Precision Strike SPO

Integrity - Service - Excellence

NDIA FUZE CONFERENCE

Air Force Fuze Overview

9 April 2003

Ms. Wanda Siefke
Chief, Fuze Division
AAC/WMGS
wanda.siefke@eglin.af.mil

Purpose of Briefing

- **Why Are We Here:**
  - **Provide Lessons Learned on Fuze Systems**

- **What Do I Want From You:**
  - **Understand Fuze Challenges and, That to Survive, We Must Change Our Mindset**

BIJAF

Outline

Precision Guided Munitions/Fuzes

- Challenges From Last Conference
- Challenges Today
- Challenges Tomorrow

Change our mindset to meet challenges of tomorrow

Challenges from Last Conference

- **Availability and Reliability**
- **Collateral Damage**
- **Effectiveness of Defeat Mechanisms**
- **Multiple Event Requirements**
- **High G Environments/High Velocity**
- **Weapon/Aircraft Compatibility**
- **Miniaturization**
- **Versatility**

Budgets for PGMs increased, but no provision for increased fuze quantities

Challenges Today

- **Technical Complexity**
- **Production Capacity**
- **Manufacturing Capability**
- **Unit Cost**

Not Only Are Fuze Designs Complex,...

…. They Are Extremely Hard to Build

Joint Programmable Fuze (JPF)

POC: Roy Suarez

(850) 882-9514x2237

roy.suarez@eglin.af.mil

Contractor: Kaman Dayron

FMU-152A/B

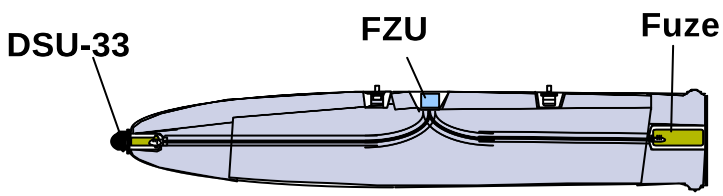
JPF System Description

- **Single Fuze Compatible With Mk82, Mk83, Mk 84, BLU-109, BLU-113 for Use in AGM-130, GBU-10/12/15/24/27/28 and All JDAMs**
- **Can Be Used in Current FMU-139 and FMU-143 Applications**
- **Cockpit Selectable Arm/Delay Times**
  - **Arm 2-25 Seconds**
  - **Delay Instantaneous to 24 Hours**
- **Multi-function Capability**
  - **Hard Target Penetrator Weapons**
  - **Blast Fragmentation**
  - **Backward Compatibility With Current Weapons**

JPF Provides Key Flexibility the Warfighter Desperately Needs

Challenges

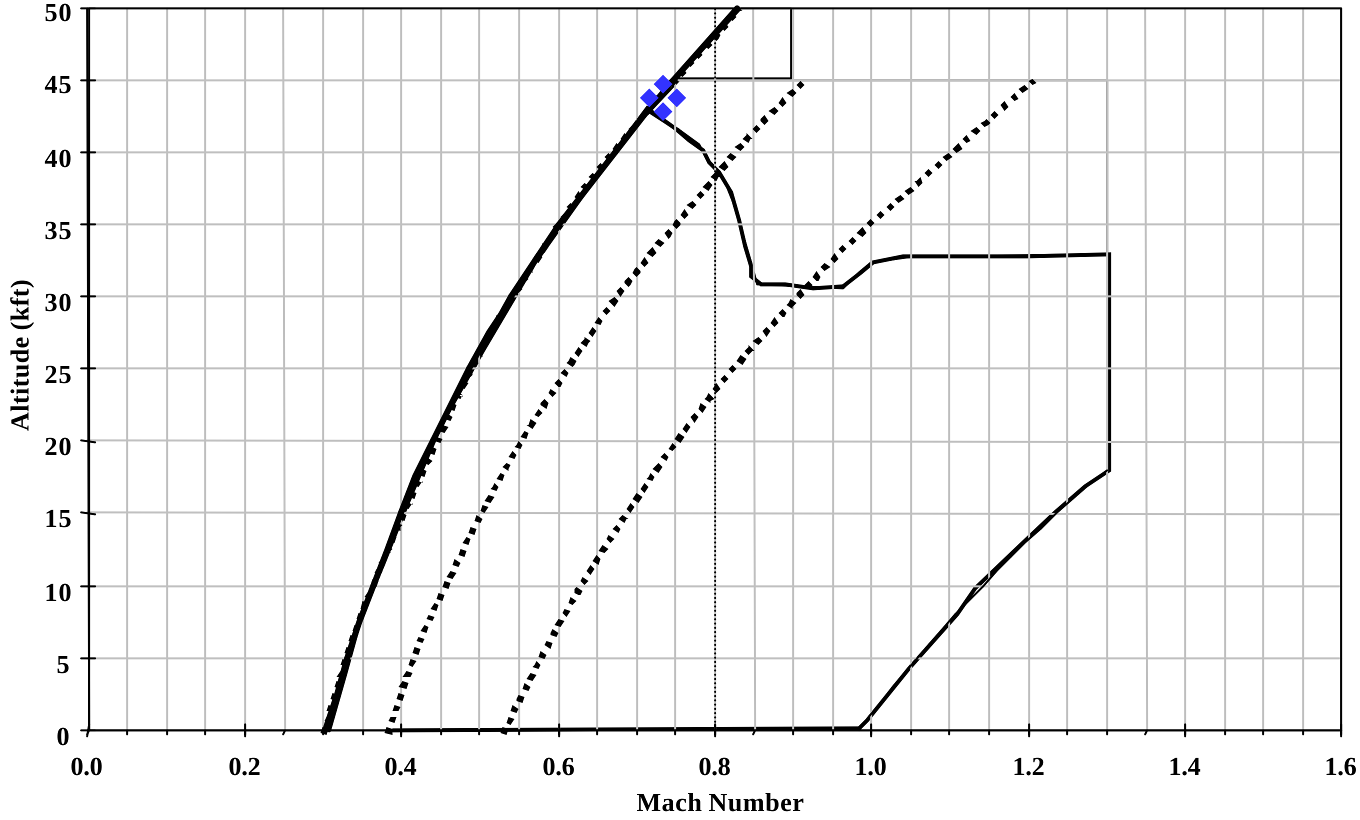
- **Technical Complexity –**
  - **High Altitude Low Airspeed (HALA)**
    - **Low Power Output From FZU Due to Inadequate Airflow**



