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AVIATION

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THE BLOODY 100TH

HOW AN EIGHTH AIR FORCE
B-17 BOMB GROUP EARNED
ITS HARD-LUCK REPUTATION

PUNCHING OUT: 75-YEAR QUEST
TO PERFECT THE EJECTION SEAT

LOCKHEED NEPTUNE: U.S. NAVY'S
GUARDIAN OF THE SEVEN SEAS

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ON THE COVER: Photographer Paul Bowen captured the B-17G Aluminum Overcast in flight near Oshkosh, Wis., in 2001. One of a dozen surviving airworthy B-17s from the thousands built during World War II, the Flying Fortress was donated to the Experimental Aircraft Association by Dr. Bill Harrison. Cover: Paul Bowen Photography.

CLOCKWISE FROM TOP LEFT: LOCKHEED-MARTIN; BRADY PATIN; NATIONAL MUSEUM OF THE U.S. AIR FORCE; LIBRARY OF CONGRESS

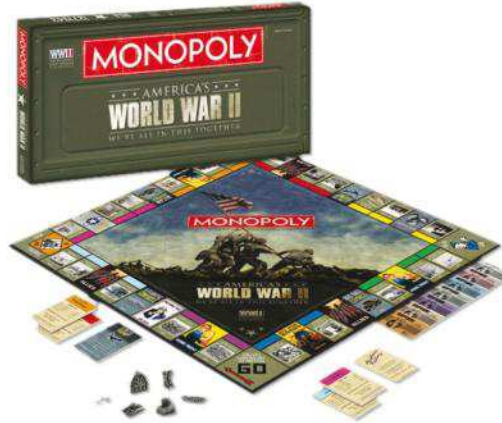
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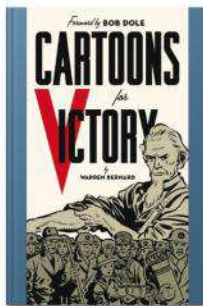
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A 91st Bomb Group B-17 disintegrates over Europe.

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EIGHTH AIR FORCE RAID ON SCHWEINFURT

October 14, 1943, would be known as "Black Thursday" in U.S. Army Air Forces folklore. Before the day was over, more than 600 airmen were killed or captured, and the future of America's daylight bomber offensive was in doubt.

COLD WARRIOR

Like Lockheed's P2V Neptune, the Martin P4M Mercator was built to fulfill the U.S. Navy's requirement for a long-range maritime patrol bomber. And like the Neptune, it was later modified into an electronic reconnaissance aircraft, the P4M-1Q, for Cold War service.

CORNFIELD BOMBER

When 1st Lt. Gary Foust's Convair F-106A fell into a flat spin on February 2, 1970, he ejected at 15,000 feet. His Delta Dart was not done flying, however, and proceeded to recover and gently land itself in a Montana cornfield.

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DC-3 MEMORIES

Walter Boyne and Philip Handleman's great article about the illustrious DC-3 [May] brought back pleasant memories for me. I served in the U.S. Marine Corps as an aviation electronics technician with VMF-312 at Marine Corps Air Station Cherry Point, N.C., during 1954-57. The R4D-8 Skytrain was our primary source of transportation when we went on travel hops. The old bird had been around as long as I could remember—the R4D seemed to have a never-ending life. Attached is a photo of the USMC version [above].

Lloyd Stimson
Fort Washington, Md.

I am 97, a former B-17 pilot instructor stationed at Lockbourne Air Base in Columbus, Ohio, in 1944-45. On one occasion I had a free day and I asked a fellow instructor to check me out in an AT-6 that we had on the base. As I recall we flew to a base in Wilmington,



Ohio, south of Columbus, to practice landings. On my second downwind leg the tower called and asked us to make way for a glider on approach. The glider was a DC-3 with rounded nacelles in place of the engines. The scuttlebutt was that they were experimenting with it for use as a troop transport. I have never seen anything in print about this experiment.

John L. McCloskey
Norristown, Pa.

That was indeed a converted DC-3 designated the XCG-17 (photo below left). Only one prototype was built, and it was tested at Clinton County Army Air Field in the summer of 1944. Although it performed well, the project was abandoned, the Army Air Forces no longer needing such a large glider. The airplane was eventually reconverted to powered configuration, and remained in civilian service in Mexico until 1980.

LOCKHEED XF-90

When I was first researching the XF-90 ["Extremes," March] in 1990-91, Lockheed test pilot Tony Levier related a story of his first flight in the aircraft. After starting his roll, he was unable to gain altitude and saw the raised railroad track bed that crosses the lakebed coming up before him. At the last second, he popped the stick and the aircraft struggled just enough to clear the rails.

Tony also told me about the time when he couldn't get the XF-90's wheels down. Another test pilot came alongside the aircraft to check it out. Seeing nothing obviously wrong, he stayed next to Tony and, when Tony got approval to do a belly landing on the lakebed, he talked him through it. The other test pilot's name was Chuck Yeager.

The aircraft was recovered, disassembled and fully decontaminated at the Nevada test site, not at the National Museum of the U.S. Air Force in Ohio. Once decontaminated, it was transferred to the museum.

Robert Friedrichs
Las Vegas, Nev.

CONCORDE BIRD STRIKE

I enjoyed the Concorde article ["Supersonic Gamble"] in the March issue. In 1983 I was part of a team sent by Boeing to London to make modifications to the first batch of production 757s. We were assigned a bay in the hangar used by the Concorde at Heathrow, and got up close and personal with them and the British Airways mechanics who worked on them. The hangar was like a hothouse, all glass, and you could always tell when a Concorde was taking off—the roar was like nothing I've ever heard; it rattled every pane. A beautiful airplane but difficult to keep in the air. Thermal expansion caused fuel leaks in the wings, and the high landing speed was hard on brakes and tires, requiring so much maintenance that the

BA crew referred to them as "hangar queens."

Before leaving Seattle we had been told to expect bomb drills, so when the airport's emergency siren sounded we evacuated as instructed, but all the emergency vehicles scrambling told us this was no drill. A departing Concorde, unable to maintain cabin pressure, made an emergency landing after dumping 90 tons of fuel over the English Channel. I got a firsthand look at it when it was brought to the hangar. Wasn't hard to see the problem. On takeoff a bird was sucked into the starboard main gear bay and penetrated the bulkhead. When they opened the cargo door, my God, what a mess. Everything was covered with bloody seagull feathers. Glad I didn't have to clean that up!

Patrick Engle
Marysville, Wash.

C-130 FIREBOMBERS

Your article on aerial fire-fighting operations ["Fire-bombers!," March] was interesting, but author Stephan Wilkinson's insinuation that MAFFS C-130 crews are ineffective was way off base. MAFFS [Modular Airborne Fire Fighting System] missions are flown by specially selected crews who are required to requalify every year with the U.S. Forest Service. These crews are highly trained and highly effective in MAFFS operations. Their past record speaks for itself.

Lt. Col. Nick Daffern (ret.)
146th Airlift Wing
California Air National Guard

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BRIEFING



TWIN YAK AEROBAT

DOUBLE VISION John Klatt Airshows' "Yak-110," created by joining two Yakovlev Yak-55s, makes a test flight (above). Builder Dell Collier's team has since added a CJ610 turbojet, slung under the center section (inset).

Aviation history is littered with examples of siamesed, twin-fuselage airplanes, from the 1915 Blackburn TB double-floatplane Zeppelin attacker to today's White Knight Two and Stratolauncher spacecraft carriers. In the early years, it was an easy way to

double horsepower without designing an all-new twin. Later it became a means of conveniently increasing crew, fuel or cargo capacity. The most successful of them was the North American F-82 Twin Mustang, but the World War II Heinkel He-111Z—a five-engine, two-fuselage kludge in-

tended to tow the bloated Messerschmitt Me-321 troop-carrying glider—had its day in the sun as well.

An audacious new mirror-image mutant recently joined their ranks when a free-thinking team of airshow pilots mated two Yakovlev Yak-55 radial-engine, single-seat aerobatic aircraft to create

what has inevitably been renumbered as a “Yak-110.” It required a carefully engineered and fabricated center section joining the two fuselages, plus mating of the horizontal stabilizers and trimming of the outboard horizontal tails. Both cockpits remain fully operational, and the Yak-110 has been extensively test-flown, including a full range of conventional aerobatic maneuvers.

Now builder Dell Coller, of Dell Aero Speed, in Caldwell, Idaho, is adding a 3,000-pound-thrust GE CJ610 turbojet to the airplane, slung under the center section. Essentially a Lear 25 engine, it will provide the equivalent of roughly four times more horsepower than the Yak-110’s two nine-cylinder, 360-hp Vedeneyev radials already generate. The first airshow performer to team a CJ610 with a piston engine was Jim Franklin, who in 1996 began flying his Jet Waco UPF-7. That airplane, and Franklin, were lost in an airshow midair in 2005. In 2014 Coller’s *Screamin’ Sasquatch* Jet Waco, a 1929 Taperwing with a CJ610, was introduced, and has since become a fixture at airshows.

The Yak-110 is set to appear at this summer’s EAA AirVenture in Oshkosh, Wisc. Like the F-15, F-16 and several other superfighters, it has a thrust-to-weight ratio greater than 1-to-1, which should provide for some decidedly unconventional aerobatics.

Stephan Wilkinson



FROZEN IN TIME

A Grumman F4F-3 Wildcat sunk aboard the aircraft carrier *Lexington* (inset) still displays the markings it wore when flown by Albert Vorse.



AIR QUOTES

“STRATEGIC AIR ASSAULT IS WASTED IF IT IS DISSIPATED PIECEMEAL IN SPORADIC ATTACKS BETWEEN WHICH THE ENEMY HAS AN OPPORTUNITY TO READJUST DEFENSES OR RECUPERATE.”

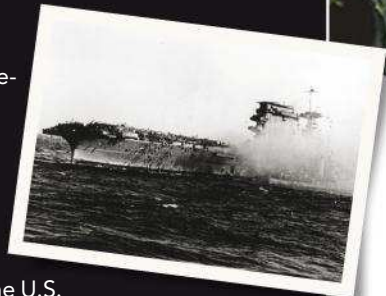
—GENERAL HENRY H. “HAP” ARNOLD

“LADY LEX” LOCATED

On March 4, remote-controlled submersibles from the research vessel *Petrel*, sponsored by Microsoft co-founder Paul Allen, owner of the Flying Heritage Collection in Everett, Wash., located the U.S. Navy aircraft carrier *Lexington* on the floor of the Coral Sea, where it sank on May 8, 1942, after history’s first direct carrier-versus-carrier engagement.

“We’ve been planning to locate the *Lexington* for about six months, and it came together nicely,” said Robert Kraft, director of subsea operations. As a war graveyard, *Lexington* will not be subject to any salvage attempts, but underwater photographs reveal how well preserved the ship has been in the cold depths. Equally remarkable is the condition of the 35 Douglas TBD-1 Devastators, SBD-3 Dauntlesses and Grumman F4F-3 Wildcats that went down with it, battered by time and sea, but with their camouflage and markings still distinct after 76 years. One F4F-3 sports four small Japanese flags under the cockpit, as well as the “Felix the Cat” insignia of fighter squadron VF-3. When VF-2 replaced it aboard “Lady Lex” in April 1942, seven of VF-3’s pilots and many of its F4Fs—complete with Felix—were transferred to VF-2 for the Coral Sea fight. That included “F-5” and its pilot, Lieutenant Albert O. Vorse, who downed two Aichi D3A1s at Coral Sea and survived the war with 10½ victories.

Jon Guttman





FINDING GLENN MILLER

On December 15, 1944, superstar bandleader Glenn Miller was lost when the Noorduyn UC-64A Norseman in which he was a passenger went down in the English Channel. Perhaps only octogenarians will remember Miller, but his big band had more number-one hits than either Elvis Presley or the Beatles. He was on his way to Paris to arrange appearances of the U.S. Army Air Forces Band that he had established.

The fate of that Norseman, a USAAF utility hack, has remained a mystery ever since. It was a minuscule episode in an enormous war, and would have been forgotten long ago if

not for Miller's fatal role.

Like the Amelia Earhart saga, Miller's disappearance has been the subject of conspiracy theories, wild guesses, spurious witness reports and even some carefully plotted theorization. And like Earhart, Miller is now the focus of an investigation by TIGHAR, The International Group for Historic Aircraft Recovery. True to its title, the controversial organization may soon attempt a recovery of Miller's Norseman as well.

An English commercial fisherman trawling in the Channel in the mid-1980s snagged his net on something that, when he winched it to the surface, turned out to be the battered remains of a single-engine airplane with the dim shadows of two large

stars on its silver wings and a port-side aft cabin door. The fisherman happened to be an R/C modeling enthusiast, so he was familiar with airplanes and later made a careful sketch of what looked much like a Norseman (which happened to be the only small U.S. utility aircraft in use in the European theater with such a door).

Not knowing anything about the Miller mystery, the trawler captain cut the wreckage loose and redeposited it in Davy Jones' Locker, if only because mariners consider it unlucky to mess with wrecks that might contain human remains. The fisherman did make a note of his position, which in those pre-GPS days relied on Decca, a Loran-like system accurate to within about 50 yards at the wreck's location.



WORLD WAR II MYSTERY

Big-band leader Glenn Miller was lost when a Noorduyn UC-64A Norseman like the one above went down in the English Channel in 1944.

When the fisherman recently read the story of Glenn Miller's disappearance, he took his tale to a UK air museum curator, who in turn contacted TIGHAR Executive Director Richard Gillespie. If TIGHAR determines that the fisherman's story checks out and that his position report is usable, Amelia Earhart will soon have a companion amid the legends of the lost.

Stephan Wilkinson

PEARL HARBOR SURVIVOR DISPLAYED

The National Air and Space Museum's Sikorsky JRS-1 twin-engine amphibious flying boat (right) is among the rarest aircraft in existence. Stationed at Ford Island, Hawaii, on December 7, 1941, it was one of five aircraft of reconnaissance squadron VJ-1 that went out searching for the Japanese carriers that attacked Pearl Harbor. It has since endured the decades as that fateful day's sole surviving participant.

In 2011 the JRS was moved from the Paul E. Garber facility in Silver Spring, Md., to the Mary Baker Engen Restoration Hangar at the museum's Udvar-Hazy Center in Chantilly, Va. Restoration specialists recently moved the JRS to the Boeing Aviation Hangar, where the general public can get a look at what lies beneath its flaking camouflage paint. As it turns out,



the amphibian was in its 1930s finish that day, with silver fuselage, black undersides and green tail, with a red fuselage band and VJ-1's diamond-shaped squadron insignia under the cockpit. A few days after the raid, it was overpainted in its present blue-gray colors. Until its final restoration, however, visitors to the museum will be able to make out hints of both guises.

Jon Guttman

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MILESTONES

AROUND THE WORLD IN 91 HOURS

Howard Hughes gained global fame 80 years ago on July 14, 1938, when he and his crew touched down in a Lockheed Super Electra 14 dubbed *New York World's Fair 1939* at Brooklyn's Floyd Bennett Field, just over 91 hours after setting out to circumnavigate the globe. The airplane boasted extra fuel tanks and a sophisticated array of radio and navigational equipment. Millions had followed the flight's progress via radio.

Then 33, Hughes had previously set a transcontinental speed record in the Hughes H-1 racer, and was also celebrated for his 1930 war film *Hell's Angels*. Accompanying him on the global flight were copilot



Harry Connor, navigator Thomas Thurlow, flight engineer Edward Lund and radio operator Richard Stoddart. The Super Electra touched down in Paris, Moscow, Omsk, Yakutsk, Fairbanks and Minneapolis before returning to New York.

A crowd of some 25,000 spectators frustrated Hughes' plan to place a wreath at Floyd Bennett

GLOBETROTTER Police, press and spectators surround Howard Hughes' Lockheed Super Electra 14 at Floyd Bennett Field.

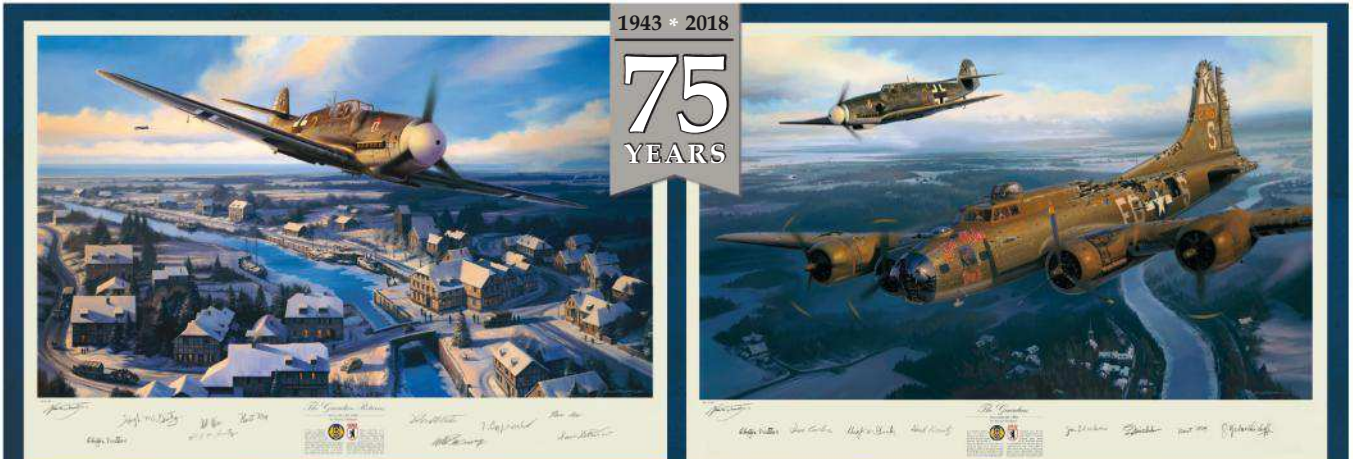
Field that day in memory of the late Wiley Post, who had landed at Floyd Bennett Field after his 1931 solo global flight in the Lockheed 5C Vega *Winnie Mae*.

Later feted at a ticker-tape parade in New York City, Hughes took the opportunity to praise his crew in

remarks published in the *Daily News*. He told reporters, "Mechanically, all our equipment was perfect," but added: "There's no use trying to compare Wiley Post's flight.... His flight must still remain the most remarkable in history."

Nan Siegel

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THE WRITER SIDE OF HAP ARNOLD

PIONEER AMERICAN MILITARY PILOT, CHAMPION OF THE AIR SERVICE, COMMANDING GENERAL OF THE ARMY AIR FORCES AND... CHILDREN'S AUTHOR?

BY WALTER S. ANDARIESE

General Henry H. Arnold's leadership of the U.S. Army Air Forces in World War II was extraordinary and well documented. During World War I, however, "Hap" served mostly Stateside with the Army Air Service, followed by difficult peacetime duty. Frustrated by inter-service rivalries in which Army aviation always seemed to come up short, Arnold wrote a series of six books in the mid-1920s intended to highlight the value of military aviation and promote flying to a young audience.

Then-Major Arnold was well qualified to write such books. A West Point graduate, he had learned to fly in 1911 at the Wright brothers' school at Huffman Prairie near Dayton, Ohio. He and 2nd Lt. Thomas Milling were the Army's first



certified military pilots and its first flight instructors.

Although Arnold's books were aimed at teenagers, adults today who are interested in early aviation will find them enjoyable and informative. They feature the adventures of fictional airman Lieutenant Bill Bruce, freshly returned from WWI service following the Armistice. One volume in

HAPPY DAYS Henry H. "Hap" Arnold smiles after signing the repeal of the Neutrality Act in November 1939 (above) and takes the controls of a Wright Model B as a flight instructor at College Park, Md., in June 1911 (left).

the series, *Bill Bruce on Border Patrol*, opens with a list of all titles in the set under the heading "The Aviator Series - Adventures of a Young Airplane Pilot for Boys 12 to 16 Years." The other five titles are: *Bill Bruce and the Pioneer Aviators*, *Bill Bruce the Flying Cadet*, *Bill Bruce Becomes an Ace*, *Bill Bruce on Forest Patrol* and *Bill Bruce in the Trans-continental Race*. Most are available via eBay or other online suppliers.

The *Border Patrol* book mainly concerns America's Southwest, but it also relates to WWI. While not a combat pilot himself, Arnold associated with them and was familiar with the slang, ter-

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light. This superior lens technology was first discovered when NASA scientists looked to nature for a means to superior eye protection—specifically, by studying the eyes of eagles, known for their extreme visual acuity. This discovery resulted in what is now known as Eagle Eyes®.

