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ERIC 'WINKLE' BROWN: WORLD'S GREATEST TEST PILOT

AVIATION

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MIGHTY MITCHELL

HOW **NORTH AMERICAN'S B-25** BECAME
THE ULTIMATE STRAFER OF WORLD WAR II

PAUL MANTZ: RECORD-SETTING RACER
AND KING OF HOLLYWOOD STUNT PILOTS

WHY THE **FRENCH AIR FORCE** FAILED TO
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ON THE COVER: The Liberty Aviation Museum's North American B-25J Mitchell Georgie's Gal flies near Oshkosh, Wisc. The B-25 is a survivor: About 45 airworthy examples remain. Cover: Paul Bowen Photography.

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The Last Flight
of Noah's Ark

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12 MOVIES WITH AIRPLANES IN STARRING ROLES

Stunt pilot extraordinaire Paul Mantz lost his life in 1965 when the one-off Tallmantz P-1 he was piloting crashed during filming of *The Flight of the Phoenix*. Pre-CGI Hollywood films often relied on unusual or cobbled-together aircraft like the P-1 when plots required aviation elements. Here are 12 movies where airplanes took center stage.

VICTOR TATELMAN WREAKED HAVOC ON THE JAPANESE

Not many people have heard of Victor Tatem, who earned two Distinguished Flying Crosses and a Purple Heart piloting nearly 120 Pacific War combat missions, but the decorated U.S. airman and his comrades of the 499th Bomb Squadron took the fight to the Japanese at low altitudes in their B-25 Mitchell bombers.

THE INCREDIBLE "WINKLE" BROWN

He was the first pilot to land a pure jet on an aircraft carrier, just one of a world-record 2,407 deck landings. His logbook tallied 487 different aircraft, including 55 captured Luftwaffe planes. Few would argue with the contention that Royal Navy Captain Eric "Winkle" Brown was the greatest test pilot who ever lived.

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DANGEROUS AIRPLANES

I have been hooked on airplanes since the mid-1930s. I was in the U.S. Navy during World War II and worked as a jet engine designer (J85 and derivatives mostly, but also many others).



I always enjoy *Aviation History's* wide range of articles, including "The 10 Most Dangerous Airplanes Ever Built" [March], but I think the author overlooked the Sopwith Camel [above]. The many references available generally indicate that 413 Camel pilots died in combat while 318 were killed in noncombat-related accidents, most involving new pilots learning to fly the Camel. In addition, it has been stated that many of the "combat-related deaths" can be attributed to inexperienced pilots who lost control of this very unstable aircraft during the chaos of combat. The irony, of course, is that the Camel's inherent instability is the very feature that made it one of the best fighters of its day in the hands of a skilled pilot.

Thank you for giving this 92-year-old the opportunity to comment.

Francis X. Tuoti
North Salem, N.Y.

Your article highlighting "The 10 Most Dangerous Airplanes Ever Built" was well done. Concerning the Beechcraft Bonanza, I owned a V-tail for 22 years (just sold it) and found it to be a very stable aircraft. However, it did require attention, since it was fast, sleek and could easily drop off on a wing and go past the never-exceed airspeed. In recovering, an abrupt, aggressive yank on the control yoke could overstress the aircraft, with destructive results. This was true even after the tail beef-up modification was done. The Bonanza became known as the "doctor killer" since doctors could afford the very nice airplane but sometimes became overconfident in the air. Flown properly by a proficient pilot, the Bonanza is a superb aircraft—a Rolls-Royce in the air.

Incidentally, my flying buddy, Garland Tuton, owned N35VB [pictured on P. 37 in the article]—celebrated as the 10,000th Bonanza off the assembly

line—in the 1980s. He sold it to a North Carolina buyer, and it was later used in a movie, *The Night Flier*.

Colonel Gerald B. Hurst
U.S. Air Force (ret.)

NIGHT DIPPERS

As a subscriber and promoter of *Aviation History*, I regularly share my issues with others who are not aware of your wonderful publication. I was reading the March 2020 issue over the Pacific, on my way to Pearl Harbor, Hawaii, to board USS *Abraham Lincoln* to ride back to San Diego, Calif., as a "Tiger" [family of crew member]. I had intended to pass the issue on to my son's squadron.

Reading about how the HS-5 "Night Dippers" pioneered night sonar operations I noticed they were assigned to Carrier Air Wing 7, which was onboard *Lincoln*. I had the privilege to entrust the March issue to the custody of the carrier air wing commander with the request that he pass it on to the Night Dippers. He was

genuinely pleased they were featured and assured me it would be passed on.

Sean O'Neill
U.S. Navy Reserve (ret.)

KAL 902 SHOOTDOWN

George Rueckert's article regarding the shootdown of KAL 902 [January] brought back memories. My aviation experiences started with four years in the U.S. Air Force and continued at the Boeing Company as a traffic agent, grade 2. One of my assignments became ad hoc charters of freighter airplanes. Most of them were in support of AOG (airplane on ground) repairs. Typical charters during my time (1975-1979) included a major 747 repair in Japan because of a tail drag, a 737 in Argentina that landed with retracted landing gear, a DC-8 charter to Tanzania with initial spares provisioning and a twisted engine strut on a World Airways 747 at Oakland.

The call came in regarding KAL 902. Could it be repaired? Normally, a four-person survey team rushed to the site to perform a detailed survey. This data, received via a telex message, triggered engineering review, repair planning and schedule and cost estimates. If repair was feasible, the Contracts Department created a written offer for airline and underwriter acceptance. However, in this case, no survey team was dispatched.

The KAL 707-320 was quickly determined a "hull loss." At the time, there was no precedent for performing airframe repair within

the Soviet Union. There was no means to deliver necessary parts and tooling to the remote repair site. The airframe was sitting on ice, which would soon melt, and there was no available runway for fly-away. Furthermore, its economic value was decreasing because 707s were being displaced on international routes by newer widebody equipment.

I retired from Boeing in 2011 after 36 wonderful years in a wide variety of challenging assignments.

John Fredrickson
Kent, Wash.

What a terrific story about the Russian shootdown of KAL 902. As someone who is an aviation geek (degreed engineer in aeronautical engineering), learned to fly and will read anything that has a mention of aviation, I was never aware of Flight 902. When KAL 007 was shot down [on September 1, 1983, with the loss of all 269 on board], I do not remember any mention that this was not the first time the Russians shot down a commercial airliner. I watched the Smithsonian "Air Disasters" episode regarding KAL 007, and there was no mention that I can recall of KAL 902. Based upon what I read of what occurred on the Russian side, the back stories of KAL 007 and KAL 902 were amazingly similar. The decision to engage were local decisions, not made in Moscow. Does this not indicate a problem with Russian command structure?

Randi A. Schwarz
Marlton, N.J.

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BRIEFING



THE ELECTRIC BEAVER

AMPED-UP FLOATPLANE

Harbour Air's electric-powered de Havilland Canada DHC-2 Beaver alights on British Columbia's Fraser River after its maiden flight on December 10, 2019, (top), before taxiing back to base in Richmond (right).

The harbinger of commercial aviation's future may just be a 1956 de Havilland Canada DHC-2 Beaver bush plane. Last December the float-equipped six-passenger Beaver, owned by Vancouver, British Columbia, seaplane airline Harbour Air, lifted off the Fraser River accompanied not by the usual rumble of a Pratt & Whitney R-985 radial, but by the smooth whine of a 750-hp



Magni500 electric motor. It was the initial test flight of what promises to be the first electric aircraft to carry a paying passenger.

The electric Beaver project is a joint effort between Harbour Air and Seattle-

based MagniX, which is developing the motor. The goal is a quieter, smoother, better-performing airplane with zero emissions and less than half the operating and maintenance costs. Harbour Air plans to retrofit the elec-

tric motor to its entire 14-plane fleet of Beavers, and eventually its larger turbo-prop-powered Otters and Twin Otters as well.

The Magni500 motor weighs just 300 pounds—less than half the weight of a comparable radial. Cooling drag is an order of magnitude less. Time between overhauls is a staggering 10,000 hours. And it spins at a leisurely 1,900 rpm, ideal for propeller efficiency. “The torque on takeoff was tremendous,” reports pilot Greg McDougall, who also happens to be Harbour Air’s founder and CEO. “I had to hold it back. Never got close to full power.”

The first flight lasted eight minutes, and used up about a third of the plane’s 150-kWh battery capacity. The battery is about 50 percent bigger than a Tesla’s, and uses the same type of small, cylindrical lithium-ion cells as the automobile. (MagniX CEO Roei Ganzarski won’t say who is developing it.) At a hefty 2,100 pounds, the battery puts the e-Beaver’s empty weight almost as high as the standard Beaver’s gross weight. But production batteries should be about a third lighter. (And don’t forget, electric “fuel” weighs exactly zero.)

Heavy batteries and the resulting severely limited flight endurance are the main stumbling blocks for the wide adoption of electric aircraft. But Harbour Air’s typical flight is only about 20 minutes, making it the perfect petri dish for e-plane development. Target date for the first commercial electric ride is 2022.

David Noland



DELAYED DEPARTURE

Addison Pemberton takes John Bevan’s immaculately restored 1956 Nord Stampe SV.4C for a spin.



**“GETTING INTO A B-25 WAS
LIKE GETTING INTO A
MODERN SPORTS CAR
AFTER DRIVING A FORD
MODEL T.”**

—DOOLITTLE TOKYO RAIDER
LT. COL. DICK COLE

STAMPE FLIES IN WASHINGTON

A 1956 Nord Stampe SV.4C has flown at Spokane’s Felts Field in Washington State for the first time in nearly half a century. Retired mechanical engineer John Bevan bought the biplane in 1974 from a collection in Michigan thinking it would be a quick project.

“When I bought it, I didn’t think it would take 45 years to finish,” Bevan said. “But as they say, life gets in the way.” The Belgian-designed, French-built biplane remained in storage while he was busy raising a family and building a career. Work on the wings and tailplane began in 2003. In 2015 Bevan, with the help of friend Addison Pemberton, began working on the Stampe in earnest.

The original 140-hp Renault engine was replaced with a new 180-hp XP-360 covered by a custom-made cowling. To bring the aircraft into the modern age, a new instrument panel was designed and fabricated, and all-new instruments and radios installed. New wheels and brakes were fitted and the rudder bar modified to accept the toe brakes. A steerable tail wheel was added to improve ground handling. Finally, the aircraft was covered in modern Ceconite fabric and painted with butyrate dope finish.

Initial ground tests were followed by a successful 30-minute test flight on December 20. Pemberton, a well-known aircraft restorer, was pleased with the ship’s flying qualities. “It had a ground roll of just 150 feet!” he said. “The airplane is a delight and flies just like its wonderful reputation suggests.” The aircraft is licensed in the experimental exhibition category and will be approved for limited aerobatics.

The Stampe joins Bevan’s recently restored 1946 Piper PA-12 Super Cruiser and will allow him to explore the type’s well-regarded aerobatic capabilities. “It’s great to have the 45-year ‘quick-build’ done,” he noted. “I’ll really enjoy flying it...it will be a great addition to the family.”

John Boyle

MUSÉE'S ART DECO GALLERY REOPENS

After several years of renovation, the Grande Galerie, centerpiece of the Musée de l'Air et de l'Espace at Paris-Le Bourget Airport, reopened to the public on December 14 with a festive weekend full of presentations and activities. Aside from the Galerie's reopening, the occasion marked the centennial of the Musée itself, which had been conceived and built after World War I as one of the world's first museums devoted solely to aviation. The Grande Galerie, described by museum personnel as "an art deco jewel," was designed and built by Georges Labro for an international exposition held there in 1937. The Galerie contains aircraft and artifacts from the beginnings of flight in Europe up to the end of WWI, including the ancestor of today's ultralights, Alberto Santos-Dumont's Demoiselle; Henri Fabre's Hydravion, the world's first seaplane (see "Milestones," March 2020); the first 180-hp engine Spad VII, flown by second-ranking French WWI ace Georges Guynemer; and a Junkers D.I, the first all-metal monoplane fighter to achieve production.

Jon Guttman



PIONEERS OF EARLY FLIGHT

Among the historic aircraft displayed in the newly renovated Grande Galerie at Paris' Air and Space Museum (below) are a Junkers D.I (top), a Farman HF.20 and Morane-Saulnier G (above, top and bottom), and a Breguet 14A-2 (left, foreground).



BIGGIN HILL MEMORIAL MUSEUM

Originally established as a testing ground for developments in flight, the Royal Air Force base at Biggin Hill played a pivotal role during World War II. Prime Minister Winston Churchill described it as “the strongest link” in the chain of airfields that protected London. Opened in January 2019, the Biggin Hill Memorial Museum commemorates the airfield and the people involved, in their own words, from fighter pilots to children scavenging souvenirs from downed planes.

The exhibition area is split into four themes: Early Years, Station Life, Community Life and Remembering. Items on display include the Biggin Hill scramble and victory bells, a Luftwaffe tea set, logbooks, a Spitfire escape crowbar, letters and a table from the local pub on which

fighter pilots had carved their names. Visitors can listen to the voices of veterans like Geoffrey Wellum, the youngest Spitfire pilot to fly in the Battle of Britain.

Adjacent to the museum is St. George’s RAF Chapel of Remembrance, built in 1951. It features a wooden floor made from slats of sectioned propeller blades and 12 stained-glass windows highlighting different aspects of the RAF’s work, such as women packing parachutes, engineers servicing aircraft and plotters charting the whereabouts of airplanes.

The museum’s design and integration with the chapel has generated some controversy. Rita Radford and David Evans of Protect Biggin Hill RAF Chapel explained: “What has been imposed on us by the local council is inadequate, ugly and damaging to the



Memorial Chapel. The Biggin Hill Battle of Britain Supporters Club had nearly 200 members, including all the local historians and high-ranking ex-RAF. Their superior project was unceremoniously pushed aside by the council, which caused a lot of ill feeling which still remains today.”

Despite this dustup, the story behind the Biggin Hill museum is certainly proving popular, especially with

GOOD SHOW

Opened in early 2019, the Biggin Hill Memorial Museum honors a legendary Battle of Britain airfield.

the next generation. The numbers of children and families visiting the museum is steadily increasing, and schools are becoming active participants in its activities, even undertaking a schools takeover day last November.

Angela Youngman

MILESTONES

AMY, WONDERFUL AMY

Ninety years ago, on May 5, 1930, pioneering aviator Amy Johnson took off in her de Havilland DH.60G Gipsy Moth *Jason* from Croydon Airport outside London on the first leg of a historic flight from England to Australia. Nineteen days and 11,000 miles later, she landed in Darwin, Northern Territory, to a hero’s welcome as the first woman to make the solo voyage.

Coming from a well-off family, Johnson was bitten by the aviation bug after a visit to a London aerodrome in 1928. Flying lessons followed, and she obtained her pilot’s license in 1929, only a year before her celebrated flight. Prior to her jaunt to Australia, the longest flight she had ever made was the 150 miles from London to her hometown of Hull.

Jason was purchased for Johnson by her biggest backer, her father. She mapped her flight to Australia, with an eye toward breaking Bert Hinkler’s 1928 record of 15½ days, by simply taking a ruler and drawing a line from London to Darwin. After stops in Austria, Turkey and Syria, a sandstorm caused her to force-land in the Iraqi desert before she continued southeast through Iran and India. On May 13, she damaged *Jason*’s wing and propeller while landing in a monsoon in Burma. The repair delay ruined any chance she had of breaking Hinkler’s record, though she arrived safely in Darwin nine days later on May 24.



LADY LINDBERGH

Amy Johnson’s 1930 flight made world news.

Johnson’s feat was heralded the world over. The British press dubbed her “Queen of the Air” and the “British Girl Lindbergh,” and nearly a dozen songs were written about her, the most famous being “Amy, Wonderful Amy”:

“There’s a little lady / Who captured every heart / Amy Johnson, it’s you...
Amy, wonderful Amy / I’m proud of the way you flew.”

Johnson remained a celebrity until her death in January 1941 when, while flying for the RAF’s Air Transport Authority, her Airspeed Oxford crashed off the coast of Kent.



LANDMARK AT SEA

Eric "Winkle" Brown makes the world's first jet takeoff from an aircraft carrier, piloting a de Havilland DH.100 Sea Vampire from HMS Ocean on December 3, 1945.

CHAMPION TAILHOOKER

IN A 2011 LETTER TO THE AUTHOR, LEGENDARY ROYAL NAVY PILOT ERIC BROWN REVEALED HOW HE RACKED UP MORE AIRCRAFT CARRIER LANDINGS THAN ANYONE BEFORE OR SINCE

BY BARRETT TILLMAN

World champion carrier aviator Captain Eric "Winkle" Brown logged an incredible 2,407 shipboard landings with the Royal Navy. He also flew a record 487 aircraft types (excluding subvariants). But those numbers are merely the framework for a unique flying career.

Born in Scotland in 1919, Eric Melrose Brown was inspired by his father, a World War I airman. Among Brown's early influences was German General Ernst Udet, whom he met in Berlin in 1936. The Kaiser's second-ranking ace insisted, "You must become a pilot!" Udet could scarcely have suspected how successful a pilot the young Scotsman would become.

When war returned to Europe in 1939, Brown was studying in Germany. Two SS men told him their countries were at war, and he was escorted to the Swiss border.

Brown joined the Royal Navy Volunteer Reserve, earning his wings in 1940. He was assigned to No. 802 Squadron, flying new Grumman Martlets (F4F-3 Wildcats) from HMS *Audacity*, the first escort carrier. Escorting convoys, Brown shot down two Focke-Wulf Fw-200C Condors before his ship was sunk by a U-boat in December 1941.

Brown adored the stubby Grumman. In 1985 he and his wife Lynn visited the Champlin Fighter Museum in Arizona. Upon entering the World War II hangar Eric spotted the Wildcat and spread his arms wide, exclaiming, "Ah, the love of my life!"

The temperature in the hangar seemed to drop 10 degrees but Eric quickly recovered, nudging Lynn, "Except you, my

dear!" She shot him a sideways glance. "Nice recovery!"

Brown spent the middle war years testing U.S. and British aircraft aboard Lend-Lease escort carriers. In that capacity he built up an enormous amount of experience.

In 2011 he explained his carrier landing technique:

"As to the subject of deck landings, I have records of the top 'scorers' in the Fleet Air Arm, and besides myself we had one other, Lieutenant Commander Bill Bailey, who just exceeded 2,000 deck landings, which he acquired during three years as a 'clockwork mouse' [demonstrating deck landings to endless courses of wartime naval aviator recruits]. However, after this there is a big gap down to 600, with very few in that bracket.

ACE ADVICE

In 1936 a young Eric Brown met German World War I ace Ernst Udet, who encouraged him to become a pilot.

"I started my score in 1941 and really piled them up in 1942 and '43 when I was graded as an escort carrier specialist and proofed all the new 'Woolworth carriers' coming over brand new from American shipyards, and some also from UK shipyards. I proofed 20 carriers in all, and this involved flying four types of aircraft [two torpedo bombers and two fighters] into each of normally eight arrestor wires twice each with each type of aircraft, followed by an accelerated takeoff.

"At first I had three pilots to assist me, but they were soon



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withdrawn because their trap rate on a selected wire was too low and the process took far too long. When on my own my trap rate on a selected wire averaged about 80 percent without an LSO [landing signal officer], which I dispensed with largely because he was replaced too frequently or none was readily available in wartime.

"I employed a standard deck landing technique of never letting my approved speed creep above 1.1 V_s [stall speed], then aiming for the wire beyond the one that

was my target and cutting the throttle as it disappeared from my forward view.

"In 1943 I was mainly engaged in deck landing various models of [Supermarine] Seafire while in the navy's Service Trials Unit, and logged over 500 traps in that somewhat tricky aircraft.

"After 1941 I also became heavily involved in catapulting trials, particularly at Farnborough, where we had every type of new catapult installed. In fact, my total catapult launches [2,721] exceeds my total traps because

MULTITALENTED PILOT

Brown readies for a mission in a Grumman Martlet (left) and demonstrates "hands-free" flying (below left) during his first helicopter test flight, in a Sikorsky Hoverfly Mark I (R-4) from Speke to Farnborough, England, in February 1946.

so many were made ashore."

In 1945 Brown's German fluency put him in a position to help with collecting Luftwaffe aircraft for examination in Britain. He retrieved and evaluated a wide variety of groundbreaking German airplanes, including the Messerschmitt Me-262 and Arado Ar-234 jets, and he probably was the only foreigner to make a powered flight in the treacherous rocket-powered Me-163 Komet interceptor.

Another assignment involved interrogating Germany's foremost aviatrix, Hanna Reitsch, whom he had met at a prewar event. Despite her controversial reputation as an unrepentant Nazi, they remained cordial long after the war.

That year Brown returned to carriers, marking a historic event. By his own admission he was "tremendously keen to beat the Yanks" in flying jets from shipboard. In December he took off and landed a de Havilland Sea Vampire aboard HMS *Ocean*, seven months before the U.S. Navy's carrier tests.

While still on active duty in the Royal Navy, Brown wrote his memoir, *Wings On My Sleeve*, which became an

aviation classic. He retired as a captain in 1970.

Much of Brown's post-naval career was devoted to helicopters, as he had largely taught himself to fly a Sikorsky R-4 in 1945. In all, he flew nearly 40 types of helos, and in the 1980s he wrote extensively on civilian helicopter operations.

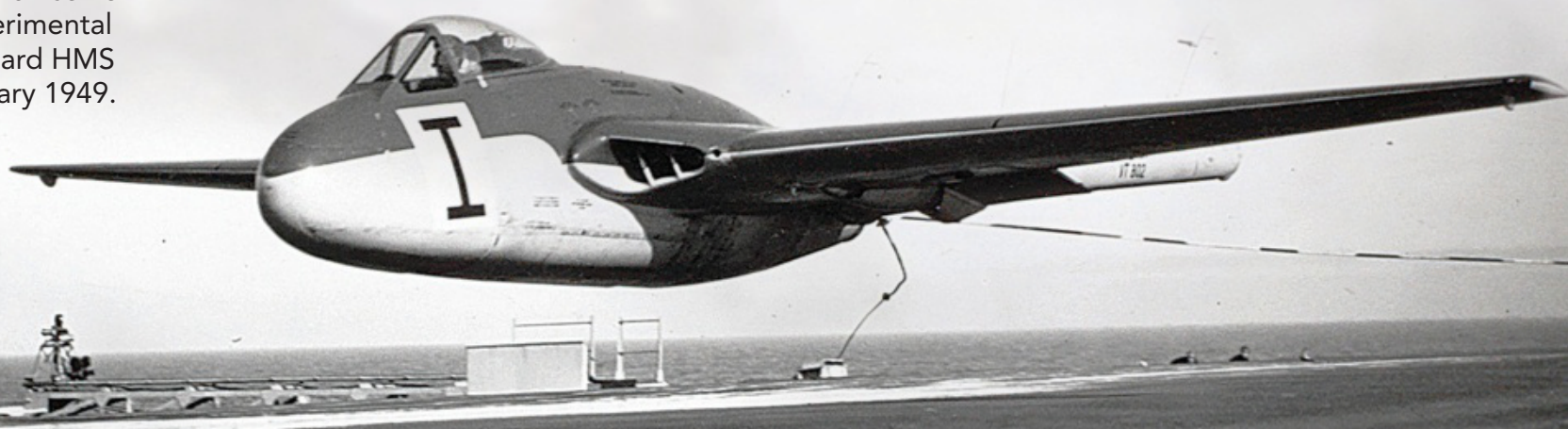
Brown's highly readable pilot reports were expanded into a series of magazine articles later published in book form. They were largely topical, including *Wings of the Navy*, *Wings of the Luftwaffe* and *Wings of the Weird and Wonderful*. Perhaps his most intriguing book was 1988's *Duels in the Sky*, comparing Allied fighters and attack aircraft against major Axis types. His matchups included theoretical dogfights, such as the Vought F4U Corsair versus the Focke-Wulf Fw-190, which never met in combat. At the end of the book he gives his picks for the greatest WWII fighters: Supermarine Spitfire and Fw-190 (tied for first place), Grumman Hellcat, North American Mustang IV (P-51D), Mitsubishi Zero and Hawker Tempest V.

