

SSME FMEA/CIL  
**REDUNDANCY SCREEN**

Component Group: Combustion Devices  
CIL Item: A705-03  
Part Number: R0017440  
Component: Oxidizer Preburner (Phase II+)  
FMEA Item: A705  
Failure Mode: Blockage of one LOX ASI passage.

Prepared: A. Kay  
Approved: T. Nguyen  
Approval Date: 9/9/99  
Change #: 1  
Directive #: CCBD ME3-01-5238

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Phase	Failure / Effect Description	Criticality Hazard Reference
SMC 4.1	Blockage of one LOX ASI injection passage causes localized LOX-rich operation, erosion of the ASI combustion chamber walls, manifold invasion, injector burnout, and aft compartment overpressurization and fire. Loss of vehicle.  Redundancy Screens: SINGLE POINT FAILURE: N/A	1 ME-FB6S, ME-FB6M, ME-FB6A C

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**SSME / A/CIL  
DESIGN**

Component Group: Combustion Devices  
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Design / Document Reference

FAILURE CAUSE: A: Contamination of the ASI LOX injection passage.

THE SMALLEST SECTION OF THE ASI OXIDIZER PASSAGEWAY IS LARGER THAN THE ASI ORIFICE INSTALLED APPROXIMATELY 5 INCHES UPSTREAM (1). ANY CONTAMINANT THAT COULD CAUSE PASSAGE BLOCKAGE WOULD HAVE TO COME FROM THIS SHORT LENGTH OF LINE. HOT FIRE TESTING OF THE ENGINE WILL REVEAL BLOCKAGE PROBLEMS PRIOR TO FLIGHT USE (2). THE ASI ORIFICE IS ASSEMBLED IN A CONTAMINATION CONTROLLED ENVIRONMENT (3).

(1): R0017440, R5009018 (2): RL00050-04; (3): R00711-600

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**SSME FMEA/CIL  
INSPECTION AND TEST**

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Failure Causes	Significant Characteristics	Inspection(s) / Test(s)	Document Reference
A	ASI ASSEMBLY HOT-GAS MANIFOLD		R0017440 R0018020
	ASI SYSTEM CLEANLINESS	ASI SUBASSEMBLIES AND THE MOV ARE CLEANED DURING MANUFACTURING TO OXYGEN SERVICE REQUIREMENTS.  AFTER BRAZING, THE PASSAGE PORTS AND ORIFICES ARE INSPECTED FOR BLOCKAGE DUE TO BRAZING MATERIAL.  THE OXIDIZER ASI SYSTEM IS PURGED DURING THE PROPELLANT CONDITIONING TO MAINTAIN IT FREE OF MOISTURE AND ICE FORMATION.	RL1000+ RA0110-018  RA1607-017 RA1607-018
	PROPELLANT SYSTEM CLEANLINESS	SSMF PROPELLANT SYSTEMS ARE DRIED AND VERIFIED DRY PRIOR TO EACH FLIGHT	OMRSD V41CB0 082 OMRSD V41CB0 083
	ASSEMBLY INTEGRITY	THE HOT FIRE TESTING AND 2ND E & M INSPECTIONS VERIFY ASI INTEGRITY.  ASI CHAMBER IS INSPECTED FOR DAMAGE PRIOR TO EACH LAUNCH (LAST TEST).	RL00050-04 RL00056-06 RL00055-07  OMRSD V41BB0 040

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Failure History: Comprehensive failure history data is maintained in the Problem Reporting database (PRAMS/PRACA).  
 Reference: NASA letter SA2188/308 and Rockwell letter 88RC09761.

Operational Use: Not Applicable.

**SSME EA/CIL  
WELD JOINTS**

Component Group: Combustion Devices  
 CIL Item: A706  
 Component: R0017440  
 Part Number: Oxidizer Preburner (Phase II\*)  
 A706

Prepared: A. Kay  
 Approved: T. Nguyen  
 Approval Date: 6/9/99  
 Change #: 1  
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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	
OPB FUEL CHAMBER	R0017425	1	GTAW	I,II	X	X	X	
OPB FUEL CHAMBER	R0017425	2	GTAW	II	X	X	X	
OPB INJECTOR	R0017440	1	FRW	Ib	X	X	X	
OPB INJECTOR	R0017440	2	EBW	II	X	X	X	
OPB INJECTOR	R0017440	3	GTAW	II	X	X	X	
OPB INJECTOR	R0017440	9	EBW	II	X	N/A	N/A	
OPB INJECTOR	R0017440	28	EBW	II	X	N/A	N/A	
OPB INJECTOR	R0017440	29	EBW	II	X	X	X	
OPB INJECTOR	R0017440	31	GTAW	II	X			
OPB BODY	R0018067	1	GTAW	II	X	X	X	
OPB BODY	R0018067	2	EBW	I	X			
OPB BODY	R0018067	6	GTAW	II	X			
OPB BODY	R0018067	7	GTAW	II	X			
OPB FUEL MANIFOLD	RS009013	9(OPT), 10(OPT)	GTAW	I		X	X	
OPB FUEL MANIFOLD	RS009013	11(OPT)	GTAW	I		X	X	
OPB FUEL MANIFOLD	RS009013	13(OPT)	GTAW	I	X			
OPB OXID INLET	RS009014	6-8	GTAW	I		X		
OPB ASI FUEL LINE	RS009024	1	GTAW	I	X	X	X	

**SSME FMEA/CIL**

**FIELD CONFIGURATION VARIANCES FROM CIL RATIONALE**

Component Group: Combustion Devices  
Item Name: Oxidizer Preburner (Phase II+)  
Item Number: A705  
Part Number: R0017443

Prepared: A. Kay  
Approved: T. Nguyen  
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Base Line Rationale	Variance	Change Rationale	Variation Dash Number
1. A705-09, -10, -11: NO RATIONALE EFFECTED.	POWERHEADS EXIST UTILIZING THE COMBINED FOUR ZONE PROOF PRESSURE TEST FROM THE HOT GAS MANIFOLD. CEI REQUIREMENTS ARE MAINTAINED	HOT GAS MANIFOLD PROOF PRESSURE TEST ACCOMPLISHED SEPARATELY PRIOR TO COOLANT DUCT AND MAIN INJECTOR INSTALLATION.	R00-2001-691, -701, 731, 991, -1051.

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