

# AFA 335

## TENNESSEE VALLEY FLYER

### **AirVenture 2019**

*Take a peek into the air extravaganza which is Oshkosh.*

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*Host a living legend from the Apollo space program.*

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*One of Huntsville's own reaches the National stage.*

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## F-4 AND F-111 RESTORATION - "MISSION ACCOMPLISHED"

by John Phillip

The restoration effort for the Aviation Challenge's F-4 and F-111 aircraft was completed in mid-July. The newly restored aircraft are now two shining jewels on the Aviation Challenge Campus.

Tennessee Valley AFA Chapter 335 President, Rick Driesbach, commented, "Our chapter has talked about generating an effort to restore these two aircraft for the past three years. We are so happy that the restoration of these heritage aircraft has finally been completed. It was simply amazing how so many pieces of a large puzzle came together in that last eight months. The real success of this restoration is the wonderful partnership that was built between our AFA chapter and the US Space and Rocket Center. I am sincerely grateful for the bond of cooperation that was built between the two organizations. Most importantly, together we have produced two restored aircraft that simply look beautiful. Actually, they look like they are ready to head down the runway and support a vital US Air Force mission."

The chapter lead for the restoration was Bryan Bennett, who searched for candidate contractors that specialize in aircraft restoration. Bryan Bennett came upon Steve Wagner of "Display Aircraft", a unique aircraft restoration company. Bryan offered the following assessment about the initial visit by the contractor. "First, Mr. Wagner's reputation preceded him as a capable and skilled restoration contractor. Second, Mr. Wagner gave everyone high confidence for upgrading the current condition of the two aircraft. Eventually, he received the contract with the Space and Rocket Center and his remarkable work bore some marvelous fruit."

A number of photos below clearly show the before and after condition of both the F-4 and F-111. The photos show how important and timely this restoration project was before serious and irreparable damage would have occurred to the aircraft.

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**Before and After Photos of the F-4**

President Driesbach commented on three areas where a chapter member provided invaluable technical skill and fabrication support for the two aircraft, “I want to express my deepest appreciation to chapter member Billy Ondrusek and SSgt Tyler Dowland for the superb assistance that they gave to this project. First, they were able to procure gas caps for the two wing tanks on the F-4 from active duty sources. Second, they made and installed metal covers on four areas of the F-111 that had been damaged or where small panels were missing. Third, they fabricated and installed a brace under the nose landing gear of the F-111. Previously, the front weight of the aircraft rested on the nose wheels which had lost their pressure and collapsed. All three of these tasks were outside of the restoration contract and would have left some serious deficiencies with the two aircraft. We are so fortunate that Billy and SSgt Dowland had these unique contacts and skills. We were also fortunate that they were able and willing to bring their fabrication skills to support critical pieces of the restoration project.”

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Before and After Photos of the F-111



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**There is even one more fantastic piece to this restoration story...**

In working on the two aircraft, Mr. Wagner, of Display Aircraft, became aware of the condition on other Air Force display assets on the Aviation Challenge campus and made two recommendations. First, the paint on the canopy on the F-16, which had only been on display for two years, was deteriorating. Mr. Wagner offered to refurbish and repaint the canopy at no charge. Second, he offered to refurbish the Air Force Hound Dog missile on the Aviation Challenge Campus for a very nominal fee since he was already on site for work on the two aircraft. Because the Hound Dog restoration was not part of the USSRC contract, our chapter offered to solely cover the cost of the refurbishment of the Hound Dog. The Space and Rocket center accepted our offer to refurbish the Hound Dog.

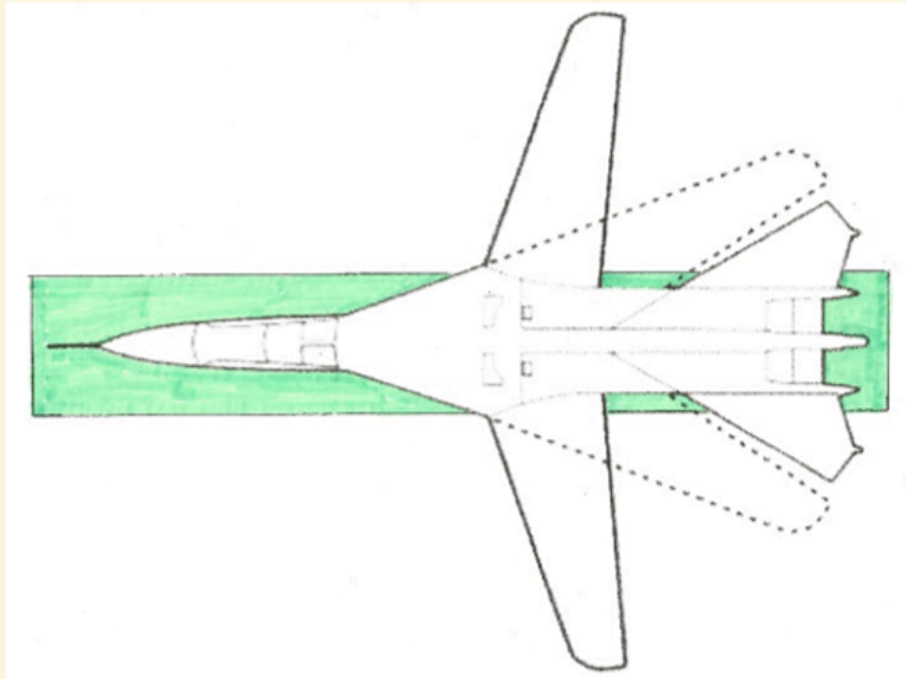
The Hound Dog was a stand-off, supersonic cruise missile carried on B-52 aircraft during the 60's and into the mid 70's. It is one of a number of unmanned aircraft on display on the Aviation Challenge campus. Note that the tail number on the missile is "00335", which is also the number of our AFA chapter number - an amazing coincidence. Our chapter can be especially proud of being solely responsible for the restoration of this unique Cold War heritage asset.