Late in life, with his wealth of knowledge and Edinburgh brogue, Brown enchanted audiences around the world. He appears in hundreds of internet videos discussing every aspect of his exceptional career.

Winkle Brown departed the pattern in 2016, just past his 97th birthday. His records and his reputation are bound to remain unsurpassed. ✚

WHEELS UP

Brown catches a wire in Sea Vampire VG701 as he lands on an experimental rubber deck aboard HMS *Warrior* in February 1949.





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COMBAT VETERAN BUFF

SOME OF THE VOLUNTEERS WORKING TO RESTORE A HISTORIC B-52D STRATOFORTRESS AT THE YANKEE AIR MUSEUM SERVICED THE VERY SAME AIRCRAFT DURING THE VIETNAM WAR

BY BARRY LEVINE

Among the first things visitors to the Yankee Air Museum in Belleville, Mich., notice is a Boeing B-52D Stratofortress, parked in a fenced-off area adjacent to Willow Run Airport. It's hard to miss, with its 185-foot wingspan and 40-foot-tall tail. Scaffolding is in place, the bomb bay doors might be open and volunteers may be working on it. The location is not an obvious B-52 work site as these aircraft were never based at Willow Run, though a nearby plant built thousands of Consolidated B-24 Liberators during World War II. As it turns out, this particular Stratofortress served with distinction in the Vietnam War, and some of those involved with the bomber's extensive restoration actually worked on it during the war.

B-52D serial no. 55-0677 was manufactured by Boeing in Wichita, Kan., and delivered to the U.S. Air Force in August 1957. It flew more than 600 combat missions during the Vietnam War from Guam, Okinawa and U-Tapao Royal



Thai Navy Airfield in Thailand. Number 677 participated in the December 1972 Operation Linebacker II bombing campaign against North Vietnam, which helped facilitate the signing of the Paris Peace Accords in January 1973. After combat operations ceased in Vietnam, bombing in Laos continued into February and 677 is believed to have been the last B-52 to bomb that country.

The veteran BUFF (big ugly fat f---er), as B-52s were known to their aircrews, returned to the United States and was ultimately flown from Carswell Air Force Base

HELPING HANDS

Former aircrewmembers, local college students and other volunteers are working to restore the B-52, which flew more than 600 missions during the Vietnam War.

in Texas to Willow Run in 1983. The bomber is on loan to the Yankee Air Museum from the National Museum of the U.S. Air Force. It hasn't been moved since it was parked, as relocating a 175,000-pound aircraft is a formidable task. On Memorial Day 1984, 677 was dedicated as a permanent memorial to all aircrew members who lost their lives

IN THE BUFF

Vietnam veteran Boeing B-52D 55-0677 looms large at Michigan's Yankee Air Museum.



in Southeast Asia.

While there are no known records indicating the bomber suffered battle damage, nature has not been so kind. As it sat outdoors over the years, the fuselage corroded and began to deteriorate. By 2014 the deterioration reached a point where scrapping 677 was seriously considered. Ralph Koehler, the museum's restoration manager, called Joe Provost, who had served as a B-52 crew chief at U-Tapao and worked on 677, to determine if it was salvageable.

Provost contacted fellow veterans and museum members Bob Bailey and Nick Consiglio, who helped evaluate the airframe. The determination was made that 677 could indeed be restored and the venerable bomber saved for posterity.

Work began in 2015. Provost, Bailey and Consiglio, along with Air Force veterans Luke Noble and Dave Barnhart, coordinate ongoing restoration efforts



throughout the year. They schedule work to be completed, assess equipment requirements and determine if any special materials or tooling are required.

In addition to museum volunteers, two other teams are actively involved in the restoration effort. One team consists of students from the nearby MIAT College of Technology, in Canton, Mich. While working on the project these students are earning college credit and receiving expert aircraft restoration training. The young men and women learn real-life job skills and get firsthand exposure to an important part of U.S. history.

The second team is composed of U-Tapao alumni, personnel from any service branch who were permanently stationed or on temporary duty at the airfield during the war. Provost, Bailey and Consiglio are all

U-Tapao alumni, which led to their organizing an annual one-day work party for these veterans, the first of which was held in 2016. Attendees come from many different states to help restore this piece of Vietnam War history for future generations. Added benefits include enjoying camaraderie with fellow veterans while sharing a few war stories.

The teams have made considerable progress over the last few years. Restoration work has included reskinning both wing roots and all 16 engine cowlings, repairing the right wing leading edge and various cracks/corrosion in the fuselage, restoring four engine nacelles and most of the bomb bay doors plus fixing mechanical parts, draining fluids and similar maintenance. Future plans include restoring the left wing leading edge, reskinning the majority of the left wing

WORK IN PROGRESS

Left: Two volunteers sand paint from 677's fuselage. Plans call for the bomber to be repainted in its original Southeast Asia scheme. Below left: The BUFF's cockpit instrument panel remains largely intact.

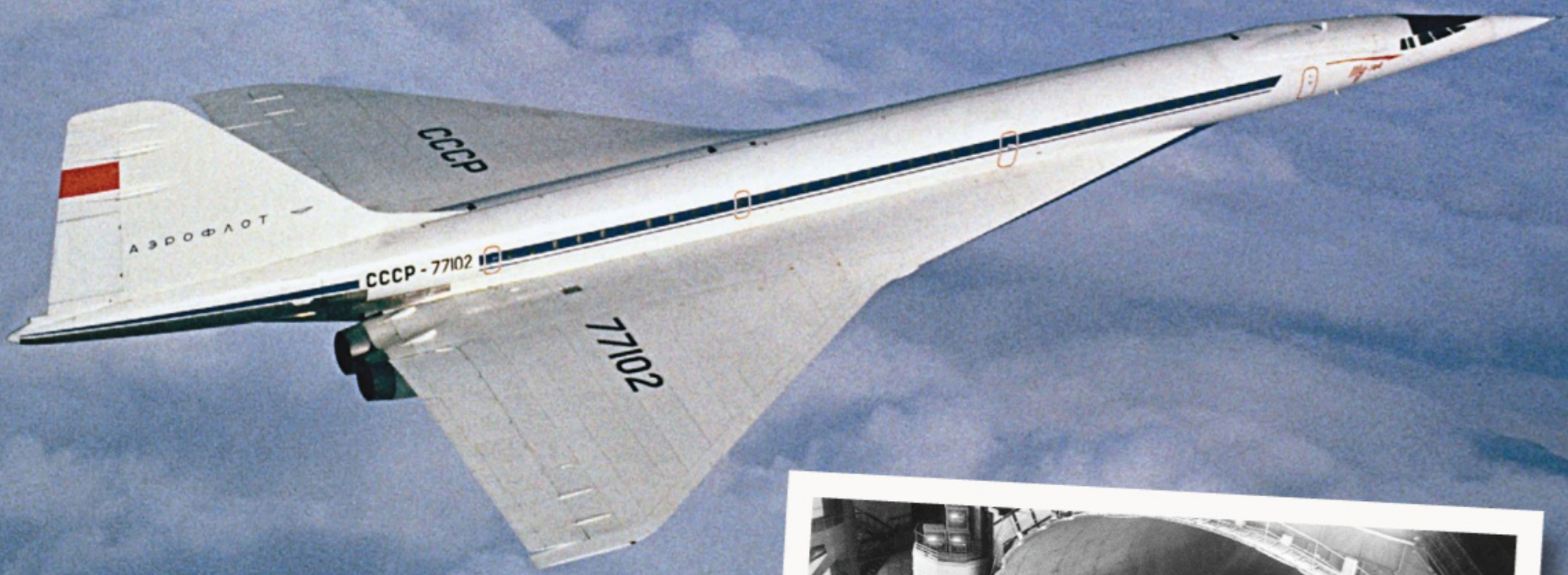
underside, ongoing corrosion repair, general maintenance and installing the restored engine nacelles. One of the many goals for 677 is to restore the original Southeast Asia black and camouflage paint scheme.

Work party participants cite many reasons why they spend their time, money and effort on the project. Brad Beall was a tail gunner on 677, based in both Guam and U-Tapao. He traveled to Willow Run from his home in Illinois to work on the bomber during a 2017 work party. "It's just so cool to be able to work on the same aircraft I flew on during the war," Beall said.

"We have U-Tapao veterans and their families from all over the nation, at their expense, come to Willow Run to partake in her restoration," Consiglio noted. "Many of these vets never touched an airplane when they served but are happy to work their hearts out." Consiglio, who also serviced 677 during the war, uses the same tool bag now as in his U-Tapao days.

Restoration work will continue over the next few years. Long term, the Yankee Air Museum is constructing a new Aeronautic Center a few blocks from the museum to house its flyable aircraft collection. The B-52 will be moved to a location adjacent to the new center, and visitors will be able to see this aviation legend close up as they arrive at the museum.

"We need to preserve what we can of aviation history and the memory of all the men and woman who came before us," commented Bailey. For more information, see yankeeamuseum.org. ✚



SOVIET SST

DUBBED THE "CONCORDSKI" BY WESTERN JOURNALISTS, THE TUPOLEV TU-144 NEVER ACHIEVED THE SUCCESS OF ITS ANGLO-FRENCH COUNTERPART

BY DOUGLAS G. ADLER

On Sunday, June 3, 1973, the sky was bright with scattered clouds over the grounds of the Paris Air Show in Val-d'Oise. The stars of the show that year were two supersonic transport (SST) aircraft: the Anglo-French Concorde and the Soviet Tupolev Tu-144. Supersonic travel for civilians was a novel and exciting concept, and interest in the two SSTs was high. Soviet pilot Mikhail Kozlov had publicly bragged about how impressed spectators would be with the Tu-144. "Just wait until you see us fly," he said. "Then you'll see something." He had no idea just how accurate his prediction would be.

Concorde went up first that day and had an uneventful flight. Later, the Tu-144 took to the skies and after a touch-and-go roared back into the air with its gear down and its famous "moustache" canards fully extended. Moments later, the aircraft stalled and went into a steep dive from which it never recovered. Film of the flight shows the Soviet plane disintegrating in the air before it crashed into a group of houses. More than 250,000 people witnessed the crash, which took the lives of the eight flight crew members and six people on the ground. The cause of the crash was hotly debated, with some concluding the Tu-144 was flying beyond its safe parameters in an attempt to wow the crowd and others postulating that it was trying to avoid a Mirage jet that may have been attempting to photograph it. Whatever the case, the disaster was emblematic of the entire Soviet SST program.



While mostly forgotten today, the Tu-144 program was the subject of intense research, development, funding and manpower in the Soviet Union. Conceived in the early 1960s, the program was intended to produce an aircraft capable of supersonic flight that could be used for both passenger and cargo transport. Just as Concorde used a Handley Page HP.115 as a delta-wing testbed, the Soviets studied thin delta wings with a modified MiG-21. With its long, narrow fuselage and double delta wing configuration, the Tu-144 bore a strong resemblance to Concorde (so much so that the press dubbed it "Concordski"). Both Concorde and the Tu-144 had a movable nosecone to increase visibility during

SHAPE OF THINGS TO COME

A Tupolev Tu-144 displays its double delta wing design (top), the result of testing in the giant wind tunnel at the Central Aerohydrodynamic Institute in Moscow (above).

takeoff and landing and both aircraft featured a tailless design. The canards on the Tu-144, positioned like a pair of dog ears aft of the cockpit, were a notable difference between the two SSTs. Initially powered by four Kuznetsov NK-144 afterburning turbofan engines, the Tu-144 could cruise at Mach 2 and by some reports topped out at Mach 2.2, slightly faster than Concorde.

Although 16 Tu-144s were built, only nine were production models. The Tu-144 was both first to fly (1968)



and first to fly supersonic (1969), beating Concorde on both scores, partially due to its truncated testing regimen. The Soviet SSTs were used to cover the somewhat unusual Moscow to Almaty, Kazakhstan, route. This was primarily due to the fact that the Tu-144 was incredibly noisy and the route was sparsely populated.

While the plane's interior was posh by Soviet standards, the cabin was still quite cramped. Noise was also a major issue inside the aircraft. The Tu-144 had to use afterburners to take off and cruise at its top speeds, leading to what was described by passengers and reporters as a deafening roar inside the cabin. People seated next to each other had to shout to be heard or pass notes back and forth to save their voices.

Despite its shortcomings and the trauma of the Paris Air Show crash, the Tu-144 was a source of tremendous pride in the Soviet Union.

FRONT OFFICE

As in Concorde, the limited visibility from the Tu-144's cockpit (above) on takeoff and landing required a movable nosecone. Unlike Concorde, the Soviet SST had canards (above right).

Although rumors abounded that espionage informed its design, many of the similarities between the Tu-144 and Concorde were probably simply due to the fact that they were designed in the same era to fly similar flight profiles at essentially the same speeds.

After entering service, the Tu-144 fleet experienced its share of troubles. The planes developed a reputation for unreliability and the Soviet government worried about bad press if another major accident were to occur, leading to limited flights and relatively few passengers. Airframe cracks, landing gear troubles, blaring alarms that could not be silenced and fuel tank failures were

just some of the problems.

Disaster struck the program a second time, on May 23, 1978, when a fuel line ruptured on a Tu-144D during a test flight and leaked eight tons of fuel inside the right wing. Three engines failed but the pilots managed to make an emergency landing near Yegoryevsk southeast of Moscow. Two members of the flight crew were killed and the plane caught fire after landing and was a total loss. In 1980 another Tu-144 only narrowly avoided disaster when it suffered an engine compressor disc failure that prompted an emergency landing.

Given the rushed production, cost, liability and public failures of the Tu-144, the Soviet government cancelled the SST program in July 1983. Some Tu-144s were later used as airborne laboratories and to train Soviet cosmonauts. Most of the aircraft were eventually put on display, all in the Soviet

Union except for one that stands next to a Concorde at the Auto & Technik Museum Sinsheim in Germany. One Tu-144 was even offered for sale on eBay with a starting bid of \$7.5 million, though it failed to sell.

One happy postscript to the Soviet SST tale was the resurrection of a Tu-144D as a NASA research craft. The plane, which had only 83 hours of flight time and had last flown in 1990, was transferred to NASA in 1994 and outfitted with new engines. It functioned well as a testbed for NASA's High Speed Research (HSR) program before it was retired in 1999 after having made just 27 flights.

Despite the Tu-144's troubled operational history, the Soviet SST was in many ways ahead of its time. To this day it remains a striking and impressive aircraft that will always be remembered as the first supersonic passenger plane. ✚

FLYING LABORATORY

Following its passenger service, this Tu-144LL was used for research flights.





*The ACH130 helicopter,
with an Aston Martin-
designed interior, trails
the Aston Martin DB11
Volante down the runway.*



AVIATION
HISTORY

STYLE

We check out a helicopter decked-out by Aston Martin, a mammoth cargo plane from Airbus and a cycle of the future that's right 'round the corner.

STYLE

For the VIP who has everything, the ACH130 is a stylish complement to the Aston Martin Volante.



AIRCRAFT

Your Helicopter, 007

The legendary **Aston Martin** automotive company, perhaps best known for James Bond's souped-up DB-5 that first appeared in *Goldfinger*, has collaborated with Airbus Corporate Helicopters on the special-edition **ACH130**. Now Aston Martin owners can drive their \$200,000 Volante up to their helo with its matching luxury leather interiors. VIPs pick from four colors: Stirling Green, Xenon Grey, Arizona Bronze and Ultramarine Black. The ACH130 seats six passengers, has a range of 400 miles and zips along at a cruising speed of 154 mph. Though the cost is not listed, the usual adage applies: If you have to ask, you can't afford it.



PHOTOS BY ADRIEN DASTÈ/COURTESY OF AIRBUS

AIRCRAFT

Whale Sighting

The **Airbus Beluga XL**, one of the world's largest aircraft, made its first operational flight on January 9, 2020.

It is designed to shuttle aircraft components between Airbus production sites in Europe and its assembly lines in France, Germany and China. Airbus engineers started with an A330 airliner, lowered the flight deck and grafted a huge cargo bay onto the fuselage. The upward-opening, bubble-like nose hatch allows completed aircraft wings, fuselage sections and other components to slide easily in and out. The Beluga XL is powered by two Rolls-Royce Trent 700 turbofan engines, hauls a maximum payload of 51 tons and has a range of more than 2,300 miles. Its three-member crew consists of two pilots and a loadmaster.



BELUGA XL specifications:
 Overall length: 184.2 feet
 Fuselage width: 23.9 feet
 Wingspan: 147 feet
 Height: 56.5 feet
 Fuel capacity: 6,303 gallons



The Beluga hatch opens like a giant mouth to swallow its cargo.



STYLE

FUTURE FLIGHT

Go Fly a Bike

It was only a matter of time before drone technology would be applied to personal vehicles. Enter the **Aero-runner GSX** from Aviator Cycles. This superbike of the future will cruise at speeds upward of 100 mph powered by Li-poly cell 100Ah batteries. Should your ride get dicey, an onboard brain box has your back. Just release the controls, and the GSX will return to a low-altitude hover. While the first batch will be pricey at \$200K each, the manufacturer says the mass-produced models will run you a gentler \$65,000 for the base model and go up from there. aviatorcycles.com



GIANT IN AVIATION HISTORY

BY CARL VON WODTKE

A LIFE WELL LIVED

Above: Colonel Walter J. Boyne served 24 years in the U.S. Air Force (inset) and four years as director of the National Air and Space Museum. For legions of readers, Boyne's many aviation books and articles represent his most lasting legacy.

When *Aviation History* contributing editor Walter J. Boyne died at age 90 on January 9, the world lost one of its greatest aviation historians and authors. Boyne was a longtime friend of the magazine who contributed dozens of insightful articles and book reviews over the years. Editor emeritus Art Sanfelici recalled that when he invited Walt to join our original editorial advisory board in 1990, he “kindly accepted and would become adviser and friend over the years, as well as a valuable contributor of knowledgeable articles and a constructive critic of the magazine’s content.”

Boyne’s contributions to aviation history were legion. He got his start as a U.S. Air Force aviation cadet in 1951, served as a bomber pilot and retired in 1974 as a colonel. He joined the National Air and Space Museum staff upon his retirement,

becoming acting director in 1981 and serving as director from 1983 to 1986. But he is perhaps best known as the author of more than 60 books on aviation topics, including both fiction and nonfiction bestsellers. When Walt learned he would be inducted into the National Aviation Hall of Fame in 2007, he was characteristically humble, saying he “honestly feels unworthy” but noting the fact “they’ve likely selected me for my dedication to aviation writing really makes me proud—probably insufferably so.”

Boyne’s fellow aviation writers were effusive in their praise for a man they all respected and sought to emulate. Barrett Tillman recalled first meeting him “around 1985 during a NASM visit when he was director. He simply could not have been nicer—even sent me away with a signed copy of his latest book. As so many of us learned over the years and decades, that was just Walt, unfailingly a gentleman and supportive colleague.”

Philip Handleman, who knew him well, emphasized his character: “Walt was one of the finest men I ever knew, a loyal wingman, a consummate raconteur with a wry wit, a walking aviation encyclopedia, a person of high principle and strong values, a deep thinker, a master aviator, a warrior, a patriot, an inspiring leader who reflexively offered a helping hand, a devoted family man, an old-fashioned gentleman imbued with charm and a sense of nobility, and most of all to me a dear, dear friend whose passing represents an irreplaceable void.”

“Walt Boyne was America’s most influential and productive aviation historian of the 20th century,” wrote former NASM curator and Air Force historian Richard Hallion. “Combining a phenomenal knowledge of aviation history with tremendous energy and unmatched enthusiasm, he was as well a gifted organizer, administrator and aviation advocate. A generous and helpful colleague to many now working in the field, he will be greatly missed, but his legacy and influence will continue for decades to come.”

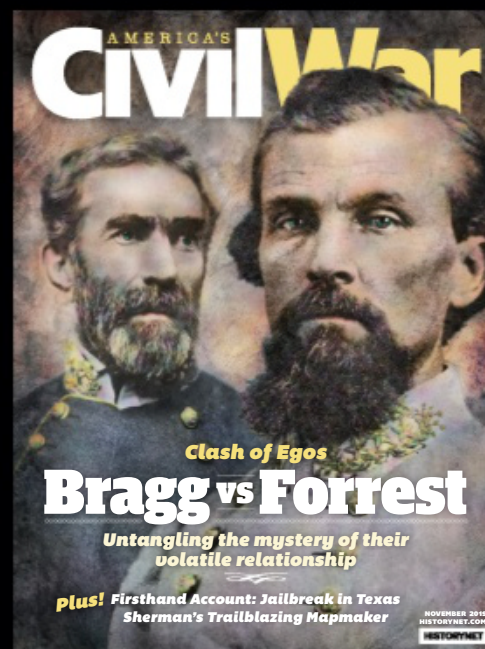
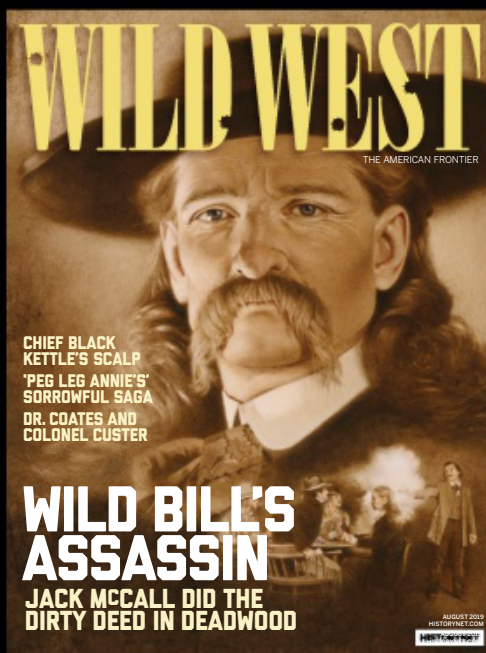
Frederick A. Johnsen, who was a 19-year-old student at the University of Washington when he first met Boyne, said he “was a friend and mentor who was forever accessible and supportive. Walt’s prodigious talents and output are well established. His loyalty to friends and down-to-earth accessibility are worthy of note—and emulation.”

Fellow contributing editor Stephan Wilkinson summed it up succinctly: “Walt was a giant in our work.”

Boyne’s last submission to the magazine was a rare personal story about a 1953 training flight as a second lieutenant during which he took control of a B-50 from the command pilot to save the airplane. You’ll find it on our website, historynet.com (search “hero story”), along with several of his articles we’ve published over the years.

