

*The Newsletter of the Western Museum of Flight*

## Future Aviators Expansion

*Photos: WMoF*

Thanks to our Master Craftsman Terry Hughes, and Electronics Wizard Scott Wood, the new Flying Tiger aircraft and interactive cockpit has been added to the expanded Kids Aerospace Discovery Zone.



Some of our younger visitors and kids of all ages enjoying the Kids Aerospace Discover Zone.



# The Douglas World Cruiser Centennial

Jayden Lim, 7th Grade Student Intern



The Douglas World Cruiser was one of the first attempts to fly aircraft around the world. This was achieved in 1924 by aviators from the U.S Army Air Service. They were able to make it around the world in 175 days and just this fact was an utterly incredible triumph covering over 27,000 miles in total. This whole ordeal was made possible due to the fact that the U.S War Department realized none of their current aircraft were capable of completing this seemingly ludicrous flight. Donald Douglas agreed to make aircraft and ended with five different models - one for testing/training, and four for the actual flight itself.

All of the “World Cruisers” were made of Sitka Spruce and were sturdy and also used interchangeable landing gear of wheels and pontoons which was a requirement at the time.

They took off from Santa Monica Airport on March 17 for Seattle, the official starting point for the world flight. The trip itself took 175 days and they departed from Seattle on April 6, 1924. Returning on September 29, 1924, they flew for a total of 363 hours and 7 minutes. This aircraft earned the nickname “First Around the World” as it completed a feat that no aircraft had ever been able to accomplish. Through all the hardships of countless repairs, forced landings, and bad weather, they still made it through this miraculous journey. This singular feat made way for so much more that was soon to happen in aviation history.



## Museum Archivists

Photo: WMoF

California Academy of Math & Science Museum Interns Elsie Perez, Jackeline Ramos, and Anusha Prasad, help with archival data entry and research projects on Sundays.



# Northrop Grumman Pegasus

Anusha Prasad, 10th Grade Student Intern



The X-47A Pegasus is an unmanned combat aircraft that was first tested in 2001. Its development began in the year 2000, by the private company Northrop Grumman, and the aircraft itself was meant to be a part of Defense Advanced Research Projects Agency's J-UCAS program. The aircraft had a very sleek and small design because its purpose was to infiltrate enemy air territory undetected and to aid in the Navy's reconnaissance missions. As such, its airframe was built by Burt Rutan's Scaled



Image: Commons.Wikimedia.org

Composites company, which effectively kept the aircraft inexpensive and lightweight. As a result, the final product had both a wingspan and overall length of only about 27 feet and a weight of less than 4000 pounds without payload. Additionally, it had the capability to store and drop bombs that weighed up to 500 pounds.

After being thoroughly tested during both 2001 and 2002, the X-47A undertook its first flight on February 23, 2003, at China Lake in California that lasted for a total of twelve minutes. Its stealth and precision were excellent, but its first flight was its only flight as of now. Northrop Grumman engineers were concerned about the resiliency of the aircraft's access panels while it was on the carrier and any circumstances in which the stealth and location of it could be compromised. Because of the need for further improvement and testing and due to the fact that the UCAS-D program was terminated in 2006, the X-47A had no more recorded flights.

Although the X-47A was not utilized much by the military, it still served as a great baseline for the production of the Northrop Grumman X-47B. This model was much larger in both length and wingspan; its length is approximately 38 feet, and its wingspan—almost double compared to that of the X-47A's—is 62 feet. This design was adopted by the U.S. Navy and became part of the previously mentioned Unmanned Combat Air Systems Demonstration. X-47A also contributed to the newer model X-47C's design, which is an aircraft that's even grander in size and is meant to carry a payload of about 10,000 pounds.

