AirshowStuff Magazine

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November-December 2012

AirshowStuff Magazine

Cover Photo

The P-51 "Betty Jane" is seen from an open hatch on the B-24 "Witchcraft" during the Collings Foundation Wings of Freedom Tour near Chicago, IL. Photo by Michael Dziadus. For more on the flight, see page 6.

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Mark Hrutkay

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We'd love to talk with you!

Thanks to those who contributed to this issue!

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THE COLLINGS FOUNDATION'S
WINGS OF FREEDOM TOUR &
Flying Aboard Watchcraft

Article and Photos
By Michael Dziadus

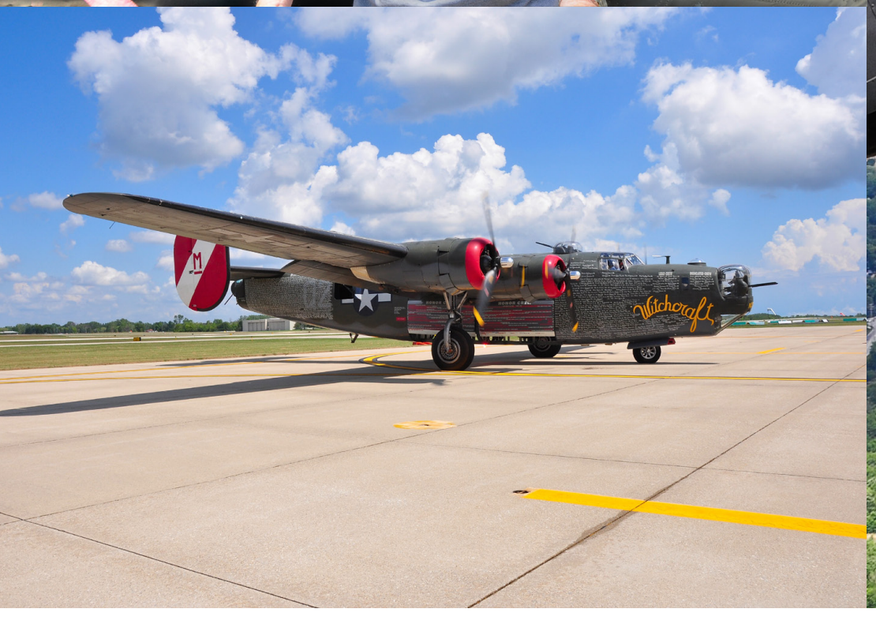
The Collings Foundation "Wings of Freedom Tour" flew into Chicago Executive Airport earlier this year as part of their tour across the United States. I had the honor to fly down with them from Waukegan Regional Airport to Chicago. Since 1989, a major focus of the Foundation has been this annual, nationwide showcase of WWII aircraft.

This tour includes two fully restored bomber aircraft: a B-24 Liberator and B-17 Flying Fortress, as well as a P-51C Mustang dual-control fighter. The Foundation encourages people to tour the planes, talk to the veterans who come to visit the aircraft, and participate in a "flight experience".

As I walked around the B-24 trying to imagine what it would be like to be a young airman getting ready to go off to war, I encountered a small group all family members, gathered around a very old gentleman with a walker in hand. As I got closer, his hat had "8th Air Force WWII" on it and a jacket with "93RD BG 329TH BS" on the back. I asked him if he had flown the B-24 and with the look of an 18-year-old young man in his eyes he replied "I was a Crew Chief on a 24". His name is Al Lee and he is now 92 years old. He went into the Air Force in October of 1941 and made it to the rank of Staff Sergeant. As we stood there, Al told us all how he worked on his B-24 to keep it in the best shape possible under the conditions he had. I think that day if someone would have walked up to us and said "we can't fly, something's wrong with engine #1", Al would have pushed his walker to the side, grabbed a wrench and known just what to do to get us in the air.

The stories he told were right out of the history books only this was no print. It was from a young man that was there and lucky enough to come home. Al's last flight home in "his 24" was in May of 1945. Now, 67 years later, Al was helped up into the B-24 to go for one more mission. As I climbed into the rear hatch I was thinking what a honor it was to be going for a flight in a WWII B-24 Bomber and to have a WWII veteran that made history happen in 'his 24' just a few feet away from me. As we flew south over Lake Michigan, the P-51 fighter came up on our port wing and escorted Al and the rest of us into the air field. This was a flight of a lifetime for me and to share it with an American hero like Al Lee is something I will cherish and honor forever.

I would like to thank the Collings Foundation for this flight experience opportunity and for all the hard work it takes to keep this piece of history alive. Lastly, a big thank you to Al and all of our Veterans for your service to our great country.



MAGTF

MARINE AIR-GROUND TASK FORCE

Article by Christopher Roberts

Christopher Roberts

Christopher Roberts

"Send in the MARINES!", sounds a voice from over the loudspeaker. Just then a pair of F-18 Hornets streaks over and a giant wall of flame and thick black smoke erupts from the ground. Meanwhile, a slew of Hueys and Cobras keep a watchful eye on the battleground and the ground troops which have just been dropped off by Ospreys. High overhead, another strike from a pair of Harriers adds to the madness and chaos below. With all of the explosions and aircraft flying around you could easily mistake this for some type of modern day war zone. Yet, over all the noise, you can hear the cheering of hundreds of thousands of people. We are not in a war zone. We are at the Miramar Airshow, and this is MAGTF.

MAGTF, or Marine Air-Ground Task Force, is a term used by the USMC to describe the organization for all the missions of military operations. MAGTFs balance air elements, ground elements, and the combined arms task organizations of Marine Corps forces under a single commander in an effort to complete a special mission. A MAGTF is broken down into four elements; Command Element (CE), Ground Combat Element (GCE), Aviation Combat Element (ACE), and Logistics Combat Element (LCE). Command Element is the headquarters for all the Marine units, and directs the other three units. The Ground Combat Element, as the name implies, encompasses all the ground units, including infantry, tanks, light armor, and special units such as scouts, recon battalions, snipers, and forward air controllers. The Aviation Combat Element portion of the MAGTF boasts all fixed and rotary winged aircraft and their support teams. Finally, the Logistics Combat Element contains all of the support units for MAGTF, such as communications, combat engineers, motor transport, medical, and supply units. Together, these MAGTFs organize logistics for all missions across the range of military operations. While on the surface the MAGTF demo may seem like cool explosions and loud jets, it is much more than that. The demonstration shows audiences how different fighting forces of the Marine Corps can be harnessed in unison with other groups to accomplish a goal.

The MAGTF demo's roots can be traced back to 1999, when Miramar officially became a Marine Corps Air Station. Each MAGTF demo can be broken up into three parts; the launch, combat mission, and pass in review/recovery. At Miramar, the launch of the MAGTF aircraft signifies the start of the afternoon portion of the show. For 15 minutes, the grumble of the helicopters and whine of jet engines is heard throughout the base. Finally, the tower clears the aircraft for takeoff and an armada of aircraft leaps into the air. The 2012 edition of the MAGTF demo included a total of 19 aircraft, with 3 CH-53 Super Stallions, 2 AH-1Z Vipers, 2 UH-1Y Venoms, 3 CH-46 Sea Knights, 2 MV-22B Ospreys, 2 KC-130J Hercules, 2 AV-8B Harriers, and 3 F/A-18 Hornets making up the fleet. It was an impressive sight to see as all aircraft departed to the east to the staging area and prepared to begin the demonstration.

To start the mission portion of the demonstration, a pair of F/A-18 hornets from VFMA-232, the Red Devils, buzzed the crowd to alert them of the impending assault. Then, the KC-130 tankers flew past the crowd and demonstrated the aerial refueling capabilities of the Marine Corps, which allows them to stay in the air and in the fight for extended periods of time. One Hercules refueled a pair of CH-53s, while the other had two Harriers and two Hornets in tow. Next, the UH-1Y helicopter entered the combat area, and dropped off four Marines who assessed the battlefield. Realizing support was needed, the four forward observers of the unit called in simulated gunfire from Naval ships, and then directed friendly aircraft to their intended targets. Large explosions rocked the airbase as fireballs and thick black smoke made the crowd wonder if they were in Afghanistan! As soon as the Marines on the ground accom-

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plished their mission, the UH-1Y flew back in to extract the soldiers. In order to simulate an extraction where a landing is not feasible, the Venom dropped a rope down to the Marines, and one by one they were hoisted up into the air dangling precariously below the helicopter. With the ground forces safely extracted, the fast movers brought in firepower, conducting simulated bombing runs which resulted in some more fire and smoke. Before additional troops could be brought in by helicopters and Ospreys, the Vipers cleared the way using their three-barreled 20mm cannons.

Within a matter of seconds the helicopters landed and opened their back gates, allowing the ground troops to deploy and secure the area. The troops advanced in on the crowd as if they were the enemy, all while the Vipers and Venoms keep a watchful eye on their fellow Marines on the ground. Soon after the troops land, the heavy lifter of the Corps, the Super Stallion, came flying in hauling a 5,500 pound Humvee from slings underneath. This flyover cued the ground assault vehicles to race down the runway to meet up with the troops on the ground. Humvees, Light Armored Vehicles, and even an M-1 Abrams tank raced in front of the crowd to flex their might as the troops moved in on the crowd line. With the troops having reached the crowd line, the end of the mission was signaled by a large wall of fire as jets flew overhead.

The barrage of aircraft and explosions finally came to an end with the pass in review. During this pass, the entire armada of aircraft and ground troops passed show center. Historically, the pass in review refers to the parade of the combat units past the assembled dignitaries on the "reviewing stand". However, for the MAGTF demo, the pass was one last chance for the crowd to cheer on the USMC fighting forces. Special thanks is always conveyed to the ground troops that march past the fence by the crowd, with fanfare that heroes deserve. It is always a great sight to see the thousands in attendance pay tribute to those fighting for our freedoms by standing and shaking their hands as they walk by.

This amazing demonstration known as MAGTF has been a staple at MCAS Miramar for over a decade now. For dedicated airshow fans and the public alike, the demonstration allows them to see the amazing fighting forces working together that makes the United States Marine Corps part of the best military fighting force in the world! If you ever have a chance to attend Miramar, or a MAGTF demonstration, make sure you seize the opportunity!

Christopher Roberts

Eric A Rosen

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The VULCAN

Article and Photos
By Laurens van de Craats

With the threat of nuclear warfare during the Cold War, air forces all around the world had to equip themselves with the newest and best equipment to be ready to fight. The British RAF was no exception. Britain's first production atomic bomb, code named "Blue Danube", had the same explosive power as those dropped on Japan, about 16,000 tons of conventional high explosive. The RAF's three V-Bombers, the Vickers Valiant, the Handley Page Victor, and the Avro Vulcan, were each designed to carry this destructive device to Russia in response to any Soviet nuclear attack.

Seeing the threat mounting and needing a deterrent device, Avro's Chief Designer Roy Chadwick first sketched out the innovative delta-winged configuration of the Vulcan over 60 years ago in 1946, just five years after the first flight of his other famous creation, the Avro Lancaster. Sadly, he died in a plane crash the following year, and never saw his second masterpiece fly. His work was picked up by Stuart Davies, who took Chadwick's ideas on to fruition.

The first prototype full-scale Avro Vulcan (VX770) first flew on August 31st, 1952 and spectacularly appeared in public at the Farnborough Airshow just a few days later.

From 1957 to 1969, during the dark days of the Cold War, the Avro Vulcan was the main British contribution to the NATO strategic nuclear deterrent. For 24 hours a day, 7

days a week, RAF Vulcans and their crews stood on “quick reaction alert”, to take off within two minutes in the event of a Soviet attack. Each Vulcan had a crew of five: two pilots, two navigators and an air electronics officer. While they were always on alert, no British bomber ever flew with a live nuclear weapon. The deterrent strategy was a success.

The only time the Vulcan was used in anger was during the South Atlantic Conflict in 1982, when Vulcans, supported by 13 Victor air-to-air refueling tankers, flew 7 missions from Ascension Island to the Falkland Islands. The 1st “Black Buck” sortie, carried out by a Vulcan armed with 21 450kg conventional bombs, placed one bomb in the center of the runway at Port Stanley airfield, proving its vulnerability and causing the Argentine invaders to change their plans. These raids captured the world record at the time for the longest-ever bombing mission: a journey of nearly 8000 miles, taking 15 hours and 45 minutes.