“Safe trip West, Walt,” said Sanfelici, “and please save me a seat.” ✈

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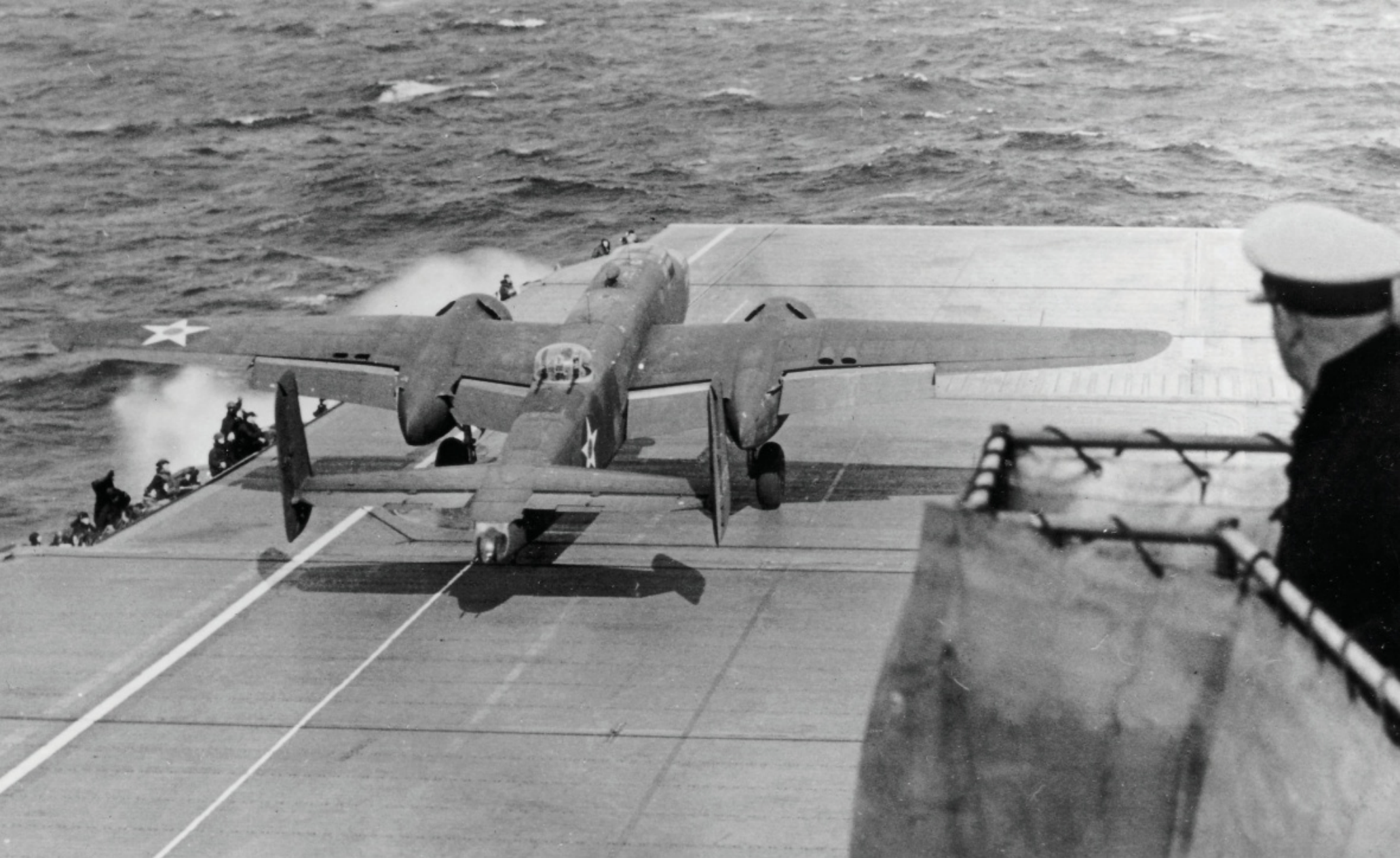


MAKING PAPPY PROUD

Running a gantlet of flak and enemy fighters on September 2, 1943, North American B-25Ds of the 405th Bomb Squadron employ tactics devised by Major Paul "Pappy" Gunn in an attack on Japanese transports in New Guinea's Wewak Harbor.

THE MIGHTY MITCHELL

ARMED TO THE TEETH WITH MACHINE GUNS AND A 75MM CANNON, B-25S PLAYED A KEY ROLE IN WORLD WAR II AS LOW-LEVEL BOMBERS AND STRAFERS BY STEPHAN WILKINSON



THE NORTH AMERICAN B-25 MITCHELL WAS PRESENT FOR THE OVERTURE OF THE PACIFIC WAR AND WAS STILL ONSTAGE AS THE CURTAIN FELL ON THE FINAL ACT.

TOKYO BOUND

On April 18, 1942, Lt. Col. James H. Doolittle pilots the first of 16 B-25Bs off the deck of the aircraft carrier *Hornet* to strike at the Japanese heartland. The carrier's skipper, Captain Marc A. Mitscher, is observing from the bridge.

On April 18, 1942, 16 B-25Bs flew one of the first American offensive missions of the war—the famous “Thirty Seconds Over Tokyo” Doolittle Raid. On August 19, 1945, four B-25J gunships escorted a surrender-negotiation delegation aboard two Mitsubishi Betty bombers from Japan partway to Manila and back.

Among American aircraft, only the Boeing B-17 had a longer combat career. The Fortress began flying raids for the Royal Air Force in July 1941, and a dozen unarmed B-17s were in the air during the Pearl Harbor attack five months later.

The B-25 finished World War II virtually unchanged from the form in which it had been born. From the A model to the J, the airframe remained unstretched, the flying and control surfaces were constant and the engines were unchanged other than detail mods—different exhaust systems, carburetors and the like. The single biggest difference as the Mitchell aged and improved was its ordnance—guns that grew and

proliferated in a manner that totally changed the airplane's mission. By the end of the war, the B-25 was the most heavily armed aircraft in the U.S. Army Air Forces' inventory. A single 12-airplane squadron of B-25s carried more .50-caliber machine guns than four infantry regiments.

The B-25 was intended to be a medium bomber, delivering substantial bombloads more economically, more rapidly and more accurately, from moderate altitudes, than the high-altitude heavy-weight B-17s and B-24s. But it found its true calling as a low-level attack bomber and strafier.

Economy had a lot to do with the B-25's success. It was substantially cheaper to manufacture than either of its rivals—the more innovative Martin B-26 Marauder and the Douglas A-20 Havoc. It took 25 percent fewer man-hours to build a B-25 than to produce a B-26. Thanks largely to the stewardship of company president James “Dutch” Kindelberger, North American Aviation was the best-organized, most efficient airframer in the



industry, able to simultaneously produce in huge numbers three of the most important aircraft of WWII: the AT-6 Texan, P-51 Mustang and B-25.

Kindelberger was a production guy. He emphasized the use of major subassemblies and of sub-components that could easily be combined into larger components, rather than hand-fabricating an entire aircraft. His engineers, including Edgar Schmued of P-51 fame, concentrated on designing with the manufacturing process in mind.

Throughout the process of prototyping and producing what became the B-25, North American's proposals were also carefully conservative. While many other manufacturers were drawn to the hot new Pratt & Whitney R-2800 engine, the Army Air Corps required that North American stay with the well-developed though less powerful Wright R-2600 Twin Cyclone. The War Department wanted a medium bomber that could be put into production quickly, not a couple of prototypes that would spend a year dealing with unproven-engine problems.

NAA had planned to use Pratt R-1830s—DC-3

engines, basically—and one of the key elements in the B-25's success was the move to the more powerful and modern R-2600. This was a result of the war that had already begun in Europe, where reports from the front caused the Air Corps to upgrade the requirements for its new "attack bomber" by 100 mph (to a top speed of 350) and its operating altitude from 5,000 feet to 20,000. In fact, the first major production model, the B-25A, added armor plating for the crew and self-sealing fuel tanks, both because of lessons learned in early combat over Britain and the Continent.

For the same reason, the B-25B got heavier defensive armament, replacing some of the airplane's .30-caliber guns with .50s and adding a powered dorsal turret as well as a useless, remotely aimed and fired retractable ventral gun package. (It was soon removed.)

The B-25's gestation began with the 1936 XB-21 Dragon, a sow-bellied taildragger with single vertical tail. North American had a thing for the Dragon name, which they would much later apply to the stillborn B-25 replacement, the B-28. NAA built only one XB-21 and decided it was a dumb idea—an archaic airframe paired with obsolete Pratt & Whitney

EVOLVING DESIGN

Top: North American Aviation's original prototype, the NA-40 featured a dihedral wing design that was discarded early in the B-25's development. Above: Workers build B-25s at NAA's Kansas City plant in October 1942. Inset: A scale model is prepared for wind-tunnel testing at the NAA facility in Inglewood, Calif.

SPECIFICATIONS

ENGINES

Two 1,700-hp Wright R-2600-9
Twin Cyclone 14-cylinder
air-cooled radials

WINGSPAN

67 feet 6 inches

LENGTH

53 feet

HEIGHT

16 feet 6 inches

WEIGHT

20,000 lbs. (empty)

31,000 lbs. (maximum)

SPEED

328 mph (maximum)

233 mph (cruise)

CEILING

21,200 feet

FUEL

692 gallons, with provision for
one 420-gallon drop tank

RANGE

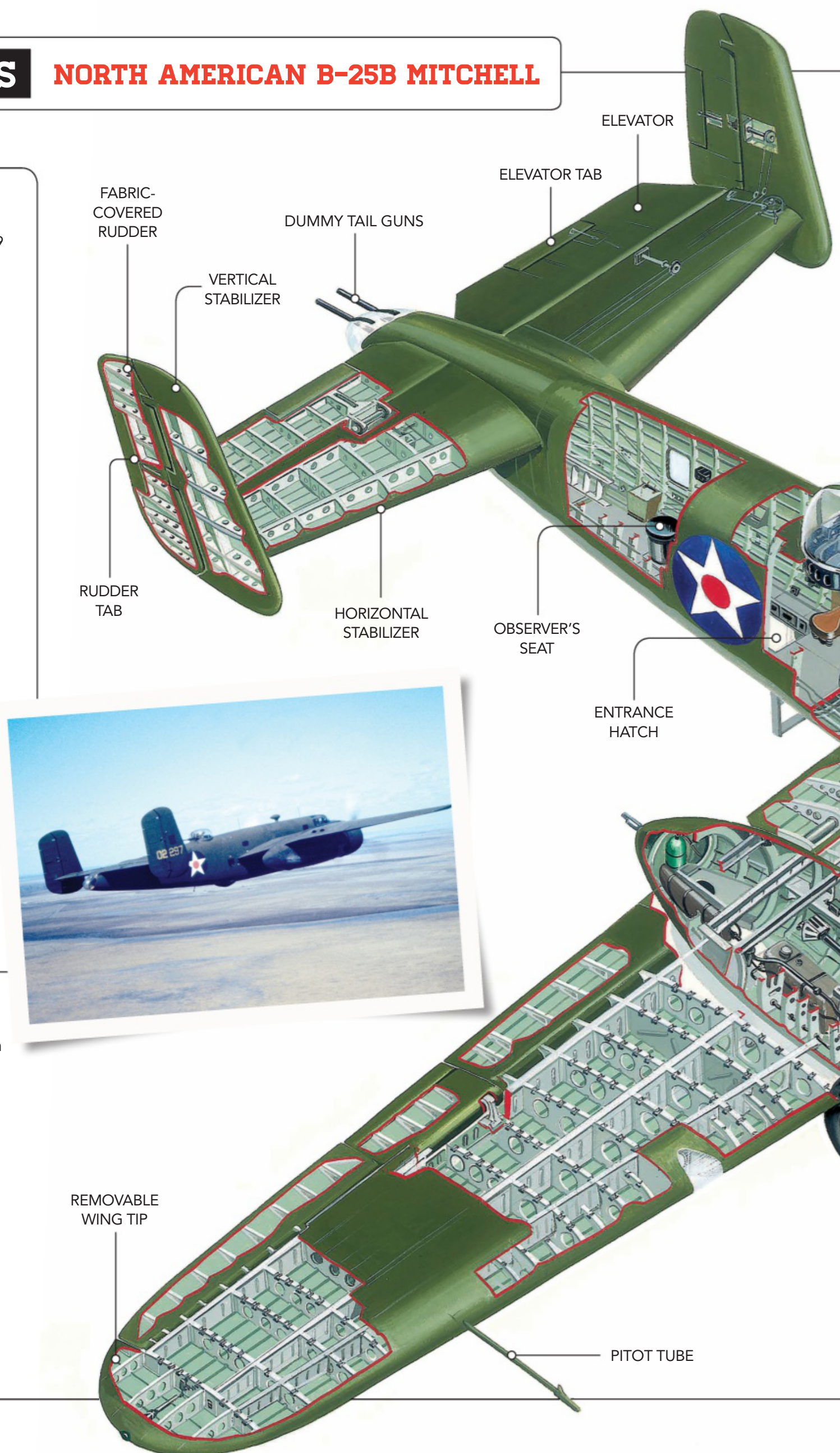
2,500 miles

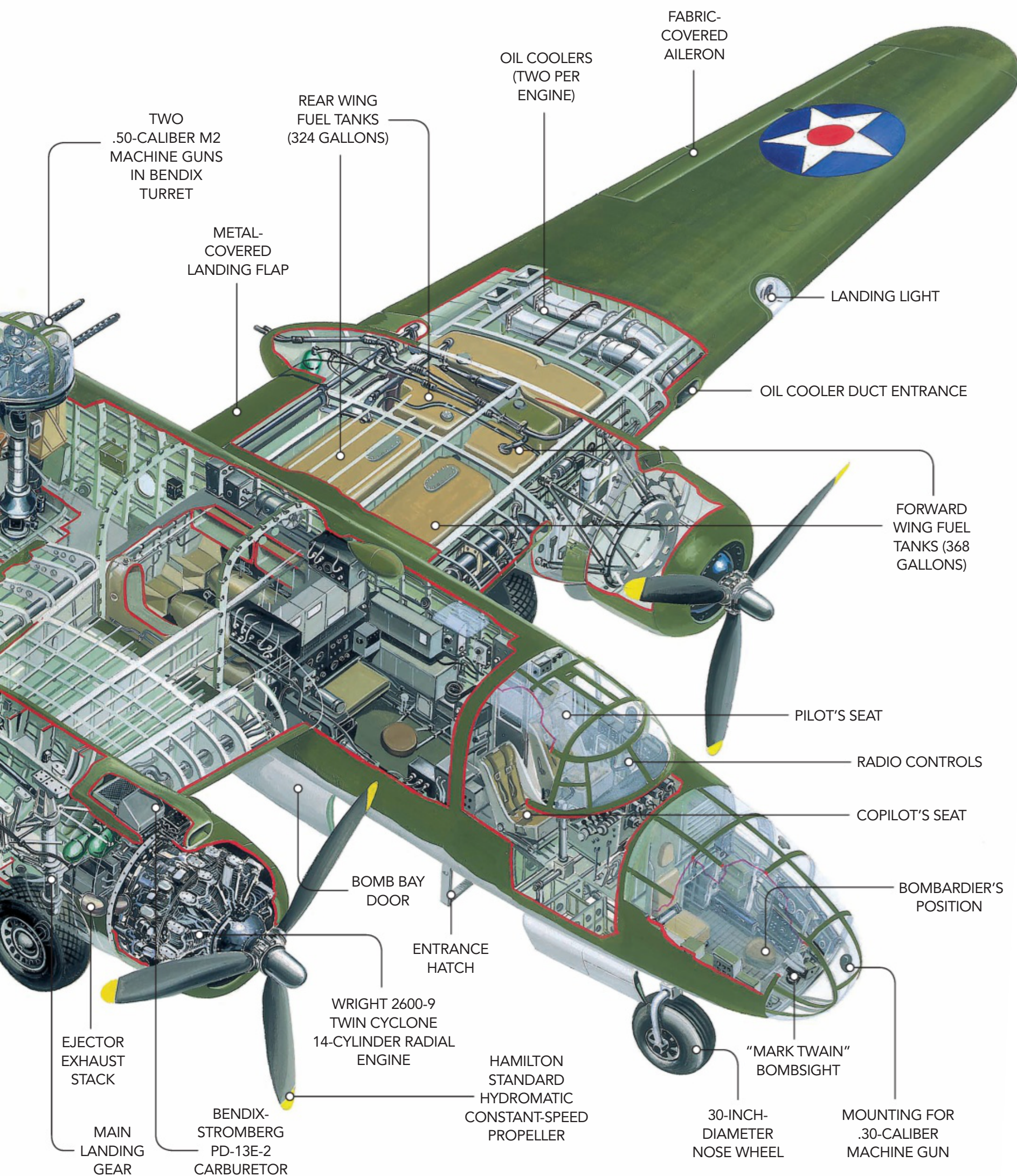
ARMAMENT

One .30-caliber machine
gun flexibly mounted in
nose, two .50-caliber
machine guns in one
dorsal Bendix turret and
two .50-caliber machine
guns in a remote-control
ventral turret

DOOLITTLE RAIDER

B-25B serial no. 40-2297
(right) heads to Eglin Field in
Florida for training. It would
be 14th off *Hornet's* deck
during the Doolittle Raid.
To save weight, Doolittle's
Mitchells featured a simple
bombsight in place of the
Norden, dummy tail guns
fashioned from broomsticks
and did not carry ventral or
nose guns, as shown in John
Batchelor's illustration.







HEAVY HITTER

The 75mm cannon installed in the nose of B-25Gs and Hs (above and below) proved to be more trouble than it was worth. The added forward-firing .50-caliber machine guns, however, were another matter.

R-2180-A transport engines.

In 1938 North American got an order from the RAF for 400 AT-6 trainers (the British renamed them Harvards), giving NAA the money and breathing room to get serious about its medium bomber proposal. The result was the NA-40 and then the NA-62, the granddaddy and daddy, respectively, of the B-25. Both were tri-gear and twin-tailed. It's not clear why North American decided to use an archaic twin tail on the B-25, but one supposition is that it gave the top-turret gunner a clear field of fire directly aft.

One of the major aerodynamic advances North American made with the B-25 was to mount the engine nacelles entirely under the wings rather than clamping them onto the leading edge, DC-3-fashion. This allowed the entire unobstructed upper surface of the wing to do useful work.

But that wing also did something less welcome: The first test flights revealed that in combination with the minimal sail area of the two vertical stabilizers, the wing's dihedral created a drunken,

unstable wallow called Dutch roll, particularly when the Norden bombsight was trying to control the autopilot. Not a useful quality for a bomber that needed straight-and-level flight to put its bombs anywhere near a target.

North American quickly came up with an economical solution that ultimately gave the Mitchell its unusual broken-wing look. Without having to do any reengineering of the wing center section, main landing gear or engine nacelles, NAA simply relocated the wings outboard of the nacelles to a very slightly anhedral position—just over a third of a degree down—while retaining the original four-degree dihedral of the inboard wing panels. Call it a gull wing or a broken-dihedral wing, it remained constant throughout the airplane's long career.

Unlike Martin's B-26, which got a reputation for being hard to handle due to its high wing loading, the B-25 went to war with thousands of newly minted pilots flying it with no problem. Latter-day B-25 pilot Jim Harley knows why. With more than 600 hours in the Collings Foundation's *Tondelayo*, he found the airplane "rock-stable...painfully easy on takeoff...and one of the most stable platforms in the landing configuration of any airplane I've ever flown, other than maybe the Mustang.

"Single-engine control speed was probably the biggest thing to be concerned about. It was around 145 mph, and you lifted off at 90 to 100. Get it off the ground, get the gear coming up, level the airplane over the runway and let it accelerate to 145. Then you can go right into the climb. Takes 20, 30 seconds. It accelerates really fast." Single-engine control speed (V_{mc}) is the airspeed needed for the rudders and ailerons to be effective enough to overcome the asymmetric thrust created by a dead engine. Below V_{mc} and with full power on the remaining engine, a twin-engine airplane will uncontrollably roll inverted and crash.

"The hardest part of teaching somebody to fly a B-25 is teaching them how to taxi, since the nose-



wheel doesn't steer but casters free," Harley says. "If you don't have a feather touch on the brakes, the airplane jerks all over the place. The brakes will heat up pretty fast and they'll fade, and then you don't have any brakes at all. If you cock the nosewheel on the runup pad and let the airplane creep, it'll turn sideways. Then you have to shut down and get out the towbar."

Harley says the Mitchell's prime strength is "its maneuverability for its size. I always likened it to a twin-engine Mustang. The one airplane I'd have liked to take into combat was the B-25. It's not at all cumbersome—it's a wonderful, rock-stable platform for combat."

Much is made of the Doolittle Raiders' gamble in taking off from a carrier deck, but the B-25's short-field performance was actually so good that with the carrier *Hornet's* steaming speed plus the wind over the deck, liftoff wasn't a problem. One Doolittle crew forgot to set takeoff flaps, so their departure was a bit shaky, and of course V_{mc} was but a distant goal for the departing bombers, so an engine failure would have meant ditching straight ahead at best.

Harley admits that the B-25's Wright engines might not have been as desirable as their Pratt & Whitney counterparts. "We were concerned about the engines when the Collings Foundation took the B-25 on the road. They do have a reputation for being fragile....But remember, these were 50-hour engines. That's as long as they needed to last. If it went bad, just give me another one."

In the Mediterranean and European theaters, B-25s largely operated as strategic level bombers, missions memorialized in Joseph Heller's novel *Catch-22*, a result of the novelist's own service as a bombardier with the Corsica-based 340th Bomb Group. In the Pacific, however, B-25s found their forte and had an immense impact on aerial tactics and attack methodology.

This happened thanks to the man who ran the Southwest Pacific Fifth Air Force, Lt. Gen. George C. Kenney. He was "born 300 years too late, a natural-born pirate," said his boss, Douglas MacArthur. Kenney, a talented pilot himself, scored two air-to-air victories during World War I and never saw a gun he didn't love. What particularly fascinated him were the possibilities offered by combining them with aircraft. The more the merrier seemed to be his operating principle.

The B-25 originally had a cumbersome and ineffective suite of defensive armament, including a peashooter .30-caliber nose gun. The Mitchell also carried a waist gunner who alternated between two .30s, plus a power dorsal turret and a ventral gun tray that took almost a minute to extend. Once it was finally in place, the gunner often found himself nauseated by trying to look through the periscopic sight. The waist guns posed as much of a danger to



the B-25's vertical tails and engine nacelles as they did to enemy fighters. The tail gunner manned the most useful position of all—the B-25 was one of the first bombers to have a tail gun.

The Fifth Air Force had already begun up-arming A-20 Havocs with fixed nose guns in the fall of 1942 when longer-range, more capable B-25s began arriving in the Southwest Pacific. Kenney's aptly named pal Paul Gunn, who would forever be known as Pappy, did the engineering and fabricating to turn his airplanes into what they called "commerce destroyers"—anti-ship-ping strafers. Initially, Gunn used .50-caliber Brownings stripped from wrecked fighters to crank up the volume on Kenney's A-20s.

Gunn deserved his nickname, unlike the 29-year-olds who only seemed like old men to teenage crewmen. Pappy, in his mid-40s, had already finished a 21-year career as an NCO naval aviator when the Air Corps persuaded him to re-up with a captain's commission. He was a junkyard genius who could fix, rig, fabricate or negotiate the

COMING IN LOW

Top: Mitchells bomb and strafe Japanese shipping in Rabaul's Simpson Harbor on November 2, 1943. Above: B-25Ds fly at treetop level over Gasmata, New Britain, to surprise another Japanese target.