In conclusion, the X-47A was a great and transformative aircraft tackled by Northrop Grumman, and was very unique due to its short wingspan and potential stealthiness. Even though the aircraft didn't undertake many flights, its design and concept were a great inspiration to Northrop Grumman's future aircraft such as the X-47B, which is in use by the Navy, and the X-47C and furthered the possibilities of unmanned combat aircraft.



DARPA-NGC USN X-47A Pegasus Team shirt & cap donated by Jim Sandberg

# Northrop Grumman Retirees - Supersonic Memories

Photo: WMoF

Northrop Grumman retirees met for a special tour of the YF-23 with docents Fred Peitzman and Roy Martin.



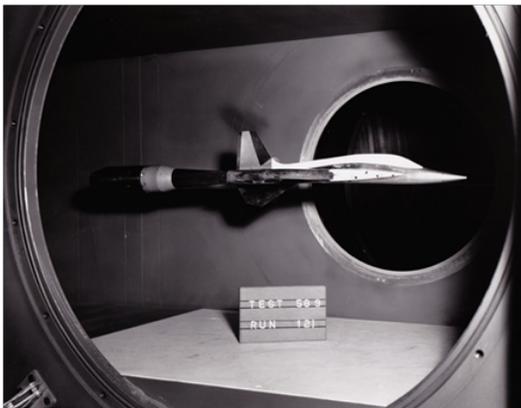
## Space Trainer

Fred Peitzman, Northrop Wind Tunnel Engineer/Manager, Retired

Having recently seen a picture of the space trainer version of the F-104, I was reminded of a wind tunnel test we ran at Northrop in the early 1960's.

Northrop also proposed a space trainer, a version of the T-38 dubbed the ST-38. It was tested in our 2' x 2' blowdown supersonic wind tunnel in Hawthorne circa 1963. Note the faired inlet and modified vertical tail. Wing looks strange in photo due to a leveling fixture installed.

The Air Force didn't appear interested in the T-38 version so the NF-104 served in the role as a space trainer.



Northrop ST-38 Space Trainer in 2' x 2' Wind Tunnel  
Photo: Fred Peitzman



Lockheed NF-104A Space Trainer  
Photo: Commons.Wikimedia.org

## High Altitude Teamwork

*Barry Tyson*

How high can it fly? That was the question from the USAF Strategic Air Command in the late '60s. The subject was the development of an Unmanned Air Vehicle to carry out strategic reconnaissance missions, undetected by radar, and too difficult for fighters to shoot down. Mission requirements were established with a goal of achieving 80,000 feet altitude and high subsonic speeds. The program was called "Compass Arrow" and a contract was issued to Ryan Aeronautical Company in San Diego for the airframe, and to GE in Evendale, Ohio, for the newly developed GE1 (later designated as J97) turbojet engine. Ryan had been working with non radar-reflecting shapes to reduce detection, and also had experience in high altitude drone operations. Flying high and slow in other programs, Ryan drones forced any high-speed aircraft in pursuit to have a difficult time at the low pressures, with the pilot fighting engine and afterburner flame outs.



AQM-91A Compass Arrow (*Photo: avionslegendaires.net*)

I joined Ryan in 1965 and was immediately assigned to develop the air induction system for the GE engine. The engine and air intake were top-mounted over the fuselage to provide shielding from ground radar. The USAF Aero Propulsion Laboratory at Wright-Patterson Air Force Base in Dayton established an Aircraft-Engine coordination program to expedite the flow of data and test results between GE and Ryan.

Engine-Airframe compatibility meant not only for hardware, but also to assure that the air induction system did not cause engine problems related to airflow distortion throughout the operating envelope. The next step was to run a wind tunnel test at NASA Ames to calibrate flow distortion at the engine face under various flight attitudes. GE had a vendor capable of creating a cast aluminum model at relatively low cost, and away we went. Meanwhile, the Propulsion Laboratory was working with the folks at the Arnold Engineering Development Center (AEDC) in Tullahoma, Tennessee, to explore the details of running a live engine test at simulated high altitude. The big concern was the lower limit of pressure that the engine required.

