

# aloft

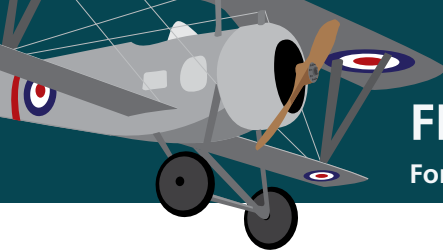
Volume 38, Number 3

May | June 2016

THE MUSEUM OF FLIGHT  
MAGAZINE

## the Long Journey to a Short Flight page 6





## FREQUENT FLYERS

For all events except those noted, please R.S.V.P. to [membership@museumofflight.org](mailto:membership@museumofflight.org).

### Flight Zone Reopens!

Saturday, May 7 | 9 to 10 a.m.  
*Flight Zone, adjacent to the Side Gallery*

Our kid-focused Flight Zone exhibit is reopening to the public after undergoing renovations. Members get the Museum all to themselves from 9 to 10 a.m. to be the first to enjoy the exhibit's new look! Drop in with your little ones for cookies, juice and fun activities—plus coffee for the grownups!—to celebrate *Flight Zone* being back in business. No R.S.V.P. necessary.

### Special Member Event: The Flavorful 40s, 50s, and 60s!

Saturday, June 11 | 7 to 9 p.m.  
*William M. Allen Theater & Weyerhaeuser Room*

Richard Foss, author of *Food in the Air* and *Space: The Surprising History of Food and Drink in the Skies* will take Museum Members on a culinary adventure through taste and time. Start the evening with a short lecture and signature cocktail, followed by a personalized tasting tour through the decades as we continue our celebration of the Boeing Centennial! Look out for an emailed invitation or visit our website for more details and ticketing information.



### Tip-to-Tail Tour of Air Force One

Saturday, May 14 | 9 a.m.

As part of the Centennial Weekend Celebration, aviation historian Mike Lavelle is giving Members a special "Tip-to-Tail" tour of Air Force One! Space is strictly limited to 20 participants. **R.S.V.P. to [membership@museumofflight.org](mailto:membership@museumofflight.org)**. Registered Members check-in at the entrance to the Airpark. Tour involves one hour of standing/walking and stairs to gain entry to the plane.

**ABOVE AND BEYOND**  
THE ULTIMATE INTERACTIVE FLIGHT EXHIBITION  
PRESENTED BY BOEING

**MEMBER PREVIEW**  
**FRIDAY, MAY 27**  
10 A.M. TO 4 P.M.

This highly interactive national traveling exhibition about the future of aviation is coming to The Museum of Flight!

Kick-off your long weekend with a visit to the Museum and preview *Above and Beyond* a day before it opens to the general public.

To learn more about *Above and Beyond*, visit [aboveandbeyondexhibition.com](http://aboveandbeyondexhibition.com)  
No R.S.V.P. necessary.

**AVIATION PAVILION**  
*Member Preview*  
**SUNDAY, JUNE 19**  
Noon to 4 p.m.

The long awaited opening of our brand-new Aviation Pavilion is here! This new structure doubles our gallery space and opens to the public on June 25th, but Members see it first at a special open-house preview on Sunday, June 19th from noon to 4 p.m.!

Groove to live music by Two Scoops Combo from noon to 3:00, immerse yourself in the exhibits of 18 airplanes, and chat with our docents about the unique aircraft on display.

No R.S.V.P. necessary.



### New to the Collection

Friday, May 20 | Noon to 1 p.m.  
*Northwest Aeroclub Room (Red Barn, 1st Floor)*

Museum of Flight Registrar Christine Runte will showcase a selection of donations to our collection made during the first half of 2016. She will also reveal some of the offers that were not accepted and explain why they were directed to other museums.

### The Gordon S. Williams Collection

Friday, June 17 | Noon to 1 p.m.  
*Northwest Aeroclub Room (Red Barn, 1st Floor)*

Supervisory Archivist, Amy Heidrick and Project Archivist, Ashley Mead, will discuss their project to inventory the Gordon S. Williams Collection. A founding member of The Museum of Flight, Williams was a noted Boeing official photographer and his collection is an essential part of the Museum's Photo Archives. We'll discuss Williams' career, the details of the inventory project and share interesting images from his collection.

## STEM starters

A monthly program series geared specifically for our youngest members! Children ages 3 to 5 and their co-pilots (adult helpers required) are invited to explore the wonders of aerospace during this fun, educational program. Space is limited to 12 families (one child/one adult per family) at each program. Please note that program content repeats every two months.

To attend, please R.S.V.P. to [membership@museumofflight.org](mailto:membership@museumofflight.org).

**Monday, May 9 AND Monday, June 13**  
10:30 to 11:30 a.m.  
*Northwest Aeroclub Room (Red Barn, 1st Floor)*

**NEW SESSIONS ADDED!**  
**Monday, May 23 AND Monday, June 13**  
3 to 4 p.m.  
*Northwest Aeroclub Room (Red Barn, 1st Floor)*

May and June are all robots! Join us for a robotics workshop where you will make and decorate your own jittering bug-bot.

### CONTACT THE MUSEUM

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**Wings Café**  
206.762.4418

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Questions or Comments?  
Email us at [aloft@museumofflight.org](mailto:aloft@museumofflight.org)

**On the cover:** The Museum's Boeing 727-22 prototype lands at Boeing Field after its historic final flight on March 2, 2016. (Francis Zera)



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In honor of Chief Curator Dan Hagedorn's retirement, a North American AT-6 Texan in flight; Dan's favorite aircraft. Date unknown. (The Peter M. Bowers Collection/The Museum of Flight)

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Smithsonian Institution  
Affiliations Program





"The miracle of flight still resides in her graceful wings and in her body, an airplane's heart beats still."

Boeing 727 Prototype Restoration Project Manager, Bob Bogash so eloquently summed up the vivacity, spirit and magnitude of our Boeing 727 during the commemorative ceremony following its March 2 final flight. It was a truly a historic moment! The Future of Flight at Paine Field in Everett, Wash. held a pre-flight ceremony while hundreds of enthusiastic fans and former 727 flight crew members awaited the plane's flight and arrival at the Museum. The plane received a heartfelt welcome when it

taxied directly into the Museum's parking area through a celebratory arch of water created by Boeing and King County fire trucks. It was incredible to watch the community of United Airlines pilots and flight attendants adorned in their retro uniforms flood the doors of the Side Gallery to welcome their beloved plane home. The event was well attended and attracted regional and national press. A testament to the zealous 727 fan community, its Commemorative Appeal raised over \$40,000 from 351 donors to support The Museum of Flight's mission to restore and conserve aircraft. I sincerely thank Museum staff, the 727 Flight Crew and the devoted team of restoration volunteers for helping make this final flight a huge success. Please read our special spread devoted to the history behind the Boeing 727 and the restoration effort on pgs. 6-9. And if you haven't had a chance to see the 727 up close and personal, make sure to stop by the Airpark for a tour.

*The Inspiration Begins Here!* Campaign continues to gain momentum; we are just 14% away from meeting our \$77 million goal. As part of the Boeing Academy for STEM Learning—one of the campaign's largest projects—two new immersive outreach programs have been developed for Big Picture Alternative School in Highline Public Schools: one for middle school students called Imagine, Invent, Innovate and another for high school students called Aviation & The American Character. Students are free to create, design and strategize in a collaborative environment while building critical thinking, writing and communication skills. Read more about this exciting campaign project on pg. 18. In addition, Connections—a free membership program for youth ages 5 to 18—is now in full swing. Connections is part of a larger educational initiative designed to inspire and prepare students for STEM (science, technology, engineering and math) education and career paths. Response to this program has been fantastic—13,000 youth have been enrolled thus far—and its launch has helped boost interest in many of the other fantastic education experiences the Museum has to offer.