GUN-HAPPY

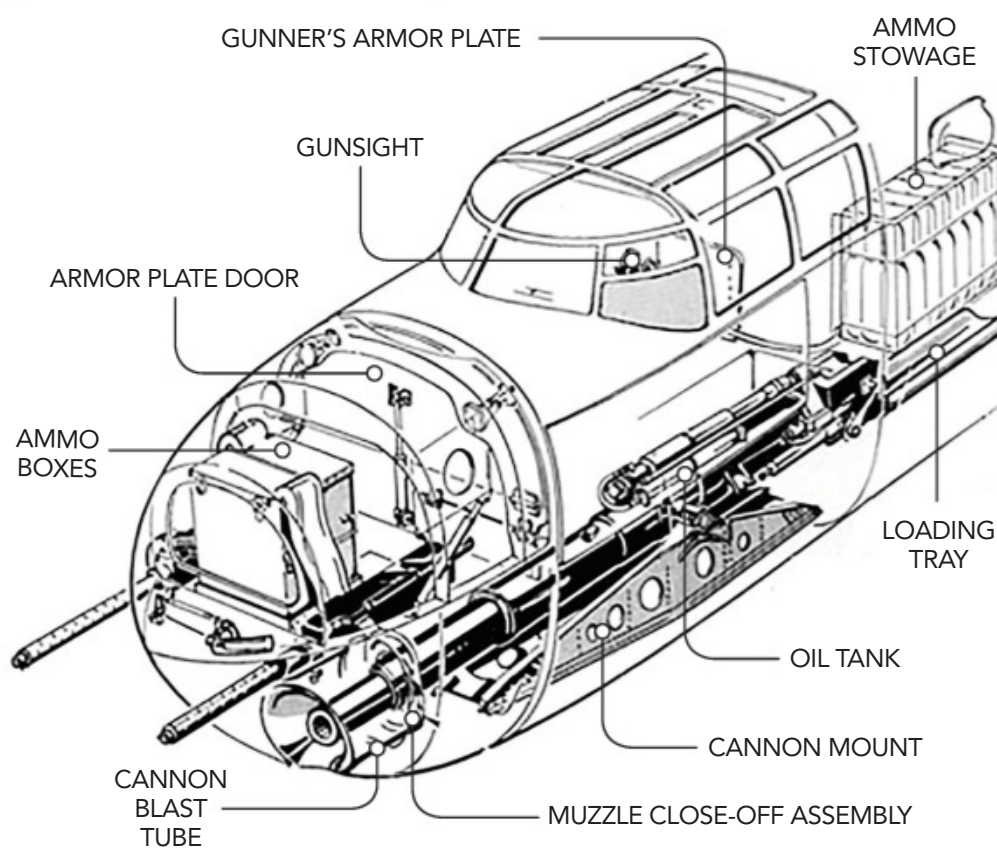
Pappy Gunn smiles from the cockpit of a B-25 in Australia.

solution to any mechanical problem, and he ultimately equipped Kenney's B-25s with as many as eight fixed .50s in a hard nose, plus four more in external "cheek" pods affixed to the fuselage slightly behind and below the cockpit on each side. Add in the top turret rotated to fire straight ahead and you had a battery of 14 .50-caliber machine guns with a total throw weight of about 215 pounds per second. One version of the late-model B-25J had 18 forward-firing machine guns.

One of the earliest uses of the Gunn strafers was in the March 1943 Battle of the Bismarck Sea. It was a serious defeat for the Japanese, who were



TECH NOTES PAPPY'S BIG GUN



The nearly 10-foot-long, 900-pound 75mm M4 cannon was mounted in the B-25G bombardier's crawlway, below the pilot's seat, and navigators served as loaders in a cramped space below and behind the pilot. Loading a round from the rack of 21 available to the gunner was totally manual, and that meant lifting a 19-pound round from rack to breech and slamming it home, then signaling that the gun was locked and loaded. It was fired by a button on the pilot's yoke.

Throw in some low-level turbulence and a dose of terror—remember, the Japanese are firing at you while the pilot is trying to maintain a straight-and-level gun run—and getting off a maximum of four rounds during an attack becomes a challenge. Often only one round was fired.

S.W.

trying to resupply their garrisons on New Guinea. The B-25s not only strafed but used to good effect two tactics developed with the help of the RAF and Royal Australian Air Force: skip bombing and mast-height bombing. Twelve of Gunn's B-25 strafers from the 3rd Bomb Group skip-bombed and sank four cargo vessels and two destroyers in the first 15 minutes of their first combat mission. Low-level specialists, 3rd Group pilots claimed that if they came across a cow during a mission, they simply flew around it.

Skip bombing sometimes wasn't true to its name, which implied a bomb rocketing toward a ship like a flat stone flung across a pond. Often skip bombing meant literally throwing a bomb against a hull, and the B-25's speed made it particularly effective at this. Skip bombing had first been tried with B-17s, but they weren't fast enough to get the job done.

Strafing Japanese airfields was a primary B-25 mission. Blowing up enemy fighters and bombers in their revetments would never make anybody an ace, but destroying airplanes on the ground was just as useful as shooting them down. B-25 strafers in the European theater even used special "jet ammunition," developed to ignite the fuel in Messerschmitt Me-262s and other jets. They destroyed a large number of the parked German jets during April 1945 alone.

Though many ground targets were hard for B-25 strafers to find under their camouflage, bridges were an exception. One Mitchell unit operating in Burma, the 409th Bomb Squadron, became so good at destroying bridges that it named itself the Dental Clinic...for its bridgework.

Unfortunately, Gunn's most famous gun installation—the 75mm short-barrel tank cannon he mounted in the belly of a number of B-25Gs—was his least successful. Intended to sink destroyer-size ships and troop-transport barges with one or two rounds, it was briefly productive as a maritime marauder and became standard on the B-25H. But by early 1944, floating targets were increasingly scarce, and soon the big cannon was being stripped out of Mitchells by units that found it hard to operate, punishing to airframes and unpleasant to use. It popped rivets, filled cockpits with smoke and cordite and assaulted crewmen's ears (see Tech Notes, left).



Some B-25s went to the U.S. Navy, which had done little to create its own attack bomber. The Navy had planned to use heavily armed Boeing PBB Sea Ranger flying boats as its anti-sub and long-range patrol aircraft, but the Sea Ranger was canceled when it became obvious that the Army and Marines would be taking Pacific islands that could serve as bases for more-efficient landplanes.

The USAAF was loath to provide the 900 B-25s that the Navy brashly demanded, but eventually 706 slightly navalized versions, designated PBJs, wound up being flown mostly by the Marine Corps. Crews had to be rapidly trained, since the Marines had no experience with anything but single-seat aircraft. PBJs came in as wide a variety of configurations as did the AAF's B-25s, including some with the 75mm cannon. Even the Coast Guard operated a few PBJs, making the B-25 one of the few fixed-wing aircraft ever to be flown by all four services.

In February 1942 North American began test-flying its intended B-25 successor, the B-28 Dragon, a single-tail, pressurized medium bomber with R-2800 engines, capable of 372 mph at 35,000 feet. It had three remotely controlled Sperry twin-.50 turrets—dorsal, ventral and tail—and with its cigar-shaped fuselage and long nose looked much like a B-26 Marauder. Only two prototypes were built, and one lost its vertical tail while running high-speed stability tests. In a vote of confidence for the Mitchell, the AAF decided to end the program, since the B-25 was doing so well they didn't see the need for any major improvement.

Instead, in 1944 the AAF asked North American to add R-2800s and other upgrades to the B-25 to create a super-strafer rivaling the more expensive 14-gun Douglas A-26 Invader. It was given the company designation NA-98X and was not a success. Overweight and with little performance improvement to show for the more powerful engines, the lone prototype crashed in April 1944 when a hotshot test pilot pulled the wings



off during a showoff low pass and hard pullup. The AAF terminated development of what might have been the ultimate B-25.

Though it started life as a mid-altitude level bomber, the B-25 became the most formidable low-level attack aircraft of World War II. And it retained its bombing capability: Beat to death the ground gunners by strafing, then drop the bombs on the way out, whether attacking ships, bridges or airfields. The Mitchell was the most heavily armed strafer of the war, and it was built in far greater numbers than any of its competitors.

Easy to fly, hard to knock down, the B-25 never gained the B-17's iconic status, but it was in some ways the A-10 of its day: never fully appreciated yet always ready to do what no other bomber could. ✚

Contributing editor Stephan Wilkinson suggests for further reading: North American B-25 Mitchell: The Ultimate Look, by William Wolf; The Saga of Pappy Gunn, by George C. Kenney; Air Apaches, by Jay A. Stout; and North American B-25 Mitchell, by Frederick A. Johnsen.

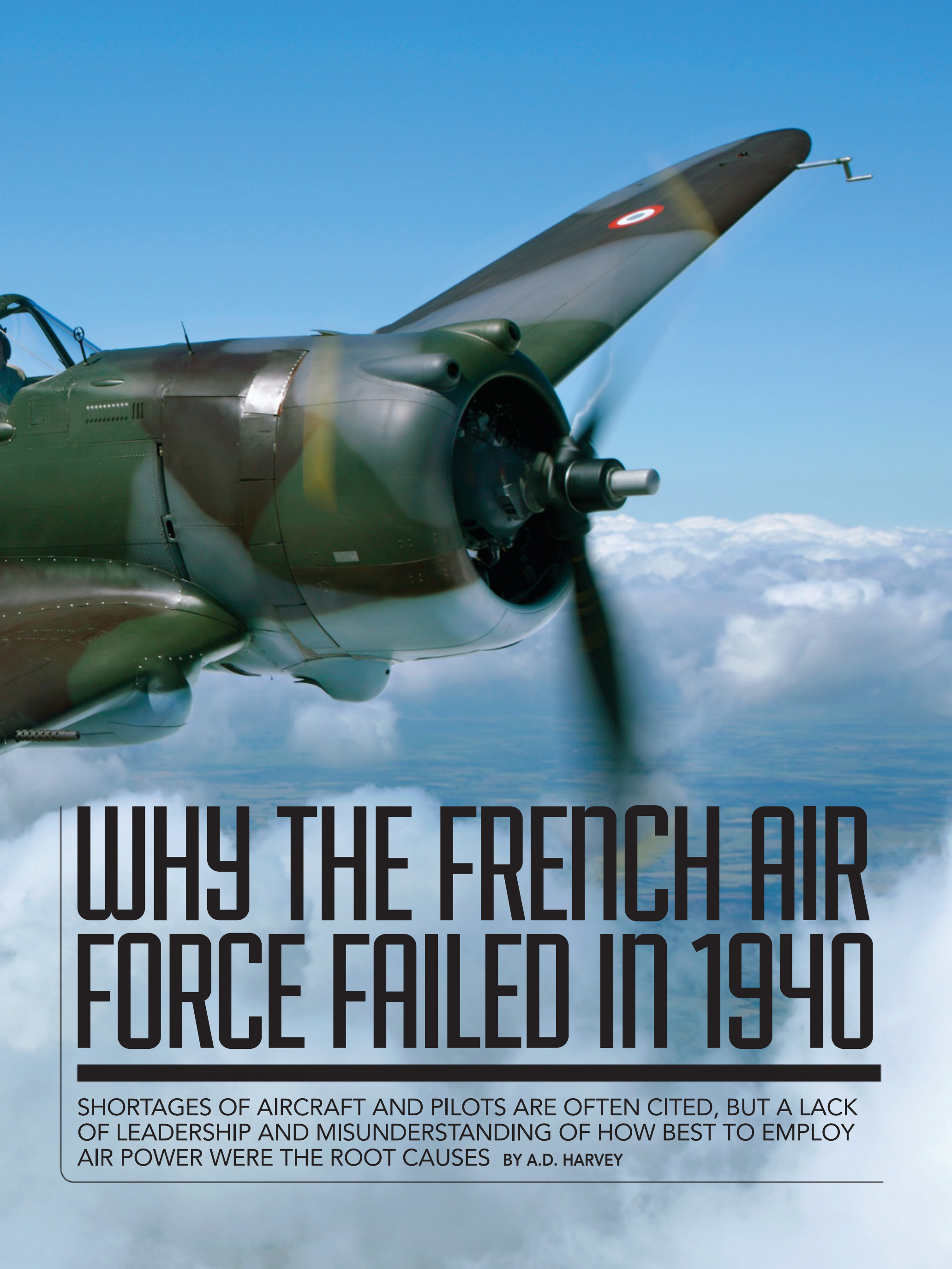
STILL FLYING

Top: Fagen Fighters WWII Museum's B-25J wears the markings of *Paper Doll*, which flew 125 combat missions from Corsica with the 447th Bomb Squadron. Above: A view of the B-25J *Old Glory* shows off its .50-caliber guns in fuselage-mounted "cheek" pods.

TOP GUN OVER FRANCE

The American-built Curtiss H75 had the highest victory tally in the French fight against Germany in 1940. This H75A-1, the only flying example, is part of The Fighter Collection at Duxford, England.





WHY THE FRENCH AIR FORCE FAILED IN 1940

SHORTAGES OF AIRCRAFT AND PILOTS ARE OFTEN CITED, BUT A LACK OF LEADERSHIP AND MISUNDERSTANDING OF HOW BEST TO EMPLOY AIR POWER WERE THE ROOT CAUSES BY A.D. HARVEY



THE GERMAN ATTACK ON FRANCE, BELGIUM AND THE NETHERLANDS IN MAY 1940 HAS GONE DOWN AS THE CLASSIC EXAMPLE OF BLITZKRIEG (LIGHTNING WAR).

GRUDGE MATCH

Above: These French Morane-Saulnier MS.406s sport the national emblem of their Polish refugee pilots in March 1940. The most numerous French fighter of the short war, the MS.406 was by then regarded as obsolescent. Right: German Dornier Do-17Zs attack French positions on June 4.

The ignominious collapse of the French army in June occurred despite the fact that it possessed more tanks and better anti-tank guns than the Wehrmacht. Where the French were weak was in combat aircraft, though the deficiency in numbers was perhaps less significant than sometimes claimed. Yet many histories cite the poor performance of the French air force, the *Armée de l'air*, as a major reason for France's defeat. Was it as bad as we've been led to believe?

For their western campaign the Germans had available about 1,000 Messerschmitt Me-109E single-engine and 250 Me-110C twin-engine fighters, compared to a total of fewer than 800 modern French, British, Belgian and Dutch single-engine and 120 Dutch and (mainly) French twin-engine fighters. During the first few days, in the expectation of a very rapid conquest of the Netherlands, the Luftwaffe concentrated 180 Me-109Es and 62 Me-110Cs against 29 Fokker D.XXIs and 23 Fokker G.Is of the Dutch army aviation brigade. With reinforcements of British



Hawker Hurricanes arriving within hours of the opening of the German offensive and the Me-110 proving less effective than expected, the Germans had almost no numerical advantage in fighters on the French and Belgian fronts.

All the Allied fighters were slower than the Me-109E, but they were also more maneuverable. The most numerous fighter type on the French side was the Morane-Saulnier MS.406. It was regarded as obsolescent and three *groupes de chasse* (fighter groups) were in the process of changing over to newer types during the May-June campaign. Nevertheless, the MS.406 was by no means

ineffective in combat. Robert Williame of GC I/2 was flying one when he shot down three Me-109Es on the morning of June 8 and followed up by shooting down three Junkers Ju-87B dive bombers that afternoon.

The Luftwaffe did have an overwhelming superiority in bombers: nearly 1,200 Heinkel He-111, Dornier Do-17 and Do-215 and Junkers Ju-88 twin-engine bombers and 340 Ju-87 Stukas against about 400 Allied bombers, including 38 Vought V-156F and Loire-Nieuport LN.411 dive bombers of the French navy. French bombardment groups were even more behind in introducing new types than were the fighter groups. Units equipped with the new Lioré et Olivier LeO.451 still had problems with its overly complex hydraulic, electrical and pneumatic systems, exacerbated by a shortage of spares. Units re-equipping with American Martin 167 and Douglas DB-7 bombers could not be deployed in action until May 22 and 31, respectively, due to delays in fitting their armament. And the Amiot 351 and 354 (single- and twin-fin version of the same design), which were superior to Germany's Ju-88, were only just beginning to come off the production line and did not see action until June 4, and then only at night. Most of the British bombers in France were single-engine Fairey Battles with a bombload of just 1,000 pounds.

It is doubtful, however, whether the Germans obtained much benefit from their numerical superiority in bombers. Their employment on May 10, the first day of the battle, to attack Allied aerodromes yielded disappointing results typical of their performance during the campaign as a whole. Thirteen of the Belgian air force's 49 fighters were destroyed on the ground but only 31 first-line French airfields out of 91 were attacked (along with 16 aerodromes without combat aircraft) and just two army observation units and a squadron of V-156Fs were put completely out of action. The destroyed aircraft were quickly replaced from reserves, as were the few fighters lost by various units. A number of attacking aircraft were shot down by anti-aircraft fire, and during the afternoon of May 10 German bombers that were supposed to strike the airfield at Dijon-Longvic mistakenly dropped their bombloads on Freiburg in southwest Germany 140 miles away, killing 57 civilians and injuring 101 more.

Heavy bombing of French positions at the Meuse River crossing in the Sedan sector on May 13 gave little practical assistance to German troops forcing the river crossing, and at Dinant, farther north, Erwin Rommel's 7th Panzer Division crossed without any help from the Luftwaffe. Most subsequent German bomber activity was dispersed, desultory and in small formations.

The Luftwaffe's biggest single raid in the May-June campaign was on aerodromes, railway sta-



DETRITUS OF WAR

Above: Wrecked MS.406s and an RAF Bristol Blenheim Mk. I litter a captured French airfield as German soldiers inspect the damage and a Messerschmitt Me-109E comes in for a landing. Left: German bombers plaster an Anglo-French road convoy.

tions and factories in the Paris region on June 3. Up to 300 bombers sortied, destroying 16 French aircraft on the ground (plus 17 shot down by escorting Me-109Es), damaging several railway stations that were quickly repaired but causing a major fire in the Citroën automobile plant. The raid killed 32 military personnel and 195 civilians.

It is generally supposed that the Germans also had a major advantage in anti-aircraft guns. The figures given by Alistair Horne in his book *To Lose a Battle: France 1940* are often quoted: 2,600 88mm heavy anti-aircraft guns and 6,700 37mm and 20mm light automatics. This is a ludicrous exaggeration. According to German sources, the real figure is about 300 88s, fewer than 100 37mm guns and about 1,000 20mm guns operated by Luftwaffe flak troops, plus a dozen 20mm guns with army crews assigned to each of the invading army's 10 armored divisions. On the Allied side the British Expeditionary

IT IS DOUBTFUL WHETHER THE GERMANS OBTAINED MUCH BENEFIT FROM THEIR NUMERICAL SUPERIORITY IN BOMBERS.



MIXED-BAG DEFENSE

Above: French ground crewmen bomb up an American-supplied Martin 167 Maryland. Above right: France's modern Lioré et Olivier LeO 451 bomber had mechanical issues. Below: A Luftwaffe officer examines a crash-landed RAF Hawker Hurricane.

Force alone had more than 250 heavy anti-aircraft guns and 300 40mm Bofors. The Belgians and Dutch had an additional 100 or so Bofors and the French 1,152 25mm guns. The French, Belgian and Dutch also had between them more than 50 heavy anti-aircraft guns and nearly 800 75mm anti-aircraft guns. In other words the Allies had about the same number of 20–25mm anti-aircraft guns, at least four times as many in the 37–40mm class and nearly four times as many heavy anti-aircraft guns as the Germans.

During the first week of their offensive the Germans assembled impressive concentrations of flak at the Meuse River crossings at Maastricht and west of Sedan, but that was because they knew where to expect Allied aerial activity. Later on, as German spearheads moved deeper into France and Belgium, the Luftwaffe flak units proved better at getting in the German army's way than at being in the right place to defend it, and showed themselves to be as keen to shoot at things on the ground as in the air. Figures vary, but from 152 to 331 French and British tanks were claimed as destroyed by Luftwaffe flak. At the same time the Luftwaffe attributed about 14 percent of its own aircraft losses to Allied anti-aircraft gunners, who also seemed quite adept at shooting down air-

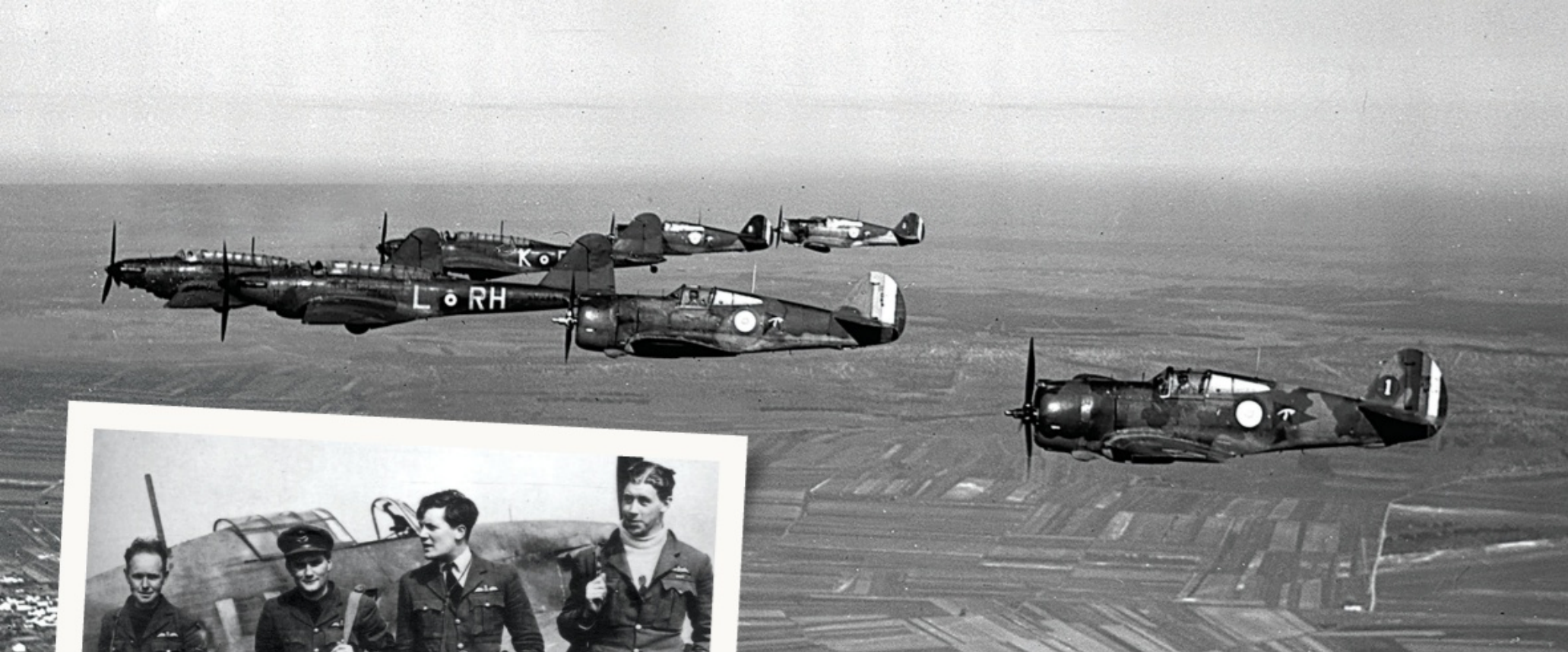


craft on their own side: French anti-aircraft guns allegedly downed five British planes on the first day of the German attack alone.

As with the armored formations in the ground fighting, overall numbers were evidently less important than the use made of what was available. Though brand-new Breguet Br.693 assault bombers were sent into action within hours of being fitted with their bomb-release gear, most French bomber units were held back in expectation of a drawn-out campaign. The major Allied effort to destroy the Meuse crossings west of Sedan on May 14 consisted of 109 sorties by the British Royal Air Force and 29 by *Armée de l'air* bombers. On May 17 French air force bombers carried out six sorties and French navy dive bombers 20. On the 23rd the air force managed just two bombing sorties and the surviving navy dive bombers six, with Latécoère 298 floatplanes based at Cherbourg carrying out a further 18 bombing missions south of Boulogne.