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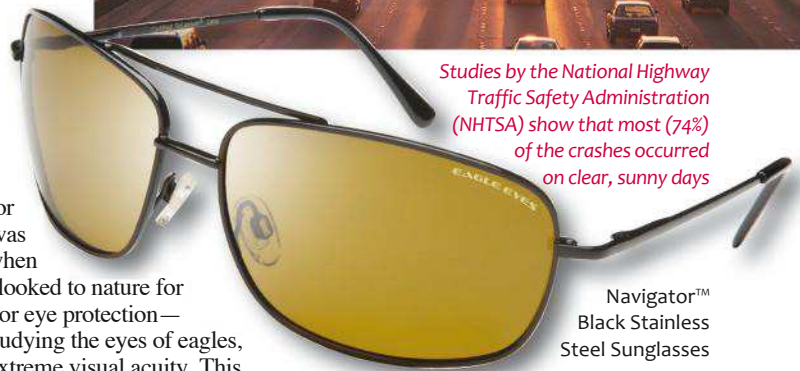
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minology, tactics and aircraft nicknames (such as “DH” for a British de Havilland). To enhance the book’s sense of realism, Arnold incorporated some real-life events, including an unauthorized stunt performed by 2nd Lt. Jimmy Doolittle.

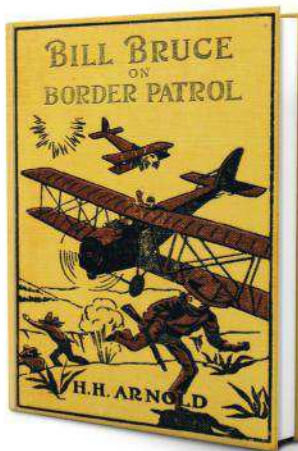
Major Arnold was not alone in his struggle to promote military aviation. Brigadier General Billy Mitchell led the fight for a strong peacetime air defense. By the end of WWI, Mitchell commanded all American air combat units in France and served as chief of the Air Service, Group Armies. But by 1925, his forceful advocacy of expanded air power and criticism of military leaders gained him a reputation as a loose cannon. Twice that year he was severely disciplined for his accusations and insubordination. In March he was demoted to the rank of colonel and sent to Texas.

PROVING FLIGHT Arnold stands in front of one of 10 Martin B-10s he led to Alaska in the summer of 1934.



Then, after the U.S. Navy airship *Shenandoah* crashed in September, his denunciations of the “almost treasonable administration of the national defense” earned him a court-martial. Judged guilty in December, he resigned from the Army rather than accept another demotion and separation from service for five years. (After Mitchell died in 1936, President Franklin D. Roosevelt raised his rank on the Air Corps retirement list to major general. Ten years later, President Harry S. Truman posthumously awarded him a special Medal of Honor “in recognition of his outstanding pioneer service and foresight in the field of American military aviation.”)

In testimony during Mitchell’s court-martial, Arnold had vigorously supported his fellow officer’s ideas, and he too was called on the carpet. In February 1926 he was given one day to choose resignation or court-martial. He opted for the trial and was immediately transferred to Fort Riley in



FEW ARE AWARE THAT AMONG HAP ARNOLD’S IMPORTANT CONTRIBUTIONS WERE SIX BOOKS THAT HELPED SPARK DREAMS OF FLIGHT IN COUNTLESS YOUNG AMERICANS.

Kansas, the Army preferring to avoid the public spectacle of another court-martial. Arnold gained favorable reviews at his new post, and his future prospects seemed to improve.

With a less hectic command in 1926, Arnold undoubtedly had time to write his books. His second-grader son reportedly had a reading problem, and Hap would read to him each evening from books Mrs. Arnold bought. But Hap found them poorly written, thought he could do a better job and began working on his aviation books. Although earning extra money was probably not on his mind, the book royalties would later cover bills for an operation his son needed. (In those days military dependents received very few benefits.)

Convinced the battle for a stronger Air Corps was going nowhere, Arnold hoped his books might excite the younger generation enough for the adult public to notice. More important, the youngsters who read his books would come of age a decade later as the nation again prepared for war. When the time arose, thanks in part to Arnold, many of them headed straight for service in the Air Corps.

By 1927 both military and civil aviation were looking up. Advanced aircraft designs, construction of new airfields and Charles Lindbergh’s solo transatlantic flight in May helped boost aviation’s image. Yet as the United States hurtled toward another world conflagration, the Air Corps was still on a starvation diet of planes and personnel.

In 1938 Arnold became chief of the Army Air Corps, and in 1941 was made commanding general of the newly renamed Army Air Forces. Throughout WWII he was on duty most of his waking hours, seven days a week. Several heart attacks interrupted that grind, but Arnold persisted, retiring in 1946 from a job well done. In 1947 he witnessed his and Mitchell’s ideas come to full fruition with the establishment of the U.S. Air Force as a separate service.

From the birth of heavier-than-air flight in 1903 until Arnold’s death in 1950, his career closely paralleled the history of American military aviation. General Arnold’s military service certainly featured its share of ups and downs, but his legacy in the annals of aviation history is undeniable. Few are aware, though, that among his important contributions were six books that helped spark dreams of flight in countless young Americans. †



Actual size is 40.6 mm

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SHIOW WITH A STING

AFTER ITS RETURN TO FLIGHT IN LOUISIANA, A RARE GUNSHIP VERSION OF THE BUBBLE-COCKPIT H-13 HELICOPTER HAS GARNERED AIRSHOW ACCOLADES

BY FREDERICK A. JOHNSEN

To Baby Boomers, the ubiquitous Bell 47 helicopter was the weekly hero in the *Whirlybirds* television series, filmed in southern California from 1957 to early 1960. Decades later, this iconic open-frame, bubble-cockpit rotorcraft was the signature feature in the opening sequence of the Korean War medical dramedy *M*A*S*H*.

Bell 47s have been an ever-present umbrella over Wittman Field in Oshkosh, Wisc., during the Experimental Aircraft Association's annual AirVenture extravaganza. Now AirVenture can add an armed U.S. Army version, the H-13E, to its list of Bell 47 visitors. At the 2017 EAA fly-in, Reid Hays displayed his H-13E complete with a brace of .30-caliber Browning M37 machine guns, adding a sting to the insect-like Bell machine.

Hays had for years flown a civilian Bell 47 as a workhorse on his ranch in Sulphur, La., when he had the opportunity



to buy a 1955 former Army H-13E. He described it as "airworthy, but well-worn." The characteristic Plexiglas bubble had holes in it. The logbooks recorded nearly 13,000 hours.

Hays bought the Bell in November 2009. He flew it for about three years as-is, until it came due for a 1,200-hour overhaul. Time for a complete makeover, Hays figured. Nearly four years later, in October 2016, he finished its maintenance

BELL RINGER Reid Hays stands with his H-13E (top) and sits in the cockpit at AirVenture in 2017 (above).

and restoration.

Hays is an industrious fellow. Rather than simply freshen up his second Bell (he refers to his first one as "my work helicopter"), he began researching the H-13's history. The Army called the H-13 series the Sioux, in keeping with a line of military helicopters named after



ARMED AND DANGEROUS

Hays brings his restored gunship in for a landing (left). Two Browning M37 machine guns are mounted above the helo's landing skids (below).

Army service, the H-13E was surplus and civilianized. The New York City Police Department was the Bell's next operator, before it saw service at helicopter flight training schools and probably with an agricultural application company, Hays said.

With a leisurely 65-mph cruising speed and lots of fresh air blowing through the open sides of that trademark bubble, the H-13 is not be the best machine for long cross-country flights to airshows any distance from Louisiana. So Hays built a custom enclosed trailer to transport his prized helicopter. He brings a team of five or six people to help set up and show the H-13, which flies with civil registration N4250A. Hays enjoys talking about his rare armed helicopter with interested airshow visitors.

All the effort and research have paid off. At last year's AirVenture, Hays and his H-13E took the Best Helicopter award in the warbirds category along with a Silver Wrench award for his restoration prowess. And that came after winning Grand Champion Warbird honors at the big springtime Sun 'n Fun fly-in in Lakeland, Fla., earlier in the year.

There's something timeless about the Bell 47. Arguably the first modern helicopter design, it has been in service since 1946. More than 5,600 have been produced, including overseas license-built models. And as Reid Hays demonstrates, the Model 47 is still equally viable as a working helicopter or a pampered showpiece. †

American Indian tribes. As various iterations of the H-13 entered production, the 490 E-models were configured for dual controls and had provision for stretchers mounted over the landing skids on either side of the cockpit.

Hays' research into H-13E history revealed that in 1957 some were fitted with those .30-caliber weapons, fixed to fire ahead of the helicopter's path when triggered by the pilot. The Army's vast aviation research facility at Fort Rucker, Ala., tested the armed H-13Es, perhaps the first helicopter gunships. Hays said he learned that the Army sent 60 of them to South Vietnam, where they proved the concept. But far more aggressive gunship helicopters quickly came on line, and the H-13's service as a gun-toter was brief.

Hays found photos and blueprints of the armed H-13Es that helped him replicate the gun mounts "using pictures and scaling it," he explained. The two Browning M37s on his Bell are configured for semi-automatic fire only. The ammunition boxes are reproductions Hays constructed, and the gun-firing solenoids—details that sometimes get lost—were



obtained from military surplus suppliers.

American machine guns often are fed via flexible stainless-steel ammunition chutes. Hays' guns fire .30-06 rounds, which differ from the more modern 7.62 x 51mm ammunition. The introduction of that shorter round eliminated the need for .30-06 chutes, making them increasingly difficult to find on the surplus market. "The complicated thing was the flex chutes," Hays recalled. Standard Armament, a California manufacturer of flex ammo chutes since 1950, had the tooling to build proper .30-06 chutes for his diminutive gunship project.

A Bell 47 can be taxed by the load it is asked to carry, especially on a hot day. Weight-and-balance issues with the bolt-on armament packages on each skid required careful calculations to get it right. With the addition of a new bug-eye bubble, some straightened metal, fresh paint and Army markings, Hays had an exemplary H-13E restoration to show for his efforts. He figures 5,000 manhours went into the project, including the manufacture of some parts when used examples did not pass muster with him.

This 60-plus-year-old helicopter has a varied history. After five years of



BLAST FROM THE PAST A Convair F-106A fires a training version of the AIR-2 Genie nuclear missile. Below: An F-106B research aircraft displays its area-ruled fuselage.

THE ULTIMATE INTERCEPTOR

CONVAIR DEVELOPED THE FASTEST AND MOST SOPHISTICATED FIGHTER OF THE COLD WAR TO PROTECT THE U.S. FROM SOVIET BOMBERS

BY JOHN LOWERY

During the Cold War years, Convair's delta-wing F-106A was the fastest and most lethal all-weather interceptor in the U.S. Air Force inventory. The F-106A, when lightly loaded, approached the magic 1-to-1 thrust-to-weight ratio—a characteristic coveted by fighter pilots everywhere. With a 24,500-pound-thrust afterburning Pratt & Whitney J75-P-17 engine pushing an airframe only slightly heavier than the engine thrust output, this 1950s-era airplane had an impressive initial climb rate of 30,000 feet per minute and a zoom-climb altitude above 70,000 feet. As a result of the “thermal barrier” created by friction heat on the ship’s skin and Plexiglas canopy, its airspeed was limited to Mach 2.31 (1,525 mph).

The genesis of the fighter that ultimately became the F-106A, and later the F-106B trainer, began in 1949 as Project WS-201A. The concept called for a supersonic fighter-interceptor carrying air-to-air guided missiles, with an all-weather



search and fire-control radar.

The Hughes Aircraft Company was awarded the armament and electronics contract in October 1950. Hughes developed the MA-1 fire-control system, designed to fire a nuclear-tipped Genie rocket and/or four Super Falcon radar-homing, infrared heat-seeking missiles. (In 1972 an internal Vulcan 20mm cannon package

would replace the Genie on some F-106As.)

The airframe development contract was originally presented to Convair, Lockheed and Republic. Convair’s proposal ultimately won the day, since it was closely related to the company’s earlier efforts on the delta-wing XF-92A. The delta-wing design had evolved from the work of Alexander Lippisch,

ABOVE: U.S. AIR FORCE; ABOVE LEFT & OPPOSITE: NASA

who pioneered the concept in Germany during World War II. Based on the XF-92A experience, Convair's management remained convinced that the delta-wing configuration was the best answer to problems encountered with supersonic flight.

The Air Force wanted the interceptor to be operational in 1954, but by December 1951 it became apparent that neither the engine nor the MA-1 fire-control system would be ready by then. Meanwhile, Convair proceeded with development of an interim version designated the F-102A Delta Dagger. It fell short of the Air Force's required performance, however, so Convair made several changes to the airframe and engine. The new J75 turbojet replaced the original Pratt & Whitney J57. While the delta wing remained essentially unchanged on the first few test aircraft, the F-102A's fixed leading edge and wing fence were subsequently replaced with leading-edge wing slots. The fuselage was stretched and streamlined using NASA's "Coke bottle" area-rule design, with the air intakes moved closer to the engine and well aft of the nose. For flights at very high Mach numbers, automatic variable inlet ramps moved fore and aft as airspeed changed to keep the inlet air flowing into the J75's compressor subsonic.

The resulting airplane, initially designated the F-102B, had been altered to such a degree that in 1956 it was redesignated as a new type, the F-106A Delta Dart. By August 1958, four years later than originally planned, the "ultimate interceptor" was complete, entering service in May 1959. Its combat radius with internal fuel was 575 miles, and its range could be extended to 2,700 miles with

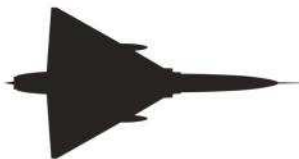
external tanks. The airplane's service ceiling was 57,000 feet. At 35,000 feet, the Delta Dart was capable of interceptions at speeds up to Mach 2. On December 15, 1959, Major Joseph W. Rogers flew a stock F-106A to set the world's absolute speed record for single-engine aircraft of 1,525.695 mph.

Armament, housed in a ventral weapons bay, consisted of four Hughes AIM-4 Super Falcon air-to-air missiles, along with a single Douglas AIR-2A Genie air-to-air rocket with a 1.5-kiloton warhead. These were intended to be fired at enemy bomber formations.

The MA-1 fire-control system was designed to work in conjunction with the Semi-Automatic Ground Environment (SAGE) continental air defense network. After takeoff, the MA-1 system took control of the airplane (though the pilot provided throttle inputs) and a SAGE ground controller guided the F-106 to the intercept, whereupon the pilot would lock on the intruder and fire his weapons. The SAGE controller then returned the Delta Dart to the vicinity of the air base, where the pilot again took control and landed.

Ultimately, the initial F-106A order was reduced from 1,000 aircraft to 277, plus 63 two-seat, dual-control F-106Bs, outfitting 14 squadrons and a training unit. The reduced order reflected the evolving Soviet threat, which had shifted from an emphasis on bombers to ballistic missiles. The last F-106A was delivered on July 30, 1961.

In late 1961, the Air Force conducted Project High Speed, pitting the F-106A against the U.S. Navy's McDonnell F-4 Phantom II. While the F-106A bested the F-4 in visual dogfighting, the



THE DELTA-WING DESIGN HAD EVOLVED FROM THE WORK OF ALEXANDER LIPPISCH, WHO PIONEERED THE CONCEPT IN GERMANY DURING WORLD WAR II.

Phantom's APQ-72 radar proved more reliable, with longer detection and lock-on ranges. That December the USAF announced that Tactical Air Command would acquire the F-4, with the F-106A remaining in Air Defense Command's inventory.

In 1965 the Weber Aircraft Corporation was tasked with designing a "zero-zero" ejection seat to replace the F-106's unpopular and complicated conventional ejection seat. Weber delivered the first new seat in just 45 days, and it proved highly effective. Ejection with the Weber seat

was a one-step procedure: The pilot simply raised the armrests, which jettisoned the canopy and ignited the first stage of the two-stage rocket catapult. The booster rocket started the seat up the rails and then the second stage provided upward and forward thrust so that both seat and pilot cleared the ship's tail. The new seat was subsequently retrofitted on the entire F-106 fleet.

During its long service life, the F-106A had the distinction of recording the lowest single-engine aircraft accident record in USAF history. The Air Force began replacing its Delta Darts with McDonnell F-15s in 1972, keeping many in service as QF-106 target drones. The last F-106A was retired from the 119th Fighter Interceptor Squadron, New Jersey Air National Guard, in August 1988. Yet even today the Delta Dart could hold its own in the fighter training and combat arena, and Major Rogers' speed record for a single-engine jet still stands. That's quite an accomplishment for an airplane that first flew more than 60 years ago. †

DRONE-DUTY CONVERSION

The QF-106 retained its flight instruments and the aircraft's unique forked control column.





AVIATION
HISTORY

STYLE

We take to the air with photographer Bonnie Kratz, celebrate Leatherman's 35th anniversary and report on some cool new gear



A 1937 American Airlines DC-3, photographed off the Gulf Coast near Tampa by Bonnie Kratz.



Kratz photographed the EAA Aviation Museum's two Pitcairn Autogiros near Oshkosh.

PHOTOGRAPHY

Picture Perfect

Bonnie Kratz is a former EAA staff photographer based in Wisconsin. For the past 10 years she has been a board member and treasurer for the International Society for Aviation Photography. She's been featured in numerous publications and covered two of the Living Legends of Aviation annual events and several Women in Aviation conferences. Kratz currently lives in Luxemburg with her husband, Gary, and is enjoying retirement. Her work can be viewed at kratz.zenfolio.com



Photos: ©2018 Bonnie Kratz

TRAVEL

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GOODS

Repurposing History

Plane Pieces creates unique home decor items by cleverly repurposing parts from historical aircraft. Their limited-edition Kate Jacobs WWII radial engine piston candle holder (below) is created using a 1940s Jacobs R-755—often called the L-4—radial-engine piston. \$195, aviationart.com

Plane Pieces' P-51 Mustang (short variant) Piston Desk Clock (polished edition) was created using an authentic Packard V-1650/Rolls-Royce Merlin engine piston off the famed fighter, meticulously polished to a mirror finish. \$495



STYLE

HARDWARE

Tools by Tim

Tim Leatherman's "aha" moment came in 1975. While on a road trip through Europe, he battled leaky hotel plumbing, and his \$300 Fiat (below) required multiple roadside fixes. Leatherman had the right know-how, but not the right tools. "I was carrying a scout knife and used it for everything from slicing bread to fixing the car. But I kept wishing I had a pair of pliers!" Back home in Oregon, he started on the path of designing a better multi-tool. Thirty-five years later, Tim's **Leatherman Tool Group, Inc.** continues his commitment to quality and builds every tool in their Portland factory. To commemorate the company's 35th anniversary, Leatherman offers a specially packaged, limited-edition Pocket Survival Tool, \$274.95, leatherman.com



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FACING HORROR HEAD-ON

BY CARL VON WODTKE



"FLYING CHICKEN"
B-17Gs of the 100th Bomb Group run a gantlet of Luftwaffe Me-109Gs, in Keith Ferris' *Fortresses Engaged* (top). John Luckadoo (above) was among the lucky 100th crewmen who survived their 25-mission tours.

Few occupations in aviation history approached the level of danger experienced daily by Eighth Air Force bomber crews over Germany in 1943 and 1944. At that point in the war, the Luftwaffe was still a potent force, able to field thousands of advanced fighter aircraft manned by seasoned combat veterans. The Germans' deadly 88mm anti-aircraft guns doubled down on the danger, casting a steel screen over vital industrial targets.

Into this maelstrom flew the young Americans manning B-17 and B-24 heavy bombers, including the men of the "Bloody 100th" Bomb Group (story, P. 28). Their odds of surviving a 25-mission tour were close to zero. "Statistically, our average crew life was four missions," said 100th Group pilot John Luckadoo in a video produced by the National WWII Museum in New Orleans. "And in retrospect they now say that, actually, there was no way that anybody, statistically, could complete a tour. I think I calculated over a 400 percent turnover in the first 90 days. So every time you went out, you were facing the stark possibility that that would be your last mission."

The Luftwaffe's favored fighter tactic to counter the bomber threat was the head-on attack. "You're flying chicken," said Luckadoo. "They're closing at you with the combined speed of your aircraft and theirs, and they flew right straight through the formation, firing all the way or fish-tailing so they were just spraying the formation."

"You were very impressed very quickly that

they not only knew what they were doing, but they did it well—and they were out to kill you," he said. "To be truthful you had to be numb.... You had to be pretty much immune to the fact that you were in the big leagues—you were being confronted by very experienced, and very well equipped and very well trained opposition."

Luckadoo's worst mission, his 21st, targeted heavily defended Bremen on October 8, 1943. "As we turned from the initial point, the IP, we were inundated with flak—it was the heaviest flak that we had encountered," he recalled. "...You hear the shrapnel as the shells explode, ricocheting through the airplane.... Some guy said, 'Well, if we put our wheels down we can just taxi on it' it was so thick. But as we turned on the IP, we lost 12 ships simultaneously out of the formation."