Spring 2016 is truly an ideal time to flock to the Museum as we celebrate the opening of the new and improved Flight Zone on May 7. The renovated space will include high quality, exploratory play-oriented exhibits for eager young flyers and their parents to enjoy. If that wasn't exciting enough, right next door to the Flight Zone in the Museum's Side Gallery we welcome the much anticipated *Above and Beyond* traveling exhibit on May 28. A treat for the senses, *Above and Beyond* celebrates both the history and future of flight through a variety of immersive simulations, interactive design challenges, impactful stories of innovation and so much more. You won't want to miss the opportunity to fly like a bird, pilot a drone into the eye of a hurricane and create your own supersonic jet! The Museum launches full speed into summer with the imminent addition of the Aviation Pavilion—the new home to 19 of our most iconic commercial and military aircraft. We invite you to take part in "Paint the Ave to the Pav," a free community sidewalk painting project in front of the Aviation Pavilion. Come make your mark on June 19! The celebration continues with an epic Grand Opening on June 25 and 26. Fun giveaways, runway entertainment, live music and make-and-take crafts will be held all weekend in the fabulous new gallery. Festivities are free with Museum admission.

On a more bittersweet note, I am not looking forward to May's Friday the 13th. Putting superstitions aside, this is the day that our beloved Senior Curator and Director of Collections, Dan Hagedorn, will retire from the Museum. We will miss him dearly. His vast aeronautical wisdom is known around the world, and with his steady hand the Museum has become a better place during his eight-year tenure. Dan personifies a "gentleman and a scholar," and like a few of the great planes in our collection, "they don't make 'em like that anymore!" We salute you, Mr. Hagedorn, and wish you a happy and healthy retirement! Please read our tribute to this incredible man on pg. 19.

This spring and summer are shaping up to be busy ones, from fantastic fly-ins to the Fabulous Fifties Boeing Centennial Celebration, our runway is packed with some of Seattle's freshest features! Hope to see you in the new Aviation Pavilion!

Sincerely,

Douglas R. King, President and CEO

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## Spring is in the Air

Just in time for Valentines Day, the Museum hosted a heartfelt airlift on Feb. 13 with Wings of Rescue—a non-profit organization committed to saving the lives of shelter dogs and cats that are facing death by transporting them from over-crowded shelters to shelters that are under populated. 200 at-risk dogs and cats from California and Oklahoma boarded seven airplanes (covered with hearts) and arrived to the open arms of shelter reps and Museum staff and volunteers. Despite the dreary northwest weather, Museum visitors welcomed and applauded the transfer of our furry friends to local shelters offering the pets for adoption.

With more craft brews than ever before, and adventurous tastes such as pineapple cider and peanut butter stout the 14th Annual Hops and Props on Feb.27 was quite a hit! Thanks to Spiegelau—a specialized beer glassware company—VIP visitors explored the nuances of various types of beers. All in all, it was a fabulous evening and a fun way to support our mission and vision.

Women Fly! 2016—The Museum of Flight's annual event for young women in middle and high school interested in aviation and aerospace careers—was a huge success this year with motivational speakers such as South Korean Soyeon Yi on March 24 and University of Washington scientist Melania Guerra on March 25. Girls were invited to participate in a day of inspirational and career-oriented activities that will allow them to meet and learn from professional women working in a variety of aerospace-related careers.

**Clockwise from top:** Astronaut Soyeon Yi explains the importance of teamwork to a group of young women. • (Ted Huetter) An eager Hops and Props visitor enjoys a tasty brew next to the Douglas A-4F Skyhawk II. (Rachel Dreeben) • Adorable puppies prepare to be transferred to local animal shelters. (Ted Huetter) • A pair of Women Fly! students practice a team building challenge. (Ted Huetter)



# the Long Journey to a Short Flight

On March 2, 2016, the Museum's Boeing 727 prototype, N7001U, was flown one last time. It was a brief trip, a 15-minute hop from Paine Field, Everett, to the Museum at Boeing Field, but it was a very long journey to its permanent home at the Museum. This unique jet, originally called E1 at Boeing, had not been airborne since it was donated to the Museum by United Airlines in 1991. It had been under restoration ever since by volunteer crews at the Museum's Restoration Center and Reserve Collection at Paine Field. First flying in 1963, the sleek, innovative 727 introduced the jet age to millions of new passengers around the globe. Now it will kindle memories and create new ones as a testament to times gone by.

By: Ted Huetter, PR Manager and Ted Young, Volunteer at The Museum of Flight

It may come to a surprise that the Boeing 727—the first commercial airliner program to complete a twenty-two-year production run and sell more than 1,000 airplanes—was considered quite the gamble. The Boeing Company was convinced that the future of commercial air travel was in jets. Jet airplanes were both more efficient and faster than piston-powered airliners. This combination promised savings in time for passengers and lower operating costs for airlines. The Boeing 707 and its rival the Douglas DC-8 were designed for longer range, intercontinental air travel, but these big and heavy four-engine jet airliners required longer runways for take-offs and landings, limiting their ability to serve medium and short-range routes between cities that had shorter runways. Boeing was faced with the challenge to design an airplane that could combine the short field performance and handling qualities of piston-engine airliners with the high speed of a jet airplane. The design had to allow for operations with a full payload out of airports with runways five to six thousand feet in length, but with enough power to climb quickly to high altitudes for high speed cruise, and fuel for a range of around 1,500 miles. As if this challenge was not enough, the design would also have to be built for multiple take-offs and landings during a working day, operating in all weather with a quick turnaround and low operating costs. Could Boeing design an airplane that could meet these demanding requirements? And, would it be the right airplane for the market?

After three years of design studies, the Boeing Model 727 achieved project status in 1959 with Jack Steiner as Project Manager who assembled a team of talented engineers to resolve the complex design issues. The greatest challenge was the design of the wing; the airplane needed to combine low speed performance and handling qualities with efficient cruise at higher speeds and altitudes. Boeing combined these attributes by using a swept wing similar to the wing on the Boeing 707 with special high lift devices—leading edge slats and Krueger flaps on the front of the wing and triple-slotted trailing edge flaps— that were used for the first time on a Boeing airliner.

Engine configuration was another headache; some customers wanted four engines for added safety and performance at higher elevations, while others wanted two engines for lower operating costs. Boeing compromised with three engines, and after testing many different configurations placed all three Pratt & Whitney JT8D engines in the rear of the airplane—two in pods on either side of the fuselage and one buried in the tail. To ensure good handling qualities, the Model 727 employed fully-powered flight controls, another first for a Boeing airliner. The project team adopted the same fuselage dimension as the Model 707, with the first 727 model accommodating up to 129 passengers in mixed class configurations. To facilitate operations from smaller airports, the Model 727 had its own auxiliary power unit and self-contained stairs at the rear of the airplane.

Boeing formally announced the Model 727 on December 5, 1960, with orders of eighty aircraft from United Airlines and Eastern Air Lines. The prototype 727, N7001U, built for United Airlines, made its first flight on February 9, 1963, with Boeing test pilot Lew Wallick at the controls. Following extensive testing, Boeing sent the prototype on a world tour to drum up more business, covering 76,000 miles and visiting 26 countries. The Boeing 727 made quite the splash, and by September 1972, total orders reached 1,000, setting the sales record for commercial airliners. A Boeing sales brochure from 1979 noted that every 5.6 seconds a 727 took off or landed somewhere in the world, while over the course of one week the world's fleet of 727s flew more than 3.5 billion passenger miles between 1,889 city pairs in 96 countries. The final Model 727, a 727-200F for FedEx, was delivered in September 1984, the last of 1,832 727s built at Boeing's Renton plant.

