OCTOBER 8-12 2018

June 2018 Release

49th INTERNATIONAL SYMPOSIUM

SOCIETY OF FLIGHT TEST ENGINEERS

Hosted by the Coastal Empire Chapter
at the DeSoto Hotel
Savannah, GA

Sponsored By
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Tomorrow's Flight Test

October 8 - 12, 2018

Savannah, GA

These are exciting times. Some of us are evaluating platforms intended to take "ordinary" people into space. Some are going to be testing electric or hybrid propulsion vehicles intended for normal, non-experimental use. Some continue testing increasingly-capable unmanned platforms for military use while others are helping introduce unmanned systems for civilian applications. Even seemingly-routine aircraft designs are incorporating ever-newer technologies. There is a lot to look forward to and that's why the Coastal Empire chapter chose the theme "Tomorrow's Flight Test" for this year's Symposium. As we FTEs approach things we have never done before, we may not be able to rely on doing things the way we always have in the past. With this Symposium's agenda, we hope you will come to Savannah and take the opportunity to temporarily set aside what you already know – what you are already doing or have done – and consider how you might approach doing something new, something you have never done before. Even as you return to the same job and the same challenges following this Symposium, stimulated thinking may help you find a better approach to the same tasks. Learning about less-familiar types of testing can also prepare you for unexpected, future changes in assignment. Consider too that forethought is generally one of the most important soft skills in our business, so please come with the mindset to question, evaluate and re-think your current approaches.

Even though we will be considering our potential future, we remain products of our past. In case you have not heard, 2018 is the 50th anniversary of the Society! In this past half-century, technology has definitely changed. But our personal needs as flight test practitioners have not. We all continue struggling to learn anew what others often already know. Many barriers to information transfer exist – some of them legitimate. With the Society, we have a forum which helps incentivize the extra work required to transcend those barriers. In honor of our predecessors who saw fit to create this forum, we will also be taking a little time to reflect on our history even as we peer into the future.

This will all take place in a thoroughly-enjoyable setting. Massive live oaks with hanging Spanish Moss abound along nearby streets and in adjacent squares. Several nearby buildings are on the National Register of Historic Places. We have a large selection of dining establishments and local ordinances permit carry of open containers within the confines of the Historic District. The Coastal Empire chapter envisions Savannah being an ideal setting for you to form new relationships – and renew existing ones – with your fellow flight testers.

Coastal Empire Chapter
Society of Flight Test Engineers

Information in this publication
current as of June 6, 2018

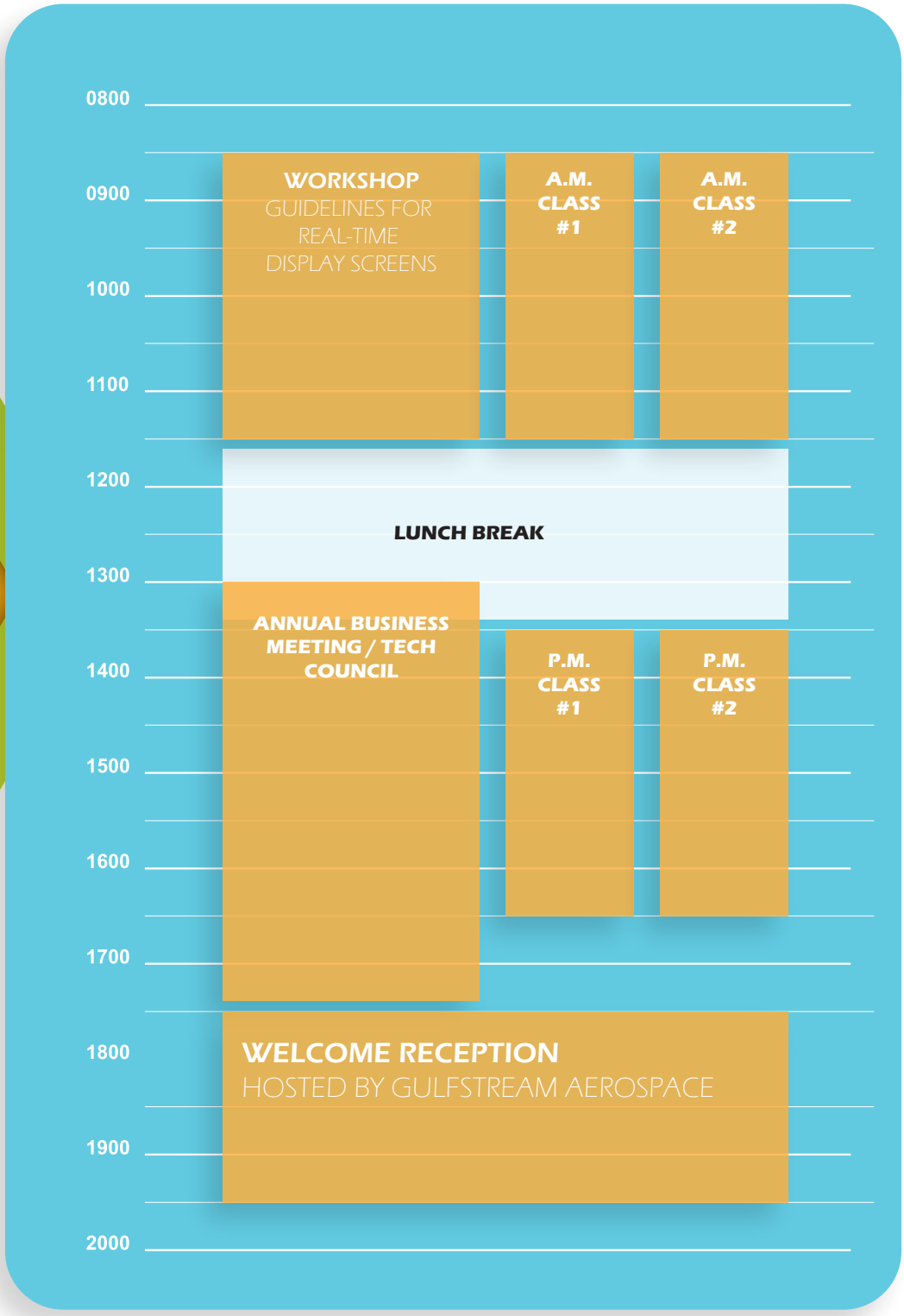
Agenda Overview

	MONDAY 8 WELCOME TO SAVANNAH	TUESDAY 9 TECHNICAL AGENDA	WEDNESDAY 10 TECHNICAL AGENDA	THURSDAY 11 TECHNICAL AGENDA
AM	REGISTRATION WORKSHOP: DISPLAY SCREEN GUIDELINES MORNING TRAINING CLASSES	REGISTRATION SYMPOSIUM WELCOME MORNING SPEAKER BLOCK	MORNING SPEAKER BLOCK	MORNING SPEAKER BLOCK
	LUNCH	LUNCH	LUNCH	LUNCH
PM	REGISTRATION ABM TECH COUNCIL AFTERNOON TRAINING CLASSES WELCOME RECEPTION	REGISTRATION KEYNOTE ADDRESS GENTRY LEE AFTERNOON SPEAKER BLOCK	AFTERNOON SPEAKER BLOCK SOCIAL EVENT DOWNTOWN SAVANNA	AFTERNOON SPEAKER BLOCK PRE-BANQUET SOCIAL MIXER AWARDS BANQUET

ALL TIME BLOCKS ARE APPROXIMATE. THIS GRAPHIC DOES ILLUSTRATE ACTUAL START AND END TIMES.
SCHEDULE IS SUBJECT TO CHANGE. CHECK WWW.COASTALEMPIRESFTE.ORG REGULARLY FOR LATEST AGENDA.