**North American AGM-28 Hound Dog at the USSRC**

**One portion of the Restoration Effort Remains**

The F-111 simply sits on the Aviation Challenge lawn. This has been a source of concern for the aircraft. Damage by contact with lawn mowers and also debris from the lawnmowers has been a problem for the proper care of the F-111. On August 30, chapter members Lee Smith and John Phillip met with Ed Stewart, the Director of Exhibits and Curation for the Space and Rocket Center. They reviewed and discussed options for protecting the F-111 by creating a landscape feature under and around the aircraft. The attached diagram shows a minimum landscape option. Additionally, options are being reviewed that would provide a landscape feature some distance around the whole circumference of the aircraft. All options involve some fill material inside a buffer zone that will be enclosed by a solid, ground-level barrier which will separate the landscape area from the grass. All options are being evaluated for cost, effectiveness, and longevity. The landscape project will be initiated and managed by the Space and Rocket Center with assistance by our chapter.



**Proposed landscape option for F-111 static display.**



**US Space and Rocket Center (USSRC) and AFA chapter partners recognize the restoration as done and paid for. L to R: Lee Smith, Bryan Bennett, Ed Stewart (USSRC), Rick Driesbach, Schelly Corry (USSRC), Zyg Jastrebski, Billy Ondrusek.**

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**AirVenture 2019**

by Ken Philippart (Images by Lisa Philippart and EAA)

Members of the Tennessee Valley Chapter attended the world's largest aviation gathering, the Experimental Aircraft Association (EAA) AirVenture in Oshkosh, Wisconsin from July 22 - 28. For the second consecutive year, chapter members met for pictures and socializing while enjoying all that AirVenture offered.

AirVenture celebrated its 50th anniversary in Oshkosh this year. Over 640,000 people made the pilgrimage to Oshkosh in 2019, a new attendance record.

Over 10,000 aircraft ranging from operational military aircraft, homebuilts, vintage warbirds, antique general aviation aircraft, ultralights, unmanned aerial vehicles, and powered parachutes converged on Whitman Field for the annual celebration of all things aviation. Daily airshows included military flybys, aerobatics, vintage warbird formations, World War II reenactments, parachuting teams, and commemoration of events such as the 70th anniversary of the legendary T-28 trainer and the Year of the Fighter. The Apollo 11 50th anniversary celebration featured a presentation by Apollo 11



*USAF F-22 Raptor at AirVenture*



*Col Bud Anderson, highest scoring, living WWII ace, served as Grand Marshall of AirVenture's Annual Salute to Veterans Parade.*

Command Module pilot Michael Collins and his long-time friend, X-15 pilot and astronaut Joe Engel. Two evening airshows capped the performances with aircraft equipped with LEDs and fireworks dispensers followed by a fireworks show culminating in AirVenture's unique Wall of Fire with a new fireball display this year. The EAA also held its annual Salute to Veterans parade with each veteran receiving a commemorative hat and challenge coin and then marching together by service from the Warbirds area to the show's central plaza to cheering crowds of spectators.

Aviation legends Dick and Burt Rutan, World War II triple Ace Col Bud Anderson, and Tuskegee Airman Colonel Charles McGee spoke about their experiences, helping aviation history come alive for AirVenture attendees.

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Chapter member Lisa Philippart and Susan Mallett also participated in WomenVenture, the 12th annual celebration of female aviators and aviation enthusiasts at AirVenture. Activities included a group photo in front of the Boeing 787 Dreamliner, the WomenVenture Breakfast, and a luncheon with guest speaker Air Force Lt Col and Iraqi War A-10 pilot Kim Campbell.



*WomenVenture 2019 participants (image by EAA)*

There is an abundance of things to do at AirVenture, but Chapter 335 members again made time to meet at Oshkosh's historic Roxy Supper Club. Susan Mallett arranged dinner with a diverse group of aviation enthusiasts including 3-time US National Aerobatic Champion and retired Southwest Airline Captain Debbie Rihn-Harvey, Korean War pilot Lt Col Bob Haver, and members of the Civil Air Patrol. The stories and passion for flight shared by this group of aviation experts made for an enjoyable evening befitting AirVenture's moniker as an "aviation family reunion."

Chapter members enjoyed their second AirVenture adventure and are making plans to return next year. See you in Oshkosh!



