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As we begin another publication year, volume one is chockful of interesting items, five articles and twenty book reviews.

Our first article is from first-time contributor Michael E. Weaver, and is about the F-100 Super Sabre and its employment as an air superiority fighter. Lots of interesting information on an aircraft that started off the Century Series.

The second article is by repeat author Jayson A. Altieri, who talks about the background to an intriguing episode whereby the government used early crowd sourcing methods to purchase aircraft in World War II.

The third item is from another first-time contributor, John Chamberlin, who discusses the connections between Purdue University graduates and some of the more important events surrounding the Pearl Harbor attack. Some really good stuff here.

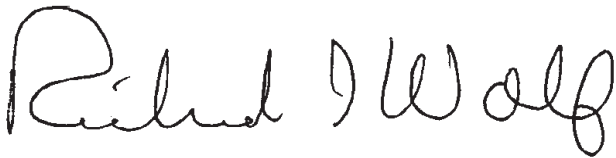
Our fourth article is by the familiar names of William Head and James Tindle, who have written for us before. This time, they discuss the B-32 Dominator, which had the misfortune of emerging from the factories just as World War II was over. Probably not a bomber many people remember.

The fifth and final article was written by prolific contributor Daniel Haulman, who wrote this item shortly before his retirement from the Air Force Historical Research Agency last year. As head of Organizational Histories, he discusses the difficulties faced when trying to enforce lineage procedures in the codified way.

We also have included a full twenty reviews, in hopes of reducing the number of reviews waiting to be printed. A number of very interesting books in this bunch.

If there is something you would like us to include in our departments, send us an email with your suggestions. I can be found at the addresses on the facing page.

The President's Message is on the next page, and a tribute to Walter Boyne is on page 61. Walter passed away in January at the age of 90, and he was a force in air power history for many years. Enjoy!



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From the President

Dear Members,

This page soon to be completed.



Very respectfully,

A handwritten signature in black ink, appearing to read "Christopher D. Miller". The signature is fluid and cursive, with a long horizontal flourish extending to the right.

Christopher D. Miller, Lt. Gen., USAF (Ret.)
President and Chairman of the Board

The F-100 Super Sabre as an Air Superiority Fighter



Michael E. Weaver

F-100A Edwards Air Force Base.
(All photographs are USAF photographs.)

On May 25, 1953 the prototype of a new air superiority fighter aircraft, the YF-100A “Super Sabre,” took to the skies over Edwards Air Force Base, California.¹ With the ability to exceed Mach 1.0 in level flight, the YF-100A possessed a speed advantage over all other fighter and bomber aircraft in existence at the time. North American Aviation did not design it to fly faster than its adversaries for the sake of speed alone. As a consequence of its unrivaled performance, it could intercept all Soviet bomber aircraft it might encounter during the rest of the decade, and it could overtake and force other fighter aircraft to engage in combat with it. Given this advantage, how was the F-100 used as an air superiority fighter? What tactics did it employ? How effective was it as an air-to-air fighter? Why did the Air Force make air superiority the F-100’s secondary mission less than five years after it entered service? This article will shed light on these questions using sources that until relatively recently have not been available.

North American Aviation’s F-100 Super Sabre was an outgrowth of both failure and need. The company had not won the contract for developing the F-102, F-106, or F-103 interceptors; those contracts went to Convair and Republic (the F-103 contract was later cancelled). North American chose to fund continued research and development on a follow-on to its F-86 Sabre, the “Sabre 45.” This paid off when in January 1952 the company signed a contract with the Air Force to develop the F-100. The Air Force had its own reasons for funding this new fighter. Its current air superiority fighter, the F-86, was roughly equal to the Soviet MiG-15 it was then fighting in Korea, and it clearly needed something better.²

The MiG-15 and F-86 flew at roughly the same top speed with the MiG being faster at high altitude and the F-86 possessing a marginal advantage at lower levels. A MiG-15 could out-climb an F-86, but an F-86 could out-turn a MiG-15. Roll rates were similar, so neither could enter a turn faster than the other.³ While it was true that American F-86A and F-86E units scored impressive kill ratios against MiG-15s Chinese, Soviet, and North Korean pilots flew, relying on skill and tactics alone, as the Americans did, to combat an aircraft that was the rough equal of one’s own was not the ideal path to gaining air superiority during the Cold War of the 1950s.

The Air Force rightly wanted a fighter that was better than the MiG-15, and given that it was fighting a war that included combat against MiG-15s, it wanted it as soon as possible. This wartime requirement led to a choice to forgo more cautious, prudent, and successful design and procurement practices. For instance, North American completed “the basic design” before the Air Research and Development Center had had a chance to subject the design to a thorough review. The ARDC warned against proceeding with production too quickly, but was overridden.⁴ The Air Force did not yet have a stated requirement for an aircraft with its capabilities, but “because of its high performance and short delivery time it was ordered for production.”⁵

This contract was let quickly because the Air Force did not consider the F-100 to be a leap into new, unknown technology; it believed the F-100 was only an evolutionary change in aircraft performance. Moreover, it trusted North American's design prowess due to the success of the F-86, an aircraft with almost no vices.⁶ The Air Research and Development Center, however, predicted at the time that the F-100 design was in fact a leap forward into the unknown.⁷ Engineers at North American were likewise cautious, and argued that this was a brand new aircraft that featured a large numbers of untested characteristics. Every part of the wing and fuselage was new in design and construction, and the engine was still under development. In 1954 the company wrote, "Recognizing that this airplane is a completely new development and is the first combat aircraft capable of sustained flight and combat maneuverability at supersonic speeds, we have expected that major development would be required."⁸ Indeed, most testing and development of the F-100 took place after dozens of airframes had been accepted into squadron service.

Major General Albert Boyd, the commander of the Air Force Flight Test Center at Edwards Air Force Base, had mixed feelings about the F-100A after his flight of July 11, 1953. He took off on a hot day and required a takeoff run of about 10,000 feet on Rogers Dry Lake to get airborne, but once he reached 485 knots, the optimum speed for climbing, it climbed "quite well." The afterburner used fuel at an enormous rate. When he accelerated to Mach 1.1 at 26,000 feet he watched the fuel gauge move right before his eyes. He found its performance and maneuvering above 45,000 feet up to be less impressive than he had hoped. Its landing speed was so fast that he believed a dead stick landing was out of the question; he thought two engines instead of one ought to power the F-100A. He considered it "too big," but redesigning it for two engines would probably have made it bigger. A veteran of MiG Alley over Korea warned General Boyd "that the MiG always has an altitude advantage initially, makes an attack, and runs away from the F-86. So WADC must look for better maneuverability at altitude, more acceleration, and smaller aircraft—perhaps one with two engines." Boyd did not want others to exaggerate his misgivings. He considered the F-100 to be a good aircraft: "It is superior, certainly, to anything that we've flown to date in the way of turbojet-powered aircraft. It has some excellent characteristics." For instance, it displayed no instability when flown in a max-

power supersonic dive. Its low airspeed flying characteristics around 30 to 35,000 feet were docile and manageable; when forcing the aircraft into a stall at that altitude, he found that the F-100 provided "plenty of stall warning," and that the jet would roll in a way that "is easily controllable."⁹

The F-100 was not a supersonic F-86 with a bigger engine. It was a new aircraft with differing capabilities. Lt Col Frank K. Everest, Jr., Chief of the Flight Test Operations Laboratory, made clear this difference: "This airplane is strictly a hit-and-run type fighter when utilized against present day fighters; i.e., this airplane should not be expected to fight with an F-86 at the F-86's speeds." One reason was the low sustained G at altitude. While it could pull 5.6 G's instantaneously above Mach 1.0 at 35,000 feet, it could only sustain a 1.75 G turn at that speed and altitude. Everest believed the F-100 had good potential as a fighter, but its prototype was not yet acceptable.¹⁰

The first operational unit to receive the F-100A was the 479th Day Fighter Wing at George AFB, California on October 1, 1954, just sixteen months after the first prototype flew.¹¹ A training unit, the 3595th Combat Crew Training Wing at Nellis AFB, Nevada, received them after the operational fighter unit, welcoming its first F-100As in August 1955.¹²

Super Sabres initially had just one mission: finding and shooting down enemy aircraft, either while flying escort missions, operating under the guidance of a ground control intercept radar station, or defending a particular place against enemy strike aircraft.¹³ Designed as an air superiority fighter, that is how the first squadrons that received the jet employed it. With four M39 20 millimeter cannon, it had firepower superior to .50 caliber machine guns of its predecessor, the F-86F. The first F-100A unit was convinced that, "a one second burst will kill any aircraft."¹⁴ The new fighter's performance was impressive; clean it could reach 40,000 feet in four and a half minutes, but the best climb/endurance performance came from climbing to 35,000 feet, setting Mach 0.87, and then slowly climbing to 42,000 feet as the jet's weight fell due to fuel consumption. When carrying drop tanks the best altitude and speed was 30,000 feet and Mach 0.84. Climbing to that altitude with external tanks took 6 minutes and 45 seconds.¹⁵ Even though the underwing tanks produced more drag, an F-100A that was flying with them could still reach Mach .96.¹⁶

The F-100A's J-57 engine produced 8,000 pounds of thrust at full power, and 14,800 with the afterburner lit.¹⁷ The afterburner was a long tube ringed with fuel ejectors attached to engine abaft the turbine that sprayed raw fuel into the hot engine exhaust. An afterburner gives an aircraft a great increase in power, which translates into greater speed and climbing capabilities—and voracious fuel consumption. An F-100A's afterburner gave it more than one advantage over aircraft like the MiG-15, most of which lacked that engine component. The afterburner meant that F-100s did not have to constantly struggle for altitude in order to be able to turn it into speed; it could cruise along and then light it for acceleration as needed. Indeed, instead of flying at higher altitudes where one

Michael E. Weaver is an associate professor of history in the department of air power at the Air Command and Staff College. He has taught there since 2002 after completing his doctorate in history at Temple University under the guidance of Russell Weigley. His publications include Guard Wars: The 28th Infantry Division in World War II (Indiana University Press, 2010), and articles in such publications as Diplomatic History and Air Power History. His current writing project examines the relationship between air power and national policy during the Vietnam War.



AIM-9B/GAR-8 under wing of F-100D.

could dive in order to accelerate—and where it was easier for one's quarry to see you—in the F-100 a pilot could stay lower and still be able to accelerate to make a hit-and-run firing pass.¹⁸ Its use was also necessary to make the jet as maneuverable as possible because without it the F-100 was relatively under-powered. As then Major Everest A. Riccioni wrote, "Let's face it, the F-100C is a dog without the afterburner!"¹⁹ If at all possible, a pilot flying an F-100 should achieve and maintain a speed above Mach 1.0 because the aircraft had more "G's" available supersonically than at subsonic speeds. Indeed, the F-100D G limit above Mach 1 was over 7 G's. Below Mach 0.9 it could sustain only about 2 or less, and one really needed to stay above Mach .95 in order to be able to complete hard turns. An F-100D flying at 35,000 feet, Mach 1.14, and in a 4-G turn had a turn radius of 9,440 feet. A Marine Corps exchange pilot observed that one could then turn inside an enemy aircraft and fly into a better firing position.²⁰ An F-100A's quickest roll rate of 260 degrees per second took place at both Mach .7 and Mach 1.2. Roll rate was important to an aircraft's turning ability because the faster an aircraft rolls, the sooner it can enter a turn.²¹

When compared to its Soviet counterpart, the MiG-19, the F-100 was that jet's equal in top speed, and in maneuverability at speeds above Mach 0.9. As one flew at lower and lower speeds, however, the MiG-19 gained a marked advantage over the F-100 in turn radius and maneuverability. Wing loading was lower for the MiG-19 at 63 pounds per square foot, while the F-100's was 83 pounds, and that helped it to be more maneuverable. A MiG-19 possessed a turning advantage up to Mach 0.95. American

intelligence assessed its turn radius at about 7,000 feet at Mach 0.6 while the F-100's turn radius at the same altitude and airspeed was 10,000 feet. If, however, an F-100 pilot could fight his opponent to a standstill for five minutes, the MiG-19 would have to disengage to avoid fuel starvation, but the F-100 would have fuel enough for up to fifteen more minutes of combat. One reason was its constant use of underwing fuel tanks. The F-100 possessed a speed advantage over the MiG-19, particularly from 20,000 to 40,000 feet, where the advantage grew from about 10 knots at 20,000 feet to 130 knots at 36,000 feet. A MiG-19 could out-climb an F-100 at all altitudes, considerably so up to 30,000 feet.²²

Altogether an F-100 pilot ought to keep his speed up and never enter a turning fight with a MiG-19, particularly at lower Mach numbers. That was the doctrine for employing this aircraft from the beginning: the F-100's "high kill potential will be best utilized in hit and run, high speed tactics."²³ A look at the flight strength Vg diagram for an F-100 made this clear; in order to have 5 G's available for a hard turn, the jet needed to be flying with at least 300 knots indicated airspeed. An F-100 flying at 25,000 feet achieved its maximum turn rate of about 12 degrees per second at 400 knots indicated airspeed, and minimum turn radius of 3,900 feet at 250 knots indicated.²⁴ These values changed with altitude. At 40,000 feet its tightest turn radius occurred from Mach .8 to .9.²⁵ It achieved its greatest speed of Mach 1.3 at 35,000 feet, although it required about 11 minutes to accelerate to that speed.²⁶

Learning to fly the F-100A well took some time, but those who had gotten used to it found it to be a "stable" gun



F-100D on a strafing pass.

platform and also found that keeping the pipper on the target was “not difficult.” Pilots transitioning from the F-84F or F-86F had to adjust to the F-100’s sight line; the sight line for the F-84F and F-86F were parallel to the fuselage, but that for the F-100 was depressed two degrees in order to be parallel with the F-100’s guns.²⁷ The jet’s ailerons were very sensitive to control inputs, while the elevators were “quite stiff at firing speeds. This gives good longitudinal tracking stability in the firing curve.” Trimming the rudder was a consideration because of adverse yaw, an annoying and dangerous characteristic of the F-100 in which the nose of the aircraft would point in the direction opposite of the direction the pilot was rolling the aircraft: rolling left at lower speeds would cause the F-100 to yaw to the right, and vice versa.²⁸ Adverse yaw was “the tendency in the F-100 for the nose to move in a direction opposite the turn . . . In a turn the low wing aileron is deflected up and the high wing aileron is deflected down. This condition imposes a greater amount of drag upon the high wing than on the low wing, resulting in a yaw toward the high wing or in the direction opposite the turn . . . add rudder as necessary in the direction of the turn to counteract this condition.”²⁹ An “extreme shortage of personnel” in the Training, Research, and Development section of the wing that was training pilots how to fly the F-100A stymied the development of tactics for the F-100A that year.³⁰

F-100 tactics were not extensive or overly complex. New pilots began by learning the orientation and purpose of the two-ship element: the leader was the shooter and the wingman was offset to the side and slightly behind. The wingman’s task was to prevent enemy fighters from getting behind his leader so that the leader could concentrate on flying his aircraft into a position where he could take kill shots with his guns. Thus the wingman had to fly aggressively to stay with his leader, and look for enemy fighters trying to sneak up on them. The optimal formation was the “fluid four.” Here the lead element (actually the leader of the lead element) focused on finding and shooting, while the offset trailing element focused on protecting the lead element.³¹ Maneuvers included the “break,” a hard turn to

defeat an enemy fighter’s attack, and the “reverse,” a turn to gain an advantage on the enemy. Here one should employ the F-100 differently from an F-86. Use the extra power from the engine to “climb up and out or just move out, and set yourself up to become the attacker. Do not attempt to go into the scissors maneuver [a series of hard turns in which a pilot tries to shake a fighter that is behind him, and maneuver to a place of advantage behind his opponent] you are just throwing away all the sweat and years of work that have gone into giving you a high speed, fast kill weapon. The scissors maneuver degenerate to a point where one pilot is trying to go slower than the other to gain an advantage . . . your aircraft fights best at high speeds, FLY IT THAT WAY” [capitalization in original].³² Another F-100 tactician, Everest Riccioni, ridiculed practicing scissoring. Yes, it was effective against other F-100s, F-86Hs with fully wing tanks and against F-84Fs, but the enemy was never going to be flying any of those American aircraft! He warned that “vertical, or horizontal scissors fighting in the F-100C should not be used to effect [sic] a planned kill, only for break-away from an undesired engagement.”³³ Since high-speed hit-and-run attacks were the F-100’s forte, an F-100 pilot might overshoot his quarry. In that case, he should not enter into a scissors, but instead “yo-yo high the moment he realizes he cannot stay inside the defender’s turn.”³⁴ If a pilot found a MiG latched onto his tail, the two best options were the “diving spiral” and a maximum performance hard turn. The former is exactly what it says, with the proviso to go to maximum power, dive, and pull G’s.³⁵

During offensive sweeps the primary tactic was to “bounce” the enemy and then climb away—“hit and climb.”³⁶ Tactics for shooting bombers from behind focused on deceiving the bomber’s radar-aimed tail gun. A flight of four would split in two with the second element making an attack run to draw the attention of the bomber’s tail gun and then breaking off the attack before coming into the range of the bomber’s tail gun. Meanwhile the lead element would press its attack while the bomber was momentarily distracted.³⁷ Fighter sweeps would use a “hit and climb” tactic with the aircraft flying in the finger-four formation. When “bouncing” the enemy in this way, attacking fighters should focus on “stragglers” and keep airspeed high.³⁸ When escorting bombers, stay above them, maintain speed—even weaving back and forth to stay with and not outrun the bombers. Only a quarter of the fighters would actually fly close escort; one-fourth would sweep ahead, and half would follow closely as “a reserve high cover.”³⁹

When making a hard turn in an F-100A, pilots were advised to increase the pressure on the control column “steadily but quickly to maximum performance” because yanking it into a hard turn would “kill off your airspeed very rapidly and will reduce your future maneuvering potential.” The latter type of extreme turn was reserved for a “break” when one was under attack. Both turns required judicious use of the rudder to counteract a characteristic of the F-100—particularly at lower airspeed—adverse yaw.⁴⁰ Adverse yaw was not a problem at supersonic speeds, but if a pilot used “extreme rudder pressures” he

could send the jet into out of controlled flight. In sum one had to use rudder, bank, and elevator to “perform a coordinated turn.”⁴¹

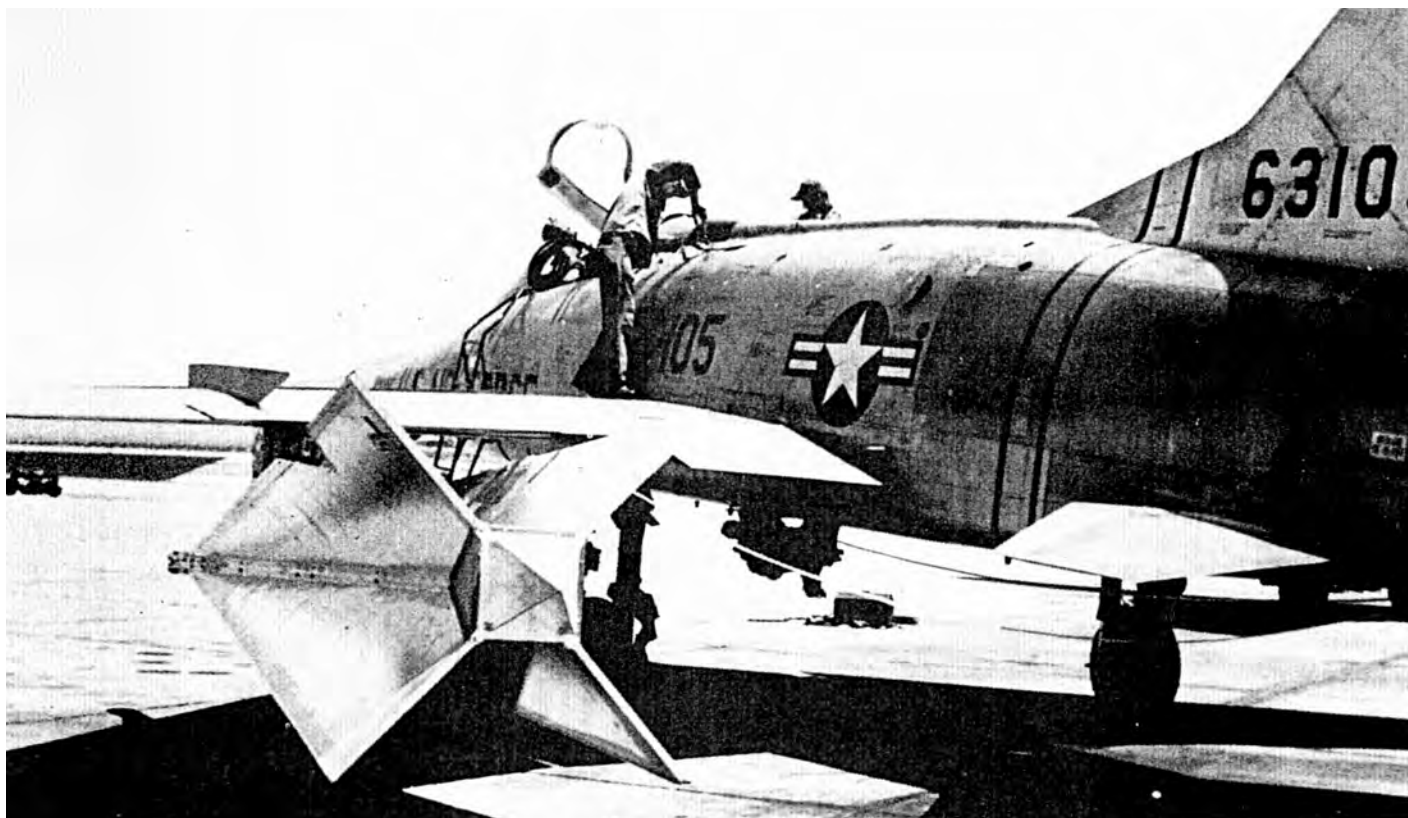
The best altitude range for air-to-air combat in an F-100 was from 20 to 30,000 feet, and tactics assumed flying at those altitudes.⁴² The “D” was more sensitive to control inputs than the “A,” and did “not feel as solid as the A, and [was] somewhat less stable [as a] gun platform.” At 30,000 feet when flying from Mach .9 to .95 “a mixed porpoise was encountered when tracking ‘G’s’ were applied.” That meant that above 30,000 feet in a hard turning fight the pilot could not keep the gunsight on the enemy aircraft, which made the F-100D unsuitable for air combat at this altitude. That characteristic made the addition of the AIM-9B air-to-air guided missile more attractive. From 25,000 feet on down the jet did not porpoise at all during gun firing passes. Supersonic gun firing passes from 30-42,000 feet were another matter: F-100s flew supersonic firing passes “very well” in that altitude range.⁴³

Within a year of receiving the F-100A, the 435th Fighter Day Squadron, one of the 479th Fighter Wing’s squadrons, deployed to the east coast to develop and evaluate air-to-air and air-to-ground combat tactics. This was Operation Hot Rod and it pitted the F-100A against a variety of target aircraft: F-86H, F-84F, B-57, B-47, and B-52s. The sorties relied on intercept guidance from ground radar stations (ground controlled intercept or “GCI”) to drive the fighters toward their adversaries, and pilots flew their F-100As with and without drop tanks so as to practice with the speeds available in both configurations. Since they flew over the populated state of North Carolina, their sonic booms irritated a lot of people, who complained. Evaluators concluded the F-100A could hold its own against every other Air Force fighter aircraft, but that is was too GCI dependent. The operation concluded that fighters needed their own on-board radar that could search and track other aircraft. They also wanted more tests to further develop F-100A tactics.⁴⁴ When the 435th Fighter-Day Squadron of George AFB deployed to North Field, South Carolina, pilots averaged only 23 flying hours in the new jet, but on average they were experienced flyers with an average of 840 hours a piece. For their training in a variety of air combat missions—interception of bombers and fighters, point defense, escort of bombers and fighters, “area cover,” and strafing—the 25-plane squadron flew a total of 477 sorties during their exercise. Gun camera film and pilot debriefings were the only means they had of assessing that happened during their practice flights.⁴⁵ Although the new fighter could reach 54,000 feet, it required the use of the afterburner for turning and maneuvering into firing position above 45,000 feet, which was “unacceptable” because that used up too much fuel, and because the afterburner often would not even light at that altitude.⁴⁶

Some wings participated in air defense operations with Air Defense Command. The 413th Fighter-Day Wing’s leadership placed a high value on working with ADC ground control intercept weapons directors (GCI for short). During the second half of 1957, for example, the wing completed 114 air defense practice sorties.⁴⁷ TAC leaders be-

lieved that tying fighters more closely to GCI would make them more effective. Because fighters flying at maximum power settings for maximum speed used fuel at such a rate, there was no time for anything but successful interceptions, and ground radar guidance was the way to make them more effective. Intercept geometry was becoming more difficult and computers, which could only function on the ground because of their size, were necessary for fighter success. Moreover, TAC was moving to the position that fighters should function in groups no larger than a flight of four, sometimes as an element (two jets), or at times even individually. Colonel Gordon F. Blood, the commander of the 413th FDW, disagreed with this proposed change in F-100 tactics. He favored large formations of fighters, and asserted that “teamwork and observance on the part of the pilot” will enable him “to get out of any tactical disadvantage that they find themselves in.” He dismissed the aide of GCI—also with an assertion: “Fly fighter sweeps and saturation type missions until air superiority is achieved. With this type mission, radar cover and ground control are not necessarily needed to achieve the mission.”⁴⁸ Fighters, he argued, should not split up into elements and flights until after the squadron had reached the combat zone. Blood also believed that new fighter technology like the F-104A Starfighter would not require doctrinal changes: “We believe as the performance of our fighters increases, more emphasis should be placed on teamwork and the development of tactical advantages in the aircraft rather than increasing the dependence on ground control. We believe that we can achieve air superiority when placed in the immediate vicinity of enemy fighter forces, rather than depending on ground control to place us in firing position.”⁴⁹

At times the training was rather advanced conceptually for the day. In the fall of 1957, for instance, the 413th FDW from George AFB engaged in practice air combat training with Marines from El Toro MCAS, 3rd Marine Air Wing, flying F4D-1 Skyray fighters. The 413th had intended for this kind of joint training to continue “indefinitely,” but it only lasted through November.⁵⁰ Both wing commanders realized that having their pilots fly and fight “against aircraft with differing characteristics and capabilities” would improve their combat proficiency.⁵¹ This was the very definition of what later became known as dissimilar air combat tactics training—DACT. Norton AFB’s radar site provided GCI for these missions, and the two wings swapped roles morning and night; the F-100s functioned as targets in the morning for the F4D-1s, who then became targets for F-100s in the afternoon. The pilots recorded their engagements with their gun cameras, although who actually got who was never conclusively sorted out. Colonel Darrell S. Cramer, the deputy for operations at the 831st Air Division, reminded the participants that the purpose of this joint training was “the practice and development of supersonic fighter tactics against aircraft of differing characteristics and capabilities”—not racking up “kill claims.” However the pilots interpreted the goal of these flights, they also noticed that their flight was becoming more aggressive and proficient as a result of practicing against aircraft besides other F-100s, and that the pilots



Gunnery dart under the wing of an F-100.

as a group as a result embraced this kind of training. Toward that end, the airmen and marines scheduled a meeting to discuss air-to-air tactics, but before it could take place, the whole endeavor was canceled.⁵² This was unfortunate because the “supervised tactics have been the most realistic so far performed by this organization, and combined with the camera film, have given us a real insight into the problems of supersonic flight in relation to other high performance aircraft.”⁵³

First Lieutenant John R. Boyd found air combat training when the F-100A entered service deficient in terms of determining what actually happened during a practice engagement, the teaching of maneuvers for flying a jet into a firing position, and the training of less-experienced pilots: “Too many simulated fights today degenerate into private wars between the leaders, while the young’uns are flung out on their own.”⁵⁴ He proposed a formal and systematic approach to training in air combat, and his program started with academics. The syllabus examined tactics from the First World War to the 1950s, and progress from one versus one tactics to two versus two, four versus four, and so on, from the perspectives of being both the attacker and the defender. Case studies and lectures taught fluid-four and two-ship tactics, and culminated with instruction on fighting an aircraft that was more maneuverable than your own. Boyd warned that academics needed to be treated as foundational, not as something to cover when conditions did not permit flying on this day or that. His plan started with identifying a unit’s best and most experienced pilots, getting them up to speed, and then having them teach the newer aircrews—all in a building block ap-

proach from the simple to the complex. Boyd’s syllabus was basic, teaching hard turns, the scissors maneuver, the high-speed yo-yo (a sudden pull up, roll, and dive toward an opponent that it turning inside you), a low-speed yo-yo (a brief dive followed by a pull up to get into firing position during a turning fight), spirals, barrel rolls, and a hammer turn. He wrote this because of the letters he’d received from F-86H and F-100A pilots.⁵⁵ A more comprehensive examination of air combat tactics was published in June 1957.