Join us on Friday for a Gulfstream Tour

Monday Agenda
October 8



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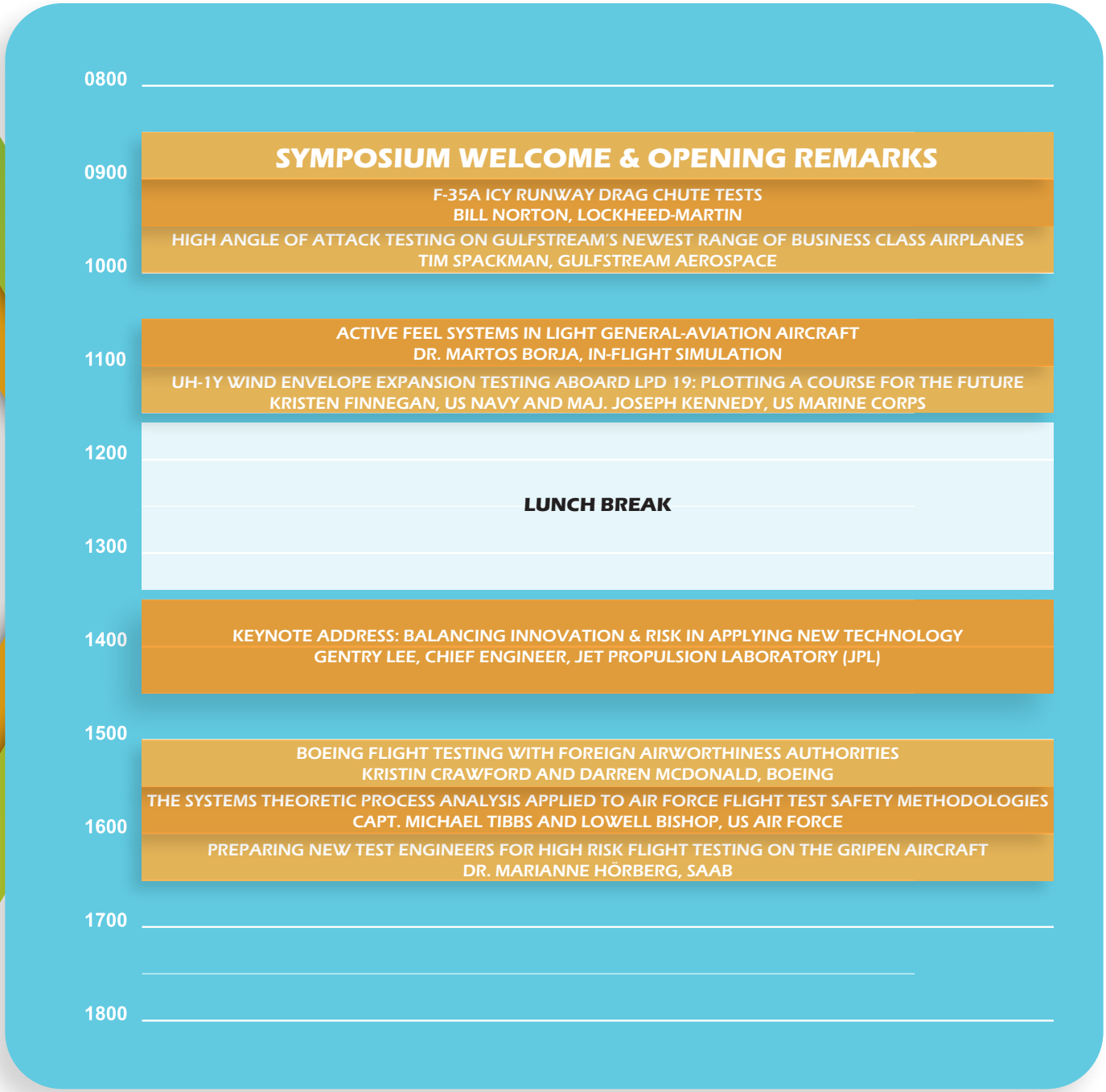
Tuesday Agenda
October 9

Join us for a **07:00 Breakfast Buffet**
Available only to DeSoto Hotel Guests



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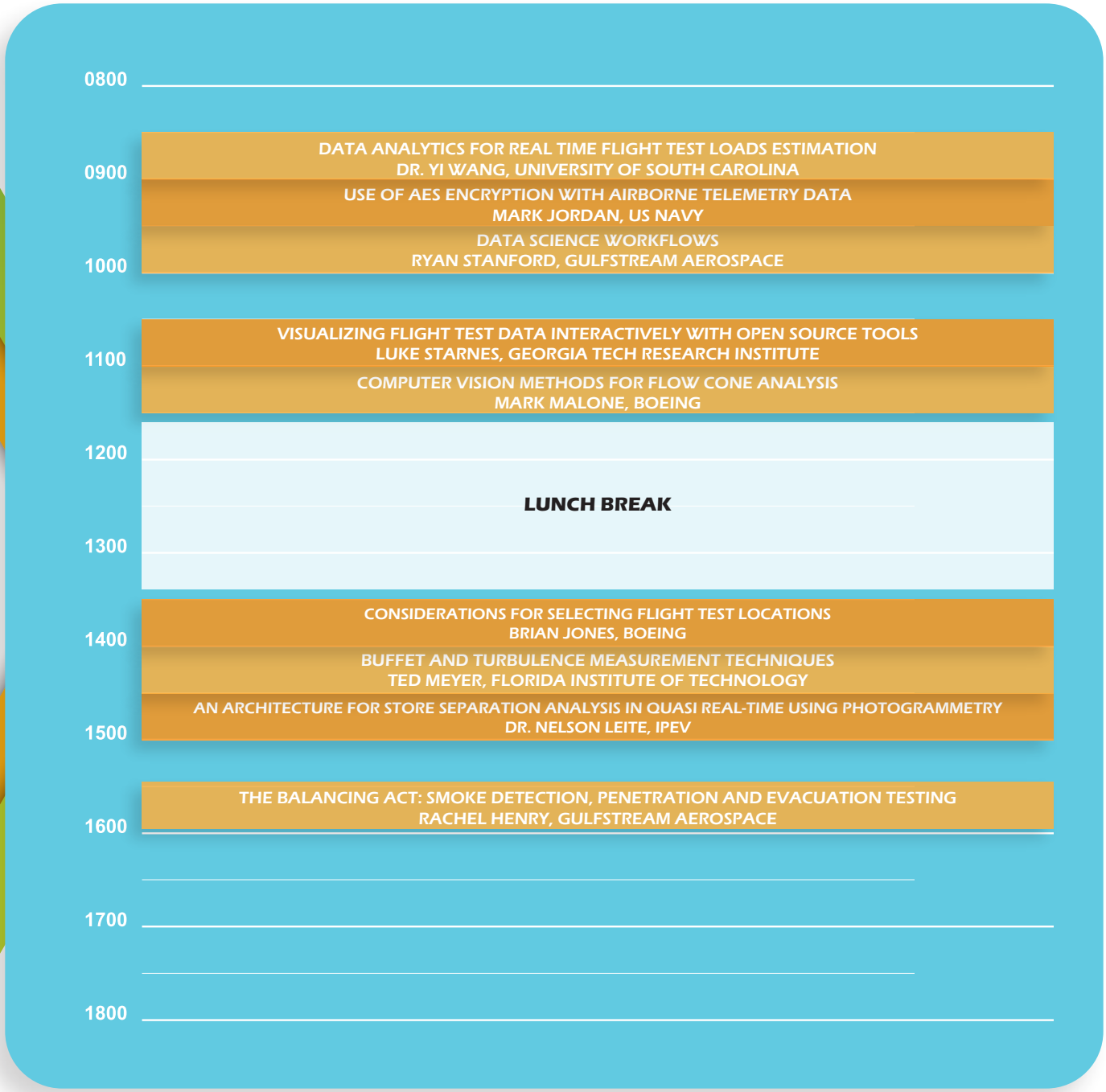
Wednesday Agenda

October 10

Join us for a **07:00 Breakfast Buffet**
Available only to DeSoto Hotel Guests



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Thursday Agenda
October 11

Join us for a **07:00 Breakfast Buffet**
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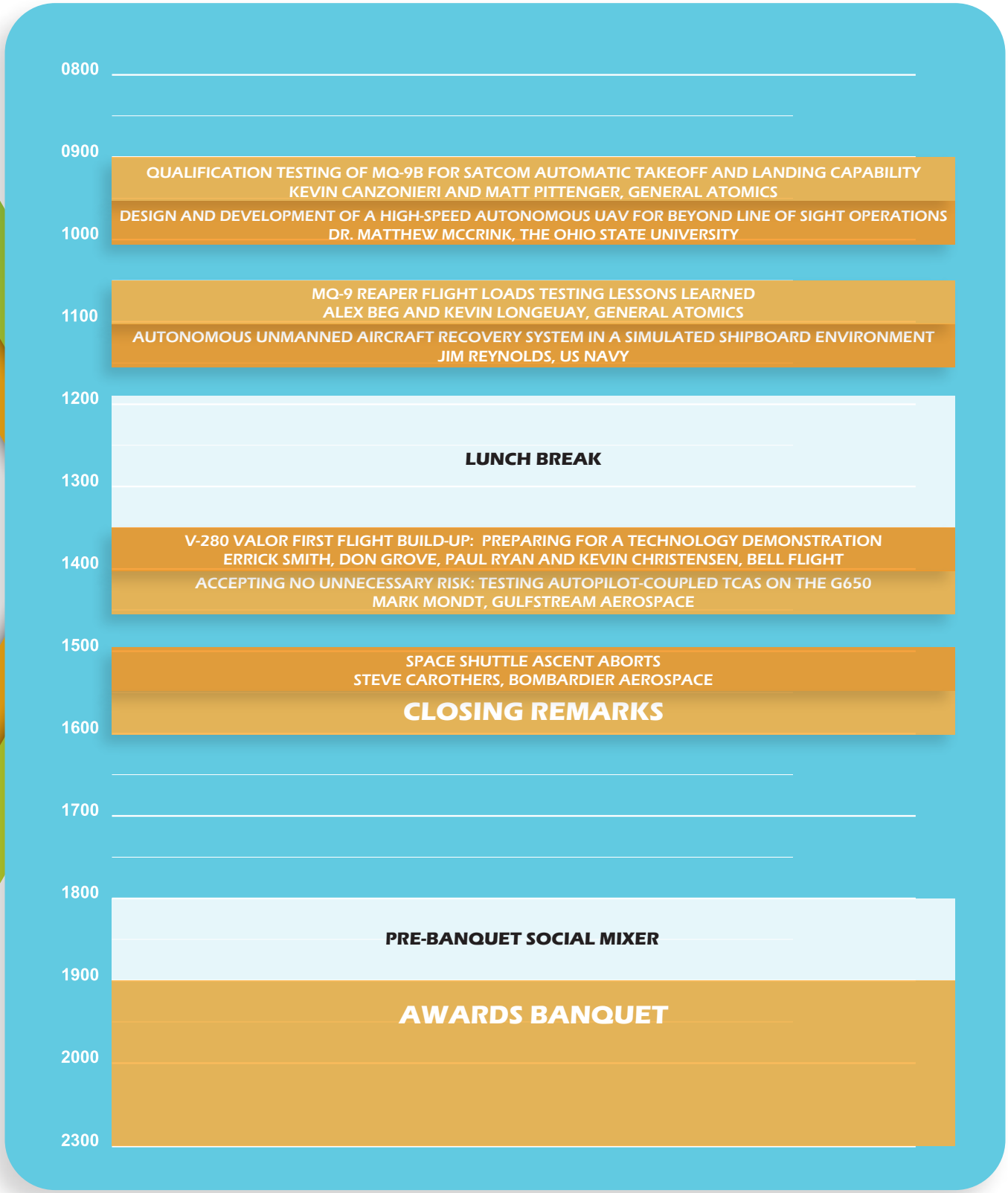