*Air Force Heritage Flight F-22 Raptor, P-51 Mustangs, and A-10 Thunderbolt II fly in formation over Oshkosh.*



*(l to r) Susan Mallett, past national aerobatic champion Debbie Rihn-Harvey and Lisa & Ken Philippart at the Roxy Supper Club.*



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## A Day With a Legend

by Burke Hare

The US Space and Rocket Center honored Tennessee Valley AFA Member Burke Hare, Lt Col, USAF (Ret) with the privilege of serving as the Escort or “Handler” for Lieutenant General Thomas P Stafford, USAF, (Ret) during the festivities associated with the 50th Anniversary of the Apollo 11 Moon landing between July 15 and 16, 2019. Burke Hare escorted General Stafford throughout his stay in Huntsville, Alabama, making sure the General’s needs were met before, during, and after the Apollo Ceremonies. In addition to his primary duty to General Stafford, Burke found himself taking part in escorting Colonel Al Worden, USAF (Ret) (Command Module Pilot for Apollo 15 moon mission), Colonel Jack Lousma, USMC (Ret) (Skylab and Space Shuttle) and his daughter, Dr. Ed Gibson, (Skylab) and Dr. Gibson’s spouse, the family of the late Admiral Alan Shepard (First American In Space & Commander Apollo 14), the family of the late Captain Alan Bean, USN (Ret)

(Apollo 12 and Skylab), and the family of the late Dr. Werner Von Braun.

An USAF Fighter Pilot and Test Pilot, General Stafford was selected in the Second Class of National Aeronautics and Space Administration (NASA) Astronauts behind the Original Mercury 7 Astronauts. During the Gemini program, a pathfinder for the Apollo Moon Missions, General Stafford served as the pilot of NASA Gemini Mission 6A, and commanded NASA Gemini Mission 9.

In May, 1969, General Stafford commanded the Apollo 10 Mission to the Moon, known as the lunar landing “Dress Rehearsal” with command module “Charlie Brown” and lunar module “Snoopy”. Accompanying General Stafford on Apollo 10 were Captain John Young, USN, the future Commander of Apollo 16 lunar landing mission and Captain Gene Cernan, USN, the future Commander of the final lunar landing mission, Apollo 17. General Stafford with Gene Cernan flew the lunar module “Snoopy” to within 47,000 feet of the lunar surface, achieving all Apollo Program goals with the exception of landing on and launching from the lunar surface. Apollo 10 paved the way for the successful Apollo 11 first lunar landing mission in July 1969.

General Stafford’s final mission was the Apollo-Soyuz Program—the first joint US-Soviet Space mission. On July 15, 1975, General Stafford commanded the final Apollo flight with his fellow American crewmates, Deke Slayton, (Major, USAF and Original Mercury 7 Astronaut), and Vance Brand (US Navy) on board. Two days after launch, General Stafford, then an Active Duty US Air Force Brigadier General, successfully docked with a Soviet Union Soyuz spacecraft manned by Soyuz Commander, Alexei Leonov (first human to walk in space) and his crewmate



VIP Astronauts (l to r), Al Worden, Jack Lousma, Lt Gen Stafford, and Dr. Ed Gibson, pictured during the 50th Anniversary of Apollo 11 event.



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Soyuz flight engineer, Velari Kubasov. Upon docking, Stafford and Leonov exchanged handshakes culminating in the world's 1st international rendezvous and docking and paving the way for future international cooperation in space.

In November 1975, Lt Gen Stafford left NASA and returned to the USAF assuming Command of the Air Force Flight Test Center at Edwards AFB, CA. General Stafford was directly responsible for the management of the flight program which ultimately became the F-117 Program. In 1978, General Stafford's Air Force Career Culminated as the Deputy Chief of Staff, Research Development and Acquisition, where he advocated for programs which became the Peacekeeper ICBM and the B-2 Spirit Stealth Bomber. General Stafford retired from the US Air Force in 1979, as a bona fide US Air Force legend.

Needless to say, taking care of General Stafford remains an extraordinary and humbling experience for Burke Hare. Burke, a retired Air Force Space and Missile Officer related that he asked General Stafford what is was like to ride on top of a Titan II Intercontinental Ballistic Missile (ICBM) into Space during the Gemini program. General Stafford replied "I rode (Titan II ICBM to Space)

Twice.....It was a kick in the pants." General Stafford further elaborated, "The (Apollo 10) Saturn V Rocket took 10 minutes and 32 seconds to reach orbit. With Titan II, I reached orbit in 5 minutes." When the Apollo Celebration ended, General Stafford looked at Burke Hare and said "Boy, I am sure glad I came, Kennedy Space Center was twisting my arm off to be with them today, but I told them —No I am going to Marshall (Huntsville) because they got us to the Moon!" An experience to be forever remembered!



*Burke Hare (l) shakes hands with Lt Gen Stafford (r) earlier this year at an event in Colorado Springs.*



*(l to r) Francis French (Co-Author of Al Worden's Autobiography), Al Worden, and Burke Hare*



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**Driving the Mighty Raptor**

by Col (ret) Daron J. Drown

Former Commander, F-22 Combined Test Force, Edwards AFB, CA



Acquisition lore has it that the initial requirement for the F-22 Raptor was to be “twice as capable as the F-15C.” Early in my government career, I would not have believed that requirements could begin in such caveman fashion. Now I consider it plausible--even likely. Fast forward three decades from the first F-22 requirements discussions, and my assessment is that the Raptor has:

1. 1.0 x the Eagle’s weapon load (albeit carried internally for stealth)
2. 1.0 x the Eagle’s fuel (in terms of effective play time and combat radius)
3. 1.5 x the Eagle’s speed
4. 2.0 x the Eagle’s protected geography (or lane width) in a defensive counter-air mission
5. 3.0 x the Eagle’s slow speed maneuverability
6. 4.0 x the Eagle’s sensing capability
7. Much smaller radar signature than the Eagle’s

The primary factors that drive employment tactics in the Raptor, as compared to the F-15C, are #1, 2, 6, and 7 in the list above (the extremes of the comparison spectrum). If the Eagle were an ancient warrior-archer on horseback, the Raptor is that same archer on a similar horse with the same number of arrows in his quiver, but with four times the eyesight and effectively camouflaged. But with 4x better eyesight, wouldn’t it be great to have four times the weapon loadout? If I can see more threats, I want to shoot more threats, but my magazine of 8 missiles quickly runs dry (even fewer missiles when a pair of Joint Direct Attack Munitions (JDAM) are carried).

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*U.S. Air Force photo*

This disparity between the Raptor's sensing power and weapon load hastened the evolution of the F-22 as a battle management platform. First, the F-22 pilot is almost completely freed from tedious sensor management. In two years flying the Raptor, I can count on one hand the number of times I commanded the radar elevation or azimuth to change. And the passive sensors are completely automated. As much as I hate to say it, the display of sensor-fused information to the pilot really is like a video game, freeing the human to focus on higher level tactics and strategy. Second, the Raptor's incredible 360 degree sensing capability enables the Raptor driver to see and then communicate the threat picture to blue forces. This potent capability was clear even on my first Raptor flight before leaving the ground. While waiting in the arming area at the end of the long Edwards AFB runway, I glanced at the primary situation display (God's-eye view) and I could see most of the aircraft in the local airspace. And my radar wasn't even transmitting yet.

But there exists one huge limitation to Raptor battle management effectiveness: the F-22 is data-linked only to other F-22s. It cannot directly pass data to legacy fighters, AWACS, nor even its close cousin the F-35. And as sensing capability and data sharing needs increase in successive aircraft generations, passing large quantities of information via human voice is untenable. High bandwidth data links are vital.

This unfortunate data-sharing constraint results from perfectly explainable factors. Stealth requires you to keep your eyes and ears open but your mouth shut. Look and listen, but try not to "talk" (send data signals in all directions or transmit radar energy). And if you have to "talk," do so in a whisper with your hands cupped around your mouth. This makes the Raptor more difficult to find and keeps knowledge of Raptor sensing capabilities from getting into the wrong hands. For these reasons, the Raptor shares information within a flight of four F-22s very effectively and stealthily, but no else gets in on the conversation. Band-aids to this problem have included gateway aircraft to "launder" F-22 data and share it on more common datalinks. Today we are burning significant calories trying to fully solve the stealthy data sharing challenge. While technically feasible options exist, they are yet to be funded.

To its credit, the Raptor's capable inter-flight data link enables great flexibility in combat formations and tactics. The traditional F-15C fighting formation was a 2-ship or 4-ship line-abreast visual formation, with one to two miles between each jet. A flight lead and his wingman had to visually check each other's six because there was no sensor coverage to the rear. But the Raptor's 360 sensor capability means visual formations are often not required, and today's tactics involve two or four F-22s spread out in much wider non-visual formations. Verbal brevity communication has also evolved, as the data link shares position, altitude, direction, fuel state, weapon state, and importantly, who is targeting whom. Human voice merely fills in the information gaps.

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A small example of how the F-22 design elevates the pilot to battle manager, freeing him from unnecessary system details: the engine instruments are completely hidden from the pilot under normal display configurations. Imagine not worrying about exhaust gas temperature, RPM, and nozzle position, even while moving the throttles from stop to stop at any altitude and airspeed. As a testament to the reliability of the Pratt and Whitney F119 engines, the only engine parameter a Raptor driver might occasionally glance at after takeoff is Percent Thrust.

What about stealth? The F-22 pilot maintains constant awareness of the signature he is presenting to adversaries, aided by the Raptor's computers which graphically display model predictions of real-time signature. One key feature that contributes to Raptor stealth but doesn't make headlines is doors. Doors are everywhere on the Raptor exterior, hiding a host of otherwise radar-reflecting objects. The 20mm rotary cannon (similar to that on the F-15) is hidden behind a door which opens only when the gun is fired. Flares? Behind a door. Tail hook? Also behind a door. But doors are complex and add weight, so nearly all routine maintenance touch points on the jet are located in areas exposed by the landing gear doors or side weapon bay doors, which are normally open on the ground. Fuel, oil, hydraulics, exterior circuit breakers--all are accessible without dedicated access panels.

While the F-15C was billed as a Mach 2 fighter, the reality today is that F-15C has a hard time getting above Mach 1.5 because of de-tuned engines (to increase service life). And the F-15E with larger and newer motors is bristling with bomb racks and conformal fuel tanks, also making it difficult to fly much above Mach 1. F-15s have a service ceiling of 50,000 feet, but it takes some effort to get above 40,000 feet. In contrast, the Raptor routinely and easily achieves Mach 1.5, and it's not difficult to reach 60,000 feet and Mach 2.