Vulcan XH558 was the last Vulcan to leave RAF service, flying from 1986 to 1993 as the single RAF Display Vulcan, a career of 33 years. Her final flight was on the 23rd of March 1993 to Bruntingthorpe Aerodrome in Leicestershire, having been sold off by the Ministry of Defense to C Walton Ltd, a family firm who purchased and maintained her, with the thought that one day, she might be returned to fight. In 1997, a small team headed by Dr. Robert Pleming started to put together an audacious plan to return her to

flight, but it was clear from the start that the project would be technically challenging and enormously expensive. Nevertheless, the team set off down the path that led to XH558’s return to the air.

From 1998 to 2000, the start-up team confirmed the formal support of all the manufacturers needed to help XH558’s restoration, and completed a technical review which showed there were no show-stoppers. The real challenge was money. First estimates were that over £3.5 million would be required to pay for the restoration. Eventually, a successful bid was made to the Heritage Lottery Fund, who in December 2003 announced a grant of £2.7 million for XH558’s restoration.

On August 31st, 2006, XH558 rolled out of the hangar for the first time in 7 years. She almost didn't make it though. In the last three weeks of August, the team was faced with a critical funding crisis. However, with their fantastic energy and enthusiasm of XH558's supporters, The Vulcan to the Sky Club managed to raise over £1.3 million to save the project.

After extensive tests, XH558’s Olympus engines were started up for the first time in August 2007. A further two months of testing on the ground followed, to ensure that XH558 was 100% ready for flight.

Finally, 14 years after her last flight & with over £7 million spent, Vulcan XH558 roared into the air again on Thursday October 18th, 2007. The day was perfect for flying. XH558 was piloted by veteran Vulcan pilot Martin Withers, one of the pilots who flew the Vulcan during

the Falkland Islands bombing raids. The first flight was an unforgettable day for the Vulcan to the Sky team and a display of a great British project, owing its success to optimism, determination, teamwork and a little bit of paranoia!

XH558 was finally granted her permit to fly on July 3rd, 2008, and returned to air displays two days later at a packed RAF Waddington Airshow, her former home. On that day she flew in formation with the other famous Avro-built bomber, the Avro Lancaster. There was not a dry eye on the airfield!

While funding originally was only going to support flights in 2008, with the help of the Vulcan to the Sky Club and the publicity from extensive media coverage, the trust was able to announce the successful conclusion of the campaign to raise a further £1 million in pledges on March 6th, 2009. In an incredible final six days, over £500,000 was pledged. XH558 survived yet another financial crisis, and flew the 2009 season.

A similar funding crisis threatened to end the flying life of XH558 at the start of 2010, but thousands of supporters rallied to her cause once again, and with two significant legacies, sufficient funds were raised to fly through the 2010 display season.

Now, in November 2012, the Vulcan to the Sky Trust CEO Dr Robert Pleming, announced that 2013 will be the last display season for the Vulcan due technical and financial reasons. It seems that XH558, the Vulcan airframe with the most flying hours of any, may not be able to safely fly after 2013. Even to getting XH558 in the air for a final flying season will require a lot of money. 400,000 GBP is needed before the flying season (April) and another 400,000 is needed to finalize the 2013 season. Sadly, this wonderful piece of British history once again faces retirement.

www.VulcanToTheSky.org

ENDEAVOUR

CLOSING VOYAGE

Kevin Helm

SUPPORTING CAST

THE SHUTTLE CARRIER AIRCRAFT

Article by Kevin Helm

Photo Courtesy of NASA

On October 15, 1970, Boeing 747-123 Construction Number 20107 took to the air for the first time. The 86th 747 produced was registered as N9668 and delivered two weeks later to American Airlines where it spent less than four years uneventfully flying between New York JFK and Los Angeles International Airport (LAX), logging 8,999 flight hours and 2,985 cycles. Due to the fuel crisis of 1973-1974, this and about 18 other 747s were placed into storage in Roswell, New Mexico. It was from here that a Rockwell manager in flight test named Bob L Mosley picked this 747 out of the lot. Everything changed for this particular 747 when on July 18, 1974 it was delivered to NASA for testing and research and assigned the registration N905NA.

At the time NASA was investigating trailing wake vortices of large aircraft. The objective of the flight test program was to test different configurations and mechanical devices on the 747 that could be used to break up or lessen the strength of the trailing vortices. This could lead to shorter spacing between landings and take-offs, thereby helping to alleviate air traffic congestion. To evaluate the effectiveness of the different configurations, chase aircraft were introduced into the vortex sheets to probe their strengths and patterns at different times. Six smoke generators were installed under the wings of N905NA to provide a visual image of the vortices.

Over 30 flights of N905NA were flown using combinations of wing spoilers in an attempt to reduce wake vortices. Tests without the 747 wing spoilers deployed produced violet "upset" problems for a NASA T-37 aircraft at a distance of around three miles. From the magnitude of the problems found, distances of as much as ten miles may be required if spoilers were not employed. With two spoilers on the outer wing panels used, a NASA T-37 could fly at a distance of three miles and not experience an "upset" problem.

The wake vortex tests were a precursor to the real reason NASA acquired “905”, to carry the new Space Shuttle during atmospheric tests and ferry flights. In the early 1970s, weight and cost concerns drove many of the Space Shuttle concepts to delete the feature of jet engines for landing cross range and self ferry capability. Jack Conroy, the developer of the Super Guppy concept that NASA was using to transport rocket stages, had suggested using a jumbo-class aircraft to carry the Orbiter on its back. Boeing and Lockheed both submitted proposals that feature an Orbiter on the back of a 747 and a C-5 respectively. On 24 April 1974 NASA selected the C-5 Galaxy proposal from Lockheed due to lower cost and because less structural modifications were needed than for the 747. An arrangement was molded where NASA would pay for the modifications and then lease the modified C-5s as needed from the Military Airlift Command. A single C-5 was agreed to be bailed to NASA full-time for development into the Shuttle Carrier Aircraft (SCA) and for use in the atmospheric approach and landing flight tests with the planned first Orbiter.

However, the fuel crisis of the 1970s caused many airlines to park their brand new 747s that were ordered for a now stunted passenger market. As a result, the Boeing 747 concept cost dropped much lower than the Lockheed C-5 concept. Additionally, NASA decided it was much easier to have complete control of the SCA than to have to compromise with military priorities for use of a C-5 Galaxy. Following the conclusion of the wake vortex research program, Boeing began a $30M conversion program on NASA 905.

Modifications included new bulkheads to strengthen the fuselage with skin reinforcement at critical stress areas, beefing up of the horizontal stabilizer structure, the addition of fittings for the Orbiter support struts and the installation of a 747-200 rudder actuator system. Boeing also developed a set of modifications for the SCA that were removable at a later date if NASA wished; a telescopic forward support assembly that was used only during the atmospheric tests to hold Enterprise at six-degrees angle of attack, a fixed assembly for ferry missions that held the Orbiter at three-degrees angle of attack, which induced less drag during the ferry flights, two aft support assemblies which were common to both the atmospheric flight tests and ferry flights and finally the two 10 foot by 20 foot vertical endplates on the end of the horizontal stabilizer to provide additional stability when carrying the Orbiter.

The 747's trim system was also modified to allow a greater range of trim in pitch to counteract the downwash off the Orbiter's wing on to the horizontal stabilizer. Since each Orbiter has a different empty

weight, an adjustable ballast system using standard cargo containers in the forward lower cargo compartment had to be developed to maintain the center of gravity. On 14 January 1977 Boeing finished the modification work and after a period of flight testing, it was delivered to NASA.

As the lone SCA for 15 years, 905 performed all captive and free flights over Edwards Air Force Base and NASA Dryden Flight Research Center in addition to all ferry flights of the Shuttle program. Notable ferries include the SCA/Enterprise stack on static and flying display at the 1983 Paris Airshow, the 1984 ferry of Enterprise to the World's Fair, deliveries of the Shuttles Columbia, Challenger, Discovery and Atlantis from the factory in California to Florida, final museum deliveries of Enterprise (twice), Discovery and Endeavour, and post-mission flights to deliver Orbiters back to Kennedy Space Center for 32 of the first 40 Shuttle missions. In December 2010, 905 performed the only non-Shuttle ferry flight of the program. Boeing's failed J-UCAS entry, the X-45C "Phantom Ray" was ferried from St Louis to DFRC where it subsequently made two flights before being retired into storage.

On Aug 31, 1978 Boeing 747SR-46 Construction Number 20781 took to the air for the first time under test registration N1795B. The 221st 747 produced was later registered as JA8117 and delivered later to Japan Airlines where it flew passengers for almost 15 years. The Boeing Aircraft Holding Company took possession on April 15, 1988 and performed modifications for NASA. Delivered as an SCA to NASA on October 27, 1988 and registered as N911NA. The first mission for SCA "911" was the delivery of OV-105 Endeavour directly from Palmdale to KSC.

During a typical ferry mission the SCA's maximum speed was 250 KIAS (Mach 0.6) at an altitude of 13,000-15,000 feet with a range of approximately 1,150 miles with reserves. The maximum gross taxi weight was 713,000 lbs, maximum gross brake release weight was 710,000 lbs and the maximum gross landing weight was 600,000 lbs. The basic weight for NASA 905 was 318,053 lbs, while for NASA 911 it was 323,034 lbs.

During ferry flights the usual SCA crew is two pilots and two flight engineers, but only one flight engineer is needed on non-ferry flights. Due to the low altitude flyovers as part of the museum delivery flights, an FAA observer was also onboard. The two SCAs were under the operational control of NASA's Johnson Space Center in Houston, Texas with the aircraft themselves being based at DFRC, California.

In 2005, SCA pilot Gordon Fullerton, then chief pilot at DFRC stated "It's obvious [the orbiter] is up there, because there's a constant rumble that you can feel because of the wake of the orbiter hitting the vertical stabilizer of the 747," Fullerton said of ferry flights. But other than long takeoff rolls and the need for some extra care in steep turns, "it's pretty much the same."

In 2003, Pete Seidl, then NASA's 747 SCA maintenance boss stated " the nearly 2 tons (1710 pounds) of pig iron up-front in the former first class section of the aircraft, and the 3.5 tons (7000 pounds) of pea gravel in the cargo hold are for keeping the aircraft's center of gravity forward when a heavy Shuttle is mounted on top,".

With the Space Shuttle now a part of history and no need or customer to fund keeping the SCAs in flyable status, the decision was made to retire them. Both SCAs will be used as a source of spare parts to support NASA's Stratospheric Observatory for Infrared Astronomy (SOFIA) Boeing 747SP aircraft flying out of Palmdale, CA. Eventually the SCAs will be put on display.

On Feb 8, 2012 NASA 911 flew its 336th NASA flight, a 20 minute final flight from DFRC to Site 7, USAF Plant 42 in Palmdale. An FAA waiver was obtained for this flight as the No 2 engine was inoperative. Aircraft NASA 911 amassed 33,004.1 flight hours over its more than 38-year flying career, and carried Orbiters on ferry flights 66 times over 21 years. A likely future display location is the Heritage Airpark in Palmdale, CA.

On Sept 24, 2012, NASA 905 flew its 818th NASA flight, a 30 minute flight from LAX to DFRC. Aircraft NASA 905 made 223 Shuttle ferry flights; Columbia 60 times, Chal-

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Kevin Helm

lenger 20 times, Atlantis 35 times, Discovery 38 times, Endeavour 13 times and Enterprise 57 times. At the time this appeared to be 905's final flight as DFRC is not far from Palmdale and SOFIA, and other NASA aircraft are on prominent display at the Edwards AFB gates.

However, in a surprising turn of events on Oct 24, 2012 NASA 905 departed DFRC and landed at Ellington Field, TX after a three-hour, sixteen minute flight. The aircraft was subsequently on static display that weekend during an airshow. Sources have indicated that as of this writing no official paperwork has been processed to retire NASA 905 near JSC and that the final decision lies with NASA Administrator Charles Bolden. However, the aircraft will be due for periodic maintenance soon so the window for NASA 905 to fly again is rapidly closing. Like the Space Shuttle Orbiters, after 40 years, the SCA mission is now complete.