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Featured Speakers

GENTRY LEE

Chief Engineer
Jet Propulsion Laboratory
Keynote Speaker

Gentry Lee is Chief Engineer for the Solar System Exploration Directorate at the Jet Propulsion Laboratory (JPL) in Pasadena, California. In that position Mr. Lee is responsible for the engineering integrity of all the robotic planetary missions managed by JPL for NASA. His major recent work includes the engineering oversight of the fantastically successful and popular Curiosity rover mission to Mars in August 2012, the Dawn mission to the asteroids Vesta and Ceres, the Juno mission to Jupiter, and the GRAIL mission to the Moon. Previously, Mr. Lee provided guidance and oversight for the engineering aspects of the Phoenix and twin rover missions to Mars, as well as NASA's successful Deep Impact and Stardust missions.

COLIN MILLER

VP Flight Operations
Gulfstream Aerospace Co.
Awards Banquet Speaker

Colin Miller is the Vice President of Flight Operations for Gulfstream Aerospace Corporation. The department has responsibility for developmental flight test, production test, sales and demonstration flights, and corporate transportation. Colin has been with Gulfstream for five years with a prior position as an Experimental Test Pilot on the G500 program. Prior to Gulfstream, Colin served in the United States Air Force as an operational F-15C and F-117A pilot, as an F-15, F-16, and F-22 experimental test pilot, and as a Flight Test Squadron, Group, and Wing Commander; serving six total experimental test tours. Colin has a bachelor's degree in Mechanical Engineering from Virginia Tech, and a master's degree in management. He is a distinguished graduate of the United States Air Force Test Pilot School and an Associate Fellow of the Society of Experimental Test Pilots. Colin lives with his wife, Jacquie, and daughters Katie and Grace in Savannah Georgia.

Registration & Reservations

FULL RATE - $745
Contact us for reduced rates for students or unsponsored members.

SFTE MEMBER DISCOUNT - $680
Available ONLY through August 1st
Full Rate applicable August 2nd.

TRAINING CLASSES - MONDAY, OCTOBER 8

Morning Session A
Class and Registration Cost
To Be Announced

Morning Session B
Class and Registration Cost
To Be Announced

Afternoon Session A
Class and Registration Cost
To Be Announced

Afternoon Session B
Class and Registration Cost
To Be Announced

ADDITIONAL BANQUET TICKETS

The standard symposium ticket includes one (1) Banquet Dinner Ticket.
Additional tickets for guests can be purchased at $75.

HOTEL RESERVATIONS

Attendees and Guests can remain onsite and look forward to the most convenient stay at the DeSoto Hotel in historic downtown Savannah

A Group Rate of $179/night is available October 3rd to October 16
Reservations made after September 18, 2018 are at the DeSoto standard rate
Reservation information available on our website

coastalempiresfte.org

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Thank You

Join us in thanking Gulfstream for being the Premium Sponsor of the 49th International Symposium of the Society of Flight Test Engineers. Their generous donation allows the Society to further its mission.

About Gulfstream

Gulfstream has led the evolution of business and personal aviation since the 1958 debut of the Gulfstream I, the world's first purpose-built business aircraft. Today, Gulfstream produces the world's most advanced business aircraft, with innovations from nose to tail and wingtip to wingtip, all while offering unmatched global product support and service.

Gulfstream's commitment to excellence reflects that of its parent company, General Dynamics. Headquartered in Falls Church, Virginia, General Dynamics is a market leader in business aviation; land and expeditionary combat systems, armaments and munitions; shipbuilding and marine systems; and information systems and technologies.

General Dynamics' workforce numbers more than 95,000 employees worldwide.
Gulfstream engineers, manufactures and services the world's finest business aircraft. Headquartered in Savannah, Georgia, USA, Gulfstream operates facilities on four continents and employs more than 15,000 people worldwide.

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Gulfstream G600

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see coastalempireSFTE.org for SFTE Group Rate booking information

THE DESOTO

One defining characteristic of Savannah's Historic District is its relatively-rare rectangular layout. James Oglethorpe devised this pattern in 1733, shortly after landing in the New World and founding the Georgia Colony. The plan called for a repeating series of "wards", each surrounding an open square. This system was devised to aid efficient flow of traffic as residents went about public and private life.

Join us at the DeSoto Hotel, conveniently located in the heart of this unique city layout, within walking distance of the best that Savannah has to offer.

www.coastalempireSFTE.org

Abstracts

ACTIVE FEEL SYSTEMS IN LIGHT GENERAL AVIATION AIRCRAFT

Flight Level Engineering is equipping its 5-DOF variable stability in-flight simulator aircraft with an active stick and active rudder pedals. No certified light general aviation aircraft is equipped with an active stick and active rudder pedals. The FAA is sponsoring this work to determine the airworthiness requirements for Part 23 FBW aircraft and associated Methods of Compliance. Specific challenges will be discussed as well as the progression of designs that lead to a final hardware and software solution. Results from ground testing and flight testing will be shown as well as pitfalls experienced. The required hardware and software safety systems as they pertain to a variable stability aircraft will also be explained. The application of these safety systems to certified systems will be discussed via flight test techniques, mission task elements, and proposed methods of compliance.

AN ARCHITECTURE FOR STORE SEPARATION ANALYSIS IN QUASI REAL-TIME USING PHOTOGRAMMETRY

The Brazilian Air Force Instituto de Pesquisas e Ensaios em Voo ("Flight Test and Research Institute" - IPEV) is currently developing a new airborne near real-time Optical Tracking System (OTS) to be used for store separation flight test campaigns. Such system should determine the released store Time-Space Positioning Information (TSPI) data and send such information to be merged with the Flight Test Instrumentation (FTI) data set. With this new tool it would become possible, in near real-time, to correlate the simulated 6DoF trajectory with the real one to provide the confidence degree of the trajectory estimation model (e.g. simulation runs from CFD analysis) to provide a solid preview whereas the next separation test point is still considered safe or not and to improve test campaign efficiency without jeopardizing its safety levels. Several approaches have been highlighted in the literature to improve this particular Flight Test Campaign (FTC) efficiency and to reduce its costs. In this paper it will be presented the proposed architecture, the development and experimental evaluation of the software, the calibration process for the optical system, the determination of associated uncertainties, and the preliminary test results by static ejection test. Further developments should encompass the final system integration into the existing photogrammetric POD and its evaluation by a real FTC.

AUTONOMOUS UNMANNED AIRCRAFT SYSTEM RECOVERY FLIGHT TESTING IN A SIMULATED SHIPBOARD ENVIRONMENT

The current U.S. Navy operations tempo has resulted in fewer ship assets available for flight test and evaluation efforts. The RQ-21A Blackjack Unmanned Aircraft System test team recently overcame this challenge when no ship was available for testing by developing a simulated shipboard environment at Webster Outlying Field, MD. The test team modified a three-degree-of-freedom motion platform and utilized it to simulate underway ship motion for autonomous Differential Global Positioning System guided approaches. This enabled the evaluation of software updates aimed at improving shipboard recovery rates without a delay in schedule for ship availability. This paper will present a summary of the flight test program and discuss lessons learned, including development of an appropriate ship motion simulation profile. The 152 approaches performed showed a three-fold recovery rate improvement, enabling programmatic decisions without the expense or time required to conduct underway testing.

BOEING FLIGHT TESTING WITH FOREIGN CIVIL AVIATION AUTHORITIES

In addition to FAA type certification, a number of foreign civil aviation authorities (CAA) require validation of type certification prior to operation by an operator in their jurisdiction. Many times this validation requires flight test involvement, including a dedicated flight test with the CAA test pilot and flight test engineers. At Boeing, the successful execution of this flight test relies on one flight test engineer, known as the Foreign Validation Focal, to bridge the gap between the CAA, Boeing Flight Test, and other Boeing organizations. This process requires the focal to balance the desires of the foreign CAA with Boeing schedule pressures during final stages of a type certification program, while building a positive working relationship with the CAA. Learn the history of The Boeing Company's approach to flight testing with foreign CAAs and how the approach has evolved over the years, presented by current and former Foreign Validation Focals.

Abstracts

COMPUTER VISION METHODS FOR FLOW CONE ANALYSIS

This report presents a new method for the processing and analysis of "Flow Cone" visualization images. Traditional methods of analyzing flow cone images are time consuming, requiring the viewing of each video sequence frame by frame to manually note or map the flow cone motion and orientation, during each test sequence. Presented here, is a newly developed computer vision application for flow cone image analysis. Whereby flow cone image sequences are digitally processed to produce a composite flow vector image and data set. This new technique, provides near real-time processing of flow cone images in flight as well as post-test processing of test sequences. The new method can be performed on multiple image sequences from multiple sources. This report provides an overview of the image processing process, an explanation of the computer vision techniques and processed image and data examples.