The issue of which formation was best for aerial combat was an ongoing debate. An extensive article the Fighter Weapons School, located at Nellis AFB, Nevada, published in 1957 stated that “the basic fighting unit in ACM is the 2-ship element” because each aircraft could see what might be sneaking up behind the other aircraft’s blind spot.⁵⁶ During the late 1950s, for example, the 36th Fighter Day Wing, an F-100C unit based at Bitburg, West Germany, recognized that the two-ship element was the primary offensive formation, but opted for the four-jet flight because it offered better defensive options, as well as some additional opportunities for making attacks. A wingman’s primary task in a flight was defensive lookout, defending his element leader, and going over to the attack if “that is demanded of you.” This wing’s doctrine argued “that when two aggressive opponents meet in conflict, and neither has the element of surprise in his favor, a maneuvering fight will always follow.” Moreover, it will be difficult to surprise an attentive enemy formation.⁵⁷

Major Everest E. Riccioni had no doubts which was better. He believed his two-jet “double attack system” was superior to the tactics that Lieutenant Colonel Frederick

C. Blesse espoused in his Air Force manual “No Guts, No Glory” which employed the fluid-four. Riccioni produced his tactical doctrine from 1956-1958 for the F-100C in order to take advantage of its speed advantage over MiG-15s and MiG-17s, and to cover its weakness: a less than sterling ability to excel in close-in turning fights. Riccioni argued that, “this system will permit a faster less maneuverable aircraft to win every time against slower more maneuverable aircraft.” He believed that it was “obviously stupid” to make use of the firepower of just one fighter out of four, especially considering the numerical advantage Warsaw Pact air forces brought to the skies of central Europe. Furthermore, a fighter’s ultimate purpose was destroying other aircraft, not protecting other jets in the flight—which had been a justification for the fluid-four. Nor was just staying in formation the primary purpose of a fighter jet, an exceedingly difficult task in fluid four. Worse, that task took so much effort that wingmen had less time to look for threatening aircraft which was what they were supposed to be doing in the first place. Instead, with double attack, a pair of fighters flew about a mile apart with the wingman 15 degrees back. This actually improved the protection of each fighter because each pilot could clear the airspace one mile behind the other by looking over his shoulder. Riccioni warned that the best way to visually search was not with continual movement of the eyes, but instead, “search sectors in depth! Pick a sector, search in depth, then change the sector, and search it in depth. And look! It is hard, relentless work.” When the leader attacked an enemy aircraft, his wingman cleared his rear quadrant, and was also in position to function as a shooter as well; both aircraft were offensive and could gang up on their foe.⁵⁸

First the leader attacked, broke away while staying fast, and then “number two” attacked momentarily, then the leader again, and so on. F-100s should not get “embroiled in a scissors scrap, but rather retain the superior airspeed to zoom and pull up and out as the second attacker moves in.” This was true against a similar aircraft like a MiG-19 and ones that were more maneuverable such as a MiG-17 (Riccioni used the F-100 and the F-86F Sabre as foils in his argument). In his system, both F-100s were shooters and each oriented his position in relation to the MiG, not the other F-100. Riccioni conceded that no one was clearing the wingman’s six o’clock position when flying as a pair employing the double attack system; neither was anyone clearing the second element in the flight of four that employed the fluid four method. If a MiG attacked one of the jets, that one could make a simple 90 degree turn away from his wingman to sandwich the MiG element between the two of them. This was the case if two pairs of MiG-17s attacked each F-100; both Super Sabres would make a 90 degree turn, placing the trailing F-100 behind the attacking pair. He would then accelerate to attack, out-running the MiGs behind him at the same time. Double attack actually strengthened the defensive capabilities of a flight of four because the flight that was not attacked would be able to offer assistance more aggressively. Training pilots in the double attack system was simpler because

both were trained the same: to function alternately as a shooter and a supporting wingman. Since both of these jets functioned alternately as shooters, they were always employed at least as many guns as fighters in the fluid four, in which only the flight lead was the shooter, and the other three protected him. Double attack, he argued, was applicable to a flight of four as well: simply follow the philosophy of the tactic with each pair. Unlike finger four, a four-ship that used the double attack system coordinated with each other; they were not rigidly tied together. He also recommended flying the two elements in a lead-trail formation. The first pair’s attack would make it easier for the second pair to maneuver for an unobserved kill. Riccioni provided plenty of instruction on using this aircraft and the double attack system against high-flying bombers. A supersonic zoom from below and from two quadrants was the way to go, but one really needed to know what kind of bomber he faced due to the tail gun most carried.⁵⁹

Typically the F-100s would keep up their speed because, Riccioni warned, “There is no acceptable turning tactic that an F-100 can employ to stay in the fight!” Furthermore, the F-100 accelerated slowly, so it was imperative to keep one’s speed above Mach .9. Once in the attack, Riccioni added, just leave the afterburner on from the time you spot the enemy until the time you disengage—fighting with maximum speed and power was the only way to use the F-100 because that gave it its advantage over MiGs, and covered for its weakness—a progressive lack of turning capability at lower speeds. An attack from below flown above Mach 1.0 was the best way to begin an attack due to its inherent surprise and the F-100’s good supersonic maneuverability. Many pilots were still in the habit of looking for attacks from above, because that had always been necessary, so the enemy would be less likely to spot F-100s attacking from below. Indeed, even if spotted, the F-100s’ adversaries would go into a diving turn which would automatically give the Super Sabres an altitude advantage to match their speed advantage. If trolling for MiGs, an F-100 could use its power advantage—when compared to a MiG-15 or a MiG-17—and fly at an altitude that would produce contrails as bait so that his wingman could sneak up from behind for an unobserved kill from below. High altitude attacks against bombers were somewhat delicate affairs. One had to keep Mach and indicated airspeed high in order to remain flyable.⁶⁰

When Riccioni tried to sell the doctrine in 1963, he realized that the Air Force was no longer interested in “the day fighter concept,” but posited that the need for them may arise again in the future.⁶¹ The F-100 division of the Fighter Weapons School “briefly” taught the double attack system during “the mid-1960s,” but the Air Force then rejected it out right as too challenging for all but the most experienced pilots.⁶²

There was a discontinuity between what was taught at the Fighter Weapons School in the late 1950s and the practices of F-100 fighter units. From 1958 it offered Course 111505B “Fighter Weapons Instructor Course” with the purpose of producing first-rate tactics instructors for fighter squadrons. Offered once a quarter, the ten-week

course subjected each class of sixteen to 112 classroom hours and 50 flight hours, as well as field trips. The school's purpose was not to produce "top guns," but to pass on knowledge and ability, so "the qualifications are pretty high. We want pilots who will be able to go back home and help other pilots and their units, not just dazzle them with their nifty air work." Candidates needed to be men that the other pilots would take seriously because of their experience and ability. The school just asked that applicants be fully qualified in the F-100: "We're not hard to get along with, it's just that we feed you the stuff pretty fast in academics and if you aren't already familiar with the fundamentals we're just wasting your time, and ours."⁶³ Unlike syllabi in later decades, this course did not practice air combat maneuvering, only gunnery passes at the towed target, and sorties employing the Sidewinder. Nearly half of the flying and academics covered the use of the F-100 as a nuclear bomber.⁶⁴

The F-100A suffered from a number of problems when it entered the Air Force's inventory. Compressor stalls were a problem, as was the new fighter's UHF radio, its attitude indicator, and its radio navigation aid.⁶⁵ Cockpit venting could not keep the canopy defrosted, and there were problems with the afterburner, brakes, fuel filters, and drag chute. These problems made it difficult for the Nellis wing to function as a training unit.⁶⁶ Smoke got into the cockpit, and the new jet suffered from "longitudinal and directional instability" and inadequate cockpit instruments.⁶⁷ Operational readiness was a challenge because the first wing to receive the aircraft, the 479th, did not receive enough tools and parts to maintain the F-100As, even though they were available in warehouses. For example, five V-10 cranes were supposed to have been delivered to the wing, but only three had. The jet need a new kind of grease fitting, an "NAS 497," but none were available anywhere on the base.⁶⁸ No sooner had George AFB greeted its first F-100A in October 1954 than the whole wing was grounded in November. "A series of high speed crashes and control system malfunctions and cause [Air Materiel Command] to become dissatisfied with the stability of the F-100A."⁶⁹ Indeed, at the beginning of 1955, the Secretary of the Air Force, Harold E. Talbott, scheduled a review of the F-100 program in February 1955 to determine whether it was "a suitable weapon."⁷⁰ Tactical Air Command had declared it "unsuitable as a gun platform."⁷¹

Aiming the F-100's guns should be relatively easy. It had a ranging radar (an AN/APG-30) connected to a lead-computing gunsight (an A-4) which projected a dot onto a glass reflector in front of the windscreen that told the pilot where to shoot; place the dot on the target—between 600 and 6,000 feet—and squeeze the trigger. The radar's parameters were modestly larger. It locked onto the target automatically from 750 to 9,000 feet. At altitudes below 6,000 feet the pilot was to use the manual settings on the gunsight since ground returns interfered with the radar.⁷² The ranging radar was inoperative so often in 1955 that new pilots had to learn to aim without it.⁷³ During 1957 this radar gunsight malfunctioning became "a matter of grave concern throughout the USAF,"⁷⁴ so much so that in

April its fire control system was "officially declared unsuitable for combat."⁷⁵ There was, however, no consensus as to the severity of the problem. Tests found that the system functioned about as well as it had in the F-86. What was certain was that insufficient data existed on the F-100's high-altitude gunnery capabilities because the Air Force did not yet have a suitable gunnery target for the F-100 that it could use at high speeds and high altitudes.⁷⁶ The Air Force Proving Ground, however, argued in December 1956 that the MA-3 FCS in the late-model F-100D was producing an "improper lead prediction angle . . ." Other deficiencies included "radar break-lock prior to and during gunfire, radar interference from noise and phantom targets, and gunsight reticle oscillation." Now the F-100A had not had problems like this. The difference was the AN/APG-30A radar in the F-100D had replaced the AN/APG-30 radar that the F-100A had used—a change that had not been tested in flight prior to implementation. One source of the deficiency seemed to be the lack of a single agency ensuring quality control among the contractors who produced the components that went into the ranging radar. Another culprit was moving the "gun stabilizer" in the F-100D "eight inches" from its location in the F-100A.⁷⁷ At first, engineers could not determine what the problem was. What was certain was that the best pilots could achieve scores of only 15-25 percent, and that the MA-3 was "critically sensitive to maintenance and pilot technique." In the opinion of the Air Research and Development Command, "The scores indicate the MA-3 FCS represents an acceptable operational capability." Nevertheless, he supported examining installing the necessary equipment for the F-100 to employ the Navy's new AIM-9B "Sidewinder," a guided missile that homed in on the heat exhaust of a targeted aircraft. In the meantime the current system was going to have to be fixed; producing a new one would require up to five years.⁷⁸

By June of 1957 the Air Force had worked out an agreement with North American Aviation that the contractor would work with subcontractors and the Air Force to develop and implement the fixes necessary to make the radar/gunsight work right.⁷⁹ This would be a challenge because "the AN/APG-30A radar equipment produced for use in the F-100D was, to all appearances, substandard in quality of components and workmanship." The ultimate source of problems like these in the F-100 was the assumption that if components worked well in other aircraft, they would work well together in this new airframe. That was not the case. In any event, air-to-air combat had become a mission secondary to ground attack for the F-100, so there was less urgency to fix this gunsight problem.⁸⁰ Pilots in the 413th FDW managed nevertheless to complete their gunnery qualifications.⁸¹

A working gunsight was imperative for effecting fighting at medium altitudes, because keeping the pipper on the target above 20,000 feet was challenging unless supersonic, where the F-100 "tracks beautifully."⁸² The modifications to the MA-3 greatly eased the pilot's aiming at high speeds. Its radar locked onto the target at 2,850 feet, and the pipper brightened when lock on was achieved.⁸³ The AN/APG-



Lt. Alex Thompson, squadron gunnery officer points out damage done to dart target during gunnery practice.

30 ranging radar emitted a cone-shaped signal approximately 9 degrees either side of the aircraft centerline. Its maximum range was 14,000 feet, but that was too far away to be of use for a gun firing pass. Overall, every single component had to function without fail for it to work, and making manual adjustments to it in the middle of an engagement was problematic.⁸⁴

As the decade came to an end, it was noticed that F-100 gunnery scores were not as good as they had been for F-86s. Captain John R. Boyd argued that gunnery scores in the F-100 had dropped off from those of the F-86 due to the fact that as speed and altitude increased, the target's cone of vulnerability shrank. Furthermore, an interceptor lost available Gs at higher altitudes, and "any such decrease in G will be reflected by an increase of firing range," and that did not help one score more hits because the "density" of cannon shells reaching the target "decreases by a function of the square (if range doubles, bullet density quarters)." In addition, "In pursuit attacks with today's fighter/bomber velocities, a fighter is forced to fire under conditions where its velocity is less than twice that of the target. In this type attack, the fighter is not only forced to fire at longer ranges but also to fire where his rate of turn is decreasing." Complicating the firing solution even more, all of these variables changed in relation to each other at changing rates.⁸⁵ Now the radar gunsight computed many of the variables involved in determining where to aim the aircraft, but the interactions between the pipper, which from the pilot's perspective seems to drift, and his control inputs to compensate, cut down on the accuracy of the gun firing solution.⁸⁶ Boyd further explained that because of the higher speeds that both targets and fighters flew, the ranges at which a pilot began firing had increased. These greater distances also magnified the miss distances for the cannon shells, and "These conditions produce a tracking index which is quite loose and difficult to control. Since the pilot's responses are not precise enough, results are usually poor, even though the equipment may be working properly."⁸⁷

Altogether the mathematics of gun aiming with an F-

100, or any other high speed fighter, for that matter, had become so complex that a pilot needed a computer to tell him where to point his aircraft. Boyd anticipated the "death dot" one would be able to use in an F-15 or F-16 a decade and a half later in calling for a "Director System." As he explained, "The essential difference between the disturbed system [which the F-100 used] and the director system is the manner in which lead for target motion is acquired. In the disturbed system, lead is acquired indirectly through measurement of the angular velocity of the attacking aircraft. In the director system, lead information is acquired directly, through use of the search/tracking radar. In other words, lead for target motion is acquired independent of the pilot's responses and the dynamics of the attacking aircraft. Because the prediction angle is going solved in this manner, the attacker is not is not continuously chasing the tracking index to match his ever-changing turn rate. Therefore, assuming that the system is operating properly, a pilot will be able to produce better results regardless of range and the ratio of fighter/target velocities."⁸⁸

After analyzing 700 gunnery sorties, analysts found that firing from 1,600 to 900 feet put the most cannon shells on the target. Completing a lethal firing pass was anything but automatic. A 100 round burst from the F-100s four cannon would result in only about forty strikes on average. One-hundred-nineteen firing passes by seven different pilots produced somewhat disappointing results. Collectively they had a 32 percent chance of scoring a lethal hit, but these tests employed only two guns, so these predictions were on the low end. What was certain was that hitting another aircraft beyond 3,000 feet was well-nigh impossible.⁸⁹ A similar test in 1958 with F-100Ds and Fs found both to be "suitable gun platforms . . ."⁹⁰

In 1956 the Air Research and Development Center recommended adding an AIM-9 Sidewinder capability to the F-100C and D.⁹¹ The Air Force began testing the AIM-9B on the F-100 in 1958. The men involved found the prospect of guided missiles exciting, but the technology did not dazzle them: "We feel that the GAR-8 (Sidewinder) is just the beginning of a whole new family of Fighter Weapons which will greatly increase our offensive potential. Don't misunderstand us, we do not advocate removing the guns nor do we intend to stop gunnery training. We feel there will be a definite need for air-to-air gunner training even after the missile has become our primary weapon. It is always possible to find yourself in a position where you are unable to fire the missile, and must make a gunnery attack." Even the first version of this missile displayed uncanny precision: ". . . in many practice firings against drones, GAR-8 has been observed to enter the tailpipe" of the drone. This weapon changed air-to-air tactics for the F-100. A pilot would fly a profile to position himself for a missile shot first, following up with a gun attack second if necessary. A ground control intercept (GCI) weapons director giving the pilot vectors via voice radio would guide hit toward his quarry. "With GAR-8, GCI will be a real friend, and you may not pick up your target visually until you are almost read to fire your missile. It may come to a point where if

you claim a gun kill you will be admitting that you goofed—heaven forbid!”⁹²

As the F-100 community incorporated the Sidewinder missile into its arsenal, it had to develop tactics from scratch; other users such as the Navy’s F4D-1 Skyray had a good search radar, but the F-100’s was a range-only radar. Something else was new with this missile: its range gave it the ability to shoot down an aircraft before it had been positively identified, and that was a problem. At the same time, F-100s began to receive “a new fire control system,” the ASG-20.⁹³

The Training, Research, & Development section of the Fighter Weapons School developed tactics for the use of the AIM-9B by its F-100s quickly. Aiming the missile was easy: point it toward the target, wait for its infrared detector to pick up the heat signature of the target aircraft’s engine exhaust, and listen for the audio signal indicating that the missile was tracking that heat source. The gunsight reticle could be adjusted to match the 4 degree wide field of view of the missile’s seeker. Assessing the distance to the target—necessary because of the missile’s limited range—relied on estimate, not radar data. Determining whether the target was friendly or enemy was another challenge; the missile had enough range to go after a target that was too far away for a pilot to positively confirm its identity. With good closure rates from behind, an AIM-9B could have a range as great as five miles under the most optimal conditions. The Sidewinder was not a complex system; a pilot could be taught how to use it in just three sorties.⁹⁴ Sidewinders were not, however, designed to make the hard turns necessary to run down a maneuvering target like a MiG-19. Although the missile could pull as many as 10 Gs near sea level and three at the F-100D’s maximum altitude of around 50,000 feet, the launch aircraft was to be in no more than a 2 G turn when firing—less than that above 40,000 feet. Since other sources of heat besides the target aircraft’s engine exhaust nozzle could distract the missile, it was best if in doubt to fire at close to minimum range.⁹⁵ One thing for the pilot to remember was to hold down the trigger until he saw the missile in flight, otherwise a misfire will take place. In addition, it was a waste of a missile to fire it at a target with the sun in the background; it would guide on the sun. Clear air was a necessity; clouds absorbed the infrared energy the seeker head tracked. Because the missile needed time to arm, it had a minimum range. That was 3,000 feet if the launch aircraft was flying at the same speed as the target, and was greater if the launch aircraft had some overtake. A look at the formulas necessary to determine that range make it clear that a missile-carrying fighter needs a fire control computer for such tasks.⁹⁶ For co-speed attacks at Mach .9, tests provided some rules of thumb for the maximum firing range for the AIM-9B: 6,100 feet against a target flying at 10,000 feet, 8,000 feet back against targets flying at 20,000 feet, 11,500 against one at 30,000 feet, and three miles when shooting a target at 40,000 feet.⁹⁷

A fighter had to fire the Sidewinder from behind, ideally this would be from below against a background of blue sky, giving the seeker head an unambiguous target. This

profile would also ambush the enemy from a quadrant where the pilot cannot see the attack approaching, and would give more of a planform of the target, making visual identification easier. If the target was an enemy fighter, surprise was essential because the missile was useless against a hard maneuvering target. Fortunately for the F-100, it could continue an attack with its gun armament. That would be a real possibility against enemy fighters, because tests thus far had found that about half the time target fighters saw the Sidewinder-equipped interceptor.⁹⁸ The report on the mating of this new weapon to the Super Sabre harbingered the future with the recommendation that the AIM-9B “be considered the primary air-to-air weapon for the F-100D/F tactical fighter.”⁹⁹ The F-100 community realized that given that the ranges of a Sidewinder were greater than that of a fighter’s guns, positive aircraft identification was a concern. When a pilot from Nellis, Captain Bruno A. Giordano, consulted with the Navy on that issue, he found that they had concluded that identifying a bomber would not be an issue, and that GCI would identify hostile fighters for them.¹⁰⁰

A Marine exchange pilot recommended the following hit-and-run missile attack profile against an opponent flying at 35-40,000 feet which is worth quoting at length: “Fly at the lowest possible altitude, consistent with fuel consumption, cloud cover, and enemy ground fire. This will be approximately 20,000 to 25,000 feet for the ideal attack on a 35,000 to 40,000 foot target. Stalk your target in an attempt to be in trail some 15,000 feet below and behind. Keep the aircraft which you are attacking in sight. One glance away and you may have lost him. Use afterburner thrust to climb up his tail in a supersonic high-angle climb. Fire your missile when in range. If no missile is available, continue to close at a supersonic Mach of approximately 1.2. If still undetected when approaching firing range, decrease Mach slightly. If you are detected when approaching firing range, and the target performs his maximum effort subsonic turn, convert the Mach to G until you are able to track. If you have misjudged and are unable to track, continue the climb to near vertical, do a roll-off opposite to the direction of the enemy break, and dive in for another attack. The advantages of such an attack are numerous: a) The lookout aft, in the new airplanes, is almost non-existent, and an attack from below is ideal - especially with the attacker framed against the ground where he is difficult to see. b) The attacker is presented with a clear unobstructed view upward, framing all targets against the sky. c) The total G/radial G relationship, in a climb approaching vertical, is superior. d) The attacker is in the perfect position for a missile launch and is in a position where a diving enemy missile launch would probably be ineffective. e) The element of surprise! Using A/B [afterburner] it will take no more than 10 - 15 second to climb into position for a missile launch. The climbing supersonic attack works beautifully in practice and you will seldom be detected. TRY IT.”¹⁰¹ F-100 units did just that.¹⁰²

The realization that the F-100’s adversary might use missiles similar to the Sidewinder affected the combat formation F-100s used. Missiles from fighter aircraft meant



Pilots from the 413th Fighter Day Group, 1957. Left to right: 1st Lieutenant Jim Thompson, Major Robert Wayne, Colonel Gordon Blood, Major Robbie Risner, Captain Hoyt S. Vandenberg, Jr., 1st Lieutenant Eddie Levell.