The Museum is privileged to have the 727 prototype in its collection. The Model 727 aircraft entered service with United Airlines on October 6, 1964 and flew in revenue service for nearly 27 years. During that time the airplane accumulated 64,495 flight hours and carried an estimated three million passengers. In 1984, the Museum of Flight's Chairman of the Aircraft Acquisition Committee, Bob Bogash,



approached then-United top managers Ed Carlson and Dick Ferris, and asked for the 727 upon its retirement. United agreed. On Jan. 23, 1988 the airplane was present during an official Museum ceremony a few years before it was retired. On Jan. 13, 1991, the airplane—repainted in its original United colors—flew revenue trip 838 SFO-SEA, and was then ferried to Boeing Field for a final acceptance ceremony at the Museum. It made one last stop to the Museum's Paine Field Restoration Center. Bogash, a Boeing Company veteran of 30 years, became the 727 restoration project manager.

United removed many of the major parts on the airplane, to use as spares for its remaining fleet of 727s. The Museum was left with a significant challenge with its goal to restore the airplane to airworthy condition. After a few idle years the restoration began in earnest, and grew significantly with the donation of two more 727s for parts. On March 6, 2004, FedEx donated a 727-100 airplane to the Museum, and in September 2005, Clay Lacy donated a 727-200.

For the past 25 years, dozens of enthusiastic volunteers have helped bring the plane back to life. Terry "TC" Howard, a retired Boeing engineer who was part of the plane's original team at Boeing, has led the restoration effort as crew chief for the past 10 years. FedEx has been a long-time partner on the project, and last year donated the engines for its final flight. Aviation Technical Services (ATS) provided the plane and crews with a new work space for its last couple months at Paine Field. Our vendors were incredibly supportive of the project. We hired Global Jet Painting—the group who painted our 747 in 2014—to repaint the 727 in the United livery; SOAR was contracted to be the primary technical entity to complete the restoration for the ferry flight, and began this final, crucial phase in January of this year. And sometimes we just had to buy a thing or two over the past couple decades. But restoration of the 727 was overwhelmingly, remarkably, and decidedly accomplished because of volunteers. Their expertise and equipment for the huge project was

international, and from all walks of life.

The last flight, flown under an FAA Special Flight Permit, was commanded by Tim Powell, a pilot who is type-rated in almost all the Boeing transports, and currently serves a captain for Vallejo Corporation, a company that provides 727 VIP transportation. The First Officer, Mike Scott, and Flight Engineer Ralph Pascale, also fly for Vallejo Corporation. Rounding out the crew on the ferry flight as Safety Officer was the Museum's 727 restoration project manager, Bob Bogash. They were the only persons onboard, yet in another way, every one of its 100 seats was filled with the hearts and souls of the volunteers who made the flight a reality.

The countdown to the final flight was followed anxiously by fans from around the world. The Museum's social media posts reached new highs, Boeing groups became 727 groupies, past and present United Airlines crews were 'onboard,' and project manager Bob Bogash said that his internet service provider was complaining that the daily updates on his website were getting so many hits they were crashing their systems.

The final flight was—in the supremely unemotional jargon of the flight test world—"uneventful." She flew well and looked grand. The landing was sweet. She was welcomed by hundreds of anxious fans at the Museum. Many of them were former United flight attendants and pilots with a personal attachment to the 727. When E1's engines were shut down after landing, it was not just the airplane that grew silent, the crowd was choked up.

Over the years we have been asked, "why all of this time, expense and trouble to make a 15-minute flight? Why not just truck it?" The reason is hard to define. It falls outside of the bottom line and it links directly to the heart. The volunteers knew it all along. And that's what makes it worth it. This airplane got a heart transplant, and that's what made her fly.



(Jim Larson)

### THE 727 RESTORATION CREW MEMBERS THROUGH THE AGES:

Ingrid Abendroth	John Brown	Al Horne	Lawrence Litchfield	Scott Shurtleff
Grey Clark	John Budig	T.C. Howard	David McKee	Marabelle Smith
Nathaniel Coates	Bill Bush	Steve J. Huemoeller	Ross Michel	Simon So
Morgan Barbour	David Capodilupo	Barb Hyde	Jim Munneke	Tim Spencer
Ralph Bernard	John Catanzaro	Irving Jenson	Landon Nye	Rich Stein
Ryan Best	Jim Chasteen	Richard Johnson	Lawrence Pintor	Lee Umsheid
Megan Betts	Dan Dilgard	Renee Lachman	Dale Rantz	Bruce Sutherland
Bob Bogash	Dana Dilgard	Andrew Lease	Liz Ryker	Jon Vernier

### WE THANK THESE INDIVIDUALS WHO HELPED WITH THE PROJECT IN MANY DIFFERENT WAYS:

Jim Adams	Richard Ciervo	Dave Kidney	Gary Pugh	Tomas Stubbs
Tim Adamson	Larry Cotton	Mo Kidney	Rod Randall	David Sutton
Rusty Aimer	Jeff Dabbs	Leo Kojlbacher	Al Rico	Jerry Titus
Jeff Akridge	Bill Daniell	Joy Krauss	Mitchel Rigby	Dave Tripld
Guy Amico	Gabe Doleac	Tanya Kriese	Brandon Rimerman	Dave Waggoner
Phillip Arroyo	Dick Ferris	Mike Lacy	Andy Rish	Becky Wallick
Mike Atchison	Kenn Finister	Clay Lacy	Si Robin	Perry Watkins
Dale Baker	Bob Flores	Jessica Lowry	Ralph Roppo	Douglas Weeth
J. David Barnes	Ed Graham	Brandon Maus	Gerry Rouillard III	Terry Wilcoxson
Jeff Bohnet	Jim Grogan	Stephen McNally	Alan Schlosser	Gary Williams
Jeff Bongard	James Havers-Strong	Gordon McKinzie	Mike Scott	David Wittrig
Terry Buck	Michael Haynes	Chris Merry	Thom Sena	Brien Wygle
Jenks Caldwell III	Jackie Heal	Dennis 'Denny' Middlesworth	Steve Shataka	Matt Yerbic
Gabriel Campanario	Richard Hickson	Anthony Miele	Kayle Shulenberg	
Rick Cannon	Richard Joseph	Tom Moore	Jan Simpson	
Ed Carlson	Dave Jones	Eric Mortensen	Cari Smith	

### AND FINALLY WE THANK THE FOLLOWING BUSINESSES WHOSE GENEROUS SUPPORT MADE THE 727 RESTORATION POSSIBLE:

<b>Pratt &amp; Whitney</b>	Aviation Technical Services, Inc.	Global Jet Painting	Triumph Group, Inc.
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## Curator's Corner

Your questions answered  
by the Museum's Chief Curator,  
Dan Hagedorn.

### Q: What's your most adventurous flying story? Rachel D.

A: For me, and I suspect for others, there are so many that I have trouble picking several that really might mean something to someone other than yours truly! Certainly May 10, 1962 (my 16th birthday) will always be etched indelibly in my mind. It was my solo day at Riverside Field in Zanesville, Ohio in a 1947 Cessna 140 (N3001N which, to my astonishment, still exists and is owned by a gentleman in Ketchikan, Alaska!). Looking back on it, I think it was the first day of my life that I felt truly 'awake' in every sense, with the awareness that if I screwed it up, there was not a soul on the planet that could help me. Teenagers are notoriously invincible, but for me, it was a personal epiphany. My IP, Chuck Norman (a WWII B-24 Liberator pilot) wrote, "Good job Dan!" in my log book, and for me, that was high praise indeed. They cut the shirt tails off my shirt and hung them in the small hangar owned by the FBO, a tradition that I hope still survives, although the hangar (and my shirt tails) are long gone. Then fast forward six years and a few months to Fort Kobbe in the former Panama Canal Zone. As a young Area Intelligence Specialist, I was slated to make an early morning flight from Fort Kobbe to the remote WWII era bomber base at Rio Hato, Republic of Panama, some 80 miles to the west. My 'ride' was a two-seat US Army Southern Command, Army Aviation Detachment Bell OH-13H helicopter which, on a good day, had a range of about 215 miles at a blistering 80-90kts or so. In December in Panama there is an early morning weather phenomenon that takes place that has to be seen to be truly appreciated. A huge, nearly flat cloud mass, with a rounded 'leading edge,' moves in off the Pacific and effectively cloaks the jungles and extremely rugged terrain between the Canal Zone and points westward in what looks like a

nearly flat and impenetrable mass. The Warrant Officer pilot and I took off and headed directly west, hovering on our flying carpet just above the cloud mass for nearly an hour. The OH-13H had only basic flight control instruments but, at almost precisely the 60-minute mark, the cloud mass abruptly ended and, there, directly ahead and slightly to the north, was Rio Hato. Other pilots will understand that, during that hour flight, we felt like we were completely isolated from the rest of the world. It was thrilling, especially knowing that, below that cloud mass was nothing but trackless and very hostile jungle, and only the two-lane ribbon of the Inter-American Highway somewhere below, wending its way westward and, eventually, northward.