CONSIDERATIONS FOR SELECTING FLIGHT TEST LOCATIONS

Where do I test? This paper discusses the considerations when selecting airport locations for flight tests. It includes a brief description of data requirements that drive test programs to remote facilities, planning complications, and technical challenges. Specific test sites are examined, with attention given to airport environment, safety, runway features, navigational aids and local resources and infrastructure. A look into ILS characteristics, an analysis of beam quality and type determination, and finally some open questions and lessons learned are presented.

SURROGATE MODELING AND DATA ANALYTICS FOR FLIGHT LOAD ANALYSIS

Determining the stability and control characteristics at the edge of the flight envelope is one of the most challenging aspects of the aircraft development. In an AFTC-sponsored project, we are developing an innovative data analytics framework and tool that encapsulates a suite of surrogate modeling techniques for robust and accurate analysis of combined static and dynamic flight loads. Specifically, the surrogate models are based on the parsimonious regression, including the orthogonal functions and sparsity-promoting regression, and the analysis results are verified using flight load data. Our results show that the surrogate models not only accurately capture the most representative load-driving factors with the uncertainty of parameter estimation and prediction typically less than 5-10%, but also allow automated parameter selection for enhanced tool autonomy. The proposed methodology could potentially bridge the gap between emerging data analytics technologies (e.g., model updating, sensitivity analysis, and others) and in-situ flight test analysis and planning.

DATA SCIENCE WORKFLOWS

Many of us within the aerospace industry work in "data-intensive" environments, and the goal for this paper is to expose the audience to approaches formalized in the field of data science to help gather, sort, store, make sense of, and create actionable information from the abundant data we have available. Specific examples of data science workflows from the author's work in support of aircraft performance testing can be shown along with lessons learned. These include the concepts of separating the analysis from the raw data, using reproducible research methods, and applying best practices of data visualization. The author proposes that those of us involved in flight test engineering can learn from the community of data scientists that specialize in the methods of handling data with the intent of making our jobs easier, more consistent, and more repeatable leading to more objective decision-making and better end results.

F-35A DRAG CHUTE AND ICY RUNWAY TESTING

The Norwegian Air Force required a drag chute on their new F-35A fighters to assist in stopping their aircraft on icy runways, among other benefits. Incorporating the drag parachute into the low-observable aircraft required hardware added atop the fuselage and enclosed in an articulated fairing. This arrangement presented unique testing challenges. Safely achieving the maximum airspeed for parachute deployment and jettison mandated inflight execution. Apart from hardware/software integration, testing focused on ground handling with drag chute deployment on dry and wet runways. Operations on icy surfaces, even in the absence of the drag chute, were undertaken to support F-35A certification for icy runway operations that had not been previously performed. The unique drag chute installation, the long lapse since testing of such systems, plus the icy runway trials that have also become rare, yielded a rich trove of lessons. Relating these is hoped to benefit programs and testers that follow.

Abstracts

ACCEPTING NO UNNECESSARY RISK: TESTING AUTOPILOT-COUPLED TCAS ON THE G650

A block software upgrade on the G650 will include a function to couple the autopilot and autothrottle to targets established from Resolution Advisories issued by TCAS. While proper vetting of this "new and novel" feature drove more numerous and more aggressive inflight encounters than typically employed for basic TCAS tests, the team sought to minimize the number of formation-flight operations involved. A special installation was devised to simulate airborne encounters. A TCAS ramp test set was used onboard during flight in conjunction with a secondary, top TCAS antenna mounted inside the fuselage. The test set vendor was engaged to increase the sophistication of its "target" aircraft behavior to generate desired Resolution Advisory types within the test aircraft. Derivation of test requirements for the number and aggressiveness of encounters are discussed. The aircraft installation and test set modifications are detailed. Analytical results of the automated escape maneuver are presented.

MQ-9 REAPER FLIGHT LOADS TESTING LESSONS LEARNED

By the start of the MQ-9 Reaper Aircraft Structural Integrity Program (ASIP) in June of 2013, the Reaper platform had accumulated over one million hours of flight time. The Reaper, a Remotely Piloted Aircraft (RPA), had established its maturity while flying under a Federal Aviation Administration (FAA) waiver exempting it from various general requirements that most new aircraft platforms must adhere to prior to being fielded. One of these requisite assessments includes having undergone a loads evaluation within the aircraft flight envelope. The ASIP program was initiated to survey and document the actual flight loads acting on the MQ-9 and to demonstrate that these loads were well within the established design load limits previously defined through analysis. This paper will outline the many lessons learned from the MQ-9 ASIP program. These lessons will be divided into three overall topics. First, the paper will describe the complexities of instrumenting a very robust airframe platform to satisfy the loads evaluation test requirements adequately. The paper will also describe the process undertaken to create an ad hoc flight test control room from the ground up, equipped with real-time data monitoring interactive analysis and display softare (IADS) and telemetry capabilities matching those of expensive state-of-the-art government test control room facilities. Finally, the paper will address the manner in which elevated loads test points were able to be achieved on MQ-9, which has an attitude-based flight control system vs the conventional rate based system, by means of developing unique pilot displays to aid in commanding pitch rates correlating with the desired Nz targets at given speed and altitude test conditions.

EVOLUTION OF TEST PLANNING AND EXECUTION FOR NATURAL ICING TESTING

Natural icing testing is a unique part of the test program required to certify aircraft to operate in all weathers. Over the last 3 years BFTC have conducted natural icing testing for development and certification on 2 clean sheet aircraft programs (CSeries and Global 7000), including 4 measured icing campaigns and 1 unmeasured. This presentation will discuss the learning associated with Bombardier's first 2 FBW aircraft programs, including the development of operational methodologies to combine institutional knowledge and new ideas. It will also cover the changes in approach that longer range, larger cabin aircraft allow in this test regime, and how the incorporation of FBW technology has changed the test approach from an overall certification point of view, as well as lessons learned on best practices to conduct testing in this challenging regime.

DESIGN AND DEVELOPMENT OF A RECORD SETTING HIGH-SPEED AUTONOMOUS UAV FOR BEYOND LINE OF SIGHT OPERATIONS

On August 30, 2017, a team of Ohio State researchers and students set world records (pending official review) for speed (147 mph) and distance over an out-and-back course (28 miles) for a fully autonomous unmanned aerial vehicle (UAV) named the Avanti. This presentation will cover the development of the high-speed small UAS, its custom avionics, design of the command and control links, and the verification and validation flight-tests carried out before the record attempt. Numerous RF and structural failures occurred during the months preceding the attempt. The fundamental lessons learned during these trying moments will be discussed in the hopes that valuable insight into the process required to field new high-performance UAS systems might be disseminated. Finally, the talk will conclude with a discussion of the crew resource management dilemmas that can occur when conducting a record flight while combatting stress, fatigue, systems failures, weather, and the unknown unknowns.

HIGH ANGLE OF ATTACK TESTING ON GULFSTREAM'S NEWEST RANGE OF BUSINESS CLASS AIRPLANES

The High Incidence Protection Function that exists within the Gulfstream G500 and G600 Control Law (CLAW) is designed to protect the airplane from aerodynamic stall during scenarios likely to be encountered in-service. Flight testing required an understanding of CLAW architecture, certification framework, likely in-service scenarios for which effective stall protection was required, and test maneuvers that would accurately simulate these scenarios. Flight Test Risk Management was another important element – what are the hazards, how do we deal with them, and what data were available to provide confidence that our "Get Out" plan would work? This paper provides a synopsis of the flight testing conducted to develop the Alpha Limiter for Gulfstream's latest airplane models. Aerodynamic Stall testing, Alpha Limiter development, an unplanned airborne event, subsequent re-design, and eventual repeat flight testing – the process is described in detail, along with lessons learned and a summary of how Gulfstream's test practices have evolved throughout the program.

Abstracts

PREPARING NEW TEST ENGINEERS FOR HIGH RISK FLIGHT TESTING ON THE GRIPEN AIRCRAFT

Updated control laws tailored for aft heavy store configurations have been developed for the Gripen fighter aircraft. The flight tests performed included high risk carefree testing with a test team consisting of several new and unexperienced test engineers. A great deal of effort was spent on preparing the team and making sure sufficient understanding, knowledge and experience was gained prior to the flight tests. Examples of activities include connecting a simulator to the control room to practice communication and strategies to be used in case of departure. Also, rehearsal carefree flight tests with the well tested previous flight control system edition was used to prepare both pilots and the test team. The results include successful flight testing of the updated control laws as well as team members with new experiences that will be very useful for future flight tests, for example with the Gripen E aircraft currently undergoing initial envelope expansion.

QUALIFICATION TESTING OF MQ-9B FOR SATCOM AUTOMATIC TAKEOFF AND LANDING CAPABILITY

In 2017, General Atomics Aeronautical Systems, Inc. (GA-ASI) successfully demonstrated its Automatic Takeoff and Landing Capability (ATLC) using a Satellite Communications (SATCOM) data link for its MQ-9B SkyGuardian™/SeaGuardian Remotely Piloted Aircraft (RPA). The demonstration also included the first SATCOM taxi of the MQ-9B. This paper will describe the testing strategy needed to qualify the MQ-9B aircraft for SATCOM taxi, takeoff, and landing. Three subjects will be described in detail. First, the overall system test philosophy used for development of the test plan. Second the test methodology used for each phase. Third the test safety concerns that were addressed for this test series.