  - **Changes**
    - **FZU-55A/B Initiator - Improve Power Output**
    - **FMU-152A/B Fuze - Modify Fuze Logic to Handle Low Power Conditions**

HALA Redesign results

- **JDAM/B-52 Tests Feb 03**



Great Success: 5 Released, 5 Performed

Challenges….Industry-wide

- **Manufacturing Capability**
  - **Technology Dated**
    - **Labor Intensive**
    - **Tight Tolerances**
  - **Changes**
    - **Modernize Manufacturing Operations**
      - **Lean Manufacturing Principles – Creates Capacity**
      - **Cellular Factory Layouts**
      - **Focused Product Teams Employ Taguchi and Six-Sigma Methods**
    - **Characterize and Validate Activities such as**
      - **Detail & Sub-Assembly Operations**
      - **Component & Assembly Test Sets**
      - **Outsourcing**

Ownership, Accountability, Responsibility at Cell

Hard Target Smart Fuze (HTSF)

POC: **Tanya Lambert**

(850) 882-9514 x-2178

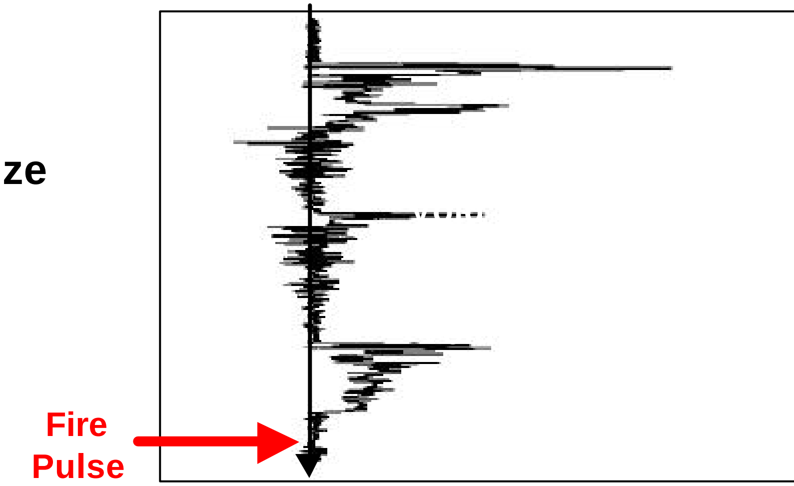
tanya.lambert@eglin.af.mil

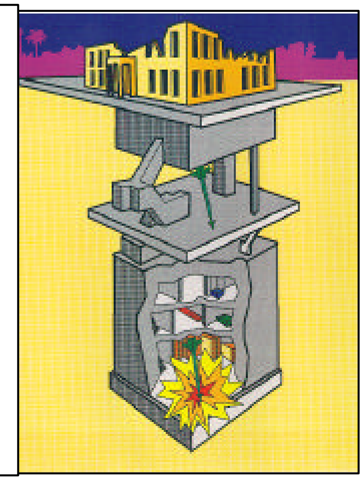
CONTRACTOR: ATK (Alliant Tech Systems)