Quite early in the campaign a British intelligence officer in France remarked, "It is felt here that with 500 more aircraft at our disposal the German advance would have been utterly smashed as a result of our bombing of the immense and recklessly vulnerable targets offered to our aircraft in the form of close columns on the many routes of the enemy's advance." That is a very questionable assertion. Allied ground units on the move suffered in most cases little disruption from enemy bombing ("noisy but comparatively





inaccurate," as one British officer noted) despite the Germans' superior numbers. Perhaps the only time a decisive deployment of France's admittedly inadequate resources might have made a difference was during what has been described as "the hitherto biggest known traffic jam in Europe," a line of military traffic, headlights full on, stretching back for 60 miles through the Ardennes and into Germany during the night of May 12-13. The jammed-up German advance had been reported in good time by the crew of an Amiot 143 night bomber, but the French were unable to respond on short notice. In the end the peak French bomber effort in the campaign was 126 sorties against various targets on June 5.

The small number of French bombers and their somewhat desultory employment might have tended to lay a greater burden on the French fighters. As there was no radar network covering France's eastern frontier, it was impractical for French fighters to respond to individual incursions by small Luftwaffe formations. The French could either ignore the Luftwaffe altogether and concentrate on direct intervention in the ground fighting, or find some other means of engaging the Germans above the battlefield. Although some French fighters had been equipped for ground attack, it was not until June 5 and 8 that they struck German tanks in any strength, suffering heavy losses from flak.

Trying to find the Luftwaffe in the air by patrolling was almost useless. With a long border and 16 hours of summer daylight flying time, one or two patrols a day were unlikely to encounter the Germans. Thus GC I/5 flew seven patrols on May 17 involving 45 Curtiss H75 Hawks, only one of which encountered German aircraft, and

on June 12 seven patrols by 21 Hawks resulted in the destruction of a Henschel Hs-126 observation plane whose rear gunner caused so much damage to two of the three attacking Hawks that they had to make forced landings. Both GC I/5 and GC II/5 reported instances of group attacks on single unescorted Do-215 bombers that were able to escape when the French fighters used up all their ammunition.

As more fighter units were belatedly brought into action, the tempo of French fighter activity increased. From May 10 to 21, 2,675 fighter sorties were flown (an average of 223 a day), while from June 4 to 10 more than 2,000 were flown (say 286 a day). Nevertheless, some units were evidently carrying out more than one mission a day while others were flying none. Later it was reported that though 20mm ammunition for the French cannon-armed fighters had been coming from factories at the rate of a million rounds per month, only 80,000 rounds had been fired off in the whole six-week campaign. Meanwhile the RAF was running out of machine gun ammunition for its Hurricanes in France.

New Zealander Edgar Kain, the leading Allied ace up till the French capitulation despite being

UNITED FRONT

Top: French Hawks escort British Fairey Battles during an aerial counterattack. Above: A wrecked Breguet 19 (foreground) and a Breguet 270 lie in a field in Auxerre. Inset: Hurricane pilots of No. 73 Squadron in France include New Zealander Edgar "Cobber" Kain (right), the leading Allied ace of the battle.



FUTURE FOES

Armée de l'air chief of staff General Joseph Vuillemin (left) chats with Luftwaffe General Erhard Milch in Berlin on August 21, 1938.

not been issued a month later. And the delay in deploying imported American bombers was due in part to holdups in the delivery of machine guns, bomb racks, radios and intercom gear from French factories.

Confusion in administrative arrangements was paralleled by lack of clear thinking with regard to how best to employ air power. The official French strategy for deployment of tactical air units, issued on March 31, 1937, spoke grandly of the *Armée de l'air*'s ability to choose whether to attack the enemy air force, army or navy, and whether to do so either with or without the cooperation of other arms, and referred to attacks on enemy centers of production and communication, and on military units on the move, including armored formations. The French air force did in fact possess useful 1:25,000 maps of the Ruhr industries (which it did not use), but its maps of the German railway and Autobahn systems were on too small a scale to be of assistance in attacks on communications.

In any case, the French army, in the person of General Maurice Gamelin, overall commander of the French armed forces, insisted, "There is no such thing as air battle, only battle on land." General Joseph Vuillemin, head of the *Armée de l'air*, probably agreed with him and toyed only briefly with a scheme to detach aviation units from a zonal organization linked to the army's defensive zones and to establish a unified strategic command structure.

The French air force's subordination to the army command was actually cited by British critics of what they regarded as the excessive autonomy



COMMAND INDECISION

Above: French General François d'Astier de la Vigerie was stymied in his efforts to more effectively employ air assets. Below: A shot-up Do-17Z lies wrecked in northern France.

killed in a flying accident on June 7, was credited with unassistedly shooting down 16 German aircraft. Meanwhile, the leading French ace, Edmond Marin La Meslée, though also officially credited with 16 victories, had actually shot down only four on his own, the other 12 being shared with colleagues but, in accordance with French practice dating to World War I, counted each as a single victory for each of the participants.

By early June a flood of replacement aircraft was reaching French frontline units, though most of them were lacking vital equipment and could not be flown. Many Potez 63.11 reconnaissance aircraft even lacked propellers, and there was also a shortage of replacement aircrews for them.

The 63.11 nevertheless achieved the distinction of being shot down in greater numbers than any other French type. That it was not employed in greater numbers (suffering even more losses) was due to the astonishing confusion that prevailed in the French air force administration. On May 17, for example, 30 63.11s were made available from training schools for use by combat units, and though the crews were stationed nearby, the order for these aircraft to be handed over still had





of the RAF, but in practice nobody had quite figured out what that subordination was to consist of. General François d'Astier de la Vigerie, commanding aviation in the northern army zone, later claimed that "almost every evening" during the May-June campaign he had to telephone the northern zone army commanders to remind them of the availability of air support and to ask, "Have you got a job for them?" The invariable response: "Thanks very much but we haven't any work for them."

General Lucien Girier, placed on May 26 in command of a combined fighter/assault bomber force to assist the Seventh Army, never received a single request for aid even when his responsibility was extended to cover the Tenth Army area in June. Girier had to send out attack missions on his own responsibility and on the basis of intelligence supplied only by personnel under his direct command. It was later discovered that Vuillemin's headquarters did in fact receive at least one request for assistance from the Seventh and Tenth armies but did not pass it on. On June 4, when the Tenth Army launched an attack on the German bridgehead at Abbeville, Astier de la Vigerie proposed a preliminary aerial bombardment at dawn, but the army staff had already scheduled the attack for 4 a.m. and refused to make the slight postponement a dawn attack would have required. When Astier de la Vigerie raised the matter with Tenth Army commander General Robert Altmayer, he responded: "What shall I do with all this aviation? I already have such an abundance of artillery I can hardly deploy it." Of course after the battle the army generals were not slow to attribute the completeness of their defeat to the "inferiority of our aviation."

Astier de la Vigerie later complained of Vuillemin's "vainglorious orders, orders for posterity." The air force commander also made would-be morale-boosting visits to French air bases to shake hands with everyone and tell them, "You've met the Boche, it's been very tough, very tough, I thank you. I'm proud of you." That sort of thing did not impress senior British officers who had to deal with him. Less than three weeks into the German

LASTING SYMBOL

Decked out in French markings, this D.3801 is an improved Swiss-built version of the MS.406 fighter—a reminder of the French air force's failure to keep its fleet up to date, and the fateful consequences.

THE FAILURES OF THE ARMÉE DE L'AIR WERE A SYMPTOM, NOT A CAUSE, OF THE FRENCH MILITARY COLLAPSE.

offensive, Air Commodore Douglas Colyer, the British air attaché in Paris, reported: "There are few officers in the French Air Force of really first class mental calibre.... On the other hand, there are many general officers who, while undoubtedly very brave pilots in the last war, are not sufficiently educated to make commanders of important formations. Among these, I fear, must be classed General Vuillemin." Later Maj. Gen. E.L. Spears, the British liaison officer to the French government, described Vuillemin as "a pilot of the last war who had gone to seed.... Rather fat, rather pasty, bursting out of a uniform several sizes too small.... He never contributed or said anything, but just looked on with the bewildered washed-out eyes of an ancient celluloid doll floating on the opaque waters of the bath...."

In the opinion of Pierre Cot, who had been the French aviation minister in 1933–34 and 1936–38, "*Armée de l'air* command bears the shame of having lost the battle without having fought it." That judgment is probably too harsh. It may be that with fewer resources the French air force had proportionately even less influence than the Luftwaffe on the ground fighting, but it was on the ground that the campaign was won and lost. The failures of the *Armée de l'air* were a symptom, not a cause, of the French military collapse.

Perhaps the chief result of the air combat in May and June 1940 was to persuade the Luftwaffe that it had won an air superiority campaign when it hadn't: The level of French (and British) air activity actually increased as the campaign progressed. Barely a month after the French capitulation, the Luftwaffe, emboldened by its largely illusory success against weaker opponents, embarked on a new air superiority campaign over southern England, and this time the weaker side prevailed. †

A.D. Harvey taught at the Universities of Cambridge, Salerno, La Réunion and Leipzig before becoming a full-time writer. Further reading: The Blitzkrieg Legend: The 1940 Campaign in the West, by Karl-Heinz Frieser with John T. Greenwood.



SMALL WONDER

Flying out of Wels, Austria, Rupert Überacker and his piston-engine Bede BD-5G are regulars on the European airshow circuit.



BEDE'S BOONDOGGLE

JIM BEDE AIMED HIGH WITH HIS LITTLE HOMEBUILT BD-5 BULLET, BUT ENGINE WOES AND QUESTIONABLE FINANCIAL MOVES CAUSED HIM TO OVERSHOOT THE TARGET BY DAVID NOLAND



ON AUGUST 2, 1972, STANDING NEAR A TAXIWAY AT WITTMAN FIELD IN OSHKOSH, WISCONSIN, I PRESSED A CHECK FOR \$200 INTO THE HAND OF A SHORT, FAT GUY IN A RED SHIRT.



AIR ENTREPRENEUR

Jim Bede set the kit-plane community afire with his BD-5 Micro.

His name was Jim Bede and he was promising to deliver, at some unspecified future date, the parts and materials for me to build a tiny single-seat airplane that looked like a rocketship and was powered by a snowmobile engine. The kit, he promised, would take only about 600 man-hours to assemble—just four months of full-time work—and cost no more than a new Volkswagen Beetle.

The tiny plane was called the BD-5 Micro. More than 3,000 people—many of them, like me, with imaginations fired but zero experience building airplanes—eventually purchased BD-5 kits. A handful of factory prototype BD-5s made test flights, triggering paroxysms of excitement among us kit-buyers. But plagued by the lack of a reliable engine and reckless financial mismanagement, Bede never delivered a single complete BD-5 kit. The company eventually went bankrupt,

and thousands of Bede customers ended up losing some \$10 million.

Yet the plane's allure remained undimmed. A number of diehard builders managed to complete and fly jury-rigged BD-5s powered by improvised engines. In the process, they crashed and killed themselves in horrifying numbers.

But when I recall watching an airshow trio of jet-powered BD-5Js swoosh by at 300 mph, or think back on my brief 1974 flight in a factory prototype, there's no doubt in my mind: Almost 50 years later, the BD-5 is still the coolest light-plane ever, still the ultimate private pilot's fantasy.

Jim Bede's place in aviation history is that of both visionary and charlatan. An aeronautical engineer with an upbeat, fast-talking personality ("100 words a minute, with occasional gusts to 150," as he put it), Bede



JET-POWERED AEROBATS

Curious onlookers examine two BD-5Js used by Corkey Fornof's jet demonstration team in the 1970s.



KIT AND CABOODLE

From top: The third BD-5 prototype first flew in March 1973; not all kit buyers used the word "fun" to describe flying the BD-5—if they ever did get to fly it; Bede engineer Burt Rutan sits in the second BD-5 prototype.

was part of a grassroots clan of sport pilots frustrated and bored by expensive, stodgy Cessnas and Pipers.

In the early 1960s, Bede designed and promoted the BD-1, a conventional-looking two-seater intended to be fabricated by amateur homebuilders. In a harbinger of things to come, he ran out of money before he could finish the project. Outside investors took over, kicked Bede out and redesigned the BD-1 as an FAA-certified production aircraft, the American AA-1 Yankee.

His next project was the BD-4, a boxy, easy-to-build four-place homebuilt. He started selling BD-4 construction drawings in 1968, and in 1970 introduced prefabricated kits—a new idea at the time. And a splendid idea it turned out to be; several hundred BD-4s were completed, and many are still flying.

Encouraged by the BD-4's success, in November 1970 Bede offered for sale a \$5 information packet about his latest concept: a plane so small and sleek that the pilot had to lie semi-supine beneath its fighterlike canopy. The promised specs were astounding: a top speed up to 270 mph, full aerobatic capability and a basic kit price of just \$1,800. He cashed the first \$200 deposits for the still-imaginary plane in February 1971.

The tangible BD-5 made its public debut in July 1971 at the Experimental Aircraft Association's annual Oshkosh fly-in. Not yet flyable, but looking very badass indeed, the tiny red plane was an instant sensation. By the end of the show, the bullhorn-wielding Bede, ever the carnival barker

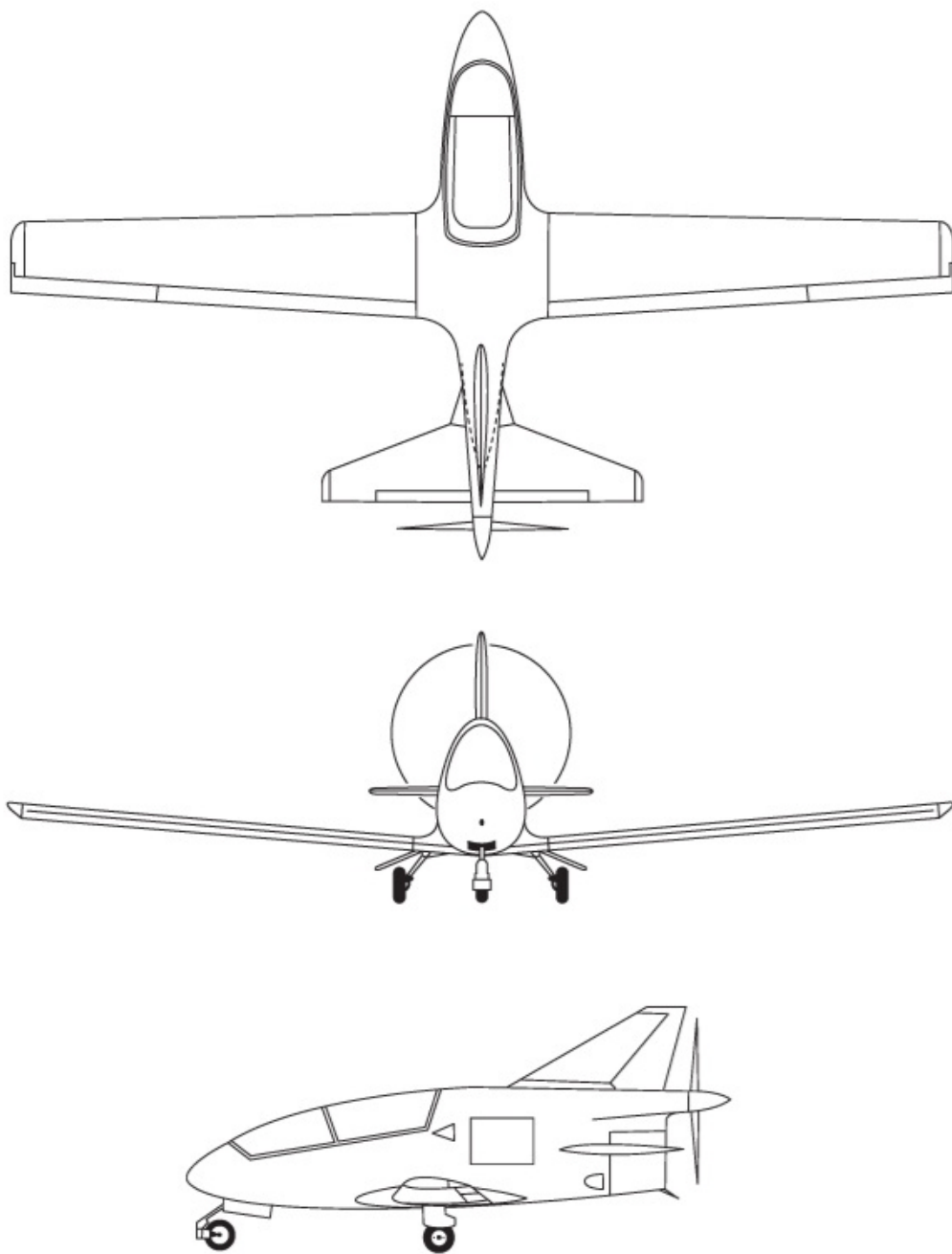
showman, had collected more than 800 deposits.

That first BD-5, N500BD, had a fiberglass fuselage, a V-tail and a 36-hp Polaris snowmobile engine. It flew, briefly and barely, on September 13, 1971—a short hop down the runway, with Bede at the controls. The little plane proved wildly unstable. A second brief hop was equally precarious, and it never flew again. But in another ominous harbinger of things to come, a subsequent Bede newsletter cheerily reported that the company was "quite pleased with the results....of these flight tests," conveniently neglecting to mention that the plane never got more than a couple feet off the ground.

Soon thereafter Bede made what was perhaps the best decision of his aviation life: He hired a 28-year-old stability-and-control engineer from Edwards Air Force Base in California to be his director of development. The young fellow's name was Burt Rutan.

TECH NOTES

BEDE BD-5B MICRO



SPECIFICATIONS

ENGINE

70-hp Hirth (or comparable) two-cylinder two-stroke driving a two-bladed wooden pusher propeller

LENGTH

13 feet 3½ inches

WINGSPAN

21 feet 6 inches

WING AREA

47.4 square feet

HEIGHT

4 feet 2½ inches

WEIGHT

355 lbs. (empty)

640 lbs. (maximum takeoff)

SPEED

233 mph (maximum)

210 mph (cruise)

RANGE

575 miles

RATE OF CLIMB

1,460 feet per minute

SERVICE CEILING

26,000 feet

Rutan arrived at Bede headquarters in Newton, Kan., in March 1972. The second BD-5 prototype, N501BD, was then under construction. The new version was made of aluminum and had a conventional vertical tail, a swept horizontal stabilator and a 40-hp Kiekhoefer snowmobile engine. Rutan's job: get the airplane ready to fly and conduct the flight-test program. One of his first moves was to hire a friend and fellow engineer from Edwards, Les Berven, as chief test pilot.

Rutan quickly discovered that 501 was hideously tail-heavy. (Solution: Fill up the nosecone with lead.) The flaps had to be redesigned. High-speed taxi-testing led to a complete redesign of the stabilator. After a deal to buy production engines from Kiekhoefer fell through, a German-made 40-hp Hirth snowmobile engine was substituted.

In May 1972, eight months after the first runway hop and 15 months after the first deposit checks had been cashed, the BD-5 finally made its first up-and-away flight. It was brief; the Hirth engine overheated within seconds and the cockpit filled with smoke. Berven shut down the engine and glided back to a safe landing. But at least the flight-test program was finally underway.

The smoke and overheating problems were quickly fixed. Berven reported that the plane flew beautifully, with good stability and "the best-harmonized controls I've ever flown."

But, recalls Rutan, "We had many engine failures." One came during a demo flight in front of FAA officials, from whom Bede was seeking a permit to fly at the 1972 Oshkosh confab. With the FAA men watching, the engine seized 90 seconds after takeoff. Berven managed to glide back to the runway, but ran off the end and crunched the nose gear. No permit.

The plane's failure to fly at Oshkosh that year didn't dissuade me, nor many others, from handing Bede deposit checks. (Hell, the thing looked like it was going 200 mph just sitting there on the ground!) A month later, 6,000 people showed up at Bede's home field to watch the first public flight demonstration.

The following month, however, 501 crash-landed on a road after another engine failure. Rather than repair the substantial damage, Bede scrapped it and focused on the next prototype, N502BD, scheduled to fly in a couple of months. But vibration problems with a new belt-drive system persisted, and by the time Bede began to ship the first partial kits to long-yearning builders in early 1973, 502 had still not flown.

At this point, Rutan was having second thoughts about Bede's business practices: "I was thinking, if we can't even fly the airplane for two minutes, how can we be sending out kits?"

Perhaps money had something to do with it. The BD-5 program had been pattering along

for more than two years on Bede's personal funds and about \$600,000 in kit deposits. But once the first partial kit packages were ready for shipment, builders had to come up with the full balance—in my case, \$2,385. Multiplied by 3,000 customers, that worked out to about \$7 million.

UPS dropped the first two big cardboard cartons in my driveway in March 1973. They contained the canopy, airspeed indicator (it read up to 300 mph!), wheels and brakes, and prop spinner, plus the parts to build the vertical stabilizer's framework. But no plans or instructions. I spent a lot of time staring at the airspeed indicator and fondling the spinner.

In April the wing kit arrived, with a set of excellent plans and instructions, and I at last began what I hoped would be my 600-hour journey to flying nirvana.

Meanwhile, back at Bede, with partial kits now shipping, the money flowed in. And out. The 502 prototype finally flew in March 1973, but the belt-drive system and the Hirth engine continued to cause problems, triggering more forced landings. The Hirth also lacked the power to meet the plane's promised performance. "It was becoming clear that this was a junk engine," notes Rutan.

Despite Bede's desperately upbeat reports to its customers ("The basic twin-cylinder engine manufactured by Hirth is as good, or better, than any engine we have had the opportunity to study and test..."), it was around this time that the rumblings of discontent among us builders began.

Perhaps as a distraction from all the engine problems, in mid-1973 Bede fired a double-barrel shot of adrenaline into the Micro community: the promise of an FAA-certified production model, the BD-5D, and a real-life jet-powered version. Slick two-page color ads in aviation magazines ("You've just run out of excuses for not owning your own



airplane") sent ripples beyond the world of home-building. The ready-to-fly production BD-5D, it was promised, would cost less than half the price of the cheapest new plane then available, yet fly twice as fast. Send in your deposit now! Just \$400! "He needed a new product, and he needed it fast," recalls Rutan.

Powered by a minuscule 200-pound-thrust French Microturbo TRS-18 turbojet engine, the BD-5J set the 1973 Oshkosh airshow crowd agog. (A landing accident caused by a stuck thrust attenuator dampened spirits not a whit.) It flew so well and so reliably that six months later Bede let the first aviation journalist, former U.S. Air Force F-86D Sabre pilot Dick Weeghman, take a test hop. Weeghman rhapsodized, "It remains a haunting, indelible experience that got me as close to Birdsville as I ever expect to get."

In June 1974 at the Reading Air Show in Pennsylvania, Bede unleashed a three-jet aerobatic

HUMBLE START

Above: The Bede's Hirth engine required a pull-start like a lawn mower. Below: This BD-5B took 5,000 hours to build and was donated to the National Air and Space Museum in 1984 after only nine flying hours.





BOND'S BEDE

Top: Former fighter pilot Justin Lewis hit the airshow circuit in 2011 with the FLS Microjet, an improved BD-5J. Above: The BD-5J is perhaps best known for its cameo in the 1986 James Bond film *Octopussy*.

ing problem was that airplanes are different than snowmobiles. "We broke every part of the engine on the test stand," Les Berven later admitted. "Rings, cylinders, pistons, bearings, crankshafts. Everything went at one time or the other."

At about the same time, the ever upbeat (delusional? lying?) Jim Bede wrote in "Bede News," Vol. 1 No. 3, "We have completed all testing of the BD-5."