QUANTITATIVE MEASUREMENT TECHNIQUES FOR VIBRATION AND BUFFET

Buffet onset plays a part in determining the range of allowable operating speeds, load factors and altitudes in transport category airplanes. Current flight test techniques involve a qualitative assessment by the pilot to determine points of buffet onset, which can be problematic in cases where buffet onset is not well defined. This paper presents a method using a parameter developed from smoothed accelerometer data to supplement and support pilot comments. While no quantitative certification criteria currently exist for buffet magnitude, this parameter is proposed as a measurement to be included in future guidance material. Additionally, similar measurements are gaining importance in the operational sector, where passenger ride quality and turbulence avoidance are a concern. Methods for incorporating this parameter into existing digital avionics suites typical of modern light aircraft are proposed to build upon ride quality monitoring and turbulence forecasting improvements already in work for operators of large airplanes.

SPACE SHUTTLE ASCENT ABORTS

Many times in flight test, we assume that if something goes wrong we can just return to base to sort things out. With the Space Shuttle, quickly returning to base was rarely an option. For the few situations where it was, doing so would have cost hundreds of millions of dollars and delay the next launch by months. Moreover, a successful landing was not guaranteed for several abort scenarios. To ensure successful missions, the Space Shuttle team spent significant time on pre-flight analysis, mission planning, and flight operations training. Although flight test organizations conduct missions at a much faster pace than the Space Shuttle, there are lessons from the Space Shuttle program that can be applied to traditional flight test. This brief will provide an overview of Space Shuttle ascent aborts, training provided to the Mission Control team, and what flight test engineers can learn from the Space Shuttle program.

THE BALANCING ACT: SMOKE DETECTION, PENETRATION, AND EVACUATION TESTING

At the intersection of environmental control systems engineering (ECS), doors engineering, and completions engineering lies a small, yet significant piece of aircraft type certification... smoke detection, penetration, and evacuation testing. While compliance demonstration to the applicable smoke requirements is often considered minor in the grand scheme of a certification flight test program, Gulfstream Aerospace Corporation's experience conducting this test under development and certification efforts for the GVII-G500 showed that baggage compartment smoke testing results are highly sensitive to test equipment, ECS zone flow, and internal baggage door design. This presentation will use specific test events to illustrate the importance of early development testing with a holistic aircraft lens of focus, test equipment review relative to progressive smoke detector technology, and overall integration of applicable engineering disciplines during early phases of design.

Abstracts

THE SYSTEMS-THEORETIC PROCESS ANALYSIS AS APPLIED TO THE AIR FORCE TEST SAFETY PROCESS

Created at MIT, the Systems-Theoretic Process Analysis (STPA) is a tool used for identification of hazards and mitigations. The role of the STPA in USAF acquisition was explored to establish safety design requirements and safety mitigations traceable to unsafe control actions. This tool was investigated by the Air Force Test Center for incorporation into their test safety process. This effort supported the 2018 Air Force Materiel Command Strategic Plan. It offered the potential to guide consistent and repeatable safety planning for developmental systems regardless of technological maturity or amount of existing system data. Cross-enterprise teams from Edwards, Eglin, Holloman, and Arnold AFBs were assembled to use STPA to create multiple flight/ground test safety plans over the course of 1 year. Although several limitations were identified, STPA was found to be effective in preventing mishaps by identifying safety requirements sufficiently early to influence system design and assist in flight test planning.

UH-1Y WIND ENVELOPE EXPANSION TESTING ABOARD LPD 19: PLOTTING A COURSE FOR THE FUTURE

For years, the UH-1Y and AH-1Z were only allowed to operate within a very limited Launch/Recovery (L/R) envelope aboard LPD 17 class ships. Previous attempts to expand the envelope uncovered unexpected and unsafe results. Due to limited ship assets, follow-on testing was never conducted, and the restrictive UH-1Y L/R envelope impaired fleet mission accomplishment. So, when the opportunity arose to perform envelope expansion with a UH-1Y, the test team jumped at the chance. However, there were many unusual factors surrounding this test which introduced potential risks, including the location of the supporting ship. The ship and aircraft were actively deployed to the Mediterranean Sea, and would be conducting live military operations during the test window. This paper will discuss the many unusual risk factors, the test team's mitigation for each factor, the lessons learned from testing, and how those lessons will improve safety, efficiency, flexibility, and overall success of future shipboard tests.

USE OF AES ENCRYPTION WITH AIRBORNE TELEMETRY DATA

Traditional airborne instrumentation systems are required to use government encryption. These systems typically require specific hardware with storage and use requirements. While this encryption method works well for large installed systems, it is not suited for one time use systems, specifically those used for weapon separation, the cost, logistics, and size prevent easy incorporation. Programs that face size and funding constraints preventing the use of traditional encryption methods have been limited to waiver encryption requirements or limit testing capability. To overcome these limitations alternative encryption methods have been investigated. Commercial encryption methods have improved in recent years and Advanced Encryption Standard (AES) is now able to provide an approved encryption capability with a low overall cost per use and a size that can fit in even the smallest telemetry systems. AES can also be implemented using a combination of hardware and/or software providing for increased flexibility and capability over traditional encryption methods.

V-280 VALOR FIRST FLIGHT BUILD-UP: PREPARING FOR A TECHNOLOGY DEMONSTRATION

The Bell V-280 Valor is a third-generation tiltrotor being developed for the US Government as part of the Joint Multi-Role Technology Demonstrator program to inform the requirements and reduce risk for the Future Vertical Lift program of record. The V-280 completed first flight in December 2017. This paper will show how experimental risk management was applied to prepare for and execute the build-up testing required to achieve first flight of a technology demonstrator in a short period of time. Examples will be provided from the first power disconnect, first high flapping ground run, and first unrestrained ground run. Lessons will be shared on first flight preparation, risk management, and build-up.

VISUALIZING FLIGHT TEST DATA INTERACTIVELY WITH OPEN SOURCE TOOLS

Flight testing produces a large amount of data, some of which needs to be visualized to best understand the interaction of the systems or variables being assessed. This visualization is best done interactively as this allows the engineer to explore and investigate the data. Current technologies are limited in their ability to plot large data sets interactively as they have performance constraints as the number of data points increase. Datashader is an open source solution specifically focused on plotting large data sets and is able to overcome these limitations through smart aggregation techniques. Datashader, in conjunction with Bokeh, is able render millions of data points in the browser in a way that supports interactivity (e.g. pan and zoom). This talk will demonstrate Datashader and Bokeh using publically available Automatic Dependent Surveillance-Broadcast (ADS-B) data, a worldwide dataset consisting of over 7M reports per day.

Presenter Profiles

PREPARING NEW TEST ENGINEERS FOR HIGH RISK FLIGHT TESTING ON THE GRIPEN AIRCRAFT
Dr. Marianne Hörberg, Saab

Dr. Marianne Hörberg currently works as a flight test engineer at SAAB Flight Test and Verification. She is responsible for development of test methods for aerodynamic, flight mechanic and performance testing of fighter aircraft, and her work also includes flight testing of flight control systems. Prior to her flight testing career she worked with electronic warfare at the Swedish Defense Research Agency. In 2009 she received her PhD in Aeronautical Engineering at the Royal Institute of Technology in Stockholm, Sweden, focusing on aircraft trajectory optimization.

ACTIVE FEEL SYSTEMS IN LIGHT GENERAL AVIATION AIRCRAFT
Dr. Martos Borja, In-Flight Simulation

Dr. Borja Martos is president of Flight Level Engineering. Until October 2014 he was a research professor and head of research flight operations in Aviation Systems and Flight Research at the University of Tennessee Space Institute (UTSI). He holds a B.S. and a M.S. in Aerospace Engineering from ERAU, and a Ph.D. from UTSI. He has over ten years of experience as a flight test engineer and in directing and teaching academic courses and short courses in aircraft performance, flying, and handling qualities. He is an expert in fly-by-wire in-flight simulator aircraft and active/passive feel systems. Dr. Martos has an FAA airline transport pilot rating with instrument and multiengine instructor ratings. He has over 2500 hours of pilot time and over 500 hours in research aircraft as a flight test engineer.

AUTONOMOUS UNMANNED AIRCRAFT SYSTEM RECOVERY FLIGHT TESTING IN A SIMULATED SHIPBOARD ENVIRONMENT
Jim Reynolds, US Navy

James Reynolds is an Air Vehicle Flight Test Engineer at NAVAIR's Unmanned Aircraft Systems Test Directorate at Webster Outlying Field, Maryland. He has conducted testing on a wide range of small and tactical UAS in support of the U.S. Navy and Marine Corps. Before joining NAVAIR, James was a Flight Test Engineer at General Atomics Aeronautical Systems, Inc. in Poway, California, where he focused on ground control station, datalink, and weapons testing for the MQ-9 UAS. Prior to that, he served on the staff of the USAF Test Pilot School from 2011 until 2014. James graduated from the United States Air Force Academy in 2011 with a Bachelor of Science degree in Aeronautical Engineering and from the Georgia Institute of Technology in 2016 with a Master of Science degree in Aerospace Engineering.