According to official figures, the U.S. Army Air Forces suffered more than 62,000 casualties in the European theater, including 23,805 killed in action. Eighth Air Force bomb groups lost more than 11,000 bombers and their crews, with the Bloody 100th's share variously cited as 177 or 184 B-17s. "You had to conclude sooner or later that if you survived, you were just damn lucky," said Luckadoo, whose nickname naturally was "Lucky." You can read more about him and the other brave men of his group in the ensuing pages, and view video clips of them describing their experiences at nationalww2museum.org (see "The Eighth Air Force vs. The Luftwaffe" in the articles section). †

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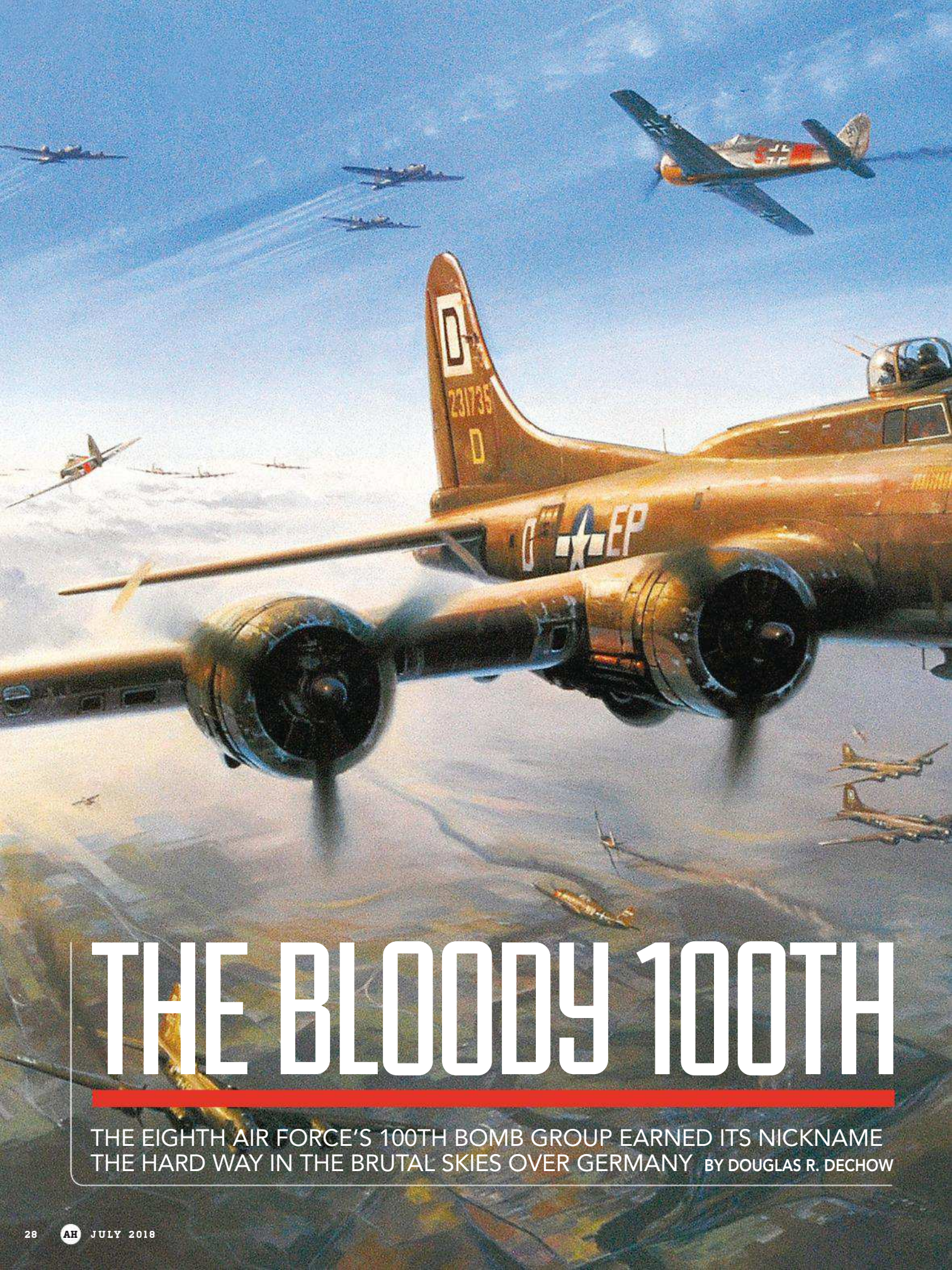
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THE BLOODY 100TH

THE EIGHTH AIR FORCE'S 100TH BOMB GROUP EARNED ITS NICKNAME THE HARD WAY IN THE BRUTAL SKIES OVER GERMANY BY DOUGLAS R. DECHOW

HEAD-ON CONFRONTATION

On March 6, 1944, Boeing B-17Gs of the 100th Bomb Group fight their way through an attacking force of Focke-Wulf Fw-190A-8s, in *First Strike on Berlin*, by Nicolas Trudgian. The 100th lost 15 bombers that day.





ONLY ONE WORLD WAR II U.S. ARMY AIR FORCES TAIL FLASH SURVIVES IN THE PRESENT-DAY U.S. AIR FORCE: THE SQUARE D.

Seventy-five years ago, on June 25, 1943, the 100th Bombardment Group (Heavy) first wore that emblem into battle.

The 100th was constituted as a heavy bomber group inside the Eighth Air Force, which, at peak strength on D-Day, June 6, 1944, fielded 40 groups of Boeing B-17s and Consolidated B-24s. The 100th's tail marking of a bold "D" on a square background was rendered on the vertical stabilizers of its B-17s, whose big, parabolic-shaped tail fins made for an effective if utilitarian canvas. In 2018 the Square D still adorns a Boeing aircraft—the KC-135R—though the 100th is now an aerial refueling wing. Even still, the Square D carries with it the heroic, bloody history of the 100th Bomb Group.

In November 1942, Colonel Darr Alkire was the first commander assigned to head up the 100th. By December, several hundred men formed the initial flying cadre of the group's four bomb

squadrons—the 349th, 350th, 351st and 418th—along with the requisite administrative, engineering and ground support units. While each unit was actively training, the Army Air Forces identified leaders who could forge the ungainly mass of civilians into airmen.

Among the commanders serving under Colonel Alkire were two officers who became synonymous with the unit's early dashing, devil-may-care notoriety. John "Bucky" Egan was originally the 100th operations officer, and Gale "Bucky" Cleven was the initial commander of the 350th Bomb Squadron. Just two of the several Bucks or Buckys who would serve with the 100th, Egan and Cleven were excellent pilots and charismatic men. More than a few of the 100th's young airmen came to view the two Buckys as inspirational figures, modeling their own behavior on that of these older leaders.

On the way to operational readiness, the group trained in Walla Walla, Wash., and, by the end of

TAILCHASE A twin-engine German fighter approaches a 100th Bomb Group Flying Fortress from behind.

November, in Wendover, Utah. The third phase of training occurred in Sioux City, Iowa, where the crews focused on formation flying and navigation. In February 1943, the fliers were dispersed throughout the western United States and relegated to the role of instructors for new units. Ground personnel were assigned to the air base at Kearny, Neb. While in limbo, the group's airmen regressed in their march toward combat readiness.

In April the lack of preparation and three months spent apart manifested in a training mission gone badly awry. Of 21 aircraft scheduled to make the 1,300-mile run between Kearney and Hamilton Field in California, three landed in Las Vegas (including Alkire's ship) and one flew the opposite direction to Tennessee. The whole group, sans Alkire, who lost this command over the debacle (though he would later lead a B-24 unit), was sent back to Wendover for a much-needed refresher.

One of the more intriguing outcomes of continuing to keep the 100th Stateside for more training was the decision to replace all the group's copilots with a recently graduated class of multi-engine pilots from Moody Field in Valdosta, Ga. In a recent interview, a member of that class, John "Lucky" Luckadoo, said that breaking up crews who had worked for months to establish camaraderie and trust had a profoundly negative impact on morale. The 96-year-old Luckadoo called the decision "ludicrous" because it forced him and his classmates, who were sitting in the right seat of a B-17 for the first time, to undergo a difficult "learn-on-the-job" experience. Luckadoo recalled that he had accrued less than 20 hours of B-17 flight time prior to making the transatlantic crossing to Britain.

The 100th Bomb Group arrived in England in early June 1943, just one of the dozens of heavy bomber groups comprising the Eighth Air Force's 1st, 2nd and 3rd air divisions. After a brief stay at an incomplete airbase in Podington, the 100th set up shop at Thorpe Abbots airfield in East Anglia. The group's airmen began flying over England and the Channel to get the lay of the land as they prepared for their first mission over enemy territory.

That first mission came on the morning of June 25, 1943, when 30 B-17s took off from Thorpe Abbots for a raid on the submarine pens at Bremen, Germany. By the end of the day, the group had lost three Flying Fortresses and 30 crewmen, including pilot Oran Petrich and his crew, one of the first assigned to the 100th. The group acquired its reputation as a hard-luck unit very early in its operational history, and it would go on to become known as the "Bloody 100th," a nickname laden with the weight of sacrifice.

On August 17, less than two months after its ini-



tial foray over enemy soil, the 100th flew to Regensburg for the first time. The raid was in the men's self-interest, for it targeted a factory where Messerschmitt Me-109s—fighters that would torment them in the months to come—were assembled. It was a complex mission, requiring the coordination of two separate masses of Eighth Air Force bombers (the second was headed to Schweinfurt and its ball-bearing works) and Republic P-47 escorts. Ultimately it required the Regensburg-bound bombers to shuttle to North Africa, with a planned return to England at a later date. In the end, the 100th, located at the tail end of a 15-mile bomber stream, was left unescorted when one of the P-47 units never appeared.

As they approached Regensburg, "what seemed to be the whole German Air Force came up and began to riddle our whole task force," wrote 418th Bomb Squadron navigator Harry H. Crosby in *A Wing and a Prayer*. "As other planes were hit, we had to fly through their debris. I instinctively ducked as we almost hit an escape hatch from a plane ahead. When a plane blew up, we saw their parts all over the sky. We smashed into some of the pieces. One plane hit a body which tumbled out of a plane ahead."

Of the 24 American bombers lost that day over Regensburg, more than a third bore the 100th's Square D on their tails. The 100th put up 220 fliers in 22 B-17s, and 90 of those men and nine Fortresses didn't make the return trip to Thorpe Abbots.

The group's reputation as a hard-luck unit was sealed in the second week of October 1943, during missions to Bremen and Munster. On October 8, Lucky Luckadoo put his nickname to the test over Bremen. That day, he was flying in a combat formation position with the darkly humorous nickname of "Purple Heart corner," the low plane in the low group.

Luckadoo noted that the Luftwaffe favored head-on attacks during those first months of combat flying by the 100th. The German fighters



THE TWO BUCKYS

Top: Majors John Egan (left) and Gale Clevon were among the 100th's inspirational leaders. Above: Harry Crosby, a 418th Bomb Squadron navigator, later wrote a book about his service in the "Bloody 100th."

ONE THAT GOT AWAY

The B-17G *Hang the Expense II* returned from Frankfurt on January 24, 1944, in spite of a flak hit that blew tail gunner Staff Sgt. Roy Urich from the plane. He survived to become a prisoner of war.











would “get out in front of our formation—in line abreast of 25 or 30 Focke-Wulfs or Messerschmitts—and spray the formation with cannon fire, rockets and .30-caliber machine guns.” As a result, he said, “We suffered tremendous fatalities.” Anti-aircraft artillery also took a toll, and Crosby noted that as they approached Bremen, the group encountered “Flak, a whole, mean sky full of it.” Luckadoo and his crewmates returned to Thorpe Abbots that day, but seven B-17s were lost and 72 aircrew died on the Bremen mission.

Crosby’s shot-up B-17 barely made it back on three engines to crash-land at an abandoned RAF airfield. After catching a ride in a lorry to Thorpe Abbots, Crosby and his fellow crewmen, who were presumed lost, found their beds stripped and personal possessions removed. “On the bare cot were two clean sheets and two pillowcases, two blankets, one pillow, all neatly folded,” he wrote. “Ready for the next crew.”

Two days later, 21 Forts departed Thorpe Abbots for Munster, but just 13 reached the target. The losses on the Munster mission were devastating: 12 aircraft and 121 men. A single B-17, *Rosie’s Riveters*, piloted by Lieutenant Robert Rosenthal, bombed the target and returned to Thorpe Abbots that day.

The perceived impact of the losses was compounded by the attrition in squadron leadership:

100TH BOMB GROUP’S WORST MISSIONS

Date	Target	Crew Losses
August 17, 1943	Regensburg	 9
October 8, 1943	Bremen	 7
October 10, 1943	Munster	 12
March 6, 1944	Berlin	 15
May 24, 1944	Berlin	 9
July 31, 1944	Merseberg	 8
September 11, 1944	Ruhland	 12
December 31, 1944	Hamburg	 8

“DID WE DESERVE TO BE CALLED THE ‘BLOODY 100TH’? OTHER OUTFITS LOST MORE PLANES AND CREWS THAN WE DID. WHAT MARKED US WAS THAT WHEN WE LOST, WE LOST BIG. THESE EIGHT MISSIONS GAVE US OUR NOTORIETY.” —HARRY H. CROSBY, A WING AND A PRAYER

THORPE ABBOTTS CRACKUP

The original *Hang the Expense* fell victim to a takeoff accident on November 26, 1943. All aboard, including two Red Cross nurses, escaped injury.



350th Bomb Squadron commander Major Bucky Clevon was shot down over Bremen, and Major Bucky Egan, CO of the 418th Squadron, was downed over Munster on October 10 while trying to exact revenge for his best friend Clevon. The two commanders found themselves at the same POW camp. Legend has it that when Egan arrived, Clevon said, "What the hell took you so long?" The loss of the two Bucky's, seen by the rank and file as exemplars of everything that a flier should be, was crushing.

Several days after these disastrous missions, the 100th was able to muster only eight aircraft for a raid that nearly broke the back of the Eighth Air Force. October 14, 1943, became known as "Black Thursday." On that autumn day, 291 B-17s assembled to make a second raid on the ball-bearing factories at Schweinfurt. American losses were appalling: 60 aircraft shot down, 17 written off and more than 100 others damaged. The loss of more than a quarter of the aircraft participating in the raid was clearly unsustainable, both in the eyes of VIII Bomber Command and, perhaps more important, the American people.

In a twist of fate that served to highlight the randomness inherent in warfare, the 100th Bomb Group emerged comparatively unscathed that dreadful day. All eight B-17s that it contributed to the mission returned to Thorpe Abbots.

THE LOSS OF MORE THAN A QUARTER OF THE AIRCRAFT PARTICIPATING IN THE RAID WAS CLEARLY UNSUSTAINABLE.

The October 1943 missions wound up being among the last bombing raids deep into German airspace that the Eighth Air Force flew without end-to-end fighter escort. Though the bombers bristled with .50-caliber machine guns (ultimately 13 in the B-17G, with its added chin turret to counter frontal attacks) and adhered rigorously to combat box formation flying to provide mutually supportive defensive fire, it was obvious that the B-17s in the European theater were vulnerable to Luftwaffe hunters. In the end, the primary tool for redressing the imbalance of power between the hunters and the hunted was to import a newer, more capable long-range fighter, the North American P-51 Mustang.

Though the fuel burn of aircraft is typically measured in gallons per hour, it's also instructive to think in the traditional earthbound measure of miles per gallon. The P-51 was a pilot's dream in terms of speed and maneuverability, but its real superiority was that it could eke out twice as many miles from a gallon of 100-octane avgas as could a P-47. With the Mustang, Army Air Forces planners finally had a fighter that could stay with the bomb groups all the way to Berlin and back.

Commander of the Luftwaffe Hermann Göring had once pompously bragged that Allied bombers would never be seen in the skies over Germany. By March 4, 1944, Allied bombers weren't just flying



DAINGEROUS SKIES

Top left: Flak peeled open the fuselage of the 100th Group B-17 *Humpty Dumpty II*.

Top right: A stricken B-17F goes down over Europe. Above: A view from the ball turret as the bomb bay doors open over the target.

over Germany, they flew all the way to Berlin. On that date, the 100th and their mates in the 95th Bomb Group became the first fliers to successfully bomb the German capital. For its efforts, the 100th was awarded a Presidential Unit Citation.

The ability to provide fighter escorts end-to-end on bombing missions had a profound effect on bomber losses suffered over Germany. The Eighth Air Force had lost nearly 30 percent of the bombers that took part in raids during the second week of October 1943. During what became known as the “Big Week” in February 1944, Eighth Air Force bombers suffered losses of only about 2 percent.

German flak and fighters weren’t the only dangers the heavy bomber crews faced. Flying in the foul English weather along the coast on instruments could be a formidable challenge. John Clark, a copilot in the 418th Bomb Squadron, flew the bulk of his combat missions in the depths of the wet and cold winter of 1944-45. He described instrument flying as “something you’re doing with the aircraft that was unique and important, to get this big device [bomber] through impenetrable fog

or night...and bring it down to the ground.”

Danger wasn’t found only in the skies. Simply repairing and maintaining the massive B-17s could be hazardous to one’s health. At a recent gathering of 100th veterans, Master Sgt. Dewey Christopher, a crew chief in the 351st Bomb Squadron, recounted how a live magneto combined with the necessary act of hand-propping a Wright Cyclone R-1820 led to his being tossed 30 feet through the air by a suddenly active propeller as the engine tried to start. He landed on his head and then in the infirmary with a broken shoulder.

While the 100th lost only a single bomber on the first Berlin mission, the use of P-51s to provide air cover over Germany didn’t completely eliminate the group’s propensity for bad days. Two days later, on March 6, the 100th suffered its worst losses of the war—15 aircraft and 150 crewmen—on the second mission to Berlin.

The 100th Bomb Group flew its final combat mission on April 20, 1945, just days before the cessation of hostilities in Europe. As the war in Europe wound down, the 100th and numerous other Eighth Air Force bomber groups celebrated the weeks leading up to V-E Day on May 8 by exchanging their 500-pound general purpose bombs for containers of food, medical supplies, clothing, candy and cigarettes. The so-called “Chowhound” missions dropped thousands of tons of supplies to the long-suffering people of the Netherlands and France. So many 100th fliers wanted to be a part of the humanitarian efforts that the oxygen systems, unnecessary at low level, were removed from the B-17s, freeing up room for as many as four extra crewmen on each plane. The missions helped the 100th put a positive spin on what had been a harrowing experience.



"SQUARE D" FORMATION

A mixed squadron of 100th Group Flying Fortresses includes a veteran B-17F (foreground) among the newer camouflaged and bare-metal B-17Gs.

Over the course of 22 months of aerial combat, the aircrews of the 100th had served a deadly apprenticeship as they honed their skills and tactics. In an unemotional analysis of the raw numbers, the Bloody 100th's wartime losses were not the worst suffered by the Eighth Air Force, though they were in the top three of losses by heavy bomber groups. The official history from the 100th Bomb Group Foundation cites 184 missing aircrew reports on 306 missions. In his memoir *An Eighth Air Force Combat Diary*, 100th copilot John Clark pointed out that "50% of the Group's losses occurred in only 3% of its missions." Like a gambler whose luck has gone cold, when the crews of the 100th had a bad day, they had a very bad day.

More than 26,000 Eighth Air Force personnel sacrificed their lives in service to the war effort. The total number killed or missing in action was slightly more than that suffered by the U.S. Marine Corps, and a little less than half the losses sustained by the entire U.S. Navy. Comparisons such as these do nothing to diminish the contributions of other military branches, but rather point out the gargantuan scale of the Eighth Air Force's effort. The 100th Bomb Group's portion of those losses was 785 men killed outright or missing in action and 229 aircraft destroyed or rendered unsuitable for flight.

In 2016 the Bureau of Veterans Affairs estimated there were 620,000 World War II veterans alive, but that we lose 372 per day. The responsibility for remembering, for commemorating the service of those veterans has fallen to their children and their grandchildren. In the case of the 100th

**LIKE A GAMBLER
WHOSE LUCK
HAS GONE
COLD, WHEN
THE CREWS OF
THE 100TH HAD
A BAD DAY,
THEY HAD A
VERY BAD DAY.**

Bomb Group, a number of organizations have taken up that obligation.

The 100th Bomb Group Foundation maintains an extraordinarily useful website (100thbg.com), and its members hold a biennial reunion. Last October, 17 group veterans, all in their 90s, attended the most recent reunion outside Washington, D.C. A smaller reunion takes place in February of each year in Palm Springs, Calif., in collaboration with the Palms Springs Aviation Museum. Other institutions connected with the 100th include the 100th Bomb Group Memorial Museum at the former Thorpe Abbots airfield; the American Air Museum at the Imperial War Museum in Duxford, England; the Museum of Air Battle Over the Ore Mountains in Kovarska, Czech Republic; and the National Museum of the Mighty Eighth Air Force near Savannah, Ga.