that F-100 pilots would have to scan and clear an area about four miles behind each other in order to spot an approaching MiG before it reached its missile firing range. That meant that a 2-ship formation needed to fly side by side about a mile and a half apart, which degraded mutual support and formation integrity, and the pilots spent more time clearing each other's rear quadrant than they did looking for enemy fighters. A four-jet formation worked best. In each two-jet element the wingman flew about a thousand feet or so, 20 degrees back of his element leader. The other element was one to one and a half miles away. The wingman in each element cleared the "six o'clock" position behind the other element. This four-ship formation allowed element leaders to look for targets, was more flexible, and allowed wingmen to defend the flight. The best altitude to fly was 35,000 feet with the flight leader setting his throttle just below full power so as to leave some margin for the other three jets to stay in formation. This report warned against using the afterburner to close up the formation; when lit it gave off a puff of smoke that could be seen for miles. In this four-jet formation, the flight leader led it, but if the other element leader was in a more advantageous position for making an attack, that element leader was to complete the attack. One rule of thumb for attacking a group of enemy aircraft from behind was to work from the outside in, stabbing trailers in the back, so to speak. While the first attacks would rely on Sidewinders, once

spotted, the careful missile tactics would soon take a back seat to traditional gun fighter tactics. F-100s should not try to make subsequent missile attacks after the first one because the hard turning target aircraft will be pulling too many Gs, and will be outside of the missile's firing parameters. The AIM-9B, the writers insisted, was a surprise attack missile, not a dogfighting weapon.¹⁰³

Until AIM-9B Sidewinder missiles were installed, the F-100s only armament was a quartet of M39 20 millimeter cannon. Each had a rate of fire of 1,500 rounds per minute, enough ammunition for eleven seconds of firing, and had a "3,500 foot per second muzzle velocity."¹⁰⁴ One aspect of preparing an F-100 for combat was harmonizing the guns. "Harmonizing can be thought of as the orientation or marriage of the fuselage reference line, the sight line, and the gun line, at a specific range. The sight is calibrated to do the rest . . . with a little help from you."¹⁰⁵ Another way of describing it is orienting the guns so that the cannon shells converge at a particular spot in front of the aircraft, such as 1,000 feet.¹⁰⁶ Precise harmonization was not critical. One expert found that, "regardless of the range at which you harmonize for gun convergence, you will have a satisfactory bullet density at any range from 1000 feet to 2250 feet."¹⁰⁷ For the F-100, 1,400 feet was the optimal range for harmonizing the guns for two reasons. First, that was the approximate range where most gun attacks occurred, and second, the corrections made to the fire control

system did not take into account air density, which meant that harmonizing for 1,000 feet would tend to disperse the cannon shells short of the target, and harmonizing for 2,250 feet—which had initially been the standard—would disperse them slightly in front of the target. It did not make a great deal of difference.¹⁰⁸

Live fire air-to-air gunnery practice against a towed target for the F-100 was predictable and scripted. The pilot fired at a large dart towed on a cable about 2,000 feet behind another F-100. The jet towing the dart would fly at Mach .75 and execute 2-G turns, while the F-100 that was getting to practice gunnery flew profiles so as to be in about a 3-G turn at Mach .92 with a radar lock-on, firing at 1,500 feet from the dart.¹⁰⁹ One challenge was making sure the radar was locked onto the dart and not the aircraft towing the target.¹¹⁰ Not surprisingly, the more practice one got in executing these firing passes, the better one performed. During a 1958 gunnery competition, for example, the team from Nellis AFB—the home of air-to-air fighter gunnery—scored twelve hits on twelve passes. The next best was the 36th Tactical Fighter Wing's team, a premier unit from USAFE, which scored ten out of twelve. The 18th TFW from Kadena Air Base, Okinawa, only scored one hit.¹¹¹ F-100s also practiced against a dart that was towed at supersonic speeds, with firing passes as high as Mach 1.2. The towing pilot would feel the shockwave, usually through the rudder pedals, as the supersonic F-100 flew by.¹¹²

With the advent of the AIM-9B Sidewinder guided missile, an F-100 could fire a 5-inch target rocket for his AIM-9B to lock-on to and track. The Air Force had developed an unsatisfactory version that changed its flight path, and for the time being used the non-maneuvering version the Navy had produced. This target rocket had a motor that fired for 45 seconds and the rocket provided a useful infrared target for a Sidewinder for a minute and a half.¹¹³

As far as mission effectiveness was concerned, the F-100A was not yet what was needed to accomplish a variety of fighter missions against contemporary threats. Scrambling F-100As at the last minute was futile because by the time the interceptor reached 40,000 feet, a bomber flying at 0.90 Mach would have flown 58 nautical miles. Evaluators believed the jet would perform fighter sweeps effectively, although tests did not provide enough enemy fighters to effectively test this assumption. Escort missions required all aircraft to fly the same speed. Because the F-100A had an afterburner, it was not always struggling to gain speed; it could accelerate to a degree impossible for its stable mates.¹¹⁴ To have enough range the F-100A needed to use external tanks for intercepts, but that reduced speed. Its clean combat radius was 175 miles, and that went below 100 miles for "maximum performance intercepts" (use of afterburner throughout).¹¹⁵ The engine possessed one of several characteristics that made this fighter less than 100 percent trustworthy: its afterburner often would not light at high altitude, and the nozzle could fail during takeoff, which would decrease engine thrust "disastrous on takeoff or go-arounds." Worse were the compressor stalls, which were "mostly unpredictable in cause and effect." At Mach

0.93 the pilot had to adjust the trim of the aircraft which would detract from the accuracy of his shooting.¹¹⁶

The primary mission of F-100 wings was at first air superiority, but in 1956 that began to become secondary to ground attack.¹¹⁷ With the transition to the F-100D, its mission switched to that of a fighter-bomber. The 1959 Operational Training Course for new F-100 pilots included three sorties on the use of the AIM-9B, three for shooting the dart, and three on air defense intercepts, but none for air combat maneuvering. Instead, the emphasis went to ground attack: three for conventional bombing and seven for nuclear strikes.¹¹⁸ Five years into the F-100's career—1959—multi-mission priorities did not allow units enough time to train their pilots well enough to be proficient in air-to-air gunnery: "we will have to be satisfied with mediocrity."¹¹⁹ Even before the F-100A had reached initial operational status, the Air Force discussed in October 1953 procuring a fighter-bomber version of the F-100, and it decided in January 1954 that the F-100 series would soon be used as a fighter-bomber. This was due to the performance shortcomings inherent in the F-84F fighter-bomber.¹²⁰

When the war in Vietnam heated up six years later, air combat tactics received seven sorties, along with three for shooting at the dart target, and two for the use of the AIM-9B.¹²¹ As one pilot wrote, "What was once thought of as a 'dying cause' or 'thing of the past' is again a reality—air combat."¹²² Indeed, a flight of F-100Ds had engaged North Vietnamese MiG-17s in combat on April 4, 1965, and Captain Don Kilgus probably shot down one of them with 20mm gunfire. The gun camera on his F-100D did not work correctly so there was no film of the engagement. One source states that two MiG-17s were shot down on April 3 and 4, which suggests that Kilgus's shots on the MiG-17 downed it.¹²³ If these F-100s did in fact shoot down two MiG-17s in this engagement, that fact would have confirmed the viability of the "Hun" against one of its contemporaries. In any event, F-100s flew 200 fighter escort missions over North Vietnam in early 1965 before F-4C Phantoms replaced them.¹²⁴

The F-100 Super Sabre suffered from deficiencies as an air superiority fighter. It was relatively under-powered, and did not have the subsonic maneuverability it needed to be truly effective. It suffered from serious control problems at low speeds and killed many a pilot who lost control of it in the landing pattern. Forty-seven F-100As out of 273 produced crashed.¹²⁵ The Air Force and North American needed to test and refine the design more than they did before beginning production, but the MiG-15's capabilities lent great urgency to producing a replacement for the F-86. Given the newness of turbojet engines, supersonic flight, and swept wing aerodynamics, the F-100's shortcomings should not be surprising. In spite of them, the F-100 series was an impressive feat of engineering for its day. It did not have the advantages necessary to dominate the skies over central Europe to the extent needed in case of an invasion by the forces of the Warsaw Pact, but the findings included herein lead me to conclude that it would have held its own. ■

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Government Girl Nose Artist Phyllis Grothjan.
Photo courtesy of the Washington Post.

With the availability of 21st century global crowd sourcing websites like GoFundMe to raise monies for various public and private causes, the idea of public subscriptions seems to be a rather recent phenomenon. However, this is neither the case in the United States (US) and Great Britain (and what was then known as the British Empire). Such endeavors date back as the early 1800s with the U.S. Congress' Act of March 14, 1812 which was designed to help raise monies to fight Great Britain during the War of 1812. In 1862, during the American Civil War, Southern ladies raised over \$240,000 Confederate dollars to pay for three gunboats for the Confederate Navy by banding together to sew quilts.¹ Over 100 years later, nations would conduct what were to become known as War Bond drives to raise monies to pay for the cost of the First and Second World Wars. As the 20th century technological advancements in science and technology rapidly changed the character of warfare, so too the cost. The nascent aviation field saw some of the most far reaching advances, combined with the efficiency of industrial mass production, in the history of mankind. In particular, the aviation industries development of aircraft with metal airframes, high performance engines, and electronics. Few advanced nations could afford the associated costs of these technologies in wartime, and even those that could, required financial support from the general public. To address this challenge during the Second World War, both Great Britain and the United States turned to the use of War Bonds and Stamps to help pay for and encourage personal investment in a myriad of wartime aviation programs. Using the Diplomatic, Information, Military, and Economic (DIME) model, aviation historians can properly assess the value of such fund raising programs in the past and assess the utility of such programs in the future.

Paying for the "Arsenal of Democracy"

In the United States during the First World War, War Bonds and Stamps were originally named *Liberty Bonds*, and renamed as *War Bonds* starting after the 1941 Japanese attack on Pearl Harbor. These Bonds and Stamps were seen as a way to remove money from general circulation as well as reduce inflation.² Living in the United States with a median income during the Second World War meant earning about \$2,000 a year and, despite the war's hardships, 134 million Americans were asked to purchase war bonds to help fund the war.³ The U.S. War Finance Committee was in charge of supervising the sale of all bonds and the War Advertising Council promoted voluntary compliance with bond buying.⁴ The Council used an emotional appeal to citizens by means of advertising.⁵ Even though the bonds offered a rate of return below the market value, it represented a moral and economic stake in the

war effort, which in turn became the ideal channel for those on the home front to contribute to the national defense.⁶ This idea was summed up by author and historian Jarvis M. Morse,

*They [the bonds and stamps] gave the individual investor an added sense of personal participation in the war effort, and when widely distributed and of sufficient magnitude, helped to equalized the financial burden of the war.*⁷

Great Britain and the Empire nations used a similar bond program, called Treasury Redemption Schemes (more commonly known as Defense Bonds), which had been in use in one form or another since the 18th century.⁸ During the Second World War, bonds, loans, and stamps allowed the American and British Empire citizens to pay for the development and production cost for a vast array of combat aircraft, like the North American P-51 *Mustang* and the Supermarine *Spitfire* to fight the Axis powers.

Even today, with the cost of the most advanced U.S. Air Force fighter aircraft like the F-22 *Raptor* at \$140 million per airframe and the F-35B *Lightning II* at \$80 million, each highlight the amount of treasure a nation like the United States is willing to invest in maintaining its national security through global air dominance.⁹ The cost of research, development, production, and maintenance of advanced aircraft is, next to the cost of combat vessels, one of the most expensive defense investments today. The cost of such aircraft have continually increased dramatically since the Second World War with

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the prime example being Boeing's B-29 *Superfortress* program, with an estimated cost of \$4 billion (\$56 billion in 2018), \$3 billion more than the Manhattan Project's Atom Bombs.¹⁰ Development of aircraft of the period was far costlier than those of the previous generation First World War aircraft. Early 20th century combat aircraft were made mostly of canvas and wood primarily due to the early structural weakness of metal airframe and greater availability of spruce wood sources.¹¹ By the late 1930s, combat aircraft transitioned from canvas and wood to more complex and expensive metal airframes and the accompanying advancements in engine and avionics technologies began to increase costs. A 1918 Sopwith *Camel* and its Clerget rotary engine (one of the most advanced for its time), cost approximately \$15,000 (\$250,000 in 2018). Two Vickers machine guns and instrumentation could easily add another \$6,000 to the price package, making the typical First World War fighting aircraft at the same time, a very costly machine indeed.

While the cost of a First World War fighter was considered an expensive financial and technological investment in 1918 dollars, the technological advances of a 1945 aircraft would more than double the price of a front-line fighter twenty-eight years later. The change from consumer to wartime economies at the beginning of the Second World War, meant that most production lines switched from producing automobiles and refrigerators to aircraft and machine guns.¹² The wartime mass production of aircraft, guns, tanks, and ships, what President Franklin D. Roosevelt called the "Arsenal of Democracy," helped to keep both the individual cost of combat equipment minimized and help maximize production during the Second World War. For example, the low cost of production from 1939 to 1945 was a factor in the ability of the U.S. to produce more than 300,000 combat aircraft and the British Empire another 100,000 during the same period.¹³ Among the most famous of these combat aircraft bought by the war bond programs was the British Empire's Supermarine *Spitfire* fighter.

Spitfire Funds

When one thinks of the early Second World War European air campaign images, none exemplifies this period more so than the Supermarine *Spitfire* fighter. Designed in the mid-1930s, Reginald J. Mitchell of Supermarine Ltd., responded to a 1934 British Air Ministry specification calling for a high performance, in-line engine, mono-plane fighter with an armament of eight wing mounted machine guns.¹⁴ At a time when most of the major world powers aircraft, including Great Britain, were still equipped with bi-plane, fabric covered, radial engine fighter aircraft like the Hawker *Fury* and Gloster *Gladiator*, the call for a design like the *Spitfire* was far sighted indeed. First flown in 1935, the *Spitfire* was based off Supermarine S.6 floatplane which won the 1931 Schneider Trophy Cup at a then record speed of 340 mile (574 km) per hour. Its design ensured superb



The Nazim of Hyderabad. (Photo courtesy of the RAF Museum.)

performance and flight handling characteristics.¹⁵ More radical in fighter design than the contemporary Hawker *Hurricane*, the *Spitfire*'s stressed-skin aluminum structure and graceful elliptical wing provided exceptional performance, and from an informational perspective, inspired an almost movie star-style of public attention.¹⁶

As advanced as the *Spitfire* was at the time, few were produced in late 1930's Great Britain due to the crushing national debts resulting from the First World War and the economic impacts of the Great Depression of the 1920s and 30s.¹⁷ These two factors not only limited production of the *Spitfire*, but played a significant role in British Prime Minister Neville Chamberlin's decision to support the appeasement policies that avoided war with Nazi Germany during the same period.¹⁸ Britain's placations ended with Germany's September 1, 1939 invasion of Poland. When Britain and France declared war two days later, the need increased for larger numbers of combat aircraft, especially the *Spitfire*.¹⁹ Even with an increase in spending on defense by the British government, more would need to be done.

In early 1940, Lord Beaverbrook, an Anglo-Canadian business and media tycoon, was brought into the government by Prime Minister Winston Churchill to increase aircraft production based on his previous construction and newspaper business experience in Canada.²⁰ Lord Beaverbrook advocated for public subscriptions or contributions, based on unsolicited public enquiries about helping to pay for additional aircraft, especially the *Spitfire*.²¹ As the average cost of a wartime production *Spitfire* was around £5000 (£100,000 in 2018), Lord Beaverbrook believed such fund raising ef-

forts would both increase *Spitfire* production and allow the British public to "do their bit" by having aircraft "presented" in the donor's name.²² Within one month of Lord Beaverbrook's decision, the *Spitfire* Fund was established and set up by local businesses, city councils, individuals, and overseas voluntary organizations to raise funds for additional presentation aircraft.²³ As the Battle of Britain was taking place over the skies of the British islands, the sight of *Spitfires* roaring across the countryside chasing German bombers increased the number of *Spitfire* Fund groups.²⁴ The amount of monies raised were to buy not only just a complete aircraft, but parts and ammunition as well.

Lord Beaverbrook pushed for the idea to reward those raising substantial monies by having "their" name (personal or company) or a caption written in letters four inches high in yellow paint on the fuselage once a donation amount of £5000, the cost of a *Spitfire*, was attained.²⁵ By the end of the war almost every big town in Great Britain came to have its name on a *Spitfire*, even Anti-aircraft batteries and aircraft factories contributed.²⁶ To encourage the idea that every penny counted, a components price list was published (unusual at a time of heightened national security), including a wing for £1800, eight Browning .303 machine gun at £100 each, a Rolls-Royce *Merlin* engine spark plug at eight shillings, and fuselage rivet at sixpence.²⁷ By the end of 1943, *Spitfire* Funds, and the lesser known Wings for Victory Aircraft committee fund, became the norm and amounts collected ranged from just pennies to thousands of Sterling pounds. An example of a larger contributions for entire squadrons saw the Nizam of Hyderabad, North West British India, donated, not only for two *Hurricane* fighters named "Samasthans I" and II", but also provided a gift of £150,000 to help equip the entire RAF 152 (Hyderabad) Squadron with *Spitfires*.

Perhaps the most poignant of the presentation aircraft came from women who were invested both personally and emotionally in the war effort. On one side were mothers who had lost sons in battle, like the widowed American born Lady Rachel MacRobert of Tarland Aberdeenshire who lost three sons flying operational missions with the RAF during the war.²⁸ Determined to do her part for the war effort, the independently wealthy Lady MacRobert donated funds to purchase two Short *Sterling* bombers to be named "MacRobert's Reply", followed by the additional purchase of four *Hurricane* fighters, three of which were named "Sir Roderc", "Sir Alasdair", and "Sir Iaian", and a fourth named "MacRobert's Reply to Russia – the Lady".²⁹ On a much lighter note, several funds were started seeking contributions from people with similar names from across the Empire. Nearly 4000 donations by women named "Dorothy" came from as far and wide as Canada and Ceylon.³⁰ Not to be outdone, a dog, calf, cat, and swan, all name Dorothy by their owners, also subscribed.³¹

Other British expatriates, including some living in Japan as late as November 1941, and many foreign nationals also donated to the *Spitfire* Fund.³² The Free



A Spitfire of the Nazim of Hyderabad in India. (Photo courtesy of the RAF Museum.)

French Colonial Governor of Cameroons transferred over £10,000 in gold bullion and an Ivory Elephant, to be carried as a mascot, to the Bank of England for the purchase of two *Spitfires* name “Cameroon Français”.³³ The success of the Spitfire Fund was so successful, that by February 26, 1941,

*The ten million pounds spontaneously given us for the aircraft fund pays for the replacement of all the Spitfires and all the Hurricanes lost in battle from the day the Churchill Government took office to the end of 1940. We [the Ministry of Aircraft Production] proposed therefore to devote to the Benevolent Funds of the three fighting services [Army, Navy, and Air Force], 10 percent of the money sent to us after the end of March [1941].*³⁴

While a similar system was used to purchase other RAF aircraft, none were as popular as the “presentation” *Spitfires*.³⁵ By 1943, in the United States, similar crowd sourcing efforts were undertaken to raise funds for aircraft in a similar fashion and would prove as successful in helping meet General Arnold’s U.S. production goal of 300,000 combat aircraft.

Government Girls

As the U.S. entered the Second World War, the American economy’s shift from peace to war time ramped up quickly. Fortunately for both the U.S. and her allies, aircraft planning and production goals had already been

established as early as 1940 by the Roosevelt administration.³⁶ Under these plans, armament, aircraft, ship, tank, and truck production for both the Army and Navy would increase to the point that not a single U.S. civilian market automobile was manufactured or sold until the end of the war.³⁷ While the U.S. used War Bonds and Stamps to help fund this massive wartime armament effort, many in the American public wanted to do more. In February 1943, a pseudonymous letter-writer, using the pen name “Government Girl,” submitted a letter to the *Washington Post*’s Federal Diary column asking what if U.S. government employees in the District of Columbia and elsewhere each contributed \$1 toward the purchase of a combat airplane.³⁸ The term “Government Girl” was not just a random name, and was in fact a term that reflected the change in both U.S. society and its war effort.³⁹ With the number of U.S. military age males leaving for military service and the increase in size of the U.S. Government bureaucracy increasing to levels never seen in American history, a need for more manpower to run the various government agencies was necessary. Like their “Rosy-the-Riveter” counterparts, women stepped in to fill the void left by men going to war. In 1945, more than nineteen million women would join the government or private sector work force.⁴⁰ The influx of women into the U.S. government workforce was so great that the term “Government Girls” entered the popular culture and lexicon.⁴¹

Following the publication of the “Government Girl” letter, Federal Diarist editor Jerry Kluttz peppered his

column with the phrase GIVE YOUR DOLLAR FOR GOVERNMENT GIRL WARPLANES.⁴² By the end of April 1943, more than \$15,000 was raised and Kluttz revealed whom the original letter writer had been.⁴³ She was Agnes Richardy, a contract representative for the Veterans Administration.⁴⁴ Eventually more than 157,000 Federal employees would donate towards the purchase of one Chance-Vought F4U *Corsair* for the U.S. Navy (\$50,000 in 1943) and one North American P-51 *Mustang* (\$40,000 in 1942) for the U.S. Army Air Forces.⁴⁵ Following the collection of the donated monies, it was decided by the U.S. government, who saw the information value of the program, to hold an official ceremony to recognize the Federal employees who donated to the program. On May 9, 1943, a Sunday, people streamed to the Washington, D.C. Ellipse for the 3 p.m. dedication ceremony.⁴⁶ There were two bands: one from the Army and one from the Navy and an 80-woman honor guard composed of U.S. government women employees who had vied for the honor.⁴⁷ There were speeches from Jerry Kluttz and *Washington Post* publisher Eugene Meyer.⁴⁸ Additionally, President Roosevelt sent a message that ended: "On behalf of all the boys in the services to whom these planes are sent, I salute you."⁴⁹ At the ceremony, in front of a crowd of more than 15,000, Agnes Richardy handed one donation check to Army Captain Ted Lawson, a veteran of the Doolittle's Tokyo raid, and another to Navy Lieutenant Commander Leroy Simpler, whose fighter squadron had destroyed 35 Japanese planes in the Solomon Islands late 1942.⁵⁰ If later press reports are to be believed, both the *Mustang* and *Corsair* were shipped to U.S. combat forces in the Orient.⁵¹ The Navy *Corsair*, according to one report, was "staunchly and proudly zooming to its destiny and in hungry search of Jap Zeroes" over the Pacific.⁵² The Army's *Mustang* joined the China-Burma-India Theater of Operations, where it flew 107 missions and destroyed two enemy aircraft, its pilots earning the Air Medal and the Distinguished Flying Cross.⁵³

Like the Spitfire Fund, the Government Girl fund raising program was designed to give U.S. citizens on the Home Front an opportunity to have a personal investment in the war effort and serve as an information tool to encourage others across the country. Not only was the donation of monies highlighted, but so was the special insignia applied to the two Government Girl aircraft next to the U.S. Blue and White Star on the fuselage.⁵⁴ The insignia designed by nineteen-year-old Phyllis Grothjan, who was working in the Reconstruction Finance Corporation, had won a contest to design a personalized logo for the two planes.⁵⁵ A *Washington Post* photograph from the period shows Grothjan standing next to the *Corsair* with the Government Girl logo applied: the image a young woman standing on the back of a giant eagle as it soared through the sky dropping two bombs, encircled by the words Government Girl in White letters inside a Red band.⁵⁶ The personalization of aircraft, first popularized during the First World War, continued into the Second with nose and fuselage art

£5,000 DOWN PUTS ONE FIGHTER UP! CHELSEA "SPITFIRE" FUND



HALF-A-CROWN FROM EACH
CHELSEA CITIZEN
OR
£15 FROM EACH STREET
WILL DO IT.

PENNIES or POUNDS
WILL BE GRATEFULLY RECEIVED BY
THE MAYOR OF CHELSEA
TOWN HALL, S.W.3

An RAF Spitfire Fund Poster. (Photo courtesy of the Imperial War Museum.)

reflecting both the personalities of the crews who flew the aircraft and the communities who contributed to the funding and construction of the same airframes.

Buy-a-Bomber

During the Second World War, the U.S. war effort required nearly \$296 billion of funding (57% paid for by public investment) and one way to raise these funds was through the sale of War Bonds and Stamps.⁵⁷ These monies were used to expand facilities and their subsequent production of every item of war from Liberty Ships, to tanks and jeeps, and of course aircraft.⁵⁸ One way to convince the U.S. public to assist economically in the war effort was the Treasury Department's "Buy-a-Bomber" campaigns. These campaigns were devised to enable communities and groups to contribute to the purchase of an individual aircraft which would be named, according to certain criteria, by those communities, be they States, Counties, Cities, Townships, Societies, or even schools and businesses.⁵⁹ The amount of money raised through the sales of War Bonds or Stamps determined the type of aircraft which would be "purchased."⁶⁰ Publications ranging from the *New York Times* to the *Weekly Reader*, were used as a venue to advertise the program, appealing even to the youngest in the war time society.⁶¹ The benefits for donating were not hard to see, as articles espousing the value of U.S. wartime airpower ran simultaneously with articles about the program.⁶² The contributors represented a broad cross section of the



The U.S. Navy and War Departments combined Government Girls Dedication (Photo courtesy of National Geographic.)

country ranging from women's clubs on the east coast to workers at the Hanford nuclear power plant (part of the Manhattan Project) in the west.⁶³

Like the *Spitfire Fund*, the amount of monies raised determined what item was purchased and named. Initially, \$275,000 would enable a community group to have a heavy bomber named (a B-17 or B-24); lesser funds could "purchase" a twin-engine B-25 *Mitchell* (approximately \$110,000) or a pursuit fighter or even a tiny liaison plane converted for medivac duties to help make the program more tangible.⁶⁴ Early in the war, aircraft bought by the program were flown to a local airfields and naming ceremonies were carried out with much fanfare, but as the necessities of the war increased this became impossible so the aircraft was painted up as it left the factory or modification facility and a photograph was sent to the community representatives or local newspapers.⁶⁵ According to aviation history John Fredrickson, author of *Warbird Factory: North American Aviation in World War II*, many of these aircraft seem to have disappeared from history and little is known of what became of many of them in the war effort.⁶⁶ Like all combat aircraft of the period, some were assigned to advanced aircraft training duties and deployed to combat units around the globe bearing this original name but others were promptly re-named by combat crews overseas with a sexier or more relevant title or artwork.⁶⁷ Based on Fredrickson's research, because the large numbers of donations made it impossible to paint every aircraft with an individual name, some of these "Buy-a-Bond aircraft never existed at all,

At North American [Aircraft Company] of Kansas, the ruse was carried out in the photographic department. A master photo of a generic B-25 was prepared [with] no serial number or other identifying marks. A calligrapher then inked the name of the contributing group onto paper. The image was photographed so the small cursive was then overlaid onto the generic negative [an early version

*of photoshopping]. The resulting 8x10 photo implied that there was an actual B-25 with white paint decorating the nose in celebration of their monetary contribution. Every group received a photo of the same airplane and nobody at the factory bothered to dab a brush into paint. Many people have attempted to research the combat fate of "their" bomber, only to be frustrated when told that no such airplane ever existed.*⁶⁸

Unfortunately, not all "Buy-a-Bomber" programs attracted the most patriotic of feelings in society, as some less-than-savory individuals took advantage of the public's largesse. On November 17, 1943, two men in Newark, New Jersey were convicted in U.S. Federal Court for embezzling more than \$13,000 of "Buy-a-Bomber" funds to pay for advertising at a Trenton, New Jersey radio station owned by the defendants.⁶⁹ Despite this unpleasant experience, the program in hindsight appears to have been successful and resulted the purchase of a wide variety of aircraft.