BOEING FLIGHT TESTING WITH FOREIGN CIVIL AVIATION AUTHORITIES
Kristin Crawford and Darren McDonald, Boeing

Kristin Crawford is a flight test engineer in the Stability and Controls group. She joined Boeing Flight Test in 2012, worked as a 787 field service representative in 2015, and returned to flight test as the Foreign Validation Focal in 2016. As a flight test engineer, Kristin has participated in experimental flight test programs on the 747, 767, and 777 as well as several versions of the 737 and 787.

Darren McDonald is the 777-9 Flight Test Value Stream Leader and is an Associate Technical Fellow in the Flight Test Engineering Stability & Control group. He is a Senior Member of the Society of Flight Test Engineers (SFTE), and has authored and presented papers with the AIAA, SFTE, and the Society of Experimental Test Pilots (SETP). As a flight test analysis engineer, Darren has participated in experimental flight test programs on the 707, 717, 757, and 767, as well as several versions of 737, 747, 777, and

Presenter Profiles

COMPUTER VISION METHODS FOR FLOW CONE ANALYSIS
Mark Malone, Boeing

Mark Malone, joined the Boeing Company 1986 as a member of the Boeing Physics and Technology group. Here he worked on optical and imaging projects in support of military aircraft, rocket and missile programs. These projects included the first industrial X-Ray computed tomography inspection system for rocket motors. From 1990-2005 he was a member of the flight test Data Systems Group and the Boeing aircraft accident investigation team as a forensic imaging and photogrammetry expert. He is currently a physicist and Associate Technical Fellow in the Boeing flight test engineering technology group. He is developing imaging applications and systems for flight test aerodynamics and flow visualization testing. He received his B.S. in Physics and Mathematics in 1985 from University of Washington and a Masters Certificate in Image Science from Rochester Institute of Technology in 1999. Mark is a 1990 graduate of the M.I.T Egerton Center high speed imaging course..

CONSIDERATIONS FOR SELECTING FLIGHT TEST LOCATIONS
Brian Jones, Boeing

Brian Jones is a Flight Test Engineer with The Boeing Company. He has worked in the Autoflight Analysis group since he joined the company in 2005, primarily working on flight controls, automatic flight/autoland, and avionics systems. He has participated in experimental flight test programs on both commercial and military aircraft, including the 737, 747, 767, 777 and 787. He graduated from West Virginia University in 2004 with Bachelor of Science degrees in Aerospace and Mechanical Engineering. He is a member of the Society of Flight Test Engineers (SFTE) and Experimental Aircraft Association (EAA). He lives in Seattle, WA with

SURROGATE MODELING AND DATA ANALYTICS FOR FLIGHT LOAD ANALYSIS
Dr. Yi Wang, University of South Carolina

Yi Wang obtained his B.S. and M.S. in Machinery and Energy Engineering from Shanghai Jiao Tong University, P.R.China in 1998 and 2000, respectively; and his Ph.D. in Mechanical Engineering from the Carnegie Mellon University in 2005. Currently he is an associate professor of mechanical engineering at the University of South Carolina (USC). His research focuses on data mining and management, large-scale and/or real-time data analytics, machines learning, surrogate and reduced-order modeling, and numerical analysis of multiphysics systems. The applications of these technologies span spacecraft thermal analysis, aeroservoelasticity and aerothermoservoelasticity, massive computational data management, real-time load data analysis, integrated multi-scale fluidics systems (design, fabrication, and experimentation). Prior to joining USC, Dr. Wang served as the R&D Director at the CFD Research Corporation, where he demonstrated a proven track record of identifying, launching, and growing strategically important R&D programs for both software/hardware development. He has over 80 publications in book chapters, journals, and conference proceedings and holds 5 US patents. Dr. Wang has served as a single PI on 30 research projects and a Co-PI on 13 projects funded by various federal agencies.

DATA SCIENCE WORKFLOWS
Ryan Stanford, Gulfstream Aerospace

Ryan Stanford is a graduate of aerospace engineering from North Carolina State University. After graduating he worked in aircraft performance and flight test for NAVAIR at Pax River supporting the E-2D and JSF programs. In 2013 he accepted a position at Gulfstream Aerospace in Savannah to work as a performance engineer supporting development and certification of the G500/G600. He completed his master's in engineering from Purdue University in 2016 and now works in the preliminary design group for Gulfstream. He is a student pilot and a member of SFTE and AIAA.

Presenter Profiles

DESIGN AND DEVELOPMENT OF A RECORD SETTING HIGH-SPEED AUTONOMOUS UAV FOR BEYOND LINE OF SIGHT OPERATIONS
Matthew McCrink, the Ohio State University

Dr. Matthew H. McCrink is a Research Scientist at The Ohio State University. His research interests include unmanned flight vehicle design and testing. This broad field includes a focus on embedded systems design and vehicle state estimation and control. Through the course of his work, Dr. McCrink has designed, built, and tested one full-scale aircraft and 23 unique unmanned aerial vehicles. With OSU, he currently holds the world speed and distance record for a fully autonomous, beyond line-of-sight aircraft. In addition to this work, he has designed and built numerous small-scale inertial navigation systems used for unmanned, full-scale, and rocket vehicle analysis. He is currently serving as a lead technical engineer for the Ohio State ASSURE FAA Center of Excellence focused on integration of UAS into the NAS.

F-35A ICY RUNWAY DRAG CHUTE TESTS
Bill Norton, Lockheed-Martin

William J. Norton is a flight test engineer, continuing a career begun during 20 years as a US Air Force officer where he also served as aircrew on test aircrat. Bill has held numerous positions in many organizations on dozens of aerospace programs spanning all aircraft types. He has penned scores of technical papers, fourteen books, and a multitude of magazine articles. Bill is a civil pilot with numerous ratings, restored and operates a DHC-1 Chipmunk, and built a Rutan Long-EZ. He holds a Masters in Aeronautical Engineering. Bill is happily married to the lovely and talented Anya Victoria Eriksson.

MQ-9 REAPER FLIGHT LOADS TESTING LESSONS LEARNED
Alex Beg and Kevin Longeuay, General Atomics

Alex Beg has been a Flight Test Engineer at General Atomics working as a test director for the MQ-9 Reaper since August of 2015. He was previously a Flight Test Engineer at Lockheed Martin working in the Flying Qualities Discipline for the F-35 program and a Validation and Verification Engineer Working for The Boeing Company in support of the International Space Station program. He holds a BS in Mechanical Engineering from The George Washington University and MEng in Aerospace Engineering from Cornell University in 2011.

Kevin Longeuay has been a Flight Test Engineer at General Atomics working as a test director for the MQ-9 Reaper since October of 2012. He was previously a Flight Test Engineer at Lockheed Martin working as a test conductor for the F-35 program. He holds a BS in Aerospace Engineering from San Diego State University and an MS in Aerospace Engineering from USC in 2016. He has previously published "Handling Qualities Evaluations for Unmanned Aerial Systems" at the SFTE 2016 Conference.

Presenter Profiles

NATURAL ICE TESTING
Ben Povall, Bombardier Aerospace

Ben Povall is a Fight Test Engineer Specialist at the Bombardier Flight Test Center in Wichita, KS, where he is currently the Lead Flight Test Engineer for FTV2 on the Global 7000 program. He started his career at BAE Systems Warton, UK working in the Flight Test Engineering department initially on Eurofighter Typhoon and Harrier GR9 before moving to the Nimrod MRA4 program as an Operations and Planning FTE. Following this he was assigned to NAS Patuxent River, MD as a part of the UK contingent supporting as an FTE on the F-35B, where he primarily supported Loads, Flying Qualities and Weapon Separation Testing as both a Test Conductor and Test Director. In 2014 he left BAE Systems and moved to Mirabel, QC to join Bombardier where he was the Lead FTE for FTV2 and Flight Test Team Lead for FTV7 during the C Series certification program, prior to moving to Wichita, KS to join the Global 7000 program. Ben earned a Master of Engineering degree in Aerospace Engineering from the University of Liverpool in 2006.

QUALIFICATION TESTING OF MQ-9B FOR SATCOM AUTOMATIC TAKEOFF AND LANDING CAPABILITY
Kevin Canzonieri and Matt Pittenger, General Atomics

Kevin Canzonieri has been a flight test engineer since joining GA-ASI in 2010. He has experience with systems and flight test on many GA-ASI RPA platforms including MQ-1 Predator, MQ-1C Grey Eagle, MQ-9 Reaper, and Avenger. Most recently he was the lead systems test engineer for Predator XP and is currently the lead systems test engineer for MQ-9B SkyGuardian. As a flight test director for GA-ASI with a performance and flying qualities qualification he has been working with auto takeoff and landing on various RPA platforms since 2011. Prior to joining GA-ASI he worked as a student researcher in the Rensselaer Polytechnic Institute Flow Control Lab and the UCLA Energy & Propulsion Laboratory. He has also had internships at NASA Langley Research Center's Research and Technology Directorate, Flow Physics and Control Branch.