(Dan Hagedorn)



(Dan Hagedorn)

### Q: What's the smallest item you have in your collection that has the most significance? Darius Z.

No doubt about it Darius, the smallest artifact that we have is a tiny, 1/16th (.0625) inch diameter carved white ivory elephant, one of 100 carried to the Moon by astronaut Michael Collins aboard Apollo XI – about the size of a small eraser on your pencil. These were then presented to MSC staff who participated in the design and building of the spacecraft's flight hardware. Accession Number 1988-1-22/3, the exquisite object was donated to the Museum by Mr. Woodrow W. Wilson in 1988 and is stored in a very secure place!

**Attention Readers:** This is the final Curator's Corner from the Museum's Chief Curator, Dan Hagedorn. After 27 years serving in the Armed Forces and a 28 year career in curation, Dan has decided to retire and spend more time with his family. Please see page 19 for a farewell tribute to our beloved Curator.

### Q: Why do some planes have vapor trails and many don't? - Tina W.

A: Commonly called "contrails," a short-hand version of "condensation trails" or vapor trails, these are tiny particles of water vapor and engine exhaust that form into ice crystals at the high altitudes that these aircraft are flying. They are very dependent on the actual temperature and humidity at the altitude where the contrails form and sometimes are visible for only a few second or minutes or, in some extraordinary instances, might persist for hours and actually spread to be several miles wide, even sometimes resembling natural cirrus or altocumulus clouds. They usually (but not always) form at between 25,000 and 40,000 feet (7,500 to 12,000 meters). Some scientists sometime refer to them as "aviaticus cloud." The grounding of all aircraft in the United States as a result of the events of September 11, 2001 ("9/11") provided scientists with a rare opportunity to study the effects of contrails on climate. Measurements showed that, without the contrails, the local diurnal temperature ranges (that is, the difference of day and night temperatures) was about 1.8 degrees Fahrenheit (1 degree Celsius) than immediately before; however, it was also suggested that this was due to unusually clear weather during the same period. You might like to know that there is another, rather rare phenomenon known as a "distrail (or dissipation trail)," which takes place when an aircraft passes through a cloud and clears a path through it. The plane's warm engine exhaust causes existing water droplets to evaporate, leaving a clear wake through an otherwise cloudy sky. See if you can spot one of these some time!

Have a question for the curator? Send an email to [aloft@museumofflight.org](mailto:aloft@museumofflight.org) with your name and question. It may be featured in the next Curator's Corner!

# May FLIGHT PLANS



Thursday, May 5 | 5 to 9 p.m.

T.A. Wilson Great Gallery

### Wells Fargo Free First Thursday: SPACE DAY

Join The Museum of Flight as we celebrate Space Day—an internationally recognized educational event. Local science and astronomy clubs will share their telescopes with the public; viewing opportunities include solar activity and the night sky. Families can attend planetarium shows and other educational activities.



Saturday, May 7 | 2 to 3:30 p.m.

William M. Allen Theater

### Golden Age of Model Rocketry

Join Lee Piester, founder and President of Centuri Engineering, in a nostalgic retrospective of the golden age of model rocketry. Formed in the early days of the space race, Centuri Engineering launched the careers of engineers, scientists, and astronauts alike through the hobby of model rocketry. Lee and Betty Piester join fellow rocketry pioneer Bill Stine to discuss this exciting chapter of space history.



Saturday and Sunday, May 14 and 15  
11 a.m. to 4 p.m.

Museum-wide

### Celebrate the Fabulous Fifties

The Jet Age arrives with a Tex Johnston-style tour of Boeing Red Barn favorites! Seattle's love affair with *Dick's Drive-In* pairs deliciously with a fifties "fly-in" movie and vintage TV marathon. Go ape for swept wing technology, Air Force One, retro candy, and a "Sputnik, Shot Into Space Tang™" toast to famous space animals including Laika—the legendary Soviet space dog.



Calendar subject to change.  
Visit [museumofflight.org](http://museumofflight.org) for updates.



Saturday, May 21 | 10 a.m. to 5 p.m.

East Parking Lot

### American Heroes Airshow

Learn how helicopters play an important role in law enforcement, fire service, public safety, communications, national defense, and homeland security. The American Heroes Air Show features static displays, special presentations and entertainment. Representatives from many organizations including local flight schools, police, Search & Rescue units and the U.S. Coast Guard will be available to answer questions. Come early to watch helicopters land! For more information on the event, visit [www.heroes-airshow.com](http://www.heroes-airshow.com).



Saturday, May 21 | 11 a.m. to 12 p.m.

William M. Allen Theater

### U.S. Customs and Immigration Services Naturalization Ceremony

In conjunction with the American Heroes Airshow, U.S. Citizen and Immigration Services will host a naturalization ceremony for members of the military, first responders and aviators who have applied for U.S. citizenship. The public are welcome to attend this moving patriotic event and witness people achieve their dreams of citizenship.

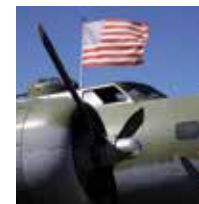


Saturday, May 28 | 2 to 3:30 p.m.

William M. Allen Theater

### Ask the Astronaut

Astronaut Tom Jones answers every question you have ever had about space in "Ask the Astronaut." Jones is a planetary scientist, space consultant, author, and NASA astronaut who completed four space shuttle missions and three spacewalks. His presentation focuses on what it's like to live, work, and explore space. Jones will then sign copies of his book and help us launch the new Above & Beyond exhibit.



Monday, May 30 | 10:30 a.m. to 12:30 p.m.

East Parking Lot

### Memorial Day Program

The Museum of Flight honors military service on Memorial Day. This ceremony will feature a performance by the Boeing Employee Concert band. Veterans and active U.S. Military personnel receive free admission to the Museum with identification.

THE MUSEUM OF FLIGHT  
North American AT-6C Texan





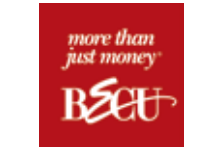
**Thursday, June 2 | 5 to 9 p.m.**  
T.A. Wilson Great Gallery  
**Wells Fargo Free First Thursday:  
Seattle MS Science and  
Engineering Fair**

The Museum of Flight is proud to host the Seattle Public Schools Middle School Science and Engineering Fair. Students in grades 6-8 complete a research-based project that either answers a scientific question or solves an engineering problem. Exemplary projects compete as finalists and will be displayed and judged on June 2. Projects will be available for public viewing once judging is complete and all are invited to attend the awards ceremony.



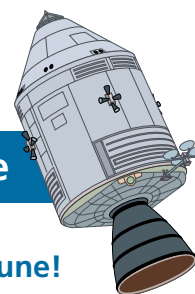
**Saturday and Sunday, June 11 and 12  
11 a.m. to 4 p.m.**  
Museum-wide  
**Centennial Celebration:  
Welcome to the Sixties**

The Space Age dawned at Seattle's World's Fair! Engage with stories of Ham the Space Chimp, astronauts, and our Saturn V model. Revel in the rise of luxury air travel with Pan Am crews, tasting menus, and lectures from Food Aviation Historian and author Richard Foss. Chinook helicopters and Vietnam pilots share the saga of this era of extremes.



