

A photograph of two F/A-18 Hornets in a dogfight. The aircraft on the left is painted with shark teeth and the number 80674. The aircraft on the right is also painted with shark teeth. Both aircraft are firing missiles, with visible smoke trails and fire. The background is a blue sky with white clouds.

TUTORIALS IN AIRCRAFT SURVIVABILITY WEBINAR

April 27 – 28 | [NDIA.org/AircraftTutorials](https://ndia.org/AircraftTutorials)

TABLE OF CONTENTS

WHO WE ARE	2
AGENDA	3
BIOGRAPHIES	5

NDIA

WHO WE ARE

The National Defense Industrial Association is the trusted leader in defense and national security associations. As a 501(c)(3) corporate and individual membership association, NDIA engages thoughtful and innovative leaders to exchange ideas, information, and capabilities that lead to the development of the best policies, practices, products, and technologies to ensure the safety and security of our nation. NDIA's membership embodies the full spectrum of corporate, government, academic, and individual stakeholders who form a vigorous, responsive, and collaborative community in support of defense and national security. For more than 100 years, NDIA and its predecessor organizations have been at the heart of the mission by dedicating their time, expertise, and energy to ensuring our warfighters have the best training, equipment, and support. For more information, visit **NDIA.org**

GET INVOLVED

Learn more about NDIA's Divisions and how to join one at **NDIA.org/Divisions**



COMBAT SURVIVABILITY

WHO WE ARE

The Combat Survivability Division focuses on the transfer of information and technology between the military survivability and civil aviation communities to improve flight safety and mitigate the effects of terrorist acts. To do so, the Division addresses all aspects of susceptibility reduction (probability of hit), vulnerability reduction (consequences of hit), and the overall survivability discipline, including countermeasures, signature reduction, tactics and training, camouflage, concealment, and deception, as well as damage resistance, damage tolerance, and combat damage repair.

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AGENDA

TUESDAY, APRIL 27

12:00 – 12:05 pm
All times listed are EDT

OPENING REMARKS

Chris Bogdan

Senior Vice President, Booz Allen Hamilton

Chair, Combat Survivability Division, National Defense Industrial Association (NDIA)

12:05 – 2:05 pm

FUNDAMENTALS OF AIRCRAFT COMBAT SURVIVABILITY

Chris Adams

Senior Lecturer, Department of Mechanical & Aerospace Engineering, Naval Postgraduate School

Mark Couch, PhD

Warfare Area Lead, Live Fire Test & Evaluation, Operational Evaluation Division, Institute for Defense Analyses

Richard Huffman, PhD

Adjunct Research Staff Member, Operational Evaluation Division, Institute for Defense Analyses

2:05 – 2:35 pm

BREAK

2:35 – 4:35 pm

INTRODUCTION TO AIRCRAFT CYBER COMBAT SURVIVABILITY

William Bryant, PhD

Technical Fellow, Modern Technology Solutions, Inc.

4:35 – 4:40 pm

CLOSING REMARKS

Mark Couch, PhD

Warfare Area Lead, Live Fire Test & Evaluation, Operational Evaluation Division, Institute for Defense Analyses



NDIA
AT THE HEART
OF THE MISSION

2021 AIRCRAFT SURVIVABILITY SYMPOSIUM

Save the Date

The Future of Survivability: The Future is Now

Join senior-level defense industry professionals and their government counterparts as they engage in a technical dialogue and exchange information related to technological advances, operational experiences, current and future threats, system reliability, and more aircraft survivability topics. Over the course of three days in a classified environment, attendees will collaborate to unlock the keys to enhancing survivability across a multi-domain battlespace. This symposium offers a unique opportunity for learning with its extensive agenda and inclusion of relevant tutorials and presentations. Mark your calendars for this highly anticipated event.