More than seven decades on, the actions of the men of the Bloody 100th still loom large in our cultural memory. Each time we refresh those memories, we ensure that their hard-earned lessons are not forgotten. ✦

Douglas R. Dechow's grand uncle Tech Sgt. Harry Dale Park was a member of the 100th Bomb Group. The 20-year-old Park was killed in a B-17 over Normandy on August 8, 1944. Dechow is the director of digital projects at the Center for American War Letters at Chapman University. Further reading: A Wing and a Prayer, by Harry H. Crosby; An Eighth Air Force Combat Diary, by John A. Clark; Century Bombers, by Richard Le Strange; and Masters of the Air, by Donald L. Miller.



TRIDENTS PATROL A Lockheed SP-2H Neptune of U.S. Navy Reserve patrol squadron VP-65 sorties from Naval Air Station Point Mugu, Calif., in 1973.



SEA SENTINEL

LOCKHEED'S P2V NEPTUNE SERVED IN KOREA AND VIETNAM, SEARCHED FOR SOVIET SUBMARINES AND EVEN CARRIED NUCLEAR WEAPONS, BUT TODAY IS LARGELY FORGOTTEN BY STEPHAN WILKINSON



“IT’S A PILOT’S AIRPLANE. IT HAS GREAT HANDLING QUALITIES; IT’LL DO WHAT YOU WANT IT TO DO WHEN YOU WANT IT. IT’S JUST A PLEASURE TO FLY.”

COLD WARRIOR

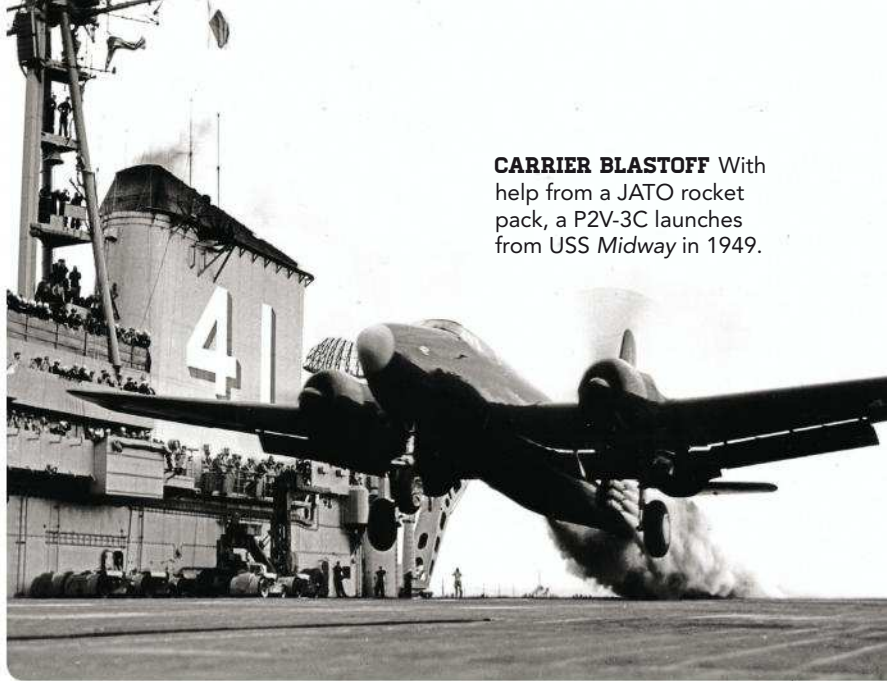
A P2V-7 of VP-18 flies past the Soviet freighter *Okhotsk*, searching for nuclear weapons during the Cuban Missile Crisis in October 1962.

“It” is the Lockheed P2V Neptune patrol bomber, and that opinion comes from Russell Strine, who flies the Mid-Atlantic Air Museum’s fully restored P2V-7 (which is currently inactive, since airshows can no longer afford the amount of fuel it burns).

“We didn’t get there fast, but we always got there,” says P2V-7 radioman Richard Boslow, who flew in Neptunes from 1965 through 1967. Richard Pickering started his patrol-bomber career flying the Consolidated PB4Y-2, the U.S. Navy’s single-tail version of the B-24, before spending 4,500 hours in four different versions of

the Neptune. “I always felt that I was strapped to the PB4Y and that the P2V was strapped to me,” he comments.

“The P2V was very forgiving,” says Ron Price, a sonobuoy operator with 2,500 hours in Neptunes between 1962 and 1966. “The wings were flexible, which was a big help down low in turbulence. I remember I had to look up to see the stack on a Russian trawler.” The Neptune was designed to absorb the low-altitude turbulence that was inevitable during maritime surveillance and sub-hunting. Make-do patrol bombers such as the PB4Y-2 and the Royal Air Force’s Avro Shackleton



CARRIER BLASTOFF With help from a JATO rocket pack, a P2V-3C launches from USS *Midway* in 1949.

“FEW AIRCRAFT HAVE SUCCEEDED SO WELL IN DOING SO MANY TASKS OVER SUCH A LONG PERIOD OF TIME.”

The Neptune was manufactured nonstop from 1946 through 1961—one of the longest unbroken production runs of any military aircraft ever built. As *Aviation History* contributing editor Walter J. Boyne once wrote, “The Neptune signaled a new era in which aircraft became platforms for other technology and as such had a far greater longevity than ever before. . . . Few aircraft have succeeded so well in doing so many tasks over such a long period of time.”

Early in its career, the Neptune was a heavily armed offensive weapon with turrets, a noseful of fixed 20mm cannons and a big bay full of bombs, torpedoes or depth charges. All but the depth charges were eventually shed, when it became clear that no Neptune would ever catch a Soviet nuclear sub on the surface. P2Vs were briefly used as gunships during the Vietnam War. Filled with expensive electronics, however, they were too vulnerable and valuable to risk as truck-busters.

Lockheed had produced about 9,000 medium patrol bombers for the Navy and the RAF during World War II—the Hudson, Ventura and Harpoon, all based on the twin-tail Model 14 Super Electra and its derivative Model 18 Lodestar airliners. The Neptune was Lockheed’s first all-new bomber. It was initially designed as a private venture of Lockheed’s Vega subsidiary in late 1941, but the exigencies of war prevented serious work being done on the project until 1944. The Navy needed proven aircraft, not an all-new design. The year after the war ended, Lockheed lost almost \$22 million, and even more in 1947 and ’48. Consistent postwar orders for P2Vs, however, helped to keep the inevitable postwar slump manageable.

Lockheed designer/engineer Kelly Johnson played a key role in the development of the Super Electra and its offspring, but it apparently soured him on further patrol-bomber work. Johnson had a famous list of 14 rules for how his Skunk Works team of iconoclasts would operate. Those rules were published and public, but a 15th never made it into official print.

ton were both based on airframes intended to fly at far higher altitudes.

“When we used to take our Neptune to airshows,” Strine says, “people didn’t know what it was. It’s a forgotten airplane.”

Indeed it is. Ask casual aviation enthusiasts to trace the history of the modern American bomber and they will almost certainly go full Boeing, with maybe a nod to the B-24: first the B-17, then the B-29 and B-50, leading directly to the B-47 and B-52. Few will remember that Lockheed had substantial skin in the game with the Cold Warrior P2V, which first flew in 1945 and remained operational as a U.S. military aircraft until 1970: too late for World War II and ultimately overshadowed by its successor, the four-turboprop P3 Orion. The Neptune flew combat missions for the U.S. in two wars—Korea and Vietnam—and was one of the nation’s busiest aerial resources during much of the Cold War. The P2V’s last combat operation took place in May 1982, when an Argentine Neptune radar-guided a Super Etendard through a heavy overcast to sink the British destroyer *Sheffield* with an Exocet missile during the Falklands War.

TECH NOTES LOCKHEED P2V-7S NEPTUNE

SPECIFICATIONS

WINGSPAN

103 feet 10 inches

WING AREA

1,000 square feet

LENGTH

91 feet 8 inches

HEIGHT

29 feet 4 inches

WEIGHT

49,548 lbs. (empty)
79,895 lbs (maximum takeoff)

MAXIMUM SPEED

403 mph

CLIMB RATE

1,760 feet per minute

CEILING

22,400 feet

RANGE

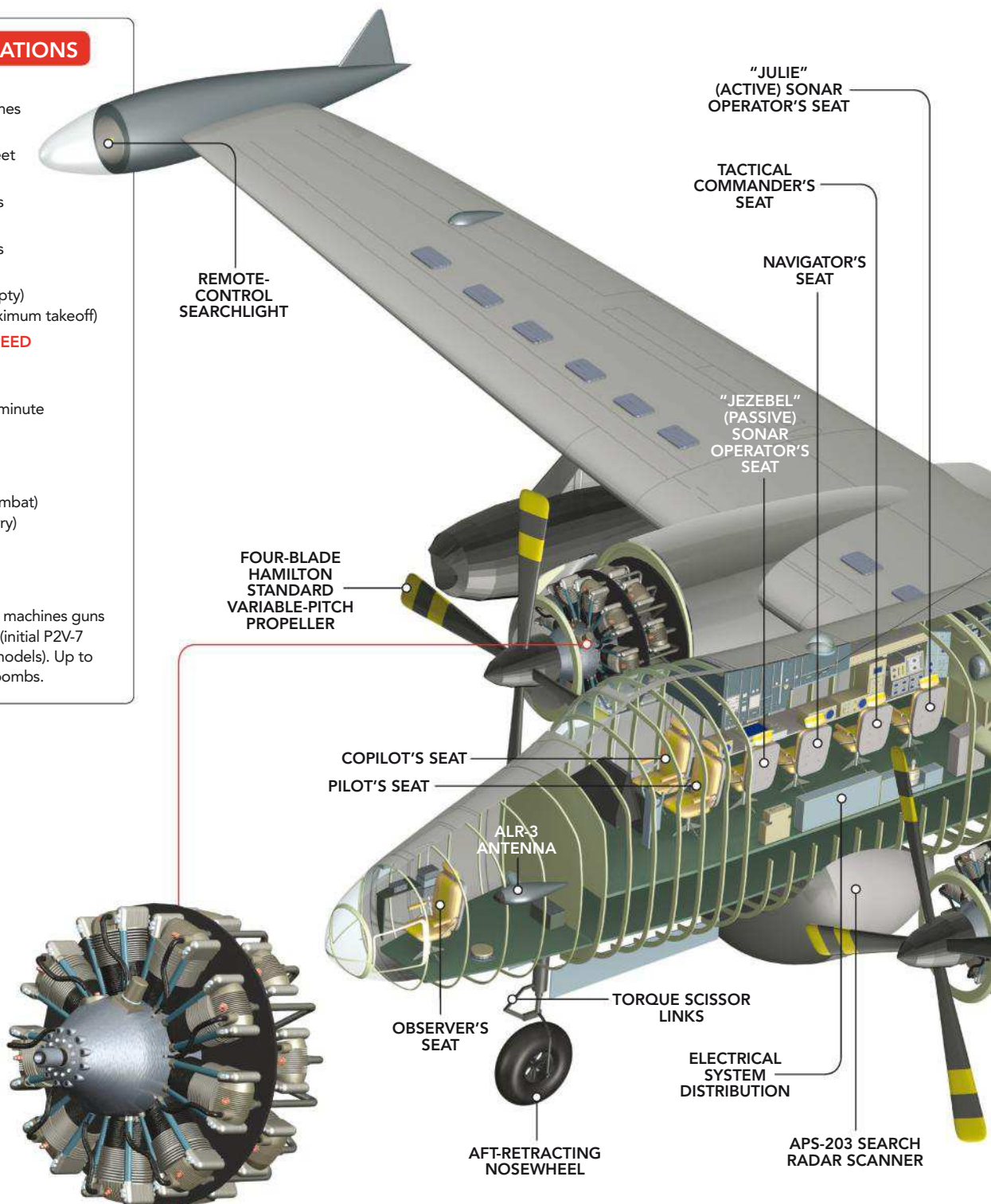
2,200 miles (combat)
4,350 miles (ferry)

CREW

10

ARMAMENT

Two .50-caliber machine guns in dorsal turret (initial P2V-7 and all earlier models). Up to 10,000 lbs. of bombs.



REMOTE-CONTROL SEARCHLIGHT

"JULIE"
(ACTIVE) SONAR
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TACTICAL
COMMANDER'S
SEAT

NAVIGATOR'S
SEAT

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SONAR
OPERATOR'S
SEAT

FOUR-BLADE
HAMILTON
STANDARD
VARIABLE-PITCH
PROPELLER

COPILOT'S SEAT
PILOT'S SEAT

ALR-3
ANTENNA

OBSERVER'S
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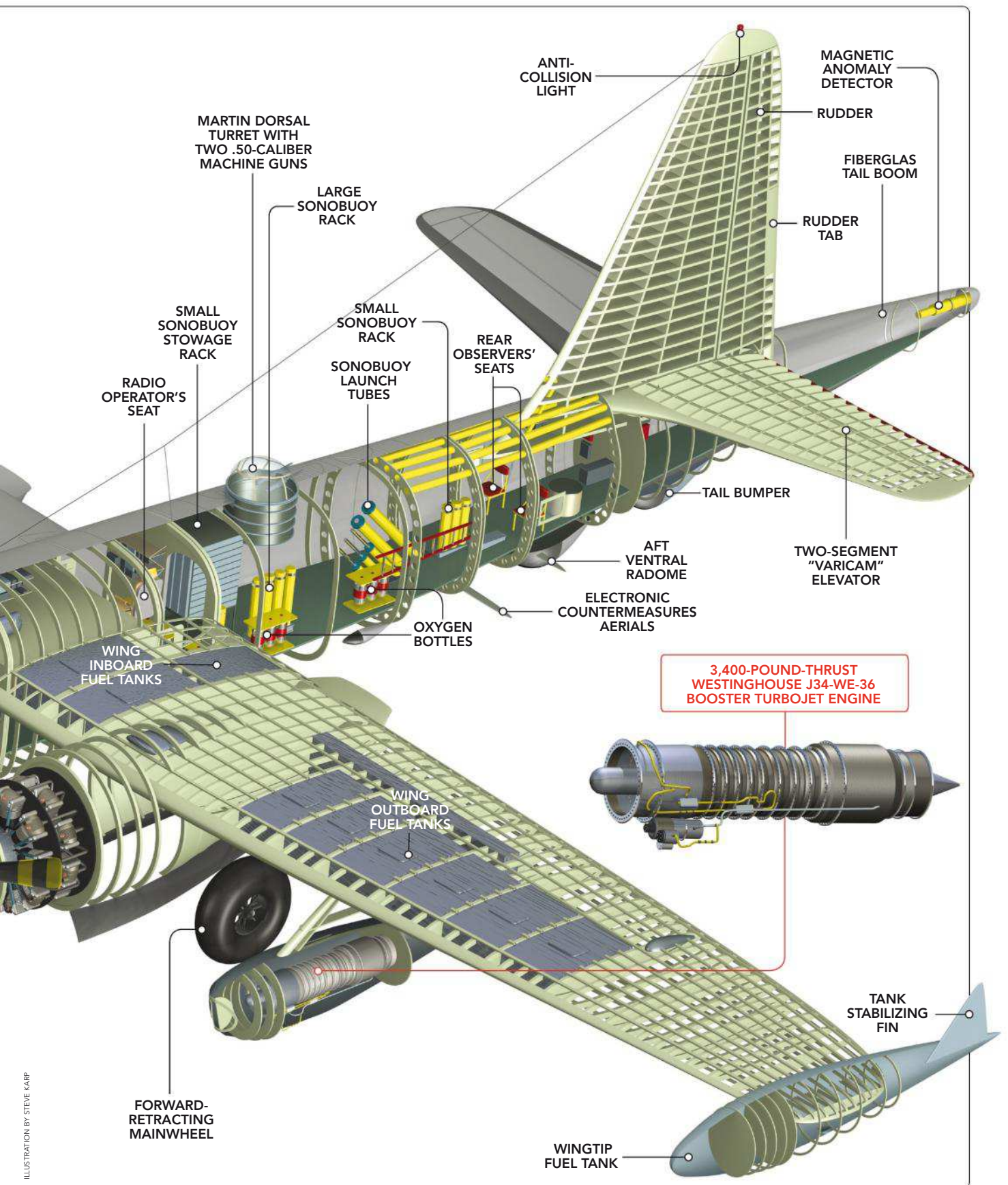


ILLUSTRATION BY STEVE KARP



MARITIME MISSIONS

A Neptune patrols off southern California circa 1959-60 (top). Radioman Richard Boslow of VP-21 said his most memorable mission was when his P2V-7 came across a Soviet “Whiskey boat” in the Mediterranean (above).

“Starve before doing business with the damned Navy,” Johnson said. “They don’t know what the hell they want and will drive you up a wall before they break either your heart or a more exposed part of your anatomy.” So it’s not surprising that Johnson had no hand in the design of the Neptune, instead busying himself with the P-80 Shooting Star and the Constellation. The Neptune was the work of John Wassall, chief engineer of the Vega subsidiary, with the substantial help of engineers R.A. Bailey and Lou Height.

The P2V was a success straight out of the box.

In 1946 the U.S. Army Air Forces was setting records routinely with B-29s, raising the bar by simply ferrying them nonstop from the Pacific back to the States. This annoyed Admiral Chester Nimitz, who knew the AAF was campaigning for the big budget bucks by claiming that long-range nuclear raiding was its bailiwick alone.

Nimitz suggested upstaging the Army by setting a record with the Navy’s brand-new Neptune. P2V-1 production aircraft number three was fitted with extra fuel tanks that increased its capacity to almost 9,000 gallons. The airplane was sent to Perth, Australia, with the goal of flying east non-stop and unrefueled all the way to Washington, D.C., maybe even on to Bermuda. Headwinds and bad weather dashed those hopes, but *The Turtle* made it as far as Naval Air Station Columbus, Ohio, setting a record of 11,236 miles that stood for 16 years, until an Air Force B-52H flew about 1,300 miles farther.

A Navy spokesman decided that *The Turtle* wasn’t a jazzy enough name for a record-setting bomber, so in a press release he bumped it up to *The Truculent Turtle*. Call it what you will, the airplane today sits in the National Naval Aviation Museum, in Pensacola, Fla.

The P2V went through a considerable range of variants, from P2V-1 to -7, with endless subvariants along the way. There was a P2V-8 on the drawing board, but it was canceled with the arrival of the P-3 Orion, the Neptune’s direct successor.

(In 1962 the Navy redesignated P2Vs as P-2s, but to us the Neptune will forever be a P2V, just as a Mustang is a P-51, not an F-word.)

The Neptune grew in fuselage length as more and more sub-hunting and electronic intelligence gear was loaded aboard, including the characteristic tail-stinger extension to hold the magnetic anomaly detector boom. The fuselage was extended with a section inserted forward of the wing starting with the P2V-6. This was relatively simple to do, as the Neptune was designed for ease of manufacture, and the entire fuselage from just aft of the cockpit to the beginning of the tail cone is a straight-sided, uniform cross section oval can.

Throughout its Navy career, the P2V was powered by a pair of Wright R-3350 twin-row Duplex-Cyclone radials, which had proved troublesome aboard B-29s. But wartime experience had pinpointed the R-3350's weak spots—mainly cooling problems and an improperly designed exhaust system—and the engine turned out to be reliable on the Neptune.

Most Neptune variants mounted straight R-3350s, but with the P2V-4, the Wright engines became turbocompounds—R-3350s with three power-recovery turbines that each added about 150 hp. The PRTs were essentially exhaust-driven turbocharger impellers, but rather than driving compressors, they imparted their torque mechanically, straight back to the crankshaft via shafts driving fluid couplings. (Horsepower figures for the R-3350 and its turbocompounding system vary substantially from source to source. The always-reliable Aircraft Engine Historical Society says that the Neptune started life with 2,400-hp engines and ended its career with 3,700 hp each.)

A far more substantial power boost came from the addition of two 3,500-pound-thrust turbojets in underwing pods on the P2V-5 and succeeding marks. The Navy had by this time loaded four tons of extra electronic gear aboard the Neptune, and the airplane could barely get off the ground. "I learned early on that the -7 is a four-engine airplane on takeoff," says Russ Strine. "It does burn fuel going down the runway, nearly 2,000 gallons per hour, but you get off that power setting right away and then can throttle the jets back. Typically, I left them at idle until I got the recipcs cooled down, then I went ahead and secured them." Strine kept the jets at idle during low-altitude airshow displays, but unlike Navy SOP, didn't leave them running during landings.

Though it was hard to hear the jets inside the airplane, the R-3350s were another matter, thanks to a lack of any interior insulation. "The guys who flew Neptunes are mostly deaf," says Richard Boslow. "Ninety percent of them wear hearing aids, and the other 10 percent need them. The patrols you didn't look forward to were the ones where you were out in a patrol box in the



THE P2V WAS A SUCCESS STRAIGHT OUT OF THE BOX.