Photo Courtesy of NASA

Kevin Helm

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DRYDEN

FLIGHT RESEARCH CENTER

Article by Eric A Rosen

Dryden Flight Research Center (DFRC) at Edwards Air Force Base has been at the forefront of flight research since its founding in 1947. It has operated some of the most advanced aircraft in the world. One of those aircraft included the rocket-powered X-15 that flew 199 missions from 1959-1968. This vehicle was designed initially to fly at supersonic and hypersonic speeds. A B-52 was used to aid the X-15 in ascendance. As soon as it was dropped, the pilot lit a rocket engine which accelerated the X-15 to speeds up to Mach 6 and altitudes of 350,000 ft. Further contributions included use of a reaction control system (control of vehicle attitude in space), first practical use of a full pressure suit in space, ability of a pilot to function in weightlessness, successful transitions from aerodynamic controls to reaction controls and back again, and the first piloted lifting atmospheric reentry. Previous to the Space Shuttle development, the US Air Force and NASA Dryden performed research and development in the mid 1960s to mid 1970s on experimental aircraft called lifting bodies. The first ones were made of plywood and fabric

over a tubular steel frame. They flew using the body of the aircraft, rather than wings, to produce lift and allow for a controlled descent and landing like a conventional aircraft. The first one, designated M2-F1, had no engines and was towed into the air behind a C-47. This gave pilots a feel for the handling of the aircraft. In all, there were six such lifting bodies built and flight tested at Dryden to determine the best design for a future reusable spacecraft. In 1975, a heavyweight lifting body they designated X24B made two touchdowns on the runway at Edwards and proved the concept of landing a low lift over drag aircraft on a conventional runway. However, by this time planners for Space Shuttle development had decided to go with a fixed wing configuration instead of a lifting body. The X24B experiments also verified that the Shuttle would not require jet engines for use during final approach and landing on a conventional runway. Dryden personnel also made contributions to other areas of Space Shuttle design and development including thermal tiles, braking, and flight controls, just to name a few.

All in all, six Orbital Vehicles (OV) were built: OV-101 Enterprise (Prototype), OV-102 Columbia, OV-99 Challenger, OV-103 Discovery, OV-104 Atlantis, and OV-105 Endeavour. The Endeavour was built after the tragic launch disaster of the Challenger in 1987 from the structural spares that were made during construction of Atlantis and Discovery. During construction of the Endeavour, it was outfitted with safety and functional upgrades which were later added to all orbiters. After final assembly, it was delivered to NASA in 1991. Aside from Enterprise, which was named by write-in vote from Star Trek fans, Columbia, Challenger, Discovery, and Atlantis all were named after important exploration and research vessels. The appellation for Endeavour was chosen through a national competition involving elementary and secondary school students. The requirement for the kids was also the same, to name the new orbiter based on an exploration or research vessel. The final choice was in honor of the ship Endeavour captained by British explorer James Cook who traveled the

Eric A Rosen

South Pacific in 1768. This exploration of the South Pacific led to the successful charting of New Zealand, Australia and the Great Barrier Reef.

It was a year after its delivery to NASA that OV-105 Endeavour embarked on its first mission, designated STS-49. Some of the major accomplishments by the Orbiter Vehicle over its years of service include capturing a non-functional satellite and replacing its rocket motor so it could reach its proper orbit, capturing and repairing the Hubble Space Telescope in 1993, and a visit to MIR, the Russian space station. Endeavour also delivered the first American component of the International Space Station (ISS) in 1998, made 12 subsequent visits to the ISS, and brought the final components that completed the ISS on its final mission, STS-134. Mission STS-118 included astronaut Barbara Morgan, the backup to astronaut Christa McAuliffe, who was to be the first elementary school teacher in space, aboard the ill-fated STS-51-L Challenger mission. During the entirety of the Space Shuttle program, there were a total of 54 landings from space at Edwards/Dryden, including seven by Endeavour.

The announcement by NASA to end the Space Shuttle program in 2011 came as a shock to the general public. For 30 years, the Space Shuttles had been a huge part of capturing the imagination of people in their quest to learn more about the universe. To preserve their momentous place in the history of mankind, NASA planned to award the Shuttles to museums throughout the country. The orbiter Endeavour was granted to the California Science Center in Los Angeles, California. The trip from Kennedy Space Center to its new home would be by piggy back aboard the Shuttle Carrier Aircraft with a few stops in-between prior to its arrival in Los Angeles.

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In September 2012, I was afforded the opportunity to experience an arrival and departure ferry flight of the Space Shuttle aboard the SCA, thanks to the PAO office and Alan Brown at Dryden. This event would mark the final flight of an orbiter stacked on the SCA.

Having never witnessed a piggy back flight of the Space Shuttle on the SCA, I awoke excitedly early on Thursday morning and made the two hour drive from Los Angeles to Edwards/Dryden in the high desert of the Antelope Valley. After media check-in between 10am-11am, we were led by NASA personnel and USAF military police in a caravan of personal vehicles and made our way to a location 300ft from the runway centerline. The plan was for the Shuttle to do a few flybys of the base and Dryden before landing at approximately 1pm. While out near the edge of the runway, we were presented with the opportunity to photograph flight operations of other aircraft. There were several T-38 Talons from the Air Force test pilot school doing touch-n-gos, several F-16s departing for test flights, and a C-130 from the Wyoming National Guard. Later in the day, a surprise flyover by the F-35 AF-1 as it roared over the DFRC ramp for a photo opportunity with a F-16 photo chase. Being able to photograph test flights and flight operations taking place at Edwards is not a common opportunity, so this was a nice bonus for me.

As the time of arrival neared, someone with NASA Public Affairs proclaimed that the Shuttle was inbound; at the same time, a similar announcement was made over the base public announcement system. You could feel the mounting excitement of the group as everyone grabbed their video or still cameras and positioned themselves for the perfect photo to record this event. Before the Shuttle arrived, the NASA DC-9-30 (N932NA) "Vomit Comet" (so called because it is used for weightlessness training) landed. This aircraft plays a role as a pathfinder aircraft for the ferry flight. The pathfinder aircraft flies approximately 100 miles in front of the stack to plan a route that will avoid weather and turbulence. Finally, we could see the Stack, so called for the Shuttle piggy backed on the SCA, coming into view and it made its first pass down the runway in front of us with a NASA F-18 chase plane formed up slightly in front. In the backseat of the F-18 was a photographer/videographer capturing this event from a different perspective as the stack made several flybys of the entire base. Cameras all around me were clicking away as the piggy-backed Endeavour flew a single arching banana pass by the flightline, then flew over the north part of the base on the downwind leg. The SCA then made the turn that put it on final approach for landing. You could see the smoke billowing from the tires as it touched down. As it rolled right by the group, cheers and applause erupted from the crowd, while the NASA F-18 chase plane roared overhead at low altitude capturing the landing and rollout. After the SCA rolled down the runway and then proceeded to taxi over to the Dryden ramp, we headed over to DFRC for a closer look at the stack parked on the ramp.

Upon arrival at DFRC, we were escorted out to the one of the hangars on the ramp where we were greeted by some of the PAO staff and heard very brief statement by the SCA crew before they left to plan for the next day's flight. After this, we were allowed out on to the ramp for up close views of the stack. It was very warm standing on the ramp in the heat of a midday sun in the high desert landscape of California, with perfectly clear blue skies overhead. A Shuttle is 122 ft long, 57 ft tall, has a wingspan of 78 ft, and weighs in at 155,441 lbs. Those dimensions seem large, but atop the 747, its size was diminished considerably. For me, seeing this sight for the first time in person instead of on TV or newspapers was a real treat. This special occasion allowed me to walk completely around the stack and photograph it from various angles. My favorite view was to see the in-


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dividual thermal tiles that covered the orbiter. After years and multiple missions into space and back, the thermal tiles bore the scorch marks of reentries. You could also see the areas where the orbiter had a different type of thermal protective system. After photographing the stack on the ramp for several hours in the desert heat, I was ready to call it a day since I was coming back the next morning for the final departure and flight of Endeavour aboard the SCA.

In anticipation of the departure the next morning for its final flight, I could hardly sleep and awoke at the ridiculous hour of 4am since I had to be at the Edwards gate at 5am for media check-in. Even though we knew the flight had been delayed from a 7:15am departure to approx. 8:30am due to fog along part of the flight path in Northern California, we still had to arrive at 5am for check in. The media group that morning was far less that the day before, most likely deterred by the earliness of its departure. Our group stood around waiting in the cool morning desert air chit-chatting about the events from the day before and what to expect for the departure, knowing that the air would warm up quickly after the sun cleared the mountains in the east. The time finally arrived for our group to caravan out to the runway just as the sun was clearing the mountains to the east. Soon after arriving at the runway, the NASA DC-9-30 (N932NA) "Vomit Comet" took off once again to serve as a pathfinder aircraft for the ferry flight. It was followed by a NASA F-18 chase plane that would fly along with the stack and photograph its departure and flight through California. Soon after, the stack was on the end of

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the runway and was rolling for takeoff on her final flight. I picked up my larger telephoto lens and started clicking images but was nervous the lens would be too much as the stack rolled by and rotated for takeoff. I decided to switch to the shorter lens which worked out much better as the stack rolled by. As the main gear of the SCA lifted off for the last time with an orbiter piggy backed upon it, the stack was now on its way for a grand tour of California.

After the Shuttle departed Dryden/Edwards, I hopped back in my car and headed out on the two hour drive back down to Los Angeles to see if I could photograph the Shuttle in flight in an urban setting. I knew the flight path it was taking throughout California, so I made the decision to head straight for Los Angeles International Airport, where it would make two low passes down both sides of the airport. These two passes would give me two last chances to photograph the stack in flight before finally touching down at Los Angeles International Airport for the last time, the Shuttle never to leave the ground again. It was both the first and last time I would ever see a Space Shuttle piggy backed on the SCA, and it was spectacular.

Kevin Helm

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Eric A Rosen

SHUTTLE OVER CALIFORNIA

ENDEAVOUR TOURS THE GOLDEN STATE

Article by Kevin Helm

On September 21, 2012 at 8:15am local time, the Space Shuttle Endeavour took to the air for the final time. After departing Edwards AFB/NASA Dryden Flight Research Center, Endeavour and Shuttle Carrier Aircraft NASA 905 embarked on a final 4.7 hour aerial tour of iconic locations in Northern and Southern California. At takeoff, the "stack" weighed 710,000 lbs, including the 155,500 lb Endeavour and a maximum allowable load of 225,000 lbs of fuel. This was Endeavour's 10th and final ferry mission of the shuttle program. The crew for this flight were pilots Jeff Moultrie (SCA Chief Pilot and flight IP), Bill Rieke(FP/CP), Bill Brockett(FP/CP), Henry Taylor (Flight Engineer), Gary Ash (Flight Engineer), Larry LaRose (Flight Engineer), and Jim Johnston (FAA Observer).

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Using the callsign ASTRO 95 HEAVY, the “stack” overflew locations at 1500 ft of altitude. The airspace for 50 miles around Los Angeles International Airport fell under an “Aerial Event” TFR – the hour-long Southern California portion was considered by the FAA the same as one big airshow. Due to concerns over the safety of the crew flying the national icon at such low altitudes over a large population, the specific flight path was not released to the public and was blocked from flight tracking services. The final Southern California portion had two accompanying NASA F/A-18Bs (NASA 852 and NASA 846) for still photo and video chase respectively.

The flyover sites with significance to NASA or the Space Shuttle Program were: Edwards AFB/DFRC (landing and test site), Mojave Air and Space Port (Scaled Composites and private spaceflight efforts), Palmdale USAF Plant 42 (Site 1 former Rockwell final assembly and major mods site, Site 6 current NASA Dryden Aircraft Operation facility), NASA Ames Research Center (heat shield and wind tunnel testing, shuttle astronaut training, computational modeling), Vandenberg AFB (alternate landing site and cancelled West Coast DOD shuttle missions launch site), Exposition Park (future Endeavour home), Jet Propulsion Laboratory (payloads launched by shuttles), Boeing Huntington Beach (shuttle and International Space Station support, former McDonnell Douglas site of Space Station Freedom development), Hawthorne Airport (home of private spaceflight company SpaceX and Triumph 747 fuselage production site), Northrop Grumman Redondo Beach (former TRW payloads site) and finally Downey Studios (former Rockwell Shuttle Program Division, shuttle engineering site, home of Apollo capsule production and shuttle crew compartment, aft fuselage and body flap construction). This was a timely event as not two weeks after the flyby, the large Building 290 at the former Downey Plant, the final "check-out" location for shuttle major assemblies and Apollo space craft, was torn down.