November 2 – 4 | Monterey, CA | [NDIA.org](https://www.ndia.org)

WEDNESDAY, APRIL 28

12:00 – 12:05 pm

OPENING REMARKS

Chris Bogdan

Senior Vice President, Booz Allen Hamilton
Chair, Combat Survivability Division, NDIA

12:05 – 2:05 pm

INTRODUCTION TO RADAR AND INFRARED SIGNATURES

Craig Baucke

Consulting Engineer, Radar Cross Section, GE Aviation

Gary Wollenweber

Consulting Engineer, Infrared & Thermal Design, GE Aviation

2:05 – 2:35 pm

BREAK

2:35 – 4:35 pm

INTRODUCTION TO HYPERSONICS

Danny Millman, PhD

Chief Technology Officer, Stratolaunch

4:35 – 4:40 pm

CLOSING REMARKS

Mark Couch, PhD

Warfare Area Lead, Live Fire Test & Evaluation, Operational Evaluation Division, Institute for Defense Analyses

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BIOGRAPHIES



CHRIS ADAMS

Senior Lecturer

Department of Mechanical & Aerospace Engineering, Naval Postgraduate School

Christopher Adams is a Senior Lecturer at the Naval Postgraduate School's

(NPS) department of Mechanical and Aerospace Engineering. He is a retired Navy Commander and the former Associate Dean

of the Graduate School of Engineering and Applied Sciences at the Naval Postgraduate School in Monterey, CA.

Professor Adams provides unique advanced education in support of national security and teaches a course entitled Combat Survivability, Reliability and Systems Safety Engineering. This course provides the student with an understanding of

survivability, reliability and systems safety engineering for military platforms including submarines, surface ships, fixed-wing and rotary wing aircraft, as well as missiles, unmanned vehicles and satellites. In-depth studies of the survivability various vehicles give the students practical knowledge in the design of battle-ready platforms and weapons.



CRAIG BAUCKE

Consulting Engineer, Radar Cross Section

GE Aviation

Mr. Craig Baucke is in his 32nd year with GE Aviation. He is the Consulting

Engineer for Radar Cross Section and founded the Survivability Design Board at GE Aviation. He has been involved in computational electromagnetics, RCS design, RCS analysis & test for 37 years, working on the YF120, F414, F118, F-136 & other advanced systems. He has been team leader for numerous programs including

the initial deployment of an operating jet engine exhaust system near-field RCS test system. Before GE, Craig worked as an RCS engineer for Rockwell/North American Aircraft on the B1-B, Tomahawk cruise missile and other systems.

Mr. Baucke received GE-Aviation's 2007 Perry T. Egbert award for most outstanding technical achievement. He holds numerous RCS-related patents. He has taught propulsion system RCS short courses for

Georgia Tech since 2006, and has taught numerous short courses for NDIA, AFIT and GE Aviation After-Hours courses. He has been a member of the IEEE AP-S society for over 35 years. In 1995, he received the Best Paper award from the Applied Computational EM Society.

Mr. Baucke graduated from the University of Tulsa with a B.S. in Engineering Physics & an M.S. in Electrical Engineering (1988).



WILLIAM BRYANT, PHD

Technical Fellow

Modern Technology Solutions, Inc.

Dr. Bill "Data" Bryant is a cyberspace defense and risk leader with a diverse

background in operations, planning, and strategy. He is a thought leader in the cyber defense of weapon systems and other non-traditional cyber-physical systems with multiple published works coupled with numerous operational and strategic assignments building these capabilities in complex organizations.

Bill believes that non-traditional cyber-physical systems such as aircraft and control systems are often an organization's most

critical, and least defended assets, and he is passionate about improving the defensive posture of these systems.

Bill has an unusually diverse background including more than 25 years in the Air Force where he was a fighter pilot, planner, and strategist. He helped create Task Force Cyber Secure and served as its deputy director; he also served as the Air Force deputy Chief Information Security Officer and developed and successfully implemented numerous proposals and policies to improve the cyber defense of weapon systems. Bill currently works for Modern Technology Solutions Incorporated where he created the Prioritized Integrated Cybersecurity Assessment Methodology

(PICAM), while also supporting OUSD R-E by developing a strategy and roadmap for the cyber resiliency and survivability of weapon systems across DoD.