PRE-JET POWER

Mechanics uncowl a P2V-3's Wright R-3350 engine at Naval Air Station Patuxent River, Md., in the early 1950s.

middle of the North Atlantic in midwinter and you got a radio message 'PLE,' which meant fly to the prudent limit of endurance: Stay out until you have just enough gas to get home. We had one mission that went 15½ hours." Sonobuoy operator Ron Price remembers that "We had gas heaters, but if we got even the slightest whiff of gasoline, we had to secure them. We did 10-hour flights without any heat."

The Neptune is a big airplane. A casual glance at a photo of a P2V might have you thinking in B-25 terms, but the Neptune is bigger than a B-17 in every dimension and carried a larger crew—as many as 12 pilots, observers, weapons-system operators, a radioman, a navigator and other electronics specialists. The P2V also had a flight engineer, whose official title, oddly, was "plane captain," but who was not a pilot. He sat in a jump seat just behind and between the pilots and was responsible for a variety of duties, including balancing the substantial fuel load.

Despite the size of the crew, it was almost impossible to bail out of a Neptune. The fuselage was studded with antennas and radomes, many of them close to the two bailout hatches—one below the flight deck and a second in the aft compartment. "The only way to bail out of a Neptune was the after hatch," says Boslow, "and there were number of antennas out there that could cut you in half. Or you went out the nosewheel well and hoped you didn't face-plant into the radome." Ditching was considered a better option.

Ditching was indeed part of the mission for the dozen P2V-2s and -3s that the Navy outfitted as nuclear bombers in the late 1940s. The P2V-3Cs, as they were designated, were supposed to take off from carriers and, assuming they somehow pen-



INTO THE SIXTIES

An SP-2H examines the Soviet helicopter carrier *Moskva* in 1968 (top). One of four Neptunes converted in 1968 for ground attack as AP-2Hs flies a mission over South Vietnam (above).

etrated Soviet defenses and survived, return to ditch alongside the ships, since they had no tail-hooks. The one concession to this maneuver was a “hydro-flap” that extended down from the belly forward of the wing leading edge, to help keep the nose up during a ditching.

These weren’t the only P2Vs armed with nuclear weapons. “Sometimes we carried nuclear depth charges,” recalls Boslow. “If you got within half a mile of a Soviet sub, you’d be sure of killing it. Of course you’d probably kill yourself too.”

Among the most unusual Neptune variants were the seven heavily modified P2V-7s redesignated as RB-69As and given Air Force markings. Like the U-2, Lockheed’s Skunk Works actually built them for the CIA as spyplanes. The “Sacred Seven” operated over both central Europe and mainland China from 1957 through 1964, and some of their pilots were civilians.

Though the RB-69As were capable of everything from leaflet-dropping to aerial delivery and retrieval (via Skyhook) of behind-enemy-lines agents, their main mission was gathering electronic intelligence. They called it “perimeter aerial reconnaissance,” the perimeters being the Iron and Bamboo curtains, and there were times when the RB-69As actually crossed those borders. The

Chinese shot down five of the seven, and nobody seems to know what happened to the two survivors. An “RB-69A” is on display at Warner-Robins Air Force Base, in Georgia, but it is actually an ex-Navy P2V painted in Air Force colors.

The Army was the third U.S. service to operate Neptunes. Six P2V-5s, redesignated as AP-2Es, served in Vietnam as radio-signal snoopers and jammers. Robert Cothroll was a voice-intercept operator aboard one of those AP-2Es from May 1970 through 1971, working for the intelligence staffs of Army ground units. “We flew over the Ho Chi Minh Trail in Laos,” says Cothroll, listening to short-range tactical radio transmissions by the North Vietnamese Army. “We usually flew at around 130 knots, about as slow as we could. We made lazy ovals, never the same way twice. There was a lot of triple-A in the area, plus a couple of SAM sites. We weren’t shot at that often. One plane had a round go through a wing fuel tank, but it exploded well above the aircraft. I think because we were passive—no armament—and were often with F-4s, they didn’t expose their gun sites to us. And they were holding their SAMs back for someone more important.”

One thing Cothroll particularly remembers about those 13-hour missions was that the Neptune lazed along in such a nose-high attitude that “Guys would complain that our buttocks were going to be disproportionate—one cheek bigger than the other—because we sat sideways and were always leaning slightly to the left.” Look at any side-view photo of a Neptune and you’ll see the substantial downward thrust line of the piston engines. This is an airplane that obviously was designed for loitering patrol flight, when the increased angle of attack would have put the engines at a normal attitude.

That side view also makes apparent one of the Neptune’s most distinguishing features: its oversize vertical tail. Some might assume the big tail fin was designed to enhance control during single-engine flight, but the rudder—the crucial engine-out control surface—is actually relatively narrow. The huge vertical stabilizer, however, creates great stability in low-altitude turbulence. “We got turbulence during monsoon season,” Cothroll remembers, “but nothing so bad you’d lose a cup of coffee. It was a pretty comfortable ride.”

“You have to be very aware of the crosswind component because of that big fin,” Russ Strine warns. “When you land and put the props into reverse, suddenly there’s no airflow over the fin, and the crosswind really grabs hold of it. They landed us at Oshkosh one time with a quartering tailwind. Jesus, what a scary episode that was. We lost control of the airplane momentarily and almost went off the runway. Went into reverse again and the airplane turned even harder, took out two runway lights.”



STILL SERVING A Neptune flying for the U.S. Forest Service drops retardant on a fire near Bonner, Mont. The last P2V firebombers have since been retired.

The Neptune's tail featured an unusual "varicam," a complex mechanism that altered the camber of the horizontal stabilizer, thus serving as an especially powerful trim tab but with lower drag. It was so effective that some pilots called it a super-elevator. The varicam helped trim out the varying center of gravity as Neptunes burned fuel on 10- to 13-hour missions, but its biggest benefit showed up during landings.

P2Vs were typically nose-heavy, especially with a forward CG at the end of a long mission, and more than a few unwary pilots landed them nosewheel first, which led to up-and-down porpoising on the runway. Three or four porpoises usually resulted in the nosegear collapsing. Proper P2V landing technique was to roll on increasing amounts of nose-up varicam as the power came off in the flare. "It takes all the control pressures off, and you can hold the yoke back in your gut, and the nosewheel stays off till you're halfway down the runway," says Strine.

Another Neptune characteristic was its sometimes-leaky, high-pressure hydraulic system. "It's a hydraulic airplane, no question about it," explains Strine. "Everything is hydraulic except the cowl flaps: landing gear, flaps, spoilers, varicam, bomb bay doors... it's a 3,000-psi system." One story has it that when a pencil-size cockpit line sprang a tiny leak, a new Navy copilot tried to stanch it with his

THE NEPTUNE'S SWAN SONG WAS AS A FIREBOMBER, STARTING IN THE LATE 1960S.

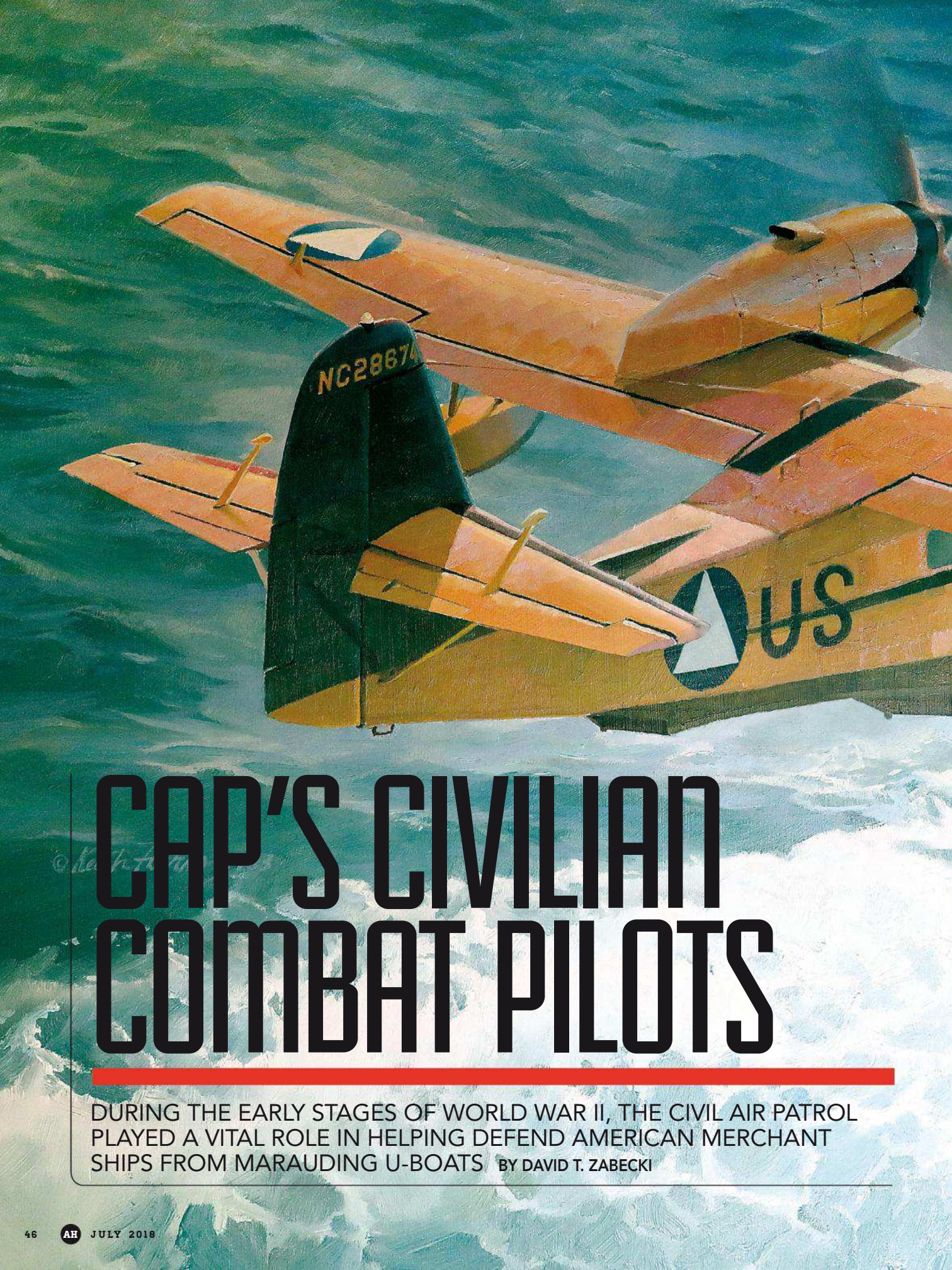
thumb. The spray of hydraulic fluid continued... through his thumbnail.

The Neptune's swan song was as a firebomber, starting in the late 1960s. At one point there were 33 Neptunes operating as borate bombers in the West—a high percentage of the approximately 40 P2Vs that survived military service (not counting those left to molder away in the Davis-Monthan Boneyard). The last seven firefighters were retired in 2017, largely replaced by British Aerospace BAe 146s, which carry half again as much retardant and have a service life of 80,000 hours versus the Neptune's 15,000.

Today there are only two restored Neptunes still flying. The Australian Historic Aircraft Restoration Society operates a handsome P2V-7 painted in Royal Australian Air Force colors, and the Erickson Aircraft Collection, in Madras, Ore., regularly flies its -7 to airshows. Though the Mid-Atlantic Air Museum has grounded its Neptune, it could be relaunched after a thorough annual and some new tires and hydraulic and fuel hoses.

Unfortunately, airshow crowds are far more interested in B-17s, B-24s and B-29s than they are in this forgotten bomber. †

Contributing editor Stephan Wilkinson suggests for further reading Lockheed P2V Neptune, by Wayne Mutza.



CAP'S CIVILIAN COMBAT PILOTS

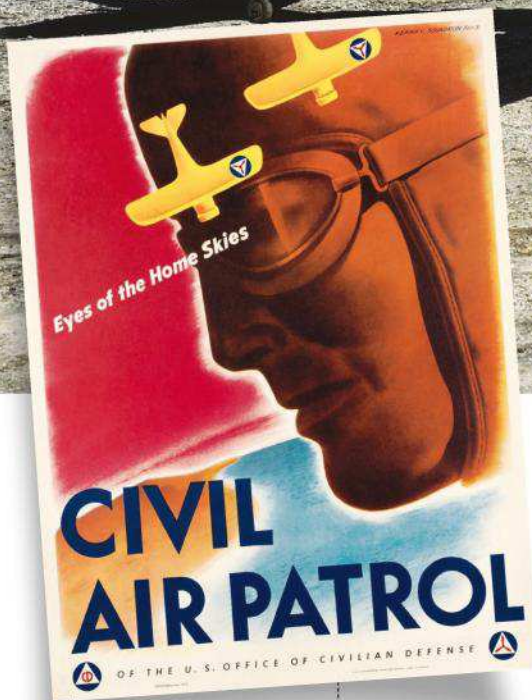
DURING THE EARLY STAGES OF WORLD WAR II, THE CIVIL AIR PATROL PLAYED A VITAL ROLE IN HELPING DEFEND AMERICAN MERCHANT SHIPS FROM MARAUDING U-BOATS BY DAVID T. ZABECKI



FLYING MINUTE MEN On July 11, 1942, Civil Air Patrol crewmen Wynant Farr and John Haggins drop a depth charge from their Grumman Widgeon on a surfacing German U-boat off the New Jersey coast, in *A Dangerous Game*, by Keith Ferris.



NATURAL DISASTERS ALWAYS PLACE HIGH DEMANDS ON THE NATION'S EMERGENCY SERVICES.



The 2017 hurricane season was particularly difficult, with Hurricanes Harvey, Irma and Maria battering the southern United States and Puerto Rico in rapid succession.

For Harvey alone, more than 170 Civil Air Patrol volunteers from 19 states supported air operations in Texas, flying various disaster relief

missions, including transporting medical supplies and conducting aerial photoreconnaissance of key infrastructure sites and inland waterways. Last year, the nationwide CAP fleet amassed more than 100,000 flying hours.

The Civil Air Patrol came into being during the dark days immediately preceding America's entry into World War II. In 1941 there were more than 128,000 licensed private pilots in the U.S., operating some 25,000 light aircraft from 2,500 airfields. Many of those pilots, including aviation writer Gill Robb Wilson, worried that when America was finally drawn into the war, all civil aviation would be grounded for the duration, as had happened in Germany. They also thought that if properly organized, private aviation could be a valuable national

asset, relieving military fliers of some of the burden of liaison, light transportation and coastal and border reconnaissance work. With the backing of U.S. Army Air Corps chief General Henry "Hap" Arnold and the Civil Aeronautics Authority (CAA), Wilson was instrumental in establishing the New Jersey Civil Air Defense Services, the forerunner of CAP.

Other states established similar organizations on the New Jersey model, which in turn led to the initiative to form a national-level organization. On May 20, 1941, the federal government established the Office of Civil Defense, with former New York mayor Fiorello LaGuardia as its first director. Advocates for a national civilian air organization, including Wilson and publishers Thomas Beck and Guy Gannet, lost no time in petitioning LaGuardia with a plan for a Civil Air Patrol organized into 48 state wings as part of the Civil Defense office. LaGuardia, a former World War I bomber pilot himself, enthusiastically endorsed the plan, but he also knew that the support of the Air Corps (soon to be redesignated the U.S. Army Air Forces) was critical to its success. Arnold, in turn, established a board headed by Brig. Gen. George Stratemyer to evaluate the proposal. The board quickly recommended that the Army Air Forces

EYES IN THE SKIES

A CAP crewman hand-props a Stinson 105 prior to a patrol from Bar Harbor, Maine.

provide a team of officers to help set up and administer the new organization. LaGuardia signed the order creating the Civil Air Patrol on December 1, 1941—six days before the Japanese attack on Pearl Harbor. The AAF assigned Maj. Gen. John Curry as CAP's first national commander, with Wilson as his executive officer.

Immediately after Pearl Harbor, the government placed limited restrictions on private civilian flights along certain areas of the West Coast. Captain Earle Johnson, another CAP founder, was less than impressed with the aerial security measures for the country's interior, especially around airports and critical war industries. Taking off in his own private plane one night in early 1942, Johnson dropped sandbags onto the roofs of three war plants on the outskirts of Cleveland. Completely undetected, he notified the various plant managers the next morning that they had been "bombed." The CAA reacted immediately by grounding all private flights until far more comprehensive security measures could be implemented. These included background checks on all licensed pilots, guards at all airports and approved flight plans required for all flights. The new rules resulted in a huge influx into the ranks of CAP, which gave private pilots greater opportunities to fly under the auspices of an official U.S. government organization.

Although the Japanese attack initially caused federal authorities to focus on the West Coast, the first real threat emerged on the East and southeast coasts, as German U-boats started operating within a few hundred yards of the shoreline, often sinking merchantmen and tankers at the rate of two a day. The U.S. Navy was spread too thin to be everywhere at the same time along the 1,200-mile eastern sea frontier, from Halifax to the Florida Keys. Nor did the AAF have enough aircraft to screen the coast and provide adequate early warning to ships. The idea of using civilian pilots and their private aircraft for such a hazardous mission was a measure of desperation. It was a huge risk, but there was no viable alternative.

CAP was authorized to establish and conduct the Coastal Patrol Experimental Program on a 90-day trial basis. Gill Robb Wilson stepped down as CAP's national executive officer to assume the mission of organizing the Coastal Patrol. Officially established on March 5, 1942, it flew its first over-water combat patrol that same day from a base in Rehoboth, Del. The other bases in the trial program were in New Jersey and Florida. By September CAP was operating from 21 Coastal Patrol bases from Maine to the Texas-Mexico border. The bases were initially under the operational control of the Eastern Defense Command's I Bomber Command, but in October they were



THE IDEA OF USING CIVILIAN PILOTS AND THEIR PRIVATE AIRCRAFT FOR SUCH A HAZARDOUS MISSION WAS A MEASURE OF DESPERATION.



placed under the 25th and 26th wings of the AAF's Antisubmarine Command.

The initial flights were reconnaissance missions only, consisting of a pilot and an observer with a donated maritime radio. They operated as far as 150 miles from shore, and the crews' only over-water gear consisted of kapok life vests. The volunteer pilots received \$8 a day, the ground crewmen \$5. Volunteers ranged from garage mechanics to millionaire sportsmen, farm hands and even grandfathers.

Whenever a patrol spotted a U-boat, the crew broadcast its position to merchant ships in the area, as well as to the Navy and AAF. The CAP plane then stuck with the sub as long as possible to vector in any intercepting forces. The patrols also radioed in reports of tankers and merchant ships that had been hit, and the position of survivors in the water.

In May 1942, one patrol sighted a U-boat sitting on the surface. Not knowing the aircraft was unarmed, the crew executed a crash dive, but the sub hung up on a sandbar. The CAP pilot circled the sitting duck for more than half an hour, but the U-boat finally managed to work loose and get

MULTIPLE ROLES Top: Members of CAP Tow Target Unit No. 22 in Clinton, Md., show off their personalized target sleeve. Above: CAP nurses train in parachuting to isolated locations at Norwood, Mass., in July 1942.



GATHERING OF EAGLETS
CAP members and their families and aircraft assemble at Lansing, Mich., in 1942.



HONORED AIRMEN
President Franklin D. Roosevelt awards Air Medals to CAP crewmen Edmond Edwards (right) and Hugh Sharp (middle) while Director of Civilian Defense John Landis looks on.

away just before land-based bombers reached the target. Shortly after that, CAP planes started carrying bombs and depth charges slung from jury-rigged external racks.

CAP claimed its first U-boat kill on July 11, 1942, when Captain Johnny Haggins and Major Wynant Farr, flying a Grumman G-44 Widgeon armed with two depth charges, bombed a sub they had been shadowing for three hours, just as it came up to periscoping depth. The resulting oil slick and surface debris seemed to confirm the kill, and for

many years after the war that and one later claimed kill were credited to CAP. However, no corroborating evidence has been found in the extensive records the Kriegsmarine kept on all 1,154 of its commissioned U-boats. Those records indicate no U-boats missing off the East Coast during the period that the Coastal Patrol was active. Nor do the war diaries of the Navy's Eastern Sea Frontier and the Gulf Sea Frontier record any mention of CAP aircraft sinking a U-boat.

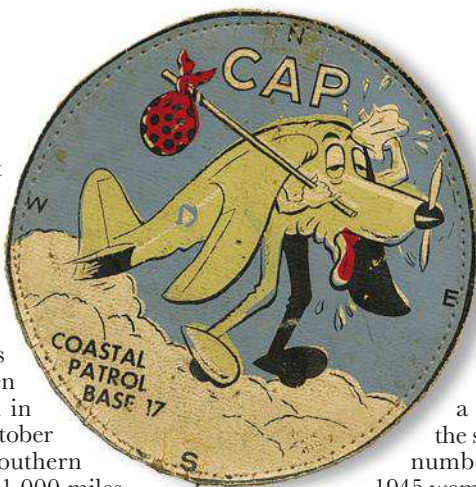
The very legality of the Coastal Patrol was highly dubious, of course. Despite wearing semi-military uniforms and having military rank titles, the CAP crews were officially civilians. Had any of them been shot down and captured, they would not have received prisoner of war status under the Geneva Conventions. The CAP members knew this, yet they continued to volunteer to fly the hazardous missions.