Calendar subject to change.  
Visit [museumofflight.org](http://museumofflight.org) for updates.

## Weekly Aerospace Update



**Every Saturday in May and  
every Wednesday & Saturday in June!**

Charles Simonyi Space Gallery | 1 p.m.

Get the latest news in astronomy, aviation and spaceflight from our own experts. Every Saturday at 1 p.m., a Museum Docent or NASA Solar System Ambassador leads a 15-minute chat about the week's events and discoveries. Q&A to follow.



**Saturday, June 18 | 2 to 3:30 p.m.**  
Charles Simonyi Space Gallery  
**NewSpace Conference:  
Industry Insider Mini Talks**

Hosted by the Space Frontier Foundation, NewSpace is a three-day conference focusing on the current, near term, and future issues and challenges in commercial space and is attended by members from all sectors of the space industry. The Museum welcomes guests from the Space Frontier Foundation for a series of lightning, "TED" style talks celebrating the hottest topics in new space exploration!



**Thursday, June 30 | 10 a.m. to 4 p.m.**  
Alaska Airlines Aerospace Education Center  
**Asteroid Awareness Day**

Incoming! Asteroid Awareness Day is a global movement where people learn about asteroids and what we can do to protect our planet through fun activities and live stream lectures. Asteroid Awareness Day is held on the anniversary of the 1908 Siberian Tunguska event, the largest asteroid impact on Earth in recent history.

## THE MUSEUM OF FLIGHT MEMBERSHIP

**Spring  
Special**  
3 Months Free!

**Celebrating Moms, Dads, Grads  
and anyone in between!**

Give the gift of Membership at the Navigator, Aviator, or Captain level and receive an additional 3 months of membership, free! That's 15 months of exclusive Museum access for the price of 12.

**Sign up at the Museum or call our office at 206.768.7139.**

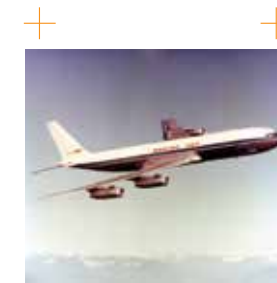
\*Special applies for first-time Members and recipient must be a 3rd party. Offer good through 6/20/16.

# WEEKEND FAMILY WORKSHOPS

Programs made possible by **Bank of America**

Every Saturday and Sunday from 11 to 11:45 a.m. and 1 to 1:45 p.m., unless otherwise posted.

Explore the exciting world of flight in fun hands-on workshops offered every Saturday and Sunday! Family workshops are free with Museum admission and open to all ages (kids six and younger should come with an adult helper). Contact our Interpretive Programs Coordinator at 206.768.7187 with any questions.



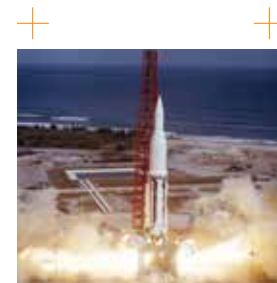
**Boot Scootin' Jets!**  
May 1, 7, 8, 14, and 15

In 1955 Tex Johnston barrel rolled the prototype of Boeing's 707 over Lake Washington. Four years later the Boeing VC-137B, a 707-120 became the first Air Force One. Hear these exciting stories before creating your own plane.



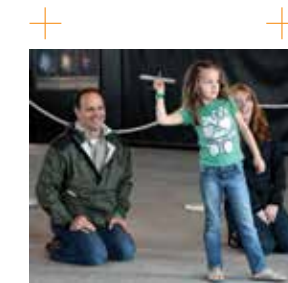
**Pushing the Envelope: the X-15**  
May 21, 22, 28 and 29

In the early 1960's, a new generation of test pilots went into space in the X-15 experimental aircraft to find out the limits of human endurance. Learn about this break-through project that paved the way for all future space travel. Then design your own X-15 aircraft.



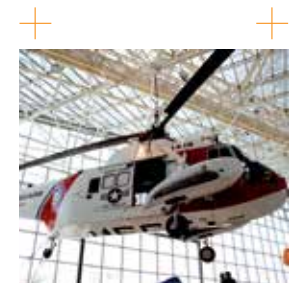
**Saturn 5: Rocket to the Moon!**  
June 4, 5, 11, and 12

The 3-stage rocket that carried U.S. astronauts to the Moon stood higher than the statue of Liberty! Learn about the creation of the Saturn 5 and its successful missions to the Moon. Then build your own 3-stage rocket model!



**The Incredible Edible, High Flying  
Father's Day Fun Flyer Fest!**  
Sunday, June 19 | 11 a.m. to 2 p.m.

No, your eyes are not playing tricks on you. It actually says EDIBLE! Give your dad a version of the 'sweetest' plane in our collection. This is a plane that you have to see and taste to believe.



**Hovering Helicopters**  
June 18, 25, and 26

Did you know Leonardo da Vinci had an idea for a machine like a helicopter? Join us as we learn about these amazing flying machines, including the museum's very own Sikorsky (USA) HH-52 Seaguard. Then construct several helicopter models of your own.



\$20/participant  
\$15/Members  
Ages 10+  
(14 and under must be accompanied by an adult)

**Test out your pilot skills in Flight Club!**

Join us for weekends in March for a one-hour experience in the Aviation Learning Center and see if you have what it takes to become a pilot. Inspect a real Cirrus SR20 for safety, plot your course, and take off into the sky in our professional-grade simulators.

Register day of in the Alaska Airlines Aerospace Education Center. Questions? Send an email to [alc@museumofflight.org](mailto:alc@museumofflight.org).

## TAKE A TRIP TO MARS!

\$20/participant | \$15/Members  
Ages 10+

Every weekend in March, experience a one-hour simulated space mission to Mars in our John Fluke, Jr. Challenger Learning Center. Get a taste of real astronaut training as you experience the final phases of a nine-month journey to the Red Planet. You'll work as a team as you fly the final approach and ride the hair-raising 7 minutes of terror to the surface.

Register day of in the Alaska Airlines Aerospace Education Center. Questions? Send an email to [clc@museumofflight.org](mailto:clc@museumofflight.org).



## Getting the Big Picture

By: Louisa Gaylord, Campaign Communications Coordinator at The Museum of Flight

Just like The Museum of Flight, Big Picture Schools take an alternative approach to the traditional classroom structure found in most public schools, incorporating project-based, experiential learning and internships into their science, technology, engineering and math (STEM) curriculum. Big Picture middle and high schools are the testing sites of a new Museum outreach education program. Museum educators work with small groups of Big Picture students; in middle school to explore what it means to be an innovator, and in high school to discover how the history of aviation has shaped the American identity.

The Museum of Flight gives 21st century learners exclusive access to a learning laboratory of resources, artifacts and tools to enhance their academic development. The Big Picture classes teach students that they are in control of what they create and learn, and to elaborate on existing ideas to produce something new. "Students oftentimes take 'educational' and 'boring' and lump them together in the same category," says Arthur Bednar, Museum educator. "We want the students to realize that education can also be fun."

"Offering these two educational programs to Big Picture Schools is part of a larger initiative with Highline Public Schools to accelerate opportunities for youth and connect them to fulfilling, in-demand STEM careers," says Museum's Vice President of Education and Raisbeck Aviation High School founding principal, Reba Gilman. "We are committed to providing a pipeline of qualified workers that will keep our economy strong for generations to come."

"When we started the elective class, none of the [middle schoolers] really saw themselves as an innovator," says Bednar. "They saw innovation as this big event that changes the world, but it's more personal than that. We see innovation every day."

The twelve-week classes use robotics, Rube Goldberg machines, film, writing projects, self-portraits and field trips to the Museum to foster students' curiosity in the world around them. They learn how to design space suits and gliders, and visit Raisbeck Aviation High School to meet with current students and alumni. The program's goal is to build on the students' individual interests – everything from sports, 3D printing, found objects, art and Minecraft – and show how innovation and creativity are a fundamental part of their everyday lives.