The reaction on the ground to the homecoming flyover was universal among the millions of spectators across the state - schoolchildren screamed and cheered while adults clapped and hollered. Although a bit somber and reflective, this “funeral” for the shuttle program was indeed more a celebration of the spirit of the program. Having been greeted in the same manner a championship sports team would, the flyby turned into a giant victory lap around the state in which Endeavour was born.

Matt Kuhns

1 Dryden Flight Research Center/Edwards Air Force Base

Mojave Airport

2 USAF Plant 42 Palmdale (Includes former Rockwell Final Assembly Site)

3 Sacramento

Oakland

4 Golden Gate Bridge

5 NASA Ames Research Center

Monterrey

Vandenberg AFB (Cancelled USAF Missions Launch Site)

6 Malibu

7 Santa Monica

8 Downtown Los Angeles

9 Dodger Stadium

10 University of Southern California

11 Exposition Park and California Science Center

12 LAX Runway 24R Low Approach

Photos Courtesy of NASA

13 Getty Center

14 Hollywood Sign

Warner Brothers Studios

15 Universal Studios

16 Griffith Observatory

Jet Propulsion Laboratory

17 Rose Bowl

18 Disneyland

19 Anaheim Stadium

20 Boeing Huntington Beach (Space Station/Shuttle)

Long Beach and the Queen Mary

Port of Los Angeles / BB-61 USS Iowa

Goodyear Blimp Base

Hawthorne Airport (Space-X & Triumph)

21 Hollywood Park and Forum

22 LAX Runway 25R Low Approach

Manhattan and Redondo Beach

(Northrop Grumman Space Systems)

23 Downey (Former Rockwell Plant)

24 LAX Runway 25R Landing

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MISSION 26

THE FINAL LEG

Article by Kevin Helm

Eric A Rosen

The Space Shuttle Endeavour (OV-105) weighs 147,000 lbs, has a wingspan of 78 feet tip to tip, is 124 feet long, and measures almost 56 feet from the ground to the tip of the tail. How do you move a Space Shuttle through Los Angeles and Inglewood city streets? The answer is "very carefully".

One of the lowest scores the California Science Center (CSC) received in NASA's April 2011 Orbiter disposition site selection competition was a "Moderate" rating for "Transportation Effort/Risk". The CSC subsequently submitted its logistics plan to NASA in May 2011, including details on how it planned to transport the Orbiter from Los Angeles International Airport (LAX) to the Exposition Park museum. The CSC dubbed the twelve mile multi-day road trip as "Mission 26: The Big Endeavour".

The $10 million move would begin first thing on Friday, October 12, 2012 and was planned to take 45 hours ending late Saturday night. In actuality, the trip took 67.5 hours hangar to hangar and stretched well in Sunday evening! Despite the delays, over a million people came to see the Shuttle during these three days. Under the threat of rain and thunder, the first leg started on time when the large door of the United Airlines hanger at LAX opened at exactly 11:15pm Thursday, October 11th. Fifteen minutes later Endeavour was backed out and wheeled down the LAX taxiways escorted by a motorcade of support vehicles. When Endeavour left LAX property at 2:15am, additional police cruisers, utility trucks, tree trimming trucks and movie production trucks from Terbine Entertainment, formed to create a documentary for the CSC using volunteer Hollywood

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professionals, joined the rolling convoy which numbered over 150 people.

The Space Shuttle Endeavour was the only Orbiter delivered directly from the Palmdale final assembly site to Kennedy Space Center. By the time Endeavour was christened, a device called the Orbiter Lifting Frame had been relocated to Palmdale from Vandenberg AFB due to the DOD cancelling the West Coast military payload aspect of the Shuttle program. All other Orbiters made a 35 mile trek on desert roads atop a specially built strongback to Dryden Flight Research Center (DFRC) where they were mated with the Shuttle Carrier Aircraft (SCA). In Jan 2012, after decades of storage at DFRC, the 25,000lb stainless steel Overland Transporter (OT) was disassembled, inspected, found to have no corrosion and was shipped off to be modified to carry Endeavour for the first time during Mission 26.

Belgian oversized transport specialists Sarens Group planned meticulously for months, to engineer and execute the transportation of what the company called its most valuable cargo to date. "This may not be the largest or heaviest object we have transported before but it is certainly one of the most important in our company's history," said Jim Hennessy, marketing manager, Sarens North America, before the journey began. "The Endeavour is a national treasure and we are honored to play a key role in its final mission."

Sarens employed an array of Self-Propelled Modular Trailers (SPMTs) built by KAMAG Transporttechnik in Ulm, Germany to carry the Endeavour mounted atop the OT. The four independent diesel-engined SPMTs (two 4-axle units at the front and two 6-axle units at the rear) were synchronously steered using a single remote control and had a hydraulic liftable chassis. In total there were 80 tires mounted 4 per axle which had steering angles of +130° to -100°. The SPMTs could maneuver Endeavour forward, backwards, translate diagonally at any angle, crab sideways and even spin Endeavour 360 deg in place like a dancer. The total weight for the four SPMTs (axles and power units), supports beams, counterweights, etc was about 375,000 lbs – over twice that of Endeavour herself.

Two different configurations would be used depending on the portion of the route. For streets requiring straddling a median, a "wide" configuration with the SPMTs separated was used. Otherwise, the "narrow" configuration with the SPMTs side by side was employed. The Shuttle stopped at four spots along the route to change configurations, which took a couple of hours to perform if there were no issues.

During the first stopover, the atmosphere was carnival-like as news reporters held live shots all morning long, parents brought children to view and take photos, and hundreds of volunteers from the general public (pre-registered with the CSC weeks in advance) answered questions and offered to take photos. A private elementary school fortuitously located adjacent to the Shuttle held the "mother of all bake sales" and spirits were high even through a period of light drizzle. One enterprising individual even pre-positioned a cherry picker in an adjacent lot and would, for a "donation", elevate riders 20 ft above the crowd for a photo of the Shuttle. The line was easily 40 people deep!

A single Sarens remote control operator walked alongside and in front of the Shuttle, controlling the SPMT's movements via joystick on a large control board dangling from his neck. Several spotters along the wings were on the lookout for hazards and signaled obstacle clearances with hand signals and radio calls. A cherry picker also followed behind the Shuttle the entire route to allow an elevated view of obstacle clearances.

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Saren's half dozen remote control drivers split the task into two shifts. "This is a lot cooler than we are used to," said driver Steve Mitchell, who was dressed in distinctive blue coveralls and a blue Sarens hardhat. "I just moved a 2,200-ton bridge in Chicago. It was 450 feet long and almost 100 feet high. This [Endeavour] ain't big. It's just so special… nothing means as much as this."

Engineers concluded that some portions of the city streets could not support the 529,000 lb weight of the SPMTs, OT, and OV-105. Decades old maps and blueprints were gathered to identify all the gas lines, sewers, water pipes, drainage systems and other utilities that needed protecting with up to 2,800 steel plates, each up to 1.5" thick, ranging from 4 ft by 6 ft to 8 ft by 20 ft in size, and weighing as much as a small car. Officials had to truck them in from as far away as Arizona and Nevada to get enough for the project. Each plate needed to be carefully placed on the ground, welded into place and surrounded with asphalt to make the Shuttle's passage smooth.

There were also locations where the SPMTs had to leave city streets and transverse grass areas and curbs. The first such area was the transition from Crenshaw Dr. to Crenshaw Blvd. One set of crews placed 400 tons of base material made up of broken asphalt, concrete and green material, to keep the Shuttle level with the traffic islands at the intersection, then after the Shuttle had passed a second set immediately scooped up the material from the road. The second such area was a grassy park in Exposition Park. Over 900 high-density polyethylene mats measuring 8 x 14 ft and capable of supporting 600 lbs/sq-in were interlocked over the soft soil. The manufacturer, Newpark Mats & Integrated Services, trucked them in from a yard in Colorado.

The single iconic image from the Mission 26 is probably that of Endeavour on Manchester Blvd. crossing over an empty 405 Freeway. The plan originally called for the SPMTs in a wide configuration to make the crossing. However, the SPMTs were not on the California Department of Transportation's list of approved vehicles to travel over the bridge. There were concerns that the 529,000lbs total weight would not be distributed equally on the overpass and damage could result.

Toyota has a long standing relationship with the CSC and was planning to tow Endeavour the last quarter mile in Exposition Park with a stock Tundra model pickup truck. The solution to the 405 crossing problem was already in hand. Prior to the crossing, the Orbiter was hydraulically lifted by the SPMTs and placed on lighter beams and dollies. This configuration weighed a mere 292,500 lbs and satisfied the highway engineers. Toyota filmed footage of the crossing and has released multiple commercials showing the event which to all appearances went off without a "hitch". The Tundra will eventually go on display at the CSC.

Saturday's third leg was the longest, narrowest, and most challenging, with two stops for major public celebrations. "It's a very narrow stretch for us," said Marty Fabrick, Project Manager orchestrating the move. "Our wings will be over some driveways." If all went to plan, Endeavour would arrive at the Plaza on the corner of Crenshaw and MLK Blvd at 2pm. Los Angeles's official ceremony would occur here and include a glitzy 30 minute Hollywood style tribute choreographed by "Fame" actress Debbie Allen, which would include dancers and aerialists performing on an erected stage.

Endeavour began moving at 6am Saturday morning, quickly navigating a winding downward sloped stretch of the route. The public was encouraged to come to Inglewood's


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Endeavour
United States
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official ceremonies at the Forum to see the Shuttle. Endeavour arrived at the Forum at 7:30am, over 90 minutes ahead of schedule, to "Men in Black" blaring over speakers. After the ceremony, which included remarks by Apollo 7 astronaut William Cunningham, "I Believe I Can Fly" blared as the Orbiter resumed the journey at 10am.

The next leg of the route quickly proved to be troubling. Poles, trees, regular maintenance on the transporters, even a parked LAPD truck all slowed Endeavour's progress to a crawl. At one point a large tree had to be cut down and people temporarily surrounded the tree in protest trying to protect it, a total delay of over an hour. Endeavour ran two hours behind schedule, then three, then four. Meanwhile, the crowds continued to grow in and around the Plaza. Over 30,000 people gathered along the route in the mile before the Plaza, and another 10,000 (3,000 ticketed) were at the Plaza itself. With the guest of honor miles away, the speeches began at 2:15pm. Three astronauts who flew on Endeavour, Greg Johnson, Kay Hire and Mike Fincke (who holds the American record for the most time in space at 381.6 days) also spoke to the assembled thousands. A couple hours later the half hour production was performed. "I thought it was going to be 1pm, then they said 2pm, then 3, then 4," choreographer Debbie Allen said. "When they said 5pm, I just said, 'OK, let's do this.'" One part of the performance featured aerialist astronauts and floating above the stage in apparent zero gravity.

Finally, just before 8pm Endeavour arrived at the Plaza to cheering and camera flashes, 6 hours behind schedule. After entering the intersection to the theme from "Star Trek: The Next Generation", the Orbiter briefly stopped as 10-year-old Sebastian De La Cruz from "America's Got Talent" sang the national anthem. The Shuttle then turned the corner on MLK Blvd to chants of "USA, USA, USA" and James Brown's "Living in America" blaring over the sound system. It felt like New Year's Eve, the 4th of July, Election Night


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and the Rose Parade, all rolled into one!

Crews also worked weeks in advance to remove any obstacles along the route that might be in Endeavour's way. The City of Los Angeles' Street Lighting, Transportation and Water and Power departments temporarily removed 222 street lights, 63 traffic signals, 35 power poles, 11 parking meters and two overhead signs during the move. Many telephone and power lines also had to be raised higher into the air along the route.

The city of Inglewood is supplied with power by Southern California Edison. When the Shuttle rolled down Manchester Blvd a handful of power lines had to be de-energized and taken down. Larger, 220,000-volt transmission lines had to be lifted up by crane. "We will actually have cranes standing by and as the Shuttle comes by, what we'll be doing is de-energizing the line, testing and grounding, and then lifting the conductors to an estimated height of about 70 feet," said Ed Antillon of Southern California Edison prior to the move. Some short local rolling power outages occurred as Endeavour made its way to Exposition Park as a result.