FMU-159A/B

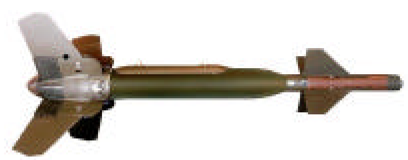
HTSF Description

- **Electronic, In-Line**
  Accelerometer-based fuze
  - **Void sensing**
  - **Hard layer count**
  - **Depth of burial**
  - **Back-up Timer**





- **Compatible with existing fuze wells**
- **Cockpit Programmable with JDAM interface**
- **Potential weapon systems**
  - **GBU-24, -27, -28, -37, -31**
  - **GBU-15, AGM-130, AGM-142,**
  - **AGM-86/D, Tactical Tomahawk Penetrator Variant**



Precise, lethal targeting

HTSF Challenges

- **Technical Complexity**
  - **Knows Where It Is Within the Target – <u>Not Just a Timer Anymore</u>**
  - **Must Survive Target Environment**

- **Manufacturing Capability**
  - **Labor Intensive**
- **Production Capacity**
  - **Low Quantity Does Not Incentivize Investment**
- **Unit Cost**
  - **Low Quantity Can't Yield Learning Savings**

DSU-33 Proximity Sensor

POC: Bill Yourick

(850) 882-9514 x-2204

john.yourick@eglin.af.mil

CONTRACTOR: ATK (Alliant Tech Systems)

DSU-33 System Description

- **Low Altitude RADAR Proximity Sensor**
  - **Height of Burst (HOB) 20 Feet (Nominal)**
  - **Over all Water and Land Surface Conditions**

- **Provides Air Burst Proximity Fuzing for JDAM, Mk-80 Series & M117 GP Bombs**
- **Provides Fire Pulse Signal to the FMU-139 and FMU-152 Fuze**
- **Self Powered: Initiated by FZU or FFCS**
  - **DSU-33A/B: 60-90 Sec - GP Bombs**
  - **DSU-33B/B: 200 Sec – JDAM**
- **Employment on A10, F15, F16, F22, B1, B2, B52, F/A18, AV8, and F14 Aircraft**

DSU-33 Challenges

- **Technical Complexity**
  - **Parts Obsolescence**
  - **Change**
    - **Qualify New Parts**

- **Unit Cost**
  - **Stable Funding and Competitive Procurement Provided Meaningful Cost Reduction Incentives**

"Green" Program – It is Meeting Cost, Schedule & Technical Requirements

Outline

Precision Guided Munitions/Fuzes

- Challenges from Last Conference
- Challenges Today
- **Challenges Tomorrow**

Change our mindset to meet challenges of tomorrow

Challenges Tomorrow
(AKA: Observations from Air Armament Summit)

- **Affordability**
- **BIA/BDA: Weapon Data Links**
- **Plug and Play Capability**
- **System Interoperability**

Mission Flexibility is Key

Air Armament Summit Sound bites

- **Capabilities Panel: HDBT**
  - **Challenge of Targets That Are Deeper and Harder**
  - **Mission Flexibility – Ability to Reprogram Fuzes From the Cockpit**
- **Integrated Armament Panel : HDBT**
  - **Precision, Accuracy**
  - **Mission Flexibility but "Boutique" Programs**
- **S&T Panel:**
  - **Hypersonic Cruise Missile – Penetrating Fuzes, High G Smart Fuzes**
  - **Directed Energy Weapons: Pacer – Power Sources**
  - **Deeper Targets: Influence Fuze in Facility Denial Munition**
- **"Smart Weapons Reduce Collateral Damage"**

Future fuzes must be flexible and interoperable

Moving Toward the Future….
….A theoretical case study

- **All Future Fuzes**
  - **Low Unit Cost**
  - **High Reliability/Long Shelf-life**
  - **Standard Fuze Interface**
  - **Reduced Size**
  - **No FZU Dependency**
  - **Standard Architecture**
  - **Multiple Sources**
  - **In-flight Programmability**
  - **Cruise Missile Application**

Common Architecture and plug and play

Low Unit Cost

- **Increased Integration/Reduced Parts Count**
- **Manufacturable Design**
- **BIT Capability**
- **High Production Quantities**
  - **Modular Design**
  - **Flexible Architecture**
  - **Standardized Fuze Interface**

