Aircraft Survivability
Today & Tomorrow

AAAA Aircraft Survivability Equipment Symposium

13-14 November 2017
Von Braun Convention Center
Huntsville, AL

Mr. Dennis Lindell
Manager
Joint Aircraft Survivability Program Office

Distribution Statement: Approved for public release; distribution is unlimited.
Aircraft Survivability Today & Tomorrow

Outline

- Introduction
  - Mission
  - Organization
- Education
- Aircraft Combat Damage Reporting
- RDT&E
  - Defeat Near-Peer Adversary Threats (N-PAT)
  - Improve Aircraft Force Protection
  - Improve Aircraft Survivability to Fire
Aircraft Survivability Today & Tomorrow

Mission

“Achieve Increased Affordability, Readiness, & Effectiveness of Tri-Service Aircraft Through Joint Coordination & Development of Survivability Technologies, Design Tools & Assessment Methodologies”
Aircraft Survivability Today & Tomorrow

Organization: DOT&E Within OSD

Secretary of Defense
Deputy Secretary of Defense
Chief Management Officer/
Chief Operating Officer

Immediate Office
of the Secretary

USD (Acquisition,
Technology, &
Logistics)
USD (Policy)
USD (Comptroller) /
Chief Financial
Officer
USD (Personnel &
Readiness)
Chief Human
Capital Officer
USD (Intelligence)
Deputy Chief
Management
Officer

Inspector General,
DoD ***
Director, Cost
Assessment &
Program Evaluation
Director, Operational
Test & Evaluation
General Counsel,
DoD
ASD (Legislative Affairs)

ATSD (Public
Affairs) *
DoD Chief
Information
Officer *
Director, Administration
& Management *
ATSD (Intelligence
Oversight) *
Director, Net
Assessment *

Current as of 5/24/13
* All positions shown are Presidentially Appointed, Senate-confirmed (PAS) except those with * which are SES positions
** As of February 2013
Aircraft Survivability Today & Tomorrow

The Two Faces of JASP

JAS........Joint Aircraft Survivability
JASP.....Joint Aircraft Survivability Program
JASPO...Joint Aircraft Survivability Program Office

AS Coordination

Technical Projects
Aircraft Survivability Today & Tomorrow

Aircraft Survivability Coordination

US Government
Aircraft Survivability Education

Joint Aircraft Survivability Program Review

AIAA Survivability Textbook

JCAT Threat Weapons Effects Training

Aircraft Combat Survivability Short Course

Joint Model User Meeting (JMUM)

AIAA 2006 Summerfield Book Award

Aircraft Survivability Journal/DVD & Website

AIAA Survivability Journal/DVD & Website

AWARDS


Inspired Awards: 2007 Fall

American Graphic Design Awards: 2006 Spring

The Communicator Awards: 2005 Spring

Red Flag - Nellis AFB, NV
September 19-21, 2017

Hurlburt Field - Eglin AFB
April 2018

3rd Edition in Work
Aircraft Survivability Today & Tomorrow

**Joint Combat Assessment Team**

**Multiply combat effectiveness via threat understanding & awareness**

- Collect and analyze data from combat damages and losses
- Archive data in DSIAC Brief Services and Program Offices
- Modify/Design aircraft to reduce vulnerability
- Train Warfighter in effects of threat warheads on US combat aircraft
- Inform Combatant Commanders of Threat Environment
- Warfighter Modifies tactics and training

**Bring Aircrew and Aircraft Back**

**Increase Sortie Availability**
Aircraft Survivability Today & Tomorrow

The Two Faces of JASP

JAS...Joint Aircraft Survivability
JASP...Joint Aircraft Survivability Program
JASPO...Joint Aircraft Survivability Program Office

AS Coordination

Technical Projects
Susceptibility Assessment & Reduction
Chairs: NRL, PMO ASE, USAF 412 EWG

Vulnerability Assessment & Reduction
Chairs: ARL, NAVAIR, AFLCMC
OBJECTIVE: To develop high fidelity techniques to counter state-of-the-art RF systems that threaten Army / Navy / Air Force rotary wing aircraft.

SUCCESS:
- Completed technique development and field tests against three threat systems.
- Gathered valuable information on threat performance
- Integrating developed techniques into the ALQ-211

JASP SUCCESS STORY
Effective techniques developed with the improved ALQ-211 12-bit capability were demonstrated and transitioned to the field.

