CRITICAL ITEMS LIST (CIL)

No. 10-03-01-01/01

SYSTEM:	Space Shuttle RSRM 10	CRITICALITY CATEGORY:	1
SUBSYSTEM:	Ignition Subsystem 10-03	PART NAME:	SRM Ignition Initiator (1)
ASSEMBLY:	SRM Ignition Initiator 10-03-01	PART NO.:	(See Table A-3)
FMEA ITEM NO.:	10-03-01-01 Rev M	PHASE(S):	Pre-launch (PL)
CIL REV NO.:	M	QUANTITY:	(See Table A-3)
DATE:	31 Jul 2000	EFFECTIVITY:	(See Table 101-6)
SUPERSEDES PAGE:	405-1ff.	HAZARD REF.:	FI-01
DATED:	30 Jul 1999		
CIL ANALYST:	S. E. Rodgers		
APPROVED BY:		DATE:	

RELIABILITY ENGINEERING: K. G. Sanofsky 31 Jul 2000

ENGINEERING: S. R. Graves 31 Jul 2000

1.0 FAILURE CONDITION: Premature operation (A)

2.0 FAILURE MODE: 1.0 Premature operation

3.0 FAILURE EFFECTS: Premature ignition results causing loss of the RSRM, SRB, crew, and vehicle

4.0 FAILURE CAUSES (FC):

FC NO.	DESCRIPTION	FAILURE CAUSE KEY
1.1	Lightning strike	A
1.2	Electromagnetic interference	B
1.3	Electrostatic discharge	C
1.4	Increased sensitivity due to contamination	D
1.5	High temperature	E
1.6	Shock and vibration	F

5.0 REDUNDANCY SCREENS:

SCREEN A: N/A
SCREEN B: N/A
SCREEN C: N/A

6.0 DESCRIPTION:

1. Each RSRM igniter assembly has two SRM Ignition Initiators (SIIs). The SIIs have a unibody design, meaning the body is one piece. The sealing surface is built into the part. There is no sealing washer. Each SII is a small electro-explosive device (EED) that initiates the ignition process in the RSRM. It is shown in Figures 1 and 2. Materials are listed in Table 1.

TABLE 1. MATERIALS

Drawing No.	Name	Material	Specification	Quantity
SED26100107	Initiator, SRM Ignition (SII)	Inconel 718 Stainless Steel		2/Motor (Body Only)
1U77386	Barrier-Booster Assembly, S/A Device, Loaded			1/Motor

6.1 CHARACTERISTICS:

1. The SIIs are Government Furnished Equipment (GFE). They have a unibody design that allows greater flatness control. Ignition of the SIIs is the first step in the motor ignition process. They ignite the following in turn; pyrotechnic basket, initiator, igniter and finally the motor. The SII closure cup protects the SII from humidity prior to ignition and the header seals the SII after ignition.

7.0 FAILURE HISTORY/RELATED EXPERIENCE:

1. Current data on test failures, flight failures, unexplained failures, and other failures during RSRM ground processing activity can be found in the PRACA Database.