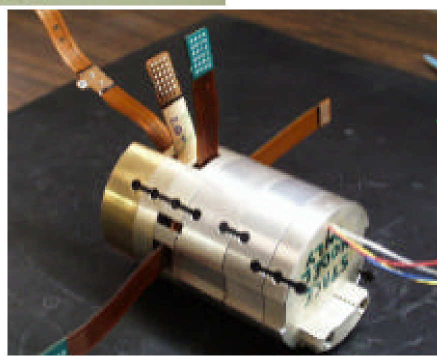
Meet multiple weapon and Fuze Needs with cost effective module replacement

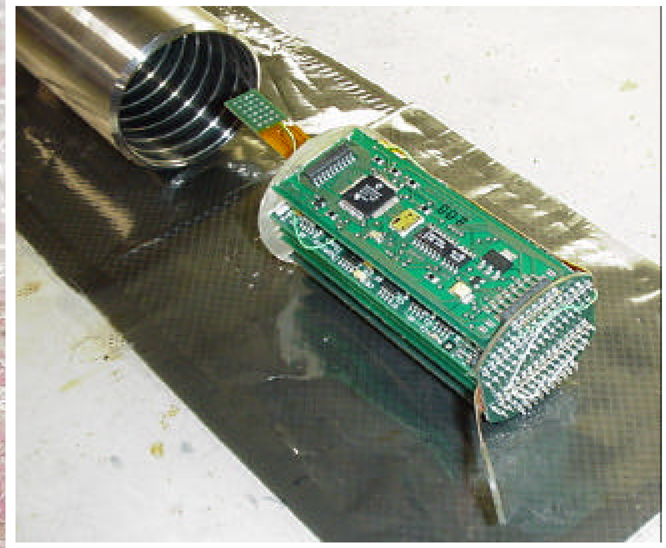
High Reliability/Long Shelf-life

- Increased Integration/reduced Parts Count
- No Mechanical Moving Parts (All Electronic)
- Hermetically Sealed
- BIT for Nondestructive Surveillance and Field Verification

Fuze Modular Integration Evolution

Precision Strike SPO





Standard Fuze Interface

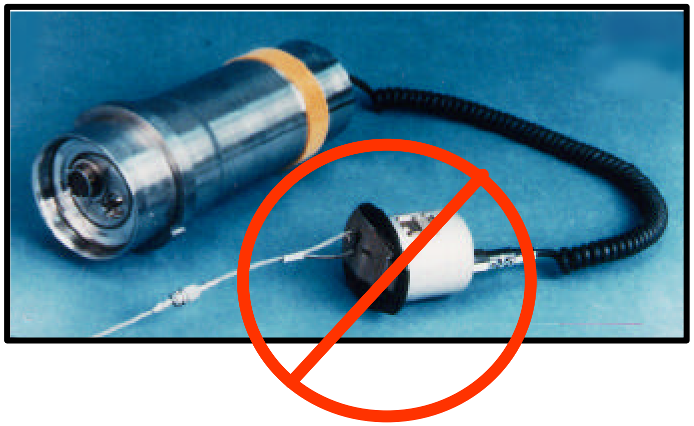
- Standardizing Interfaces Not Unique
  - 1760/1553 Communications Interface
  - FFCS
  - Microsoft Windows
- Simplifies Both Fuze and Weapon Design
- HTSF Example of Fuze Interface Flowed Into System Requirements (AGM-86/D&TTPV)

Reduced Size

- **Smaller munitions require smaller fuzes**
- **2" fuze well with 3" fuze well compatibility**

No FZU Dependency

- **MIL-STD-1316 Compliance (Weapon Power and/or FFCS)—AGM-86/D and TTPV are Early Steps**
- **No Altitude/Airspeed Restrictions**
- **No Weapon Flight Characteristic Sensitivities**
- **Reliable Function**

