

SSME F A/CIL
REDUNDANCY SCREEN

Component Group: Combustion Devices
 CIL Item: A205-03
 Part Number: RS009122
 Component: Baffleless Main Injector (Phase II*)
 FMEA Item: A205
 Failure Mode: Blockage of one LOX ASI passage.

Prepared: A. Kay
 Approved: T. Nguyen
 Approval Date: 9/9/99
 Change #: 7
 Directive #: CCBD MF3-07-5238

Page: 1 of 1

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-FB4S, ME-FB4M, ME-FB4A,C

SSME FMEA/CIL
DESIGN

Component Group: Combustion Devices
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Component: Baffleless Main Injector (Phase I+)
FMEA Item: A205
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Page: 1 of 1

Design / Document Reference

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

THE MAIN INJECTOR ASI OXIDIZER INLET LINE HAS ORIFICES WELDED UPSTREAM OF THE LOX PASSAGE (1). THE CRIFICES WILL NOT PASS PARTICLES WHICH ARE LARGE ENOUGH TO BLOCK THE PASSAGES WITHIN THE ASI (2). ANY CONTAMINATION WHICH COULD CAUSE BLOCKAGE WOULD HAVE TO BE IN THE APPROXIMATELY 14 INCHES OF LINE BELOW THE ORIFICE PRIOR TO WELDING (1). HOT FIRE TESTING OF THE ENGINE WILL REVEAL ASI BLOCKAGE PRIOR TO FLIGHT USE (3).

(1) RS009126 (2) RS009038; (3) RL00050-04

A - 108

**SSME FME :IL
INSPECTION AND TEST**

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Page: 1 of 1

Failure Cause	Significant Characteristics	Inspection(s) / Test(s)	Document Reference
A	ASI SYSTEM CLEANLINESS	ASI SUBASSEMBLIES ARE CLEANED DURING MANUFACTURING AND PRIOR TO FINAL ASSEMBLY	Document Reference RL10001 RA1610-005
		AFTER BRAZING, THE PASSAGE PORTS AND ORIFICES ARE INSPECTED FOR BLOCKAGE DUE TO BRAZING MATERIAL.	RA1607-009
		DURING PROPELLANT CONDITIONING, THE OXIDIZER ASI SYSTEM IS PURGED TO MAINTAIN IT FREE OF MOISTURE AND ICE.	OMRSD SC0FB0.000
	PROPELLANT SYSTEM CLEANLINESS	SSME PROPELLANT SYSTEM IS DRIED AND VERIFIED DRY PRIOR TO EACH FLIGHT.	OMRSD V41CB0 082 OMRSD V41CB0 083
	ASSEMBLY INTEGRITY	HOT FIRE TESTING AND 2ND E & M INSPECTIONS VERIFY ASI INTEGRITY.	RL00050-04 RL00056-05 RL00056-07
		THE ASI CHAMBERS ARE INSPECTED FOR DAMAGE PRIOR TO EACH LAUNCH (LAST TEST).	OMRSD V41BU0.029

Failure History: Comprehensive failure history data is maintained in the Problem Reporting database (PRAMS/PRACA)
 Reference: NASA letter SA2168/308 and Rocketdyne letter 88RCC9761

Operational Use: Not Applicable

A - 109

**SSME I A/CIL
WELD JOINTS**

Component Group: Combustion Devices
 CIL Item: A205
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 Part Number: Baffleless Main Injector (Phase II+)
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 Page: 1 of 1

A - 135

Component	Basic Part Number	Weld Number	Weld Type	Class	Root Side Not Access	Critical Initial Flaw Size Not Detectable		Comments
						HCF	LCF	
MAIN INJECTOR ASI LINE	RS009061	3	GTAW	I		X	X	
MAIN INJECTOR ASI LINE	RS009061	5	GTAW	I		X	X	
MAIN INJECTOR	RS009126	1	EBW	I				
MAIN INJECTOR	RS009126	6-7,52-53	GTAW	I	X	X	X	
MAIN INJECTOR	RS009126	9	EBW	I				
MAIN INJECTOR	RS009126	3	CBW	I	X			
MAIN INJECTOR	RS009126	10	EBW	II	X	X	X	
MAIN INJECTOR	RS009126	12-13	GTAW	I	X			
MAIN INJECTOR BODY	RS009126	14-15	GTAW	I	X	X	X	
MAIN INJECTOR BODY	RS009126	16	GTAW	I	X	X	X	
MAIN INJECTOR BODY	RS009126	17	GTAW	I	X	X	X	
MAIN INJECTOR	RS009126	20	GTAW	I	X			
MAIN INJECTOR	RS009126	21	GTAW	I	X			
MAIN INJECTOR	RS009126	22	GTAW	I	X			
MAIN INJECTOR	RS009126	23-29,54	GTAW	I	X			
MAIN INJECTOR	RS009126	44-45	EBW	I	X	X	X	
MAIN INJECTOR	RS009126	50-51	CBW	Ia	X	X	X	
MAIN INJECTOR	RS009126	59	EBW	I,II	X			
MAIN INJECTOR	RS009126	60-61	GTAW	II	X			
MAIN INJECTOR BODY	RS009237	600 FLCS	FRW	I		X	X	
MAIN INJECTOR LOX SUPPLY LINE	RC018C15	1	GTAW	I	X	X		

FIELD CONFIGURATION VARIANCES FROM CIL RATIONALE

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Page: 1 of 1

Base Line Rationale	Variance	Change Rationale	Variant Case Number
1. NO RATIONALE EFFECTED	REWORKED BAFFLE POSTS EXIST ON 2 DASH NUMBERS.	INLINE REWORK OF COMPLETED BAFFLE MAIN INJECTOR IS AN ALLOWABLE ALTERNATE TO THE BAFFLELESS MAIN INJECTOR	RS009122-1571, RS009122-1581
2. NO RATIONALE EFFECTED.	BLOCK I Isp IMPROVEMENTS DO NOT EXIST ON 2 POWERHEADS	BLOCK I FLIGHT ENGINES MEET CEI REQUIREMENTS FOR Isp. HOWEVER, CERTAIN FLIGHT MANIFESTS REQUIRE AN INCREASE IN Isp FROM THE BLOCK I FLIGHT ENGINES. THE MAIN INJECTOR PRIMARY AND SECONDARY FACEPLATES WERE MODIFIED TO ENHANCE THE COMBUSTION PROCESS.	RS009122-1671
3. A205-12 AND A205-13, BLOCK III Isp IMPROVEMENTS.	THE BLOCK I FLIGHT ENGINES DO NOT HAVE THE MODIFIED MAIN INJECTOR PRIMARY AND SECONDARY FACEPLATES, ROW 13, FUEL SLEEVES AND NEW V-SEAL	BLOCK I FLIGHT ENGINES MEET CEI REQUIREMENTS FOR Isp	RS009122-1681

A - 136