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NDIA 48th Annual Fuze Conference Low Cost SDF for ICM Rounds



M223E1 Self-Destruct Fuze (SDF) An L-3 BTFP ARDEC IPT Success



Contents

- **Contract Requirements**
- **Design**
- **Recent Test Results**
- **Applications**
- **Value: Operational Utility, Producibility, Cost**
- **Summary**

Pyrotechnic Self Destruct Fuze



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Current Contract Requirements

- **20-Year or better storage life**
- **SDF function time ≥ 24 sec**
- **Reliability:**
 - **Primary Mode 95%**
 - **SDF Mode 95%**
 - **Hazardous Duds $\leq 1/500$**

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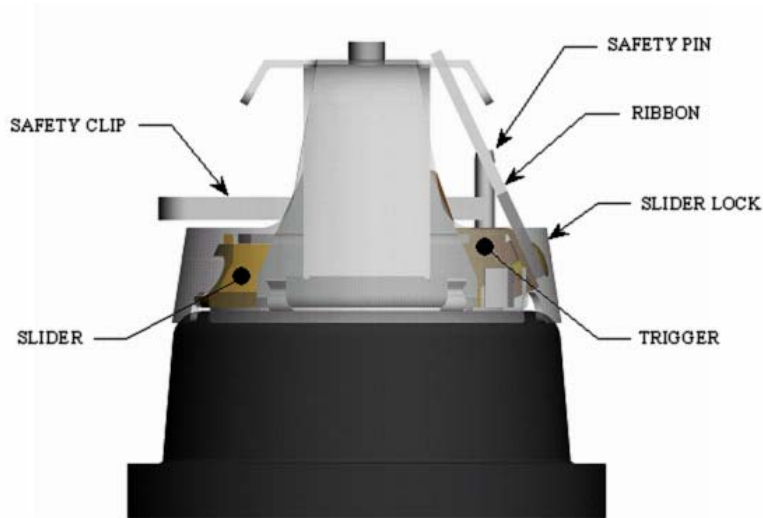
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Contract History

- **Contract Awarded May 2000**
 - **Concept Validation**
 - **Ballistic Testing**
- **Contract awarded February 2002**
 - **Formation of the IPT**
 - **Design improvements**
 - **Three(3) ballistic tests**



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M223E1 SDF Design Features

- **Based on M223 Fuze Design**
 - Arming screw, weight, slider, housing, cover
- **Compatible with M42, M46 and M77 Grenades**
 - SDF functions with or without spin
- **SDF is independent of primary mode.**
- **All energetics are contained in slider**
 - Stab ignitor, pyro delay, transfer element, M55 detonator
- **Pyrotechnic delay is a standard mix (Tungsten/Barium Chromate/Potassium Perchlorate Composition: (MIL-STD-82710))**
- **Compatible with all existing LAP facilities**

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Description of Applications

Application	Projectile	Grenade	Fuze Configuration
Cannon Artillery	M915 (105mm)	M80	M223E1 (Mod)
	M483A1 (155mm)	M42, M46	M223E1
	M864 (155mm)	M42, M46	M223E1
Rocket	GMLRS	M77	M223E1 (Mod)

