

Flying Wing

Excellent article in the February 2017 issue of *Air Force Magazine* by John T. Correll on early flying wing aircraft ["Jack Northrop's Flying Wing," p. 68]. One interesting fact involves the copilot, Glen Edwards, of the YB-49 that crashed on June 5, 1948, killing all onboard. He emigrated from Canada at the age of 13 and was raised right here in Lincoln, Calif. He served with distinction in World War II and went on to test pilot duties at Muroc Army Airfield in the high desert area of California. He is interred in Lincoln and a school here is named Glen Edwards Middle School. Muroc AAF was renamed Edwards AFB in 1949.

Col. Vern Luke,
USAF (Ret.)
Lincoln, Calif.

The B-35 and B-49 designs had well-documented performance and design issues, while the Convair B-36 needed more development money. At that time, it appeared the B-36 program might be canceled, as well as the B-35. USAF and the Texas congressional delegation desired to have a production program for the large Fort Worth aircraft production factory, and Convair had much more effective lobbyists in Washington, D.C. Northrop Corp. was always a technological trailblazer but the independent nature of Jack Northrop often collided with the political wheeling-and-dealing in Washington that tended to run huge

military allocations. Consequently, the B-36 prevailed, with just over 380 aircraft built. Furthermore, earlier the same year, when the YB-49 jet bomber was canceled, Northrop received a smaller production contract for its F-89 Scorpion fighter as compensation for the lost Flying Wing contract.

Phillip R. Earles
Princeton, Ind.

Vulture

I was so glad to read about the Vulture Rescue program taking place at Bagram ["Forward Deployed," February, p. 8]. When I was deployed in Afghanistan in 2011, we were working to lay the groundwork to use EAES [expeditionary aeromedical evacuation squadron] assets on rescue HC-130J aircraft. I'm very happy to see that this idea has continued and that it is in operation to partner our aeromedical evacuation members with our rescue professionals to provide the best patient care during transport.

Lt. Col. Paul Jones,
USAF (Ret.)
Kansas City, Mo.

Fighter Competition

The catalyst for the Lightweight Fighter program leading to the F-16 was not the urging of Congress, as Erik Simonsen claims in his otherwise excellent article "Legacy of the Lightweight Fighter Competition," [February, p. 59] but the persistence and tenacity of one Air Force officer, Col. John Boyd. The omission of any mention of Boyd's contribution in the article is disappointing in the extreme. Boyd's creation of the theory of energy maneuverability became the key design tool for the competitors in the LWF competition in the early 1970s. Harry Hillaker was the father of the YF-16 design, as Simonsen attributes, but Boyd was the creator, the father of the operational concept and the engineering theories upon which the LWF designs were based.

Boyd was forceful in debate and irascible in demeanor. If you didn't have keen knowledge of his EM theory and fighter tactics, or if you tried to use rank or position to advance your

point, it was best to avoid arguing with John Boyd.

I worked side by side with Boyd in the Fighter Requirements Shop at the Pentagon for two-and-a-half years, from 1970-72, putting together the arguments, rationale, and initial requirements documents for the LWF. Air Force leadership was dead set against the LWF for two reasons. The attitude was that small, lightweight fighters would lack range and internal space for sensors necessary for its missions. And secondly, Air Force leaders viewed the LWF as a threat to the F-15 program just underway at the time.

Overtuning the first objection required data from flight demos of the prototype YF-16 and YF-17 and the technical revolution in smaller sensors and miniaturized electronics just beginning. The myth that small fighters lack range was based on the belief that range was dependent on fuel quantity. But, any aero-design engineer knows that range depends on fuel fraction, not fuel quantity. The fuel fraction (weight of internal fuel divided by takeoff gross weight) was higher for the F-16 than the F-15. The F-16 actually outranged the F-15 on internal fuel.

Secondly, to overcome the Air Force fear that the LWF would cause the F-15 program to be canceled or shortened required the help of another LWF advocate, Secretary of Defense James Schlesinger. Schlesinger saw the potential for the LWF and brokered a deal with then-Air Force Chief of Staff Gen. David Jones. After the post-Vietnam downsizing, the Air Force needed to expand its fighter force size. Schlesinger agreed to keep the full size of the F-15 program, 750 fighters, and allow the Air Force to fill the

Index to Advertisers

AFA Term Life Insurance.....	43
Bradford Exchange.....	87
DefenseNews.....	61
SpiritAerosystems.....	3
UTC Aerospace Systems.....	Cover II
USAA.....	Cover III
USAF Charity Ball.....	61
Walgreens.....	Cover IV

AFA's Air, Space & Cyber Conference.....	7
AFA Membership.....	78
AFA Monthly Giving.....	15
AFA Wounded Airman Program.....	36
<i>Air Force Magazine</i>	6

Do you have a comment about a current article in the magazine? Write to "Letters," Air Force Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. (Email: letters@afa.org.) Letters should be concise and timely. We cannot acknowledge receipt of letters. We reserve the right to condense letters. Letters without name and city/base and state are not acceptable. Photographs cannot be used or returned.