Matt Pittenger is a Systems Test & Qualification Engineer at General Atomics Aeronautical Systems Inc. (GA-ASI) at their Flight Test Facility in Palmdale, CA. He has been in Test Engineering for 8 years, splitting that time between GA-ASI and a green energy company in Silicon Valley. As a Flight Test Engineer, his primary focus areas have been in Propulsion and Flying Qualities; more specifically to include efforts in electrical system upgrades, flight envelope expansion, improving aircraft endurance, and automatic takeoff and landing. In 2009, he graduated from California Polytechnic State University, San Luis Obispo with a B.S. in Aerospace Engineering while also completing his fixed-wing Flight Instructor certification.

QUANTITATIVE MEASUREMENT TECHNIQUES FOR VIBRATION AND BUFFET
Ted Meyer, Florida Institute of Technology

Ted Meyer has worked in the general aviation industry for 12 years. After starting out cleaning and maintaining airplanes in high school, he earned a BS in Aerospace Engineering & Engineering Mechanics from the University of Cincinnati. During that time, he was selected by Gulfstream Aerospace for their Co-Op program and accepted a full-time offer after graduation. He worked in structural design engineering for 2 years, followed by flight test engineering for 4 years. He recently completed a Master's of Science in Flight Test Engineering at the Florida Institute of Technology, and currently works as first officer on a privately owned Beechjet 400a. He is a Multiengine Instrument Flight Instructor (MEII) and has flown 26 airplane types from gliders to jets.

SPACE SHUTTLE ASCENT ABORTS
Steve Carothers, Bombardier Aerospace

The author, Steve Carothers, is a Flight Test Engineer at the Bombardier Flight Test Center in Wichita, KS. His flight test experience centers mainly on avionics testing, but he also participated in the C Series Community Noise testing effort. In addition to his testing duties, Steve is the software tools focal for flight operations. Steve earned a Bachelor of Science degree in Aerospace Engineering with honors from Wichita State University. Prior to joining Bombardier, Steve worked for 15 years at the NASA Johnson Space Center as a Space Shuttle flight controller in Mission Control. His primary duties there were to provide real-time support as an Ascent/Entry Guidance & Procedures Officer during launch, deorbit, and landing. Steve also worked as a Rendezvous Onboard Navigation Officer where he helped the Space Shuttle rendezvous with the International Space Station and the Hubble Space Telescope.

Presenter Profiles

HIGH ANGLE OF ATTACK TESTING ON GULFSTREAM'S NEWEST RANGE OF BUSINESS CLASS AIRPLANES
Tim Spackman, Gulfstream Aerospace

Tim Spackman is a Graduate of the University of New South Wales (2005 and 2013), a Graduate of the Empire Test Pilots' School (2010), and a former Royal Australian Air Force (RAAF) Flight Test Engineer. He has flight test experience in more than 25 different aircraft types, ranging from single-seat fighters to business jets, and currently works with the Gulfstream Aerospace Corporation in Savannah, GA, as a Performance and Flying Qualities Flight Test Engineer. Having graduated from his Bachelor degree, and subsequently from ETPS, Tim worked with the Australian Defence Force's Aircraft Research and Development Unit (ARDU), where he conducted a range of testing including Air-Air Refuelling, Weapons Clearance and initial flight testing of a Bristol Boxkite replica – the first military airplane ever flown by the Australian Defence Force. Tim left the RAAF in 2013 to take up a position with Gulfstream; in the years since, he has conducted numerous high angle-of-attack, flying qualities, performance and control law development and test programs on the G500 and G600 model airplanes.

THE BALANCING ACT - SMOKE DETECTION, PENETRATION, AND EVACUATION TESTING
Rachel Henry, Gulfstream Aerospace

A graduate from Georgia Institute of Technology (2015) with a Bachelor of Science in Mechanical Engineering, Rachel Henry began her Flight Test career in February of 2016 with previous experience at Gulfstream Aerospace in Production Engineering, Flight Sciences, and Human Factors Engineering. Since stepping into Flight Test two years ago, Rachel has earned a certification in Flight Test Engineering through the Florida Institute of Technology (2016) graduate program and conducted numerous Powerplant & Systems test efforts on the GVII-G500 and GVII-G600 certification programs. Environmental Control Systems, Anti-ice Systems, Smoke Evacuation, Community Flyover Noise, Flammable Fluids Drainage, and Water Ingestion tests have composed the majority makeup of Rachel's test conduct experience at Gulfstream in her short time as a Flight Test Engineer.

THE SYSTEMS THEORETIC PROCESS ANALYSIS (STPA) APPLIED TO AIR FORCE FLIGHT TEST SAFETY METHODOLOGIES
Capt. Michael Tibbs and Lowell Bishop, US Air Force

Capt. Michael L. Tibbs is the Flight Commander, Operations Engineering Flight, 419th Flight Test Squadron, Edwards AFB, Calif. As Flight Commander, he leads a flight of 20 military, civilian, and contractor engineers and manages the test planning and execution of $67M B-1, B-2, and B-52 developmental test programs. As a B-1, B-2, and B-52 test conductor, he leads mission planning and ensures the safe and effective execution of ground and flight tests. He also serves as a B-52, F-16, and C-12 on-board flight test engineer. As a unit test safety officer and project safety lead, he helps create, approve, and manage test program safety plans.

Mr. Lowell Bishop is a Test Systems Safety Engineer on a rotational assignment to the 412th Test Wing's Test Safety Office at Edwards Air Force Base, California. In this role, he serves as an independent safety reviewer to all projects executed under Test Wing oversight, enabling safe and effective execution of the USAF test programs. He has chaired 28 safety reviews across 17 different platforms, which ensured all test unique hazards were identified and mitigations were implemented, thus reducing the residual risk level of testing for Test Wing personnel and resources.

VISUALIZING FLIGHT TEST DATA INTERACTIVELY WITH OPEN SOURCE TOOLS
Luke Starnes, Georgia Tech Research Institute

Luke Starnes received a BS degree in Electrical Engineering and MS degrees in International Politics and Business from Georgia Tech. He works for the Georgia Tech Research Institute (GTRI) where he is the Chief Engineer of the Electronic Systems Laboratory. During his 15+ year career, Luke has been involved in defense technologies where he has primarily focused on avionics and mission system integration for fighter aircraft. The test and evaluation of these programs generates a large quantity of data. The team regularly processes terabytes of flight test data to evaluate the performance of their embedded avionics software. The employed data analysis process has been migrated to a Python-based tool chain. While their data exploration and analysis needs are atypical, they strive to leverage tools and best practices employed by the community. Luke serves as the co-organizer of the Atlanta Jupyter User Group.

Presenter Profiles

UH-1Y WIND ENVELOPE EXPANSION TESTING ABOARD LPD 19 - PLOTTING A COURSE FOR THE FUTURE
Kristen Finnegan and Maj. Joseph Kennedy, US Navy

Kristen Finnegan is a flight test engineer working for the Naval Air Warfare Center (NAVAIR). She currently works in the rotary wing ship suitability group, which primarily conducts envelope expansion and compatibility testing of military helicopters aboard Navy ships. She has led tests for the Navy, Marine Corps, and Coast Guard, and has supported tests aboard sixteen US Navy ships. She graduated with a Bachelors degree in Aerospace Engineering from Penn State University and is currently working on completing a Masters degree in Flight Test Engineering from Florida Institute of Technology. She's an active member of the Patuxent River chapter of SFTE. In 2015, Kristen completed the Rotary Wing Long Course at the United States Naval Test Pilot School. She was a graduating member of Class 148, along with her co-presenter, Major Joe Kennedy.

Major Joe Kennedy is a Marine Corps developmental test pilot and project manager at Air Test and Evaluation Squadron TWO ONE (HX-21) for the AH-1W and AH-1Z Cobra, and UH-1Y Huey aircraft. Prior to becoming a test pilot, Major Kennedy flew the UH-1Y during two combat deployments in support of OPERATION ENDURING FREEDOM. He also served as a UH-1Y instructor pilot for three years. Maj Kennedy graduated with a Bachelor's Degree in Quantitative Economics from the United States Naval Academy. He's a provisional associate member of the Society of Experimental Test Pilots and a graduate of the United States Naval Test Pilot School, Class 148. He and his co-presenter, Ms. Kristen Finnegan, were Test Pilot School classmates. Maj Kennedy enjoys spending time with his wife Rachel, son Blake, and daughter Hannah.

USE OF AES ENCRYPTION WITH AIRBORNE TELEMETRY DATA
Mark Jordan, US Navy

Mark Jordan is a Sores Compatibility Test and Evaluation Specialist Engineer at NAVAIR Air Vehicle Stores Compatibility Division. He holds a Bachelor of Science in Aerospace Engineering from the University of Florida and a Master's in Computer Science from the Florida Institute of Technology (FIT). His publications include Adding New Instrumentation to Aircraft Platforms, Lessons Learned from Cross Agency and Cross Discipline Testing, Captive Carriage Miniature Telemetry, Limitations to CAD Model use for Real World Stores Compatibility Testing and "Is the Data Valid".

