

**SSME FMEA/CIL  
REDUNDANCY SCREEN**

Component Group: Ducts and Lines  
 CIL Item: K401-02  
 Part Number: RES1001  
 Component: Hydraulic Supply Hose  
 FMEA Item: K401  
 Failure Mode: Quick-disconnect fails (disconnects).

Prepared: D. Early  
 Approved: T. Nguyen  
 Approval Date: 7/25/00  
 Change #: 1  
 Directive #: CCBD ME3-01-5638

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Phase	Failure / Effect Description	Criticality Hazard Reference
M 4.1	<p>All actuators go into hydraulic lockup. Loss of mission may result when hydraulic lockup occurs at Max Q throttling.</p> <p>Redundancy Screens: DUCT SYSTEM - SENSOR SYSTEM: UNLIKE REDUNDANCY.</p> <p>A: Pass - Redundant hardware items are capable of checkout during normal ground turnaround.            B: Pass - Loss of a redundant hardware items is detectable during flight.            C: Pass - Loss of redundant hardware items could not result from a single credible event.</p>	<p>1R            ME-E1P,S,A,M,C,D</p>
C 4.2	<p>When failure occurs when MFV is less than 10%, but not closed, Channel B SEII will not occur. MFV will remain at lockup position until failsafe servoswitch is de-energized post cutoff. Open air fire if on launch pad. Loss of vehicle.</p> <p>Redundancy Screens: SINGLE POINT FAILURE: N/A.</p>	<p>1            ME-E1P,S,A,M,C,D</p>

**SSME FMEA/CIL  
DESIGN**

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Design / Document Reference

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**FAILURE CAUSE: A: Structural failure of: Support, Retainer.**

THE SUPPORT, AND RETAINER ARE SUPPLIED AS COMPONENTS OF A VENDOR ITEM, SYMMETRIC INCORPORATED PART NO. 511010 (DRAWING NO. 511010), PROCURED TO MEET THE REQUIREMENTS OF ROCKETDYNE PROCUREMENT SPECIFICATION (2).

THE QUICK DISCONNECT IS A MALE-FEMALE INNER PASSAGE SEALING DESIGN. THE TWO HOUSINGS ARE ENGAGED BY THREADS. A ANTI-ROTATION LOCKING MECHANISM IS EMPLOYED IN THE DESIGN TO PREVENT DISENGAGEMENT. THIS LOCKING MECHANISM IS VISUALLY VERIFIED TO BE ASSEMBLED CORRECTLY BY TWO PIN-DETENT MECHANISMS. DURING DISCONNECT THE INNER PLUG SEALS AGAINST THE HOUSINGS TO PREVENT CONTAMINATION OF THE INNER PASSAGES AND PREVENT FLUID LEAKAGE. DISCONNECT REQUIREMENTS ARE ESTABLISHED FOR OPERATING PRESSURE, BURST PRESSURE, TEMPERATURE RANGE, SHOCK, VIBRATION, SIDE LOADS, FLOW RATE, AND HEAD LOSS PER ROCKETDYNE PROCUREMENT SPECIFICATION (2). INSTALLATION IS CONTROLLED PER SPECIFICATION (3). THE DESIGN WAS VERIFIED TESTED FOR VIBRATION, FLOW RATE, PRESSURE, SHOCK ACCELERATION, AND COUPLING ENDURANCE PER SPECIFICATION REQUIREMENTS (2). THE MINIMUM FACTORS OF SAFETY FOR THE CONNECTOR MEET CEI REQUIREMENTS (4). THE HIGH AND LOW CYCLE FATIGUE LIFE MEET CEI REQUIREMENTS (5). THE QUICK DISCONNECT CONNECTOR WAS CLEARED FOR FRACTURE MECHANICS/NDE FLAW GROWTH, SINCE IT CONTAINS NO FRACTURE CRITICAL PARTS (6).

(1) RE2201-01; (2) RC2201; (3) OMRSD V58AG0.121; (4) RSS-8546, CP320R0003B; (5) RL00532, CP320R0003B; (6) NASA TASK 117

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**INSPECTION AND TEST**

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Failure Causes	Significant Characteristics	Inspection(s) / Test(s)	Document Reference
A	(VENDER P/N 511010)		RE2201-01
	MATERIAL INTEGRITY	MATERIAL INTEGRITY IS VERIFIED PER DRAWING REQUIREMENTS.	RE2201
	ASSEMBLY INTEGRITY	THE FOLLOWING TESTS ARE PERFORMED DURING ACCEPTANCE TEST: - FLOW AND PRESSURE DROP. - PROOF PRESSURE. - BONDING.	RC2201 RE2201 RC2201
	FLIGHT FLOW TESTING	CONNECTOR INSTALLATION IS VERIFIED PER SPECIFICATION REQUIREMENTS.  FOLLOWING REPAIR OR REPLACEMENT, AN EXTERNAL LEAK CHECK IS PERFORMED TO REVALIDATE THE SUBSYSTEM.  DURING EXTERNAL INSPECTIONS, THE HYDRAULIC SYSTEM IS VISUALLY INSPECTED FOR LEAKAGE.  DURING AFT CLOSEOUT INSPECTION, ANY EVIDENCE OF PREVIOUS HYDRAULIC LEAKAGE REQUIRES FURTHER DISPOSITION. (LAST TEST)	OMRSD V58AG0.121  OMRSD V41GEN.575  OMRSD V41BU0.030  OMRSD V41BU0.070

Failure History: Comprehensive failure history data is maintained in the Problem Reporting database (PRAMS/PRACA)  
 Reference: NASA letter SA21/88/308 and Rocketdyne letter 88RC09761.

Operational Use: FAILURE MODE CAN BE DETECTED IN REALTIME BY THE FLIGHT CONTROL TEAM WHO WILL EVALUATE EFFECTS UPON VEHICLE PERFORMANCE AND ABORT CAPABILITY. BASED ON THIS EVALUATION THE APPROPRIATE ABORT MODE OR SYSTEM CONFIGURATION WILL BE SELECTED. FAILURE DETECTION CUES AND ASSOCIATED SSME PERFORMANCE DATA HAVE BEEN COORDINATED BETWEEN THE ENGINEERING AND FLIGHT OPERATIONS ORGANIZATIONS WITH THE RESPONSES DOCUMENTED IN MISSION FLIGHT RULES.

**SSME WEA/CIL  
WELL JOINTS**

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Component	Basic Part Number	Weld Number	Weld Type	Class	Root Side Not Access	Critical Initial Flaw Size Not Detectable		Comments
						HCF	LCF	
LINE	RES1001	1,12,14	GTAW	I	X	X		
LINE	RES1001	2,5,8,11	GTAW	II	X			
LINE	RES1001	3,4,9,10	GTAW	II	X			
LINE	RES1001	6,7	GTAW	I	X			
LINE	RES1001	13	GTAW	I	X	X	X	
LINE	RES1001	15-19	GTAW	I	X			