By the summer of 1974, a new prototype of the prop-driven plane, N503BD, was finally deemed ready to be flown by journalists, although the engine had to be pull-started by hand like a lawnmower and would stop dead if the plane encountered turbulence. I was lucky (?) enough to be invited, despite my meager 400 hours flying time.

Slipping into the tiny cockpit, I felt as if I were pulling on an aluminum body suit (or perhaps climbing into a coffin). Instead of the normal control wheel or stick, there was a tiny joystick control on the right armrest—just like the YF-16, the revo-

lutionary new Air Force fighter prototype that had recently made its first flight.

I lack the words to describe the half-hour of giddy dream fulfillment that followed. N503BD was extremely stable, yet responsive to a flick of the wrist. I indeed felt as if I were soaring among the birds, albeit at only 170 mph, not 270. Forty-five years later, it still rates as the peak moment of my flying career.

Not long after my flight, Hirth went bankrupt. At that point it dawned on me that my dream might never be realized. I'd been plugging away in my barn workshop for almost two years, and had a beautiful set of wings, a fuselage shell and a vertical stabilizer. But many of the kit parts and materials—including, of course, the engine—had not been delivered.

With his cash flow dwindling, Bede turned his focus to the FAA-certified airplane, leaving us homebuilders feeling abandoned. Worse, he was also spending money—our money—developing two new projects, the BD-6 and BD-7. A new engine from the Japanese manufacturer Xenoah was tested, with the usual results: many promises, no reality.

By mid-1976, I had concluded the BD-5 was doomed, and sold my partially completed kit. I'd put \$3,500 and 400 hours of labor into the project, but felt lucky to get \$1,500 for it. (I recently heard from the fellow who bought it; the pieces remain in his basement, untouched to this day.) Looking back, I had probably done no more than 10 percent of the work to complete the job. Even with all the parts, it's now obvious I lacked the skills and determination to ever finish it.

In November 1976, the 503 prototype was destroyed in a crash. Bede Aircraft Corp. was by



MICRO BREW

The jet-powered BD-5J proved to be the most reliable of the Bede family, with about a dozen of the 25 built still flying.

thread. Of the first four homebuilt BD-5As, a version with shorter wings, three crashed and killed their builders on their first takeoffs. The fourth survived long enough to crash on its first landing.

I've always been puzzled by this rash of fatal crashes. The plane I piloted was easy to fly, with dead-on pitch stability. Its stalls were gentle and predictable, with instant recovery when back-pressure on the stick was released. Yet the same plane I flew, N503BD, later stalled and crashed. I still don't get it.

Perhaps poor workmanship degraded the flying qualities of some customer-built planes. And most homebuilt BD-5s, with their bulkier engines, were much heavier than the factory prototypes, which increased stall speeds. The heavier engines may also have caused center-of-gravity problems; the BD-5's safe CG envelope was literally a matter of inches. But one thing is clear: An amateur pilot with less recent practice in flying than building has no business in the cockpit for the first flight of a homemade airplane with a kludged-together engine. That's a job for a professional test pilot—and a very brave one at that.

The BD-5J, with its more reliable jet engine, has been by far the most successful Micro. (Who can forget James Bond's miraculous jet escape in *Octopussy*?) About 25 BD-5Js have flown over the years, mostly as aerial stunt planes for purveyors of liquid refreshment. A dozen or so Microjets are currently active.

Surprisingly, pilots newly smitten with BD-5 fever can still pursue their fantasies. A company called BD-Micro Technologies, in Siletz, Ore., has decades of BD-5 experience and a stockpile of original Bede kit parts. It makes all the missing pieces (with many design improvements) and has set up construction tooling and jigs. An aspiring BD-5 builder can today, after writing a check for about \$90,000 and putting in 200-300 hours of supervised hands-on labor at BD-Micro's production facility, fly away in a new, Hirth-powered BD-5 that's way better than the original.

Believe me, I'm tempted. ✦

David Noland is a former editor at Air Progress and Aviation Consumer magazines now drifting into semi-retirement. He currently flies only in his imagination. For more information on BD-Micro Technologies, see bd-micro.com.

then a dead company walking. Having burned through some \$7 million in kit payments and \$2.7 million in production model deposits, it had no money left to build a new prototype, produce kit parts, find an engine or pursue FAA certification of the BD-5D. Multiple attempts to secure financing foundered, and bankruptcy mercifully arrived in 1979. Accused of fraud by the Federal Trade Commission, Bede signed a consent decree promising to not accept money for any aircraft project for a period of 10 years.

(Ten years later, almost to the day, Bede announced the BD-10, intended to be the world's first supersonic homebuilt. Five examples were built and three crashed, killing their pilots. None ever got close to supersonic speeds. In 1995 Bede began taking deposits for the BD-12, a two-seat version of the BD-5 with a standard aircraft engine. It crashed on its first flight attempt. Jim Bede died of natural causes in 2015.)

In the four decades since Bede's bankruptcy, an estimated 150-200 determined and resourceful BD-5 builders have managed to complete and fly improvised planes. BD-5s have flown with Honda Civic, Volkswagen and Subaru engines; Mercury outboards; Wankels; Rotaxes; and even an updated version of the accursed two-cylinder Hirth that seems to run just fine. There was a turboprop version, powered by a gas generator from a Chinook helicopter. Perhaps 50 BD-5s are currently airworthy worldwide.

Almost as many have crashed and killed their pilots. The Aviation Safety Institute database shows a total of 25 fatal BD-5 crashes—12-15 percent of all BD-5s that ever flew. Many occurred on the first flight of newly finished aircraft, with engine failures and subsequent stalls a common

SLIPPING INTO THE TINY COCKPIT, I FELT AS IF I WERE PULLING ON AN ALUMINUM BODY SUIT (OR PERHAPS CLIMBING INTO A COFFIN).

A black and white photograph of Paul Mantz and a woman. Paul Mantz, on the left, is a man with dark hair, wearing a light-colored jacket over a dark shirt and tie, smiling and looking towards the right. The woman, on the right, has short, curly hair and is wearing a plaid shirt under a dark leather jacket, also smiling and looking towards the right. They are positioned in front of the fuselage of a large aircraft, with structural elements like rivets and a vertical support visible in the background.

KING OF HOLLYWOOD PILOTS

STUNT PILOT AND AIR RACER PAUL MANTZ FLEW IN
MORE THAN 250 MOVIES AND ONCE OWNED THE
WORLD'S SEVENTH LARGEST AIR FORCE BY DON HOLLWAY



CELEBRITY CLIENT

(From left) Paul Mantz, Amelia Earhart, radioman Harry Manning and navigator Frederick Noonan stand before Earhart's Lockheed Electra 10E in Oakland, Calif., on March 14, 1937, prior to her round-the-world flight attempt. Mantz served as Earhart's technical adviser for the fateful flight.



IN JUNE 1928 AVIATION CADET ALBERT PAUL MANTZ HAD THE WORLD BY ITS TAIL FEATHERS.

CAMERA READY

In February 1953, Mantz and his mechanics perform maintenance on *The Smasher*, the modified North American B-25H he used for filming aerial sequences.

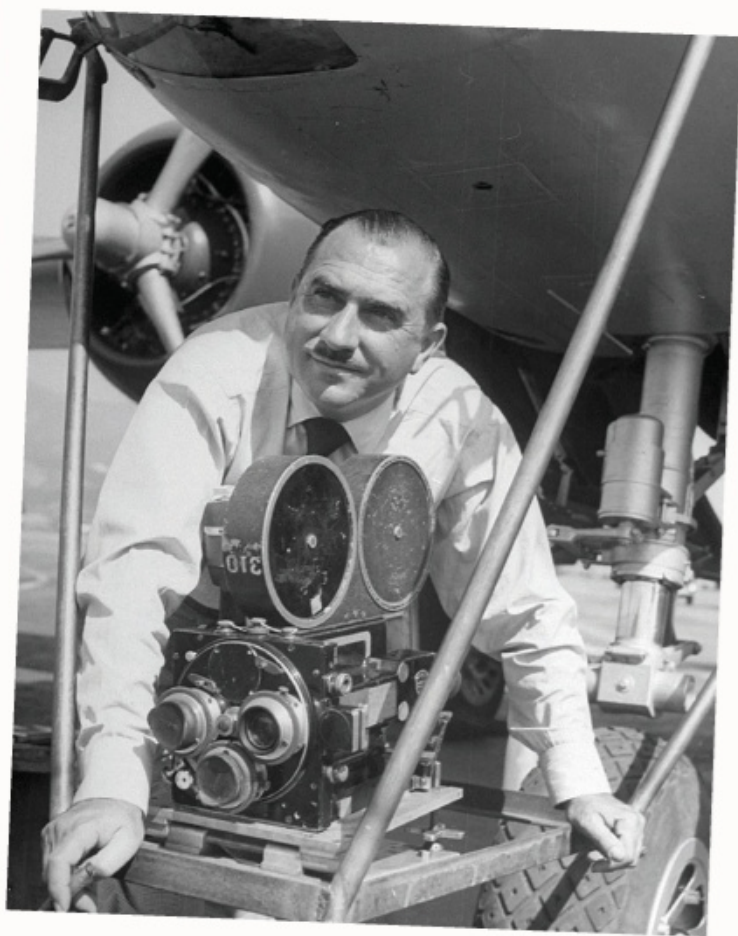
The 24-year-old, high on the honors list at the U.S. Army flight school at March Field, Calif., had more than 125 hours in the air, needing just one more hour of solo time to graduate the next day.

He took off in a Consolidated PT-1 Trusty biplane trainer and followed the Southern Pacific rail line east toward Whitewater. Spotting a train laboring up 2,600-foot San Geronio Pass, he decided to have some fun with it, and rolled the Trusty over and down to pull out just above the tracks, headed right for the locomotive. As the engineer blared his whistle, Mantz pulled up just enough to miss its stack and buzzed the length of train, for good measure doing a low roll past

Whitewater Station, giving a wing-wave to passengers as they hit the dirt.

When he landed back at March Field, he was arrested on the spot. The train had been full of Army Air Corps brass, coming to attend the graduation ceremony. Mantz was dragged before a disciplinary board and dismissed, his Army flight career over. And they hadn't even found out he'd faked two years of college at Stanford University just to get in.

Mantz found work as a flight instructor and distributor for Consolidated Aircraft, manufacturer of the Fleet two-seat biplane trainer. On July 6, 1930, for the dedication of the San Mateo airport,



he flew a Fleet Model 2 through an eye-popping 46 consecutive outside loops. (The previous record was 19.) With that achievement on his resume, he found work as a pilot for the nascent movie industry. His United Air Services in Burbank soon became a private airline for film royalty—the “Honeymoon Express” to Las Vegas for quickie marriages. “They call me Hollywood’s Flying Cupid,” Mantz said, “but it doesn’t make me mad, not as long as it pays dividends.”

But being aerial chauffeur to the stars wasn’t enough for his inner barnstormer. The money was in stunt work. For the 1932 John Ford film *Air Mail*, he got a job flying a Curtiss-Wright CW-15N

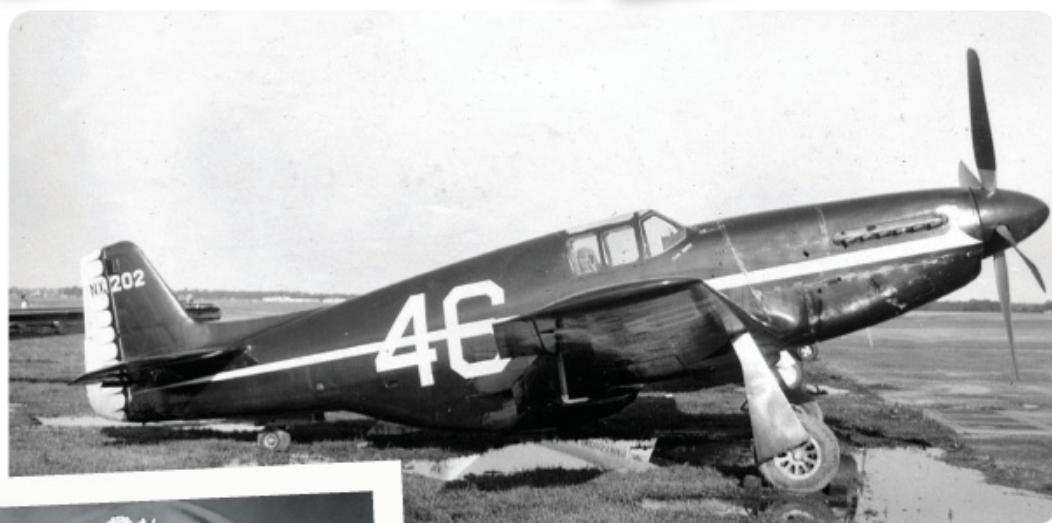
through a hangar with less than five feet to spare off each wingtip.

With his reputation flourishing, Mantz’s celebrity client list soon included Howard Hughes, Veronica Lake, Wallace Beery and Amelia Earhart. In 1934 he began instructing “A.E.” in long-distance navigation. He acquired the Lockheed Model 10 Electra for her proposed around-the-world flight (over his personal recommendation, the amphibious Sikorsky S-43 “Baby Clipper”—advice which, if Earhart had taken it, might have saved her life). She parked the Electra in Mantz’s hangar, rented a house nearby and ultimately was implicated in his 1936 divorce, though allegations by his wife that they had carried on an affair didn’t hold up in court. Mantz tried in vain to teach Earhart radio communication and navigation, but she told him, “I will just turn the knobs until I get what I want!” That was undoubtedly a factor in her disappearance over the Pacific in July 1937.

The next year Mantz married Terry Minor, widow of air racer Roy Minor, and began dabbling in air racing himself. He bought his hero Jimmy Doolittle’s Lockheed Orion 9C (one of just 35 made, and today the sole surviving example) and placed third in both the 1938 and 1939 Bendix Trophy Burbank-to-Cleveland races. Meanwhile

STAR POWER

Above: The stuntman chats between flying sequences with actor James Cagney, “an old friend & staunch admirer—but no pilot.” Inset: Mantz shows off one of the airborne film cameras carried by his B-25.



HOLLYWOOD'S ARMY

Mantz served as a major in a World War II Army film unit (above), modified P-51Cs for racing (middle) and worked on flying scenes in numerous Hollywood films (top).

his subsidiary company, Paul Mantz Air Services, furnished pilots and aircraft to all the major studios (motto: "Anytime—Anywhere"), even hauling a 600-pound Technicolor camera and crew through air maneuvers to follow the action in 1941's *Dive Bomber*, with Errol Flynn and Fred MacMurray.

Filmed with the cooperation of the U.S. Navy—and in retrospect notable for its views of the carrier *Enterprise* just prior to Pearl Harbor—*Dive Bomber* proved Mantz's worth to the military. Chief of the Army Air Forces Gen. Henry H. "Hap" Arnold enlisted him as a major in the USAAF's First Motion Picture Unit—"Hollywood's Army"—under command of studio boss Lt. Col. Jack L. Warner. The unit would churn out more than 400 propaganda and training films. Mantz flew on bombing raids over the Mediterranean and worked with stars such as Clark Gable, Alan Ladd, Van Heflin, George Montgomery and future president Ronald Reagan, making connections and developing innovations in aerial photography that would serve him well in the future.

In 1946, with postwar America scaling back its expensive military, Mantz paid \$55,000—less than the cost of one new P-51 Mustang a few years earlier—to buy 475 surplus aircraft that had originally cost taxpayers \$117 million. Mantz boasted that his private air force (including 75 B-17 Flying Fortresses, 228 B-24 Liberators, 10 B-25 Mitchells, 22 B-26 Marauders, six P-39 Airacobras, 90 P-40 Warhawks and 31 P-47 Thunderbolts) was the world's seventh largest—bigger than China's. He picked out the best for his company, kept a pair of P-51Cs and a B-25H for himself, and sold the rest. Just the leftover fuel in their tanks, nearly half a million gallons, more than recouped his investment. He got \$160,000 for the scrap aluminum and \$100,000 for the Plexiglas. On top of that he sold more than 1,000 perfectly good aircraft engines and all the planes' oxygen regulators, which the U.S. military bought back (rather sheepishly, one would hope) for \$75 each.

Mantz's chief mechanic, Cort Johnson, stripped his Mustangs of ammo boxes, armor, radios and other superfluous gear, and rebuilt them as air racers. (Right out of the box the P-51C, with its faired canopy, was 4 mph faster than the later bubble-top models.) They sealed both wings to make fuel tanks of them, and Mantz cooled his gasoline to near zero with dry ice to squeeze in extra gallons. Prior to takeoff for the 1946 Bendix race, he said, "It was funny—everybody kept asking me where I intended to land for fuel, with no drop tanks. I shrugged and told them the truth, that I was going to use wet wings. Nobody believed me. I got 875 gallons inside those wings!"

After the wartime layoff, and with the market flooded with cheap warbirds, the field for the '46 Bendix was the biggest before or since: 22 entries, including four Mustangs, 14 P-38 and F-5 Lightnings, two Bell P-63 Kingcobras, a Goodyear

FG-1 Corsair and a Douglas A-26. Four USAAF P-80 Shooting Star jets raced in their own division. Mantz, his Mustang painted blood red with white trim and given his favorite number, 46 (for his outside-loop record), won his division's \$10,000 first-place prize with an average speed of 435.5 mph. His other P-51, flown by Thomas Mayson, came in third at 373 mph.

Naming his Mustang *Blaze of Noon* after his 1947 Anne Baxter/William Holden film project, Mantz set coast-to-coast speed records in each direction and won that year's Bendix again. In '48, flying his second Mustang, *The Latin American* (and proving that victory wasn't all in the aircraft), Mantz completed a hat trick, speeding along at 447.98 mph to win by a margin of 1 minute, 9 seconds—the only three-time consecutive Bendix champion. In 1950 he sold *Blaze of Noon*, which went on to even more long-distance records (see sidebar, P. 59).

Mantz christened his B-25H *The Smasher* and, besides equipping it with a refrigerator and toilet as a company plane, modified it into an aerial camera ship with a 180-degree bow window in the nose—perfect for the immersive three-camera, widescreen Cinerama process with which the film industry hoped to compete against television. Audiences taking in 1952's *This Is Cinerama* and 1956's *Seven Wonders of the World* were awed, and many made a little airsick, by the views of the Grand Canyon, Manhattan Island and other world landmarks as seen through the B-25's nose. (In several sequences, the plane's shadow can be seen racing over the ground.) In 1958 *The Smasher* was also employed by the Walt Disney Company to carry the nine cameras needed for its Circle-Vision 360-degree feature *America the Beautiful* shown at Disney attractions.

The Smasher flew at 175 knots to keep up with Navy jets in 1954's *The Bridges at Toko-Ri*, with Mantz operating cameras in the open-air tail-gunner position; it flew alongside mammoth Convair B-36 bombers in 1955's *Strategic Air Command*; and it labored along with gear and flaps down and props set to low pitch to avoid outrunning a *Spirit of St. Louis* replica in the 1957 Jimmy Stewart film of the same name. For that movie Mantz purchased two Ryan B1s and had them converted to match Charles Lindbergh's Ryan NYP. Each had a ghost cockpit for the actual pilot installed in front of the movie cockpit. Cowl panels, removable depending on the camera angle, covered the windshields. Mantz boasted, "Lindbergh was astounded when he saw our replica of the *Spirit of St. Louis*."

For 1950's *Chain Lightning*, starring Humphrey Bogart, Mantz built a full-size dummy jet fighter for \$15,000. The "Willis JA-3," looking like a sleeker, sexier Bell X-2 rocket plane, was capable of ground rolls, deploying braking parachutes and exhaust plumes, but wasn't intended to fly. "I could taxi pretty fast, then turn and stop with



IN THE SPIRIT

Above: Mantz used two Ryan B1s to create Ryan NYP replicas that played the title role in the 1957 Jimmy Stewart film *Spirit of St. Louis*. Left: Mantz checks out one of his P-51C Mustang racers.

the brakes—gently," Mantz recalled, "but it had no ailerons or rudder so it was a real shock when I came down the runway too fast and found the damn thing starting to take off. It was so clean it just wanted to fly!" (One of the reasons the "jet" was so clean was that it had no air intakes.) The movie also featured Mantz's surplus B-17F in flashback sequences, as *Naughty Nellie*.

Though Mantz built his career on flying, a good bit of it required crashing. He's the one who bellies-in the B-17F in 1949's *Twelve O'Clock High*. Plenty of pilots had solo-landed shot-up Flying Fortresses during the war, but nobody was sure you could take off that way; the throttle levers required two pilots. Offered the then unheard-of payment of \$4,500 (about \$48,000 today) to perform the stunt, Mantz welded a steel bar across the throttle cluster and

**THOUGH MANTZ
BUILT HIS
CAREER ON
FLYING, A
GOOD BIT OF
IT REQUIRED
CRASHING.**



CRASH COURSE

Below: Mantz's crack-up in a Boeing B-17F for the 1949 film *Twelve O'Clock High* was intentional. Above: Tragically, the crash that was to befall the improvised namesake of 1965's *The Flight of the Phoenix* was not.

got the Fortress airborne but, approaching downwind for the cameras, lost rudder authority and landed off-course, wiping out some film crew tents. Luckily nobody was inside; they were all out to see the stunt. The footage was so good it can be seen again, from a slightly different camera angle, in 1962's *The War Lover*, with Steve McQueen.

For John Ford's 1950 comedy *When Willie Comes Marching Home*, Mantz, an uncredited stunt pilot, flew a Stearman 75 through yet another hangar, dragging a wingtip on exit, before tearing off its wings between two trees. Mantz, who always said, "I'm not a stunt pilot. I'm a precision pilot," purposely weakened the Stearman's wings to shed them as planned. "Your chances for survival and rescue after a crash landing depend largely on how well you succeed in making the airplane, and not

yourself, absorb the shock," he noted. "I've lived to walk away from numerous precision crashes because I've made it a point to learn what actually kills an airman when a plane crashes."

Sidelining as a flying ambulance driver and rainmaker, Mantz pioneered aerial fire suppression as part of the U.S. Forest Service's Operation Firestop. In 1954 he had an ex-Navy TBM-1C Avenger torpedo bomber fitted with an internal 600-gallon water tank lined with a U.S. Weather Bureau balloon, and that September personally flew its first drop against a live fire. The water balloon, distending from the torpedo bay before bursting, earned the TBM the moniker "Pregnant Guppy," but led to improved systems and a fleet of USFS Avengers and PBY Catalina firebombers.

By the early 1960s, Mantz had worked on more than 250 movies and earned in excess of \$10 million. He and his family lived on Balboa Island in California or aboard his 80-foot motor yacht. In 1961, at age 57, he partnered with friendly rival Frank G. Tallman to form Tallmantz Aviation, Inc. They housed their combined air fleets at Orange County Airport as "Movieland of the Air"—in its day, the world's largest air museum. Tallman, 16 years younger, took over most of the company operations. Mantz eased into retirement, telling reporters, "I'll let Frank do the stunts from now on."

But in 1965, during filming of *The Flight of the Phoenix*, Tallman broke his leg off-set. The filmmakers turned to Mantz. "I'm trying to wean myself away from this stuff," he told the press. "I'm 61 and my ears ring constantly from power



dives. But there's just one trouble. I keep putting my prices so high they won't hire me—and they keep doing it anyway.”