*Wikimedia Commons photo*

High altitude flight puts the F-22 pilot at greater risk of not surviving a rapid decompression event, rare as this might be. In a decompressed cockpit at 60,000 feet, the Raptor has to push oxygen into the pilot's lungs at very high pressure to keep the partial pressure of oxygen high enough to sustain consciousness. To prevent the pilot's chest from exploding, Raptor drivers wear an upper pressure garment to contain the chest in the event of a decompression. This vest also marginally helps with high-g flight, partially inflating under elevated g-load at all altitudes. Unfortunately, some aspects of this upper garment contributed to the much publicized F-22 hypoxia problem eight years ago. After several years of intense investigation, a smoking gun was not found. But some fixes to likely underlying causes were implemented, and as a result the upper pressure garment now has an improved valve.

Flying high and fast enables the Raptor to sling missiles and bombs at greater range, providing stand-off from defended air and ground targets. A JDAM will fly a long way from 60,000 feet and Mach 1.5! The air-to-ground mission was added to the Raptor late in development to save the program from cancellation. The nation's purse could not tolerate such an

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expensive single-role fighter. Today, the Raptor has dropped bombs in combat (Syria), employing 1,000-lb JDAMs. Lacking a targeting pod or integrated laser designator, the F-22 is limited to GPS and self-guided bombs, including the Small Diameter Bomb (SDB).

Another point of contrast between the venerable F-15 and the Raptor is the position of the pilot's control stick. The F-15 and F-18 are likely the last fighters to use a center stick, for several reasons. First, fly-by-wire technology first fielded in the F-16 allows placement of the stick anywhere in the cockpit. And the space between your knees is prime real estate—a side stick enables a clear view of the displays which are vital for information-dominated warfare. Second, a side stick is lighter and more comfortable on long missions. But there was one advantage of a center stick that I missed: in a right-turning dogfight I could fly left-handed, using my right arm as leverage on the canopy rail to twist my head and shoulders farther to the right to see behind me. But like most fighter pilots, I claim to have rarely needed to check six.

It's important to note that on the Raptor and fly-by-wire aircraft generally, the control stick and foot pedals do not control specific aerodynamic control surfaces. Notice I did not use the term “rudder pedal.” Instead, the pedals are used to command yaw, and the computer decides which surfaces are best for producing yawing moment, depending on speed and angle of attack. For example, consider the F-22's famous “helicopter turn”. Pull the nose up, slow down until the stick is full aft, and feed in full left or right pedal with control stick laterally centered. The Raptor will settle into a 60 degree angle of attack near vertical descent, yawing with wings level as long as you like. The control surfaces working the hardest during this maneuver are the aft wings which move independently and aggressively. At



*U.S. Air Force photo*



*U.S. Air Force photo*

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slow speed, differential stabilator is your primary roll control (not the ailerons). And at high angle of attack, roll induces yaw due to yaw-roll coupling. So in the “helicopter maneuver” (or pedal turn), the horizontal stabilators are providing pitch, roll and yaw control, often banging stop-to-stop while the airframe remains stable in the pilot-commanded attitude. Impressive to experience, a great demonstration of the control laws at work in the Raptor, but not very useful in combat.

Thermal challenges are common on stealth aircraft. The computers and motors are powerful, generating immense heat energy. But the skin is tight, with minimal openings for air to enter and escape. As in legacy fighters, the fuel is used as a heat sink in the F-22, absorbing thermal energy until the fuel is burned to produce thrust. A dizzyingly complex system of heat exchangers and pumps manages all of this. Heat energy from the main computer is first absorbed into the liquid coolant that flows through each of the Raptor’s encased computer cards. This liquid then transfers heat energy to the fuel, and to the exterior atmosphere through ram air coolers. Likewise, heat from the engine oil bearings is also transferred to the fuel. But JP-8 can only tolerate so much heat before it gets grumpy. Consequently, a primary cross-check for the pilot before taking off on a hot day is the fuel temperature. One degree over the limit and you are taxiing back for a spare jet.

Much more can be said about the design and features of the F-22. But what comes after the Raptor and its fifth generation cousin, the F-35? Much has been written and speculated on this topic. With a renewed national focus on preparation for the high-end fight, two needs certain to influence 6th generation designs are speed and range. And slow-speed maneuverability will likely be traded for increased stealth. How will we achieve this? Remove the tails for one, and incorporate engines with greater fuel efficiency. Tailless aircraft are flying today (B-2, various UAVs) and benefit from very low RF and visual signatures at all azimuths. But today’s tailless are subsonic and do not maneuver aggressively. Solving the supersonic directional stability problem without tails is a significant challenge, but will be overcome.



*U.S. Air Force photo*

Finally, the only thing more important in a 6th generation fighter than speed and range will be information sharing. As advanced as our sensors and data links are today, we’re still in early stages of truly networked warfare. Whichever side can sense, process, share, and act on information more quickly will win. The F-22 was a giant step in this direction. And although a very small fleet with approximately 180 jets, the Raptor is a potent force multiplier, operated and painstakingly maintained by great Americans.