FIELDING TECHNIQUE IMPROVEMENTS ANNUALLY FROM 2015-2017
Aircraft Survivability Today & Tomorrow

RPG Defeat

M-16-05 RPG Engagement Model

S-16-05 Anti-RPG Warhead

V-17-07 Rotorcraft Vulnerability to RPG Debris

T-13-07 CH-47D/F Chinook Rotor Blade Damage Assessment (ADC0884525)

T-10-04 CH-47F Combat Incident Emerging Threat Investigation (ADC082635)

Aug 17

HARP

Supporting operational, assessment and engineering efforts to defeat the RPG threat.
Primary Objectives

- Defeat Near-Peer Adversary Threats
- Improve Aircraft Force Protection
- Improve Aircraft Survivability to Fire
### Aircraft Survivability Today & Tomorrow

#### FY17 Defeat Near-Peer Adversary Threats (IR Guided)

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<td>Coupling technique, technology, and M&amp;S development</td>
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- Techniques Fielded in Mission Data Sets
- Inform future system requirements
- Updates to IRCM and Engagement Models (e.g., MOSAIC, HWIL)

- USA, USAF, USN IRCM effectiveness studies
- Current and future weapon system studies
- CM technique development
- M&S capability, credibility, usability (MOSAIC, etc.)
## Aircraft Survivability Today & Tomorrow

### FY17 Improve Aircraft Force Protection Objectives Roadmap

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<td>Improve Aircraft Force Protection</td>
<td><img src="fl11.png" alt="RPG Defeat – Non-kinetic Concepts" /></td>
<td><img src="fl12.png" alt="Vuln. Assessment" /></td>
<td><img src="fl13.png" alt="Opaque Armor (TRL 7)" /></td>
<td><img src="fl14.png" alt="Transparent Armor (TRL 7)" /></td>
<td><img src="fl15.png" alt="Thermo Mechanical Failure..." /></td>
<td><img src="fl16.png" alt="Composite Failure Data" /></td>
<td><img src="fl17.png" alt="Hardening Concepts (TRL 5)" /></td>
<td><img src="fl18.png" alt="HEL Vulnerability Prediction in COVART &amp; AJEM" /></td>
<td><img src="fl19.png" alt="HEL Warning to Aircrew" /></td>
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<td><img src="fl20.png" alt="Current Projects" /></td>
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### FY17 Objectives

- **RPG Defeat – Non-kinetic Concepts**
  - **Active Protection System Requirements**
  - **Aircraft Vulnerability Assessment**

- **Lightweight Aircraft Armor for AP Protection**
  - **Better Protection**
  - **Less weight**
  - **Lower cost**

- **Vulnerability Assessment Accuracy & Confidence**
  - **USAF & USN vulnerability studies**
  - **Current and future weapon system studies**
  - **M&S capability, credibility, usability (COVART, AJEM/MUVES, etc.)**

- **High Energy Laser (HEL) Hardening**
  - **Advances test and M&S readiness**
  - **Supports HEL protection requirement development and specification compliance**

### Current Projects

- **RW Vuln. to RPG Debris**
  - **Better Protection**
  - **Less weight**
  - **Lower cost**

- **Integrated Analysis Environment**
  - **COVART IAE 1.0**
  - **COVART 7.0**

- **6DOF Intersections in COVART**
  - **COVART 7.0**

- **AP Threat Protection**
  - **High Hardness Transparent Armor**

- **AP Threat Protection**
  - **Opaque Armor (TRL 7)**

- **Vulnerability Assessment Accuracy & Confidence**
  - **COVART 7.3**

- **High Energy Laser (HEL) Hardening**
  - **HEL Hardening for Aircraft**
  - **HEL Hardening for Aircraft**

- **Thermo Mechanical Failure...**
  - **Composite Failure Data**

- **HEL Vulnerability Prediction in COVART & AJEM**
  - **HEL Warning to Aircrew**

- **Objectives**
  - **Fully Met**
  - **Partially Met**
  - **Unmet**
## Aircraft Survivability Today & Tomorrow

### FY17 Improve Aircraft Survivability to Fire Objectives Roadmap

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**8 Projects Supporting**

- **Current System Upgrades**
  - 50% Lighter Tech to Prevent and Suppress Fire in Aircraft
  - Multi-Port FS
  - Prototype Cabin Fire Suppressor (TRL 6)
- **Future Systems**
  - Enhanced Self-Sealing Technologies
  - Self-Sealing Materials (TRL 4)
  - Autonomous Self-Sealing Fuel Cell
  - Advanced Fuel Containment System (TRL 6)
  - Intelligent Fire Suppression System
  - IF Suppression System (TRL 6)

### FY17 Implememtation of Aircraft Survivability to Fire

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- **Current Projects**
  - 8-DOF Intersections in COVART
  - FLASH 3.0 Library
  - Self-Sealing Materials (TRL 4)
  - Autonomous Self-Sealing Fuel Cell
- **4 Projects Supporting**
  - Prototype Cabin Fire Suppressor (TRL 6)
  - Multi-Port FS
  - Architecture, ICD, Dev. Plan
  - Predict API Projectile Function & Warhead Fragment Flash
  - Predict HRAM & Fuel Spurt
  - Hydrodynamic RAM Spurt Model

**Objective Fully Met**
- Warhead Fragment & Projectile Fire Prediction w/ 80% Accuracy
- Objective Fully Met
- Objective Partially Met
- Objective Unmet
I WANT YOU!
To Submit Project Proposals

Opened: 1 Nov 2017
Closes: 31 Jan 2018

For Guidance Package:
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jaspo@navy.mil
www.jasp-online.org
www.dsiac.org