Precision Guided Bomb (PGB) Fuze

Presenters: R Clutterbuck TME ; B Helgeson ATK

Acknowledgements:

AFRL, DEC, DSTL, RAYTHEON

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PGB Fuze - Introduction

- TME / ATK ESAD Fuze Designs Leading to PGB
  - TME / ATK Research
  - MEHTF
  - HTSF
- Paveway IV PGB Project, Requirements and Progress
  - Program
  - Technical
- Leveraging the Technology
- The Future

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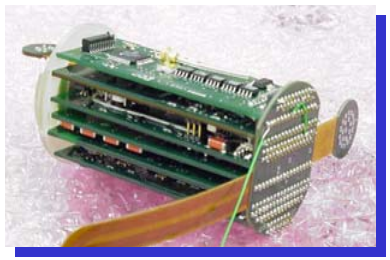
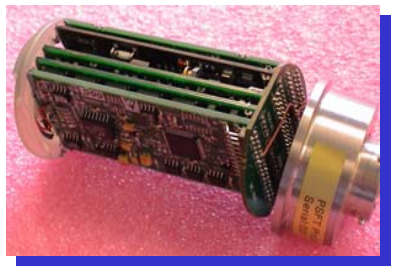
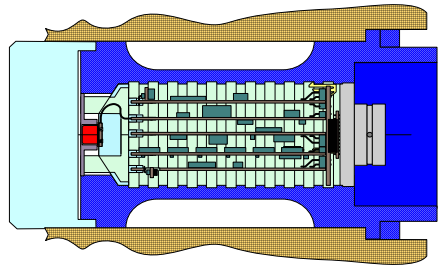
TME/ATK ESAD Fuzes and Technologies

Research → MEHTF Phase 1 & 2 → PSFT → PGB

KEY ACCOMPLISHMENTS:

- High Sensitivity electronics
- Void / Layer DOB fuzing
- Advanced Fuze Packaging
- High Speed Penetrator Applications
- Modular Architecture
- EFI
- 2” fuze
- Safety Architectures
- Second Environment
- Cost Reductions
- MIL-STD-1760 Format
- FZU interface
- On Board Recorder
- 3” Fuze
- Reduced Card Set
- Enhanced Architecture
- Reduced Price
- Enhanced Fireset
- Qualified ESAD
- Qualified Fuze

MEHTF programs have provided Key Fuzing Technologies

Strong Design and Development Foundations

- US-UK Government and Industrial International Co-operation
- Over 8 of years continuous active development
- TOTAL of Over 70 high G gun/cannon/sled impacts

MEHTF foundation lead to the selection of TME/ATK for the PGB fuze

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A Successful Test Background