There was another physical change along the route that occurred in the weeks leading up to Mission 26. Crews went about the work of trimming or cutting down and removing a number of trees along the 12 mile route. The city of Inglewood lost 128 trees, which the CSC promised to replace with at least 256 new saplings and also provide $500K of improvements and funding to cover the first two years of growth. The city of Los Angeles lost 265 trees, to be replaced with a minimum of 530 new saplings and also provide $1M of improvements and funding to cover the first two years of growth. Thousands of additional trees were pruned back to make way for the Shuttle.

The removing of the trees caused a fair amount of controversy in the media and the local community. For example, there were concerns over 400 Canary Island pine trees, which were planted by more than 3,000 people in 1990 as a living memorial along Martin Luther King Jr. Blvd. The CSC responded that engineers designed a complex and extremely time consuming series of zigzag, crablike movements through the 2.6 mile stretch of Martin Luther King Jr. Blvd that Endeavour would travel that resulted in only 14 of these culturally significant trees being removed. As part of working with the community and listening to their concerns, the total number of replacement trees soared up to 1,000, at least 5 large ones were identified to be transplanted and none of the 400 Canary Island pines were cut down for Endeavour.

The fourth and final leg began at 1:30am Sunday morning, over three hours late. The crews had to grind off a stuck bolt as well as replace the hydraulic fluid in the SPMTs while undergoing a personnel shift change. Endeavour hadn't moved more than 100 ft with when an SPMT suffered a leaking seal, the repair taking another 30 minutes. The pace of Endeavour slowed as the move now had to occur at night instead of the planned daylight hours though the area which required much maneuvering to protect the memorial MLK pine trees.

Endeavour was finally visible from inside Exposition Park at 10:45am and at 11:45am made the turn onto Menlo/Bill Roberson Lane. By 1:15pm, the Orbiter had arrived in the grassy park area where a official ceremony occurred. California Science Center president and CEO, Jeff Rudolph, speaking at the event, thanked the people of Los Angeles and Inglewood for their support as the Endeavour made its way from LAX through city streets. "I may be kicked for it, but it was the mother of all parades," Rudolph said, drawing applause from the crowd. After the ceremony at 2:00pm, Endeavour drove across the grassy park and stopped about 50 yards short of the temporary pavilion before proceeding up the dirt ramp that lead inside. Endeavour drove into the Pavilion at 7:30pm Sunday evening, completing her 67.5 hour, 12 mile Los Angeles commute. Mission 26 was a success as measured by the fact that no damage had occurred to Endeavour over the 12 mile move.

Prior to Mission 26, Marty Fabrick, who was managing the move for the CSC stated "It's not a once-in-a lifetime event. It's a once event. No one is ever going to move a Space Shuttle through the middle of a congested urban area ever again." On at least one occasion, Endeavour's wing passed so close to a tree that a credit card couldn't be inserted into the gap. After twelve miles and an unscheduled third day of traveling, Endeavour arrived without a ding, dent or scratch. This fact serves as a testament to those involved planning and executing Mission 26.

The author would like to thank Kristina Kurasz of the California Science Center Foundation and Emily Heidt of Sugerman Communications Group and Crenshaw Plaza for their assistance and facilitation of Mission 26 coverage.

Kevin Helm

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Endeavour
Taste of Soul
OCT. 20
Louisiana
FRIED
CHICKEN
CHINESE F
California Science Center
Samuel Oschin Air and Space Center
SOUL FOOD

A TRULY REWARDING JOURNEY

BECOMING A PRIVATE PILOT

Article and Photos
by Jeremy Hampton

You may be wondering, what does it take to become a licensed pilot? I recently had an amazing opportunity to follow my dreams and do just that, and I want to pass what I learned about the process onto others to help them do the same.

The decision regarding where to receive your flight training is one that should be carefully weighed. When you boil everything down, it's your butt on the line so you need to make absolutely sure that your school has the right stuff to turn you into a qualified and, more importantly, safe pilot. So what do you look for? Everyone will have different needs, but here are some key items to consider: Aircraft are an important, so look for schools that utilize a modern fleet of aircraft with multiple planes available for training. Your "real life" schedule may not always be conducive to flying at regular times, so you need to find a school with more than a couple of planes in order to better ensure you'll be able to schedule a plane when needed. Those planes should be relatively modern as well. It's difficult to feel safe flying in a plane with more creaks and groans than an 80-year old Greco-Roman wrestler. Learning to fly should be an enjoyable experience and not one that has you wondering if the engine could seize at any time, or if your foot is going to go through the rusted out floorboard as you descend on final approach or when you're doing the "rudder dance" after landing. You don't necessarily have to find an airplane with a nice G600 or G1000 panel, steam gauges will work just fine at first, but you do want to make sure that the plane is in excellent condition and is cared for by a top notch maintenance staff.

Another pivotal thing to consider is the instructor. You're going to spend a lot of time in the cockpit with your instructor and you'll get to know each other pretty well. As

with any relationship, you need to make sure that you are compatible with each other so take the time to sit and talk with a potential instructor and try to feel out their personality before signing on the dotted line. You'll also want to be sure your instructor is qualified. Sure, he or she will have their CFI, but experience is key. Your instructor is the one who will set your pilot mold, so you'd better make sure it's a mold that's solid. You need an instructor that will give you unbiased feedback, because it's that feedback that will help you stay safe and make you a proficient pilot. In the same vein, you'll also need to make sure you thicken your skin a bit and be willing to take constructive feedback. Your instructor won't (or shouldn't) criticize you without just cause, but when they provide constructive feedback, no matter how harsh it seems at the time, just know that it's because they're trying to make you the best pilot you can be and they honestly want to see you succeed. Once you earn your license and begin to take passengers up it'll be more than your skin on the line, so be sure to take instruction and criticism to heart. It'll just make you a better pilot.

Of course, you'll also want to know what you want to get out of your training. Do you want to get a light sport or private license or do you want to progress further by obtaining your instrument rating followed by your CFI and ATP ratings? Do you want to get checked out in a tail-dragger? Do you want to go on and learn aerobatics? Everyone has a different motivation for earning their license and various ratings, so make sure you fully assess your needs and wants. No matter how far you'd like to go in terms of

ratings, make sure you look for a school that can meet those eventual needs even if you're not 100% sure that you'd like to move beyond your recreational or private license. It'll make it that much easier for you if you attend a school that offers a large number of ratings so that you won't have to keep changing schools after you reach each stage of your ultimate goal.

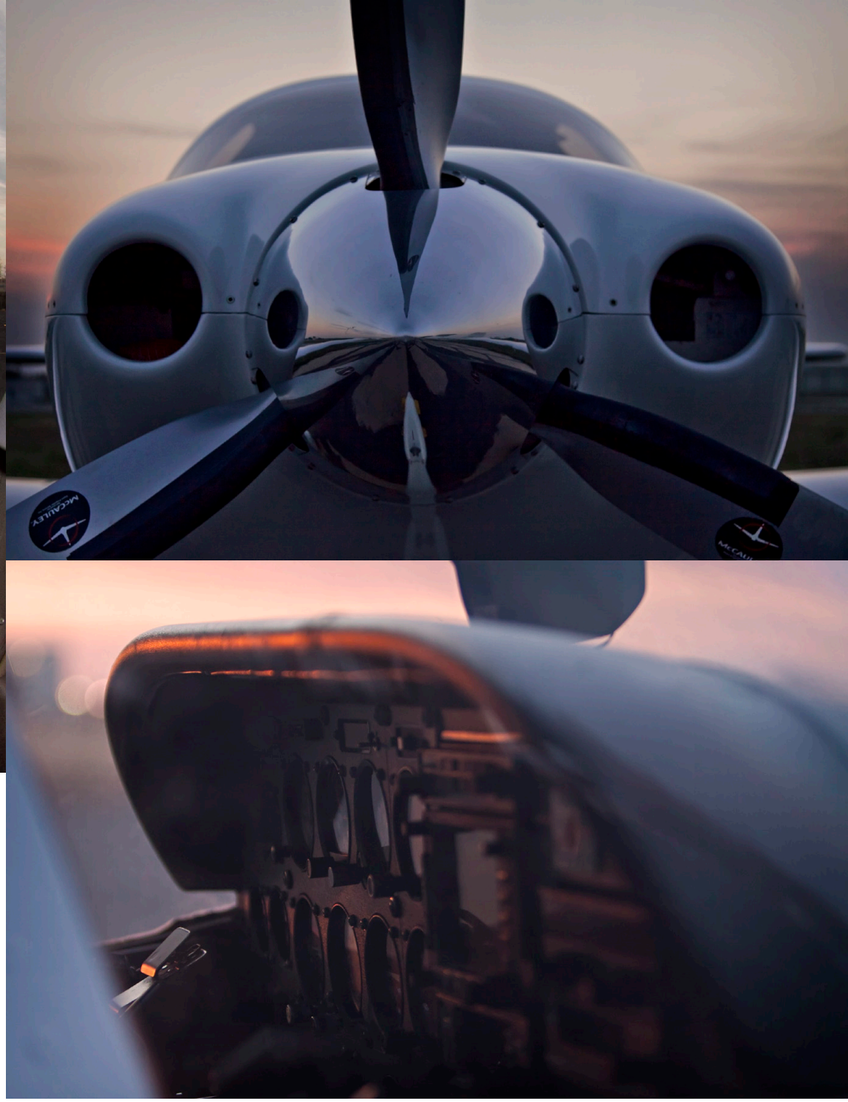
The training in the air is just as important as the training on the ground. Since you will need to pass a ground test before being certified to take your check-ride, be sure that your chosen flight school offers good ground training as well. The better schools will offer face-to-face instruction in conjunction with computer-based training that's structured to match your level of training.

You might be surprised at how much flight simulators (especially full-motion simulators) can help in your quest to perfect your skills. By finding a school that utilizes a full-motion simulator, you'll be able to practice those things that may leave you a little queasy at first in a real plane. Want to practice landing in a 20-knot gusting crosswind? Jump in the simulator and practice! At least if you crash in the simulator, you can just hit the reset button and try again. Not so easy to do that in the real thing.

Other pilots may have additional items to add to the list, but these are the primary items I looked at when selecting my flight school. So which flight school did I choose? I live in the Kansas City area and there was one flight school that stood out above all the others…Air Associates of Kansas. Here's why:

Aircraft – Air Associates maintains a very modern fleet of painstakingly maintained aircraft and they have a lot of them. Their primary fleet consists of very new Cessna 172s, the oldest being a 2002 model, and they have everything from steam gauge fitted C172s to Garmin G600 and G1000 equipped C172s. I recommend starting with the steam gauges before jumping into the "glass panel" planes. It'll help you focus more on the art of getting the "feel" for the plane at first. They don't limit their offerings to "standard" C172s, however. They also have a low-wing Diamond DA-20, a very good looking Cessna Corvalis, a Cessna 182, and a Cessna 162 Skycatcher for those looking to obtain their light sport or private license, a retractable gear C172 for those looking to get their complex rating, and a Beech Duchess for those looking to get a multi-engine rating.

Instructors – One thing that really impressed me about Air Associates was the family atmosphere they maintain. Their instructors think of themselves as a large family and they warmly welcome you in



with open arms. From the first day, you'll feel like you belong there and that feeling really helps to increase your personal comfort level when flying. They have a very large number of highly qualified and very safe instructors available to assist in your training, meaning that there should always be someone available to go on a flight with you. Another benefit is that no matter which rating you're looking to obtain, there is an instructor available that can help you reach that goal. Do you want to get checked out and rated for aerobatics in your tail-dragger Citabria? There's an instructor that can make that happen! Want to get your ATP and become a commercial airline pilot? No problem!

Ground School – Air Associates is a certified Cessna Pilot Center and the benefit of this cannot be understated. Of course you'll receive face-to-face ground training, but as a Cessna Pilot Center, Air Associates is able to offer an interactive, computer-based curriculum that allows you to receive training on your own schedule from the comfort of your home. This approach allows you to learn with a structured approach at

your own pace and you can repeat lessons as many times as you like. What is the benefit? You'll save a lot of money in face-to-face ground instruction costs. In addition, the online training utilizes C172s and C162s for their learning modules, meaning that what you learn on the computer will directly relate to what you're doing when you climb into the cockpit for your flight lessons. The Cessna Pilot Center training also includes everything you need to pass your written, oral, and practical flight test. It even includes sample tests from the FAA to help ensure you are ready when you sit down for that written exam.