Some aircraft, like the B-29 *Eddie Allen* was named after famous Boeing test pilot Edmund T. "Eddie" Allen, was paid for by donations from the employees of Boeing Wichita and given to the U.S. Army Air Forces as a gift.⁷⁰ The *Eddie Allen* served its country well during the war, flying twenty-four combat missions before being so badly damaged that it was almost unable to return to its Tinian Island base.⁷¹ The damaged aircraft was never to fly again and its remains were left on the small Pacific Island.⁷² The B-17 *Spirit of South High* served as a state-side advanced aircraft trainer for aircraft commanders and navigators, only to crash after running out of fuel near Mabry Mill on the Blue Ridge Parkway in southwestern Virginia.⁷³ Others, while not as glamorous as B-17s and P-51s, included C-47 *Dakota* transports and L-5 *Sentinel* liaison aircraft.⁷⁴ By the end of the war, according to aviation historian Ray Bowen, at least 292 U.S. combat aircraft were bought with the program; although as previously mentioned, the exact number may

never really be known.⁷⁵ Ultimately “Buy-a-Bomber,” was just part of the larger effort to mobilize the U.S. home front’s economic and information efforts during the war.⁷⁶

Conclusion

The events of the Second World War, in the hindsight of nearly 70 years, are today seen by some as products of the Industrial Age rather than the 21st century’s Information Age.⁷⁷ But according to historian Victor Davis Hanson, the war is in fact a model for how great modern economic, information and technological based nations go to war.⁷⁸ Nations play on their strengths against their adversaries. And in the Second World War, for the British Empire, it was the information value of fighting on principle alone against the German and Italian armies, and for the United States, the economic “Arsenal of Democracy” that out produced the combined economic efforts of Germany, Italy, and Japan. War time fund raising programs like Spitfire Funds, Government Girls, and Buy-a-Bomber programs brought these two strengths together to help produce hundreds of thou-

sands of combat aircraft for the Allied airpower efforts. The rapid development of aircraft technology in the first half of the 20th century, evolving from wood and fabric, rotary engine aircraft in 1918 to metal airframes with high performance piston and jet engines in 1945, came at a high cost even with the use of mass-production. To meet the financial demands of the war effort, Britain and the U.S. turned to the time-tested methods of appealing to the patriotism of their respective populations to buy War Bonds and Stamps. The result of this combined information and economics efforts allowed the U.S. and Britain to out-produce the Axis state run economies in the total numbers of combat aircraft which had a significant impact on the winning Allied strategies in Europe and the Pacific. This was only possible with the financial support of the population of each nation and the cross fertilization of ideas between the two biggest democratic allies of the war.⁷⁹ Perhaps similar crowd-sourcing approaches would serve today as a valuable linkage between a military and civilian population in both the United Kingdom and United States that is becoming more separated in terms of views towards their national defense. ■

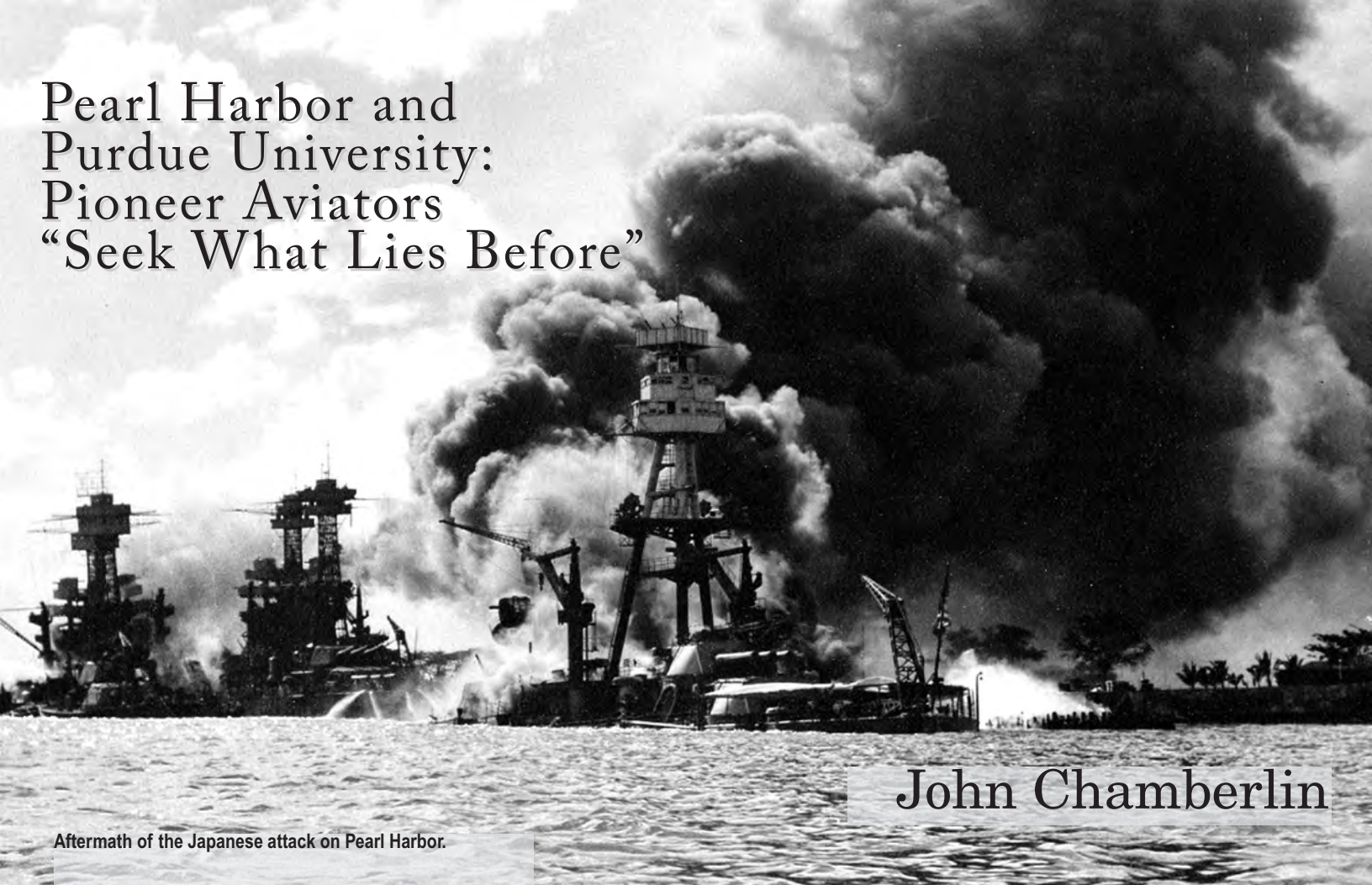
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Pearl Harbor and Purdue University: Pioneer Aviators “Seek What Lies Before”



Aftermath of the Japanese attack on Pearl Harbor.

John Chamberlin

On January 8, 1942, only a month after the Japanese attack on Pearl Harbor, two former Purdue Boilermakers exchanged salutes in front of the 14th Pursuit Wing Headquarters at a hastily repaired Wheeler Army Airfield. One was a holder of the United States' second highest decoration, Major General Frederick L. Martin, who had just pinned the same award on the other, Second Lieutenant George S. Welch. General Martin had won his Distinguished Service Cross in peacetime for his part in the Army Air Service's groundbreaking 1924 flight around the world. Until December 7, 1941, he had prospered in the Army Air Forces, rising to command the Army's "Hawaiian Air Force" of two Wings (18th Bomb Wing at Hickam Field and 14th Pursuit Wing at Wheeler) and outlying airfields at Bellows and Haleiwa.¹ Pearl Harbor had left General Martin's career hanging by a thread, yet catapulted Lt Welch into the role of hero when he shot down four Japanese aircraft during the disastrous attack.

General Martin had been relieved of command and was under investigation by the Presidential "Roberts Commission" sent to probe the attack and determine, as Senator Tom Connally had famously asked President Roosevelt "how did they catch us with our pants down?"² In fact, being chosen to conduct the ceremony decorating his former subordinates was the first hint that the Army was beginning to trust his judgement again. If General Martin had still been under suspicion of dereliction of duty, Major General Clarence Tinker, who had replaced him in command, would likely have presided. General Martin would soon emerge from under the cloud of Pearl Harbor and go on to larger commands. As for Lieutenant Welch, his heroism at Pearl Harbor brought him instant fame in an America desperate for some good war news and jump-started a career as a flying ace and test pilot. While there is no definitive record of Martin and Welch ever meeting again, they were not only joined by their alma mater and the formative experience of the Pearl Harbor attack. Connections between the two ran deep and wide. Not only did they share wartime duties in training and serving as the Army's face at bond rallies, but they also left the Army near the same time and moved to Los Angeles. They even died within months of each other and were buried a short walk apart in Arlington. Most significantly, however, Martin and Welch exemplified the line in Purdue's alma mater song "let us seek what lies before" by making pioneering contributions which advanced the field of aviation and America's global reach and power.

The General

Frederick L. Martin was born in Liberty, Indiana in 1882, the same year that Purdue University founded its School of Mechanical Engineering. He enrolled in that already prestigious program in 1904. While at Purdue, he had a reputation as being fascinated with military affairs. He was a member of the student military "club" (this was before the Reserve Of-



Maj. Gen. Martin pins Distinguished Service Cross on Lts Taylor and Welch (on left). (Photo from *Honolulu Advertiser*, January 9, 1942.)

ficer Training Corp program was founded by the National Defense Act of 1916, but nonetheless the Army detailed an officer to guide a corps of students in a semi-official training program). Martin was known for wearing his uniform at every opportunity, and the comments under his senior photo in the *Debris* yearbook called him “possessed with the idea that he must become a soldier.”⁷³ In 1908, he graduated and immediately commissioned as a Second Lieutenant in the U.S. Army.

One might expect someone who joined the same year as Orville Wright’s famous Army demonstration flights and who later became a senior Army Air Force leader to have been among the earliest cadre of pilots, perhaps even trained at the Wright School himself, as “Hap” Arnold had done. Martin’s path to flight was much less direct. His background in engineering made him well suited to one of the Army’s technical fields, but he was too early for aviation and instead joined the Coastal Artillery, where his mechanical and mathematical skills would be appropriate to the challenges of integrating new weapons and figuring firing solutions to target moving ships. He reported to the remote Fort Flagler in Washington State, guarding the entrance to the Puget Sound. During his ten years in the Coastal Artillery branch, Martin gained expertise in supply and logistics, a field vital to the suddenly growing Aviation division of the Signal Corps as America sought to project power in the First World War. He transferred to the Signal Corps as a Major in 1917, making it to Europe just before the end

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of the war, but still working in supply. It was not until 1920-21 that he trained as a pilot and began a series of commands involving flight and technical training.⁴

In 1922, rumors started flying that the Army was considering entry in the ambitious race for the first around-the-world flight. The Army Air Service (no longer a part of the Signal Corps, but a branch in its own right) was looking for ways to focus public attention and congressional budgets on military aviation. The idea certainly sparked enthusiasm in their own ranks. Dozens of pilots sent unsolicited letters volunteering to take part, including Jimmy Doolittle who included a proposed itinerary. After studying the issue, the Army determined that the World Flight was an achievable goal, requiring logistics and perseverance more than state-of-the-art aircraft. Aside from ocean crossings, no one day’s flying would be especially difficult, but there would be a lot of them, and the trip would demand tons of the pre-staged spare parts, such as dozens of propellers and surplus Liberty engines for frequent replacement. In October of 1923, the Air Service sent a call for recommendations from all thirty airfields and posts with Air Service fliers. Only pilots rated “superior” would be accepted. Recommendations poured in, with 119 pilots, the vast majority of them First Lieutenants, volunteering and being endorsed by their commanding officers. The list included such luminaries as Lt. John Macready, who had already won the Mackay Trophy for most meritorious flight of the year three years running, and three aviators who would later go on to have Air Force bases named after them, Lieutenants Barksdale, Cannon, and Tyndall. How Major Frederick Martin, then commander of Chanute Field, was chosen to command the flight is not recorded. He recommended two of his subordinates for the flight, but was not one of the three commanders who also recommended himself. Nor was he on the list of potential commanders discussed at headquarters on October 20, 1923. Nonetheless, when the list of pilots was drafted on December 10, Major Martin was at its head, likely due to his experience in logistics and advanced flight training.⁵

Although the flight did not require any new technology, no existing American airplane had all of the features the Army was seeking. After a search for a plane that could be modified, Major Martin and his three subordinate pilots tested the prototype “Douglas World Cruiser,” based on the Douglas DT-2 two-seat open cockpit torpedo plane, and provided input on changes needed for the four planes that would fly around the world. Though he likely considered it only as part of preparations for the World Flight, this marked Major Martin’s entry into the as yet ill-defined world of the test pilot.⁶

The original DT-2 was a rugged floatplane that used war-surplus Liberty engines, with a top speed of about 100 miles per hour and a range of only 274 miles. It had excellent capacity for extra weight, when not carrying one of the enormous torpedoes of the day. This allowed for the addition of multiple additional fuel tanks, which brought the World Cruiser’s range to over 2,000 miles. The other major modification was to the landing gear, enabling the planes to switch from floats for overwater portions of the journey

to wheels for use over land. After testing this configuration on the prototype at Langley Field in Virginia, Major Martin and his team recommended modifications for the production craft. In February 1924, they relocated to Santa Monica to test the World Cruisers as they came off the assembly line. After some minor re-fitting to improve balance, the team was ready to depart.⁷

By March 17, 1924, the four planes departed Santa Monica, headed northwest. Major Martin's command of the expedition lasted just over a month. On April 30, already separated from the rest of the planes after losing an engine and being stuck in the remote Alaskan village of Chignik, Martin struck a mountain on the Aleutian Peninsula in the fog. For ten days, the Navy and Coast Guard searched while the papers reported breathlessly.⁸ On May 12, the news broke that Major Martin and his mechanic Sergeant Harvey had survived and hiked to a fishing cannery near Port Moller, Alaska, living on the newly-developed concentrated emergency rations and at one point taking shelter in an abandoned trapper's cabin. The Air Service could not have asked for better publicity and intended to update the World Cruiser prototype to the specifications of the other planes, ship it to a meeting point, and have Martin rejoin his command.⁹

This proved to be a bigger logistical problem than anticipated, however. When it became clear that he would miss at least half of the around-the-world flight, Major Martin requested that "in fairness to Lieutenant Smith, who succeeded me in command, I think he should so continue and himself bring the flight back to the United States."¹⁰ The newspapers commiserated with Major Martin's misfortune and lauded his sportsmanship, and when the flight completed its historic mission Major Martin was there to greet them. A second aircraft had also been lost later in the attempt, but all of the fliers, not only the two crews that made the entire trip, received the Distinguished Service Cross.¹¹ Having led, even if not completed, this triumph, Martin was well positioned to assume a leadership role in the expanding Air Corps. By 1940, he was a (temporary) Brigadier General in command of the 3rd Bombardment Wing at Barksdale Field, Louisiana. In October Martin received his second star (also temporary) and orders to take command of the Hawaiian Air Force (HAF).¹²

The choice of General Martin for command of the HAF was appropriate, with his expertise in logistics and flight training, given Hawaii's primary role as a hub for providing trained crews and equipment to forward bases that were expected to bear the brunt of any fighting in the Pacific. While HAF was technically a combat force in case of an attack on the islands, planners saw that possibility as extremely remote. Nonetheless, General Martin took this mission seriously as well. He and his Navy aviation counterpart, Admiral Patrick Bellinger, put their heads and staffs together, and submitted the initially ignored, but later rather famous, threat estimate known as the Martin-Bellinger report on March 31, 1941. In this report, the aviation leaders correctly identified the type of attack that happened eight months later as Japan's most likely course of action should they choose to attack. They correctly

warned that a surprise attack by carrier-based aircraft supported by submarines might be launched before declaration of war and without any previous intelligence indications. They also identified the patrols that would be required to forestall such a surprise attack and that there were simply not enough aircraft in Hawaii to run sufficient patrols. Prophetically they warned "in a dawn air attack there is a high probability that it could be delivered as a complete surprise in spite of any patrols we might be using and that it might find us in a condition of readiness under which pursuit would be slow to start."¹³

As tensions with Japan grew, General Martin sent a follow-up through Army Air Force channels on August 20, 1941, requesting either an additional observation squadron or significantly more B-17s so that some could be used in an observation role. He also requested two combined medium bombardment and torpedo squadrons and a dive bomber squadron to attack any Japanese vessels detected.¹⁴ While Martin did receive a few additional B-17s, his orders were to send them on to forward bases as fast as he received them. Due to a parts shortage, he actually had fewer serviceable bombers by December than he'd had in August. Though Martin's superior, Hawaii Department commander Major General Walter Short, received a war warning message on November 27, 1941, both he and his Navy opposite, Admiral Husband Kimmel, considered the threat of sabotage far greater than an actual attack on Hawaii. Therefore, Short ordered Alert Number One, which, among other measures, famously consolidated aircraft in one area on each base to make them easier to guard.¹⁵

The Lieutenant

Like his superior, General Martin, Lieutenant George S. Welch enrolled in the Mechanical Engineering program at Purdue, though he'd come from much farther than Liberty, Indiana to do so. By 1937, when Welch arrived, Purdue's reputation as an engineering school had spread, and Welch came all the way from Wilmington, Delaware to attend.¹⁶ At Purdue, he joined the Delta Upsilon fraternity, a chapter that had been founded in 1914, after Martin had already joined the military.¹⁷ Like Martin before him, Welch was fascinated with the military during his time at Purdue, especially after an Air Corps member visited his fraternity.¹⁸ With war looming, Welch left Purdue during his junior year to join the Army Air Corps. Once again like his superior, Lt. Welch and his aviation career were profoundly influenced by Japan's attack on Pearl Harbor, though in a much different way.

George Welch was born George Schwartz in 1918, but his parents later gave him his mother's maiden name to avoid exposing him to the anti-German bigotry they had experienced during World War One.¹⁹ It confused journalists, who couldn't conceive of a son with a different last name from his father's, and thus assumed that George Schwartz Sr., was actually a step-father.²⁰ It also confused his later flying mates, many of whom reportedly believed that he was heir to the Welch Grape Juice fortune.²¹

According to a fraternity brother, Welch got his introduction to flying at Purdue from another brother who had a pilot's license, and Welch almost caused an accident his first time in control.²² His first formal training was in a Purdue aviation course associated with the Civil Aeronautics Authority (predecessor to the FAA), through which he received his private pilot's license.²³ Shortly thereafter, he was accepted onto a waiting list for Army Air Corps training. While waiting for an opening, he changed majors to Science, a decision that a colleague speculated may have been in order to take courses that would prepare him for the meteorology and navigation portions of his impending flight training.²⁴ In January of 1941, he earned his wings and commission and was then posted to Wheeler Field in Hawaii.

At Wheeler, Welch had a reputation for being a bit wild. For example, he had an airplane accident in May of 1941, which author Al Blackburn describes as an intentional disposal of a hated and obsolete BT-2B into the sea. However, contemporary news reports of the incident mention an AT-6 advanced trainer that was safely towed out of the water, so it is likely that this story was embellished.²⁵

The night of December 6, 1941, Lt Welch went out for a Saturday night on the town and then joined a late-night poker game at the Wheeler Officer Club. He had only slept a couple of hours when he was awoken by the sound of the attack.²⁶

December 7, 1941

That Sunday morning did not start well for General Martin. He had chronic ulcers and was experiencing an attack as he prepared for breakfast. Then it got worse. The sound of planes was not the flight of twelve B-17s he was expecting from the mainland after all. He heard a violent explosion and ran to the door just in time to see a second Japanese dive bomber release its payload. His command was under attack, an attack he'd planned for, but the plans were not yet operational. He didn't have the planes he needed, nor even the high-tech radar installation that his old branch the Signal Corps had installed, but not yet turned over to the combatant commander. The Navy's long-range patrols, using too few planes to accomplish 360-degree coverage, had seen nothing. Worse yet, his planes were bunched together in the open, good protection from sabotage, but disastrous now. Martin and Admiral Bellinger's assessment of the potential for a dawn surprise attack had proven correct, and the devastation and unreadiness was at least as bad as feared.

General Martin ran to the telephone and called his subordinate, Brigadier General Howard Davidson at Wheeler, and told him to launch his fighters as quickly as possible if he was not already doing so. General Davidson told him that they were doing their best, but Wheeler was under attack as well. General Martin rushed through the attack to his headquarters, where he found his staff already assembling. He contacted Admiral Bellinger to turn over his bombers to the Navy for use against the Japanese carriers, as the defense plan specified. Admiral Bellinger

told him they had no information where to send the bombers, so they remained on launch alert. After ordering the remaining planes dispersed, there was little Martin could do but watch in horror. The pain of his hemorrhaging ulcer attack was clear to his staff, and it likely got worse as the damage mounted.²⁷

Ironically, the flight of B-17s arrived, unarmed, in the midst of the attack. Short of fuel, they had little choice but to land at one or another of the Oahu fields (or in one case, on a golf course) and hope for the best. Four of the twelve were destroyed.²⁸ Finally, after hearing rumors of a carrier south of Barber's Point and reports that two pursuit planes had shot down Japanese planes leaving to the south, General Martin contacted Admiral Bellinger again, and when Bellinger had no orders for the Army observation or bombing planes, Martin dispatched them himself. They found nothing but an American cruiser.²⁹

If December 7, 1941 was the low-point of General Martin's career, it was likely the high-point, and definitely the most famous, of George Welch's. When awakened by the attack, he and his friend and squadron-mate, Second Lieutenant Kenneth Taylor, rushed from Wheeler to Haleiwa, where their squadron's P-40s were temporarily stationed. Haleiwa, as a small, previously emergency-only, landing strip was not attacked by the first wave. Welch and Taylor were able to get off safely, though they were armed only with .30 caliber machine guns, as there was no .50 caliber ammunition available at Haleiwa. They quickly spotted a group of about twelve Japanese aircraft attacking the U.S. Marine base at Ewa and fought back. Each shot down one dive bomber on their first run, and Welch's plane was hit just behind his seat. With one gun jammed, Welch returned to the attack and shot down a second Japanese plane as it was heading out to sea south of Barber's Point.³⁰

As the first wave of attackers had departed, Welch returned to Wheeler, where he was able to get fuel and .50 caliber ammunition, though armorers were unable to clear his jammed .30 caliber gun. Just then the second wave arrived, and Welch took off into the attack, shooting down a Japanese plane that was on Taylor's tail. During this engagement, he was hit three more times, including once each in the engine and propeller, shots that could easily have brought his plane down. Once again, as the wave departed, Welch chased one of the planes south and shot it down over water.³¹

The Aftermath

When the smoke had cleared, with the immediate clean up and readiness preparations complete, and the fear of a follow-up invasion fading, General Martin checked in to the base hospital for his hemorrhaging ulcers. It was there that he learned on December 17 that he, along with Lt. Gen. Short and Admiral Kimmel, had been relieved of command pending investigation, news that likely made his ulcers even worse.³² Meanwhile, the Sunday papers on December 14, all across America had broken the story of the victories won by the handful of fighters that had made it into the air. As Welch had scored the most victories, he be-



Maj Gen. Martin as commander of Second Division, Army Air Forces Technical Training Command, accompanies President Roosevelt on an inspection visit. (Photo from *St. Louis Dispatch*, April 29, 1943.)

came the main focus of these articles, and an instant hero. On December 22, the citation for his (not yet awarded) Distinguished Service Cross was published, giving exciting details of his exploits.³³ Within two months, at least 650 articles featuring Welch were printed in newspapers across the country. Meanwhile, General Martin testified to the Robert Commission and waited for word. By the time the orders for Lt. Taylor and Welch's decorations came through in early January, though it was not yet clear to the public, General Martin's reputation was already being rehabilitated in military circles, and he presided over the awards.

