2019 Fuze Conference

Providing for Continued DSU-33D/B Viability

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DSU-33 Overview

Doppler Radar Proximity Sensor

• Detects one factory-preset Height of Burst (HOB) and provides fire pulse signal to FMU-139 series and FMU-152 fuzes

• Compatible with M117 & Mk80-series general-purpose warheads, including JDAM variants

Performance Parameters

• Height of Burst: 14-26 feet AGL

• Operational Life: 200 sec, min

• Storage Life: 13 years

• Service Life: 5 years outside storage container

• Multiple weapon release: salvo: 6, ripple: 24
DSU-33 Weapon Configuration (Typical)

- **DSU-33 Sensor**
- **FZU-48/55/63 Initiator or MK122 Switch**
- **Mk-80 Series or M117 GP Bomb**
- **FMU-139 or FMU-152 Fuze**
DSU-33 History

- 1970’s: Desire to improve performance of Mk 20/Mk 43 Target Detectors
- 1980’s: Motorola develops DSU-33A/B
- 1990-1995: Motorola manufactures DSU-33A/B for USAF
- 1998: DSU-33D/B JDAM-compatible design upgrade is completed
- 2000: ATK begins DSU-33B/B production
- 2006: DSU-33C/B producibility upgrade completed & production begins
- 2008: DSU-33D/B qualified and production begins
- 2018: 200,000th DSU-33 Sensor delivered by Northrop Grumman
The Challenge: Maintaining Viability Over A Long Production Run

• DSU-33D/B is a mature product in the sustainment phase of it’s overall life cycle
  – Both the design and the manufacturing process are well understood
  – C/B and D/B are virtually identical, with > 150,000 produced since 2008

• However, over time multiple factors converge to require changes; even on a stable and successful program like DSU-33:
  
  • **Obsolescence**: Suppliers drop products & exit markets altogether
  
  • **Economics**: Increasing costs force changes to maintain profitability

  • **Failures**: A long production run will promote failure mechanisms that likely would never occur during a short program life
Examples: Obsolescence

• The commercial electronics industry continues to evolve rapidly

• Specific parts become scarce or obsolete; or entire product lines are discontinued

• Situations Northrop Grumman has successfully managed include:
  – Obsolescence of 2 Transistors
  – Obsolescence of 3 Thermistors

• Mitigation strategies included:
  – Monitoring upcoming obsolescence via tools like Part Miner
  – Supplier dialogue
  – End of Life (EOL) buys
  – Selection of alternative parts
  – Qualification of alternatives via Component and Sensor-level testing, and analysis
Examples: Economics

- Suppliers may increase pricing to the point where a legacy part no longer is affordable

- Supplier quality may deteriorate to the point where their continued use is no longer affordable (e.g. unacceptable costs of nonconformance)

- Situations Northrop Grumman has successfully managed include:
  - Desiccant capsule pricing and quality
  - Pricing of a custom Transistor

- Mitigation strategies included:
  - Selecting and qualifying a COTS Transistor
  - Developing and qualifying a custom desiccant pack (shown at right)
Examples: Failure Mitigation

• Even the most robust product development efforts will be unable to prevent or detect all failure mechanisms

• Long production runs, involving tens or hundreds of thousands of units, inevitably introduce the “Cumulative Effect of Variation Over Time”

• Impact: End-item performance problems will arise during production. Situations Northrop Grumman has successfully managed include:
  – Fire pulse variability
  – Battery Initiation difficulties

• Mitigation strategies include:
  – Revising and clarifying requirements
  – Qualifying an improved Battery and Battery Igniter
  – Screening & binning key components to improve production test yields
Keys to Success

- **Product Knowledge**: As the Government’s industry partner during development and high-rate production of the last 3 DSU models, we understand the Sensor
  - Northrop Grumman has the full-service capability to resolve any issue

- **Program Continuity**:
  - DSU-33 production has been essentially continuous for almost 19 years
  - DSU-33 Support Team staffing has been managed carefully to ensure success

- **Customer Support**:
  - DSU-33 has always had a strong Government/Contractor IPT
  - Ongoing cooperation from the USAF (EAFB and HAFB), Army, and Navy has enabled success
  - Frank and open communication has fostered partnership and trust
The Future for DSU-33D/B

- The program is in the final year of the current U.S. Government FRP4 contract:
  - Deliveries to the USG will conclude in 2020

- International interest remains high, resulting in high likelihood of ongoing commercial sales

- A contingency requiring a future U.S. procurement is possible

- For these reasons, Northrop Grumman is working closely with the Government to ensure that the DSU-33D/B Technical Data Package (TDP) remains up-to-date and viable to support ongoing production

- The DSU-33 production line, Support Team, and experienced supplier base will remain in place for the foreseeable future
Summary

• DSU-33 has been one of the most successful air weapon fuzing/sensor programs in the last 40 years

• The program has been successful because of its maturity, supported by ongoing engineering and TDP updates

• Northrop Grumman remains committed to maintaining the capability of the DSU-33D/B to support ongoing customer requirements

• DSU-33 will remain a viable proximity sensor solution for many years

• Thank you!
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