- HTSF
  - BLU 109
  - GBU -24
  - GBU-27/28
  - CALCM
  - TTPV
- MEHTF
  - HiKEP
  - BKEP
  - MMT
  - HSP
  - HSO

TME/ATK fuzes have been integrated with many weapon systems

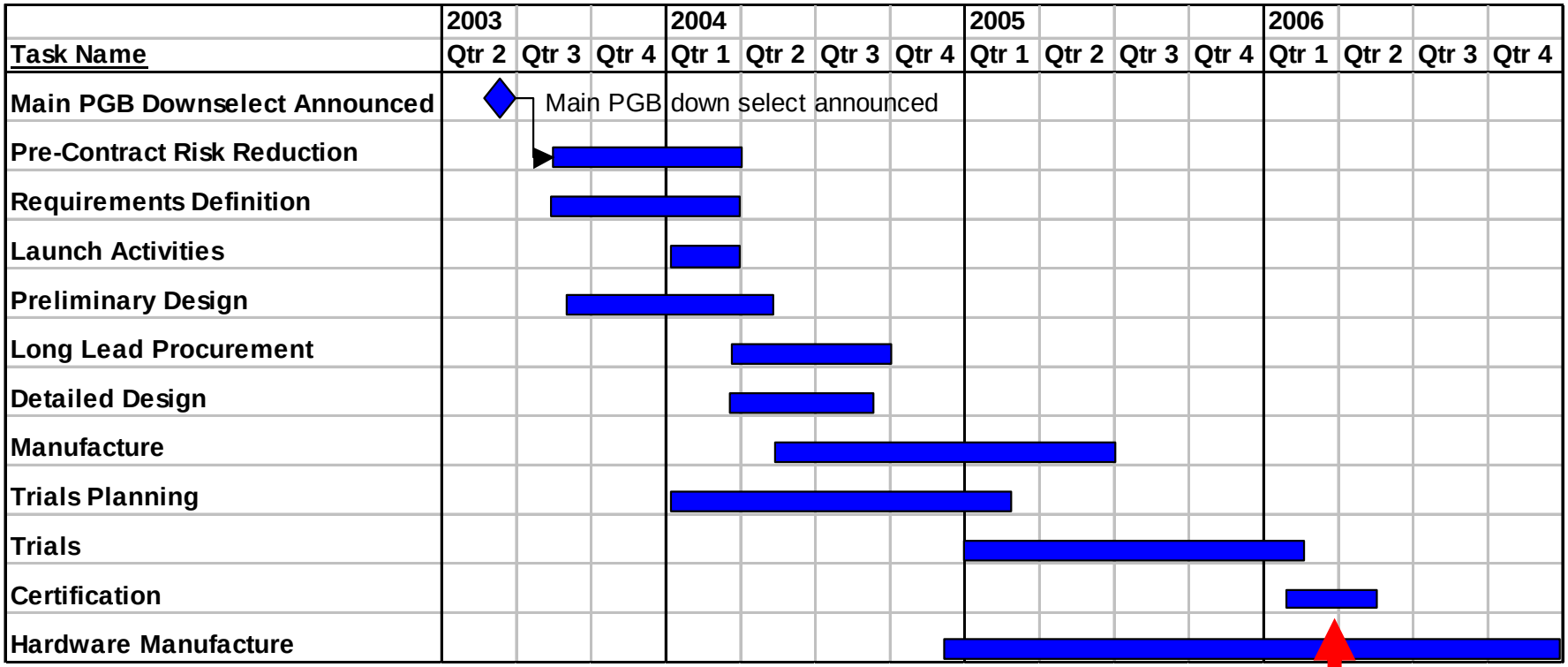
Competition: 2001-2002

MBDA- Boeing - PGB(JDAM)

Raytheon -Paveway IV

The TME/ATK Fuze was selected by both competing PGB Primes

PGB Development and Qualification Schedule



The PGB Fuze will be qualified by early 2006

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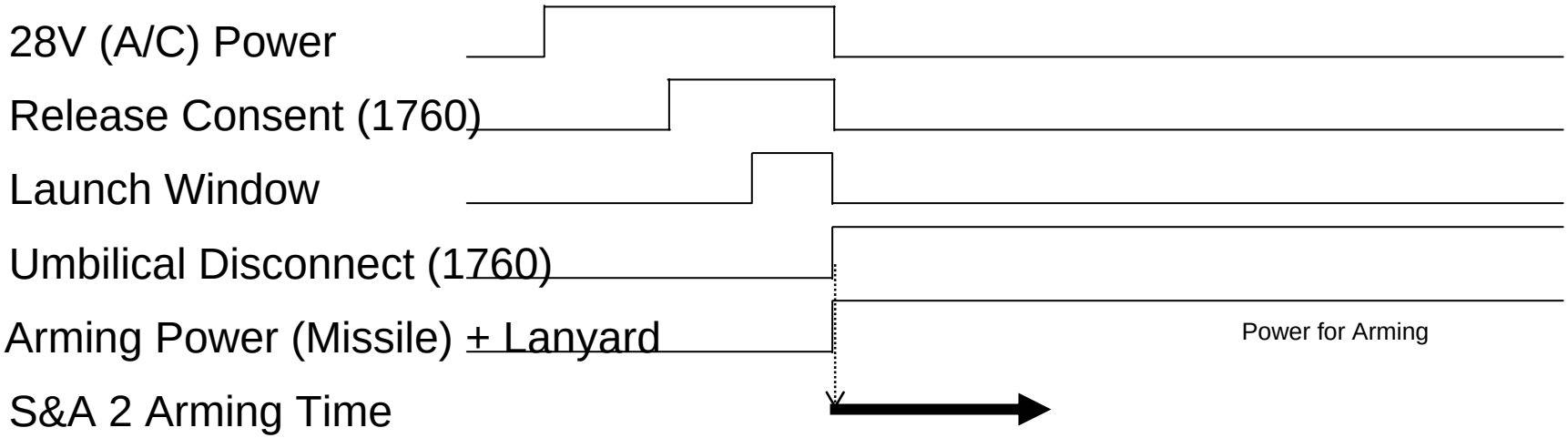
PGB Fuze Requirements