A Career Revived

On January 25, the Roberts Commission report was released in the Sunday papers. The report found Admiral Kimmel and General Short responsible for a lack of coordination and inappropriate readiness procedures. It did not mention General Martin, the other officer relieved of command, at all. It would not be until the post-war Congressional investigation, with security concerns no longer applicable that the public would learn of the Martin-Bellinger report and Martin's attempts to secure reinforcements for Hawaii. The Roberts Commission's report did end, though, with the simple proviso "subordinate commanders executed their superiors' orders without question. They were not responsible for the state of readiness prescribed."³⁴ The next day, newspapers began to speculate that General Martin might be given a new command.³⁵ On January 29, that prediction came true as General Martin was named to command the Second Air Force, headquartered at Fort George Wright, Washington. Second Air Force was a similar command to the Hawaiian Air Force, with an advanced training role for heavy bombers as well as a defense combat role. It was a considerably larger command, however, responsible for units throughout the Pacific

Northwest. Papers reported General Martin's assignment as its commander as "regarded in military circles as complete vindication."³⁶

This assignment didn't last long, as the Army scrambled to drastically increase the training pipeline. In July of 1942, General Martin was transferred to command of the Second District, Army Air Force Technical Training Command (AAFTTC), St. Louis, Missouri. Here, he was responsible for all non-flight (weather, maintenance, radio operation, etc.) training in the Midwest region. General Martin now had his largest command ever, though no longer even a token combat role. He served in this position for much of the rest of the war, absorbing greater responsibility when AAFTTC consolidated from five districts into three and changed the name of his command to Central District, his final military position.³⁷ General Martin appeared sporadically in the news, inspecting bases, and giving many speeches at military graduations, civic events, and bond drives.³⁸ Mostly, though, the papers were interested in combat stories, so General Martin was rarely headline news.

A Career Launched

George Welch, despite his much lower rank, became a minor celebrity. After his success at Pearl Harbor, he was sent to the mainland for a goodwill blitz. He was presented as an example of the value of the Civilian Pilot Training program and of Boy Scout heroism.³⁹ Welch's visit to the White House was national news, with the papers gleefully reporting the story that when he told President Roosevelt that he'd eaten three steaks after his hard day of dogfighting, the President looked at Welch's slim frame and "remarked that he could probably stand three more."⁴⁰ The War Department put Welch on a media and rally tour, recruiting for the Air Corps on the Gene Autry show and ap-



President Roosevelt congratulates Lt. Welch (From the *Wilmington News Journal*, May 26, 1942.)

pearing at war bond rallies with a cast of 14 other war heroes.⁴¹ Welch didn't seem to like it much, being quoted only a couple of weeks into the experience that he wanted to "get back to work" knocking down Japanese planes.⁴² Nonetheless, he continued the tour through July of 1942, stopping in General Martin's new headquarters at St. Louis for the Independence Day celebrations.⁴³

Upon his return to the Pacific theater, Welch moved forward to New Guinea where, in a media coup the War Department couldn't have planned better, he next saw action on the first anniversary of the Pearl Harbor attack, shooting down three more planes and earning his status as an ace.⁴⁴ He was constantly in the papers throughout 1943 as his score of confirmed kills kept mounting, keeping him in the race for top ace in the theater. By the end of the year, he had reached sixteen confirmed victories, as well as several "probables," and the rank of (temporary) Major.⁴⁵ In the course of this meteoric rise, he was given the callsign "Wheaties," by which he was known for the rest of his life. While some sources claim that this was in response to him being featured on a Wheaties box, he never was.⁴⁶ Though it is possible that he appeared in an undocumented trading card included in a cereal box, it is far more likely that it was in response to one of his multiple victory days. A simple comment that "he must have eaten his Wheaties this

morning" would have been enough for a fighter squadron to decide to dub him with a new name.

Unfortunately, while serving in the South Pacific, Major Welch added yet another parallel to General Martin that effected his ability to serve—chronic illness. Major Welch contracted malaria, though this was not general knowledge for some time. Even his time in Australia for recovery added to his media status, though, as he used it to woo and marry the beautiful daughter of an Australian World War One veteran, retired Major Evan Williams, bringing his war-bride Janette to the United States in December 1943.⁴⁷

In January of 1944, General Martin and Major Welch were both hospitalized in Florida with relapses of their chronic illnesses.⁴⁸ General Martin turned over his command temporarily to one of his base commanders, planning to return as quickly as possible.⁴⁹ His health problems continued for months, however. The news that with the big training push over, the Army was closing his command as it further consolidated AAFTTC made his career decision easy. He could medically retire without abandoning his post in time of war, which he did after 36 years of service, effective August 1, 1944.⁵⁰ Maj. Gen. Martin received the Legion of Merit upon retirement for his "distinguished services rendered during the meteoric expansion of the



Maj. Gen. Martin receives Legion of Merit upon retirement (From the *St. Louis Post-Dispatch*, August 7, 1944.)

A.A.F. training program.”⁵¹ He settled down in Los Angeles, staying out of the public eye aside from occasional appearances at Purdue University and World Flier Alumni functions.

What was an end for General Martin was the beginning of a new adventure for George Welch. After being released from the hospital, he transferred briefly to the Army Air Force Tactical Training Center as an instructor. Then the Army “loaned” him to North American Aviation in Los Angeles to serve as a test pilot for the P-51 Mustang. The planned four-month loan quickly turned permanent. By August of 1944, he was reported as being on terminal leave.⁵² Thus, he would end his service the same month and same place as General Martin. Rather than an end of public life, however, it was George Welch’s turn to advance aviation, much as Martin did in 1924.

Welch’s first groundbreaking airplane as a civilian test pilot was the XF-86 Sabre Jet, which he first flew in October 1947. He took it past the sound barrier during a dive on an undisclosed date in early 1948 (often reported as 26 April), marking him as the second supersonic flier, and the XF-86 as the second aircraft, to fly above Mach One.⁵³ In fact, there are persistent rumors that Welch actually accomplished this feat before Chuck Yeager, though if so it was not on a tracked flight and Welch never made such a claim publicly.⁵⁴ The F-86 went on to great success in the Korean War.



Maj (ret.) George Welch tests F-86 simulator. (From the *North Hollywood Valley Times*, November 13, 1951.)

He had less fortune with the F-100 Super Sabre, the last plane that Welch tested. Developed as an interceptor, it had slightly less maximum range than Martin’s World Cruisers of thirty years before, but a top speed over eight times as great. The Super Sabre was the first operational aircraft in the U.S. Air Force inventory to be capable of exceeding the speed of sound in level flight.⁵⁵ It also suffered from stability issues. As turbo jet and rocket-powered planes flew faster with thinner lifting surfaces, they became susceptible to a type of dynamic instability known as inertia coupling. This danger stalked test pilots at Edwards Air Force Base. Chuck Yeager suffered this loss of control in the X-1A in 1953 and gave up test flying for years thereafter.⁵⁶ On October 12, 1954 inertia coupling claimed George Welch’s life when his F-100 went out of control during pull-out of a high-speed dive. Even so, Welch’s death advanced aviation. After investigation, the F-100’s vertical stabilizer was re-designed. With the much larger tail, Chuck Yeager considered the Super Sabre twenty-seven percent more stable, and it went on to deployment as a fighter-bomber, most notably in the Vietnam war.⁵⁷

Maj. Gen. (retired) Frederick L. Martin’s death had preceded his more famous subordinate’s by only a few months. He died on February 24, 1954. These two Purdue Boilermakers, Pearl Harbor veterans, and aviation pioneers who sought, in the words of their alma mater song, “what lies before” are connected by one final and eternal link. They were laid to rest in Arlington National Cemetery just one section apart. They lie about 500 yards from each other, overlooking the capitol of the nation they served and defended.⁵⁸ ■

NOTES

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30. War Department, "General Orders, No. 2" (5 January 1942), Air Force Historical Research Agency working papers.

31. War Department, "General Orders, No. 2." Reports of these engagements may have been the source of General Martin's information hinting that the Japanese carriers might be south of Barber's Point.

32. United States Congress Joint Committee on the Investigation of the Pearl Harbor Attack, *Hearings*, vol. 22, p. 203.

33. See for example "Delaware Flier Among 6 Cited for Bravery; Destroyed 4 Jap Planes in First Actual Battle," *The Philadelphia Inquirer*, December 14, 1941; "Lieutenant Welch's Citation Reveals Machine Gun Jammed," *The Wilmington News Journal*, December 22, 1941. I can find no evidence for the oft-repeated

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50. "Gen. Fitzgerald Takes Over as Scott Field Commander," *St. Louis Post-Dispatch*, 15 March 1944.

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52. "Army Loans City Ace to Test Fighter Craft," *The Wilmington Morning News*, 15 July 1944; "Veteran of Zero Plane Combat Now Test Pilot," *The Los Angeles Times*, 2 August 1944.

53. "F-86 Sabre Jet: Historical Snapshot," n.d., <http://www.boeing.com/history/products/f-86-sabre-jet.page>. ; "Second Plane Beats Sound," *The Akron Beacon Journal*, 11 June 1948,

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55. "Production Fighter Tops Speed of Sound," *Popular Mechanics* (December 1953): p. 81.

56. Richard Tregaskis, *X-15 Diary: The Story of America's First Space Ship* (Lincoln: University of Nebraska Press, 2004), pp. 115-18.

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The B-32 Dominator Bomber and its Tragic History

The B-32 Dominator

William Head & James Tindle

Seventy-five years ago this year, Consolidated Aircraft began manufacturing the original 1,500 B-32s scheduled for production. Three prototypes had already been tested and would join the operational models. Due to program delays and the abrupt end of the war in August 1945, only 118 B-32s were ever completed and none exist today. In many ways, the largest and most dangerous bomber of World War II had an unfulfilled history. It also experienced one of the most infamous events of the war, and after the conflict ended.¹

Background

The B-32 *Dominator*, B-32-1-CF was developed to be a “heavy” strategic bomber during World War II. Designers intended this aircraft to supplement the nearly 4,000 B-29 *Superfortresses* built by Boeing and eventually replace the long range B-24 *Liberators* also built by Consolidated Aircraft. On 7 September 1942, the first B-32 prototype soared into the skies and 19 months later the first production models, designated Model 34, began rolling off the company’s assembly line near Ft. Worth, Texas. Numerous cost overruns and labor setbacks delayed the full deployment of this initial run, resulting in the 118 B-32 airframes that actually deployed to the Pacific Theater. Even these few planes only arrived in the final summer of the war and engaged in just a few actions. The Army Air Forces canceled delivery of the remaining aircraft when the war abruptly ended in August 1945.²

The history of the B-32 remains inexorably tied to that of its B-29 counterpart because Boeing had been developing the *Superfortress*’ engineering for two years when the U.S. Army Air Corps asked Consolidated Aircraft Company to design its own four-engine strategic bomber with similar characteristics in 1940. Engineers at Consolidated had already developed the so-called Model 33 which would evolve into the most numerous U.S. bomber aircraft built in World War II: the famed B-24 *Liberator*. Consolidated forged ahead to continue that successful streak by creating the Model 34 in hopes of supplanting the B-29 as the U.S. military’s primary strategic bomber.

For this new airframe, designers decided to create another twin tail, large “Davis wing” aft section, but make the fuselage and nose longer and more rounded than the *Liberator*’s. The engines were to be the same four eighteen-cylinder, 2,200 horsepower (1,600 kW) Wright Duplex-Cyclones Boeing intended to use in the B-29s. Original B-32 plans called for a pressurized cabin and remote-controlled retractable gun turrets comprised of fourteen .50-inch machine guns. The estimated gross weight of this high-tech design was roughly 101,000 pounds. The company and military contracted for two experimental prototypes, designated XB-32s, on Sept. 6, 1940, the same day as the contract for the Boeing prototype XB-29 was signed.³



B-32 Dominator, Consolidated Model 34.

The company's workforce built the initial XB-32, Tail Number (T/N) 41-141, in the Army Air Force's (AAF) Aircraft Plant No. 4 immediately adjacent to the Tarrant Field Airdrome a few miles west of Fort Worth, Texas near the south side of Lake Worth. The company leadership chose this location because the Consolidated Vultee Bomber Plant assembly line was six months behind schedule. This delay proved to be the first of many during the B-32 construction process, and the aircraft was unable to make its first flight until September 7, 1942. At the same time, Boeing was already well on its way to building its first 500 B-29s. In February 1943, AAF officials temporarily cancelled the B-32 contract only to restore it eighteen days later.⁴

The first XB-32 prototype in flight

Once Consolidated's labor force and engineers restarted their project, they encountered chronic issues with the pressurization system, the gun turrets, and the landing gear doors. Thus, management decided to omit these features from the first prototype. The aircraft had two R-3350-13 inboard engines and two R-3350-21 outboard engines, with all four power plants driving three-bladed propellers. To make things worse, this configuration

suffered frequent oil leaks and persistent problems with the engines' cooling systems. The B-29 had experienced similar engine problems. On a positive note, the inboard propellers' pitch had the ability to reverse and shorten the landing roll or to roll back during ground maneuvers.⁵

Eventually, as the airframe's final design evolved, designers armed this early *Dominator* with eight .50 inch machine guns in the dorsal and ventral turrets. In a rather unusual setup the prototype was also fitted with two .50 caliber and one 20 mm cannon firing rearwards from each outboard engine nacelle. Two .50 caliber machine guns sprouted from the wings' outboard propellers. Gunners operated these weapons from aiming stations inside the aircraft with remote-controlled periscopic sights that were coordinated by a sophisticated analog computer system developed by Sperry Gyroscope Company, Brooklyn, New York.⁶

In the following months, engineers began altering the form of the aircraft, creating a second prototype with a traditional stepped cockpit canopy. On 17 March 1943, the company and the AAF agreed to an initial production contract calling for the construction of 300 B-32-CFs. Unfortunately, development problems persisted, and on 10 May 1943, the first XB-32 crashed on takeoff after making a total of 30 flights. Later, on 2 July 1943, the second XB-32, T/N 41-142, finally took to the skies. At this point, AAF officials suggested numerous changes that included more conventional gun stations and a more stable tail section to replace the twin tail. At this point, the AAF envisioned purchasing 1,500 of the updated B-32s. Consolidated leaders decided to build 1,000 at their Ft. Worth plant and 500 more at their plant in San Diego, California.⁷

As it turned out, experts never completely solved the pressurization system problems that restricted the aircraft to operating at low to medium altitudes, and the designers ultimately eliminated the system from all production aircraft. Problems with the remote-controlled gun turrets resulted in modified armaments for the production aircraft that included ten manually operated .50 caliber machine guns housed in Sperry A-17 nose and tail turrets, two Martin A-3F-A dorsal turrets, one Sperry A-13-A ball turret, and an upgraded bomb load of 20,000 pounds (9,100 kg). Throughout testing the second XB-32 continued to have stability problems. In an attempt to resolve that issue, experts fitted a *Superfortress*-style tail to the aircraft after its 25th flight, but even this solution failed to resolve the problem. On 3 November 1943, Consolidated Inc.'s engineers eventually equipped the third XB-32, T/N 41-18336,

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The first XB-32 prototype in flight

with a newly-designed 19.5-foot vertical tailfin. The first production aircraft sported a vertical tail, like those from the B-29, until enough of the new tails were available.⁸

By late 1944, testing of the three prototypes was complete and AAF leaders decided to proceed with ordering 1,500 B-32s. Consolidated delivered the first production aircraft on 19 September 1944, by which time the B-29 was already in combat across the China and the Pacific Theaters of operations. The first B-32 crashed on the same day it was delivered when the nose wheel collapsed upon landing. Beginning on 27 January 1945, 40 B-32A-5, A-10 and A-15 block aircraft were delivered as unarmed TB-32-CF crew trainers.⁹

B-29 Bell Assembly Plant in Georgia

This setback for the B-32 did not totally ruin the new plane's chances to serve since the original AAF plan was to incorporate the bomber as an ancillary asset to be fully deployed only if the B-29 program fell significantly behind



B-29 Bell Assembly Plant in Georgia.

its development schedule. In the end, the major delays occurred in the *Dominator's* development while the B-29s enjoyed great success from the outset of the conflict. Initial plans for the B-32 to reinforce B-17 and B-24 units such as the 8th and 15th Air Forces prior to their redeployment to the Pacific also stagnated when only five production models had been delivered by the end of 1944. By this time, B-29 operations were well underway in the 20th Air Force which had received increasing numbers of new B-29s. By the end of the war, roughly 3,900 B-29s had served in the conflict.¹⁰

Finally Seeing Action

The B-32 got its big chance when General George Kenney, the commander of Allied air forces in the Southwest Pacific Area and the U.S. 5th AF, went to Washington, D.C. to request B-29 units for his area. Since B-29s were dedicated to strategic bombing missions, this request was denied. Not to be thwarted, he ask for B-32s instead. After a flight demonstration, the Army General Staff agreed Kenney could conduct a combat evaluation, and a test schedule of 11 missions. Upon completion of this process, plans called for the 312th Bomb Group's (312 BG) four Douglas A-20 Havoc Squadrons to be refitted with B-32s.

In mid-May 1945, project crews took three B-32s to Clark Field, Luzon, The Philippines, for a series of test flights with the 312th 386 Bombardment Squadron (386 BS). Starting on 29 May, they flew four combat missions against a supply depot at Antatet, The Philippines, and then two B-32s dropped 16 2,000-pound bombs on a sugar mill at Taito, Formosa (today Taiwan), on 15 June. Subsequently, on 22 June, a B-32 bombed an alcohol plant at Heito, Formosa, with 500-pound bombs. These raids all proved successful. However, on 23 June, a B-32 missed enemy Anti-aircraft Artillery (AAA) positions with its 260-



TB-32 trainer

pound fragmentation bombs. One last mission was flown on 25 June against bridges near Kiirun, Formosa.¹¹

The test crews were impressed with the bomber's unique reversible-pitch inboard propellers and the Davis Wing which gave the *Dominators* excellent landing performance. However, the crews made note of several problems, including the aircraft's noisy cockpit, poor instrument layout, limited bombardier visibility, and heavy weight. The nacelle designs in the bombers' engines proved prone to frequent fires, a problem which the B-29 had encountered as well. Despite these problems, senior leaders agreed the B-32s performed well overall during the test missions.

By July 1945, the 386th Bomb Squadron had completed its transition to the B-32s. The crews flew six more combat missions with the new aircraft before the war ended. On 13 August, the 386 BS, along with the B-32s, moved from Luzon to Yontan Airfield, Okinawa where they flew photographic reconnaissance missions designed to monitor Japanese compliance with the ceasefire and to gather information such as possible routes occupation forces could take into Tokyo.¹²

By the end of the War, the B-32s general characteristics included a crew of 10. It measured roughly 82 feet long and 32 feet high, with a wingspan of 135 feet. Its empty weight was 60,278 pounds, its loaded weight was 100,800 pounds and its maximum takeoff weight was 123,250 pounds. It had four Wright R-3350-23A 18-cylinder air-cooled radial engines generating 2,200 horse power capable of reaching a maximum speed of 357 miles per hour. It could cruise and 290 mph with a range of 3,800 miles a ceiling of 30,700 feet and a rate of climb of 1,050 feet per minute. Its armaments included ten .50 caliber machine guns and could carry 20,000 pounds of bombs. One unique feature proved to be AN/APQ-5 and -13 bombing radars for use during night raids or low-visibility missions.¹³

On 15 August, the Emperor announced to the nation, on a recorded disk, that Japan would do the unthinkable and surrender. This announcement came after several defiant officers and troops tried to seize Emperor Hirohito. The coup ultimately failed, in part through heroic subterfuge by the Emperor's secretary, and because the last B-29 raid on Tokyo took place that same night.¹⁴



Sgt. Tony Marchione

In spite of the surrender, which would be officially signed on 2 September, many Japanese soldiers, sailors, and airmen remained defiant. On 17 August, Japanese fighter planes intercepted several B-32s on a reconnaissance mission out of Yontan Airfield. During the two-hour engagement, the *Dominators* suffered only minor damage and none of their crew were injured. Stephen Harding says, "Though the B-32 gunners later claimed to have damaged one fighter and 'probably destroyed' two others, surviving Japanese records list no losses for that day or the next." Based on this attack, American commanders believed it was important to continue the reconnaissance missions over Tokyo so they could determine if the encounter was an isolated incident or an indication that Japan would reject the ceasefire and continue fighting.¹⁵

Tragedy struck on 18 August 1945 when four *Dominators* were assigned the task of photographing many of the targets they had inspected on the preceding day. Mechanical problems grounded two of the B-32s, and as a result, only two flew the mission. As the American bombers approached Tokyo, a formation of 14 A6M Zeros and three N1K2-J Shiden-Kai "George" fighters attacked. One of the Japanese pilots, famed ace Saburo Sakai, claimed years later that they acted in self-defense, believing the Americans intended to bomb targets below. On the other hand, another Japanese ace, Sadamu Komachi, later recalled that he and the other pilots simply could not bear to see American bombers flying serenely over a devastated Tokyo. Despite the damage suffered in this attack, both the *Dominators* managed to return to Okinawa, although not completely unscathed.¹⁶

The incident precipitated the removal of propellers



Before flying on a B-32, Marchione (front, second from right) had been on a B-24 Liberator crew that included his buddies Rudy Nudo and Frank Pallone (front, second and third from left, respectively).

from all Japanese fighters on 19 August as an additional term of the ceasefire agreement. The last B-32 combat photo reconnaissance mission was completed on 28 August, during which two B-32s crashed in separate accidents as a result of mechanical problems, killing 15 of the 26 crewmen involved. On 30 August, the 386th Bomb Squadron stood down from all operations, thus ending the combat career of the B-32.¹⁷

Looking back on the skirmish on 18 August, one could argue that the Pacific War ended much as it began, with a surprise attack by Japanese warplanes. The first was at Pearl Harbor in 1941, and the other was by Japanese pilots who refused to surrender less than four years later. During the latter attack, several of the crew members aboard one of the two B-32s were hit by pieces of glass and shrapnel. One of the casualties was Sgt. Anthony J. Marchione, who slowly bled out while helping others in his crew. To quote one source, "Marchione bled to death in the clear, bright sky above Tokyo . . . like so many before him had in the Second World War—quietly, cradled in the arms of a buddy." The *Dominator* crews claimed they shot down two Zeros and probably a Shiden-Kai aircraft but, Japanese records showed no losses.¹⁸

The after-action report recalled that a pair of bombers, including the *Hobo Queen II* (T/N 42-108532), had been cruising at 20,000 feet when the Japanese fighters first attacked, inflicting no significant injury on the *Hobo Queen II*. The Americans recalled, however, that Marchione's B-32, which was flying at 10,000 feet when the attack occurred, received much more serious damage. The first pass by the Zeros wounded the dorsal gunner. On the second attack, photographer SSgt. Joseph Lacharite was wounded in the legs. Sergeant Marchione immediately grabbed a medical kit and rushed to Lacharite's aid. As he leaned over his comrade he too received several grievous wounds

which ultimately proved fatal. His death, just one month short of his 20th birthday, was the final American combat casualty in the Pacific War.

Looking Back On a Young Life

Sgt. Marchione's story was, in many ways very typical of those who flew bombers in the Pacific in those last days. The young man from Pottstown, Pennsylvania began his career in the AAF began in November 1943, when at 18 years old, he enlisted in the U.S. Army. He wanted to be a pilot, but the AAF was experiencing a shortage of gunners and, later, reconnaissance photographers, so they decided to train him to be an aerial gunner. In November 1944, at Davis-Monthan Army Air Field in Arizona, he became a member of a B-24 *Liberator* bomber crew being transferred to Will Rogers Army Air Force Base in Oklahoma City, Oklahoma, for training in photo-reconnaissance. It was here that Marchione and fellow gunners Rudolph Nudo, Frank Pallone (both pictured above), and Raymond Zach completed a course to become photographer's assistants. In August 1945, their 20th Reconnaissance Squadron unit moved to Okinawa, which U.S. forces had captured less than two months earlier. It was there, at Yontan Airfield, that Marchione first saw a B-32 *Dominator*.¹⁹

As part of the 386th Bombardment Squadron, Marchione's unit were conducting anti-shipping sweeps of the South China Sea. They were also, if necessary, poised to fly combat missions against the Japanese mainland. However, when the Emperor surrendered on 15 August, everything dramatically changed. As mentioned above, the B-32s began executing daytime photo-reconnaissance missions to monitor Tokyo's compliance with the cease-fire and to chart a safe path to the capital city for Allied forces. Yet another purpose for "the photo-recon missions were to test



Hobo Queen II

the veracity of the Japanese,” since “according to the terms of the cease-fire, our [U.S.] planes were supposed to be able to fly freely over Tokyo. If they actually could, that would mean the Japanese weren’t planning any nasty surprises for the occupation forces.” Allied commanders wanted to be sure the Japanese would not employ their still-robust air defense system, which included early-warning radar stations, air raid sirens, and a battle-hardened fleet of fighter aircraft and experienced pilots ready to scramble to protect their homeland.²⁰

While engineers designed the B-32s with a belly camera mount just aft of its retractable ball turret, the 386th’s *Dominator* crews did not include aerial photographers at that time. In order to execute this kind of sortie, planners borrowed personnel from the 20th Reconnaissance Squadron, many of whom were actually gunners with training as photo assistants and commissioned navigators. These men were to “steer” the aircraft during the photo run by using the B-32’s Norden bombsight.

Those in the pool from the Reconnaissance Squadron, including Marchione and his boss, 2nd Lt. Kurt Rupke, were not popular with their comrades in the 386 BS. Many called them, “bastard crews,” because guys were taken out of their regular crews and had to fly with people they might not ever have met before.” The first missions to incorporate crew members from the 20th were on 16 and 17 August. They photographed the airfields at Natori and Koromiko, east of Tokyo, without incident. Lieutenant Colonel Salmon Wells, flying *Hobo Queen II*, was only 25, but was an experienced commander who had flown more than a dozen combat missions aboard a Douglas A-20 *Havoc*. In 1998, he recalled, that, on the 18th, he felt “uneasy,” since, “I’d been

at war for nearly two years by then, and I knew the Japanese were tenacious fighters who had no problem pulling dirty tricks on their enemies.” Wells also recalled, “I think I was subconsciously expecting something to happen.”²¹

As mentioned above, Wells and his fellow B-32 crew members came under fire on the 17th with only minor damage. As the B-32s returned to Okinawa, Wells radioed ahead a details of the attacks. Most of the Americans were left in “confusion.” As one pilot noted, “We were all stunned by the attack, because we knew there were high-level talks going on between us and the Japanese. This wasn’t supposed to have happened, and we were all wondering if the war was actually over.” Based on the intelligence previously gathered, Allied planners decided they needed to know if the attack was a fluke or if it represented a larger determination among the Japanese to keep resisting.