ACCEPTING NO UNNECESSARY RISK - TESTING AUTOPILOT-COUPLED TCAS ON THE G650
Mark Mondt, Gulfstream Aerospace

Mark Mondt graduated from the Wichita State University in 1994 with a B.S. in Aerospace Engineering and in 2000 with a M.S. in Engineering Management. Mark has been a licensed private pilot (SEL) since 1998 and a registered professional engineer (KS) since 2001. His first assignment in flight test came in 2000 at Boeing's Integrated Defense Systems unit in Wichita. While there, Mark contributed on programs such as E-6B MDS/ADWS, International Head-of-State conversions and 767 Tanker (GTTA, predecessor to KC-46) before becoming a Test Manager for programs including B-52 CONECT and the Dutch Air Force (K)DC-10 Cockpit Upgrade. In 2008, he transitioned to Bombardier Aerospace where he worked on the Global 5000/6000 incorporation of Collins' ProLine Fusion and on Learjet 85 FTV1. In 2014, Mark took his current assignment with Gulfstream in Savannah then became a candidate ODA Flight Analyst for avionics working on the G500/G600 and G650 programs. Mark joined the Society in 2003 and has been active ever since, serving one term as President of the Wichita Chapter then two terms as national Secretary and one term as national Vice-President. Mark currently serves as chairman of the 2018 Symposium and Vice-President of the Coastal Empire chapter. Over the years, Mark has presented papers at the local and national level, including one Best in Symposium award (Co-Presenter in 2004). More recently, Mark has tried his hand at writing. His first publication, "The Tao of Flight Test", is available on Amazon. Outside of flight test, Mark enjoys training for endurance athletic events. .

Presenter Profiles

V-280 VALOR FIRST FLIGHT BUILD-UP - PREPARING FOR A TECHNOLOGY DEMONSTRATION
Errick Smith, Kevin Christensen, Don Grove, and Paul Ryan, Bell Flight

Errick Smith is an Experimental Flight Test Engineer at Bell currently supporting the V-280 Valor Joint Multi-Role Technology Demonstrator program. Errick joined the Bell team in 2014 and has supported both the V-22 NVIA instrumentation build-up effort and the 412EPI Increased Gross Weight Test Program prior to transitioning full time to the V-280 Valor Program. He holds a Bachelor of Science Degree in Aerospace Engineering with a minor concentration in Business Administration from Embry Riddle Aeronautical University in Daytona Beach, FL. While studying at Embry-Riddle, Errick worked with the School's Flight Research Center where he supported various flight test programs. Additionally, Errick has also attended coursework at the National Test Pilot School in Mojave, California. Errick is a FAA certified fixed-wing and rotorcraft pilot with over 500 hours of PIC time and 12 years of flying experience in over 20 different aircraft.

Kevin Christensen has over 32 years of experience in aviation and has been directly involved with the development and flight testing of both military and commercial aircraft for more than 21 years. He has 3,500 hours of flight time in nearly 50 aircraft. Kevin joined Bell in 2005 after retiring from the US Air Force. While in the USAF, Kevin served as a test pilot in both the F/A-22 and F-16, was Flying Qualities Branch Chief at the USAF Test Pilot School, and commanded the USAF's weapons test squadron. With Bell, Kevin was the handling qualities lead for the ARH-70A, where he was instrumental in improving the flight control design to meet the US Army's ADS-33 handling qualities criteria. He also was a designer and flight test lead for Bell's advanced control law design and demonstration project. These fly-by-wire control laws fed directly into Bell's current fly-by-wire aircraft. Kevin has also served as the Bell flight test lead for the AW609 Civil Tiltrotor. In this capacity, he planned and directed numerous flight test evaluations in areas including vortex ring state, handling qualities, loads, and ASE. Kevin is a distinguished graduate from the USAF Academy with a BS in Astronautical Engineering. He also holds a MS in Aeronautical and Astronautical Engineering from the University of Washington where he specialized in control system theory and design. Kevin is a distinguished graduate of the USAF TPS, an Associate Fellow of the SETP, and a member of the Vertical Flight Society. He has published four papers, and has also written and published the Stores Separation chapter for the 2003 SETP Handbook. Kevin also holds four patents for his advanced control law designs. Kevin is currently the Test and Evaluation Manager for the Bell V-280 Valor Joint Multi-Role Technology Demonstrator.

Don Grove is currently Bell's Chief Tiltrotor Test Pilot and lead test pilot for the V-280 Valor concept demonstration. He is a 21-year Air Force veteran and has been with Bell since retiring in June 2014. A Distinguished Graduate from the US Naval Test Pilot School, he conducted developmental testing in HH-60G and CV-22 aircraft while in the Air Force. Since being with Bell, he has been the lead test pilot on numerous V-22 concept demonstration test programs, including live weapons fire, aerial refueler, and engine inlet barrier filter. As lead test pilot for the V-280, he was integral to the design and conducted First Flight in December 2017 and initial envelope expansion in early 2018. Grove received a B.S. in Mathematics from the US Air Force Academy, M.S. in Aeronautical Science from Embry-Riddle Aeronautical University, and M.S. in Military Operational Art and Science from Air University.

Paul Ryan retired from the United States Marine Corps (USMC) in 2016 with over 30 years of service and subsequently joined Bell Helicopter as an active Experimental Flight Test Pilot. Paul is a graduate of the United States Naval Academy, and has graduate degrees from Embry Riddle Aeronautical University, Georgia Tech and the National Defense University. He attended and graduated from the United States Navy Test Pilot School (USNTPS) in 1998. To date, Paul has accrued over 10 years of Flight Test experience and over 5,000 hours of total flight time, of which over 2,000 hours are in Tiltrotor aircraft. He participated in the first flight of the Bell V-280 Valor AVCD and is one of the primary test pilots for the program.

Presenter Profiles

AN ARCHITECTURE FOR STORE SEPARATION ANALYSIS IN QUASI REAL-TIME USING PHOTOGRAMMETRY

Luiz Eduardo Guarino Vasconcelos, Nelson Paiva Oliveira Leite, André Yoshimi Kusumoto, Cristina Moniz Araujo Lopes

Luiz Eduardo Guarino Vasconcelos is a Software Engineer with 16 years of experience. PhD Student in Space Sciences and Technologies at the Aeronautics Institute of Technology (ITA). In 2002 he joined the Brazilian Flight Test and Research Institute (IPEV) where he stayed for 16 years working with flight tests, developing applications for real-time analysis involving image processing, sensor calibration and software engineering techniques. The last 5 years he has been involved to the development of computational solutions for store separation analysis. In 2016 he joined the National Institute for Space Research (INPE) where he works for weather forecast software development. He has dozens international publications. He is a professor at Faculty of Technology (FATEC) teaching web programming, database, security and distributed systems. He is also a professor in the postgraduate on Projects and Development of Web and Mobile Applications at UNIFATEA teaching courses of agile methodologies, application security, software testing, web and mobile development. He has participation in startups and in research projects.

Nelson Paiva Oliveira Leite, in 1981 he was graduated in Electronic Engineering and later in the same year he was hired as a junior engineer by the Research and Development Institute (IPD) Flight Test Subdivision (PAR-V), which today is the Flight Test and Research Institute (IPEV), where he is the Head of the Research and Development Division (EPD). During his professional life, he mostly worked with Flight Test Instrumentation (FTI) and Real-Time Data Acquisition/Processing Systems in several experimental Flight Test Campaigns (e.g. T-27, A-1, C-97 and A-29). In 1986 he was involved in the creation of the Brazilian Air Force Flight Test School (EFEV), which in 2004 was accredited by SETP. From the beginning he always taught at EFEV. In 2006 he received his PhD degree at Technological Institute of Aeronautics (ITA). He has the Santos Dumont Medal of honor, the Brazilian Flight Test Golden Medal of honor and the Air Force Military Merit Medal of honor. Actually, he is the program manager for the development and integration of advanced fight test tools for IPEV and the responsible of technical cooperation with ONERA and DLR for flight test related PhD programs. He is also the responsible for keeping the IPEV's corporative membership with SFTE, SETP and ITEA.

André Yoshimi Kusumoto, he is a Senior Technologist at Brazilian Flight Test and Research Institute (IPEV) where he is IT Project Manager, head of Software Development Team and researcher in the Institute's projects. He is currently working for the development of new real-time processing tools for telemetry stations using computer vision techniques. He got his Master's Degree in Space Sciences and Technologies with the Aeronautics Institute of Technology (ITA) and has large experience in Computer Science, working mainly in the following subjects: Digital Image Processing, Computer Vision and Computational Systems Analysis. In addition, he is a Professor of Computer Graphics, Image Processing and Software Engineering at Universidade Paulista (UNIP).

Cristina Moniz Araujo Lopes is a PhD in Chemistry at State University of Campinas (UNICAMP, 2003) with a sandwich period at the Institut für Makromolekulare Chemie / Albert-Ludwigs Universität Freiburg, Germany. Master in Chemistry at UNICAMP (1997) and Graduate in Technological Chemistry at UNICAMP (1994). She is currently a Researcher at the Institute of Aeronautics and Space (IAE). She is a permanent Professor of the postgraduate program in Space Sciences and Technologies (ITA / IAE / IEAv). She is also the coordinator of the Space Systems area, Tests and Launches. She is the President of the Academic Programs Council of IAE. She is the Representative of Scientific Initiation of IAE with CNPq and she has experience in the area of materials, with specialization in polymers, aerospace materials, nanocomposites, hybrid composites, ballistic shielding, and electromagnetic shielding.

The objective of the SFTE Coastal Empire Chapter is to provide, in the areas of coastal Georgia and South Carolina, opportunities for promoting the advancement of flight test engineering through technical and fraternal communication among engineers whose principal professional interest is the flight testing of manned aircraft and those engineers in the allied fields of test operations, analysis, instrumentation and data systems.

We welcome you to Savannah, GA and invite you to see the latest Symposium and Chapter news at:

www.CoastalEmpireSFTE.org

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