—THE EDITORS

remainder of its desired 26 fighter wings with the winner of the LWF competition. General Jones agreed. This was a win-win for the LWF supporters and the Air Force hierarchy.

A big lesson from the F-16 program that needs to be relearned today is to start with a basic, no frills, "A" model baseline configuration while providing for growth to incorporate additional capabilities and systems over time. The F-16 multistaged improvement program, from the initial Block 5s to the current Block 50s and 60s has validated a key principle: Start with a low risk baseline and only add systems and capabilities when technical risk and cost is lowered. The Air Force seems to have forgotten this in some recent acquisitions. Let's hope they apply it to the JSTARS and T-X programs.

In the end, the F-16 has become the most successful fighter ever developed and produced. But, make no mistake, it would never have happened without the vision, ingenuity, and persistence of Col. John Boyd.

Gen. John Michael Loh,
USAF (Ret.)
Williamsburg, Va.

I read with great interest your article "Legacy of the Lightweight Fighter Competition." In June 1974 I was a brand-new second lieutenant and flight test engineer and was assigned to the Lightweight Fighter Program at Edwards. There are a couple of points I would like to make concerning your article.

The F-15 was designed to be a long-range standoff fighter with close in, air-to-air dogfighting capability. The YF-16 and YF-17 were prototypes designed to be a close in, duke it out, air-to-air fighters. The first flight of the YF-16 was a direct result of the sidestick controller having only a quarter-inch movement. This was insufficient to give feedback to the pilot that a joystick input had been made. An immediate minor modification was made, as this was viewed as a hazard to flight. A more extensive update was completed after the test program was completed.

The YF-16 mission was air-to-air and at least during the prototype evaluation phase no real consideration was given to an air-to-ground mission. This resulted in a hyperconcern for weight, which drove several decisions, which ultimately cost the Air Force a great deal of money. Once the decision was made that the F-16 would have an air-to-ground mis-

sion, minor weight concerns were no longer an issue.

The YF-16 was far more maneuverable than the YF-17. The YF-16 frequently put on a demonstration where it would compete with an F-4E in a max turn at 10,000 feet, and the YF-16 would be on the tail of the F-4 before the F-4 was able to complete half the maneuver. The YF-17 was not able to demonstrate the same level of turning maneuverability.

Toward the end of the competition, the Navy let it be known that they would not accept the YF-16 if the YF-16 won the competition as they required a twin-engine aircraft. They also let it be known that if Northrop could modify the YF-17 to include both wing and landing gear they would be interested in possibly acquiring this aircraft for the fleet. General Dynamics made a valiant effort to try and convince the Navy that with modifications the F-16 would meet their needs, but they could never overcome the two-engine bias of the Navy.

Col. Talbot N. Vivian,
USAF (Ret.)
Yorktown, Va.

Having worked with the Hornet program for much of the last 20 years, I'd like to offer a couple of minor comments.

The F/A-18A and B were production aircraft, with the Navy and Marine Corps acquiring 380 As and 41 Bs between FY78 & 87. On their second-ever cruise (and the first Atlantic Fleet cruise), F/A-18As from the USS *Coral Sea* were

Senior Staff Changes

CHANGES: Brig. Gen. Patrick J. **Doherty**, from Cmdr., 82nd Tng. Wg., AETC, Sheppard AFB, Texas, to Cmdr., 19th AF, AETC, JB San Antonio-Randolph, Texas ... Brig. Gen. Dirk D. **Smith**, from Dir., Air & Cyberspace Ops., PACAF, JB Pearl Harbor-Hickam, Hawaii, to Dep. Cmdr., Ops. & Intel., Combined Jt. Task Force-Operation Inherent Resolve, CENTCOM, Southwest Asia ... Brig. Gen. Kirk W. **Smith**, from Dir., Force Mgmt., SOCOM, MacDill AFB, Fla., to Dep. Cmdr., Spec. Ops. Jt. Task Force-Afghanistan, US Forces-Afghanistan, CENTCOM, Kabul, Afghanistan ... Brig. Gen. Stephen C. **Williams**, from Commandant of Cadets, USAFA, Colorado Springs, Colo., to Dir., Air & Cyberspace Ops., PACAF, JB Pearl Harbor-Hickam, Hawaii.