A decision to use the 16-foot diameter transonic wind tunnel at AEDC was made, together with provision for mounting and instrumenting a model of the aircraft fuselage with the engine installed. In order to simulate high altitude, the wind tunnel could be brought to near vacuum but temperature control was a problem because the air heated up and needed to be cooled. AEDC Engineering solved the problem by installing spray nozzles with both liquid nitrogen and liquid oxygen. Supplies were brought in from Huntsville on a railroad spur line.

## High Altitude Teamwork - Cont'd

*Barry Tyson*

The test program at AEDC was a novel experience for me. First, was the need to run from midnight to 5 AM because of the load on the electric grid (Tennessee Valley Authority). Next was getting used to eating every dinner at the Holiday Inn in Manchester (order the veal cutlet). Fortunately it was winter, so the trunk of my rental car served as a refrigerator for cold drinks and deli meats. The team at AEDC was fun to work with, although I never developed a taste for canned Vienna sausage at the 2AM “lunch” break. The GE rep was great, always helpful, and once had to drive 24 hours to Evendale and back to replace a bad fuel control.

The data from the previous night were always available the next day, and the program met all objectives. The engine and inlet combination worked great. Everyone was pleased. I made a decision to end each day’s running by backing off on the engine power setting to explore the blowout limits. This got me into hot water with the Air Force rep, since the engine was their baby, but years later they used my data for a Boeing program (thank you not necessary).

Another side of the story might be related to global peace efforts. In the May 2, 2022 issue of Aviation Week there was a notice about the cover that appeared in May 1972, featuring the AQM-91A Compass Arrow drones. The notice went on to mention that the goal of the program was to overfly the Chinese Lop Nur nuclear test site. However, the article went on to state that President Nixon called off overflights of China in mid-1971, as secret talks were held to normalize relations.

## SCHAF Trustees and Advisors

*Photo: WMoF*

Southern California Historical Aviation Foundation trustees and advisors attend Torrance Chamber’s State of the Region luncheon.



## Eagle Scouts

Photo: WMoF

Raphael Soliman works with his team on the BD-5 for their Eagle Scout Project.



## Celebrity Lecture Series

Photos: Bruce Guberman



**January Celebrity Lecture** featured two Northrop Grumman pilots delivering a highly popular presentation on **Aircraft Anomalies in First Article Aircraft**.

**February Celebrity Lecture** NASA Research Pilot, Kevin O'Mara, accompanied by Cindy Macha, prepare for the presentation of **SOFIA – Stratospheric Observatory for Infrared Astronomy**.



**March Celebrity Lecture** Museum Member Vietnam Veteran, Pat Carey, Director Cindy Macha, and Lt. Col. Howard Butcher, USAF, Retired, pose for picture before start of **Linebacker II** presentation.



# Celebrity Lecture Series

# SUB HUNTER

## Undersea Warfare from the Skies

**April 20, 2024**

**11 AM Lecture**



**CDR Jamie French  
USN**

**Executive Officer  
Naval Weapons Station  
Seal Beach**

**Coming May 18th**

**The 62nd Annual Torrance  
Armed Forces Day Flight  
Line Review and Parade  
Flyovers**



Join us to hear Commander Jamie French describe the role of the Anti-Submarine Helicopter in patrolling the deep. Participate in the tension and skill required to maintain the technological concentration required of these systems in high winds, turbulent seas, and pitching decks, on the destroyers on which the pilots need to recover after each mission.