Bill also has a wide range of academic degrees including Aeronautical Engineering, Space Systems, Military Strategy, and Organizational Management. His PhD dissertation topic was cyberspace superiority and he has multiple published works on various aspects of defending cyber-physical systems and cyberspace superiority. In addition, he holds CISSP, C|EH, and Security+ certifications.



MARK COUCH, PHD

Warfare Area Lead, Live Fire Test & Evaluation

Operational Evaluation Division, Institute for Defense Analyses

Dr. Mark Couch is the Warfare Area Lead for Live Fire Test and Evaluation (LFT&E)

in the Operational Evaluation Division at the Institute for Defense Analyses (IDA). He supports a variety of projects in LFT&E, most notably fixed and rotary wing aircraft programs and Joint Live Fire programs. In 2009, he analyzed aircraft combat and safety data from the Iraq and Afghanistan conflicts as part of a congressionally mandated

study. His analyses and recommendations from this study were used by the Services to implement improvements in aircraft survivability and crew protection.

Prior to joining IDA in 2007, he enjoyed a 23-year career in the Navy flying the MH-53E helicopter, serving on several major staffs, and teaching courses in Aeronautical Engineering at the Naval Postgraduate School, including Aircraft Combat Survivability. He received his doctorate in

Aeronautical and Astronautical Engineering from the Naval Postgraduate School in 2003 with his dissertation in rotary wing unsteady aerodynamics. He is a member of the Executive Board for the Combat Survivability Division of the National Defense Industrial Association (NDIA), where he chairs the Strategic Planning Committee and will serve as the chair of the 2021 Aircraft Survivability Symposium. In his off-time, he and his wife, Pam, are the senior pastors of the Vineyard Church in Manassas, VA.



RICHARD HUFFMAN, PHD

Adjunct Research Staff Member

Operational Evaluation Division, Institute for Defense Analyses

Born the son of migrant cat-herders, Rich grew up with a dream—a dream to

design perfectly survivable combat aircraft. Using the inventions of fire, the wheel and transparent aluminum, he set about his task of forging the perfectly survivable machine. It turns out that while completely undetectable, it also weighs too much to leave the soil it was built on—thus assuring its survivability perfectly. “Now, if I could just remember where I built it...”

Dr. Rich ‘Bart’ Huffman currently serves at the Institute for Defense Analyses supporting the Operational Effectiveness and Live Fire Divisions as an Adjunct Research Staff Member from his home in New Mexico near White Sands Missile Range. He has a Doctorate in Aerospace Engineering from the University of Illinois, Urbana-Champaign and is retired from the U.S. Air Force where he served as the Commander of the National Radar Cross Section Test Facility, Assistant Professor of Aerospace Engineering at the Air Force Institute of Technology, and the

Chief of Special Programs for United States Africa Command. Rich is also a Flight Test Engineering graduate of the USAF Test Pilot School with test experience in multiple fighter, bomber and transport aircraft programs with a passion for improving the survivability of our weapon systems to allow them and most importantly their crews to fight another day.



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DANNY MILLMAN, PHD

Chief Technology Officer
Stratolaunch

Dr. Daniel R. Millman is the Chief Technology Officer at Stratolaunch and

has extensive experience in hypersonic aerodynamics, hypersonic vehicle design, and flight test.

As a Chief Engineer at Booz Allen Hamilton, Dr. Millman was named an Engineering Fellow for Hypersonics and co-lead the Hypersonic Working Group for the firm. He has worked with the Air Force Research Labs to design new concepts for an extended range, maneuverable hypersonic reentry vehicle.

Dr. Millman received a patent for a flight control system using a flush air data system that is usable on various aircraft and missiles, including hypersonic re-entry

vehicles. He designed an autopilot for an agile missile concept using reaction control jets for rapid turns. He also advised the USAF on conceptual design methodologies for advanced aircraft, as well as tactical and cruise missiles.

Dr. Millman served in the U.S. Air Force as a B-52H Instructor Pilot and Air Force Test Pilot. He graduated from the USAF Test Pilot School (TPS) in 1998 and was the project pilot for the Advanced Weapons Integration Program on the B-52H. In 2004, he graduated from the Air Force Institute of Technology with a PhD in Aeronautical Engineering. His three years of research led to four journal articles, four conference papers, and a session keynote address at an international conference. After earning his PhD, Dr. Millman returned to Edwards AFB where he instructed at TPS.