"It was great to watch the transformation of the students over the program, one young woman in particular!" says Museum educator Megan Buff. "She signed up for a chance to hang out with her friends, but by the end of

### AMOUNT RAISED TO DATE FOR \$77 MILLION GOAL:

\$66 MILLION

the twelve weeks, she was one of the most enthusiastic participants in the program." The Big Picture High School students used the Museum's J. Elroy McCaw Personal Courage Wing to analyze the meaning of courage, improve their writing and revision skills and examine how the pioneers of aviation have contributed to the American character. "My opinion has changed about how I look at recklessness and courage," says one learner. "The assignment has made me more self-aware of when I'm being reckless or brave. I understand the difference now." Another student adds, "I thought it would just be about airplanes, but it was more about thinking about the heroes who flew them."

"Students learn to think of themselves as innovators, while expanding their knowledge of history and science through meaningful, hands-on projects," explains Big Picture Middle School teacher Jessie Towbin, "Arthur [Bednar] and Megan [Buff] opened up new worlds for our students and helped them to see new possibilities for their futures."

The partnership with Big Picture Schools is part of The Museum of Flight's Boeing Academy for STEM Learning, which is powered by the Museum's \$77 million *Inspiration Begins Here!* Campaign. The comprehensive fundraising efforts will expand educational opportunities across the Museum, including more long-term, immersive outreach programs. In addition to the Boeing Academy's expansions, *Inspiration Begins Here!* is making it easier for students to turn their current energies into real-world opportunities. Although the Big Picture Schools program was a test run, Museum educators were enthusiastically invited back again. "We just try to spark an interest," says Bednar.

It seems to have worked; one participant says, "I learned that nothing is impossible. It doesn't matter if you are a boy or a girl. Just do it."



(Ted Huetter)

# AVIATION PAVILION

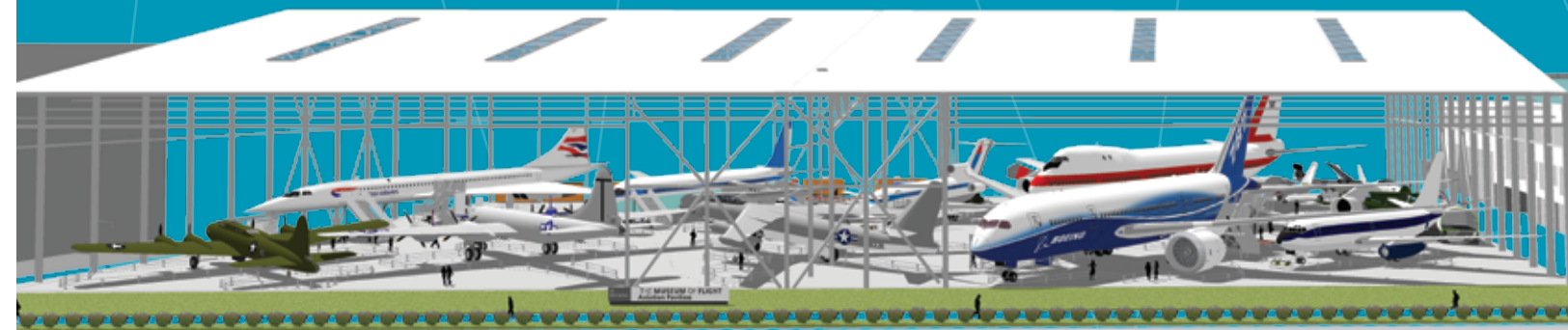
## Grand Opening Weekend

June 25 and 26, 2016

Open 9 a.m. to 8 p.m.

Celebrate the opening of the Aviation Pavilion, a stunning covered gallery featuring 19 of our most iconic commercial and military aircraft. Join us for fun giveaways, runway entertainment, make-and-take crafts and so much more for the family to enjoy!

*Festivities run all weekend. Free with Museum admission.*





**VOLUNTEER PROFILE**

# STUDENTS IN THE WINGS

By: Megan Buff, Onsite and Outreach Educator at The Museum of Flight

Every week, the J. Elroy McCaw Personal Courage Wing comes alive with the chatter of trench soldiers, balloon observers and fighter pilots. High school students in era-appropriate costumes take their places, ready to tell Museum visitors about life during World Wars I and II. These students volunteer at The Museum of Flight as part of their internship with Big Picture Schools.

Big Picture Learning was established in Rhode Island in 1995 as a way to encourage students to take responsibility for their own education. As part of the Big Picture model, students spend class time working at internships in the community. Students are encouraged to connect their internship experiences to classroom learning in competencies such as communication, science and social studies. Each quarter, they complete projects that exemplify this real-life/school connection. These projects allow them to nurture their own interests, showcase their talents and help develop the Museum's programs. Currently, five Big Picture students have pursued internships at The Museum of Flight.

Beau Cannon, a junior at Big Picture School (BPS) in Burien, was the first to volunteer with the living history program. After a year in the Airpark, he wanted to branch out into other areas of the Museum that encouraged him to be creative while maintaining an educational role. Living history was the perfect fit. Beau enjoyed his internship so much that he encouraged his friends to join the living history program as well. Beau's current project involves researching the effects of PTSD and shell shock, and incorporating what he learns into his portrayal of living history characters.

Caleb Lundeen, another junior at BPS Burien, spends much of his time at the Museum portraying a World War I balloon observer. As a re-enactor, he brings a wealth of historical knowledge and dedication to historical accuracy. His presentations provide a "window in time" for visitors, and he enjoys the challenge of developing these presentations. He would like to join the military as a medic, and loves opportunities to speak with our military veteran volunteers about their service.

Nick McCombs is also a junior at BPS Burien. He is pursuing a private pilot certification, and plans to attend a flight camp this summer. In his spare time, he can often be found testing his piloting skills in one of the Museum's many flight simulators.

Dante Novito is a sophomore at BPS Burien. His current project is focused on researching and developing a living history character from the Vietnam War era. This character is of personal interest to him, but also fills a void in our Museum's living history program.

Lastly, Nicholas Mesquita attends Big Picture School in Bellevue. He has a family aviation legacy, as his father works at Boeing. He recently completed a portrayal of an early Boeing factory worker, which ties in nicely with the Museum's celebrations of the Boeing Centennial. Through living history, Nicholas is able to connect with his family as well as our local heritage.

For these students and for our visitors, living history does in fact make the past come to life. Portraying historic characters gives students agency over their learning, an engaging process that allows them to apply their historical knowledge. "Traveling through time" also encourages them to think critically about how history shapes their lives today.



## Dan-ecdotes

Treasured memories from Museum staff.

*Dan and I started working at the Museum at just about the same time—winter, 2008. I was the new kid in town, a Californian for gosh sake! So naive I thought "Seattle chill" referred to the weather. Dan came from DC, and started a month after I got to town; but he was the one who immediately made me feel at home here. As the PR Guy, I have had to subject Dan to countless interviews with people from around the world. The reporter, be they cub or seasoned, local or national, always left feeling they were getting the straight story, from the most knowledgeable and genial source possible. What they also got was something they never expected—the feeling that they were home.*

- Ted Huetter, Public Relations Manager

*Every day, Dan has a can of tomato juice and a packet of peanut butter crackers for lunch...and that's it. The collections and exhibits staff worry about his dining habits or lack thereof.*

- Geoff Nunn, Adjunct Curator for Space History

*I have asked Dan to talk at many events over the years. Some very early in the morning, late at night and even on weekends. He has never said no. I think of Dan as the Father of our Museum. I wish him the very best, but I am really going to miss him.*

- Bette Russo, Private Events Coordinator

*I will miss Dan's storytelling. I am always excited to read his answers for Curator's Corner for every new issue of Aloft. It's amazing the way his answers capture your attention and make you experience the awe of flight. I will miss you dearly Dan.*

