M734A1 Multi-Option Fuze for Mortars &
M783 PD/DLY Fuze

Product Improvement Program

Presented By
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M734A1 Multi-Option Fuze for Mortars & M783 PD/DLY Fuze

Outline

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- Mortar Ammunition
- Integrated Product Team
- PIP Methodology
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- Continuous Product Improvements
- PIP Results
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- Summary
M734 - M734A1- M783 Evolution

M734 PRODUCTION PROGRAM
M734 Development (1970’s) - KODAK

M734 Production (Early 1980’s to ~1997) - KODAK then ATK/Accudyne
  • Mid 1970’s CW Proximity Technology
  • Upleg early (safety) issues
  • Component Obsolescence

M734E1 MATERIEL CHANGE PROGRAM
M734E1 GOVERNMENT INITIAL DESIGN EFFORT 1991


TYPE CLASSIFICATION - STANDARD WITH
M929, M934A1, M821A2, AND M722A1 CARTRIDGES 1996
M734A1 Multi-Option Fuze for Mortars & M783 PD/DLY Fuze

M734 - M734A1 - M783 Evolution (cont.)

M734A1/M783 PRODUCTION
• Performance Based Management Contract
• Continuous Design Improvement
• Contractor Maintained TDP
• Dynamic Component Obsolescence Program

  – Competitive Award to KDI

M83 LRIP (FY01-02) Bundled with M734A1 Production 2000 - 2003

  – Competitive Award to KDI
### FUZE CHARACTERISTICS

<table>
<thead>
<tr>
<th>Mode Settings</th>
<th>M734A1</th>
<th>M783</th>
</tr>
</thead>
<tbody>
<tr>
<td>60/81mm Proximity (PRX)</td>
<td>PRX</td>
<td>IMP</td>
</tr>
<tr>
<td>(7 Feet Height of Burst (HOB))</td>
<td></td>
<td></td>
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<tr>
<td>120 mm PRX (14 Feet HOB)</td>
<td>PRX</td>
<td>IMP</td>
</tr>
<tr>
<td>IMPACT (IMP) (Backup mode to Prox)</td>
<td>IMP</td>
<td>IMP</td>
</tr>
<tr>
<td>DELAY (DLY) – 50 to 150 msec (Also backup mode to Prox / Imp)</td>
<td>DLY</td>
<td>DLY</td>
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</table>

- **Electronic Arming:** Apex Detection
- **Mechanical Arming:** Setback then sustained airflow to Turbine Alternator/Safe and Arm geartrain to remove final mechanical lock
- **Power Supply:** Air Flow driven Turbine Alternator
- **Setback:** 1,000 TO 14,000 G’s
- **Temperature:** -40F TO +145F OPERATIONAL
M734A1 & M783 fuzes are ballistic matches to the M734 and M745 fuzes.
INTEGRATED PRODUCT TEAM

M734A1 Multi-Option Fuze for Mortars & M783 PD/DLY Fuze

AFMO

ARDEC FUZE DIVISION
ADELPHI
PICATINNY

ARDEC SUPPORT ORGANIZATIONS
- QED
- PQM
- PACKAGING
- ILS
- SAFETY
- MAINTENANCE
- EOD

AETC CARTRIDGE IPTs
- M720A1/M768
- M722A1
- M821A2
- M929
- M934A1
- XM1046

L3-KDI

PM CAS

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Product Improvement Methodology

• Maintain up to date technological practices
  • Mitigates Electronic Component Obsolescence
  • Enhance Producibility/Manufacturability
  • Increased Capability & Safety
• Core Contractor/Government IPT working together to submit, design, & qualify improvements is the key to the success of this program.
• The product improvements are individually qualified and validated prior to implementation.
• Product Improvements are implemented as ECPs, sometimes with cost savings.
**M734A1 Multi-Option Fuze for Mortars & M783 PD/DLY Fuze**

**PIP Execution Process Map**

**Level 3**

- **Engineering Support in Production**
  - Identify and discuss potential production issues (risk planning)
  - Identified PIPs evaluated for impact to Cost, Schedule, & Performance (risk assessment)
  - Prioritized PIP List shared with cognizant Program Manager (risk handling)