8.0 OPERATIONAL USE: N/A

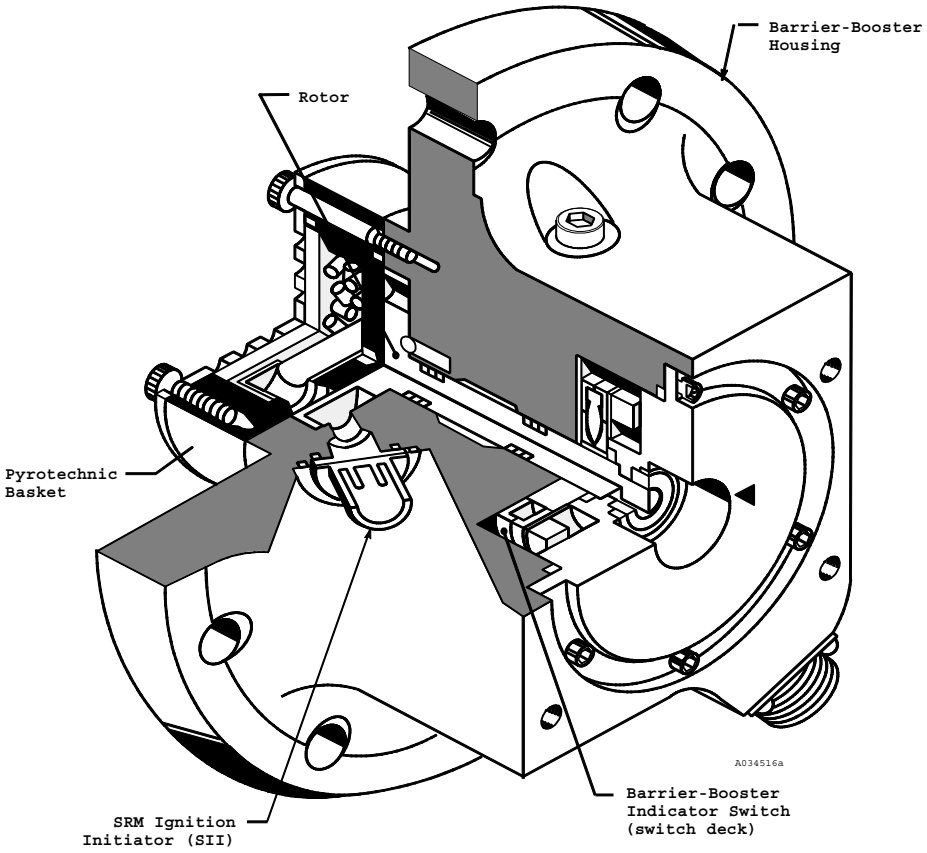

Figure 1. Barrier-Booster Assembly

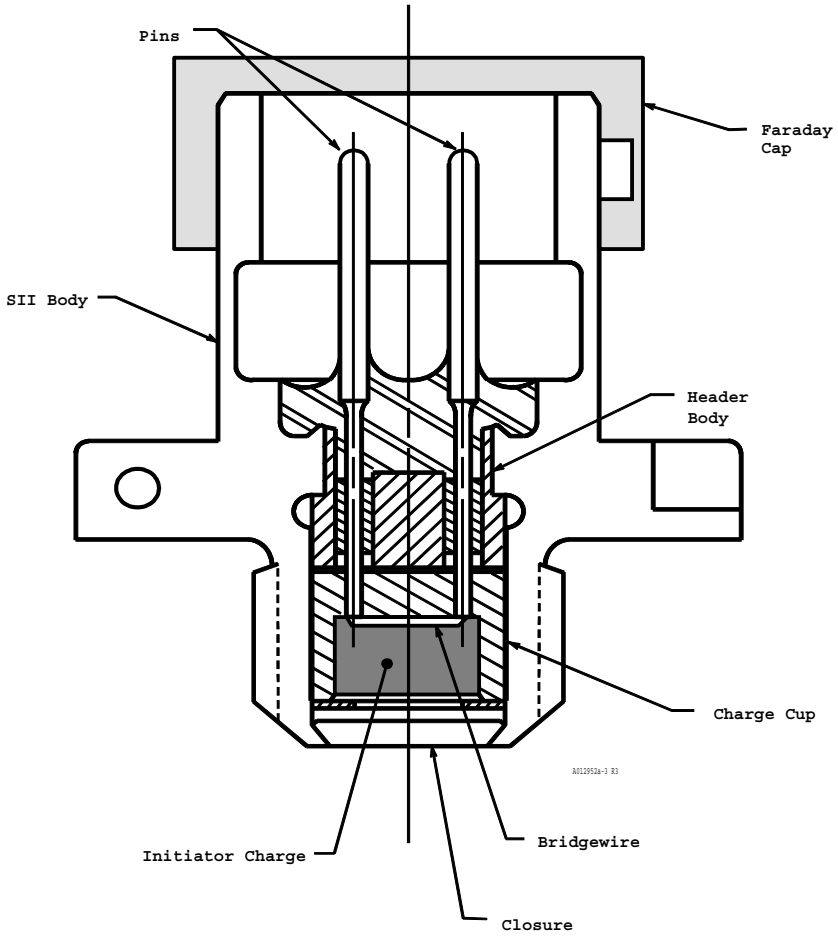

Figure 2. SRM Ignition Initiator (SII)