- GENERIC FUZE REQUIREMENTS
  - SAFE
  - ARM
  - INITIATE
- PGB SYSTEM LEVEL REQUIREMENTS
  - 1760c arming interface
  - Second environment sensing
  - Late Arm capability
  - Data recorder functionality
  - Hi G Survivability
  - Selectable fuzing
  - Retrofit compatibility

Requirements developed by TME/ATK working with Raytheon and UK DEC

Sequence and Timing of MIL STD 1760 signals:

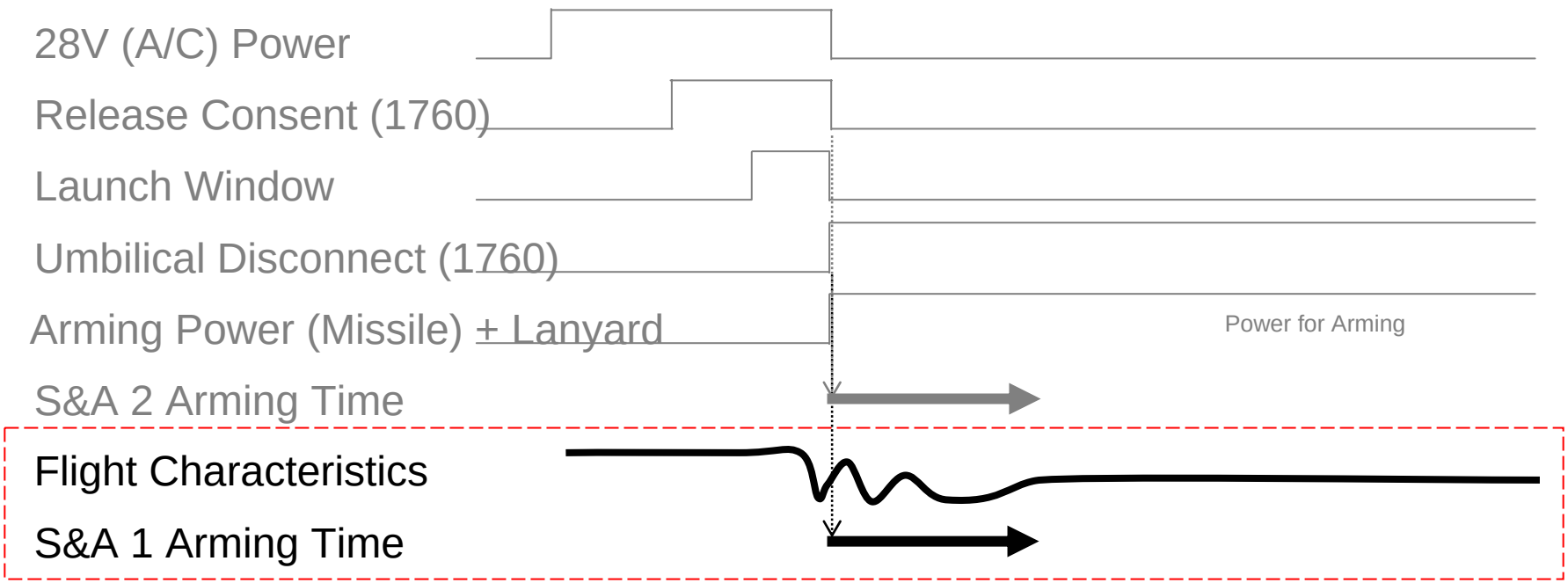
- UMBILICAL DISCONNECT
- RELEASE CONSENT



Windowing of Umbilical Disconnect and Release Consent with other System Events provides a Robust First Environment