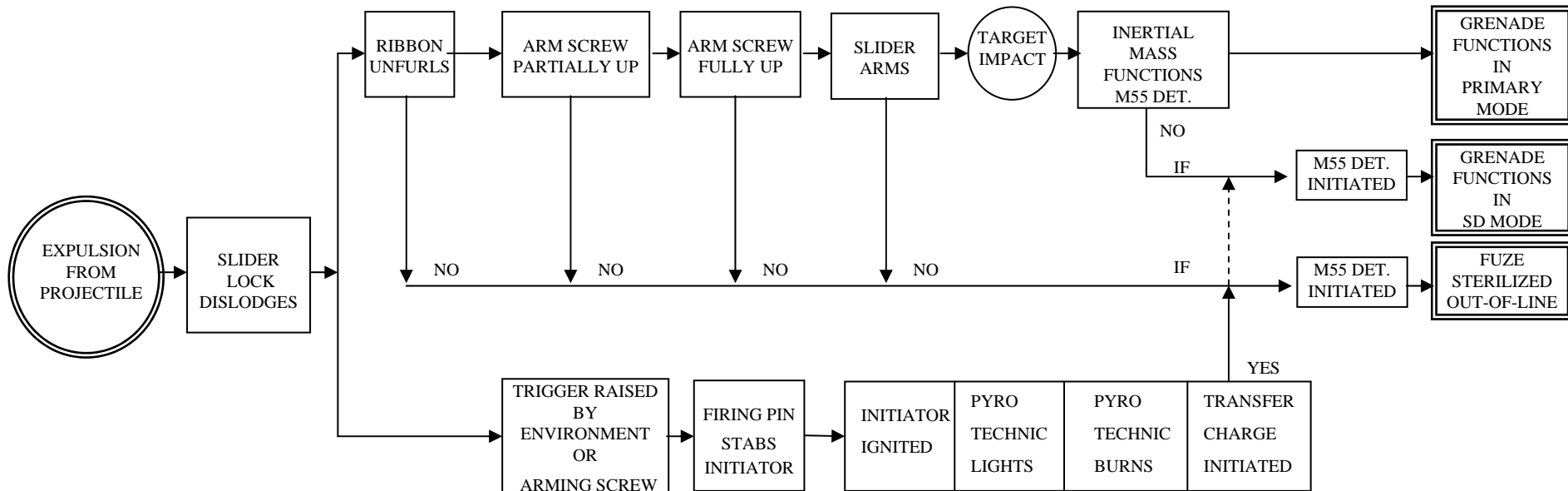
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M223E1 Pyrotechnic Self-Destruct Fuze



FUNCTIONAL SEQUENCES

Pyrotechnic Self Destruct Fuze



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Value: Operational Effectiveness

- TACOM-ARDEC self-destruct timing based upon statistical analysis of grenade fall times, various ranges for both M577 and M762 fuzed projectiles
- Criteria established at minimum 24 seconds for self-destruct to preclude air bursts
- TACOM-ARDEC 24 sec criteria ensures:
 - 100% coverage for M762
 - M577 all ranges/all QEs @ a reasonable 97.7%
- L-3 BTFP design exceeds the TACOM-ARDEC standard of 24 seconds

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Objective

*Use Design for 6 Sigma Tools to Minimize
Transition Risk from Prototype to
Full-Rate Production*

*A
PM ARMS, TACOM-ARDEC, L-3 BTFP &
DZI
Team*

Six Sigma Supporting Tools & Status



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Six Sigma Tools

Status

Complete

- Process Maps
 - **Pyrotechnic Fabrication**
 - **Load and Seal**

- FMEAs

Complete

- Cause and Effect Analysis

Complete

- Critical to Quality Analysis

Complete

- Analyze Existing Data
 - **Pareto Analysis**
 - **Rolled Throughput Yield**

Complete

- Establish Development Project Strategy
 - **Design of Experiments**
 - **Quality Document Development**
 - **Preventative Maintenance Plan**
 - **Facility/Process Qualification**
 - **Gage R&R**
 - **FMEA Update**

Complete

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Test #1 Results – Dec 02

Projectile/#	Zone	Fuze Configuration	# Grenades	Component Reliability
M864	8	Primary Only	93	98.9%
M864	8	SD Only	96	50%
M864	8	Tactical	95	96.8%

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Test #2 Results – Dec 03

Projectile/#	Zone	Fuze Configuration	# Grenades	Component Reliability
M864	8	SD Only	190	88%
M864	8	Tactical	96	100%

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Test #3 Results - March 04

Projectile/#	Zone	Fuze Configuration	# Grenades	Component Reliability
M864	8	Primary Only	60	100%
M864	8	SD Only	240	100%
M864	8	Tactical	132	100%

100% Functional Reliability – No UXO

An L-3 BTFP ARDEC IPT Success

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Production Price at Full Rate

- **L-3 BTFP Self Destruct Fuze is designed for volume production**
- **Pricing models suitable for artillery or missile ICM production**

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Summary

- **Today: Design exceeds contract design requirements (<1%)**
- **L-3 BTFP SD Fuze:**
 - **Developed in “three years” – IRAD/Govt. funding**
 - **SDF compatible with current U.S. LAP facility requirements**
 - **Loadable: Standard components and Technology**
 - **Affordable**
 - **Meets or exceeds 20-year shelf life**
 - **Reliable (100% in last test)**
- **Pre-Production Engineering is the IPT’s next step**