

SSME EA/CIL
REDUNDANCY SCREEN

Component Group: Actuators
CIL Item: E701-02
Part Number: RES1008-3003
Component: Hydraulic Filter
FMEA Item: E701
Failure Mode: Structural failure.

Prepared: P. Lowrimore
Approved: T. Nguyen
Approval Date: 6/9/00
Change #: 1
Directive #: CCBD ME3-01-5624

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Phase	Failure / Effect Description	Criticality Hazard Reference
M 4.1	Major hydraulic fluid leak into aft compartment; loss of hydraulic pressure; loss of actuator control; controller switches to channel B (servovalve No. 2) all actuators; failure continues, controller initiates hydraulic lockup all actuators. Mission abort may result when hydraulic lockup occurs during Max Q throttling.	1R ME-E1P,S,A,M,C,D

Redundancy Screens: SINGLE POINT FAILURE: N/A

SSME FMEA/CIL
DESIGN

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Design / Document Reference

FAILURE CAUSE: A: Structural failure of housing.

THE FILTER HOUSING (1) IS MADE FROM HEAT TREATED INCONEL 718. THIS MATERIAL WAS SELECTED FOR ITS STRENGTH, ELASTIC MODULUS, DUCTILITY, CORROSION AND STRESS CORROSION RESISTANCE, AND WELDABILITY (2). THE FILTER HOUSING IS WELDED TO ROCKETDYNE WELD REQUIREMENTS (1). THE FILTER IS PROOF PRESSURE TESTED TO ASSURE STRUCTURAL INTEGRITY. THE HIGH CYCLE AND LOW CYCLE FATIGUE LIFE OF THE FILTER MEET CEI REQUIREMENTS (3). THE MINIMUM FACTORS OF SAFETY FOR THE FILTER MEET CEI REQUIREMENTS (4). THE FILTER WAS CLEARED FOR FRACTURE MECHANICS/NDE FLAW GROWTH, SINCE IT CONTAINS NO FRACTURE CRITICAL PARTS (5). THE FILTER HAS COMPLETED DESIGN VERIFICATION TESTING INCLUDING VIBRATION (6). DVS TEST RESULTS ARE DOCUMENTED (7).

(1) RES1008-3003; (2) RSS-8582; (3) RL00532, CP320R0003B; (4) RSS-8546, CP320R0003B; (5) NASA TASK 117; (6) DVS-SSME-512; (7) RSS-512-52

SSME FI /CIL
INSPECTION AND TEST

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Failure Causes	Significant Characteristics	Inspection(s) / Test(s)	Document Reference
A	FILTER HOUSING		11-1147
	MATERIAL INTEGRITY	MATERIAL INTEGRITY AND HEAT TREAT ARE VERIFIED PER DRAWING REQUIREMENTS.	11-1147
	WELD INTEGRITY	WELDS ARE VERIFIED PER DRAWING AND SPECIFICATION REQUIREMENTS.	11-1147 RC1008 RL10011
	PROOF TEST	PROOF TEST VERIFIES INTEGRITY OF HOUSING PER DRAWING REQUIREMENTS.	14228-631
		COMPONENT EXTERNAL INSPECTION AND AFT CLOSEOUT INSPECTIONS VERIFY NO HYDRAULIC LEAKAGE FROM FILTER STRUCTURAL HOUSING. (LAST TEST)	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.

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