On the 18th, Mission 230 A-8 was to repeat the previous day’s flight pattern. First Lt. James Klein led the mission in *Hobo Queen II*, with 1st Lt. John R. Anderson piloting the second *Dominator*. In addition to its usual crew, each B-32 had a photo officer (usually a first lieutenant or captain), an aerial photographer (usually a sergeant or staff sergeant), and a photo assistant from the 20th Recon Squadron. Marchione, Rupke, and 29-year-old aerial photographer Staff Sergeant Joseph Lacharite flew with Lt. Anderson, all three on their first sortie aboard a *Dominator*.²²

After an early-morning briefing, during which the two crews received warnings about the possibility of Japanese fighter attacks, the Americans climbed aboard their B-32s and were in the air just before 0700 hours. Although Japanese radar tracked them on the approach to Tokyo,

the airplanes encountered no opposition during their photo runs. Then, as Klein recalled, “things went bad fast.” Air raid sirens sounded at the Yokosuka base. Japanese fighter pilots scrambled their aircraft to intercept the B-32s. Klein, in *Hobo Queen II*, received warning from one of his gunners that fighters were approaching from air fields below. At this point, “I turned the plane so I could see them, and sure enough, they were on their way up. I wasn’t too concerned about us, since it would take them a while to reach us, but Anderson was a good 10,000 feet below us.” He immediately radioed his counterpart but received no response. Anderson’s tail gunner, Sergeant John Houston, also saw the fighters, recalling that, “By the time I spotted them, they were already at about the same altitude as we were. I was facing backwards, and they were coming in from my 11 o’clock, three or four moving from my left to right. I just put the sight on them and started shooting. One fighter came so close I couldn’t miss. I gave him about 50 rounds and saw hits on the wings and fuselage. He kept coming until he was within about 100 feet, and then he just blew up.”²³

In the two top turrets, Sgt. Benjamin Clayworth (forward) and Sgt. Jimmie Smart (aft) also fired at their attackers. Smart’s rounds hit a fighter coming at them from 3 o’clock high. As it rolled beneath the big bomber, Clayworth yelled over the intercom as the enemy plane exploded. The nose gunner, Sgt. Burton Keller fired at aircraft making head-on runs after their passes at Klein’s aircraft. The only guns aboard Anderson’s B-32 not firing .50-caliber rounds were those in the belly turret, which had been inoperable even before the aircraft left Okinawa. In retrospect, this problem could not have changed the outcome of the situation because the Japanese were attacking Anderson’s B-32 from every direction but below. More than 30 years later, Japanese ace Sadamu Komachi recalled he got above and ahead of the B-32s, and entered an inverted dive from 12 o’clock high. His fire raked the bomber, knocking out the left inboard engine. It was almost certainly this attack that injured the first airman aboard Anderson’s plane when a 20-mm cannon round hit the rear upper turret, sending shards of plexiglass into Smart’s forehead and left temple. He yelled “I’m hit!” and clambered down from the shattered position.²⁴

As Marchione and Lacharite secured the camera gear, they heard Houston’s call about incoming fighters. Just before Smart descended from his perch, Lacharite stepped to the bomber’s starboard waist observation window, trying to spot the attackers. As he said in 2000, “Just as I did that, I saw a plane headed right at me. That’s when I got hit. Rounds came right through the skin of the plane and hit me in both legs. I got spun around and landed on the floor. I grabbed the cord from one of the barracks bags that carried camera gear and wrapped it around one leg as a tourniquet. Then I wrapped an intercom cord around the other leg as Tony pulled me to a cot raised a few inches off the floor.”²⁵

As Marchione repositioned Lacharite, he used the intercom to tell Anderson what had happened. The pilot replied he was sending help. As noted earlier, Marchione

had just turned back toward Lacharite when a 20-mm round punched through the right side of the aircraft and slammed into him, knocking him against the other side of the cabin. All this took place as Rupke arrived from the nose of the aircraft. In 1997, the lieutenant remembered, “When I got there, Tony was bleeding from a big hole in his chest.” Other eyewitnesses recalled that Marchione had suffered a groin injury. Rupke contended, “He was still conscious when I got to him, and I told him everything was going to be all right. He said ‘Stay with me,’ and I said ‘Yes, I’ll stay with you.’ I did the best I could to stop the bleeding and I held him in my arms.” As Rupke tried to save Marchione, Houston came forward from the tail position. He and Smart did what they could for Lacharite. Soon after, the navigator, 2nd Lt. Thomas Robinson, and radar officer, 2nd Lt. Donald H. Smith, arrived and gave Marchione oxygen and blood plasma. They also applied compression bandages to his wound, but about 30 minutes after being hit, the young gunner died in Rupke’s arms.²⁶

Soon after the attack began, the bombers dove toward the sea, providing them the airspeed to pull ahead of the Japanese fighters. The Zeros had completed ten passes, and while they failed to do much damage to Klein’s airplane, Anderson’s B-32 was in bad shape. Besides the dead engine and shattered turret, the B-32 had lost partial rudder control and was punctured in 33 places. Sometime around 1800 hours both aircraft landed at Yontan. They were immediately surrounded by what Sgt. Keller described as “every colonel in the Fifth Air Force, all wanting to know exactly what happened.” Their brother airmen on the ground rushed to Marchione, Lacharite, and Smart, gently conveying them out of the bomber through the bomb bay. Ambulances whisked away the injured men, while the other crewmen were sequestered for a full debriefing. This sobering event proved to be the final air combat of the war. As mentioned, the next day, as part of the cease-fire agreement, the Americans took further steps to ensure Japanese disarmament, including removing propellers from all the nation’s fighters. From that time on, Allied forces conducted flights over Japan without incident. As the preparations for the occupation of Japan continued, the first Allied advance parties landed on the mainland at Atsugi on 28 August, a week before the formal surrender.²⁷

At first, media members on Okinawa filed stories about the 18 August attack as fast as possible. However, once the formal surrender took place on 2 September, the clash was largely buried under news of the coming occupation. As one source stated, “The story got the biggest play in the hometown newspapers of those involved.” For example, The Fort Worth *Star Telegram* ran stories on Texans John Houston and Jimmie Smart, while several media outlets in Massachusetts reported on Lacharite, where he recovered from his wounds during the next several years. It was in Marchione’s Pennsylvania home where news hit hardest. His sister recalled,

When we heard the war was over, there was a tremendous celebration in town. Of course, our family participated in that. Then, on the 19th, it all changed. I was at work, and I

*had just gone to the ladies' room when my boss sent someone in to get me. When I walked out, he wouldn't tell me what the trouble was, only that I had to go home. Of course, when I got there my mother and dad were in pretty bad shape.*²⁸

As it turned out, members of the War Department sent a telegram saying Marchione had been killed in action, but the message gave no details of the action, nor did it mention the disposition of his remains. It was several weeks before Ralph Marchione, a shoemaker, and his wife Amelia received word that their son had been buried on Okinawa the day after his death. Three years later, on 10 June 1948, they were notified of his impending repatriation. On 18 March 1949, a casket bearing Marchione's remains arrived in Pottstown, accompanied by his Army buddies Frank Pallone and Rudy Nudo. Less than a week later, the last American to die in air combat in World War II was buried in St. Aloysius Old Cemetery with full military honors.²⁹

Conclusion

On 8 September 1945, AAF officials cancelled all B-32 contracts, ending production on 12 October. Leaders of the War Assets Administration (WAA) contracted with the Texas Railway Equipment Company to salvage and store about half of the B-32 airframes. Another 38 were flown to Kingman Army Airfield, near Kingman, Arizona for disposal by the Wunderlich Construction Company. Five of Kingman's *Dominators* had served with the 386th Bomb Squadron, 312th Bomb Group on overseas assignment. The last surviving *Dominator*, B-32-1-CF T/N 42-108474, was demolished in 1949 along with several other noteworthy aircraft on temporary display at Davis Monthan AFB after World War II.

Today, there are no B-32 airframes remaining. One XB-32 (T/N 41-18336) was used as a ground instructional airframe for fire-fighter training. One of the few surviving portions of a B-32 is a wing panel which is located at the Montgomery Memorial near San Diego, California, as a monument to aviation pioneer John J. Montgomery. A number of Sperry A-17 nose and tail turrets, unique to the B-32, survive in various U.S. locations. These included the National Air & Space Museum, the National Museum of the U.S. Air Force, the Commemorative Air Force, the National Warplane Museum in Genesco, New York and at least four private collections.³⁰

Throughout its brief history, the B-32 experienced a series of misfortunes. What might have been the most effective strategic bomber of World War II never truly got a chance to prove its worth. When construction began 75 years ago, it was constantly confronted by both administrative and mechanical delays. As a result, it did not deploy until the late summer of 1945 as the war was winding down and only flew a few missions. The compromises the aircraft's designers had needed to make limited its effectiveness. Instead of a pressurized cabin, remote-controlled gun positions, or advanced communications components, the bomber was forced to settle with the same old technol-

ogy. Ultimately, the B-32 failed to really augment or replace the B-29, ultimately taking a backseat to Boeing's famous *Superfortress*. When the Pacific conflict ended on 15 August, the *Dominator's* primary mission became to scout and map routes for occupation forces to use once the Japanese surrender was complete. Sadly, the tension of these days of humiliation for the Japanese erupted into violence on 18 August, resulting in the needless death of Sgt. Marchione after the war was supposed to be over.

The cessation of hostilities essentially meant the end of the bomber itself. By 1949-50, while hundreds of the B-29s continued in service and others were being taken out of mothballs, poised to fight in Europe and later in Korea, all 118 of the B-32s were gone for good. By the second half of 1950, while the B-29s were fighting again in Korea, the *Dominators* were only a memory. It was a melancholy end to what many thought would be a powerful and effective aircraft.

B-32 Variants

Of the 118 built and deployed the below list provides an inventory of all the variations of B-32 aircraft produced by Consolidated. Including training and prototype aircraft, 130 were airworthy. The AAF cancelled 170 partially built B-32s as well as orders for another 1,099 B-32-CFs and 341 B-32-COs.³¹

XB-32 Company Designation Model 33, three built, on first aircraft: Wright R-3350-13 (inboard) and Wright R-3350-21 (outboard) engines, three-bladed propeller, rounded, glassed nose, first two aircraft had a twin tail configuration. Second prototype was pressurized and had remotely controlled retractable gun turrets in the dorsal ventral positions, with a manned tail "stinger". Second and third prototypes had numerous tail variations installed, including a B-29 tail installation. First flown 7 September 1942.

B-32-1-CF Model 34 flight testing aircraft first flown 5 August 1944. Wright R-3350-23 engines. First two aircraft initially had modified B-29 tails installed. Installation of armament, single rudder tabs, radar bombing equipment (AN/APQ-5B and AN/APQ-13) and long range navigation equipment, 10 built.

B-32-5-CF Twin rudder tabs made standard. Last 11 aircraft converted to TB-32-5CF with deletion of all armament (openings faired over), deletion of radar bombing equipment, and deletion of long range navigation equipment, 15 built.

TB-32-10-CF Redesigned bombardier's entrance door, replacement of SCR-269-G Radio compass with AN/ARN-7 set, installation of engine fire extinguishers, and 25 built.

TB-32-15-CF Empennage deicer boots, four built.

B-32-20-CF Combat equipped aircraft. Pressurization system removed, scanning blister installed in rear fuselage, 21 built.

B-32-21-CF One B-32-20-CF converted to paratroop conversion. All bombing equipment removed and benches

- installed in rear bomb bay and rear fuselage.
- B-32-25-CF** Modified fuel system to allow auxiliary tanks in the bomb bay. AN/APN-9 LORAN, 25 built.
- B-32-30-CF** Variant with a stabilized Sperry A-17A nose turret, installation of countermeasure equipment (AN/APQ-2, AN/APT-1 and AN/APT-2) and improved APQ-13A radar bombing equipment. Seven built, last three aircraft flown directly to storage and scrapped.³²
- B-32-35-CF** Seven produced with increased ammunition; flown directly to storage and scrapped.

- B-32-40-CF** A total of ten were built and flown directly to storage and then scrapped
- B-32-45/50-CF** A total of 37 under construction. Partially assembled machines were stripped of all their government-furnished equipment and engines and were scrapped on site by the contractor.
- B-32-1-CO** Three aircraft the same as the B-32-20CF but assembled by Consolidated – San Diego. One aircraft accepted with the remaining two units flown directly to storage and scrapped.³³ ■

NOTES

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8. Jones, U.S. Bombers, pp. 106-110; Baugher, B-32 Bombers.
9. Jones, U.S. Bombers, p. 107.
10. For more information on the B-29, see Marcelle Size Knack, *Post-World War II Bombers*, (Washington, D.C.: Air Force Office of History, 1988), Appendix I b.
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 28. *Ibid.*
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Organizational Actions that Backfired

by Daniel Haulman

Introduction

The United States Air Force has developed a set of rules for its organization that allow the service to avoid confusing different organizations with each other; to make sure each of its organizations is recognized for its own lineage, honors, heritage, and emblem, and to encourage people to realize that one organization retains its heritage regardless of redesignation. These rules are defined in sets of Air Force Instructions. They were originally defined in various Air Force regulations. Those have changed in number over the years, but they are remarkably consistent in their intent and general outlines. Here are some of those rules: One organization should not have the same designation as another organization; One organization should not have the same emblem as another organization; An organization with an approved emblem that meets standards should keep that emblem; There should not be two wings with the same number; two organizations that were active at the same time should never be consolidated. Numbered air forces should not be redesignated to other nomencla-

tures and then be assigned to another numbered air force, which prevents or discourages their use as numbered air forces again. In the following paragraphs, I will discuss some violations of those rules, and the problems that resulted from them. Perhaps knowledge of these exceptions to the rules will help those in charge of making future organizational decisions avoid making the same mistakes.

Rule 1: One organization should not have the same designation of another organization.

The obvious problem with having two different USAF organizations with the same exact designation is confusing the two organizations with each other. An early example is the Eighth Air Force. The original Eighth Air Force is not the current Eighth Air Force. The original Eighth Air Force was later redesignated and is now the United States Air Forces in Europe, a major command. The current Eighth Air Force was originally the VIII Bomber Command of the original Eighth Air Force. People are tempted to believe that the current Eighth Air Force is the original Eighth Air Force, and it is not. The original Eighth Air Force and the current Eighth Air Force, each has its own separate lineage, its own separate set of honors, its own separate heritage, and its own separate emblem.

The two organizations cannot be consolidated since they were active at the same time. An organization cannot logically have two different commanders and two different headquarters at the same time. They remain separate organizations, but since the former name of one is the current name of the other, there is perpetual confusion.

Another example is the Twenty-Third Air Force. The original Twenty-Third Air Force was redesignated as the Air Force Special Operations Command. In 2007, a new Twenty-Third Air Force was constituted, and in 2008, the new Twenty-Third Air Force was activated and assigned to the Air Force Special Operations Command, the old Twenty-Third Air Force. In other words, for a time, the new Twenty-Third Air Force was assigned to the original Twenty-Third Air Force, although they are entirely separate organizations, each with its own lineage. That problem was eventually corrected in 2013, when the new Twenty-Third Air Force was inactivated and disbanded.

From a historical perspective, the old and new Twenty-Third Air Forces are confused with each other. If one asks when was the Twenty-Third Air Force established or first activated, there are different answers. Which Twenty-Third Air Force does one mean? The new Twenty-Third Air Force should have never been established, since there was already another organization that had had that designation.

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A final example of violation of the rule that two separate and distinct USAF organizations should not have the same designation, even if one was its past designation, is the Ninth Air Force. There is an original Ninth Air Force, which is now the United States Air Forces Central Command, assigned to Air Combat Command, and a new Ninth Air Force, also assigned to Air Combat Command, and both the old Ninth Air Force and the new Ninth Air Force are active at the same base. The old Ninth Air Force, now United States Air Forces Central Command, and the new Ninth Air Force, have been active at Shaw Air Force Base, South Carolina, since August 5, 2009, but each has its own separate lineage, honors, heritage, and emblem. If someone asks for a history of the Ninth Air Force, which Ninth Air Force does he mean? The two organizations are inevitably confused with each other, especially since they are at the same base, and both are assigned to Air Combat Command. A new Ninth Air Force should have never been established and activated when there was already a Ninth Air Force, even if the latter was redesignated as United States Air Forces Central Command at the same time. It made no sense. The result is perpetual confusion of the two organizations.

In history, there have been two Eighth Air Forces, two Ninth Air Forces, and two Twenty-Third Air Forces. The confusion of the organizations with each other, despite the fact that they were not called the same name simultaneously, continues to plague Air Force history. Such duplication should not be allowed to happen again.

Rule 2: One organization should not have the same emblem as another organization.

The reason for this rule is obvious. If two entirely separate USAF organizations, each with its own lineage, honors, and heritage, use the same emblem, people are naturally going to think that one organization is the other one. That might seem obvious to us, but it was not obvious to whomever made the decision to allow three new commands to have the same emblems as three old commands. It happened in 1992, when the Air Force inactivated five commands and activated three new commands. Within a few weeks, the Air Force inactivated Strategic Air Command, Tactical Air Command, Military Airlift Command, Air Force Logistics Command, and Air Force Systems Command. In the same few weeks, the Air Force activated the Air Combat Command, Air Mobility Command, and Air Force Materiel Command. The problem is that the three new commands used the emblems of three of the inactivated commands, even though there was no lineal connection between them. What should have happened is that three of the old commands should have been redesignated, if they were going to use the emblems of those old commands, or the new commands should have received emblems of their own.

In 1992, Tactical Air Command was inactivated, and Air Combat Command was activated at the same base. The two commands were similar in function, but not identical. Air Combat Command inherited the fighters of the Tactical

Air Command and the bombers and missiles of Strategic Air Command, which was inactivated at the same time. Since Air Combat Command was not the same organization as Tactical Air Command, it should have had its own emblem. Instead, Air Combat Command was allowed to use the emblem of the Tactical Air Command. Naturally, people were led to believe that Air Combat Command is the former Tactical Air Command. After all, its headquarters was at the same base and it used the same emblem. That was not true between 1992 and 2016. Air Combat Command was not the same organization. It had no history before 1992, when it was established and constituted. Tactical Air Command had no history since 1992, when it was inactivated. What should have happened, if Air Combat Command was to use the emblem of the Tactical Air Command, was that Tactical Air Command should have been redesignated as Air Combat Command, or Air Combat Command should have obtained an original emblem unique to itself. Since there was no redesignation, but one command replaced the other as a separate command, it should have had a different emblem. The problem was corrected in 2016, when Tactical Air Command was finally consolidated with Air Combat Command. The Air Force could have avoided the problem entirely in 1992 by redesignating Tactical Air Command as Air Combat Command.

Another example is Military Airlift Command and Air Mobility Command. In 1992, Military Airlift Command was inactivated, and Air Mobility Command was established and activated with the headquarters at the same base. Air Mobility Command, in other words, replaced Military Airlift Command, but they were entirely different organizations. Air Mobility Command inherited the transport aircraft of Military Airlift Command and the tanker aircraft of Strategic Air Command, which was also inactivated in 1992. If the Air Force had wanted Air Mobility Command to have the Military Airlift Command emblem, it should have redesignated Military Airlift Command as Air Mobility Command. Instead, an entirely new command was established and activated, but it used the emblem of the old command that had not been active since 1992. Naturally many people thought that Air Mobility Command was Military Airlift Command with a new name. After all, they used the same emblem, and the headquarters was at the same base. But Air Mobility Command was not Military Airlift Command, despite the fact both commands have used the same emblem, from 1992 to 2016. The Air Force finally corrected the problem in 2016, when it consolidated the Military Airlift Command with the Air Mobility Command. In 1992, the Air Force should have redesignated Military Airlift Command as Air Mobility Command, or it should have allowed Air Mobility Command to have its own emblem, before the two commands were consolidated. The Air Force could have avoided the problem entirely if it had merely redesignated Military Airlift Command as Air Mobility Command in 1992.

A third example is the fact that Air Force Materiel Command uses the same emblem as the Air Force Logistics Command, although they are entirely separate organizations. In 1992, the Air Force inactivated the Air Force Lo-

gistics Command and the Air Force Systems Command. At the same time, it established and activated the Air Force Materiel Command, to absorb the resources and functions of the other two commands. The new command was not the same as either of the two inactivating organizations but an entirely new organization dating back only to 1992. Yet, inexplicably, it was allowed to use the same emblem as one of the two inactivating commands it replaced. People naturally confuse the Air Force Materiel Command with the Air Force Logistics Command. After all, the emblem of one is the emblem of the other. But they are separate organizations. When the Air Force Materiel Command was activated, it should have obtained a new emblem, instead of using the emblem of one of the two inactivating commands whose resources and functions it assumed. If the Air Force had wanted the Air Force Materiel Command to use the emblem of the Air Force Logistics Command, it should have redesignated Air Force Logistics Command as the Air Force Materiel Command, instead of starting a new command from scratch by establishing it in 1992.

There was a simple and elegant solution to the problem of three active commands using the emblems of three inactive ones. The solution was partially implemented in 2016. The Tactical Air Command was consolidated with Air Combat Command, and Military Airlift Command was consolidated with Air Mobility Command, since the two pairs of commands were not active at the same time. What would also make sense would be to consolidate Air Force Logistics Command with Air Force Materiel Command. In that way, the use of the emblem of the older command by the newer command would be justified, because the older command would become the newer command. There are other advantages. Air Force Materiel Command would have more years of service and heritage, instead of dating back only to 1992. Air Force Logistics Command and Air Force Materiel Command have had similar functions. They have had the same headquarters base. The advantages of the consolidation would far outweigh any disadvantages. What worked for Tactical Air Command (consolidation with Air Combat Command) and for Military Airlift Command (consolidation with Air Mobility Command) could work for Air Force Logistics Command and Air Force Materiel Command, if they were consolidated. They were not active at the same time.

Rule 3: An organization with an approved emblem that meets standards should keep its emblem.

A USAF organization has its own unique lineage, honors, heritage, and emblem. It can move from one base to another. Its function and aircraft can change completely. It can have an entirely different set of personnel. It can be redesignated. What helps it keep its identity is its emblem. If a USAF organization already has an approved emblem that meets standards, it should keep that emblem, despite redesignation or movement or change of equipment or change of function or change of personnel. Changing an organization's emblem along with an organization's designation naturally leads persons to think it is a different organization.

A case in point is the Strategic Air Command, which was inactivated in 1992, but which was redesignated later as Air Force Global Strike Command and activated again. It is the same organization with a new name. There was no reason for the command, despite its new name, to have a new emblem, too. The command should have kept the emblem it used when it was Strategic Air Command, but with the new designation in the scroll. Having a new emblem naturally leads people to think that Air Force Global Strike Command is a new command that has no connection to the Strategic Air Command, when in reality it is the same organization. Since Air Force Global Strike Command does not use the emblem it had before it was inactivated as Strategic Air Command in 1992, people naturally are led to believe that the history of Air Force Global Strike Command goes back only to 2009, when the command was activated again. Reason: it got a new emblem when it was activated again.

Think of a lady who gets married. Her last name might change, but she is the same person. If she assumed a totally different appearance when her name changed, people would naturally think she was a different person.

As with a person, so with a command. Air Force Global Strike Command, since it is the same command that was once called Strategic Air Command (and Continental Air Command before that) should use the same emblem it had before, because it is the same organization. Ironically, Air Combat Command, Air Mobility Command, and Air Force Materiel Command were allowed to use emblems of other commands, in the case of the Air Force Global Strike Command, the command was not allowed to keep the emblem it already had. As a result, people have difficulty thinking that Air Force Global Strike Command is Strategic Air Command with a new name, because it also has a different emblem.

Rule 4: There should not be two wings with the same number active at the same time.

Many years ago, a decision was made to have only wing with the same number at the same time, because a standard wing structure was set up with each wing having like numbered assigned groups and support squadrons, albeit with different designations. Each wing has a standard set of groups and support squadrons with the same number of the wing to which they are either directly or indirectly assigned. That makes good sense.

What would be the problem of having two active wings with the same number at the same time? If there were two wings with the same number, there would be two sets of organizations with the same designations but they would not be the same organizations. For example, if there were an x wing, it would have an x operations group, an x logistics group, an x maintenance group, and an x medical group, and each of the standard type support squadrons assigned to those groups, such as x civil engineer squadron, an x security police squadron, and x communications squadron. If there were another wing numbered x, it would also have an x operations group, an x logistics group, an x

maintenance group, an x medical group, an x civil engineer squadron, an x security police squadron, an x communications squadron, and the like. There would be two x operations groups, two x logistics groups, two x maintenance squadrons, two x medical groups, two x civil engineer squadrons, two x security police squadrons, two x communications squadrons, and the like. Having organizations with duplicate designations leads to an inevitable confusion of one with the other. Which one is which?

That is what happened when the 16 Special Operations Wing was redesignated as the 1 Special Operations Wing, because there was already a 1 Fighter Wing. Since the 1 Fighter Wing already had a 1 Operations Group, a 1 Maintenance Group, a 1 Logistics Group, etc., the 1 Special Operations Wing's groups had to have different designations to distinguish them from the others. As a consequence, for the 1 Special Operations Wing, there is a 1 Special Operations Operations Group, a 1 Special Operations Maintenance Group, a 1 Special Operations Logistics Group, etc. Such extremely long and convoluted nomenclatures could have been avoided by keeping the 16th Special Operations Wing as the 16 Special Operations Wing, since there was already a 1 Fighter Wing. Everybody wants to be number 1, but sometimes it is not practical to allow that.

Rule 5: Two organizations that were active at the same time should never be consolidated.

