUNT ASSEMBLY

FAILURE MODE: 1/1

FAILURE MODE:

FAILURE TO RESTRAIN LINE ASSEMBLY IN NON-AXIAL DIRECTION AND MINIMIZE MOVEMENT IN AXIAL DIRECTION.

MISSION PHASE:

PL PRE-LAUNCH
LO LIFT-OFF

VEHICLE/PAYLOAD/KIT EFFECTIVITY:

102 COLUMBIA
103 DISCOVERY
104 ATLANTIS
105 ENDEAVOUR

CAUSE:

PIECE PART STRUCTURAL FAILURE, BINDING, IMPROPER INSTALLATION

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:

FAILURE TO RESTRAIN THE LINE ASSEMBLY IN THE NON-AXIAL DIRECTION OR MINIMIZE ITS MOVEMENT IN THE AXIAL DIRECTION COULD CAUSE LOSS OF VACUUM INSULATION, EXTERNAL LEAKAGE, OR LINE RUPTURE.

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HAZARDS ASSOCIATED WITH LEAKAGE OF LH2 IN AFT COMPARTMENT. POSSIBLE LOSS OF CRITICAL ADJACENT COMPONENTS DUE TO CRYOGENIC EXPOSURE. POSSIBLE AFT COMPARTMENT OVERPRESS AND FIRE/EXPLOSION HAZARD. LEAKAGE DURING LOADING DETECTABLE USING HAZARDOUS GAS DETECTION SYSTEM (HGDS) (T-31 SECONDS). DURING ASCENT, DEPLETION OF FUEL RESULTING IN POSSIBLE PREMATURE SSME SHUTDOWN.

(B) INTERFACING SUBSYSTEM(S):

SAME AS A.

(C) MISSION:

POSSIBLE LOSS OF CREW/VEHICLE.

(D) CREW, VEHICLE, AND ELEMENT(S):

SAME AS C.

(E) FUNCTIONAL CRITICALITY EFFECTS:

NONE.

-DISPOSITION RATIONALE-

(A) DESIGN:

THE MOUNT ASSEMBLY CONSISTS OF TWO SEMI-CIRCULAR STRUCTURAL MEMBERS (321 CRES) WHICH CLAMP AROUND THE LINE AND ARE CONNECTED WITH MECHANICAL FASTENERS. EACH SEMI-CIRCULAR MEMBER CONTAIN TWO LINERS (TEFLON) ON ITS INTERNAL DIAMETER WHICH ARE SHIMMED (321 CRES) TO OBTAIN A 50 TO 100 POUND FRICTIONAL SLIDING RESISTANCE FORCE BETWEEN THE LINE AND MOUNT ASSEMBLIES. ADDITIONAL SHIMMING (321 CRES) IS USED AT THE ATTACH INTERFACE BETWEEN THE TWO SEMI-CIRCULAR STRUCTURAL MEMBERS TO ASSIST IN OBTAINING THE 50 TO 100 POUND FRICTIONAL SLIDING RESISTANCE FORCE. THE MOUNT ASSEMBLY IS ATTACHED TO SECONDARY ORBITER STRUCTURE.

FAILURE TO RESTRAIN THE LINE ASSEMBLY IN THE NON-AXIAL DIRECTION OR MINIMIZE ITS MOVEMENT IN THE AXIAL DIRECTION COULD CAUSE LOSS OF VACUUM INSULATION, EXTERNAL LEAKAGE, OR LINE RUPTURE. STRUCTURAL ANALYSIS INDICATES POSITIVE MARGINS OF SAFETY FOR ALL CONDITIONS OF OPERATIONS.

(B) TEST:

ATP

EXAMINATION OF PRODUCT
DIMENSIONS AND FINISH

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CERTIFICATION OF MATERIALS

CERTIFICATION

THE MOUNT ASSEMBLY WAS CERTIFIED WITH THE MAIN PROPULSION TEST ARTICLE (MPTA) WHICH INCORPORATES ALL CONFIGURATIONS UTILIZED IN THE MPS SYSTEM. MPTA EXPERIENCED NUMEROUS FULL DURATION STATIC FIRINGS OF THE MAIN ENGINE AT DIFFERENT PERFORMANCE LEVELS. THESE STATIC FIRINGS IMPARTED WORST CASE ENVIRONMENTS AT MAXIMUM OPERATING TEMPERATURES AND PRESSURES.

DURING QUALIFICATION OF THE VARIOUS LINE SEGMENTS, SPECIFIC MOUNT ASSEMBLIES WERE UTILIZED AND SUBJECTED TO A SERIES ENVIRONMENTAL AND DYNAMIC CONDITIONS SPECIFIED FOR THEIR LOCATION.

OMRSD

ANY TURNAROUND CHECKOUT IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

(C) INSPECTION:

RECEIVING INSPECTION

INCOMING PARTS ARE VERIFIED FOR MATERIAL AND PROCESS CERTIFICATIONS.

CONTAMINATION CONTROL

CORROSION PROTECTION IS VERIFIED BY INSPECTION. GENERALLY CLEAN REQUIREMENT IS VERIFIED.

ASSEMBLY/INSTALLATION

SHEET SURFACE DEFECTS REMOVED BY GRINDING AND SURFACE FINISH ARE VERIFIED BY INSPECTION. PARTS ARE DIMENSIONALLY INSPECTED. MACHINED TEFLON PARTS ARE DIMENSIONALLY VERIFIED. ANNEALED PROCESS IS VERIFIED. MANDATORY INSPECTION POINTS ARE INCLUDED IN THE MANUFACTURING PROCESS.

CRITICAL PROCESSES

PART PASSIVATION AND FUSION WELD ON PARTS ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

N/A

TESTING

TESTS FOR MATERIAL PHYSICAL PROPERTY ARE VERIFIED BY INSPECTION.

HANDLING/PACKAGING

HANDLING, PACKAGING, STORAGE, AND SHIPPING REQUIREMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:

CURRENT DATA ON TEST FAILURE, FLIGHT FAILURE, UNEXPLAINED ANOMALIES, AND OTHER FAILURES EXPERIENCED DURING GROUND PROCESSING ACTIVITY CAN BE FOUND IN THE PRACA DATABASE.

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(E) OPERATIONAL USE:

FLIGHT: NO CREW ACTION CAN BE TAKEN

GROUND: GROUND OPERATIONS SAFING PROCEDURES CONTAIN SAFING SEQUENCE
OF EVENTS FOR MAJOR LEAKS IN THE HYDROGEN SYSTEM.

- APPROVALS -

S&R ENGINEERING	: W.P. MUSTY	:/S/ W.P. MUSTY
S&R ENGINEERING ITM	: P. A. STENGER-NGUYEN	:/S/ P.A. STENGER-NGUYEN
DESIGN ENGINEERING	: EARL HIRAKAWA	:/S/ EARL HIRAKAWA
MPS SUBSYSTEM MGR.	: TIM REITH	:/S/ TIM REITH
MOD	: BILL LANE	:/S/ BILL LANE
USA SAM	: MIKE SNYDER	:/S/ MIKE SNYDER
USA ORBITER ELEMENT	: SUZANNE LITTLE	:/S/ SUZANNE LITTLE
NASA SR&QA	: ERICH BASS	:/S/ ERICH BASS