Coastal Patrol stood down on August 31, 1943, by which time both the Navy's and the AAF's anti-submarine forces had grown large enough to handle the mission. During the almost 18-month period, CAP had flown 86,685 over-water sorties, spotted and reported 91 merchant vessels and 363 survivors in distress, reported 173 U-boat positions and dropped 82 bombs on 57 of those subs. In the process, it lost 90 aircraft and 26 crew members. After the war, 824 Coastal Patrol pilots and observers received Air Medals, and Edmond Edwards and Hugh Sharp were each awarded a second Air Medal with V Device for valor for their rescue of a CAP pilot who had ditched at sea.

As the war progressed, CAP assumed addi-

tional missions to augment the AAF. Between August 1942 and August 1944, the Courier Service transported some 3.5 million pounds of cargo for the First, Second and Fourth air forces, flying combined daily routes spanning 16,380 miles. Seven Courier Service pilots died in the line of duty. Between October 1942 and April 1944, the Southern Liaison Patrol screened the 1,000 miles along the Rio Grande from Brownsville, Texas, to Douglas, Ariz., to prevent illegal border crossings. The patrol flew 4,720 missions, losing 13 aircraft and suffering two crew fatalities. For three years CAP's Target Towing Service supported search-light target tracking and live-fire training for both aerial gunnery and anti-aircraft fire. The cost was 25 aircraft and seven pilots killed.

Search and rescue was the wartime mission that still defines CAP to this day. CAP aircrews flew more than 25,000 hours of SAR missions during the war. With their ability to fly low and slow, and their knowledge of the local terrain, they were far more efficient at such missions than military pilots. In a single week of February 1945 alone, CAP pilots located the wreckage of seven military aircraft. Once a wreck was found, CAP often sent ground rescue teams to the location to secure the crash site and search for survivors. In the Florida wing, which was commanded by Zack



Mosely, creator of the classic aviation comic strip *The Adventures of Smilin' Jack*, ground teams pioneered the use of swamp buggies for rescue missions in the marshy Everglades.

The Civil Air Patrol was a co-ed organization from the start, and attracted a large number of women pilots. By 1945 women accounted for some 20 percent of CAP's membership. More than half the Women Airforce Service Pilots (WASPs) started out in CAP.

On October 1, 1942, the Cadet Program was instituted for boys and girls between the ages of 15 and 17. Within less than a year, there were more than 20,000 young people in the program. The CAP cadets received training in first aid, Morse code, meteorology, navigation, aircraft construction and other basic ground school subjects. Many went on to qualify for private pilot licenses. As the war progressed, the CAP Cadet Program became a screening point and an entry path for the AAF's Aviation Cadet program.

Soon after the Coastal Patrol was up and running, Earle Johnson (by then an AAF major) replaced Currey as CAP's national commander, remaining in that role until February 1947. On April 23, 1943, a presidential executive order transferred jurisdiction for the Civil Air Patrol

SEARCH AND RESCUE WAS THE WARTIME MISSION THAT STILL DEFINES THE CIVIL AIR PATROL TO THIS DAY.

ESPRIT DÉCOR The squadron emblem of Coastal Patrol Base 17 (above) appeared on CAP aircraft (below) operating from Suffolk County Army Air Field in Riverhead, N.Y.



OPPOSITE TOP & RIGHT: CAP NATIONAL HEADQUARTERS; OPPOSITE BOTTOM: AP PHOTO/GEORGE R. SKADDING; ABOVE RIGHT: HISTORIC NET ARCHIVE

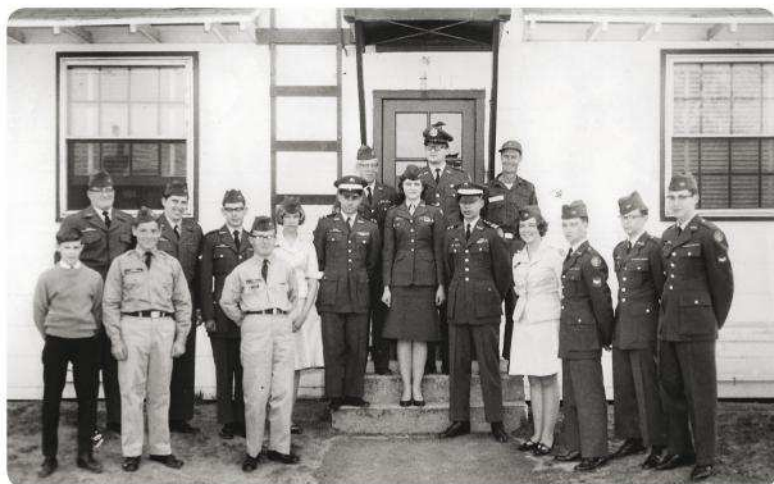
CAP CADETS Members of the Cadet Squadron at Westover Air Force Base in Massachusetts in 1964 include author David T. Zabecki (in front of steps).

from the Office of Civilian Defense to the War Department, and CAP became an auxiliary of the Army Air Forces. That December the AAF loaned 288 Piper L-4 Grasshoppers to CAP for use in the Aviation Cadet recruiting program. By the end of 1944, CAP had given more than 78,000 prospective recruits orientation flights and had actually recruited an oversupply of aviation cadets.

As World War II ended, it seemed to many that CAP's raison d'être ended with it. Although most of the AAF's senior officers were enthusiastic supporters, the sharp budget reductions that started

in 1946 brought increasing pressure on the military's ability to fund CAP. Concerned about the organization's future, General Arnold convened a conference of the 48 wing commanders to plan a path forward. They decided to incorporate CAP as an organization dedicated to aviation education and civilian emergency services.

On July 1, 1946, Congress passed Public Law 476, incorporating CAP as a nonprofit organization "solely of a benevolent character." CAP members would never again participate in direct combat operations, and the organization intended to operate without the help of the Army Air Forces. But after the U.S. Air Force was established as a separate service in 1947, CAP and USAF officials started meeting to reevaluate their future relationship. On May 26, 1948, Congress passed Public Law 557, establishing CAP as the official civilian auxiliary of the Air Force.



Headquartered at Maxwell Air Force Base in Montgomery, Ala., the Civil Air Patrol today operates under the USAF's Air Education and Training Command. It currently has 33,500 senior members and 24,500 cadets, and maintains a fleet of 560 light aircraft. In times of emergency, it can also draw from its members' 4,300 privately owned aircraft. Although civilians in every legal sense, CAP members wear modified USAF uniforms with distinctive CAP insignia, and are organized along military lines.



NEXT GENERATION
CAP cadets learn the fundamentals of air navigation and map reading in 1956.



SKYHAWK LINEUP

Cessna 172s, part of CAP's 560-aircraft fleet, await their next cadet training flights at Coles County Memorial Airport near Mattoon, Ill.

CAP's three primary missions are emergency services, aerospace education and the cadet programs. Today CAP flies 85 percent of all inland search-and-rescue missions under the operational control of the Air Force Rescue Coordination Center at Tyndall Air Force Base in Florida. CAP members typically save the lives of 75 to 100 people a year. CAP also has formal operating agreements with many of the nation's leading disaster relief and humanitarian agencies, including the FAA, National Transportation Safety Board, U.S. Coast Guard, Federal Emergency Management Agency and the American Red Cross. Since 1986, CAP aircrews have also flown counter-drug missions under the operational control of the Air Force and the U.S. Customs Service.

Cadet membership today is open to youths between the ages of 12 and 18. The Cadet Program is considered a parallel program to the high school Air Force Junior ROTC. CAP cadets who earn the Mitchell Award and achieve the rank of cadet 2nd lieutenant are eligible to enlist in the Air Force as airmen first class (E-3). Many cadets go on to either the U.S. Air Force Academy or to Senior ROTC in college.

On May 30, 2014, Congress awarded the Congressional Gold Medal, its highest civilian honor, to the World War II members of the Civil Air Patrol. According to Public Law 113-108: "The CAP's wartime service was highly unusual and extraordinary, due to the unpaid civilian status of its members, the use of privately owned aircraft



ASSESSING DAMAGE

An aerial photo taken by members of CAP's Texas Wing shows flooding in Wharton from the Colorado River in the aftermath of Hurricane Harvey.

and personal funds by many of its members, the myriad humanitarian and national missions flown for the Nation, and the fact that for 18 months, during a time of great need for the United States, the CAP flew combat-related missions in support of military operations off the Atlantic and Gulf of Mexico coasts." †

Retired U.S. Army Maj. Gen. David T. Zabecki is History.Net's chief military historian. From 1962 to 1965, he was a CAP cadet at Westover Air Force Base in Massachusetts. Further reading: Minutemen of the Air, by Carroll V. Glines and Gene Gurney; and America's Homefront Air War, by Roger Thiel.

OPPOSITE: (TOP) COURTESY OF DAVID T. ZABECKI; (BOTTOM) JACK FLETCHER/NATIONAL GEOGRAPHIC GETTY IMAGES; ABOVE & RIGHT: CAP NATIONAL HEADQUARTERS



PUNCHING OUT

THE FASTER AIRPLANES GO, THE FASTER WE NEED TO GET OUT OF THEM
BY DON HOLLWAY



METEORIC EJECTION

A Gloster Meteor T.7 test-fires a Martin-Baker ejection seat. One of two Meteors employed by the company for the purpose, WA638 has made more than 500 ejection seat test flights over five decades.

THIS YEAR'S MODEL

During a ground test, a Martin-Baker Mark 16 blasts off through the canopy of Textron Airland's Scorpion light attack aircraft.



IF NECESSITY IS THE MOTHER OF INVENTION, COMBAT IS ITS FATHER.

Little more than a month after Pearl Harbor, when the United States was belatedly gearing up for war, Germany was already testing jet fighters.

In January 1942, Heinkel company test pilot Helmut Schenk flew an He-280 prototype with four pulse-jet engines. They didn't provide enough power for takeoff, so the Heinkel was tethered to an He-111 tow plane. Unfortunately, that kicked up so much snow that when Schenk reached 7,900 feet and the bomber crew dropped the heavy towline, it remained frozen to his jet. Flying, let alone landing, was impossible, but luckily Heinkel was also working on another innovation. "I jettisoned the canopy and then pulled the release lever for the seat," Schenk recalled, "and was thrown clear of the aircraft without coming in contact with it." A blast of compressed air fired him, seat and all, out of the cockpit. He landed unharmed via parachute, the first man to escape an aircraft using an ejection seat.

Almost since airplanes started flying, people have been figuring the quickest way to get out when

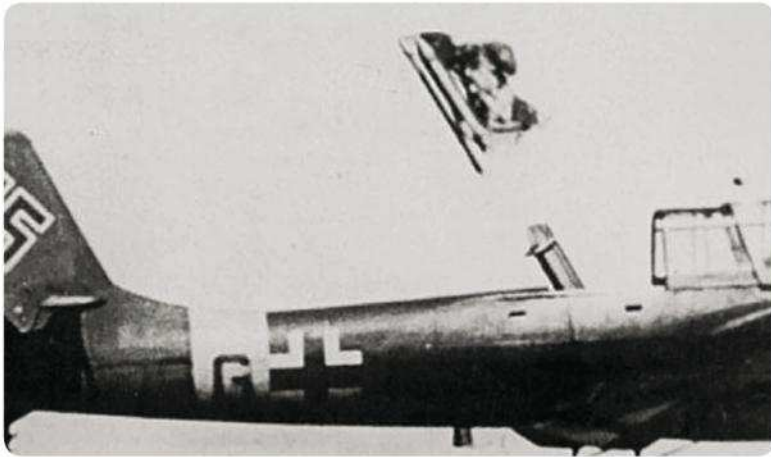
they fail. Bungee-cord and compressed-air escape systems date back to the 1910s. By September 1941, the Germans were test-firing dummies from the back seat of a Junkers Ju-87. Early ejection seats had difficulty just clearing the Stuka's tail fin. As aircraft speed and required ejection power increased, air bottles became impractically heavy; instead the He-162 jet's seat used a gunpowder cartridge. It's thought some 60 Luftwaffe pilots ejected during the war, but how many actually survived is unknown.

In Britain, during an emergency landing in a fighter prototype he co-designed with Irish engineer James Martin, test pilot Captain Valentine Baker was unable to bail out in time. Martin took his partner's death so hard that he repurposed their company toward aircrew escape. In July 1946, Martin-Baker employee Bernard Lynch ejected from the rear cockpit of a Gloster Meteor 3 at 320 mph, and eventually made 30 more successful ejections. "From an engineering point of view," company spokesman Brian Miller said decades later,

"ZERO-ZERO" SEAT EJECTION SEQUENCE

Martin-Baker test-fires its US16E seat from a mocked-up cockpit of Lockheed Martin's F-35 joint strike fighter.





“the ejection seat was developed quite quickly, and we were able to soon come up with the velocities and accelerations that we needed to clear an aircraft fin. The problem was that nobody knew what those accelerations would do to a man.”

Early Martin-Baker seats might save your life, but could also end your flight career, as reflected by aviator slogans “Meet Your Maker in a Martin-Baker” and “Martin-Baker Back Breaker.” Within a year, however, the ejection seats were standard equipment in British jets. That saved the life of test pilot Jo Lancaster, who on May 20, 1949, punched out of an Armstrong Whitworth A.W.52 flying wing, the first British emergency ejection.

On August 17, 1946, Sergeant Larry Lambert earned the Distinguished Flying Cross by ejecting from a modified Northrop P-61 over Wright Field, Ohio, at 302 mph. American aviation manufacturers all hurried to design ejection seats. Within 10 years, however, aircraft were capable of such speeds that seats could barely keep up. In February 1955, North American Aviation test pilot George F. Smith took a factory-fresh F-100A Super Sabre on a check flight and suffered total hydraulic failure at 37,000 feet. By the time he was down to 6,500 feet, out of control, the “Hun” was doing Mach 1.05. On ejection the wind forces amounted to a 40-G deceleration, knocking Smith unconscious. Though a third of his chute was torn away, it deployed automatically. Smith spent seven months in the hospital, but survived to fly F-100s again.

Counterintuitively, it’s at zero airspeed and altitude that seats require the highest power, because

TESTED AND TRIED

Above: The first test of an ejection seat was from the rear gunner’s position in a Junkers Ju-87 in 1941. Right: George Aird ejects from his English Electric Lightning F.1 in September 1962.



COUNTER-INTUITIVELY, IT’S AT ZERO AIRSPEED AND ALTITUDE THAT SEATS REQUIRE THE HIGHEST POWER.

the aircraft is not moving away and parachutes need enough height to open. Rather than relying on gunpowder charges, “zero-zero” seats began using rockets to extend the acceleration and reduce spinal injuries. The first zero-zero test subject was Doddy Hay, whose Martin-Baker seat fired him 300 feet from the ground in 1961. In late 1965, American manufacturer Weber Aircraft produced a zero-zero seat with a rocket motor, gun-deployed parachute and survival kit, including an inflatable raft. U.S. Air Force Reserve Major Jim Hall volunteered as guinea pig, and on firing was subjected to a sustained 14 Gs. Hall landed in a nearby lake, emerging to shrug, “I’ve been kicked in the ass harder than that.”

Pilots have even ejected below zero altitude. In June 1969, on his first night landing during carrier qualifications off Southern California, Lieutenant Russ Pearson brought his Vought A-7 Corsair II aboard USS *Constellation* off centerline. He caught the no. 3 wire, but on rollout the plane went off the edge of the deck, slipped the wire and plunged





VIETNAM WAR SAVE Lieutenant Jack Terhune ejects from his F-8 Crusader on August 11, 1965.

into the Pacific. “In the history of Naval Aviation, only a handful of pilots had ever attempted, much less survived, an under-water ejection,” he later wrote. “. . . There was also the chance I might eject directly into the Connie’s passing steel hull or even worse, into one of her massive propellers.” Fortunately his turned-turtle Corsair fired Pearson downward and, against dense water rather than thin air, not very deep. He surfaced and a rescue helicopter pulled him to safety.

Three days later, that same helicopter was lost at sea with its entire crew, who had no ejection seats. Overhead rotor blades obviously present an impediment to ejection. Russian Kamov attack choppers blow off their blades first, and the Mil Mi-28 has seats that fire sideways. The Soviets never lagged in ejection-seat design. After his MiG-29 ingested a bird at the 1989 Paris Air Show, pilot Anatoly Kvochur’s Zvezda K-36D seat ejected him just 2.5 seconds before impact. At the same show 10 years later, K-36s saved both crewmen of a Sukhoi Su-30MKI fighter that pancaked at the bottom of a too-low loop. In both incidents the Russians ejected almost horizontally at extremely low altitudes, yet everybody walked away. A Paris official called the K-36 seat “clearly the best in the world.”

In the U.S., female aviators presented another challenge for designers, who had to compensate for their lighter weight to avoid faster, more dangerous accelerations. But the one danger they can’t

overcome is a handle pulled too late. In October 1994, U.S. Navy Lieutenant Linda Heid, coincidentally the second female naval aviator to eject, witnessed the service’s first female fighter pilot, Lieutenant Kara Hultgreen, lose airflow to her Grumman F-14’s left engine intake on final approach to the carrier *Abraham Lincoln*. “Horrorified, I watched her aircraft lose altitude and start rolling to the left,” Heid remembered. “The landing signal officers screamed, ‘Power, power, power!’ and then yelled for the crew to eject.” Hultgreen’s backseat radar intercept officer, Lieutenant Matthew Klemish, got out, but .4 seconds later the Tomcat had rolled past 90 degrees, and Hultgreen’s seat fired her down into the sea, killing her.

When ejection seats fail, they fail big. In July 1991, on a routine hop over the Indian Ocean, Grumman KA-6D navigator/bombardier Lieutenant Keith Gallagher’s seat inadvertently misfired, launching him partially through the canopy. Only his parachute, streaming back to wrap around the aircraft tail, kept his semi-conscious body from flailing in the wind or dying by impalement on the jagged canopy during landing. Post-incident analysis revealed the seat’s 28-year-old firing mechanism had fatigued. Since then, every Navy seat goes through routine, scheduled inspection.

Today the American third-generation Advanced Concept Ejection Seat (ACES) II seat is battery-powered, computer con-

trolled and so smart that it knows altitude, attitude and airspeed when fired. It can tailor drogue and main chute deployment to compensate for those factors, even when the aircraft is flying inverted at just 140 feet and when the occupant is unconscious. In May 1994, McDonnell Douglas F-15C pilot Captain John Counsell blacked out during a simulated dogfight over the Gulf of Mexico and regained consciousness to find his Eagle diving through 10,000 feet at Mach 1.14. “I had to make one decision—to pull the handle,” he said. “After that, 13 automatic functions had to work perfectly for me to live, and they did.” At that speed, wind-blast strikes with a force of more than 1,500 pounds per square foot. It broke Counsell’s left leg in five places, tore three ligaments in his left knee, folded his right leg over his shoulder (tearing three more ligaments), broke his left arm and both broke and dislocated his left shoulder, but the ACES dropped him in the water alive, where he was picked up two hours later.

In April 1995, Captain Brian “Noodle” Udell and back-seat weapons systems officer Captain Dennis White were flying one of four F-15E Strike Eagles in simulated night-combat training 65 miles out over the Atlantic. A malfunctioning head-up display indicated they were in a 60-degree turn, 10 degrees nose-down, passing through 24,000 feet at 400 knots. Udell found out too late that they were actually at 10,000 feet, headed straight down at nearly the speed of sound. The pair fired their ACES II seats at 3,000 feet, doing almost 800 mph. Udell was knocked unconscious, his right knee and left arm dislocated and left ankle broken. After a long night in the water, four surgeries and six steel screws in each leg, he



NICK OF TIME A British pilot exits his crash-landing Harrier jump jet at Kandahar, Afghanistan, in May 2009.

returned to flight status 10 months after his crash. He was lucky: The windblast killed White instantly.

Supersonic planes are easier to design than supersonic ejection systems. The three-seat Mach 2 B-58 Hustler used individual, enclosed escape capsules to protect its occupants (see P. 72). Its replacement, the General Dynamics F-111, was to have ejected the entire cockpit, but such systems were so complicated, expensive and heavy that they were discarded.

Ejection seats have saved lives right up to the very edge of space. On April 16, 1975, Captain Jon T. Little was knocked out while ejecting from a Lockheed U-2R spyplane over the Pacific at 65,000 feet and 470 mph. Unconscious, he fell 50,000 feet before his parachute automatically deployed. "I pulled the eject handle," he recalled, "and the next thing I remember I was in the water."