## Lori Nelson: 2019 Third Place National AFA Rolls Royce Aerospace/STEM Teacher of the Year

Reprinted from the AFA Aerospace Education Council Newsletter (3rd Qtr 2019)

Lori Nelson is a 5th grade science and social studies teacher at Roger B. Chaffee Elementary School in Huntsville, AL, where she has been in the classroom all 10 years of her tenure in education. (Editor's note: Mrs. Nelson recently transitioned to Hampton Cove Elementary school.) As a second career educator, at the age of 45, Lori enrolled as a graduate student in elementary education and feels it was one of the best decisions she has ever made. She has blossomed at her school and is quite a leader throughout. She is the Greenpower Engineering Team Sponsor; created and directed a Mission to Mars Summer Camp; is a lead teacher with Project Lead the Way; created and directs the annual Chaffee Rocket Week; directs the annual Science Fair; created and directs the annual Chaffetopia STEM Night; and created and directs the annual Veterans Day program.

In addition to her school leadership, she makes presentations at educator conferences, such as the most current ones: the 2019 NSTA conference in St Louis; the 2019 AL Science Teachers Association; and the 2018 Spaceport Area Conference for Educators. Lori feels that when teachers collaborate with other educators, everyone's teaching craft will improve, and she is evidence of that. She continues her professional development by attending most recent Professional Development events: 2019 Dayton Air Camp and 2019 Space Foundation Space Symposium, Colorado Springs, CO.

Lori has earned numerous teaching awards, most recently: 2019 NSTA Sylvia Shugrue Award for Elementary Teacher; 2018 AL Science Teachers Association Elementary Science Teacher of the Year; 2018 National Space Club Educator of the Year; and 2018 Dr. Rochelle Abrams Scholarship, The Space Foundation.

Ms Nelson attended Space Academy for Educators in 2015 and since then has integrated aerospace education into her curriculum. She has written grants and earned over \$15,000 over the last ten years to purchase STEM materials for her school. She is particularly interested in engineering activities that allow her students to solve real-life engineering challenges, such as designing parachutes to protect a payload or a device to grow plants hydroponically for space travel. She involves families in the annual STEM nights and other school events she has created and directs. She even directed a space-themed community event in March which featured guest speaker Sheryl Chaffe, Roger Chaffee's daughter. (Roger Chaffee

. As part of Alabama's Bicentennial focus this year, she completed an oral history project with her students entitled, "Huntsville's Heroes of Space Exploration." Her students interviewed twenty retired NASA engineers.

It is efforts such as these that have led Lori to continue to lead aerospace programs in her state. She is a NASA Solar System Ambassador and volunteers for all types of aerospace events.

Lori Nelson believes that when we invest in our nation's teachers, we invest in America's future workforce. She believes, also, if we can get students interested in space, this interest will transfer to all other subject areas.



Mrs. Lori Nelson

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## CAP in Guntersville, AL

By SM Angie Martin, CAP Public Affairs Officer, AL-135

The Mountain Lakes Squadron of the Civil Air Patrol meets weekly in the William Greenhaw Aviation Center at the Guntersville Municipal Airport. Cadets receive regular instruction in Leadership, Character Development, Physical Training, Aerospace Education, and Emergency Services. Cadets also have the option for hands-on flight training through orientation flights of both fixed wing aircraft and gliders and get the opportunity to participate in monthly activities such as campouts, communications training, search and rescue training, and field trips, among others. Mountain Lakes CAP Squadron also has a Color Guard that is available for events throughout the community and surrounding areas. We have presented colors and arms for ball games, school events, and Veteran's programs.

This summer has been quite busy for Cadets of the Mountain Lakes Squadron. During the month of May, we participated in o'flights and color guard activities, June brought encampment for most of our cadets, and July held emergency services training courses at the National Emergency Services Academy (NESA) at Camp Atterbury, IN. Mountain Lakes had two cadets earn the Outstanding Cadet award for their respective flights during the week-long encampment activities.

Our squadron is growing, and we are so excited to see what lies ahead! If you or someone you know may be interested in the Civil Air Patrol, please feel free to visit our website at [www.MountainLakesCivilAirPatrol.us](http://www.MountainLakesCivilAirPatrol.us) for more information.



CAP Cadets performing a pre-flight inspection.



*Pictured at left is William Volkerson, grandson of SMSgt Harold Lewey. AFA Chapter 335 recently sponsored William's week-long stay at Space Camp. William had a great time, learned a lot, and sends his thanks to the chapter for this opportunity!*



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## Farewell to a Friend

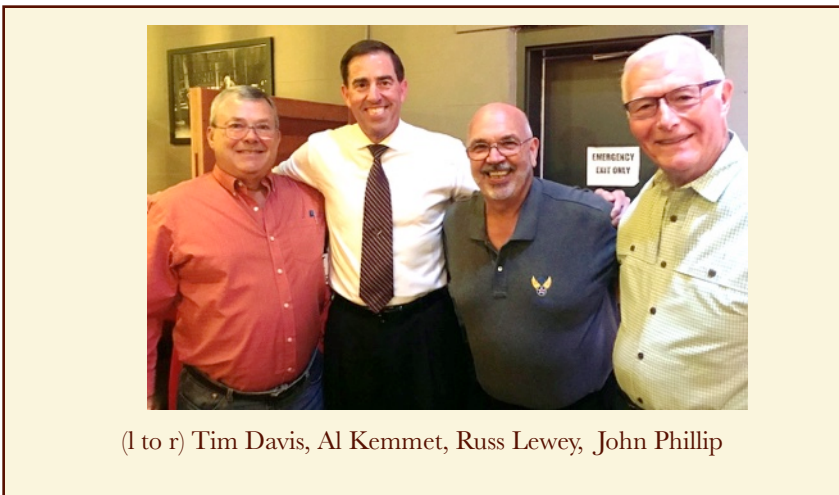
Col Russell Lewey, USAF, (ret), spent over 10 years serving the Tennessee Valley Chapter of the AFA. In addition to all of the work for the local area, he also served as Alabama AFA State President and Southcentral Regional AFA President. His dedication and efforts to furthering the spread of Aerospace Education were nothing short of awe inspiring. The chapter held a farewell social for Russ and his wife, Diane, on 2 July to say “Thanks” for all of his work. He will be missed!