Flight Simulation – Air Associates also has a new, full-motion Redbird Simulator, which as I stated above, is absolutely invaluable to your progression through flight school. I put a good number of hours into the Redbird in order to practice landings and I honestly believe that it help me to become a better pilot. It's probably the most cost-effective way to become proficient at a specific maneuver and it makes sense when you think of why that is. If you're practicing takeoffs and landings in a real plane, you'd be lucky to get 6 landings per hour when you figure that it'll take at least 10 minutes to execute each one between the time it takes to land, taxi back to the runway, get clearance to takeoff, and then fly the pattern to land once again.

However, in the Redbird the number of landings possible per hour skyrockets. You can program the computer to place you at any altitude, at any airspeed, and with any weather conditions. You want to set up on short final at 75-kts indicated airspeed with a 10-knot crosswind? No problem! Then, as

soon as you land in the simulator you can just push the reset button to be placed in exactly the same position you were the last time. Suddenly you've gone from 6 landings per hour to 30 or 40 landings per hour. Possibly the most amazing thing is that the feeling of comfort you get from the simulator directly translates to an increased level of comfort in the real plane. You suddenly get the feeling that you've been there and done that before, and the lessons you learned in the Redbird will absolutely carry over into the real world.

Safety – Owing to their well-kept fleet of airplanes and their highly trained maintenance department, Air Associates has been able to maintain an exemplary record of safety. Not one time did I feel unsafe when climbing into the cockpit of my C172, and I actually took it a bit for granted. However, after speaking with some other pilots who received training elsewhere, I learned that the feeling of safety I had when flying wasn't by accident. I heard stories of other planes with frayed wiring, holes in the floorboard, and failing instruments. Planes with

nicknames like “bucket of bolts” or “old creaky” were commonplace to hear of, but not at Air Associates. Thank goodness.

Online Scheduling – This was a great feature of Air Associates in that you can reserve a plane online, no matter where you are. I was actually on my way back from vacation and was able to look at plane availability and schedule a lesson on my phone while riding in the car.

Other Benefits – Air Associates is located at a one runway, tower controlled airport in southern Kansas City. The benefit is that by only having one runway you’ll be forced to deal with any challenges the weather throws at you. At a multi-runway airport, you can simply change to a runway better suited to the wind conditions. You can’t do that at a one-strip facility and I absolutely contend that it’ll help you to become a better pilot who is better able to handle the challenges that Mother Nature throws at you. Having a control tower is another benefit in that you’ll get a lot of practice doing the thing that can be scary to new student pilots; communicating on the radio.

Another nice feature is that Air Associates offers a variety of prepaid training plans that end up reducing the overall cost of training. Whether you’re looking for your recreational license, your private license, or your instrument rating like I’m hoping to do, there’s a package available that will keep your bank account happy.

The benefit of choosing Air Associates transcends flight training. They also offer charter services via their fleet of turbo-prop and piston aircraft, they have a flying club with group ownership options, and if you’re looking to buy your own plane (which I am!), they offer aircraft management services to help remove the guesswork of buying a plane. They’ll even operate the plane for you, making it feel like you’ve got your own flight department minus the hassles!

Air Associates also has a location in St. Louis where you could walk in the door and have that instantaneous feeling of comfort from knowing you’re going to receive the same high-quality training from top-notch instructors in a very modern fleet of aircraft.

So now you’ve selected your flight school and are ready to get flying. Throughout your training, you’ll need to meet a number of requirements to earn your private pilot certificate.

It goes without saying that flying is much different from driving and requires that one learn a new set of skills and disciplines as you enhance your flight aptitude. To ensure that future pilots achieve the skill set necessarily to fly safely and carry passengers, the FAA has established a set of minimum requirements you’ll need to meet prior to your final test, aka the check ride. The most basic of these is a minimum of 40 hours of flight time, but that breaks down into several specific

categories to ensure you experience all aspects of flying.

That's the flight portion, but that's not all you'll have to do. Even if you're proficient at all of the maneuvers and you feel like an ace stick, you'll still need to demonstrate a general knowledge of flight principles. You'll first be able to showcase your knowledge with a "ground test". For this, you'll head to an official testing center where you'll be given a 60 question, computer-based test over all things flight. The amount of knowledge you'll need may seem like a lot, but fear not… numerous resources exist to help you through the process including (but not limited to) online resources through the Cessna Pilot Center and handbooks with actual FAA test questions and answers. Books are available from several different publishers and I used the one put out by Gleim. The information should be pretty standard amongst the different publishers so don't fret over the decision of which one to buy for too long. If it comes down to it, ask your CFI which reference he/she would recommend.

I should also note that when you're ready to sit for the exam, you'll have to pay an additional fee. I'm not sure if it's a standardized across the country, but for point of reference I had to pay $150 to take mine and the feeling of elation I got after passing was well worth the price of admission! You'll need to get a 70% to pass, but in the event you don't achieve that score worry not, you can sit for the exam again if needed.

So you've got your maneuvers nailed and you've passed your ground test with flying colors. Now it's time to enter into the final phase and schedule your check ride.

In general, the check ride consists of two different phases. During the oral exam, the examiner will quiz you on pretty much everything you've learned for the ground test. In addition, you'll be asked to plan a simulated cross-country flight and you'll need to perform a set of calculations for the examiner.

Next, you'll actually fly the aircraft through many of the maneuvers you've mastered. If you don't screw any up, it's time to squeal like a giddy kid in a candy factory when you are handed your private pilot certificate! You'll get a temporary paper certificate that day, but a plastic license with photos of the Wright brothers will be mailed to you at a later date.

The key things to remember are to not get too discouraged if you have a bad day. Everybody has one at some point. Just use it as a learning experience and apply those lessons learned to your next flight. Aviation is a lifelong learning process. Acknowledge early on that you'll never be 100% proficient and make sure to commit yourself to continual learning and study.

Be humble. Your CFI will have a lot of flight experience and will be well qualified to tell you if you're not doing something right. Don't fight his or her criticism. Rather, take what he/she says to heart, accept the criticism, and use it as an opportunity to become a better pilot.

When in doubt, ask for clarification. Your CFI understands that you're learning so don't be embarrassed to say "I don't understand what you want", or "What did the air traffic controller mean by that?" You may feel slightly embarrassed at the time, but it'll make you a much safer pilot. Plus, you'll know what to do the next time you encounter the same situation.

You may not have a weather-oriented mind (I sure didn't), but take the time to really learn it. You'll learn to better predict in-flight conditions and you'll gain a better understanding of what kind of flight conditions different clouds and weather fronts can bring. Most importantly, you'll learn how to avoid potentially dangerous conditions.

Pay attention to detail. I made the mistake of letting my attention lapse one pre-dawn morning as I started to pre-flight the wrong plane (they were parked right next

to each other). This led to a very embarrassing situation when another instructor told me I should check the tail number because I was in the wrong plane. Granted, this is somewhat of a low-impact example, but the small details really matter when in flight. Does it sound like your engine is running a little rougher? Do you smell an odd odor in flight? Are your gauges indicating a problem? Where is that aircraft that just called out over the radio, announcing he was getting ready to enter the traffic pattern? Always be aware of your surroundings and make sure you pay attention to the little things so they don't spiral into something much bigger and much more dangerous.

Realize that the total number of hours you accumulate prior to sitting for the check ride will depend upon your comfort and skill level in the airplane. On average, it can take 60-70 hours of flight time to be ready for the check ride, but if you are motivated and pay attention to lessons learned, you can complete your training under that number. Again, the times will vary between pilots so don't get discouraged if it takes you more hours of flight before you consider yourself ready. You can't rush safety.

Above all, and I know this sounds cliché, have fun. Becoming a licensed pilot with the ability to leave the surly bonds of Earth at will is one of the most personally rewarding things you can do. There are few things in life that are better than taking off on a wind-free evening at sunset, reveling at the beautiful sights, smells, and sensations. Ultimately, when you look back on the process and consider all of your trials and tribulations, you'll realize how amazingly rewarding the journey has been. It'll also open your eyes to the possibilities that now present themselves. Want to go to a different state to play a round of golf? Hop in the plane and go! Have a family member you haven't seen in a long time because it's just too far to drive? Hop in the plane and go! Feel like eating the best chicken wings this side of the Mississippi but you don't want to drive three hours to get there? Hop in the plane and go! Tired of dealing with large airports, crowded commercial airplanes, and the TSA? Hop in a plane and fly there yourself!

Becoming a pilot is a difficult path, but the most rewarding things in life never come easily. It takes hard work and perseverance, but stick with it and enjoy every minute. I guarantee that you'll thank yourself for doing it when you're done.

Eric A Rosen

Flabob Flying Circus

HISTORY IN THE AIR

Article by
Eric A Rosen and Hang Tran

The first time I heard of Flabob was at the 2011 Holloman AFB Open House in New Mexico. I thought it was a very odd name. The name was emblazoned on the side of a silver and white DC-3, the Flabob Express. Climbing up rather rickety steps built into a side panel, my first view inside were two narrow rows of beautifully restored burgundy seats with white curtains by the windows. At the back was a lovely wood panel lavatory. You can just imagine what flying was like in the 1940s and 1950s. Attention to detail was apparent everywhere. And the beauty of all this is the fact that the DC-3 could still fly! In a way, the Flabob Express was the perfect ambassador for Flabob Airport in Riverside, California.

Flabob Airport is one of California's oldest airports. It was founded in 1925 and is still in use today. In addition to a paved runway, it still boasts a usable grass runway. On just about any given week, you could probably visit and see airplane enthusiasts tinkering with all manner of flying vehicles. The Flying Circus, as it was billed, was the brain child of Dan Newman president of the Flabob Antique Airplane Association who wanted to create an annual Southwest fly-in, or cavalcade, that is similar to ones held at Old Rhinebeck and the Shuttleworth Trust in England. Seeing that the association had the run of the airport, he could do as he wished to pursue a simple goal, to "have fun".

On the very warm, late September morning of the Flabob Flying Circus, "History in the Air", dozens of people were milling about behind yellow ropes waiting for the show to begin. Behind the yellow ropes, I got a close-up view of some beautifully restored airplanes; many were polished and sparkled in the sun. Of the owners and pilots I spoke with, all seemed eager to share their enthusiasm and their passion for these vintage model planes. Some of the airplanes on display included some bright yellow Stearman N2S-3 trainers, a red de Havilland Comet Racer, and a navy blue Caudron Racer. In all, over 100 planes were a part of this inaugural event, with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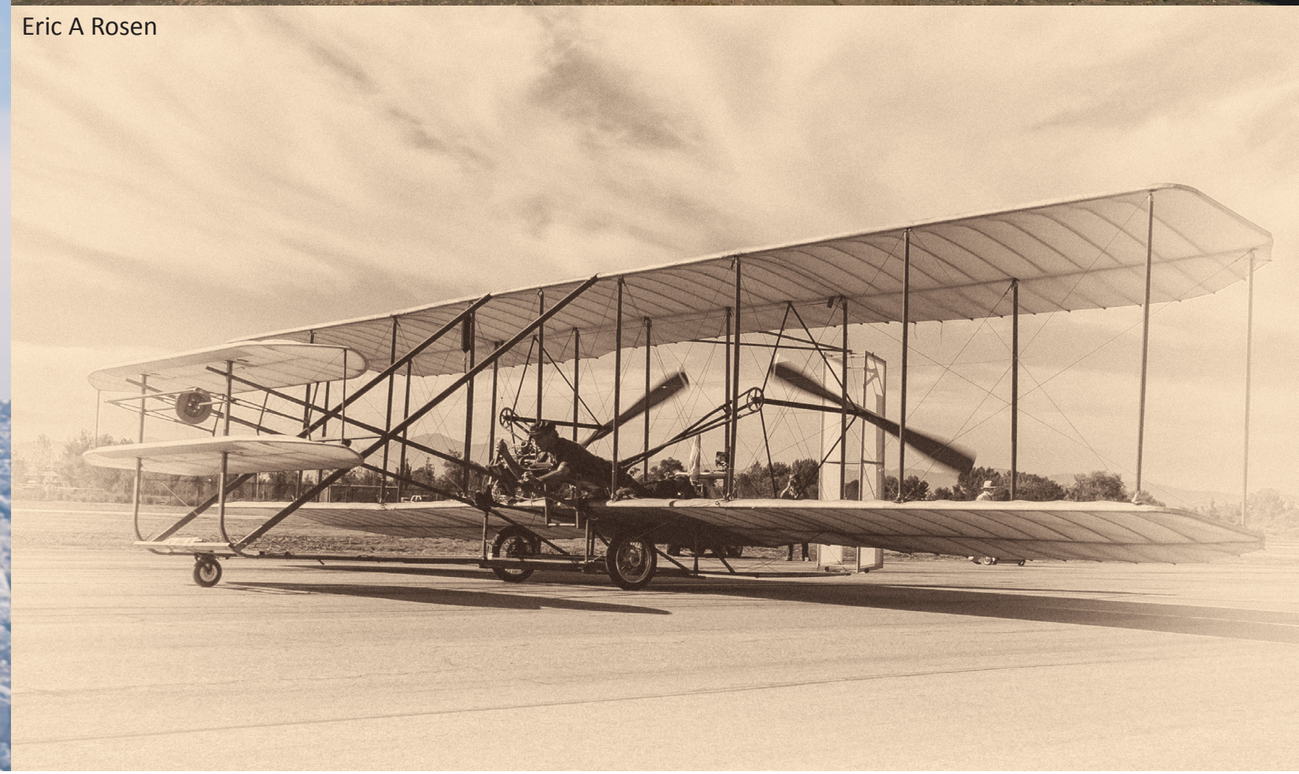
Eric A Rosen