Besides classroom instruction in compressible/hypersonic flow and modeling and simulation, Dr. Millman taught multi-engine flight test techniques in the B-52H and the C-12C. He was chosen to be the first director of the Hypersonic Combined Test Force (CTF) in 2006. His CTF was responsible for ground and flight testing of the X-37A, X-51A, and the development of the Blackswift Hypersonic Aircraft. He also conducted the first test flight of Fisher-Tropsche fuel on an Air Force aircraft – the B-52H. On May 26, 2010, he piloted a B-52H to 49,500 feet and performed the first launch of the X-51A, which set a world record for a climb using a scramjet.

As a command pilot, he flew over 3600 hours in 35 different aircraft types.



GARY WOLLENWEBER

Consulting Engineer, Infrared & Thermal Design
GE Aviation

Mr. Gary Wollenweber is Consulting Engineer, Infrared and Thermal Design,

for GE Aviation's Engineering Division in Cincinnati OH. Mr. Wollenweber's primary responsibilities include engine infrared and visible signature, suppression design, technology integration, analytic assessment, measurements and leadership of infrared and thermal design product teams.

Mr. Wollenweber has 43 years of experience in aircraft engine thermal design and has specialized on exhaust nozzle cooling and signature control technology since 1984. During this time, Mr. Wollenweber has worked on variable cycle engines, B-2, A-12, ATF, F-16, F-18A/B/C/D/E/F, E-3, C-5, A330 & B-767 Tanker, H-60, H-1, H-46, CSAR-X and other aircraft visible and infrared signatures. Mr. Wollenweber managed the Infrared and Thermal Design Section from 1989 to 1998 and then assumed his current position and role. Mr. Wollenweber has been a Member of the GE Design Boards, since 1989. Mr. Wollenweber has 13 U.S. patents, with other applications pending

and was recognized as "GE Great Person in Engineering" in 2002 by the Vice President of GE Aviation Engineering.

Mr. Wollenweber has been an adjunct lecturer for the Georgia Tech Professional Education Infrared and Visible Signature and Suppression short course since 2005. Mr. Wollenweber has taught infrared signature and suppression tutorials for MSS/IRIS Infrared Countermeasures, NDIA Aircraft Survivability conferences and USAF/AFIT graduate students. Mr. Wollenweber has also served as thesis committee member for several AFIT graduate students and is a propulsion infrared signature consultant for NASIC. Mr. Wollenweber has also taught aircraft engine cooling design for the Advanced Course in Engineering, a Master Science level curriculum jointly sponsored by GE Aviation and University of Cincinnati. Mr. Wollenweber is a regular instructor at GE's Inlet and Exhaust Department Lunch and Learn series, GE's in-house Professional Engineer Continuing Education Series and several of GE's after-hours courses.

Mr. Wollenweber has been a member of the Combat Survivability Executive Board since 2000. Mr. Wollenweber has been chairman

of the Combat Survivability Education Committee since 2003. In that role, he has been a member of the Symposium Program Committee and has chaired the Tutorial Sessions at the annual NDIA Aircraft Survivability Symposium, traditionally held at the Naval Postgraduate School, Monterey CA. Mr. Wollenweber received the NDIA Combat Survivability Division's Robert H. Gormley Leadership Award in 2019.

Mr. Wollenweber has served on the technical program committee of the MSS/IRIS Specialty Group on Infrared Countermeasures (formerly IRIA-IRIS/ERIM International, Inc.) since 1997. Mr. Wollenweber has been a Trustee for the Hyde Park Neighborhood Council, one of 52 community council recognized by the City of Cincinnati.

Mr. Wollenweber has Physics (Wabash College, 1974) and Mechanical Engineering (BS-Purdue 1975, MS-Purdue, 1977) degrees, and is a registered Professional Engineer (Ohio #47430).

Mr. Wollenweber is married to Author and University of Cincinnati Professor Cynthia Crane.