Sponsored by



Museum Members Free  
Non-Members: \$15  
Free Parking Available in  
Museum Lot

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On YouTube**



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# ARMED FORCES DAY

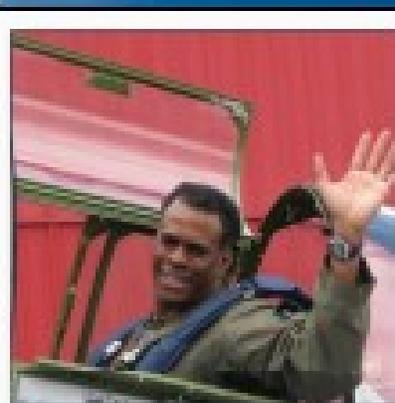


18 May 2024

11AM - 3PM



Thank You Jersey  
Mike's Subs South  
Bay & Los Angeles



Join us for the 62nd  
Torrance Armed  
Forces Day Parade  
Flight Line Activities



DOUBLETREE

Thank You  
Torrance  
Doubletree Hotel



Your \$8 admission fee will give you the opportunity to meet the pilots who fly these warbirds, ask questions, and witness the warbirds taxi out, line up in sequence and launch to fly over the parade starting at 1:15 PM.



Museum Members Free  
 Non-Members: \$8  
 Free Parking Available  
 in Museum Lot



3315 Airport Drive  
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 www.wmof.com




## Celebrity Lectures and Events

June 15, 2024 - **Where Tomorrow's Technology Is Taking Us** with *Ronald Sugar*, Uber Technologies Independent Chairman and former Chairman and CEO of Northrop Grumman

July 20, 2024 - **The Two Jackies - Jacqueline Cochran and Jacqueline Auriol, the World's First Supersonic Women** with *Lynn Jensen*, Northrop Grumman Project Manager, F/A-18 & F-5 Program

August 17, 2024 - **Joby Aviation - The New Uber of The eVTOL Industry** with *George Kivork and Brian Sandberg*

## Expanded Museum—Admission Donation Changes

We hope you have all had a chance to visit the museum since we have expanded into the hangars directly across from our original museum hangars and now have the ability to display a couple of our airplanes in the open space between. We're excited to be able to do that and for the space to have new and updated displays. We're also very happy for the new lecture/event space.

With this expansion, and the increased expenses that come with it, we have increased our adult admission donation to \$8. Kids under 12 are still free. This is still lower than most museums as we really want to encourage everyone to be able to visit. The admission for our Celebrity Lectures also increased to \$15. Our basic membership level of \$60 will be increasing later this year. We encourage everyone to take advantage of that rate to become a member or renew/extend their membership before the new rate takes effect.

## Become A Contributor

We know that many of you reading this are former members of Southern California's aerospace industry and may have some interesting stories and experiences from your careers. We ask you to consider sharing some of these stories with us, whether about a particular company's aircraft project/program or during the course of military service associated with one of the many aircraft types built in Southern California. We look to preserve these stories before they are lost to time.

Our mission is to preserve the histories of the aircraft built here in Southern California, primarily airframes in earlier times, for the defense of our nation, experimental research air vehicles, spacecraft and commercial airliners. **Lockheed** (Burbank, Palmdale); **Douglas/McDonnell Douglas** (Santa Monica, El Segundo, Long Beach), **Hughes** (Culver City, El Segundo), **North American Aviation/Rockwell/Boeing** (LAX, Downey, Palmdale), **Boeing** (El Segundo, Long Beach, Seal Beach), **Northrop Grumman** (Hawthorne, El Segundo, Palmdale), **Vultee** (Downey), **Consolidated/Convair/General Dynamics** (San Diego), **TRW/Northrop Grumman** (Redondo Beach), **SpaceX** (Hawthorne), **Robinson Helicopters** (Torrance), these amongst all the larger companies.

We look to the future as well, as history continues to be written with new initiatives and opportunities for further space exploration. We'll help to polish up the words if you are not a professional writer. Or it may simply be an interesting photo(s) with a caption added to tell the story. Please contact us directly via email: [info@wmof.com](mailto:info@wmof.com), with your thoughts and comments.

*The Western Museum of Flight honors and champions the Aerospace Industry Heritage of Southern California and inspires, motivates, and educates the dreamers and creators of today and tomorrow.*

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