On April 8, 1924, the Air Service consolidated two famous World War One aero squadrons, which was a big mistake, because those units, the 94th Aero Squadron and the 103d Aero Squadron, had been active at the same time. As a result, when one reads the lineage and honors history of the consolidated unit, he or she has no clear idea of who the commander was, where the headquarters was, to which organization the unit was assigned, what aircraft the unit flew, and what operations it performed, between August 1917 and August 1919, the period when both squadrons were active at the same time. For that time period, therefore, there are two sets of commanders, two sets of assignments, two sets of stations, two sets of aircraft, and two sets of operations. There are also two sets of honors, since the honors awarded to the two squadrons during World War One did not exactly match. The lesson was learned by the time of World War II, and, to my knowledge, neither the U.S. Army since the 1920s nor the U.S. Air Force since its founding in 1947, has consolidated two different organizations that were active at the same time. Two different organizations may be consolidated only if they were not active at the same time. If two units are consolidated, and they were not active at the same time, there is no need to have two lists of commanders, stations, assignments, aircraft, operations, or honors, as is the case of the 94th Fighter Squadron, formerly the 94th Aero Squadron and the 103d Aero Squadron. If those two squadrons had never been consolidated, each would have its own distinguished record

during World War One, and there would be another very old and distinguished unit to activate again.

Rule 6: One numbered air force should not be redesignated to another nomenclature and then be assigned to another numbered air force.

On October 1, 2003, two of the Air Force's numbered air forces were redesignated as expeditionary mobility task forces and then assigned to another numbered air force. The Fifteenth Air Force, one of the most prestigious numbered air forces in Air Force History, was redesignated as the 15 Expeditionary Mobility Task Force and then assigned to the Eighteenth Air Force. At the same time, the Twenty-First Air Force was redesignated as the 21 Expeditionary Mobility Task Force and then assigned to the Eighteenth Air Force. Two different numbered air forces were subordinated to another numbered air force. Why was this a problem? The action deprived the Air Force of two numbered air forces that it could have inactivated to be used again as numbered air forces, and other numbered air forces were eventually constituted and activated by the Air Force instead. It also made no sense to have a numbered air force like the Eighteenth with two previous numbered air forces assigned to it. The 15 Expeditionary Mobility Task Force was eventually inactivated and then redesignated back to its original designation of Fifteenth Air Force, and was available for activation again. The 21 Expeditionary Mobility Task Force was also eventually inactivated and then redesignated back to its original designation of Twenty-First Air Force. When given the opportunity to activate them again, the Air Force was reluctant to do so, since for a time they had been task forces assigned to another numbered air force.

Conclusion.

In this essay, I have focused on six general rules for Air Force organizations, and exceptions that expose why violation of these rules is problematic. One organization should not have the same designation as another organization. One organization should not have the same emblem as another organization. An organization with an approved emblem that meets standards should keep that emblem. There should not be two wings with the same number. Two organizations that were active at the same time should never be consolidated. Numbered air forces should not be redesignated to other nomenclatures and then assigned to another numbered air force. Following these rules helps avoid confusion of one organization with another, or thinking that one organization is really another one, and helps prevent confusion about the heritage of the organization. Knowledge of the exceptions to the rules, and the problems that have resulted from those exceptions, might help future Air Force leaders avoid making the same mistakes. That is my hope. ■

Concorde: Supersonic Icon-50th Anniversary Edition. By Ingo Bauernfeind. Havertown Penn.: Casemate, 2018. Photographs. Tables. Pp. 176. \$29.95 ISBN: 978-398159841-4

Ingo Bauernfeind has assembled a visually stunning tribute to the Concorde in recognition of the aircraft's 50th anniversary. The book is a multi-media work. Scattered throughout the text are eight QR codes that can be used to access short videos about various aspects of the Concorde program. The book is divided into about a dozen major segments, but each of these is further divided into one- or two-page essays on the aircraft, its development, and use. The authors of these essays are usually prominent figures from the Concorde program: test pilots, cabin crew, ground engineers, and passengers all contribute.

The written narrative does offer some interesting insights. The segments on early British and French work on supersonic aircraft are especially interesting. Several of my fellow docents describe the Concorde program as the product of "British craftsmen, French designers and a lot of German engineers." *Concorde* does little to dispel this generalization, although politicians of both countries also played a huge role in making the aircraft a reality and sustaining it financially long after any hope of profitability faded away.

But the credit for the book really belongs to the photographic contributors. Many photographs of the Concorde are truly iconic in the same way that the photo of the Wright Brother's first flight and an Apollo 11 astronaut standing on the moon are iconic. From virtually any viewing angle, the Concorde is a visually stunning piece of technology; a gifted photographer given license to arrange his shot to best advantage just cannot fail to "get the shot."

Unfortunately, Bauernfeind is so obviously smitten with his subject that his treatment is unbalanced. He dedicates two paragraphs to the tragic loss of Air France F-BTSC with her passengers and crew yet spends an entire chapter on the pipedream of restoring a Concorde to flight. There is little insight into the financial side of Concorde and almost total ignorance of the schedule slips and cost overruns that required massive bailouts by the British and French governments. Bauernfeind discusses the complications caused by certain countries restricting supersonic flight over their territory but fails to discuss how the airlines scheduled and routed aircraft to comply. Most disappointing was the complete lack of any discussion of the complex production and management efforts needed to successfully deliver this multi-national project. The reader is left to wonder if Concorde provided practical lessons that were used to facilitate the later Panavia Tornado and Eurofighter Typhoon projects.

For the true Concorde aficionado, *Concorde: Supersonic Icon* is a worthwhile read. The book uses quality materials, so the images are crisp and sharp; and the inclusion of the video links is a wonderful addition to the printed work. And

for someone doing general research into the post-World War II British and French aviation research programs, the book has value. Most importantly, anyone who enjoys looking at superb photographs of a beautiful airplane will enjoy this book.

Gary Connor, Docent, Smithsonian National Air and Space Museum Udvar Hazy Center



Thunderbolts Triumphant: The 362nd Fighter Group vs Germany's Wehrmacht. By Chris Bucholtz. Havertown Penn.: Casemate, 2018. Photographs. Illustrations. Pp. 272. \$37.95 ISBN: 978-1-61200-673-4

There are many reasons to like Bucholtz's book. He writes using a tightly efficient prose that flows effortlessly into the many quotations, report extracts, and testimonials that populate his work. His integration of the many photographs does an outstanding job of adding to the narrative. The editors did a superb job of placing photographs on the same page as the applicable narrative, so there is no rummaging through a separate photo section or index. Bucholtz also includes a section of color profiles of the more significant airframes mentioned in the book. Each profile contains a short descriptive paragraph on the airplane, its pilot, and its ultimate fate.

The narrative format is straightforward, following the 362nd Fighter Group from its inception in March 1943 through its initial combat sortie in January 1944 to its deactivation in August 1946. Each of the book's major sections presents a day-by-day description of the sorties flown by the unit. And the 362nd did every type of mission possible: escort; strafing; weather reconnaissance; and dive, skip, and glide bombing targets as varied as capital ships to bridges to horse-drawn carts and motorcycles. The mission descriptions, drawn from countless interviews, are riveting. The testimonials help the reader feel what it was like, for example, to bail out of a burning and out-of-control P-47 at minimum altitude.

Working my way through the book, I was struck by the sameness of the descriptions of each day's activities. The pilots took off and attacked their assigned target, bounced or were bounced by Luftwaffe fighters, saw compatriots shot down, and struggled home to land in marginal conditions at primitive airfields—only to do the same things two or three times again the same day—and most days thereafter until the war ended. The sameness assaults the reader until one realizes the pilots, maintainers, and ground staff may have felt just the same, only with an overlay of fear, fatigue and fatalism. *Thunderbolts Triumphant* does the best job of describing the mind-numbing sameness of tactical air combat in the European Theater of any book I have read.

But that is not to say that the book is perfect. The narrative

cries out for maps to trace the group's movements across continental Europe after D-Day. Bucholtz avoids any effort to offer statistics or analytics to describe the unit's activities. There is no list of fallen aircrews or the reason for losses (e.g., operational, human factors, material, enemy aircraft, or flak). There is no description of target numbers by type other than the dust-jacket notes. There is no mention of the transition from the Razorback to the Bubble-Canopy D models. While the title references Germany's *Wehrmacht*, the narrative provides enough information to justify replacing *Wehrmacht* with *Reichbahn* or *Luftwaffe* or *Kriegsmarine* for that matter. Bucholtz describes numerous P-47s that were lost due to oil leaks but makes no attempt to discuss if the leaks were common to all users of the Pratt & Whitney R-2800 or just those operating in primitive conditions.

Thunderbolts Triumphant is a solid product as it stands. However, I believe Bucholtz missed an opportunity to produce a truly outstanding work that would serve the researcher as well as the armchair historian.

Gary Connor, Docent, Smithsonian National Air and Space Museum, Udvar Hazy Center



Camel Pilot Supreme Captain D.V. Armstrong DFC. By Annette Carson. Havertown Penn.: Pen & Sword Books, 2019. Maps. Photographs. Appendices. Bibliography. Notes. Index. Pp. 248. \$49.95. ISBN: 978-1-52675-267-3

This book is the story of Captain D'Urban Victor Armstrong, a World War I British pilot who mastered the famous Sopwith Camel and became a pioneer night fighter before perishing in a crash two days after the November 11, 1918 Armistice. It shines a light on a now forgotten fighter pilot who was regarded as one of the most skilled Camel pilots at the time of his death at the age of 21.

Armstrong was raised on a farm in South Africa and enlisted in the local defense forces following graduation in 1914 and the outbreak of World War I. He transferred to the newly created South African Aviation Corps and sailed to England in November 1915 to undergo flight training with the Royal Flying Corps (RFC). Carson chronicles Armstrong's journey from childhood to flight training and then to combat with the RFC during the Battle of the Somme in 1916. With no surviving personal letters or accounts, Armstrong remains a somewhat mysterious figure throughout the book. Carson relied on period accounts and post-war reminiscences by fellow pilots to fill in the gaps and provide the reader with an intimate account of what Armstrong experienced during World War I. Of particular interest are the writings of Cecil Lewis, another RFC pilot, whose experiences often paralleled those of Armstrong. After the war, he wrote *Sagittarius Rising*, considered one of the great memoirs of a World War I pilot.

Following seven months of combat, Armstrong returned to England and served in several Home Defense squadrons. These units were established in response to German Zeppelin airship and Gotha bomber raids on London and other cities during the day and at night. During his time with Home Defense, he helped pioneer night flying techniques in the years before radio aids and night-flying instruments were developed.

In 1917 Armstrong was introduced to the Camel, which became as synonymous with British airpower in World War I as the Supermarine Spitfire would during World War II. Considered the most successful Allied fighter of the war, the Camel was credited with downing over 1200 enemy aircraft. However, the design characteristics that provided outstanding maneuverability (a rotary engine and the close placement of engine, fuel tank, guns and cockpit near the front of the fuselage) also made the Camel a difficult airplane to fly. Despite the Camel's fearsome reputation, Armstrong was one of many skilled pilots that mastered the plane. He was renowned for his aerobatic displays and was often sent to other Camel squadrons to demonstrate the airplane's unrivaled maneuverability. During the war, Armstrong was credited with several victories and awarded the Distinguished Flying Cross (DFC). His untimely death while performing an aerobatic display in a Camel occurred only two days after the end of World War I. Carson delves into the circumstances of his crash at the end of her book.

Camel Pilot Supreme is well illustrated with period photographs and color plates of the various airplanes Armstrong flew during the Great War. I recommend it to anyone interested in World War I aviation and the Sopwith Camel in particular.

As a docent at NASM's Udvar-Hazy Center in Virginia, I'm fortunate to show visitors one of the few surviving Sopwith Camels. Our F.1 model is similar to the one Armstrong flew and is a fitting memorial to him and the thousands of designers, builders, maintainers, and pilots who made the Sopwith Camel such an immortal part of aviation history.

Jeffrey P. Joyce, Major, USAF (Ret.)



Pacific Adversaries Volume One: Japanese Army Air Force vs the Allies, New Guinea 1942-1944. By Michael Claringbould. Kent Town, Australia: Avonmore Books, 2019. Maps. Photographs. Illustrations. Bibliography. Pp. 111. \$36.95 Paperback. ISBN 978-0-646-80314-2

Michael Claringbould is a three-dimensional, digital aviation artist and globally recognized expert in Japanese aviation. He is a contributing editor for *Flight Path* magazine and is the author of several books on the Fifth Air Force and World War II Pacific history. He is a member of

Pacific Air War History Associates. While growing up in Papua New Guinea in the 1960s, he became fascinated by Pacific air war aircraft. He has assisted both with the recovery and identification of such aircraft and has helped both the United States and Japanese governments to identify missing aircraft crews. He is founder of Aerothentic Publications and partner of Pacific Ghosts.

This first volume of a planned series presents 16 short stories of aerial warfare between the Japanese Army Air Force (JAAF) and the Allied air forces during the New Guinea and Solomons campaigns. Claringbould chose these particular accounts, because he was able to improve their accuracy by matching related Japanese and Allied records. He was also able to provide photographs of either the actual aircraft involved or of the same aircraft types. Excellent three-view and profile color drawings of the actual aircraft are offered for each chapter. Photographs of personnel involved in the various actions are also shown. Thankfully, he also provided maps of key locations described in the text.

In the autumn of 1942, the war was beginning to turn against the Japanese in the southeast Pacific area, primarily the Solomons and New Guinea. JAAF units were sent to the area to bolster Imperial Japanese Navy (IJN) air units already operating there. JAAF units first arrived in the theater in December. These operated independently from their IJN counterparts, using dissimilar doctrine, command structures, and aircraft. It is interesting to note that in combat actions described in the book, the JAAF-operated Ki-43 Hayabusa fighter was often wrongly identified by Allied pilots as the IJN-operated A6M Zeke. By April 1944, the JAAF had effectively ceased operations in mainland New Guinea because of the unrelenting and well-coordinated Allied air campaign to destroy Japanese air power on the ground as well as in the air.

In preparing these interesting combat stories, Claringbould has applied information from his private archival collection of Japanese and Allied sources. These include memoirs, unit histories, intelligence reports, and interrogation reports. He made an effort to provide a balanced perspective, but most of the accounts are clearly written from the Japanese viewpoint. This in itself provides an interesting contrast with preceding similar accounts of the Pacific air war (e.g., Hickey's *Revenge of the Red Raiders: The Illustrated History of the 22nd Bombardment Group During World War II* and Evans' *Warpath Across the Pacific: The Illustrated History of the 345th Bombardment Group During World War II*). His excellent portrayals of lesser-known JAAF aircraft will be of particular interest to modelers and enthusiasts alike. The book has no index—which hinders research a bit—but the book is definitely worth a look!

Frank Willingham, docent, National Air and Space Museum

Showdown in Western Sahara: Volume 1: Air Warfare over the Last Africa Colony, 1945-1975. By Tom Cooper and Albert Grandolini. Warwick UK: Helion & Company, 2018. Maps. Bibliography. Photographs. Illustrations. Notes. Abbreviations. Pg. viii, 64. 16.95 ISBN: 978-1-912390-35-9

This is a very nicely illustrated coffee-table sized monograph filled with an abundance of photographs that should appeal especially to aircraft buffs. As the title indicates, the backdrop is the twentieth century's continual—if obscure—wars in Africa's western Sahara region. The military and political history aspect of the book, however, is minimal except where discussions of air operations are concerned; this is what should be most interesting to aircraft enthusiasts in any event. Those already familiar with German and allied aircraft used in World War II will find it interesting to read about the Spanish and French Air Forces using them in counterinsurgency operations during the 1950s.

Imbedded in the narrative are a number of fascinating factoids. Fixed wing aircraft appear in the Sahara as early as 1911. In 1913, Moroccan insurgents firing on a Spanish Farman MF.7 became the very first ground combatants in history to shoot down an enemy aircraft. It's interesting to learn that B-26 Invaders were used in combat by the French in Algeria and that Spain's CASA-produced World War Two-era Heinkel 111s, Junkers 52s, and Bf 109s were flying combat missions into the late 1950s. The profile illustrations of many of these aircraft provide especially attractive complements to the photographs. There is also a brief discussion of Strategic Air Command's B-47 Stratojets and F-86D/Ls based in Morocco during the 1950s. An enlightening side note is the description of a fiery B-47 crash in Morocco with a nuclear weapon onboard. It was also a surprise to learn that Egyptian Colonel—and future president—Hosni Mubarak was captured in Morocco while providing assistance to Algerian forces during a brief war in 1963. In contrast, Moroccan pilots during the Yom Kippur War in 1973 flew F-5 sorties in support of Egypt against the Israelis, as did North Korean pilots flying MiGs.

There were unfortunately some deficiencies that detracted from the book. Considering the many different types of aircraft appearing throughout the monograph, there is oddly no index to assist the reader in locating any particular one of interest. Also, there were a number of spelling errors that should have been caught by the editors and not the reader. A repeated error especially caught my attention. The authors continually refer incorrectly to a Spanish Foreign Legion. The unit is properly the Spanish Legion. I speak with some insight, having been on ground operations with them in Bosnia and Spain.

However, what is important is that military aviation buffs will find enough to more than satiate their interest in the many aircraft used in the many conflicts in the western Sahara.

John Cirafici, Milford Delaware

Catkiller 3-2: An Army Pilot Flying for the Marines in the Vietnam War. By Raymond G. Caryl. Annapolis MD: Naval Institute Press, 2018. Appendix. Bibliography. Photographs. Index. Map. Glossary. Pp. xiii, 238. \$29.95 ISBN: 978-1-68247-352-8

This is a fascinating first-person account of an intense period in the Vietnam War and of an unusual mission, as told by an Army pilot who flew forward air control (FAC) missions for the Marine Corps. Perhaps I should have used the proper acronym for Caryl's mission—TACA (Tactical Air Controller, Airborne)—rather than FAC. However, not many readers outside of Marines would be familiar with the far less commonly known term. FAC was the designation used by the US Air Force, the service that flew the preponderance of close air support (CAS) missions. The TACA additionally adjusted artillery and naval gun fire.

Caryl's TACA experience was quite unique in the war. The Air Force would normally allow only its own FAC-qualified pilots to control USAF aircraft flying CAS. However, Marine leadership, exercising operational control of Caryl's US Army O-1 Birdog unit, forced the issue by authorizing the 220th Reconnaissance Airplane Company to direct fighters in combat to support US Marines and other units in Vietnam's I Corps area of operations.

Caryl begins his modestly told story with an interesting account of why and how he became an Army fixed wing aviator in the mid-1960s. Soon after he received his wings, he was thrust into the growing conflict in Vietnam.

While this is an account of the Vietnam War from just one person's experiences, it says much about what it was like for many who served in the war zone. I felt that Caryl's vignettes regarding his year of combat in Vietnam could have come right out of my own journal; they are a reflection of the experiences of so many others who served in a similar environment. His down-to-earth and unembellished style makes it easy to understand and appreciate those who fought in that part of southeast Asia. *Catkiller 3-2* is deceptively low-key, yet it has much to say about combat at the tactical level. Having said that, I hope that Air Force readers can forgive him for a little interservice rivalry when he takes a dig or two at Air Force aviators.

The only distraction, and it's a minor one, is the repetition of background information. Overall, however, the book should prove to be informative for anyone interested in the tactical air war in Vietnam.

John Cirafici, Milford Delaware



Tap Code: The Epic Survival Tale of a Vietnam POW and the Secret Code That Changed Everything. By Col Carlyle "Smitty" Harris (Ret). Grand Rapids MI: Zondervan, 2019. Photographs. Resources. Pp. 256. \$18.43. ISBN: 978-0-310-35911-1

A number of American pilots have written about their time as prisoners in Hanoi during the Vietnam War. A memoir by Colonel Carlyle "Smitty" Harris, a POW for two weeks short of eight years, differs because it intersperses chapters of his wife Louise's experiences during his time in captivity. The two of them exemplify the highest form of dedication to the nation from an American military family.

Sara Berry, an award-winning author and publisher, helped them finalize the book, which Harris began in the late 1970s. Berry is also CEO of Integrity Time, a Mississippi-based character-building educational program for children.

In the Vietnam War, Harris flew the F-105 and was the sixth American shot down in North Vietnam on 4 April 1965. He is best known for recalling a Second World War tap code that a sergeant taught him during an after-class chat at survival school. Harris taught the code to fellow POWs who passed it to others.

The tap code provided a communication system in an environment where guards enforced silence and prisoners spent long periods in solitary confinement. In his memoir *A.P.O.W. Story: 2801 Days in Hanoi*, Colonel Larry Guarino said that the code was "the most valuable life- and mind-saving piece of information contributed by any prisoner for all the years we were there."

Harris' account of his imprisonment parallels what other POWs have recorded over the past forty-five years. As was the case for most of them, he endured brainwashing, torture, starvation, untreated illnesses, and isolation at seven prison camps in the Hanoi area. In this book, he recalls the names and behavior of prison mates, focusing on their ability to comply with the Code of Conduct. He emphasizes the importance of a religious belief in maintaining a positive mentality. GBU—God bless you—was the most frequent message tapped out in prison and still exchanged today between former POWs.

Louise Harris also coped with challenges that she had never expected. She and two daughters had accompanied her husband to Kadena Air Base, Okinawa. When the US began to bomb North Vietnam, Harris' F-105 squadron deployed to Korat Air Base, Thailand. Five weeks after her husband was shot down, Louise gave birth to their only son.

As "the first MIA spouse to return to the States," Louise encountered newly established regulations that were unfair to her and the children. Consequently, she faced down the Secretary of the Air Force and leaders of the Veterans Administration, thereby clearing the path for wives of pilots lost in the future. She solved another major problem by phoning the president of the General Motors Company in Detroit—collect. After settling in Tupelo MS, she eventually played a role in planning procedures related to the POWs' release.

Harris gained freedom in 1973. He and his wife smoothly blended back together, raised a family, and hap-

pily settled in Tupelo following his Air Force retirement. They celebrated their sixtieth wedding anniversary on the book's publication date. He also explains how reuniting was, unfortunately, not as easy for several other couples.

Harris explains how Americans who spent time in Hanoi prisons share a deep friendship and enjoy frequent reunions. He recognizes them as a breed apart. The book is one well worth reading.

Henry Zeybel, Lt Col, USAF (Ret.), Austin Texas



A Spy in the Sky: A Photoreconnaissance Spitfire Pilot in WWII. By Kenneth B. Johnson. Havertown Penn.: Pen and Sword Books, 2019. Photographs.. Appendix. Index. Pp. vii, 158. \$34.95. ISBN: 978-1-52676-156-9

Flying alone and unarmed into enemy territory for the express purpose of gathering critical intelligence about the enemy in recent conflicts has been well documented. Less well documented have been the exploits of these brave men in past wars. Johnson, born in the Midlands city of Leicester, relates his experiences from his enlistment in the RAF at 18 to avoid conscription and probable assignment to the Army through basic training, flight training, assignment to fighters, and selection for Spitfires and photoreconnaissance.

A Spy in the Sky is a story of one man's journey from youth to adulthood, his efforts to deal with the class system and bureaucracy in Great Britain and the RAF, and a comparison of RAF methods of operations with the USAAF's.

Johnson presents some interesting stories of his flight training: how he overcame a serious issue with depth perception that had not been detected or, possibly, not acknowledged by the medical personnel; a failure on a critical flight check ride by the training squadron commander that is subsequently overridden by his instructor; and a cross-country flight that stretched into the night in a plane not equipped for night flying. He still believes numerous issues should have disqualified him, but he successfully graduated, was promoted to Flight Sergeant, and had his request for assignment to a Spitfire billet granted!

His elation at getting the assignment of his dreams was tempered, however, when he found himself assigned to No. 1 Photo Reconnaissance Unit. However, he took to the training and mission and excelled at the dangerous mission of flying missions very deep into Axis territory in the unarmed Spitfires. His descriptions of a few of the missions are brief. The book could have benefitted from further discussion of the missions and results and less of Johnson's continued amazement at his success given his social position.

In one instance, due to inattention, he was forced to descend from the comparative safety of his normal operating altitude due to a fuel flow issue. He successfully corrected

the problem, restarted the engine, and completed the mission. However, the problem caused him to deviate from his route. While regaining his original route he took additional pictures. Upon returning to base, he expected a reprimand and observed that, if he were an officer, he would have been congratulated on overcoming a potential disaster. His additional pictures revealed a previously unknown U-boat base and other critical infrastructure, but he was not presented with any commendation. This lament of mistreatment based on rank is a continuing theme throughout the book and can be distracting.

A further example occurred when Johnson and another pilot (an officer) were detailed for a short period to a USAAF photo-reconnaissance unit in the Mediterranean theater. During the flight from England to Tunisia, Johnson noted that the officer, acting as the flight lead, strayed from the planned route toward the Pyrenees. Johnson alerted him to the danger, and they successfully diverted to Gibraltar, using valuable fuel. The following morning, the officer, whose plane was down for maintenance, took Johnson's plane without telling him and flew on to Tunisia leaving Johnson stranded in Gibraltar. The detail in the Mediterranean presented Johnson with a stark contrast between the more relaxed approach to the mission and military life in general by the USAAF compared to the RAF.

Overall, I was a bit disappointed in *Spy in the Sky*. The length of the book did not allow for an in-depth exploration of any of the themes. For instance, there was no discussion of mission planning or encounters with enemy aircraft. There was a brief mention of a visit to the photo interpretation unit at RAF Medmenham but no real discussion of the relationship between No. 1 PRU and the users. On the positive side, Johnson's discussion of the relationships between enlisted men and officers in the RAF is interesting.

Al Mongeon, MSgt, USAF, (Ret.)



Russian Aviation Colours 1909-1922: Camouflage and Markings, Vol. 4 Against Soviets By Marat Khairulin. Moscow, Russia: MMPBooks, 2019. Diagrams. Illustrations. Photographs. Footnotes. Pp. 128. \$53.00 ISBN: 978-836528198-2

This is the fourth and final English-language volume in a series covering Russian military aviation from 1909 until 1922. The previous three volumes cover the Early Years, the Great War, and Red Stars, respectively. Khairulin wrote the first two in collaboration with co-author Boris Stepanov. Together, the four volumes provide some of the finest particulars on the topic of early Russian aviation.