9.0 RATIONALE FOR RETENTION:

9.1 DESIGN:

DCN	FAILURE CAUSES	
A,B,C,D,E,F	1.	The SII is GFE. Its design is controlled by JSC, and specific design characteristics that minimize the probability of failures related to the cause are addressed in the JSC Critical Items List.
A,B,C,D,E,F	2.	Qualification of the SII is controlled by JSC, and qualification testing and/or analysis related to failure causes is addressed in the JSC Critical Items List.
A,B,C	3.	The SII is required to withstand a model lightning flash without jeopardizing the strength or function to safely continue the mission per JSC Specifications. The SII is electrically bonded to the RSRM structure through the barrier-booster assembly and igniter adapter.
A,B,C	4.	The SII will withstand an electrostatic discharge per JSC engineering.
A,B,C	5.	Electromagnetic effects control measures are per MSFC Specification 16A00100.
A,B,C	6.	The SII will not ignite when the bridge wire is subjected to a specified current or power within temperature constraints per JSC engineering.
A,B,C	7.	A continuous metallic path is provided by electrical bonding from the RSRM to the facility grounding system to ensure electrical resistance across the mating surfaces is within limits per JSC specifications.
D	8.	The SII is hermetically sealed per JSC engineering.
E	9.	The SII is capable of withstanding high temperatures without auto ignition per JSC engineering.
F	10.	Shock and vibration environments, including pre-launch random vibration, to which the SII will be exposed are the same as for the S&A device, and are engineering.
F	11.	Shock and vibration levels to which the SII will be exposed during pre-launch are lower than SII design and qualification shock vibration levels per TWR-18147.
F	12.	The S&A device, with SIIs installed, did not fire prematurely when subjected to pre-launch flight vibration tests as part of qualification testing of the S&A device per TWR-12198.

9.2 TEST AND INSPECTION:

DCN	FAILURE CAUSES and TESTS (T)		CIL CODES
A,B,C,D,E,F	1.	Vendor inspections of this GFE item that minimize the probability of failures related to the causes listed above are controlled by JSC, and should be addressed in the JSC Critical Items List.	
	2.	For New SRM Ignition Initiator (SII), verify:	
A,B,C,D,E,F	a.	Lot of SIIs was flight-certified	RAA040
D	b.	SII is free of obvious shipping or handling damage	AKP001
D	c.	Sealing surface is free of damage such as nicks, dings, scratches, or raised metal	RAA128
	3.	For New Barrier-Booster Assembly, Loaded, verify:	
D	a.	Initiators are free of damage and contamination prior to installation	ADA048
	4.	KSC verifies:	
A,B,C	a.	S&A device to igniter adapter electrical bonding tests per OMRSD File V, Vol I, B47SA0.100	OMD071
A,B,C,E (T)	b.	S&A device for the following per OMRSD File V, Vol I, B000FL.001: 1. Bridge wire resistance test results are acceptable 2. Insulation-resistance tests are acceptable 3. General condition including Faraday caps for damage and absence of contamination	OMD020
A,B,C,D,E,F	c.	SIIs were flight-certified by JSC per OMRSD File V, Vol I, B000FL.002	OMD021
A,B,C (T)	d.	Power "ON" stray voltage tests per OMRSD File II, Vol I, S00000.140	OMD001
A,B,C (T)	e.	Power "OFF" stray voltage tests per OMRSD File II, Vol I, S00GEN.635	OMD002
A,B,C,D	f.	SII Faraday caps are in place per OMRSD File V, Vol I, B47GEN.050	OMD031