Phoenix, starring Jimmy Stewart, was about the survivors of a Fairchild C-119 Flying Boxcar that crash-lands in the Sahara, who take advantage of its twin-boom layout to cobble together a new plane from salvaged parts. Mantz had not been directly involved in the construction of the resulting Tallmantz Phoenix P-1, which unlike his dummy jet fighter was required to actually fly. Longtime aircraft designer Otto Timm used the powertrain of a North American T-6 Texan and wings from a Beechcraft C-45 Expeditor; Tallmantz built the fuselage and tail of plywood over a steel-tube and wood frame. The FAA issued the P-1 a Certificate of Airworthiness, and three weeks later, on July 8, Mantz took over for the climactic flying sequence. “It flies like a dream,” he told the press. “The nose gets too heavy at slow speeds, but we can correct that. It can do just about anything.” Privately, though, he thought the plane’s design, without flaps or adequate trim, unsound.

The P-1 couldn’t actually take off from rough ground. So Mantz, with veteran Hollywood stuntman Bobby Rose aboard behind him, would fly it to the set at Buttercup Valley, Ariz., for a touch-and-go that could be edited into a “takeoff.” As usual, Mantz got the shot on the first take, but to be safe, second unit director Oscar Rudolph wanted more. Several cameras captured the resulting crash. Mantz grazes a sand dune at 90 mph. The jolt breaks the P-1’s back, right behind the wings. The nose section, including the open cockpit, somersaults twice before coming to a stop upside-down. Rose survived with major injuries. Mantz was killed instantly.

An autopsy finding his blood-alcohol level to be 0.13 has been disputed by witnesses. “I know he had had nothing to drink,” Mantz’ secretary stated. “I knew him for many years, and he never seemed sharper than he did that morning.” It’s conceivable desert heat might have hastened decomposition, raising microbial ethanol levels. As a friend shrugged, “Drunk or sober, he was one hell of a pilot.”

More than 400 people attended Mantz’s funeral at Hollywood’s Forest Lawn Memorial Park. His pallbearers included Jimmy Stewart, Jimmy Doolittle, John Ford and Chuck Yeager. He left a photo of Amelia Earhart on his desk. In 2006 the International Council of Air Shows inducted Paul Mantz into its Hall of Fame, naming him the “King of Hollywood Pilots.” He died the way he lived: flying for the cameras. ✚

For additional reading, frequent contributor Don Hollway recommends *Hollywood Pilot*, by Don Dwiggins. For videos of Paul Mantz in action, visit donhollway.com/paulmantz.

SOLO OVER THE POLE

After a fatal crash at the 1949 Cleveland Air Races put an end to that event, Paul Mantz sold his record-setting, Bendix Trophy-winning P-51C Mustang *Blaze of Noon* to U.S. Navy Captain Charles F. Blair Jr. During World War II Blair had pioneered air routes to Great Britain, Africa and South America for American Overseas Airlines, flying the first nonstop commercial transatlantic crossing in a Sikorsky VS-44 flying boat. One of the three Sikorskys was named *Excalibur* and Blair owned a Curtiss C-46 dubbed *Excalibur II*, so he renamed Mantz’s P-51 *Excalibur III* (bottom).

During boring long-distance flights, Blair had taught himself celestial navigation. One night in a bar he met some U.S. Air Force fliers trying to map the fastest way to the Soviet Union. The most direct route was over the North Pole, but magnetic compasses were useless there and with no radio navigation aids such a flight typically required three navigators and a thousand pounds of gear. Blair bet them he could cross the pole with just a \$12 surplus astrocompass.

As a warmup, on January 31, 1951, he flew *Excalibur III* from New York to London, 3,478 statute miles in 7 hours and 48 minutes, averaging 450 mph to break the previous speed record by 1 hour 7 minutes. That record still stands today for piston-engine prop planes.

For the polar attempt, Blair took along a set of time and directional sun-fixes to navigate like an old-time sailing captain. On May 30 he took off from Bardufoss in northern Norway. Air temperatures dropped as low as minus 25 degrees as Blair reached the pole at 22,000 feet. One moment he was headed due north, and the next due south. He dropped a letter to Santa Claus from his young son Chris, and at 70 degrees north latitude turned southeast to Fairbanks, Alaska. Crossing time zones, he landed about half an hour before he took off, having covered 3,260 miles in 10 hours and 27 minutes. Ten hours later he flew nonstop to New York in 9 hours, 31 minutes.

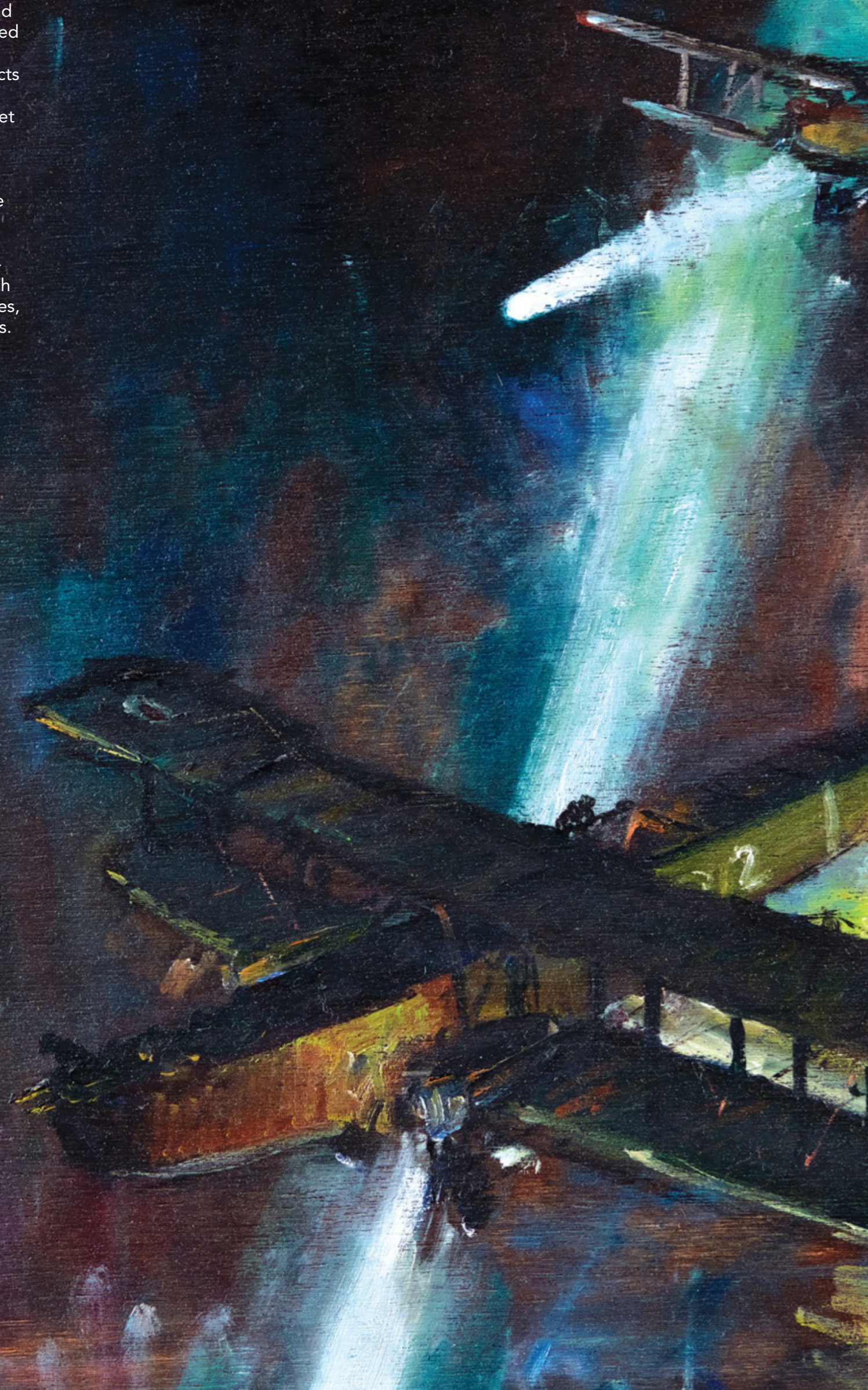
President Harry S. Truman awarded Blair the 1951 Harmon Trophy as the world’s outstanding aviator. Of his mount, Blair later commented, “Nearly every flight that was made by *Excalibur III* broke some kind of record.” Today the red Mustang hangs in the National Air and Space Museum’s Udvar-Hazy Center (right) near Dulles International Airport.

D.H



HANDLEY PAGE BOMBER

The Handley Page O/400, a development of the earlier O/100, was operated first by the Royal Naval Air Service and then by the newly amalgamated Royal Air Force. Painted by Farré in 1918, this scene depicts two of the lumbering giants attacking some unknown target by night, possibly in Germany or German-occupied France or Belgium. It may even be a rare depiction of action by the Independent Force (later the Inter-Allied Independent Air Force), which undertook coordinated bombing raids on such strategic targets as aerodromes, railways and industrial facilities.





SKY FIGHTERS OF FRANCE

HENRI FARRÉ'S PAINTINGS
ILLUMINATED AERIAL
COMBAT FOR A PUBLIC
EAGER TO GAIN A BIRD'S-
EYE VIEW OF THIS NEW
FORM OF WARFARE

BY JONATHAN R. LICHTENSTEIN

Born in Foix, France, in July 1871, French artist Henri Farré produced 175 paintings during World War I. A student of the École des Beaux-Arts, he used his canvas to record the encounters of daring men and their frail machines in the perilous skies over the Western Front. His art did more than any photograph to depict the color and movement of a new invention that would forever change the nature of warfare and the destiny of mankind.

At the outbreak of war between France and Germany in August 1914, Farré was actively pursuing a career as a portrait artist in Buenos Aires, Argentina. Determined to defend his native country against the German advance, Farré returned to France and attempted to enlist for active duty. His age (43), however, was sufficient to exclude him from selection for service. Undeterred, Farré constantly badgered friends with connections to the French military, paving the way for his investiture.

No sooner had he reported for duty than Farré was asked to paint as well as to fight for France. The French minister for war had directed Farré's division commander "to create a group of artist-painters, whose duty it will be to paint certain phases of action, so as to immortalize on canvas true pictures of fighting in the field."

ALL ARTWORK COURTESY OF THE MILITARY AVIATION MUSEUM

LEFT: CHRYSLER MUSEUM OF ART/PHOTO BY ED POLLARD



Farré was soon serving as an observer/bombardier with a Voisin bomber squadron, *Escadrille VB.102*. Its Voisin 3s were a frequent subject of his earliest paintings from above the frontlines. It would take five months of flying before Farré could, as he put it, “see vertically.”

Before long he was making accurate observations of the colors of the sky at high altitude, of cloud formations and of the earth below—as seen from a point of view few artists before him had been privileged to enjoy. *The New York Times* recalled that Farré, his sketch pad tied to his knee, “circled over the scene of action and, oblivious to the shells, noted the details.... He never got a scratch.”

As a means of raising Allied support and money for the orphaned children of French aviators killed in action, France’s government authorized the artist to take his paintings to the United States in 1918. In New York and Chicago his efforts won him great acclaim from all walks of American society. Gustave Kobbé, then art critic for the *New York Herald*, wrote of the exhibition, “Wherever these pictures are shown they will make a sensation.”

Today Farré’s paintings serve as a compelling record of the rapid advancement of military aviation during WWI. A large assortment of his artwork is displayed at the Military Aviation Museum in Virginia Beach, Va., along with many of the same ancient airplanes once depicted by Farré, some of which still occasionally take to the air. It is a fitting remembrance of the airmen who served a century ago in the first battles for mastery of the skies.

Jonathan R. Lichtenstein, an airshow consultant and commentator, recommends for further reading *Sky Fighters of France*, by Lt. Henri Farré. Additional artwork by Farré is displayed at the National Museum of the U.S. Air Force in Dayton, Ohio.



INSET: HISTORYNET ARCHIVES; TOP RIGHT: CHRYSLER MUSEUM OF ART/PHOTO BY ED POLLARD; ALL OTHER IMAGES THIS SPREAD: MILITARY AVIATION MUSEUM/PHOTO BY JOHN CADELL



Opposite
BRISTOL F.2B
2-SEAT FIGHTER

The evolution and refinement of Farré's style is demonstrated by a shift in his use of perspective. His paintings no longer depicted events strictly from the artist's point of view. As with this scene from 1918 of an embattled Bristol F.2B Fighter, Farré is able to freeze the action and permit the viewer to dwell on what would have been an instant. During his tour of the United States, *The New York Times* remarked that Farré's works opened a "completely new field of vision to the general public and stirred both the emotions and the imagination."

Top Left
CAPTAIN GEORGES
GUYNEMER, KILLED ON
THE FIELD OF HONOR

Georges Guynemer was not yet 23 when he was immortalized as a hero of France. His immortality, however, came at a high price. Captain Guynemer, with 54 victories to his credit, vanished without a trace on the morning of September 11, 1917, while on a sortie near Poelkapelle, Belgium. In this posthumous portrait, Farré captures the hollowness of the war-weary Guynemer's gaze. Inset is a cartoon depicting the ace triumphant in combat.



Bottom Left
BLÉRIOT XI SINGLE-SEAT
RECONNAISSANCE

Perhaps no other image portrays the romance of aviation in the opening stages of World War I more ably than this 1914 portrait of a Blériot XI by Farré. The venerable XI, the same type Louis Blériot used to cross the English Channel in 1909, would serve throughout the conflict, although in an increasingly diminished capacity. In 1914, however, it was employed as an early platform for aerial reconnaissance. The dynamic quality of Farré's painting almost brings to life this forgotten moment.



Left
**CAUDRON SIGNALING THE
 POSITION OF INFANTRY AT
 THE SOMME**

The introduction of the airplane into military service had been driven largely by aerial observation and later photoreconnaissance. Ultimately, very little attention would be paid to the documentation of air operations, with nearly all camera lenses focused on the persistent carnage unleashed upon the beleaguered trenches of the opposing armies. Depicted here in 1916, this Caudron G.4 is engaged in a typical reconnaissance mission over the Somme battlefield.

Below
**CAUDRON G.3 2-SEAT
 RECONNAISSANCE/TRAINER**

The Caudron G.3 of 1914, a slow, steadfast reconnaissance platform, was largely incapable of carrying either defensive or offensive armament. As a result, the Caudron brothers, Gaston and René, used the G.3 as the basis for their more successful twin-engine G.4 of 1915. Essentially, the G.4 was a doubled G.3 with two Le Rhône rotary engines, flanking a crew compartment mounted between the wings.





Top Left

CAPRONI CA.1 BOMBER

The Caproni Ca.1 of 1914-15 featured wooden construction and a fabric-covered fuselage, with wings of equal span and a distinctive twin-boom, triple-rudder tail. Despite the substantial undercarriage, the forward pair of wheels was primarily intended to prevent the plane from nosing over on landing and takeoff; the tail is shown cradled on a large dolly. Powered by three engines—two tractors and a single pusher—the Ca.1 was equipped with either Gnome or Le Rhône rotaries. Based on Farré's notes, we know this particular Ca.1 was license-built in France, as it equipped a photoreconnaissance wing (bomber wings flew Italian-built examples).



Center Left

NIEUPORT VS. EINDECKER

The "Fokker Scourge" of 1915-16 paralleled similar crises confronting French and British forces on the ground. Not until the advent of more capable aircraft such as the Nieuport 11 Bébé and the Airco DH.2 did the Allies possess equipment equal to the Fokker Eindeckers and their synchronized machine guns. Among Farré's depictions of the sky fighters of France—in their Spads, Voisins and Nieuports—this 1916 work represents the persistent hope for a French victory.



Bottom Left

VOISIN AEROPLANE AT CAMP DE MALZÉVILLE

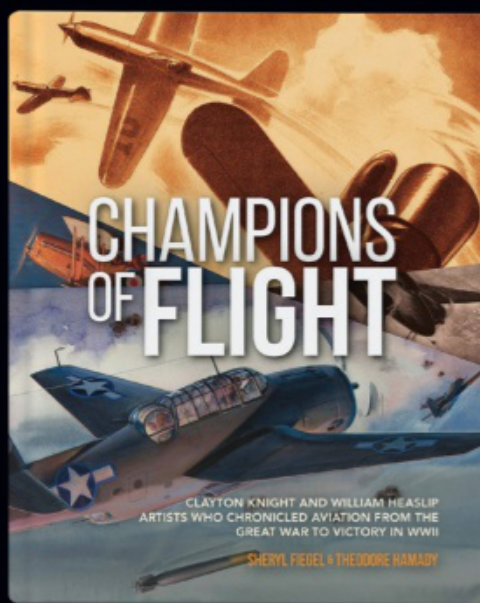
If there is one constant in combat, it is that there is always a lot of time spent waiting for the next engagement. Farré used this time to good advantage and applied himself to painting still-life portraits of the different aircraft that surrounded him. His initial posting in 1914 was to one of the first dedicated bomber escadrilles that operated the Voisin 3. The Voisin's power came from its unusual liquid-cooled Salmson radial engine, the radiators for which can be seen behind the cockpit.



CHAMPIONS OF FLIGHT Clayton Knight and William Heaslip: Artists Who Chronicled Aviation From the Great War to Victory in WWII

by Sheryl Fiegel and Theodore Hamady, Casemate Publishers, 2019, \$49.95.

For air enthusiasts of a certain age (and their sons...and grandsons), aviation art between the two world wars exerted a profound attraction, inspiring generations of avid pilots. Among the most prominent aviation artists of the era were Clayton Knight and William Heaslip. >



> Their lives were roughly parallel to a remarkable degree, including service in the U.S. Army during World War I (in which Knight saw combat attached to the Royal Air Force, mixing with Elliott White Springs and other “Warbirds” until he was taken prisoner when his de Havilland DH.9 was shot down on October 5, 1918, by

Oberleutnant Harald Auffahrt, whose personal marking of a comet was memorable enough for Knight to depict it in one of his paintings).

Both went on to apply their talents to a variety of visual media, from oil paintings to ink to etchings, advertising the latest aircraft designs of the era as well as illustrating the covers of pulp

magazines. Coincidentally, both artists died in the same year, 1969.

Although Knight and Heaslip are the central players in *Champions of Flight*, they and their works are given a “life and times” treatment for context by Sheryl Fiegel and Theodore Hamady. This means that the works of artists who influenced

WARTIME PROMOTION

During World War II William Heaslip produced sets of hanger card illustrations for the Coca-Cola Company that included this view of North American B-25s in action.

them and of some of their contemporaries also make appearances throughout the book, for a total of more than 400 stunning illustrations and photographs. Anyone with an interest in aviation’s golden age will recognize and appreciate the role these brush-wielding flyboys played, through their personal involvement and by perpetuating that interest among their successors. This beautiful volume is a fitting tribute to their contributions.

Jon Guttman

THE WRIGHT FLYERS 1899–1916 The Kites, Gliders, and Aircraft that Launched the “Air Age”

by Richard P. Hallion, Osprey Publishing, 2019, \$22.

Richard Hallion, a former curator at the National Air and Space Museum and former U.S. Air Force historian, has spent his life researching and writing about aviation's past. Now he brings his wealth of knowledge and prodigious talent to a compact account about the famed Wright Flyers' development. In a mere 80 pages he illuminates the factors behind the success of the Wright brothers, offers easy-to-understand technical analyses of the aircraft and places both the

planes and their inventors in historical perspective.

The author points out the Wrights recognized that more than lift and thrust would be required for human flight; control was also a major consideration. Moreover, they were methodical experimenters who devised and then tested the components that went into their flying machines. In the years leading up to the first successful powered flight at Kitty Hawk, N.C., on December 17, 1903, the brothers taught them-



selves to fly with their gliders and continued to practice so they would be ready when an engine was added.

The book's descriptions are so vivid that you almost feel the wind rippling across your face when Orville lifts off the sand dunes near Kill Devil Hill. But readers are reminded that glory was fleeting, for within a decade the Wrights' preeminence had plummeted in the very field they had established, owing to bitter patent disputes, overconfidence and Wilbur's untimely death. In his conclusion, the author notes that the legacy of the ingenious brothers lives on with every flight. This concise history is a shining addition to Hallion's impressive body of work.

Philip Handleman

SYDNEY CAMM Hurricane and Harrier Designer, Saviour of Britain

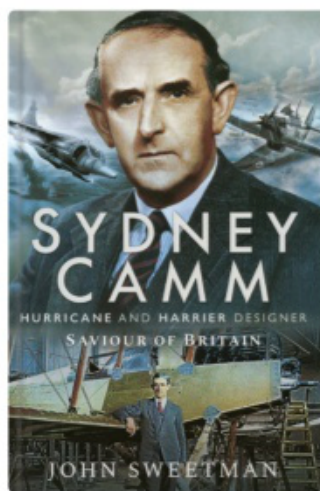
by John Sweetman, Pen and Sword Aviation, 2019, \$49.95.

Sydney Camm's name will undoubtedly appear close to the top of any list of the greatest fighter aircraft designers of the 20th century. Born in 1893, he began his aviation career as a shop carpenter and draftsman for Martinsyde during World War I, later becoming Hawker Aircraft's chief designer in 1925. During his career Camm designed no fewer than 52 different aircraft types, beginning with the Cygnet lightweight biplane of 1924 and culminating in the remarkable Harrier vertical takeoff and landing jet fighter. By far the most famous of Camm's creations was the legendary Hawker Hurricane, which contributed more than any other airplane toward winning the Battle of Britain. While the Supermarine Spitfire is generally acknowledged to have been superior to the Hurricane, the latter served in larger numbers and inflicted greater losses upon the enemy.

Prior to the Hurricane, Camm had already designed such notable Hawker aircraft as the Hart day bomber and Fury biplane fighter. Later in World War II he developed the Typhoon, Tempest and Sea Fury piston-engine fighters. After WWII Camm created the Sea Hawk and Hunter jet fighters as well as the Harrier jump jet.

The importance of Camm's Hurricane to Britain was underscored by the caption appearing above his photo in a February 1941 *London News Chronicle* interview that read "This Man Saved Britain." John Sweetman's new biography ably recounts the life of one of the most remarkable figures in 20th-century aviation history, whose career began during the era of wood-and-fabric biplanes and ended in that of advanced supersonic jets and who can arguably claim a share of credit for that progress.

Robert Guttman



FLYING THE SR-71 BLACKBIRD In the Cockpit on a Secret Operational Mission

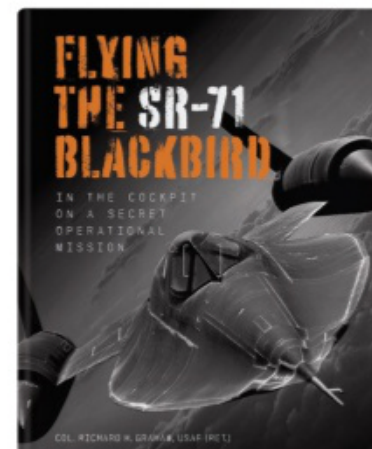
by Richard H. Graham, Motorbooks, 2019, \$29.99.

The SR-71 Blackbird was a spectacular airplane that touched the popular imagination, conjuring images of testing at Area 51 and flight crews outfitted in yellowish-gold full-pressure suits. Capable of speeds in excess of Mach 3 and altitudes beyond the reach of other air-breathers, the revolutionary spyplane came into being in the early 1960s as Lockheed Skunk Works' solution to the Soviet Union's improving air defenses. The aircraft's many admirers have long wondered what it was like to fly such a speed demon, and retired U.S. Air Force Colonel Richard Graham offers some clues in this updated reissue of his engaging 2008 book.

Graham uses his 765 hours amassed at the controls of the ultra-fast jet to put readers in its cockpit on a representative reconnaissance mission. The day starts in the wee hours of the morning with a breakfast of steak and eggs, followed by formalized protocols for takeoff, climb-out, refueling and high-Mach cruise that entail adherence to an elaborate checklist (a declassified copy of which is included as an appendix). Each phase of the flight is explained in lay terms, enabling readers to appreciate the skills required to fly such a complex machine.