On January 25, 1966, Lockheed test pilot Bill Weaver and backseater Jim Zwayer suffered a flameout in their SR-71's right engine and immediately lost control. "I didn't think the chances of surviving an ejection at Mach 3.18 and 78,800 ft. were very good," Weaver said. "...I learned later the time from event onset to catastrophic departure from controlled flight was only 2-3 sec. Still trying to communicate with Jim, I blacked out, succumbing to extremely high g-forces. The SR-71 then literally disintegrated around us. From that point, I was just along for the ride."

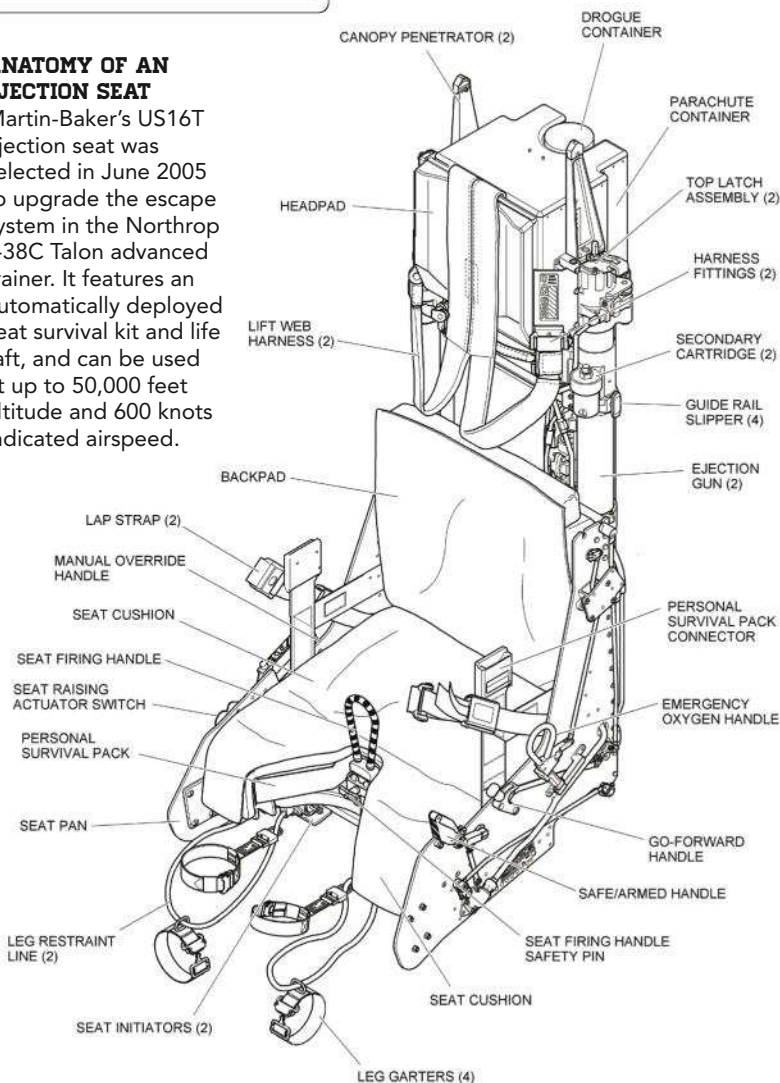
Weaver's pressure suit inflated, preventing his blood from boiling and the wind from tearing him apart. Because of the thin atmosphere at its operating altitude, a Blackbird flying faster than 2,000 mph encounters wind force equivalent to about 460 mph down below, but the air is also too thin to prevent a parachutist from spinning or tumbling so fast as to suffer injury. With Weaver unconscious, his Lockheed RQ201 seat automatically deployed a drogue chute to prevent spin, and popped the main chute at 15,000 feet just as Weaver came around. Unfortunately, Zwayer died of a broken neck during the aircraft breakup.

Test pilot Bill Park pushed it to the very edge of height, speed and luck, as the only man to eject from the Blackbird twice. In July 1964, after a Mach 3 test flight, his controls locked up on approach to Groom

TECH NOTES

ANATOMY OF AN EJECTION SEAT

Martin-Baker's US16T ejection seat was selected in June 2005 to upgrade the escape system in the Northrop T-38C Talon advanced trainer. It features an automatically deployed seat survival kit and life raft, and can be used at up to 50,000 feet altitude and 600 knots indicated airspeed.



Lake. Park punched out only 200 feet up in a 45-degree bank. Two years later, he and backseater Ray Torick were attempting to release a top-mounted D-21 drone at Mach 3.2 when it pitched down and broke their Blackbird in half. G-forces within the tumbling nose section pinned Park and Torick in their seats, unable even to reach their ejection handles, until it slowed in lower, thicker air, where they punched out safely and landed in the Pacific. Tragically, Torick's pressure suit took in water and he drowned.

But that wasn't his seat's fault. Today Martin-Baker alone counts more than 7,500 lives saved by their ejection seats,

including over 3,300 Americans. (The company's Ejection Tie Club is limited to aviators saved by its seats; members worldwide receive a distinctive tie, tiepin, cloth patch, certificate and membership card.) Yet the ejection seat, which arguably made jet combat possible, may eventually end up a footnote in aviation history. If the drone revolution does away with onboard aircrews, what they sat on will become a museum curiosity. †

For further reading, frequent contributor Don Hollway recommends: Eject!, by Bill Tuttle; Punching Out, edited by James Cross; and ejection-site.com.

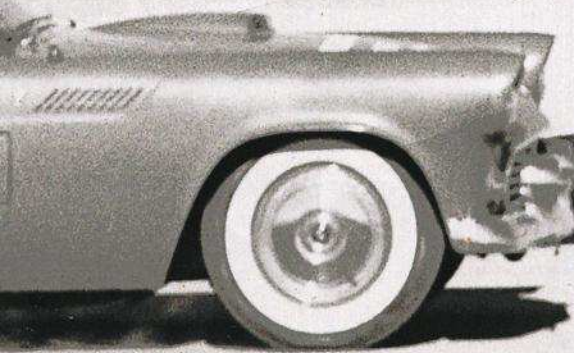
MARATHONS IN THE AIR

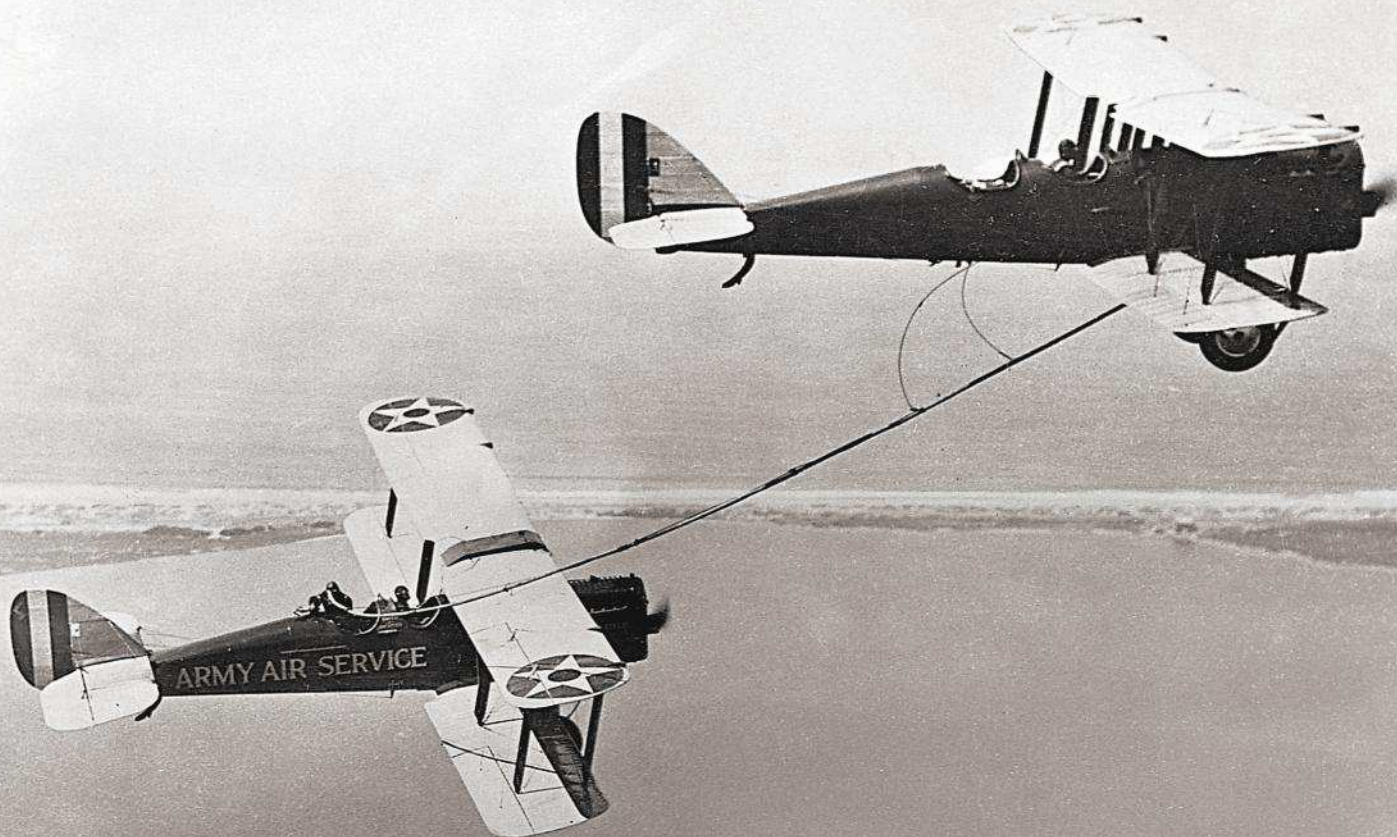
THERE'S A GOOD REASON WHY THE FLIGHT ENDURANCE RECORD HAS STOOD SINCE 1959: WHO WANTS TO SPEND MORE THAN 65 DAYS CRAMMED IN A LIGHTPLANE? BY W.M. TARRANT



ENDURANCE CHAMPIONS

Robert Timm and John Cook, in the Cessna 172 *Hacienda Hotel*, pass a 1956 Ford Thunderbird at McCarran Field, Nev., during their record nonstop flight in 1958-59.





BEFORE THE ADVENT OF AERIAL REFUELING, FUEL TANK CAPACITY WAS THE MAIN DETERMINING FACTOR OF AN AIRPLANE'S ENDURANCE.

With aerial refueling, record nonstop time aloft, once measured in hours, was measured in days. The Fédération Aéronautique Internationale recognized endurance records for classes of aircraft as well as world records that transcend all classes. In 1929 the FAI also instituted a women's class. But for examples of sheer determination and willingness to endure days and even weeks in the confines of a small airplane, nothing tops the progression of world records for time aloft with refueling.

In 1921 wing-walker Wesley May performed the first known aerial refueling as a stunt. May, along with pilots Frank Hawks and Earl Daugherty, accomplished the feat by carrying a five-gallon can of gasoline on his back as he moved from one plane to the other.

The first practical aerial refueling took place on June 23, 1923, when U.S. Army Air Service crews transferred fuel via a hose between two Liberty DH-4Bs flying from Rockwell Field in San Diego. The next day's mission allowed the receiver plane to stay airborne for 23 hours and 48 minutes. Then, on August 27-28, Captain Lowell Smith and 1st Lt. John Paul Richter remained aloft for

37 hours and 15 minutes with refueling, breaking the nonrefueled record of just over 36 hours. Smith and Richter's record held until June 1928, when Adjutant Louis Crooy and Sergeant Victor Groenen of Belgium stayed airborne for 60 hours, seven minutes in a refueled de Havilland DH-9.

The most well-known early endurance flight was that of the Army Air Service's Atlantic-Fokker C2A trimotor *Question Mark*, from January 1 through 7, 1929, over Van Nuys Airport in California. *Question Mark* was crewed by Major Carl Spatz (later changed to Spaatz), Captain Ira Eaker, 1st Lt. Harry Halverson, 2nd Lt. Elwood Quesada and Sergeant Roy Hooe, all of whom would go on to distinguished military careers. The men remained in the air for 150 hours and 40 minutes. Though the U.S. military did not pursue aerial refueling at that time, the publicity surrounding the flight prompted a rush among civilian pilots to establish endurance records, with about 40 attempts made and four new records set in 1929.

Reginald Robbins and James Kelly departed Meacham Field on May 19 in a Ryan B-1 Brougham monoplane christened *Fort Worth*.

FILL 'ER UP Captain Lowell Smith and 1st Lt. John Paul Richter refuel their Liberty DH-4B on their way to a record nonstop flight of more than 37 hours in August 1923.

Unlike the Army pilots, these men were relative amateurs—Robbins a former cowboy and Kelly a former railroad mechanic. To maintain the engine, Kelly ventured out on an eight-inch-wide catwalk twice a day and greased the rocker arms. The two remained aloft for 172 hours, just over seven days. “If anyone beats our mark, we’re going up again,” Kelly said after the flight. But it was only a matter of weeks before their record fell, and Robbins and Kelly never did reclaim the record.

A month later, Roy Mitchell and Byron Newcomb stayed airborne over Cleveland in a Stinson Detrieter for 174 hours, from June 28 to July 6. To keep their engine running, the pair devised a system to grease the rocker arms through lines that came into the cabin.

While Mitchell and Newcomb were still circling Cleveland, Loren Mendell and Roland Reinhart took off on July 2 from Culver City, Calif., in a Buhl Airsedan dubbed *Angelino*, returning to earth on July 12 after a record 246 hours and 43 minutes in the air. No sooner had they landed, however, than Dale Jackson and Forest O’Brine launched a record attempt from St. Louis in a Curtiss Robin on July 13. The pair shattered Mendell and Reinhart’s briefly held record, remaining aloft for 420 hours, 17 minutes—more than 17½ days.

Nearly a year after Jackson and O’Brine’s record, on June 11, 1930, John and Kenneth Hunter took off from Chicago’s Sky Harbor Airport in the Stinson SM-1 Detrieter *City of Chicago*, and didn’t touch ground for 23 days, one hour and 41 minutes. While John and Kenneth piloted *City of Chicago*, brothers Albert and Walter flew the refueling and resupply plane, and their mother and sister helped with ground operations. The brothers had remained low-key about their flight due to a failed attempt a year earlier, but as the days aloft rolled by they made national news. Will Rogers even rode in the refueling aircraft. Though the brothers serviced the engine by climbing outside the plane using handholds and a narrow catwalk, they were forced to land when an oil screen in the engine became clogged. Upon landing, thousands of people were on hand to greet them.

The Hunters’ record would stand for five years until another set of brothers, Al and Fred Key of Meridian, Miss., took off on June 4, 1935, in a borrowed Curtiss Robin named *Ole Miss*. The Key brothers’ record attempt was made possible by contributions in money and services from local residents and businesses. In order to reduce the inherent hazards of aerial refueling, A.D. Hunter devised a system for them that allowed hands-off refueling and incorporated a check valve in the hose to prevent fuel spills. Local welder Dave Stephenson built an extensive catwalk so Fred could service the uncowed engine in flight, and Frank Covert made a special fuel tank that replaced all three seats. James Keeton used his own Curtiss



Robin for resupply, performing 435 refuelings. For the final refueling, the crewman who operated the air-to-air system was absent, so airport porter Germany Johnson stepped in and performed flawlessly. After 653 hours and 34 minutes in the air, the brothers landed to a cheering crowd of more than 30,000 people. (In 1955 the restored *Ole Miss* was donated to the Smithsonian for permanent display, and today it hangs in the National Air and Space Museum’s Golden Age of Flight gallery.)

The Key brothers’ record held until October 1939, when Wes Carroll and Clyde Schlieper took off from Marine Stadium in Long Beach, Calif., in a float-equipped Piper Cub called *Spirit of Kay*. After the water takeoff, the men circled over Seal Beach and the desert, where they took on fuel and supplies from an automobile. While one of the men flew the plane low over the speeding 1935 Ford convertible, the other man reached down to retrieve supplies and cans of fuel handed up to him. They didn’t set foot on the ground for 726 hours—30 days and six hours. In a Piper Cub!

World War II put endurance flights on hold. It wasn’t until March 1949 that two pilots in an Aerona Sedan named *Sunkist Lady* topped Carroll and Schlieper’s record. After three previous attempts, Dick Riedel and Bill Barris of Fullerton, Calif., took off on March 15, 1949, and headed

SETTING NEW MARKS

Top: Dale Jackson and Forest O’Brine make one of 48 refuelings to their Curtiss Robin while spending 420 hours in the air in July 1929. Above: Kenneth Hunter sits on the catwalk of the Stinson SM-1 Detrieter *City of Chicago* during his and brother John’s record 23-day flight in 1930.



REFUEL & RESUPPLY

Left: *City of Chicago* refuels during its record run. Below: The Aeronca Sedan *City of Yuma* takes on supplies from a Buick in 1949.

cast for their historic flight. They flew to Miami, and were refueled and resupplied at selected airports along the route. A ground crew flying ahead of *Sunkist Lady* loaded a waiting Willys Jeepster at each resupply location. Riedel and Barris flew low over the speeding Jeepster to retrieve fuel and supplies. After reaching Miami, they loitered in the air for 14 days as they waited for the weather to clear along their route back to California. Upon their return on March 11, they circled the skies ticking off the hours, touching down on April 26 after 1,008 hours, two minutes in the air, or 42 days.

As amazing as the 42-day record was, it didn't last long. After their first two attempts were cut short due to mechanical problems, Bob Woodhouse and Woody Jongeward departed Yuma, Ariz., in the Aeronca Sedan *City of Yuma* on

August 24, 1949. The flight was intended to prompt the government to reopen Yuma Army Airfield, which had been closed after WWII. Since Riedel and Barris had remained aloft for 1,008 hours, the new goal was 1,010 hours, or "ten-ten," which became the name of the refueling car, a 1948 Buick convertible. During their flight, the pair were interviewed on national newscasts over their two-way radio. People wanted to know the details of how they managed to eat, sleep and, most important, go to the bathroom. "We had these double bags, and I would always joke that we'd fly over California and throw it out," Jongeward explained. The men took four-hour shifts at the controls, and two or three times per day would return to the Yuma airport for resupply from the speeding Buick.

Woodhouse and Jongeward passed the 1,010-hour mark and continued on until October 10: ten-ten. They landed after 1,124 hours and 17 minutes in the air—nearly 47 days. "The time of the landing came on Woody's shift," said Woodhouse. "He was a little worried because we hadn't landed in seven weeks and we had knocked a spotlight or two off of the side of the Buick and





bent the hubcap all up on the airplane.” Nevertheless, they landed successfully and succeeded in getting the Yuma airfield reopened. In 1959 the field became Marine Corps Air Station Yuma. The Aeronca and a Buick of the same model are now displayed in Yuma City Hall.

Woodhouse and Jongeward’s record stood for nine years until Jim Heth and Bill Burkhart stayed aloft for 1,200 hours and 19 minutes—50 days—over Dallas. They took off in their modified Cessna 172, *The Old Scotchman*, on August 2, 1958. The men refueled twice a day from a truck speeding down the runway of Dallas Redbird Airport, lowering a rope to retrieve gas cans and supplies. They landed on September 21. Surprisingly, their record would be challenged only a couple of months later.

Isn’t 50 days stuffed into a small plane with another person long enough? Apparently it wasn’t for Robert Timm and John Cook, who spent 64 days, 22 hours and 19 minutes together in a Cessna 172 while circling the desert Southwest from December 4, 1958, to February 7, 1959. The flight was intended to generate publicity for the Hacienda Hotel in Las Vegas, whose owners encouraged promotional suggestions from the staff. Timm, who worked as a slot machine repairman and had served as a WWII bomber pilot, suggested the endurance flight.

The Cessna prominently displayed “Hacienda Hotel” in large letters on each side of the fuselage. Besides publicizing the hotel, the flight raised money for the Damon Runyon Cancer Research Foundation.

During the first three attempts, lasting as long as 17 days, mechanical problems forced the plane down early. Timm didn’t click with his original copilot, and replaced him with John Cook, an A&P mechanic. The new donated Continental engine, which had proved problematic, was also replaced with the original 450-hour engine. Modifications to the 172 included a 95-gallon Sorenson belly tank, an accordion-style folding copilot’s door, a four-by-four-foot foam pad in place of the copilot’s seat and plumbing that came through the firewall to allow inflight oil changes.

The two men took off from McCarran Field at 3:52 p.m. on December 4. To verify that they did not secretly land during the flight, officials in a car speeding down the runway painted white stripes on the tires as the plane flew just above them.

A Ford truck with a fuel tank and pump in the back refueled and resupplied the aircraft. The



NEVER AGAIN?

Above: (From left) Cook and Timm are congratulated on their world record flight. Top: Hacienda Hotel refuels from a truck.