(l to r) Guy Broadhurst, Rick Driesbach, Russ Lewey, Ken Philippart, Jack Royster, Tim Davis, & Scott Patton.



Russ (l) accepts the CAP Regional Frank G. Brewer Award for non-CAP member who does the most for Aerospace Education from Jon Hall (r), CAP Alabama Wing Vice Commander



(l to r) Tim Davis, Al Kemmet, Russ Lewey, John Phillip



(l to r) Biddy Royster, Lane Pugh, Diane Lewey, Laurel Davis, Lisa Philippart, Charlotte Driesbach, Sabrina East

# COMMUNITY PARTNERS



*Chapter President, Rick Driesbach (l), presents the “Ace” renewal medallion to Mr. Bill Bailey (r), President of Radiance Technologies, on 9 July 2019.*



*Chapter President Rick Driesbach presents a Wingman Community Partner Plaque to Erin Bloxham Curtis (left), Marketing Director, Canvas Inc. and Sharita Baker (right), Contracts Administrator, Canvas Inc.*

# COMMUNITY PARTNERS

*Rick presented a Wingman Medallion to Victoria Erickson, Director of Customer Relations, at Conditioned Air Solutions for their CP Wall Plaque on 26 Jun 19.*



*Chapter member Al Kemmet presents a Wingman Medallion to Col (Ret) Dr. Jim Davis, CEO of Davis Strategic Innovations, Inc. and his son Andrew Davis. Please note DSI's "full" plaque. AFA Chapter 335 sincerely appreciates DSI's decade of support!*

# COMMUNITY PARTNERS

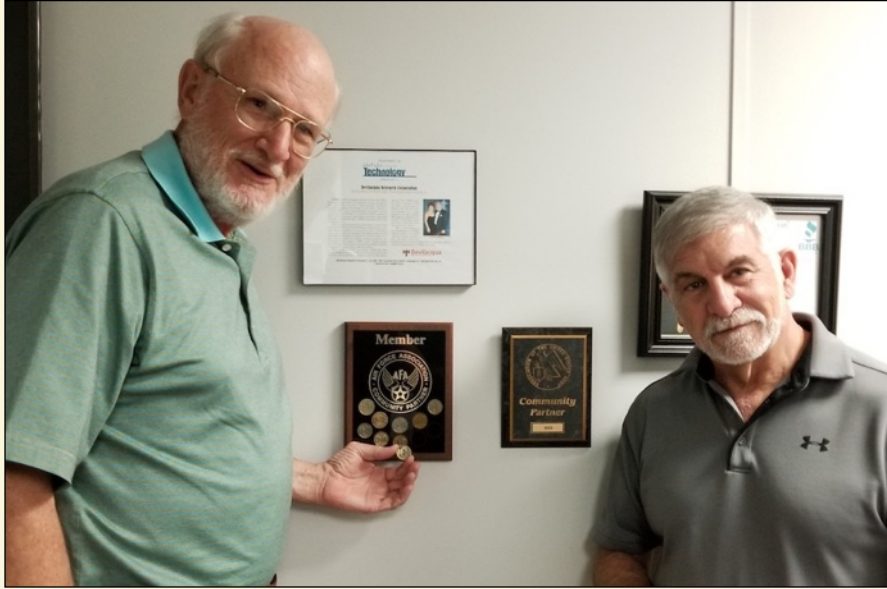


*Ed Worley (r), Chapter Vice President, Community Partner Program, presents Stan Stinson (l), co-owner of Earth and Stone Pizza, with an Air Force Association Community Partner plaque and chapter Wingman Community Partner plaque.*

*Jay Carlson, Chapter VP for Aerospace Education, presents Ms. Arlee Holmes, Corporate Communications Manager, Intuitive Research and Technology Corporation, with a Wingman Community Partner renewal certificate.*



# COMMUNITY PARTNERS



*Rick Driesbach (l), President, AFA Tennessee Valley Chapter, presented Dr. Andy Bevilacqua (r), President Bevilacqua Research Corporation, with their 9th Community Partner Renewal Medallion on 9 July 2019.*

*Rick Driesbach (r) presents Mr. Dan LaBoudiere (l), manager of the Jackson Center, with their CP renewal certificate.*



# COMMUNITY PARTNERS



*Chapter member Bryan Bennett presents Ms. Margaret Reis with the Community Partner renewal certificate for Landers McLarty Nissan on 26 Jun 19.*



*Chapter President Rick Driesbach presented a Community Partner Medallion to Lisa Philippart, Licensed Professional Counselor (LPC) on 22 Aug 2019.*

# COMMUNITY PARTNERS



*Rick Driesbach (l) presented renewal medallion to NeXolve President Jim Moore (holding plaque) along with Office Manager Mona Gatlin and Chief Engineer Greg Farmer (r) on 25 Jun 19.*