Near the "sensitive area," the Advanced Synthetic Aperture Radar System (ASARS), a side-looking sensor, gathers high-priority imagery. All the while, the Blackbird's altitude and speed ensure that hostile interceptors and surface-to-air missiles never lay a glove on it. Graham's expert descriptions of every aspect of the mission make for an eye-opening and thrilling ride in a fantastic speedster that never should have been retired. Tech-oriented aviation enthusiasts will find this book especially rewarding.

Philip Handleman



AIRWARE PLANE MECHANIC SIMULATOR

Movie Games S.A., \$12.

Offering something completely different, *Plane Mechanic Simulator (PM)* pays homage to the people without whom no aircraft could fly. *PM* is the latest entry in a subgenre of simulation games featuring 3D-modeled power plants that players can take apart and reassemble in a virtual garage. Other similar products include automobile mechanic games and even surgery simulations.

Aviation sims lacked a consumer product like this, and *PM* is the first to fill that gap. It's not for everyone; most would rather drive a car or fly an airplane than fix them. But these types of games have their own charm. Aircraft enthusiasts who like Legos or puzzles may appreciate the new perspective *PM* offers.

A mission in *PM* tasks players with a set of aircraft repair goals. These objectives can be as ordinary as refueling an airplane or replacing a tire, or as complex as fully breaking down an engine. Each game scenario features a given craft

parked in a revetment, and the player moves around the service area as if in the body of a virtual mechanic, accessing the aircraft, tools, repair benches and support trucks as necessary.

Unlike in other simulations, the player isn't spending time in the cockpit but is instead moving around the plane's exterior. Virtual mechanics can remove cowlings and hatches to access engine spaces, inspect parts such as oil filters or spark plugs for damage and reassemble the engine and restore it to operational status.

PM's core gameplay can become monotonous (although veteran mechanics might say such monotony is realistic), so the game attempts to add a sense of urgency through two mechanisms. It includes a role-playing element where the player's character in the game is a new mechanic climbing the ranks. The green mechanic starts working on simpler craft like the

de Havilland DH.82 Tiger Moth before graduating to the Supermarine Spitfire. Advanced mechanics get the challenge of working on the dual engines of the de Havilland Mosquito. Rank promotions also bring other benefits that reduce the tedium of constantly breaking down the same engine by increasing assembly, disassembly and diagnostics speed.

Less palatable are the repair time limits used to push players. Real-world scenarios where mechanics must meet pressing deadlines to cycle an aircraft are understandable, but for many the joy in a game like *PM* is in the relaxed deconstruction of the airplane and resulting appre-

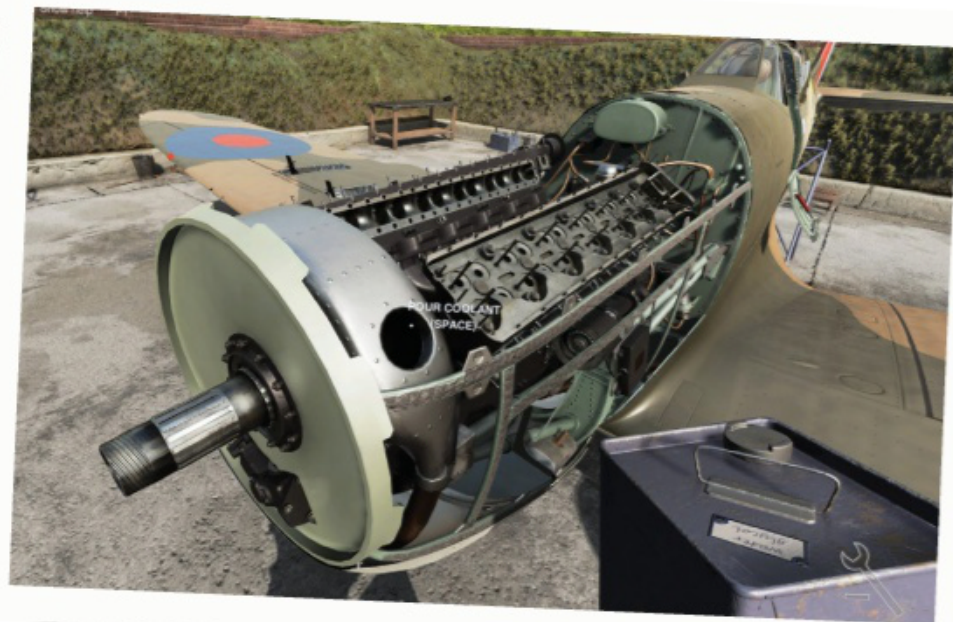
VIRTUAL OVERHAUL

Plane Mechanic Simulator allows players to access and break down aircraft engines, such as this Supermarine Spitfire's Rolls-Royce Merlin.

ciation of its design ingenuity. It's like admiring an engineer's beautiful cutaway drawing. The time limits are fortunately optional and the player can disable them.

PM could stand a few interface improvements and player aids such as checklists but I ultimately found it a soothing and educational sim. Much credit is given to history's pilots and airmen. *PM* is a tip of the hat to those who supported them.

Bernard Dy



AMERICA'S ROUND-ENGINE AIRLINERS

Airframes & Powerplants in the Golden Age of Aviation

by Craig Koderia and William Pearce, Specialty Press, 2019, \$46.95.

Co-author Craig Koderia gained fans among the aviation kit-modeling community when his book on collecting vintage plastic aircraft models was published in 2014, also by Specialty Press. Koderia, a former U.S. Air Force transport and tanker pilot and world-class aviation artist, has come up with another thoroughly enjoyable book on a seldom-described subject, vintage round-engine (radial) airliners of the 1920-1950 period. Those of us old enough to remember such classics as the Douglas DC-3 and DC-6 will have a great time going through this trove of vintage, absolutely beautiful contemporary black-and-white and color photos, with accompanying text and captions written in a loving, informal, often humorous style. The combination makes for one of the most valuable classic airplane references in recent memory.

I've flown in DC-3s and their U.S. Navy counterpart R4Ds, even the Navy's last EC-121 Constellation. After 50 years the memory is still strong of long cross-country flights in unpresurized, creaking C-118s (Navy DC-6s) struggling to maintain altitude through bad weather at 7,000 to 10,000 feet and landing at Andrews Air Force Base in driving rainstorms at the end of two-week stretches in California. Short hops in C-131s,

Navy derivatives of the twin-engine Convair 440s, also came to mind as I browsed through this book, which covers civilian aircraft, not their military counterparts. But that is how I know them, all part of a very colorful era.

It's all here, even flashbacks to movies of the 1930s. Remember the 1934 Shirley Temple film *Bright Eyes*? It centered on an orphaned moppet's adventures around the local airport filled with planes of the period, including the top-of-the-line Douglas DC-2, just entering airline service.

Besides the main text dealing with aircraft, co-author William Pearce's input on the power plants of the period—as much a part of the prop-airliner story as the airplanes themselves—rounds out what has to be one of the best aviation books of 2019. Specialty Press has published several excellent, unusual volumes in recent years, and I hope that trend and associated success will continue.

Peter Mersky



THE AVRO ARROW For the Record

by *Palmiro Campagna*, Dundurn Publishing, 2019, \$29.99.

Most aviation enthusiasts know the story of the Avro Arrow, a landmark delta-wing jet interceptor built by Avro Canada in the 1950s that was years ahead of its time. Despite the airplane's impressive performance, the project was canceled and the few examples built were scrapped.

The project included the CF-105 itself and the Orenda Iroquois engine that would have powered it. Five original test aircraft were built, with an ultimate goal of being able to intercept incoming Soviet bombers above the Arctic Circle. None ever flew with the Iroquois engine; instead, a Pratt & Whitney J75 was installed in its place for tests.

The program employed an estimated 25,000 workers at its height. The CF-105 featured such novel innovations as a fully powered flight-control ("fly-by-wire") system, an automatic mode whereby the plane could be maneuvered by ground controllers, an onboard central air data computer, a unique gyroscopic control system, an extremely high-pressure hydraulic system and an atypical cockpit display layout designed by human systems engineers.

In *The Avro Arrow*, Palmiro Campagna veers sharply away from a luminous description of the project and offers in its place a hard-nosed look at the Arrow, the situation that led to its development and the various geopolitical, financial and



strategic aspects of its demise. Campagna pulls no punches when discussing the program's termination, which forms the centerpiece of the book. Prime Minister John Diefenbaker canceled the Arrow on February 20, 1959, a day that came to be known as Black Friday because of its disastrous impact on the Canadian aerospace industry. The author discusses in great detail, and with extensive source

documentation, the economic issues (high cost per airplane, concerns about insufficient buyers for production models, low interest in the plane from the U.S. Air Force), technological issues (the notion that the Soviets were moving away from bombers and toward ICBMs and that the Bomarc surface-to-air missile could shoot down any incoming bombers anyway) and political issues (perceptions that American supersonic fighters could handle the defense of

Canada) that contributed to cancellation.

Ironically, in the aftermath of Black Friday, 25 of the top Canadian aeronautical engineers decamped to NASA. There they made significant contributions to the U.S. manned space-flight program, including the fly-by-wire systems used in the Mercury and Gemini programs.

Overall, Campagna offers a wealth of information and documentation about the Arrow and tells a dark and complex tale of the birth and ultimate demise of an aviation legend.

Douglas G. Adler

SOUTH PACIFIC AIR WAR

Vol. 1: The Fall of Rabaul, December 1941-March 1942

Vol. 2: The Struggle for Moresby, March-April 1942

Vol. 3: Coral Sea & Aftermath, May-June 1942

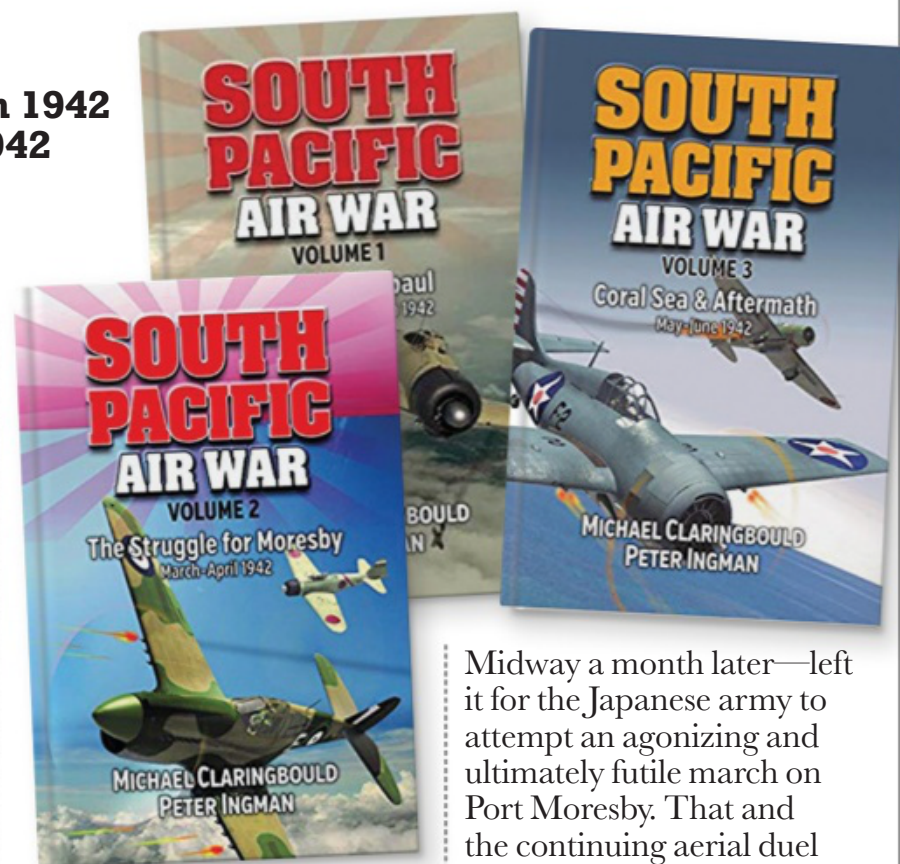
by *Michael Claringbould and Peter Ingman*, Avonmore Books, 2019, \$44.95-\$46.95.

The invasion of Rabaul—backed by four aircraft carriers—in late January 1942 heralded a series of land, sea and air campaigns in which the Japanese strove to secure their resource-rich conquests in the Dutch East Indies by advancing their bases to New Guinea and neutralizing Australia as a military threat. While the British were driven from the region by the Japanese army advances into Burma, the United States soon moved in to take their place with ships and aircraft of its own.

In the multivolume *South Pacific Air War*, Australian experts Michael Claringbould and Peter Ingman cover the critical battles for

the Coral Sea region, with both sides presented in unprecedented detail. A treasure trove of hitherto little-seen photographs are accompanied by maps and color profiles of virtually every aircraft type involved in the fighting.

One provocative claim made by the authors in Volume 3 is that the Battle of the Coral Sea was not as much a strategic victory for the Americans as a puzzling failure of resolve on the part of the Japanese. Even though the light carrier *Shoho* was sunk and fleet carrier *Shokaku* damaged, *Zuikaku* was still capable of supporting the still-intact invasion fleet, with USS *Lexington* sunk and *Yorktown*



withdrawn for repairs. With 20-20 hindsight, they believe the Japanese never had a better chance to have seized Port Moresby, and their failure to do so—combined with the loss of four carriers at

Midway a month later—left it for the Japanese army to attempt an agonizing and ultimately futile march on Port Moresby. That and the continuing aerial duel between Port Moresby and the Japanese-held airfields of Lae and Salamaua, one hour's flight from each other, will no doubt be the subject of a fourth, equally fascinating, volume to come.

Jon Guttman



MYSTERY SHIP

Can you identify this unusual homebuilt? See the answer below.

AIR BATTLE OVER FRANCE

1. Which bomber lost 13 out of 32 on May 10, 1940—and would lose many more thereafter?

- A. Fairey Battle
- B. Lioré et Olivier 45
- C. Bristol Blenheim Mk. I
- D. Amiot 143

2. Which French-flown fighter scored the most victories in 1940?

- A. Dewoitine D.520
- B. Bloch MB.152
- C. Morane-Saulnier MS.406
- D. Curtiss H75

3. Which of these British fighters operated from French air bases during the 1940 campaign?

- A. Supermarine Spitfire
- B. Hawker Hurricane
- C. Boulton Paul Defiant
- D. Westland Whirlwind

4. What French fighter was uniquely flown by *Groupe de Chasse polonaise I/145*?

- A. Arsenal VG-33
- B. Koolhoven FK.58
- C. Caudron C.714
- D. Loire 46

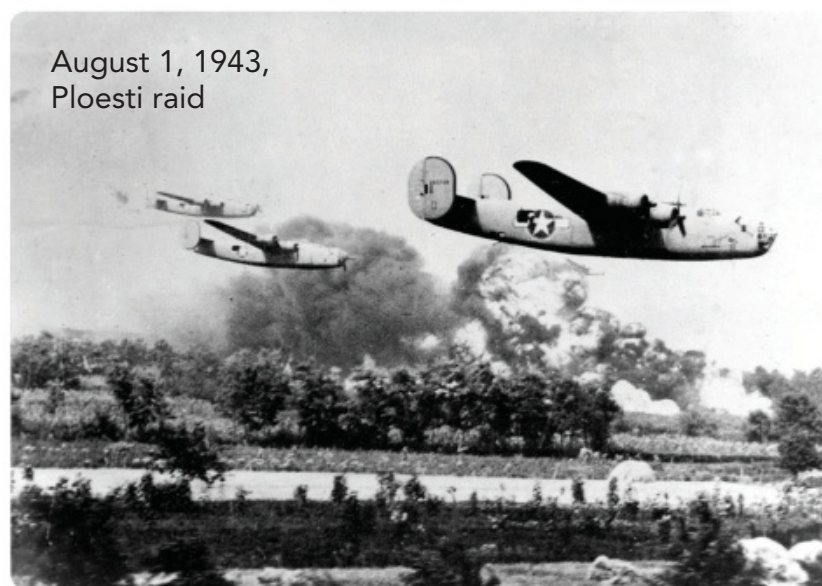
5. On June 15, 1940, Pierre le Gloan became the first French WWII pilot to score five victories in one day. What were his victims?

- A. Five He-111Hs
- B. Four Fiat CR.42s and a BR.20
- C. Five Dornier Do-17Zs
- D. Two Me-109Es and three Ju-87Bs

RENOWNED RAIDERS

The B-25 gained fame with the April 18, 1942, Tokyo Raid. Match the airplane to its famous target.

- A. General Dynamics F-16A
- B. SVA-5
- C. Avro Vulcan
- D. Consolidated B-24D
- E. Sopwith Camel
- F. Heinkel He-111H
- G. Ilyushin DB-3
- H. Fairey Swordfish
- I. Zeppelins L14 and L22
- J. Avro Lancaster



August 1, 1943, Ploesti raid

- 1. Ploesti oil refineries, 1943
- 2. Taranto, 1940
- 3. Möhne, Edersee and Sorpe dams, 1943
- 4. Berlin, 1941
- 5. Port Stanley Airport, 1982
- 6. Vienna, 1918
- 7. Edinburgh, 1916
- 8. Osirak nuclear plant, 1981
- 9. Tondern, 1918
- 10. Poltava, 1944

ANSWERS: MYSTERY SHIP: Leshner Teal. Learn more about it at historynet.com/aviation-history RENOWNED RAIDERS: A.8, B.6, C.5, D.1, E.9, F.10, G.4, H.2, I.7, J.3. AIR BATTLE OVER FRANCE: 1.A, 2.D, 3.B, 4.C, 5.B

The Invention of the Year

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Once in a lifetime, a product comes along that truly moves people. Introducing the future of personal transportation... The Zinger.

Throughout the ages, there have been many important advances in mobility. Canes, walkers, rollators, and scooters were created to help people with mobility issues get around and retain their independence. Lately, however, there haven't been any new improvements to these existing products or developments in this field. Until now. Recently, an innovative design engineer who's developed one of the world's most popular products created a completely new breakthrough... a personal electric vehicle. It's called the **Zinger**, and there is nothing out there quite like it.

"I can now go places and do things that I wasn't able to go or do before. It has given me a new lease on life and I am so happy I found it!"

—Dana S., Texas

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Available in Green, Black and Blue (shown)



The Zinger folds to a mere 10 inches.

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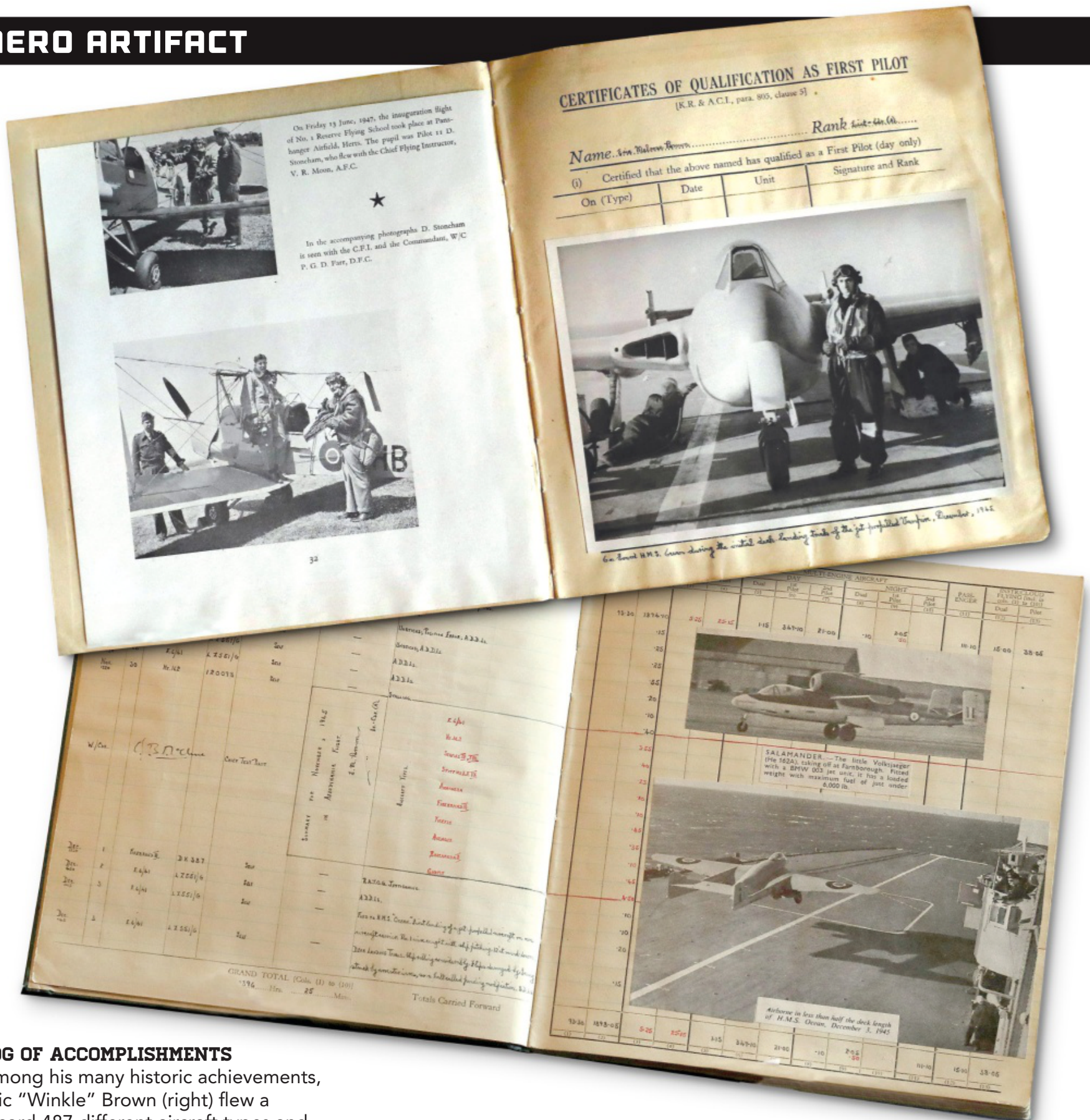
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The Zinger Chair is a personal electric vehicle and is not a medical device nor a wheelchair. Zinger is not intended for medical purposes to provide mobility to persons restricted to a sitting position. It is not covered by Medicare nor Medicaid. © 2020 firstSTREET for Boomers and Beyond, Inc.





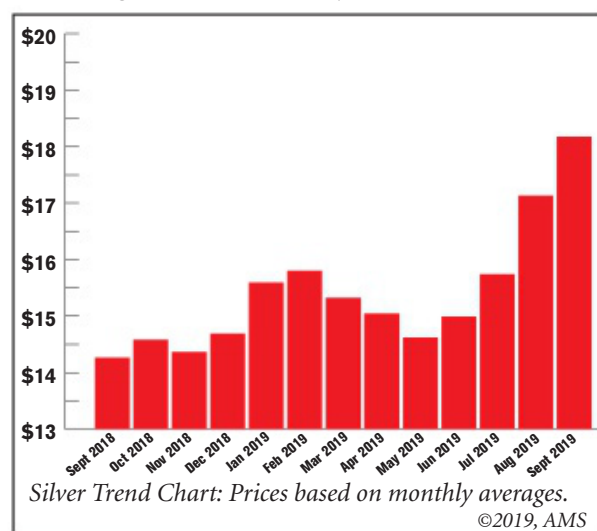
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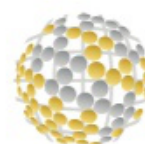
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