SENIOR EXECUTIVE SERVICE RETIREMENT: Gordon O. **Tanner**. ✪



Air Force Association

1501 Lee Highway • Arlington, VA 22209-1198

Telephone: (703) 247-5800
Toll-free: (800) 727-3337
Fax: (703) 247-5853
Website: www.afa.org

Email Addresses

Events..... events@afa.org
Field Services..... field@afa.org
Government Relations..... grl@afa.org
Industry Relations..... irl@afa.org
Insurance..... afa.service@mercer.com
Member Benefits..... membership@afa.org
Membership..... membership@afa.org
Communications (news media).....
communications@afa.org
CyberPatriot..... info@uscyberpatriot.org

Magazine

Advertising..... airforcemagsales@afa.org
Editorial Offices..... afmag@afa.org
Letters to Editor Column..... letters@afa.org
Wingman..... wingman@afa.org

Change of Address/Email

In an effort to stay connected with AFA and your local chapter, please remember to update your mailing address and email address.

Change of address requires four weeks' notice. Please mail your magazine label and first and last name to the Membership Department at 1501 Lee Highway, Arlington, VA 22209-1198.

You may also update your contact information under the Members Only area of our website at www.afa.org, by calling our Membership Department at 1-800-727-3337, or emailing membership@afa.org.

AFA's Mission

Our mission is to promote a dominant United States Air Force and a strong national defense and to honor airmen and our Air Force heritage. To accomplish this, we:

Educate the public on the critical need for unmatched aerospace power and a technically superior workforce to ensure US national security.

Advocate for aerospace power and STEM education.

Support the Total Air Force family and promote aerospace education.

key players in the April 1986 Operation Eldorado Canyon attack on Libya. They provided SEAD and CAP for the Navy's attack of targets in the Benghazi area. Ninety-four later A models were upgraded to A+ (and eventually A++) configurations to keep them relevant to continue in frontline service today. Canada, Australia, and Spain bought these early Hornets.

The F/A-18C and D were introduced in FY86 and continued in production until FY97 with the US buying 465 Cs and 147 Ds. Most of the upgrades from A/B to C/D were internal, including the introduction of color multifunction displays. Thirty early Cs are in the process of being upgraded to the C+ configuration to bring them up to standards of the later blocks. In addition, many of these aircraft are being fitted with the AN/APG-73 radars originally installed in the F/A-18E/F Super Hornets, as the newer jets are being retrofitted with the AN/APG-79 AESA radars. Finland, Switzerland, Kuwait, and Malaysia bought this version of the Hornet.

The current production versions are the Super Hornets. Beginning in FY94 the Navy (so far) has bought 297 Es and 276 Fs. Keeping with Hornet tradition, the E/Fs' first cruise was a combat cruise in support of Operation Iraqi Freedom. The EA-18G Growler entered production in FY06, with 153 being contracted for so

far. Australia has also bought Fs and Gs. Kuwait was recently cleared to buy the E/Fs, and Canada has recently announced a small buy of Super Hornets while they decide whether or not to remain in the F-35 program.

Maj. Jim Rotramel,
USAF (Ret.)
Fredericksburg, Va.

I enjoyed the article about the Lightweight Fighter competition. A few comments to expand on that article. The request for proposals to demonstrate a LWF specified that the engine(s) to be used were government furnished, and the companies could propose either the Pratt & Whitney F100 engine (in production and used on the F-15) or the General Electric YJ101, which was still considered a "development" engine.

Northrop was the only one of the five submitting contractors that proposed the YF101 in a dual-engine configuration.

The prototype program office managed several projects that eventually resulted in operational airplanes beside the F-16, including the A-10 and, eventually, the C-17. Col. (later Lt. Gen.) William Thurman directed the Lightweight Fighter prototype program and was supplanted by Brig. Gen. James Abrahamson (later Lt. Gen.) who managed the five-nation multinational F-16 full-scale development and production program.

The multinational F-16 full-scale development and production program (Belgium, Denmark, the Netherlands, Norway, and the US) could deserve an article by itself and will probably never be duplicated in defense procurement. The FSD program specified production of 998 aircraft for the five nations and also specified prices for the FSD airplanes and production airplanes.