Eric A Rosen

52 of them flying in the cavalcade. Some of the more unique planes were replicas, such as a Wright Bros. Flyer, Frank Schellings JN-4H, a completely restored Curtiss Jenny which included a steerable tail skid, and a German Fokker Tri-Plane. The replica Wright Flyer made a pass on the ground with engines running and then the flying started. All the flying aircraft passed in review according to vintage; they were arranged from the 20s to the 30s to the 40s, with a few warbirds and some home-builts interspersed in the Cavalcade of Flyers. There were a couple of Piper J-3 Cubs, a few different models of Waco aircraft (like the YKS-7, UPF-7, YPT 14, and a 1934 Waco UMF), a Monocoupe, Travel Airs, Howards, and of course the DC-3 "Flabob Express". One of the oldest planes that flew was the "Rainbow Route", a Stinson SMH-1 of 1927 vintage. It is considered the first plane to take passengers for a tour over the Grand Canyon. Inside were ivory curtains and two rows of wicker seats.

The Flabob Chapter of the Antique Airplane Association put together a very fun spectacle. They chose a couple of local aviation enthusiasts as their announcers. For first-timers, Tom "TK" Harris and Frank Bird did a tremendous job calling out the flying aircraft performing and included some history and fun facts about each plane. It was obvious in speaking with the people at the event that they were all gathered there to celebrate their passion of flight. You can tell that just about every plane there, either on display or flying, was lovingly cared for, from the smallest detail on up. The Flabob Airport Foundation should be very proud of this event. Even the backdrop of the mountain in the distance made the event photographically memorable. I truly hope that this event becomes an annual one because I had a ball!

Michael Misorski

AVIATION NATION

AIRPOWER IN LAS VEGAS

Article by Matt Shinavar

It's always interesting how the weather can change from day to day. The weather in Las Vegas on a Saturday in early November was frightfully cold and threatening to rain at a moment's notice; the following Sunday, perfectly blue skies. Such is the life of airshows and the cruelty of choosing one day or another. Airshow goers on Saturday got hammered by the weather, many of them leaving early; those that decided to brave it out were greatly rewarded with the performances and demonstrations at Nellis.

In addition to being home of the Thunderbirds, Nellis also plays host to Red Flag several times a year. Red Flag is an aerial combat training event which usually includes participation by other NATO countries and hosts live fire exercises – training at Red Flag ensures pilots and aircrews are well prepared for the demands of war. This means that not only are airshow attendees afforded an opportunity to see a performance by the Thunderbirds; they also can see the F-15 and F-16 aggressors in their beautiful paint schemes.

The morning part of Nellis' show usually contains a varied group of aerobatic performers and warbirds. There was a Korean War reenactment with an F-86, MiG-15, T-33, P-51, and T-6 Texan. Pyrotechnics were used and the dialogue between the pilots was broadcast to the crowd; a real treat. Following shortly after was a group of CJ-6 Nanchangs, taking to the sky to perform various formations. Bringing the horsepower back out, Clay Lacy performed aerobatics in his Learjet,

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Michael Misorski

barrel rolls, loops, high speed passes, and lots of smoke.

Next the Horsemen Aerobatic Team took off for a demonstration. The Horsemen originally were known for performing in P-51s, but they've branched out into performing in a variety of aircraft. At the Planes of Fame air museum airshow, the Horsemen performed in two Mustangs and a Lightning. At Nellis they performed in three F-86s. Seeing that many Sabres together was unexpected, and seeing them do aerobatics while flying in formation was just that much better.

Shortly after they landed there was a tremendous roar, the ground shook, and a B-1 took to the skies under quad afterburner power. As far as everyone in Southern California is concerned, seeing a B-1 fly is pretty rare. Suffice to say I as well as those around me were very excited to see what the Bone was going to do. It only stayed out for four passes, but oh were those four passes exciting. Afterburners were lit then cooled, wings swept then unswept, and everyone was left in awe. I can see why the show of force is so popular in Afghanistan for quelling minor annoyances.

Then it was time for the air-to-air and air-to-ground demonstrations which have made Nellis quite famous lately. This is how it goes: two aggressor F-16s launch. Two standard USAF marking F-16s and A-10s launch and sit in a holding pattern somewhere; this launch is purely administrative so the show can have a realistic appearance. The aggressor F-16s return, crossing over midfield there are pyrotechnics. The voice over the loudspeaker announces the airfield is under attack, and F-15s launch to gain air superiority. The F-15s take off using both parallel runways, suck up the gear while keeping it on the deck, then pull up hard at the end of the runway dropping flares on a near vertical climb out, simulating the procedure to safely climb out of an airfield under attack assuming an enemy force will be waiting to light up a relatively low and slow aircraft. Flare drops are something special at US airshow, and this alone has caused people to flock to Nellis for the airshow. There is a voiceover of a dogfight to gain air superiority, with the aggressors hauling over the airfield dropping flares with USAF F-15s and F-16s in close pursuit. This goes on for a couple minutes before the ground battle commences. F-15Es and A-10s engage in simulated bombing runs complete with pyrotechnics. Search and Rescue forces come out in Blackhawks to do a simulated rescue of a downed pilot; the low level helicopter operations are truly impressive. After the helicopters are clear, the jets come back lined up with their wingman, all on the same side again. Gratuitous breaks over the runways follow while landing order is established.

After all the aircraft from the air-to-air and air-to-ground demonstration were recovered, an F-22 launched for the awe inspiring Raptor demo. It seems like every other fighter in the inventory performs a demo that includes high speeds, circuits around the airfield, climbs, turns, rolls, and a handful of other standard aircraft maneuvers. The F-22 does just about none of those. It seems like the whole performance is in front of the crowd. Some of the maneuvers really need to be seen to be believed. Climbing to the vertical, shedding just about all the airspeed, and then pulling back hard to do a complete loop in what appears to be two fuselage lengths in diameter. It's astonishing. The demo just must be seen. After the Raptor demo finished up, the F-22 joined up with a P-51 and two F-86s for a heritage flight. I've seen a lot of heritage flights before, a lot including an F-22, but never one with two F-86s.

Finally, the pièce de résistance. The Thunderbirds commenced their performance, which starts before the pilots even get to their jets. As usual, the Thunderbird performance is nothing short of spectacular. Between the maneuvers performed by the diamond and the maneuvers performed by the individual solos, it's an all-around good show. Another fun treat: apparently those standing around me didn't expect the sneak pass and my huge lens focusing on the solo pilot burning down on the crowd wasn't enough of a hint; an F-16 low, fast, and close while at full throttle is something memorable if you're not expecting it. The final sneak pass, and Thunderbirds performance, of the year grabbed everyone's attention and ended the show with a bang.

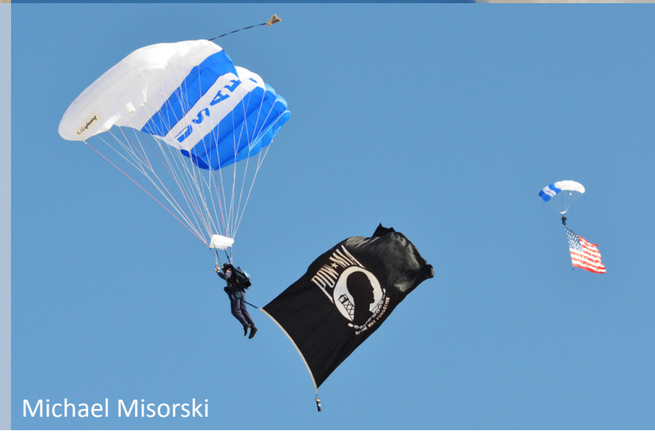
Many thanks are due to everyone at Nellis Air Force Base, the US Air Force, and hundreds of others who all came together to make the Nellis Airshow another successful aerial demonstration. I know I cannot wait until next year for the airshow at Nellis to come back.


Matt Shinavar


Michael Misorski


Michael Misorski


Matt Shinavar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REPORTS FROM THE FIELD

We have some of the best airshow photographers helping us bring you amazing photographs and informative reviews from airshows all over North America and even the world. The following pages are stuffed with this outstanding coverage of recent airshows and aviation events.

If you would like to see your own photos and reviews here, just contact us and ask how to contribute. The only requirement is a passion for aviation!

Chico Airshow - Chico, CA

Photos by Mark E Loper

Kaneohe Bay Airshow - MCBH Kaneohe Bay, HI

Photos by John Nyren


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315


Blue Angels


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AIR FORCE RESERVE COMMAND

McConnell AFB Open House and Airshow
McConnell AFB, KS

Photos by Jeremy Hampton


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CamGuard
LINCOLN ELECTRIC
Goodyear
Cleveland


OAKLEY

Fort Worth Alliance Airshow - Fort Worth, TX

Scott Fischer

Brandon Thetford

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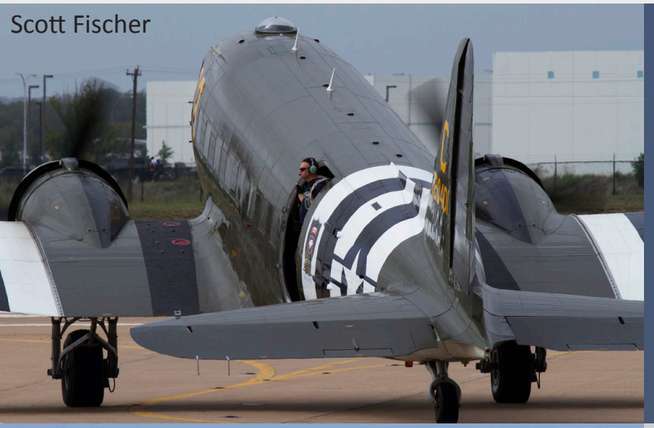
Scott Fischer



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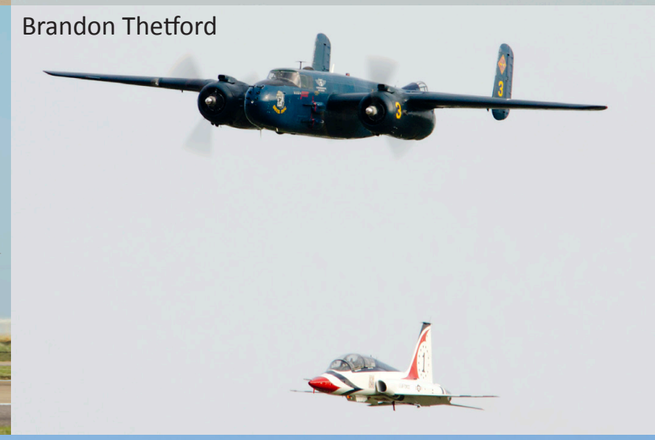

Brandon Thetford

Brandon Thetford

MCAS Miramar Airshow - MCAS Miramar, CA

Article by Sean Sydnor

Sean Sydnor

The skies above Marine Corps Air Station Miramar were busy again in the middle of October as one of the world's largest military airshows brought hundreds of thousands of fans out to see the spectacle of flight. With such a great legacy of fantastic shows in past years, Miramar had to uphold their reputation once again this year and they did not disappoint. All four branches of the US Armed Forces were represented. This year's show was later than most and while some were worried that the weather would impact the show, this turned out to not be the case. The field was packed each day as people celebrated this year's theme of 50 years of Space Exploration!