- Julie Wilbert, Creative Services Manager

*One of Dan's favorite questions is, "What's your favorite airplane?" He asks it to most young people who visit the Research Center and to all job applicants. Of course, Dan's favorites are the North American AT-6 Texan (also known as the SNJ in the U.S. Navy and the Harvard in the U.K.) and the Douglas B-18 Bolo. In general, he prefers old, propeller-driven types. Last May, a freshman from Raisbeck Aviation High School was doing research in the Reading Room when Dan happened to walk in. Dan immediately asked The Question: "So, what's your favorite airplane, young man?" The student thought for a moment and then replied, earnestly, "Well, Sir, it's pretty hard to beat some of the modern drones." Dan visibly began to turn pale: Not only had the student selected a modern aircraft; he had selected an aircraft that does not even have a pilot aboard - a sure sign that the Apocalypse is nigh. As soon as the student had departed, I asked Dan, "So, what did you think of his answer?" Dan just shook his head and replied, "Perhaps we can do an intervention."*

- John Little, Assistant Curator

*On my first donut delivery (sprinkle donuts of course) to the curator's office, Dan told me a VERY important fact that I will never forget—the wing span of a P-38 Lightning. Thank goodness I remembered because honestly you never know when he could test you, in fact, it may be the only wing span I know by heart (sorry Dan). To this day its significance remains a mystery, but perhaps that's the point.*

- Rachel Dreeben, Marketing and Communications Associate Manager

*Dan has been such an important part of the development process during my time. Donors absolutely love to be in his presence, and he brings an immediate gravitas to every interaction with our wonderful supporters. They immediately "get" what we do when he details his care and affection for the artifacts and our duty to protect them forever. He cares deeply about every aircraft and spacecraft. They are like his children. Nowhere was that more evident than at the 2013 National Aviation Heritage Invitational in Reno, when our soon-to-arrive-at-the-Museum Lockheed Model 10-E Electra was up for numerous awards. Well, she was completely shut out, and didn't come home with any hardware. Proud "papa" Dan was simply not himself throughout the rest of the trip, repeating over and over, "No other plane here today has her 'historical provenance.'" That's when I fully grasped what he means when he says those two words we all know and love and that only a curator of his caliber can utter with such distinction and impact.*

- Trip Switzer, VP of Development

*To understand Dan Hagedorn and his passion for aviation, you need look no further than the sign on his office door: "Enthusiasts Welcome Here." Dan asked for this sign to be made within days of starting here at the Museum back in 2008 and it truly epitomizes how Dan feels about aviation, the mission of this institution and what we do. If you have a question about why a certain plane has four engines instead of two, what the difference is between the Bf 109 and the Me 109 designations are or why the North American AT-6 Texan is the greatest*

continued on next page.

## DON'T MISS IT!

On Saturday, April 30 at 2 p.m., The Museum of Flight is thrilled to host British pilot Tracey Curtis-Taylor as she shares her story of flying a vintage open cockpit 1942 Boeing Stearman, Spirit of Artemis, solo across 23 countries, completing a 27,000 km flight from the UK to Australia. Following in the slipstream of aviation pioneer Amy Johnson, the first woman to fly solo from Britain to Australia in 1930. The rumors are true: Curtis-Taylor will be flying in on her Stearman, this presentation is not to be missed!



(Tracey Curtis-Taylor Archive)

Dan-ecodotes cont.

*airplane of all time, Dan is the man you want to talk to! Whether you consider yourself an aviation expert or just have a fledgling interest, Dan will literally drop everything to "talk shop" about airplanes. He's spent the last 8 years desperately trying to convert me to a true, certified aviation enthusiast. I've lost count on the number of times he has rushed into my office, fluttering with excitement, just to show me what admittedly, I think looks like a pretty standard side shot of a such-and-such aircraft, only to regale me with the entire history of the aircraft, who flew it and why this one photo is so important and unique and may be the only copy of this photo in the world! While that certainly says something about the depth and breadth of our great collection, it says even more about Dan. His enthusiasm for all things wings and props translates into every aspect of his work: it never wanes and above all - it's absolutely contagious. You find yourself similarly amazed that we have this photo that shows this such-and-such aircraft and through his enthusiasm about it, you find yourself learning something new every single day and that may be Dan's greatest gift. To say that Dan has been a remarkable Curator for this Museum and a true leader for our department is an understatement: he has been our champion, greatest ally, supporter, motivator, teacher, resident expert, public face, sounding board and more importantly, he has been a man who commands our respect for everything that he is and has done for us, his staff, and for this Museum. After eight years of working in the office right next his, it is hard for me to imagine The Museum of Flight without him here every day, in his airplane tie-of-the-day, trying to explain to me the exact science and subtle nuances of military versus civilian aircraft designations. Dan is truly one-of-a-kind and it is difficult to express how much he will be missed... though I fully intend to keep him here as a volunteer, identifying aircraft photos for me for the rest of time!!!*

- Amy Heidrick, Supervisory Archivist

## MODEL ROCKET Workshop MAY 5, 2016

### Want to be a rocket scientist?

Model rocketry pioneer Lee Piester talks about this fun and exciting hobby and how you can get involved. Join us for the free presentation from 6:15 to 7 p.m. and sign up for a rocket building workshop!

### TWO WORKSHOPS!

5:15 to 6:15 p.m.  
Charles Simonyi Space Gallery

7 to 8 p.m.  
Charles Simonyi Space Gallery

Cost: \$5, ages 8+  
rocket kit included with fee;  
pre-registration required.

Register online at  
[museumofflight.org](http://museumofflight.org)

## Model Rocket Launch Saturday, May 7, 2016 10 a.m. to 12 p.m.

Come to the "Centuri Classics" model rocket launch with the National Association of Rocketry at Pacific Raceway in Kent, and learn how to prepare, launch and recover rockets safely. See classic rocket designs from Centuri Engineering streak into the sky alongside some of the newest models available.

And of course, launch your newly made rocket!

Free admission and parking.

For directions and parking information, please contact:

Bernard Cawley at [info@bemrc.org](mailto:info@bemrc.org)



# NORTHWEST SPACE

By: Geoff Nunn, Adjunct Curator for Space History and Exhibit Developer at The Museum of Flight

As America's space industry expands to fill the gap left by the Shuttle's retirement 5 years ago, the Pacific Northwest is fast growing into a hub of "new space" development. In 2013 representatives from the Washington State government and several local space companies—both long time players and relatively new entrants into the industry— met to form a new group called the Washington State Space Coalition. Now, three years later, that group has over 30 member organizations and is working hard to promote Washington's new space bona fides.

Space is not a new business for our region. Washington has long been recognized as a hub of aerospace, and "space" is part of "aerospace" for a good reason. Companies like Boeing and the Redmond Rocket Center (now part of Aerojet Rocketdyne) have been active in our national space efforts from the very beginning. Some of the earliest experiments in underwater neutral buoyancy training for astronauts took place in Boeing's Plant 2. The Kent Space Center built the lunar rovers for the Apollo Program, and nearly all of the United States' probes and landers exploring the solar system are guided by in-space propulsion systems built in Redmond.

Over the past decade or so, however, these established players have been joined by an increasing number of up-and-coming space businesses. From launch service providers like Jeff Bezos's Blue Origin and Paul Allen's Vulcan Aerospace, to satellite operators like Black Sky Global and the Seattle branch of Elon Musk's SpaceX, to entirely new business regimens like the asteroid miners at Planetary Resources, Seattle's space community is becoming increasingly diverse.

But what exactly does "new space" mean? It is a term that nobody in the industry seems to like, whether they represent a recent startup or a government prime contractor with decades of experience.

The new space, old space divide fits poorly wherever it is applied. Recent entrants like Planetary Resources include staff who worked on NASA's Mars rovers, and retired astronauts lend their expertise designing our next generation of human-rated spacecraft. Meanwhile, Aerojet-Rocketdyne is helping pioneer the use of 3D printing for manufacturing rocket and satellite propulsion systems. Ask folks who actually work in the industry and chances are they will tell you that new space vs. old space is more of a mindset than a definition that can be applied to any particular company because ultimately it is all "space."