*Chapter member John Phillip presented Melissa Lacy with her Community Partner renewal medallion and certificate for PMI-North Alabama on 27 Jun 19.*

# COMMUNITY PARTNERS

## ACE LEVEL

GATR Technologies  
[www.gatr.com](http://www.gatr.com)

Mary's Wine and Spirits  
[Hwy 431 South, Brownsboro, AL](http://Hwy 431 South, Brownsboro, AL)

Straight To Ale Brewing  
[www.straighttoale.com](http://www.straighttoale.com)

General Atomics  
Electromagnetic Systems  
[www.ga.com/ems](http://www.ga.com/ems)

MTSI  
[www.mtsi-va.com](http://www.mtsi-va.com)

Willbrook Solutions, Inc.  
[www.willbrook.net](http://www.willbrook.net)

Radiance Technologies  
[www.radiancetech.com](http://www.radiancetech.com)

## Wingman Level

Aero Thermo Technology  
[www.aerothermo.com](http://www.aerothermo.com)

Earth and Stone Pizza  
<http://earthandstonepizza.com/>

Intuitive Research and  
Technology  
[www.irtc-hq.com](http://www.irtc-hq.com)

Canvas  
<https://www.canvas-inc.com/>

Edward Jones  
[www.edwardjones.com/](http://www.edwardjones.com/)  
BrendaArmstrong

Integrated Solutions For  
Systems, Inc.  
<https://is4s.com/>

Conditioned Air Solutions  
[www.conditionedairsolutions.com](http://www.conditionedairsolutions.com)

Hildegard's German Cuisine  
<https://www.hildegardsgermancuisine.com/>

PeopleTec  
[www.peopletec.com](http://www.peopletec.com)

Davis Strategic Innovations, Inc.  
[www.davidsdi.com](http://www.davidsdi.com)

## Basic Level

Aleta Technologies  
[www.aletatechnologies.com](http://www.aletatechnologies.com)

Lamar Advertising  
[www.lamar.com/huntsville](http://www.lamar.com/huntsville)

PMI North Alabama  
[www.pminorthalabama.com](http://www.pminorthalabama.com)

Bevilacqua Research Corp  
[www.brc2.com](http://www.brc2.com)

Landers McLarty Nissan  
[www.landersmclartynissan huntsville.com](http://www.landersmclartynissan huntsville.com)

Qualis Corporation  
[www.qualis-corp.com](http://www.qualis-corp.com)

CrossTek Construction  
[www.crosstekconstruction.biz](http://www.crosstekconstruction.biz)

Linc Research Inc.  
[www.lincresearchinc.com](http://www.lincresearchinc.com)

Redstone Federal Credit Union  
[www.redfcu.org](http://www.redfcu.org)

Delta Research, Inc.  
[www.dr-inc.com](http://www.dr-inc.com)

Linda Morgan - Legend Realty  
<http://www.legend-realty.com/linda-morgan/>

Shear Faith  
<https://www.vagaro.com/shearfaith1>

Dentistry Downtown  
[www.rebeccahowelldmd.com](http://www.rebeccahowelldmd.com)

Lisa Philippart, LPC  
<https://urlifematters.net>

Southeastern Skin Cancer and  
Dermatology  
<https://www.southeasternskin.com>

FlyQuest, Inc.  
[www.FlyQuest.net](http://www.FlyQuest.net)

NeXolve  
[www.nexolvematerials.com](http://www.nexolvematerials.com)

U.S. Space & Rocket Center  
[www.rocketcenter.com](http://www.rocketcenter.com)

Jackson Center  
[www.jacksoncenter.net](http://www.jacksoncenter.net)

Northington Consulting  
[www.northconllc.com](http://www.northconllc.com)

**Annual Giving Levels: Ace: \$500, Wingman: \$250, Basic: \$90**

*Want to become a Community Partner at the Ace, Wingman, or Basic level?*

*Contact Ed Worley at [edworleyafa335@gmail.com](mailto:edworleyafa335@gmail.com).*



## UPCOMING EVENTS

- 17 Oct: *Executive Council Meeting*
- 26 Oct: *ARCON V & Regional AFA Conference*
- 11 Nov: *HSV Veterans Day Parade*
- 21 Nov: *Executive Council Meeting*
- 19 Dec: *Executive Council Meeting*
- 26 Dec: *Galaxy of Lights - HSV Botanical Garden*

### Chapter 335 Officers

- **President**  
Rick Driesbach  
[Rick.driesbach@gmail.com](mailto:Rick.driesbach@gmail.com)
- **Treasurer**  
Jack Royster  
[jroyster@knology.net](mailto:jroyster@knology.net)
- **Vice President**  
Guy Broadhurst  
[Broadhurst.guy@gmail.com](mailto:Broadhurst.guy@gmail.com)
- **Secretary**  
Eric Jackson  
[eric.jackson1969@gmail.com](mailto:eric.jackson1969@gmail.com)

### Chapter 335 Special VPs

- **Aerospace Education:** Jay Carlson
- **Community Partners:** Ed Worley
- **CyberPatriot:** Bob Hovde
- **Membership:** John Pennell
- **Public Relations/Newsletter:** Lee Alford
- **Veteran's Affairs:** Zig Jastrebski



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