The 2012 air show was conveniently broken up into civilian flying in the morning and military (with the lone exception of Sean D. Tucker) demos in the afternoon. The morning program was highlighted by various civilian acts that included the Patriots Jet Team, who made their first appearance at the show since 2009.

The afternoon portion of the show started with the United States Army's Golden Knights, accompanied by members of the Navy Leap Frogs, jumping from their Fokker C-31A Troopship as the USMC band played the national anthem. With this being a celebration of the 50th year of space exploration, it was very fitting that the current director of NASA, Retired USMC Major General Charles Bolden Jr., gave the opening comments for this year's show. Mr. Bolden was the pilot on the Space Shuttle mission aboard the Discovery (April 24, 1990) which launched the Hubble space telescope and set an altitude record at 640 kilometers. He was also the pilot on Columbia (January 12, 1986) and Atlantis (March 24, 1992); and mission commander on Discovery (February 3, 1994). The crowd was also given a very inspiring speech by Major General Sturdevant, who had just returned from Afghanistan. During his comments, Maj Gen Sturdevant told the crowd about two very brave Marines who had recently made the ultimate sacrifice, Lt. Col. Christopher Raible and Sgt. Bradley W. Atwell. These two Marines were assigned to the 3rd MCASW and were unfortunately killed in Afghanistan while trying to fight off an attack by insurgents.

Shortly after the Marines had impressed the crowd with their music, they blew the crowd away with their firepower in the MAGTF demo. The Marine Air-Ground Task Force Demonstration displays the coordinated use of close air support, armor, artillery, and infantry forces. The demo includes F/A-18 Hornets, AV-8B Harriers, KC-130 Hercules, CH-53 Super Stallions, CH-46 Sea Knights, AH-1Z Vipers, and UH-1Y Venoms. See page 10 for more details on the MAGTF demo.

After 30 minutes of high intensity Hoorah from the United States Marine Corps, the United States Air Force showed their stuff with the amazing F-22 Raptor. Major Henry "Schadow" Schantz amazed the crowd with his impressive performance. The Raptor was then joined in flight by a P-51 to perform the USAF Heritage Flight.

Next, the lone the civilian performer in the afternoon section of the show, Sean D. Tucker, took to the skies above San Diego. Tucker had been a regular at Miramar before, flying his custom made Red Oracle Challenger III bi-plane performing maneuvers such as the triple ribbon cut and the Harrier pass.

After Sean D. Tucker impressed the crowd with his performance, it was the United States Navy's turn to show off their F/A-18 Super Hornet.

The highlight of the Rhino's demo this year was its .99 Mach high speed pass achieved during the Friday show. With the high amount of water vapor in the air as the Super Hornet approached the speed of sound, a very distinguishable vapor cone appeared around the tail section of the aircraft. Not to be outdone, the Marine Corp hosts put up their AV-8B Harrier jump jet. As always the extremely loud vertical landing is a crowd favorite at Miramar.

To finish up the daytime show, the United States Navy Blue Angels put their blue and gold jets into the sunny Southern California skies. For the past few years, the Miramar show is a sort of "Homecoming" for some of the team. Starting off with Fat Albert, piloted by Capt. John Hecker and the all Marine Corp crew, Fat Albert flew an amazing 10 minute demo which includes a high angle takeoff and a step approach to landing. This year's Blue Angel performance was very special as this was the last time Miramar would be blessed to see Blue Angel #1, Capt. Greg McWherter. Capt. McWherter will probably go down as the most memorable Blue Angels commander in the history of the Blue Angels. It has been this writer's honor to see this man lead the Blue Angels the last three and a half years. The Blue Angels put on a spectacular show and dedicated it to the two Marines mentioned earlier who were recently killed in combat in Afghanistan.

The 2012 MCAS Miramar Air Show was a fine show as always. The Marines pulled out all the stops and welcomed hundreds of thousands of people from not only just Southern California, but all of the United States and the world.

Christopher Roberts

Eric A Rosen

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Eric A Rosen

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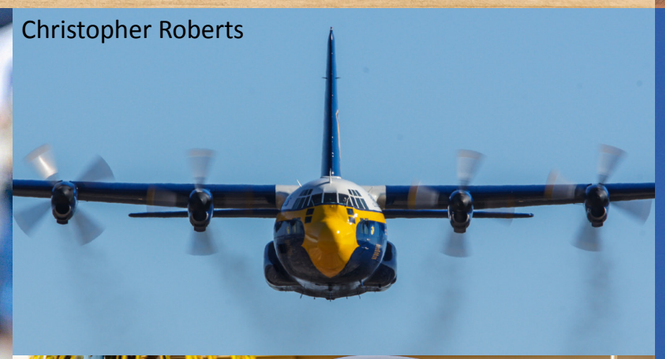
Sean Sydnor

Christopher Roberts



Eric A Rosen

Christopher Roberts

Apple Valley Airshow - Apple Valley, CA

Article and Photos by Matt Shinavar

Apple Valley airport is a smaller, uncontrolled, airport in the high desert of Southern California. The same high desert that aviation history calls home. From Chuck Yeager breaking the sound barrier over what is now Edwards AFB to Scaled Composites and Spaceship One's sub-orbital flight, including planes without people in the flight testing and development of Predator-series UAVs. To say something aviation related is happening every day in this region is a gross understatement.

The airport is relatively small in population, but to take inventory of the aircraft hidden in all the hangars would be quite the exciting venture. With a permanent aerobatic box less than five miles from mid field, there always seems to be an Extra or Edge wandering about the airport. Being a small airport offers a number of advantages for pilots on a daily basis and for photographers during the airshow. Everyday operations are a dream for pilots. The whole airport is a close knit community, with what seems to be a perpetual barbecue burning. Pilots more or less have the flexibility to fly as they please, not having to coordinate everything through the tower.

On airshow day, KAPV being my local airport meant I entered through a non-public entrance for unparalleled access to the aircraft that had flown in. The N9M Flying Wing is a rare airplane, one of one remaining, and it taxied past no more than 20 feet away. A B-25 out of Planes of Fame air museum provided relief from the sun while standing out on the ramp. As Tim Just taxied his Extra 300 out, he stopped right in front of me which presented a problem since my wide angle lens had difficulty getting it all in – his wing tip was less than ten feet from my lens hood. This is small airport life, and a good life it is.

There are of course downsides to being a small airport, and it just doesn't have the draw of a large airport airshow. Lucky for Apple Valley, they fall under the jurisdiction of the San Bernardino County Department of Airports – same as Chino and the Planes of Fame Air Museum. The Planes of Fame crew came out in force, being a short 20 minute flight away. For those not entirely familiar with Planes of Fame, their collection is rare and extensive. Jumping in the planes and showing up means they're going to roll in with a Lightning, FW-190, Warhawk, Mustang, and a B-25, apparently.

The airshow started off with a demonstration of formation flying by five Van's RVs flying a standard traffic pattern with a formation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change on every orbit. The show continued with a dazzling aerobatic performance by Tim Just, an amazing aerobatics performer having represented the United States in past competitions. Following Tim was Rob Harrison the Tumbling Bear in his Zlin 50 performing more aerobatics.

The Flying Wing took to the skies shortly thereafter, wowing the crowds with 1940s technology that still has a modern look to it. The flying wing did a number of passes in all different attitudes so people in attendance could get a good look at all angles of the strange aircraft.

Following the return of the aerobatic performers, three of the POF warbirds took to the air; the P-40, FW-190, P-51. The three-ship performed what seemed like 20 orbits of the airport ensuring everyone could get a good look at these increasingly rare aircraft. The three also changed their positions in the orbit, with the Mustang forming up on the FW-190s left wing while the P-40 watched from the back. The P-51 was flown by Steven Hinton Jr., fresh off his Reno Air Race Unlimited Gold win a couple weeks prior.

After the warbirds landed, Mike Mangold took off in his L-29 Delfin. Mike races this L-29 at Reno and, as everyone found out at the airshow, performs aerobatics in the aircraft. The aerobatics is not all that surprising considering Mike competed on the Red Bull Air Race circuit for a number of years, placing first twice.

Overall, the Apple Valley is a well put on show for a smaller airport. Many thanks are due to everyone that worked to make the Apple Valley airshow a success. We'll see you out there next year. AS

Wings and Waves Airshow - Daytona Beach, FL

Charlie Lai

Charlie Lai

Charlie Lai

Eric W Miller

Eric W Miller

Charlie Lai

Charlie Lai

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Charlie Lai


Charlie Lai

Eric W Miller


Charlie Lai

Charlie Lai

Rotorfest - West Chester, PA

Photos by Steven King


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COAST GUARD

The Great Pumpkin Fly-In - Bethel, PA

Article and Photos by Ryan Tykosh

Just off I-78 in the small town of Bethel, PA lies a small airport known as Grimes Field. This airport, which you could drive by without even realizing it, is the home of the Golden Age Air Museum. The museum is home to various WWI and Golden Age era planes like the Fokker Triplane and Curtiss Jenny, and is in the process of restoring a SPAD XII. On October 20, the museum hosted its second annual fall fly-in and pumpkin bombing event, where pilots compete against each other and test their targeting skills by tossing pumpkins out of their planes at targets set up along the grass runway.

Unfortunately, due to the heavy rains in the days preceding, the field was soft and muddy, and many pilots ended up having to pull their planes out of the runway. These conditions led the museum to decide against flying their rare aircraft for fear of irreparable damage to the planes or pilots. However, many pilots braved the muddy runway in their own rare vintage and home-built aircraft and flew some nice patterns, giving low passes and attacking targets with their pumpkin bombs. Among the aircraft present were a Super Decathlon, a few Piper Tri Pacer and Cub variants, three Bucker Jungmeisters, the museum's Waco and the odd looking Breezy, a Nanchang CJ-6, a YAK-52, three RVs, and countless Cessna aircraft.

In all, it was an enjoyable and unique trip back in time to the Golden Age Great Pumpkin Fly-In. The surroundings clearly recall a time many have forgotten, and give a great appreciation for the aviators and machines of flight's early days. To learn more about the museum, visit:

www.GoldenAgeAir.org


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Scott Fischer

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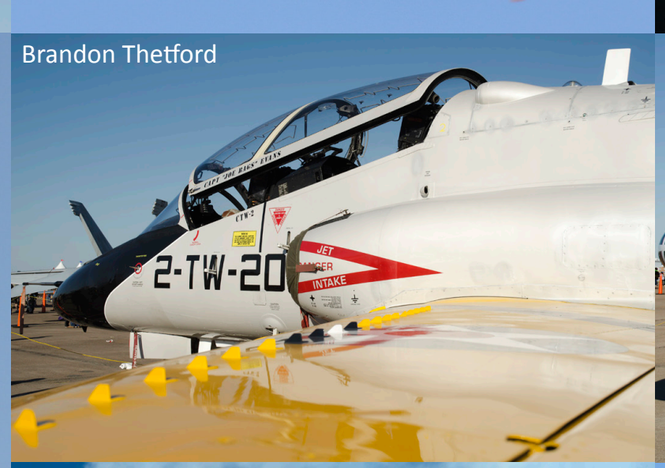

Brandon Thetford

Scott Fischer

Brandon Thetford

Scott Fischer

Scott Fischer

Scott Fischer


Andy Nixon


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Sam Bulger


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Brandon Thetford

Brandon Thetford

Warbirds Over Monroe - Monroe, NC

Photos by Ricky Matthews


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Wings Over Homestead - Homestead ARB, FL

Photos by Charlie Lai


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Jacqueline Cochran Air Show - Thermal, CA

Photos by Eric A Rosen


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