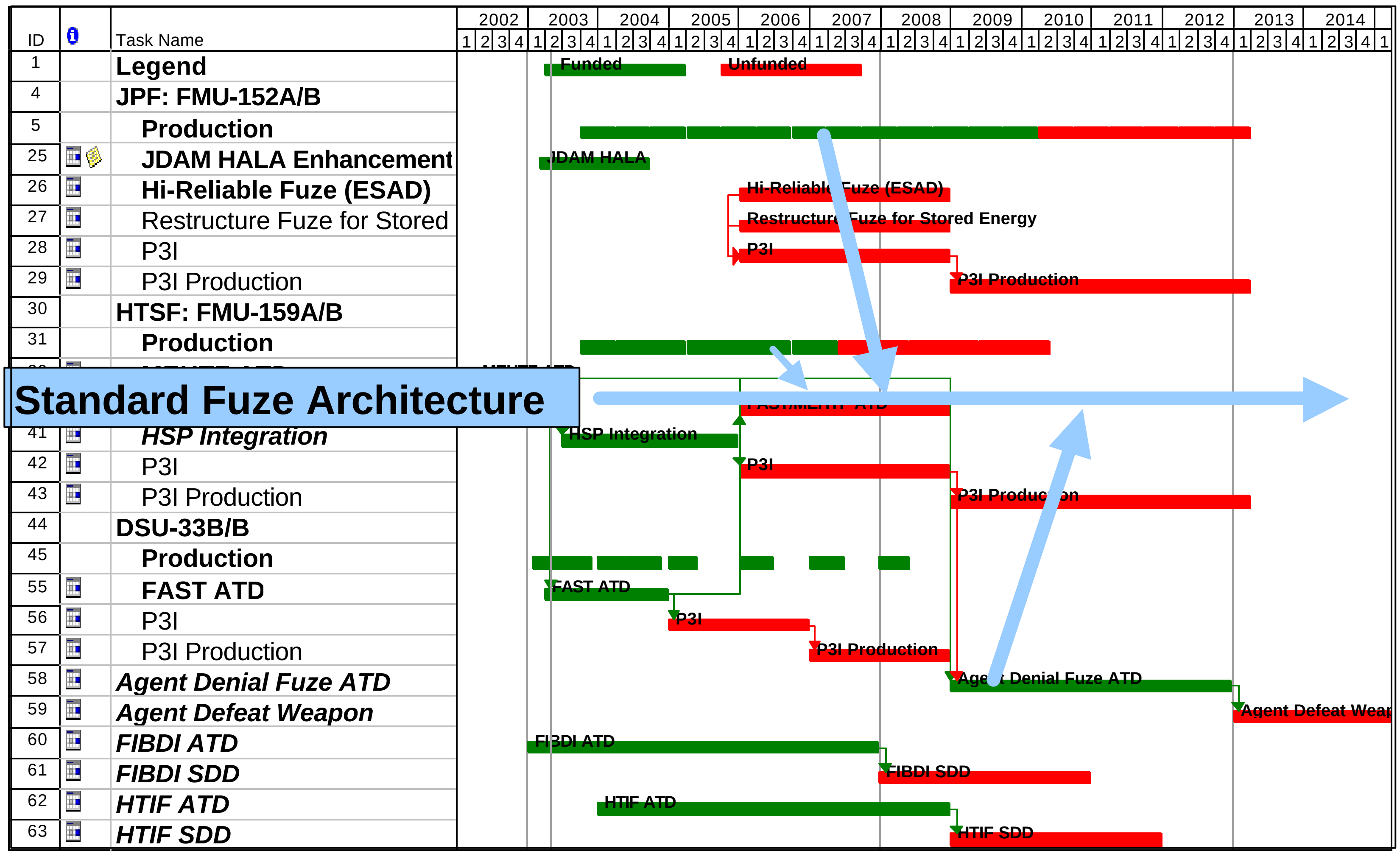


Multifunction

- **Unitary-Unguided, Direct Attack, Standoff**
- **Proximity Fuzing**
- **Multi-Event Control**
- **Agent defeat**
- **BDA**
- **Hypersonic**
- **Area Denial**

Representative Schedule Could Be…

Precision Strike SPO



…. A Theoretical Case Summary

- **Technology Exists for Standard Architecture**
- **More Economical for DOD**
- **More Profitable for Industry**
- **More Straight Forward for Safety**
- **Defined Interface for Weapons Primes**

It Is Possible To Get More With Less

Recap

- **Fuze Challenges Have Gone From No Funding for Increased Fuze Quantities**

To….

- **Recognizing Challenges Of:**
  - **Technical Complexity**
  - **Manufacturing Capability**
  - **Production Capacity**
  - **Unit Cost**

And Must Go to…

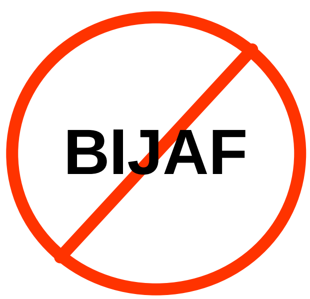
- **Future:**
  - **Affordability**
  - **BIA/BDA**
  - **Plug and Play**
  - **System Operability**

Common Architecture and Plug and play

Purpose of Briefing

- **Why Are We Here:**
  - **Provide Lessons Learned on Fuze Systems**

- **What Do I Want From You:**
  - **Understand Fuze Challenges and, That to Survive, We Must Change Our Mindset**



Questions?

Precision Strike SPO