Cessna would meet the truck on a closed section of road in the desert near Blythe, Calif. An electric winch lowered a hook to snag the refueling hose, and one of the men filled the belly tank while standing outside on a retractable platform. It took about three minutes to fill the tank.

Time finally began to take a toll on the men and machine. “We had lost the generator, tachometer, autopilot, cabin heater, landing and taxi lights, belly tank fuel gauge, electrical fuel pump, and winch,” Cook wrote in his journal. The engine gradually lost power as carbon built up on the plugs and in the combustion chambers. Disaster nearly struck on the night of January 9, their 36th day aloft, when Timm fell asleep at the controls over Blythe and awoke more than an hour later to find the Cessna flying through a canyon on autopilot.

After they finally landed, Cook said, “There sure seemed to be a lot of fuss over a flight with one takeoff and one landing.” During their nearly 65-day flight, the pair had covered more than 150,000 miles, equivalent to about six times around the world. The record-setting Cessna 172 now hangs in the terminal at Las Vegas’ McCarran International Airport.

Timm and Cook’s accomplishment likely marked the end of marathon endurance flights in airplanes. Does anyone really want to spend more than 65 days circling the countryside, eating, sleeping, bathing and using the toilet while shoulder-to-shoulder with someone else? Odds are slim. And the FAI no longer recognizes new endurance records due to safety concerns. †

DURING THEIR NEARLY 65-DAY FLIGHT, THE PAIR HAD COVERED MORE THAN 150,000 MILES.

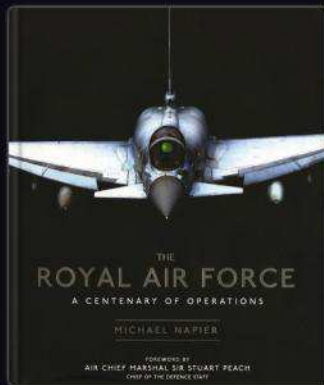
Early-aviation enthusiast W.M. Tarrant is the author of East to Meet the Enemy: A Novel of World War One Aerial Combat. Further reading: The Longest Flight: Yuma’s Quest for the Future, by Shirley Woodhouse Murdock and James A. Gillaspie.



THE ROYAL AIR FORCE
A Centenary of Operations

by Michael Napier, Osprey Publishing, 2018, \$40.

Osprey is first out of the chocks to celebrate the Royal Air Force centennial with this fine collection of images and commentary. A large, well-designed book with excellent black-and-white and period color photography, it is one of the best values I have seen in today's aviation publishing marketplace. >



RAF EMISSARIES The Red Arrows display team flies their BAe Hawk T1 trainers in 2014 during their 50th season.

center stage. But the author also discusses lesser-known RAF air operations and British use of American imports such as the Brewster Buffalo, Douglas Havoc and C-47 (known in the RAF as the Dakota), again bolstered by rare photos.

The chronology continues through the Cold War and ensuing decades to the turn of the century and the unexpected conflicts in Afghanistan and Iraq. The 100-year history beautifully chronicled in *The Royal Air Force* defies the scope of this review. I highly recommend it.

Peter Mersky

> The RAF grew out of a proposal in August 1917 from Jan Christiaan Smuts, a South African member of the British Imperial War Cabinet, to combine the Royal Flying Corps and Royal Naval Air Service. These were merged into the world's first autonomous military air arm on April 1, 1918, amid the last great

German offensive of World War I.

Familiar and unfamiliar aircraft dominate the pages. For example, the ubiquitous Airco DH.4 two-seat bomber shares pages with the lesser-known Blackburn Kangaroo, one of the world's first dedicated torpedo bombers. Postwar coverage highlights the RAF's role

in fighting against Russian revolutionaries in 1919 and British efforts to maintain the empire's long-held colonies in Asia and Africa.

For World War II, the familiar battles of Britain and Malta, as well as the strategic bombing campaign against the Third Reich and all-out effort to halt Germany's Afrika Korps, naturally take

1001 AVIATION FACTS

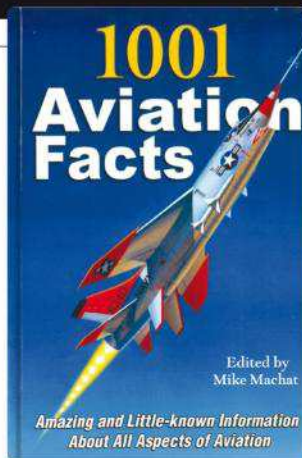
Amazing and Little-known Information About All Aspects of Aviation

Edited by Mike Machat, Specialty Press, 2017, \$24.95.

What would the end product be if you put eight leading airplane geeks together on a book project aimed at compiling scads of useful aviation information? Answer: An indispensable glossy paperback containing just over a thousand fascinating data points amid a spectacular collection of illustrations. This book resulted from the genius of well-known aviation artist/historian Mike Machat, who drew on his

reservoir of industry contacts to assemble an unparalleled team of experts.

The mass of data is made manageable by its organization into eight category-specific chapters: military, commercial, general aviation, etc. Even highly knowledgeable readers are likely to be stunned by how much there is to learn from these thoroughly researched, paragraph-length entries. Adding to the fun are many



rarely seen images, such as a dirigible moored atop the Empire State Building, Grumman F-11 Tigers of the Blue Angels in echelon

formation and Machat's own dazzling painting of the most famous X-planes.

At first blush, some might be tempted to dismiss this book as mere trivia, but they would be wrong. This is an aviation history book that shares valuable details of the past through crisply written vignettes. Its wealth of material can be mined over delightful hours at the airport while waiting for weather to clear. Be sure to pack it in your duffle bag because these factoids will make perfect conversation pieces around the fly-in campfire.

Philip Handleman

NEGLECTED SKIES

The Demise of British Naval Power in the Far East, 1922-42

by Angus Britts, Naval Institute Press, 2017, \$34.95

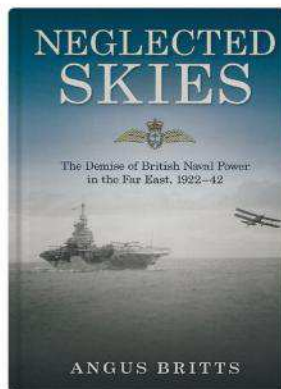
Historians frequently gloss over the Japanese fleet's April 1942 incursion into the Indian Ocean as a mere "raid." In actuality, the six-day sea battle constituted a strategic struggle between Japan and Britain that ended in a Royal Navy fleet being decisively defeated for the first time since 1805. It also marked the first major victory for a modern aircraft carrier task force against an old-style fleet in which carriers essentially played a supporting role to battleships.

Author Angus Britts recounts the story of that momentous six-day engagement and the events that made its outcome inevitable. He traces those developments back over 20 years, to the period immediately following World War I when British naval power was reduced by the economic restraints imposed after four expensive years of warfare and by the international arms-limitation treaties agreed upon during the early 1920s.

While Japan's naval forces were also limited by the Washington Naval Treaty, its war planners chose to invest in the development of powerful new land and carrier-borne air strike forces. The Royal Navy also developed carrier-based air assets, but its carrier air arm remained limited by being kept subordinate to the battleships, and by the fact that its Fleet Air Arm was a branch of the Royal Air Force rather than the navy.

Neglected Skies is the story of how, after more than two years of containing its German and Italian opponents in the Atlantic and the Mediterranean, the Royal Navy suddenly found itself faced with an enemy with whom it could not cope, bringing to a close the era of British naval dominance. Those interested in British and Japanese history, aviation history or World War II will undoubtedly find this a fascinating read.

Robert Guttman



KEEP YOUR AIRSPEED UP

The Story of a Tuskegee Airman

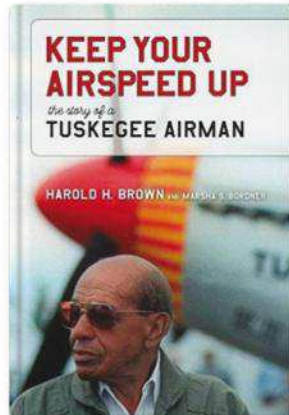
by Harold H. Brown and Marsha S. Bordner, The University of Alabama Press, 2017, \$29.95.

During World War II, a cadre of extraordinarily motivated pilots had the unusual distinction of fighting for liberty abroad while being denied its fruits at home. The Tuskegee Airmen were the first African-Americans to fly frontline U.S. Army combat planes and, despite the enforced segregation of their units, they racked up a solid record of aerial achievements. Now one of these aged warriors, ably assisted by his wife, offers a valuable memoir of his time making history above the clouds.

Growing up in an ethnically diverse neighborhood in Minneapolis, where he did not experience the sting of racism, Harold Brown developed a passion for aviation. He saved up hard-earned cash and spent it on flying lessons before the war, so that by the time he got to the Tuskegee Institute in Alabama he had a leg up on the syllabus. By a remarkable coincidence, his instructor on PT-17s at Tuskegee, Gilbert Cargill, was my instructor on Pipers in Michigan approximately 25 years later!

On March 14, 1945, Brown's 30th combat mission involved strafing a locomotive, which ended with his bailout and capture near Linz, Austria. When the Air Force integrated in the late 1940s, he stayed and made the most of it, flying jet fighters during the Korean War and Strategic Air Command B-47s during the Cold War. Then he enjoyed a fulfilling second career as an educator in Ohio. Fittingly, he ends his inspiring story with a quotation about excellence from the late Tuskegee Airman General Daniel "Chappie" James: "It is always in demand, and nobody cares about its color."

Philip Handleman



DE HAVILLAND ENTERPRISES
A History

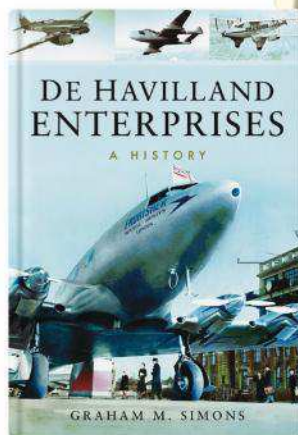
by *Graham S. Simons*, Pen & Sword Books, Ltd., 2017, \$44.95.

There is good reason for titling Graham Simons' book *De Havilland Enterprises* rather than "De Havilland Aircraft Since 1909." The most prolific name in British aviation, de Havilland embodied far more than airplanes. The company developed its own piston and jet aircraft engines, as well as aircraft propellers. It produced successful aircraft designs in subsidiary companies operated in other countries, such as Canada and Australia. And de Havilland operated its own aeronautical technical school, which produced unique designs of its own.

Prior to 1920, when Geoffrey de Havilland established his own company, he designed many of the most successful World War I airplanes produced by other companies, notably the Royal Aircraft Factory and the Aircraft Manufacturing Company (Airco). His DH.9A became one of the few WWI biplanes to remain in widespread military service long after the war ended.

The only U.S.-built combat aircraft to see action in WWI—the Liberty DH-4—was based on a de Havilland design. It was not the most affectionately remembered airplane of that conflict, but the DH-4's problems resulted from efforts to adapt it to the American-built Liberty engine rather than from flaws in the original design. Nevertheless, DH-4s remained in service throughout the 1920s, both as military planes and as mailplanes.

De Havilland really came into its own during the 1920s and '30s. The company virtually created the template for the light sporting airplane with its famous line of Moths, powered by its equally successful line of Gipsy engines. Alongside the light aircraft, it developed a successful line of commercial airliners, powered by one to four engines. It also built the famous



LIBERTY BOMBERS DH-4 fuselages with Liberty engines are assembled at the Dayton-Wright Company factory.

DH.88 Comet racer, which won the 1934 Britain-to-Australia MacRobertson Trophy Air Race.

De Havilland's greatest contribution to military aviation between the wars was the famous Tiger Moth trainer, first flown in 1931. After war broke out in 1939, the company produced one of the conflict's most spectacularly successful warplanes, the multirole Mosquito.

De Havilland was among the earliest proponents of jet propulsion, flying its first jet fighter, the Vampire, in 1943 and developing its own line of turbojets to power it and its successors. After the war, the company continued to develop both military and commercial jets, including the world's first production jet airliner, the DH.106 Comet.

In 1960 the British government consolidated the British aviation industry, and de Havilland became part of the Hawker-Siddeley Group. Several of its last designs remained in production for many years thereafter under the Hawker-Siddeley aegis. De Havilland Canada also continued to operate as a separate entity until it was sold to Boeing in 1986.

Robert Guttman

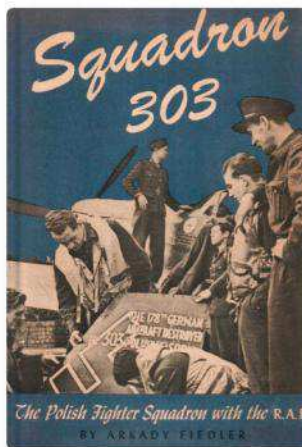
CLASSICS
SQUADRON 303
The Polish Fighter Squadron with the R.A.F.

by *Arkady Fiedler*, 1943.

Arkady Fiedler, a Polish-born writer of popular travelogues, reached his zenith as a wordsmith when he chronicled the impressive early exploits of free Polish fighter pilots flying with the Royal Air Force in the historic air battle to save Britain in the summer of 1940. His poignant account focused on No. 303 Squadron, also known as the Kosciuszko Squadron, which distinguished itself from the day it entered combat in the final climatic weeks of the clash. It was a time, as Fiedler's elo-

quently crafted book makes clear, in which human destiny hung in the balance.

The squadron was named after 18th-century Polish war hero Tadeusz Kosciuszko, whose Lafayette-like example during the Revolutionary War had inspired American volunteers to form a flying unit in 1919 to help defend Poland against the Soviet Union. Twenty-one years later, the Poles proudly fighting under this banner not only helped fend off Britain's tormenters, but sought to eventually liberate their besieged homeland from the latest in a long string of foreign occupiers. Fiedler vividly describes these Polish fliers' aerial victories, which resulted in one of the top squadron tallies by the end



of the Battle of Britain.

The Polish airmen were initially greeted with skepticism by their British hosts. But once the shooting started and the expatriates were given the opportunity to avenge the loss of their coun-

try, it soon became clear that they were extraordinarily effective warriors in their Hawker Hurricanes.

Security concerns prompted Fiedler to use pseudonyms in his wartime book rather than the pilots' actual names. With the publication of a new translation on the 70th anniversary of the Battle of Britain, the names were incorporated. Also, when Fiedler wrote this highly inspirational story about the forces of good triumphing over the forces of evil, he had no way of knowing that the pilots he so revered would sadly have their dream of a free Poland deferred until the collapse of the Iron Curtain a generation later.

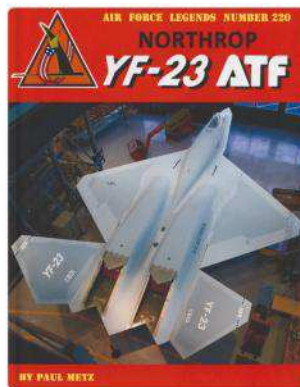
Philip Handleman

NORTHROP YF-23 ATF

by Paul Metz, Ginter Books, 2016, \$49.95.

Leafing through this book's extraordinary collection of glossy photos, finely crafted models, beautiful artwork and laudatory text about the aircraft that challenged the Lockheed YF-22 for the Advanced Tactical Fighter contract, one can only wonder what might have been if the Northrop YF-23 had gotten the U.S. Air Force's thumbs-up. By the time the ATF fly-off occurred in 1990, both contractors had built operational stealth aircraft: the Lockheed F-117 and the Northrop B-2. The Air Force thought the time had come for industry to produce a stealthy air superiority fighter.

The reasons why one was chosen over the other remain classified, but aeronautical scuttlebutt indicated that while both planes were about



comparable in their low observables, Northrop's entry was considered less agile. This book reflects the informed perspective of someone who knows more than he can permissibly share. The author was Northrop's chief test pilot, tapped for the maiden flight in the first of the company's two YF-23 test programs. Paul Metz takes us into the cockpit with him, and it's a fantastic ride.

Philip Handleman

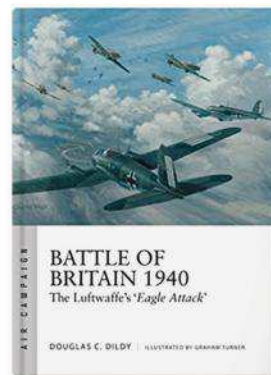
BATTLE OF BRITAIN 1940 The Luftwaffe's 'Eagle Attack'

by Douglas C. Dildy, Osprey Publishing, 2018, \$20.

Osprey has launched a new "Air Campaign" series with *Battle of Britain 1940*. American historian Douglas C. Dildy makes a dispassionate military analysis of two air arms that squared off in the first campaign in which a nation's very survival was determined in the air. While touching on all the turns in fortune that constituted the battle, Dildy primarily focuses on the German Operation Eagle Attack of August 1940.

After the anticlimax of *Adler Tag* (Eagle Day) on August 13, Luftwaffe chief Hermann Göring kept his goal on target in his general order two days later: "Until further orders, operations are to be directed exclusively against the enemy air force, including targets of the enemy aircraft industry...." In spite of such German blunders as underestimating the importance of British radar installations and the desperate courage of the Royal Air Force aircrews, Dildy suggests that the sheer attrition of these air battles brought the Luftwaffe tantalizingly close to victory. That is until a sudden change of priority to attacking civilian targets, the ultimate German blunder, altered the entire course of the campaign.

Jon Guttman



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MYSTERY SHIP

Can you identify this un-American airplane? See the answer below.

SEA SNOOPERS

Match the maritime reconnaissance plane with the aircraft from which it was derived.

- A. Consolidated Privateer
- B. Avro Shackleton
- C. Kawanishi H3K
- D. Focke-Wulf Condor
- E. Short Sunderland
- F. Canadair Argus
- G. Saunders-Roe London
- H. Hawker-Siddeley Nimrod
- I. Consolidated Catalina
- J. Lockheed Orion



Consolidated PBY-5 Catalina

- 1. Bristol Britannia
- 2. Saunders-Roe Severn
- 3. Avro Lincoln
- 4. Lockheed Electra
- 5. Short Rangoon
- 6. Consolidated Liberator
- 7. Consolidated P2Y
- 8. Focke-Wulf Kurier
- 9. Short S.23 Empire
- 10. de Havilland Comet

HAP'S CHAPS

1. Who agreed with 1st Lt. Henry H. Arnold that a semi-autonomous air corps was premature in 1913?

- A. William Mitchell
- B. Benjamin Foulois
- C. Thomas DeWitt Milling
- D. Frank Lahm

2. Which of Arnold's future senior officers flew fighter missions during World War I?

- A. Louis Brereton
- B. Ira C. Eaker
- C. Claire L. Chennault
- D. Carl A. Spatz

3. Who did General Douglas MacArthur choose to command the Fifth Air Force in 1942?

- A. George C. Kenney
- B. James H. Doolittle
- C. Ira C. Eaker
- D. Curtis E. LeMay

4. Which air forces were commanded by Jimmy Doolittle during World War II?

- A. Eighth
- B. Twelfth
- C. Fifteenth
- D. All of the above

5. Which air force did General Arnold originally intend to personally command?

- A. Eighth
- B. Fifteenth
- C. Twentieth
- D. None of the above

ANSWERS: MYSTERY SHIP: Kysushu Q1W1 Tokai. Learn more about it at HistoryNet.com/aviation-history SEA SNOOPERS: A,6; B,3; C,5; D,8; E,9; F,1; G,2; H,10; I,7; J,4 HAP'S CHAPS: 1,A; 2,D; 3,A; 4,D; 5,B

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SUPERSONIC ESCAPE POD

How to protect fliers forced to bail out at Mach 2? How could a pilot possibly survive the high-speed windblast, subzero temperatures and deadly low air pressure? For Convair, the answer was this fully encapsulated escape pod developed by Stanley Aviation for the B-58 Hustler supersonic bomber. It featured clamshell doors that closed before the seat was pressurized and then blasted out of the cockpit. Designed to float if it landed in water, the seat was even equipped with survival gear.

To test the capsule during supersonic flight without endangering human pilots, Convair used a bear weighing roughly the same as a human flier. On March 21, 1962, a female black bear named Yogi was mildly sedated, outfitted with biometric measuring gear and strapped into the B-58A escape capsule. After being ejected from the Hustler at 870 mph and 35,000 feet, Yogi was just fine when technicians recovered the capsule. A male bear named Big John later survived ejection at 45,000 feet and more than 1,000 mph. The parachute trip to the ground was doubtless more bear-able thanks to the fully enclosed, pressurized pod.

U.S. Air Force Captains Thomas Hogg, James McElvain and Richard Nauman were among the Hustler crewmen who would owe their lives to Stanley encapsulated seats. On April 3, 1969, they punched out over Nebraska after their B-58A of the 305th Bomb Wing suffered a systems failure at altitude.

Nan Siegel

LOADED FOR BEAR

Stanley Aviation's B-58A escape capsule (right) was tested with the help of a bear named Yogi (inset).



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