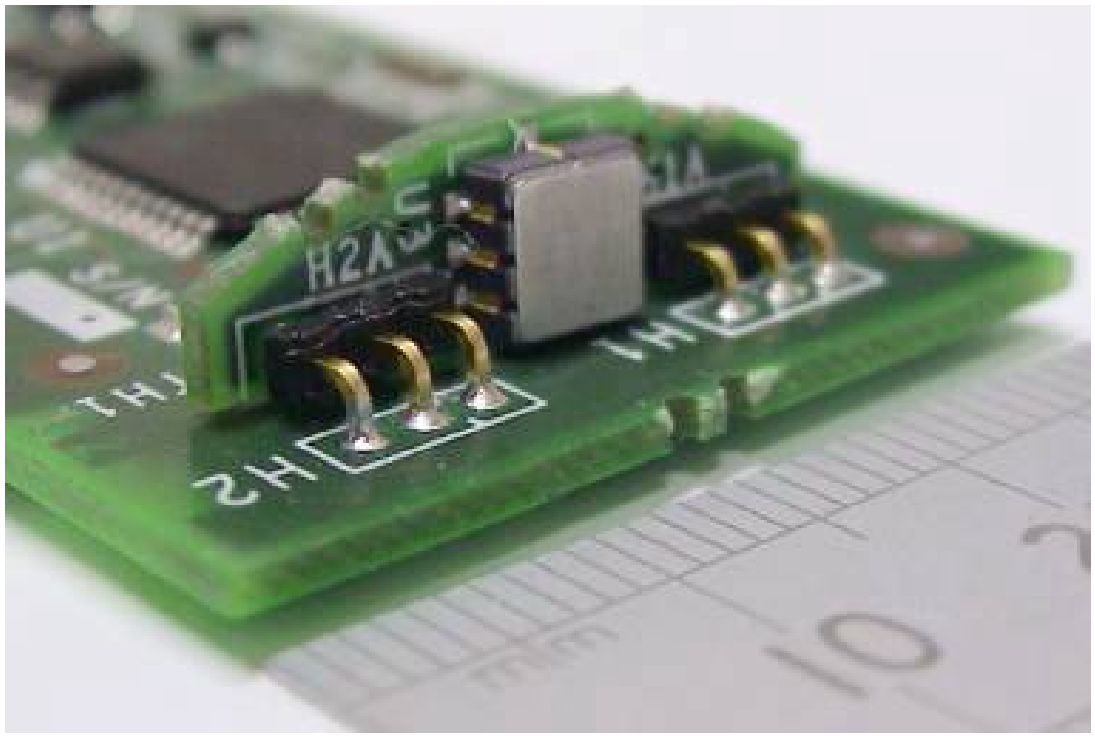
Sequence and Timing of:

- OBSERVED FLIGHT CHARACTERISTICS



Second Environment Sensor Detects a unique post launch flight environment

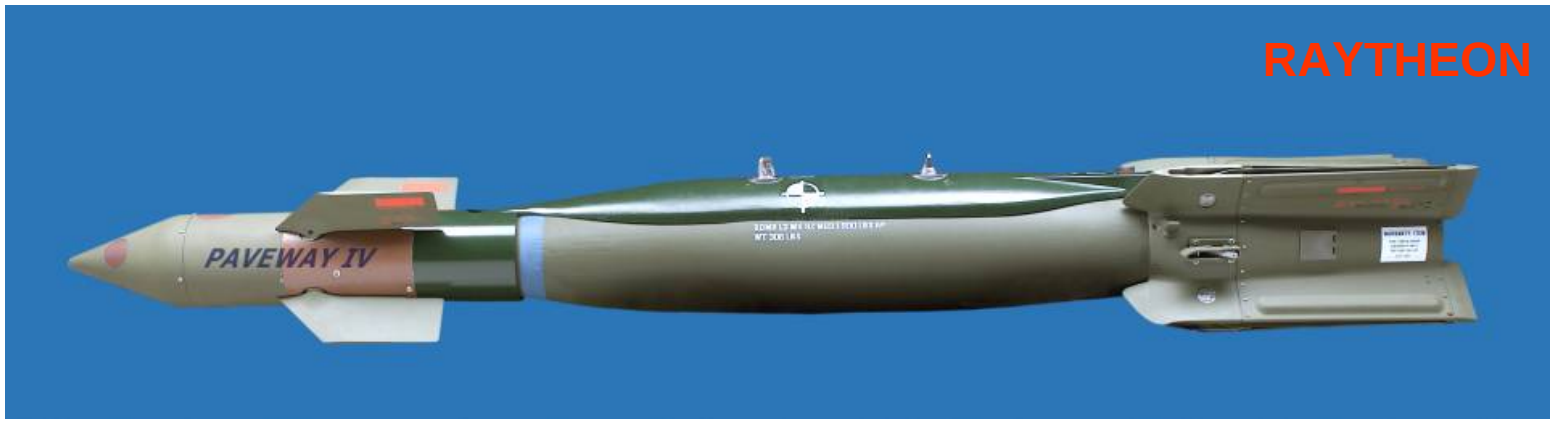
PGB Second Environment Sensor



PGB Introduces a New Second Environment Sensor

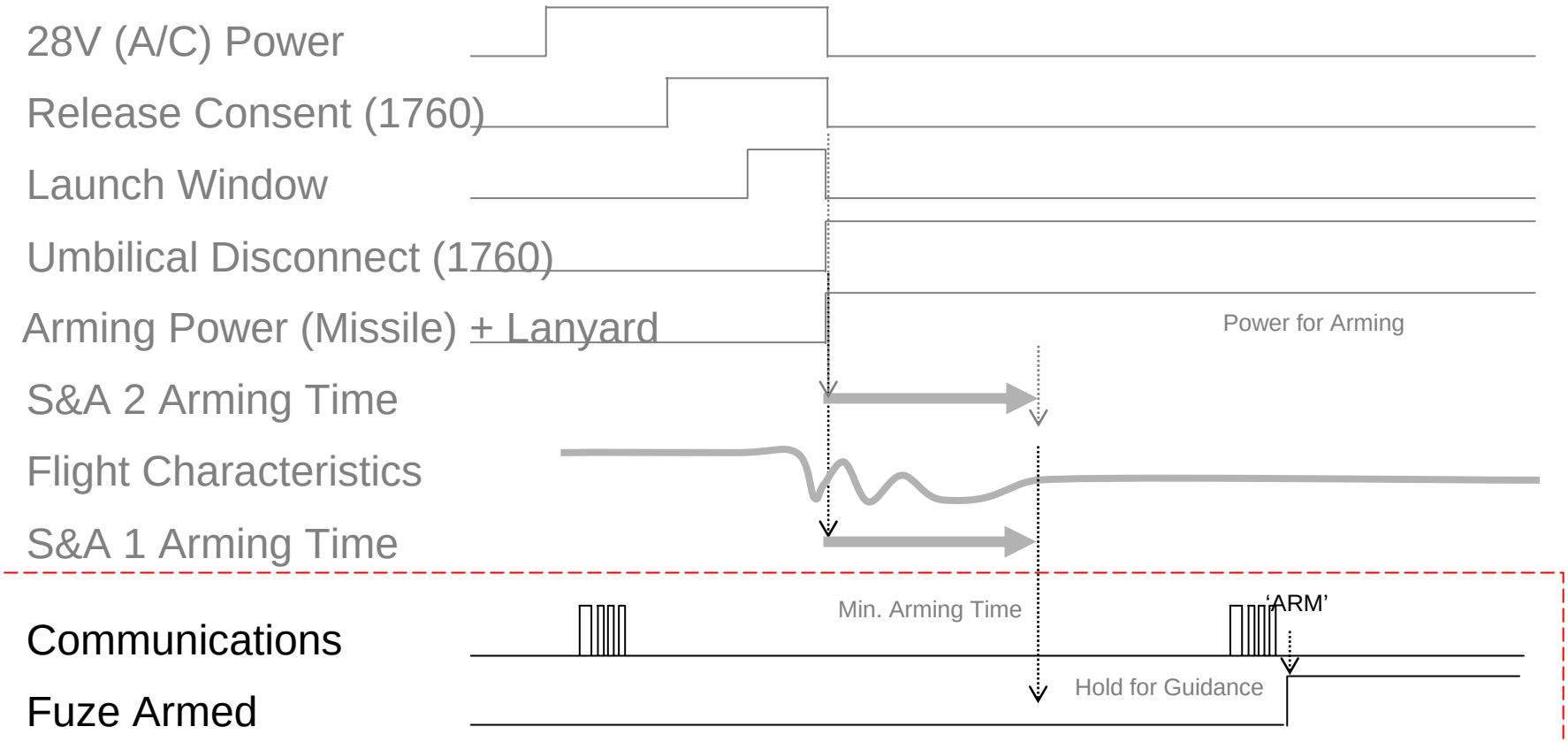
PGB - Second Environment Example

- Weapon is under guided control
- Fuze confirms guidance is successful
- Fuze allows arming to proceed