During a series of meetings held at The Museum of Flight this past March, participants examined, among other things, the qualities that have helped make the region an attractive home for this new space mindset. The qualities offered up by some of the industry participants include:

### A CRITICAL MASS OF POTENTIALLY INTERESTED INVESTORS.

Seattle is home to billionaires like Paul G. Allen and Jeff Bezos who have each launched their own space companies. The city is also a nexus for the Space Angels Network, an organization of venture capitalists uniquely focused on space.

### A LARGE TALENT POOL OF WORKERS WITH THE RIGHT TYPE OF EXPERIENCE.

The Northwest's long aerospace history has helped establish a base of high tech engineering and manufacturing talent. However, space companies are also interested in other industries driven by skills that transfer well to space-related work. The presence of software programmers, big data experts, and numerous complimentary high tech industries offers a large pool of potential employees.

### AN EXISTING CRITICAL MASS OF COMPANIES WORKING ON SPACE.

This is a bit of a chicken and egg scenario, but the presence of space companies and their

support infrastructure helps to draw even more industry to the region.

### AN ATTITUDE OF RISK TOLERANCE.

One of the defining differences between the old and new space mindset seems to be the approach to risk. The 1997 movie Apollo 13 popularized the fictionalized utterance of Apollo Flight Director Gene Kranz, "Failure is not an option." This phrase perfectly captures an old space approach. Space is inherently dangerous business, but no matter how long it takes, or how much it costs, old space will not accept failure.

By contrast, new space takes a more nimble, iterative approach to risk drawn from the software industry and entrepreneurial mindset. I hesitate to call it "fail fast and iterate" because companies with this new mindset absolutely take the safety of their payloads (both machine and human) very seriously. But they are also willing to take greater risks when appropriate. Perhaps the new thinking is better described as "fail when it is an option and then improve." The people and business culture in our region offer up a rich mixture of all of these qualities, which is helping to establish our reputation as a space hub.

This summer, Northwest space will step out from the board rooms and clean rooms into full view of the public. In June, Seattle will play host to the NewSpace 2016 conference. The conference, which has been held in Silicon Valley for the past decade characterizes itself as "the only space conference at the intersection of entrepreneurship, investment and tech innovation." The arrival of a major space conference in the area indicates a broader recognition of Washington's status as a hub for space development. But don't call us the new Silicon Valley of space. We are the Seattle of space, the Puget Sound of space, the Washington of space.



(Courtesy Mary Lu Kirchner)

# Stunt Flying wins her love!

By: Sandie Dolese, CFRE, Senior Advancement Officer at The Museum of Flight

Mark Kirchner loved to fly and so did his fiancée, Mary Lu. On their dates he took her stunt flying in his Timm N2T, an open cockpit WWII trainer. It was the perfect way to win her heart! Mary Lu and Mark were married and continued to fly together for the next 53 years. "Airplanes have always fascinated me, but of course Mark only added to that fascination," remembers Mary Lu.

Mark received his Master's degree in Aeronautical Engineering from MIT and was an engineer at The Boeing Company. He retired in 1988 as Director of Engineering Technology for the Commercial Airplane Group after a 39-year career. Mark was licensed to fly airplanes, gliders and helicopters, as well as a stunt biplane that is still being flown today—which Mark and only nine other Boeing employees are certified to fly.

For seven years, Boeing took the Kirchners to Pennsylvania; it was there that Mary Lu earned her pilot's license flying their Beechcraft Bonanza. In their Christen Eagle biplane, Mary Lu learned aerobatics: barrel roll, snap roll and loop. She was Pilot-in-Command on their six cross country flights from Philadelphia to Seattle.

Moving back to Seattle, both Mark and Mary Lu were active in the community. In 1987

Mark became a Trustee at The Museum of Flight, and was Chairman of the Board from 1997 to 1999. Mary Lu was a partner in an art gallery and continues to volunteer at their church. After retirement, Mark built a high-performance Lancair plane in the family's basement, enlisting the help of friends, family, and his favorite co-pilot, Mary Lu.

When asked about The Museum of Flight, Mary Lu says, "We were at the opening of the Museum and it has always been high on our list. I love the WWI airplane display, but I also love the diversity of the Museum. It covers so very much."

The Kirchners made provisions for the Museum in their estate planning and are founding members of the Eagle Heritage Society. Although Mark passed away in 2010, Mary Lu continues their tradition of involvement with the Museum. Her recent support of the *Inspiration Begins Here!* Campaign is in honor of Mark, recognizing his Boeing career on the Boeing Centennial Honor Wall. Their shared love for aviation lives on here at The Museum of Flight.

Like Mary Lu, you can honor a loved one by making a memorial gift in his or her honor. Contact Sandra Dolese, Senior Advancement Officer at (206) 768-7199 to learn more.

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who are exploring a world of  
possibilities, and to support  
the leaders of the future.**

**If you are interested in  
participating, please contact  
Margaux Kendall at  
mkendall@museumofflight.org**

## IN MEMORIAM

The Museum of Flight offers its sincere condolences to the families and friends of departed Museum volunteers, members, and supporters.

Duane Auringer	Dan P. Danilov	Robert C. Hanson	Richard Sigurdson
Frank D. Black	Berry R. Davison	Margaret Hofman	Robert H. Somerville
Patricia H. Blackburn	Allen E. Day	John E. Iverson	John D. Stearman
Sophie Borden	Theresa B. DeFranco	Leslie A. Kimsey	James R. Theofelis, Sr.
Irene N. Boyd	Loreve Deiter	Robert G. Lockhart	Peter P. Tonglao
Merritt H. Brooks	Otto C. Dobias	Wayne W. Lovejoy	Donald J. Walker
Harold F. Butler	Charles R. Fischette	Kelly W. McGee	William H. Wescott
Betty Jean Candelaria	Clarence C. Flora	John B. Plut	
Tony Y. Chinn	Bettie Fujioka	Barbara H. Pool	
George E. Cummings, Jr.	Bertram H. Hambleton	Cecilia Ruttkay	

## TRIBUTE GIFTS

### IN MEMORY

In memory of Douglas R. Bender <i>Darlene Hale</i>	In memory of Clarence "Chuck" C. Flora <i>Harry and Dorothy Sprague</i>	In memory of Kelly McGee <i>John Purvis and Nancy Wright</i>
In memory of Sheldon R. Bentley <i>Aerospace &amp; Flight Test Radio Coordinating Council (AFTRCC) MRFAC, Inc. John Purvis and Nancy Wright</i>	In memory of Robert (Bob) B. Frost <i>Rosann Holowach</i>	In memory of Don Morris <i>John Brightbill</i>
In memory of Betty Jean Candelaria <i>Paula Clark</i>	In memory of Ken E. Harper <i>Robin Baker</i>	In memory of C. Diane Neider <i>Karl and Tina Neiders</i>
In memory of Victor Caplan <i>Julie Caplan</i>	In memory of Jack G. Darcy-Hennemann <i>Suzanna Darcy-Hennemann</i>	In memory of Carlton L. Rhoades <i>Linda Christiansen O'Briant and Mike O'Briant</i>
In memory of Loreve Deiter <i>Jody Byrne</i>	In memory of Burnita Cooksey Hudgins <i>Martha Truell</i>	In memory of John Stednick <i>Teri Bingham Canyon Ranch Marketing Department</i>

### IN HONOR

In honor of 727 Volunteers <i>Marlene Taylor Houtchens</i>	In honor of "TC" Howard <i>Marlene Taylor Houtchens</i>
In honor of Dick Arensberg's 83rd birthday <i>Jody Arensberg Joel and Amy Arensberg</i>	In honor of Tilman E. "Tilly" Pool <i>Robert Kneppler Jr. and Susan Kneppler</i>
In honor of Bob Bogash <i>Marlene Taylor Houtchens</i>	In honor of John (Jack) Wimpres <i>Marlene Taylor Houtchens</i>
In honor of Matt Hayes <i>Carolyn Read</i>	

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