- **M734A1/M783 IPT ARDEC & L3-KDI**
  - PM Funding
  - PM Proposal Request

- **PM Evaluates PIP Proposal**
  - Proposal Discussions
  - Review Cost/Schedule/Tech
  - Proposal Benefits

- **In-House PIP**
  - Modify Production Contract
  - Confirm IGCE/SOW
  - Contractor Proposal
  - Technical Evaluation

- **Perform PIP Work**
  - Execute PIP
  - Test Samples: Lab and Ballistic
  - Review Test Results

- **Validate PIP Design**
  - Evaluate PIP test results
  - Evaluate PIP benefits
  - Develop ECP
  - Prepare PIP Final Report

- **ECP PIP into Fuze Production**
  - Contractor prepares ECP
  - Gov’t prepares ECP (Contractor concur, In House Work)

- **PIP Implementation into Fuze Production**
  - PM concurs Final Report
  - PM concurs implementation strategy

**End**

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Continuous Product Improvements

- Signal Processor ASIC HDL104D
  - Increased Performance, MMIC Compensation
  - Provide accurate specification for widest switch range

- Impact Environment Evaluation
  - Increased High ‘G’ Performance & Survivability

- MMIC Design Translation
  - Improved S&A performance and production yield (NOTE: Not yet ECPed)
  - Maximize production yield

- Signal Processor ASIC HDL104C
  - Increased High ‘G’ Performance
  - Maximized performance and production yield

- Incorporate Set Forward Washer in Turbine Alternator
  - Improved producibility and corrosion protection

- Improved Gear Lock Spring in S&A
  - Improved reliability of the impact function

- Six Sigma Project C6 Orientation
  - Improved High ‘G’ Performance & Survivability

- Improved Turbine Alternator 440 SS Shaft
  - Improved producibility and corrosion protection

- Component Binning & Select Resistors
  - Eliminated 14 parts /Reduced unit price by $5-over $2.5M savings documented to date

- Nickel Plating of Ogive Base
  - Improved performance at high charge, low QE and Environmental survivability

- Impact Switch Improvement
  - Improved Robustness to Production Handling and Environmental Survivability

- Signal Processor Improvements HDL104A
  - Improved Robustness to Production Handling and Environmental Survivability

- Dynamic Range Adjustment
  - Improved S&A performance and production yield (NOTE: Not yet ECPed)

- Flex Circuit Assembly Improvement
  - Improved S&A performance and production yield (NOTE: Not yet ECPed)

- Materiel Change to M734 1993 - 1996
  - Resulted in M734A1 Fuze - Improved Safety, HOB Accuracy, ECM, State of The Art Electronics

- 1996 to Current
  - On-Going
  - Continuous Product Improvements
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PIP Results

– **M734A1: Interfixes 6 to 9**
  • 711, 546 Fuzes Manufactured
  • 61 Lots, 61 Accepted, 20 with no failures
  • 6,370 Rounds tested, 5 duds & 90 out of mode
  • Reliability as set 98.40%
  • Overall Function Reliability 99.51%

– **M783: Interfixes 2 & 3**
  • 195,080 Fuzes Manufactured
  • 12 Lots, 12 Accepted, 7 with no failures
  • 718 Rounds tested, 0 dud & 7 out of mode
  • Reliability as set 99.3%
  • Overall Function Reliability 100%
Future Product Improvements

- Next Generation Microcontroller
- Next Generation Signal Processor
- Circuit Re-Layout for Industry Standard Components
- Fuze Transceiver Updates
- Insensitive Munitions
- FCS Mortar Fuzing Requirements
  - Remote Set
  - Direct interface with MFCS
  - Extended Range
Summary

• Product Improvement Program (PIP) allows for dynamic Technical Data Package.
  – Anticipates and mitigates component issues.
  – Resolves Production Problem Areas.
• The M734A1/M783 PIP is our production risk reduction program.
  – Periodic review and prioritization.
• All parties, PM & IPT, must agree that there is benefit to an improvement.