Second Environment Sensor is Appropriate for Guided Weapons

PGB Late Arm

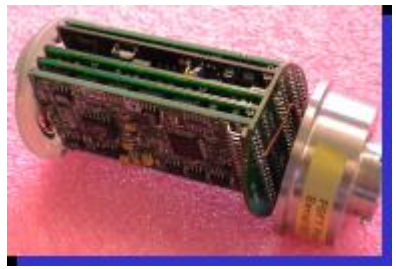
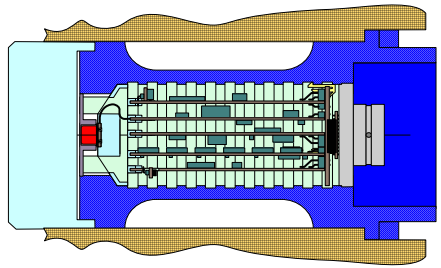


Late Arm allows for safe over-flight

MEHTF Technology Building Blocks

Research → MEHTF Phase 1 & 2 → PSFT → PGB



Technology Toolbox

- Late Arm Methodology
- Family of S&A Environments
- MIL-STD-1760 Communication
- Flexible Safety Architecture
- Integral Data Recorder
- High Shock/ Impact Packaging Technology
- MIL-STD-1316 ESAD
- High Drag Functionality
- FZU/ FZU Interface Electronics
- FFCS
- Void/Layer Sensing
- Explosive Train/ Evaluation
- BDI Interface Capability
- 2” Package
- 3” Package
- Miniaturized Fireset

MEHTF Provides Strong Foundation for Future Fuzing Needs

Other ATK programs Add to the Technology Toolbox

CALCM/TTPV

Accelerometer LOCAAS

MEMS

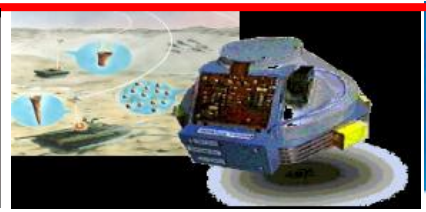
SPIDER

HTSF

Technology Toolbox

- Family of S&A Environments
- MIL-STD-1316 ESAD
- Integral Data Recorder
- Missile Interface
- GBU-15/ AGM-130
- Late Arm Methodology
- BDI Interface Capability
- 2nd Environments
- Proximity
- High Shock/ Impact Packaging Technology
- Family of EFIs
- Flexible Safety Architecture
- Magnetics
- High Drag Functionality
- FZU/ FZU Interface Electronics
- FFCS
- MIL-STD-1760 Communication
- Miniature S&A
- Void/Layer Sensing
- Explosive Train/ Evaluation
- Low Cost Manufacturing
- Shape Charge
- 2" Package
- 3" Package
- Multi-point Initiation
- Miniaturized Fireset
- Low Poeer Electronics

PIOS



LOCAAS

DSU-33

MOFA

ETFM

OICW

HTIF

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ATK/TME have the technology for Future Fuzing

Technology Toolbox

- Proximity
- High Shock/ Impact Packaging Technology
- Family of EFIs
- Flexible Safety Architecture
- Family of S&A Environments
- MIL-STD-1316 ESAD
- Magnetics
- High Drag Functionality
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- BDI Interface Capability
- 2nd Environments

Building Blocks are Vital to Cost, Cycle-time and Risk Reduction

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Summary

The MEHTF series of programs continue to provide valuable technology enhancements

The Joint US-UK nature of the programs has had benefits in both depth and breadth of concepts and technologies.

Recent trends we observe are for Weapons Specific Applications not Multi Function Solutions.

Modularity is moving away from “modules” and towards a “toolbox of parts”

The TME/ATK team is positioned to meet future fuzing needs

End of Show

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