To expand a little on the F100 engine part of the F-16 FSD program. The F100 engine was originally managed by the F-15 System Program Office (SPO). The engine had a known problem of stall-stagnation in the F-15, which required the stagnating engine being shut down and restarted as the only way to clear the stagnation. This was a problem for the F-15, but that airplane had a "spare" engine to keep flying until the stagnation was cleared. Obviously this was not a solution in the F-16 since it did not have a spare engine onboard. The problem was probably most responsible for removal of F100 management from the F-15 SPO and placement in the Propulsion System Program Office under Brig. Gen. Richard Steere who spent several weeks with Pratt & Whitney's military engine office in West Palm Beach, Fla., until a successful engineering solution to stall-stagnation was achieved.

Duane Zieg
Springfield, Va.



HUGE SAVINGS

SUBSCRIBE TO AIR FORCE MAGAZINE AND SAVE AT LEAST 50% OFF THE COVER PRICE

PLUS GET A FREE MEMBERSHIP TO THE AIR FORCE ASSOCIATION

Call 1-800-727-3337 to subscribe

Soundly Defeated

I have never written before, [but] to this piece I must reply. Extremely disappointed in your portraying of Trump and your political persuasion coming out [“Editorial: Twelve Days in December,” February p. 4].

Have you soon forgotten that you Democrats were soundly defeated last November? Do you remember that Americans coast to coast overwhelmingly voted to replace the establishment in Washington, Trump calling the process “draining the swamp”?

Are you, editorial staff, one of the “Establishment” that has your “security” in Washington in trouble?

I, for one, and probably speak for the majority, support what Trump has done to advance the ball down the field! He is using sound ideas, for example, the rethinking of the Air Force One replacement program. Let me see, how many trillion dollars are we in debt??!

How about putting some conservative editors in charge of the magazine from this day on. You all have had your chance. I, we, want to hear from conservatives.

Alan Leibundguth
Evansville, Ind.

Corrections

■ *The MC-130 fuselage static trainer featured in “Monster Garage” in the January issue is from MC-130 tail No. 64-0559. Tail No. 64-0567, commonly known as “Wild Thing,” is on static display at Hurlburt Field, Fla.*

Notice to readers

This print issue of *Air Force Magazine*, bearing a cover date of “April/May,” covers two calendar months.

The next print issue of the magazine, arriving in mailboxes and newsstands in May, will be the annual June Almanac. This is part of our new-for-2017 shift to 10 print issues and two digital-only issues per year.

In late March, *Air Force Magazine* will publish an online-only special edition covering all the news from the Air Force Association’s annual Air Warfare Symposium.

Similarly, in September, we will publish a combined October/November issue, which will be followed in early October by a digital-only special edition with the news from AFA’s annual Air, Space & Cyber conference.

These digital-only editions will allow us to provide you with comprehensive cov-

■ *In “Northern Exposure” (February p. 54), the rank and title for Lt. Gen. Ralph J. Jodice II (Ret.) were incorrect. Jodice was the Combined Forces Air Component Commander (CFACC) for Operation Unified Protector, the NATO effort in Libya. Canadian Defense Forces Lt. Gen. Charles Bouchard was overall head of the operation.*

erage from AFA’s premier events weeks sooner than is possible under traditional print schedules. These marquee events are attended by all the top Air Force leadership and always produce a large amount of important news.

In conclusion, AFA members and magazine subscribers will still receive 12 issues of *Air Force Magazine* per year. Ten of them (including the June USAF Almanac and our October/November double issue) will be in print. Two issues, delivered electronically in late March and early October, will be digital only.

We welcome your feedback and suggestions for the future as we work to make *Air Force Magazine* ever more timely, comprehensive, and responsive. As always, you can reach the editors at afmag@afa.org. Thank you.

Adam J. Hebert
Editor in Chief



The banner features a dark blue background with a large, light blue '2017' in the upper right. On the left, a yellow and white globe graphic is positioned above the text 'AIR SPACE CYBER CONFERENCE' in bold yellow and white letters. Below this, it reads 'A Professional Development Event'. The central focus is two F-35 fighter jets in flight, one above the other, angled towards the right. The top jet has 'LF' and '35092' on its tail. The bottom jet has 'FF' on its tail. In the bottom right corner is the AFA logo, which consists of a stylized eagle with wings spread, perched on a globe. At the bottom of the banner, the text 'SAVE THE DATE | September 18-20, 2017 | National Harbor, MD' is written in bold yellow and white.