The content of this volume deals with the period from 1918-1922, the most tumultuous period in 20th century Russian history. The internal strife following the collapse

of the empire catapulted the nation into a multifactional civil war. Coupled with international interventionist forces who were backing a variety of alliances and individuals, there was no shortage of disparate groups at war. This created a host of regional conflicts throughout the former Russian Empire. These ranged from the European Russian region to the far flung North and Far East expanses of Russia. Khairulin has provided a glimpse of not only the vast array of forces in this conflict, but also the nature of these groups' aviation assets. From his research into various archives and private collections, Khairulin has produced a volume that finally shows the scope of aircraft used during this turbulent period.

Volume 4 provides the reader with information on the vast array of groups involved in the conflict, along with their particular aircraft identification markings. Additionally, instances of personal emblems are shown. Interestingly, by this time a great many late-war aircraft from Germany, England, and France had made their way to Russia and were being used by all the combatant groups. There are, though, instances where Russian designs became a particular resource that was unique to the conflict. Among these were the Grigorovich flying boats which were used on the vast riverways.

As in the previous three volumes, this one contains a profusion of color drawings together with an immense collection of photographs, most previously unpublished. The work offers a prodigious amount of visual information for researchers and anyone interested in this period of aviation.

The series as a whole is not only unique but also one that provides a great deal of important historical information. It should be viewed as a major contribution to the subject of early Russian military aviation.

Carl J. Bobrow, Museum Specialist/National Air and Space Museum



Nimrod Boys. By Tony Blackman with Joe Kennedy. London, UK. Publisher: Grub Street Publishing, 2019. Photographs. Illustrations. Maps. 256Pp. \$45.00. ISBN: 978-191162127-0

Nimrod Boys is a direct follow-on to Blackman's earlier work *Nimrod—Rise and Fall*. The earlier book focused on the aircraft itself—its history, development, and capabilities. *Nimrod Boys* follows in the footsteps of other books in the Grub Street "Boys" series—gathering essays by people involved in the Nimrod program to offer personal anecdotes describing their experiences. The qualifications of these essayists are wide-ranging, from aircrew to engineers (maintenance staff) to senior leadership. It quickly becomes crystal clear that the contributors agree that the decision to scrap the Nimrod was a significant mistake on the part

of the David Cameron government, much as the UK government's decision to scrap the TSR2 decades before is viewed now as an equally flawed political decision. Even though the British government will retain a maritime reconnaissance capability with the P-8 Poseidon aircraft, Blackman and Kennedy see the P-8 as a platform that is significantly less capable than the cancelled Nimrod MRA4.

The essays offer personal and human insights to the Nimrod world. Given the extraordinarily long service-life of the Avro product, the stories also demonstrate how the RAF culture and community changed over time. When the Nimrod came into service in the 1960s, the RAF had global interests and commitments. The Nimrod's improvements in range, speed, endurance, payload, and systems over its Shackleton predecessor were revolutionary. And the basic Nimrod design had sufficient capacity to receive the numerous systems upgrades over its service life that allowed it to remain relevant throughout the Cold War and into the desert wars of the 1990s. Many contributors make clear that the failure of the AEW Nimrod project of the 1980s was not a failure of the Nimrod but was, rather, a failure of the government acquisition process and its favored system contractors and contributors.

Nimrod Boys is a very nice read. Printed on high-quality paper, it presents numerous photographs and illustrations to good effect. Many of the photos come from the contributors' personal collections making them both relevant and unique. Blackman and Kennedy have done an admirable job editing and standardizing the various chapters and essays. My only criticism is that the chapter essays were so edited that they felt sterilized. The beauty of first-person anecdotes is their humanness. And humanness seemed missing, or at least diminished, for much of the book. One of the early anecdotes revolves around a VIP transport sortie and an associated flight lunch foul up and how the crew resolved the problem. Another story describes a 40+ hour six-leg mission from the UK to Japan, and that author does an admirable job conveying the numbing exhaustion the crew felt when they finally arrived. But these examples were the exceptions, not the standard.

It is clear that Blackman and his contributors hold deep feelings toward the Nimrod and cherish their memories of this aircraft. The most heartbreaking photograph included shows aircraft being broken up and scrapped at their last operational base—in front of the men who flew and maintained them. And in front of the memory of the 21 airmen who perished flying the aircraft over its service life.

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Foundations of Russian Military Flight, 1885-1925.

By James K. Libbey. Naval Institute Press, Annapolis, 2019. Photographs. Maps. Index. Notes. Bibliography. Pp.264. \$38.00 ISBN: 978-168247423-5

English language books surveying the emergence of aviation and aircraft construction in Russia are few and far between. The reasons are intricate. Of course, one of the major reasons is that the primary source material is, predictably, in Russian. Coupled with the difficulty of archival research (much of which is available only in Russia), proper researching and writing on the subject are decidedly complex efforts. Nonetheless, over the past few decades more documents and material have become more available in the West. Granted, much of it has been written by Russian historians and researchers who have provided a steady stream of published works, some of which is outstanding.

This secondary source material has proved to be an option for scouring the State archives in Russia. This becomes problematic when relying on authors who wrote during the period of Soviet censorship. One excellent example of this is the two volumes by Peter Dmitrievich Duz, *Istoriya vozdukhoplavaniya i aviatsii v Rossii* (History of Aeronautics and Aviation in Russia). In such an instance, the researcher needs to understand the nuances of Russian and Soviet history to ascertain the facts and separate them from the political diatribe.

Much of what Libbey has presented in this concise volume is from secondary source publications. In many ways this work is similar to Robert A. Klimarx's 1960's *A History of Soviet Air Power* that looked at the subject from aviation's beginnings in Imperial Russia to the State-run enterprise of the Soviet Union. Libbey's book examines the development of aviation from aerostatics (balloons) to the initial Soviet production of aircraft built after World War I. The complex and ever-changing organization of the military air fleet is perhaps one of the least understood or appreciated aspects of the history of aviation in Russia. Libbey brings this to the forefront along with various personalities who would bring it all to maturity in the 1920s. The section covering World War I through the emergence of the Soviet Union's Red Air Fleet is concise, and the narrative is comprehensible.

The volume contains a series of well-known photographs, and the maps provide the reader with historical context of the massive geographical landscape that is Russia. As a concise review of the topic, this book provides a valuable text on the subject.

Carl J. Bobrow, Museum Specialist, National Air and Space Museum

Carrier Attack Darwin 1942: The Complete Guide to Australia's Pearl Harbor.

By Dr. Tom Lewis and Peter Ingram. Kent Town, Australia: Avonmore Books, 2013. Maps. Tables. Photographs. Notes. Appendices. Bibliography. Index. Pp. 368. A\$29.97 ISBN: 978-0-9871519-3-3

This is the second work by Lewis and Ingram. They previously published *Zero Hour at Broome* in 2010. Lewis has published more than a dozen books relating to the history of northern Australia. Ingram, an Adelaide-based businessman, has studied Australian military history for many years and has recently co-authored a two-volume set on the South Pacific air war.

The Japanese Imperial Navy attacked Darwin, Australia's closest significant port to what then was known as the Dutch East Indies (today Indonesia), on February 19, 1942, with a carrier-based force roughly equivalent to that which had struck Pearl Harbor several months earlier. Whereas the carrier aircraft limited their attack to one wave (two were sent against Pearl), Japan chose to follow up with an attack by medium-altitude, twin-engine bombers.

The authors' detailed analysis, partly based on Japanese records, offers a reasonable explanation as to why Darwin was targeted with such overwhelming force. They review the attack on a topical rather than chronological basis. Given the thoroughness of their research, this approach works well.

The first four chapters outline the strategic situation in the southern Pacific as Japan went about securing the Malay Peninsula, Singapore, and the Dutch East Indies, including one of the eastern-most islands, Timor. These chapters outline defensive measures taken by the Allies in a desperate effort to slow down the Japanese. After that, the authors break down the attack, first by exploring the targeting of the carrier-based aircraft with its emphasis on obtaining air superiority. Flights of Mitsubishi A6M2 *Zeroes* easily overwhelmed a small contingent of American-manned Curtiss P-40s.

Personal accounts and the results of a government-directed review provide the basis for analyzing various aspects of attack from the defenders' perspective. This analysis is generally broken down geographically. In the case of ships, the authors focus on various locations within the harbor. The same approach is used for land targets. Regardless of the target, it quickly becomes apparent that, despite the valiant efforts of the defenders, they simply lacked the means to resist with the meager weaponry available. However, in an effort to minimize losses—based on their experience at Pearl Harbor—Japanese aviators appear to have focused on survival rather than accuracy on many of their bomb runs.

Whereas the attack on Darwin had a profound impact on regional decision-making, the battle for Papua New Guinea and the Solomon Islands in the months ahead would have a far more greater impact on military operations emanating from Australia.



More than 15 appendices (about one third of the book) complement this highly detailed, yet easy-to-read account. Included is an appendix looking, in reasonable detail, at the more than 20 types of aircraft in the area at the time of the attack. The same approach is used for the appendix on shipping, where nearly 20 ships are reviewed. Many of the appendices focus on dispelling long-time myths associated with the attack.

Most books published in the US that discuss the fighting south of the Philippines in World War II's early months almost always focus exclusively on American forces. *Carrrier Attack Darwin* nicely complements those works.

Steven D. Ellis, Lt Col, USAFR (Ret.), docent, Museum of Flight, Seattle



An Incipient Mutiny: The Story of the U.S. Army Signal Corps Pilots Revolt. By Dwight R. Messimer. USA: Potomac Books, 2020. Illustrations. Photographs. Notes. Bibliography. Index. Pp. ix, 328. \$34.95. ISBN: 978-1-64012-212-3

It seems from the moment the US Army acquired airplanes, someone in the aviation community was trying to separate them from their overseers. The standard script starts with Brig Gen Billy Mitchell up to the Air Force's creation in 1947 as a separate service. This history includes Mitchell's feud with Army and Navy leadership about controlling airpower; his court-martial; development of daylight strategic bombardment theory and the airplanes to make that theory a reality (B-17, B-24, B-29, B-36); the USAAF's unwavering commitment during World War II to the theory despite early crippling losses and questionable results; and, finally, the effort to control tools for delivering the new atomic bombs. All this led Army aviation through a series of transitions: Air Service, Air Corps, Army Air Forces, and Air Force.

The Signal Corps acquired its first airplanes well before World War I—a hodgepodge of Wright and Curtiss machines (aircraft with entirely different control systems) acquired with no vision for their use. In the Army's defense, this was a brand new technology; and other militaries experimenting with airplanes went through similar growing pains regarding equipment, procedures, and training. One is struck with the Army leadership's casual indifference toward many aspects of a very dangerous business and the callous attitude toward that danger.

The 1913 mutiny itself took the form of a group of pilots preferring charges of neglect and malfeasance against the commander of the North Island Training School, Capt Cowan. Among other items, they charged that 1st Lt Patterson, a close friend of Cowan, was listed as a certified pilot who was drawing flight pay but had never completed any flight training! The mutineers hoped to draw suffi-

cient press coverage to embarrass the Army into doing something to improve conditions and perhaps separate aviation from the Signal Corps. To make matters worse, the Western military department judge advocate (and father of one of the mutineers), Lt Col Goodier, failed to follow procedures that would ensure an impartial investigation; he provided informal (and illegal) advice to the mutineers. The end results were Lt Col Goodier's court martial, reassignments for many aviators, and a shake-up in leadership in Washington. The separation the mutineers sought took several more years and a World War to make happen.

On the whole this is an excellent treatment of a little known chapter of US military aviation history. Several key figures (Cowan; Patterson; and Lt Col Reber, chief of military aviation, not a flier) come in for particularly harsh treatment, but Messimer strongly supports his arguments with documentation. In fact, this is one of the most impressive aspects of the book. Messimer obviously spent a great deal of time poring over old Army regulations, court-martial proceedings, and first-hand sources. At first blush, some of his conclusions appear biased; but his scholarship definitively supports his arguments. Lt Col Goodier's court-martial, which is central to the story, is thoroughly discussed and significantly aids the understanding of events. Chapter 19, which discusses the eventual separation of aviation from the Signal Corps, is the best written and most cogently argued portion of the whole book. Other parts, while factually as accurate, come across as more polemical because of language.

The book has some shortcomings which, if corrected, would make it an even more valuable contribution to understanding the early development of American military aviation. Pilot loss rate is cited as one of the mutiny's key causes. Comparing other militaries' experiences would be useful in determining if the American experience was a common one. The notes indicate all information on early aviation pioneer Benjamin Foulois was taken from his autobiography. This seems like putting far too much reliance on one person's perspective. Interestingly, the narrative suggests a more balanced viewpoint. There is a useful diagram of the Curtiss flight control system but none for the Wright system. Given the importance of the different control systems to the story, a similar diagram of the Wright system would be useful.

The book ends with an epilogue detailing what happened to all the key players. While not necessary it is very interesting. There is an extensive bibliography and will be an index (the reviewed book is a prepublication copy, so the index was not included).

This episode is the first illustration of a theme throughout Air Force history—separation and the quest for independence. Messimer makes a short comment at the end connecting these events to the Mitchell trial; but, given the foundational nature of this story, he could have expanded this aspect to provide a broader perspective. Even

without it, this book is an absolute must for any student of the Air Force.

Golda Eldridge, Lt Col, USAF (Ret), EdD



The RAF and Tribal Control: Airpower and Irregular Warfare between the World Wars. By Richard Newton. Lawrence KS. University Press of Kansas, 2019. Maps. Photographs. Notes. Appendices. Bibliography. Index. Glossary. Pp. xiv, 250. \$34.95 ISBN: 978-0-7006-2871-1

Following World War I, Britain was badly overstretched by debt, conflict in Ireland, and the added responsibilities of mandates. Cost savings were desperately required. This provided fertile ground for a different approach to internal security of its commitments. Therefore, during the 1920s and 1930s, the British adopted an aircraft-centric policy to police their newly acquired mandates. The policy of Air Control shifted this mission from the Army to the Royal Air Force and proved successful in what is now Iraq—much less expensive in money and casualties than the previous policy of punitive Army expeditions. This book is an academic study of this effort.

The focus of this study is the formation of the Air Control policy, how it was seen at the time, and its treatment in writings since then. To be very clear, this is not a tactical study. There are no statistics and no mention of sorties, tons of bombs, rounds of ammunition fired, friendly or civilian casualties, or collateral damage. Instead, Newton describes how the commander of the RAF, Hugh Trenchard, in response to Army and Navy efforts to reincorporate the RAF into their folds, sought a mission in an attempt to safeguard air force independence. He certainly found one policing the unruly tribesmen who were not good at paying taxes or obeying colonial laws. In place of the previous system that employed sizable ground expeditions backed by aircraft, a few aircraft along with small numbers of armored cars and ground troops under RAF commanders would now do the job.

Newton's research is extensive. At points, his study is a bibliographic survey of the subject of air control and air power in small conflicts (there are 43 pages of notes and a 20-page bibliography accompanying the 162 pages of text).

He stresses a number of points that have been largely overlooked: First, air control was much more than just small numbers of aircraft implementing the policy. "[M]ost technology-oriented researchers . . . [neglect] to mention or only gave short shrift to the fact that the squadrons were often reinforced by armored-car companies, indigenous paramilitary forces, local police, and on occasion Army battalions . . ." Second, there was firm civilian control of the air strikes. Air Control was clearly policing operations based on getting the population—really the tribal leaders—to comply with the mandates of the government with

concern for future relations with the population. Considerable care was exercised over what was attacked and destroyed and what was not. Third, Newton emphasizes the underrated, if not forgotten, British Special Service officers who acted as liaisons between the government and the tribes, providing a direct and credible link between the population and the RAF. They also were a vital source of intelligence acting as scout, air controller, and observer on the ground. Fourth, Newton also makes clear that Air Control was more than just air attacks that targeted houses, scattered flocks and herds, and destroyed crops. Non-kinetic operations were also important, especially in preventing problems from getting out of hand.

These operations remind the reader of present operations and difficulties with the same populations in the same areas. Newton warns, however, of the risk of taking this prior experience of Air Control out of context in what "has assumed near-mythical qualities among modern airpower enthusiasts advocating a preeminent role for airpower in small wars." Further, "in the Balkans, Iraq, and Libya, the myth of British control without occupation has sustained the airpower-can-do-it-alone school of thought." Newton makes clear that while Air Control was successful in the flat and open terrain of Iraq in policing the various tribes (42 major tribes between Bagdad and Basra) and against what the British (of the day) called less civilized peoples, it did not work as well in the urban areas of Palestine against more developed populations or in the mountains of the North West Territories and was not employed in India or Ireland.

Along the way, the reader gets to meet and learn about the prime participants in this area and subject during these two decades—a curious, diverse, and interesting lot: the "Mad Mullah" of Somaliland; T. E. Lawrence of Arabia; Winston Churchill; Hugh Trenchard; and the fascinating major authority on Arabs of the day, Gertrude Bell.

Air Control was successful in Iraq and it did provide a mission that allowed the RAF to survive. Newton also asserts that the RAF learned the wrong lessons from an experience that used obsolescent aircraft, sometimes without bombsights, in asymmetric operations against foes lacking aircraft or weapons more lethal than machine guns. This study certainly provides the background regarding unrest in this area, and how airmen devised a policy to deal with it.

Kenneth P. Werrell, Culpeper Virginia



North American P-51B/C & F-6C Mustang. By Robert Peczkowski. Sandomierz, Poland: MMP Books, 2019. Photographs. Illustrations. Pp. 160. \$39.00 paperback. ISBN: 978-83-65958-29-6

This book is aimed at the scale modeler. This is not a

surprise, as MMP Books grew out of the British modeling newsletter *Mushroom Modeling Magazine*. As such, this is an outstanding book; but there is also a great deal of information for the historian.

As the title says, the book narrowly focuses on the North American Aviation (NAA) P-51B/C (the P-51C is essentially a P-51B built in Dallas rather than Inglewood), and the F-6C photo variant of the P-51B/C. There are many well selected photos of the aircraft, both from World War II and of recent, rigorously correct, restorations of the aircraft. Included are a very large number of drawings and diagrams from the aircraft's maintenance manuals, as well as many newly drawn scale views. There are fourteen pages of excellent color profiles illustrating the colors not only of USAAF and RAF aircraft, but also of a Free French aircraft, one captured by the Germans, and one captured by the Japanese. The reproduction of color photos and drawings is excellent. Unfortunately, the black-and-white photos are generally somewhat muddy and lacking in contrast.

The early Mustangs were powered by the Allison V-1710 engine. The P-51B/C (Mustang Mk III) were the first production models to use the Packard V-1650 (RR Merlin) engine. The book quite properly begins with the Mustang Mk X, the British conversion of Allison-engine Mustangs to the Merlin engine. It is, conceptually, the predecessor of the P-51B/C. The book ends with the XP-51D, a single P-51B modified by cutting down the aft fuselage so a bubble canopy could be installed. This perfectly brackets the development history of the P-51B/C.

This said, on the first page of the introduction, Peczkowski makes two significant errors: First, that before making their pitch to the British Purchasing Commission (BPC) to build a fighter of their own design rather than the Curtiss P-40, NAA had done some preliminary design work on a fighter, making use of data from Curtiss. While NAA had, indeed, done preliminary design work, they did not obtain data from Curtiss until directed to do so by the BPC *after* the latter had accepted NAA's proposal. Further, NAA engineers have said that they made no use of Curtiss data when they did get it. Second, the Mustang cooling system did *not* deliver net thrust, though it did significantly reduce cooling drag. Peczkowski is to be commended for stating that the RAF happily accepted Allison-engine Mustangs and that they served effectively in the RAF Army Co-operation Command.

The discussion of the Mustang Mk X, while not long, is perhaps more thorough, complete, and better illustrated than any other available source. The selection of photos of the Mk X is extensive. The scale drawings of the various Mk Xs show excellent detail. The discussion, photos, and drawings of the two XP-51Bs and the single XP-51D are similarly excellent. For the historian, the page of comparisons with fighters contemporary with the Mustang and the speed vs. altitude graph were particularly interesting.

The description of the production P-51B/C is ex-

tremely thorough in illustrating the details of the aircraft and the details of all of the modifications—both on the production line and in the field. The chapter on the technical description reads as though it came straight out of NAA and USAAF manuals for the aircraft and, hence, is most likely as accurate as it can ever be. The one oddity of this rigorous description of all of the modifications to the P-51B/C is that the addition of an ADF system and its external loop to the P-51s used in China is well illustrated but never mentioned in the text! This text is supported by a very large number of illustrations from the manufacturer's and USAAF manuals. The chapter on the F-6C photo version is as well detailed as the rest of the book. This is an excellent source on these important fighter aircraft.

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Spy Pilot: Francis Gary Powers, the U-2 Incident, and a Controversial Cold War Legacy. By Francis Gary Powers, Jr., and Keith Dunnivant. Amherst NY; Prometheus Books, 2019. Notes. Photographs. Index. Pg. 296. \$25. ISBN 978-1-63388468-7

Fully one half of 20th century history is dominated by the Cold War. A deep appreciation of that era, however, presents some difficulty for those who have no direct memory of it and cannot truly grasp its magnitude and impact. It remains hard to imagine that it lasted an incredible forty-six years during which thermonuclear war was an everyday threat. Perhaps the details of that era are vague for many living today because it ended abruptly twenty-eight years ago. Consequently, it is somewhat of a mystery for many Americans (approximately one third) who never experienced the hold it had on lives. As one school teacher recently said, "It's hard for our students today to understand the Cold War. I don't think they connect with the fear factor." During those long years there were crises when the rivals came within sight of Armageddon. The early 1960s was one such time. In a relatively short period there was the Berlin Wall crisis, the Bay of Pigs fiasco, the Cuban Missile Crisis, and the U-2 "spy plane" incident of May Day 1960. This book is about the U-2 incident, its backdrop, and most importantly, Francis Gary Powers, the pilot who was shot down on that day and the lasting impact it had on him and his son. One of the book's two authors is that son, and his story of dealing with the legacy of his father and the criticisms he suffered upon return from Russian imprisonment, is a very important theme of the book.

The authors used recently declassified reports and personal materials, such as family letters from prison, to help clarify the misinformation that had shaped the public's erroneous perceptions about the pilot and the incident.

This was an era when the Soviet Union was the arch-enemy in an atmosphere of absolutes where there was no middle ground, where everything was black and white, with spies everywhere, and when anyone could be a traitor. Powers became a victim of that mindset. An opinion that gained traction as an explanation of how an extremely high flying American aircraft could be shot down by the Russians was that there must have been complicity or incompetence on the part of the pilot. False rumors suggested that he had actually defected or made an incredible error in piloting by allowing his aircraft to drop in altitude from 70,000 feet to a level where he could be shot down. This book addresses the abuse that Powers suffered in the news media and consequently in public opinion, and by high government officials. Many thought, unbelievably, that he had an obligation to kill himself before he was captured and interrogated. Ian Fleming—famous for his James Bond spy thrillers—was among those who were disappointed that Powers did not kill himself. At the highest level of the CIA, John McCone, the director during the incident, was convinced the U-2 could not be shot down unless Powers had allowed it to happen, therefore he refused to grant honors from the CIA that he had earned in making incredibly risky overflights.

As this book explains, it was many years after Powers' death that he was finally vindicated and recognized as a hero. This book was written to put an end to the misperceptions and outright falsehoods about the pilot and the incident, and to now bring closure to an important chapter in the Cold War. It is also a belated recognition of the heroism of Francis Gary Powers.

John Cirifici, Milford Delaware



A Carrier at Risk: Argentine Aircraft Carrier and Anti-Submarine Operations Against Royal Navy's Attack Submarines During the Falklands/Malvinas War, 1982. By Mariano Sciaroni. Warwick, UK. Publisher: Helion and Company, 2019. Photographs. Illustrations. Maps. Tables. Diagrams. Pp. 88. \$29.95 paperback. ISBN: 978-191162870-5

On April 2, 1982, Argentina invaded the Falklands (Malvinas) Islands and associated dependencies to establish the sovereignty it claimed over the South Atlantic islands. A mere three days later, the United Kingdom launched its largest combined arms operation since World War II to liberate the islands. Argentine forces surrendered 74 days later and returned control of the contested territory to the UK. Although both countries declared the area a war zone, neither declared war on the other. Both established complex rules of engagement to limit the spread of the conflict but used the full range of conventional military capabilities at their disposal to secure victory. As events demonstrated, while the personnel of both countries

showed extraordinary bravery fighting in extremely inhospitable conditions, Argentine forces were ill equipped to successfully operate against the British.

Sciaroni's book offers a detailed account of one small facet of the conflict—the use of the single Argentine aircraft carrier, *ARA 25 de Mayo*, as an offensive weapon at the initial stages of the war and as an anti-submarine platform throughout the later stages of the conflict. As the book makes clear, the anti-submarine effort was really an exercise in self-defense and survival against the British submarine force which demonstrated its capability by sinking the cruiser *ARA General Belgrano*.

While relatively short, the book does an excellent job of describing the anti-submarine capabilities of the Argentine Navy in 1982. Sciaroni shows the Argentine Navy clearly understood the capabilities of the opposition and, at some level, knew they were ill-equipped to counter the Royal Navy. Using used equipment secured primarily through the United States Excess Defense Article program, the Argentine fleet's ships and aircraft were operating beyond the end of their service life; and the Argentines struggled to meet minimal operational requirements. The UK-built carrier previously served in the Royal Navy as *HMS Venerable* during World War II and, later, with the Royal Netherlands Navy as *HNLMS Karel Doorman*. While it had received numerous upgrades (e.g., angled flight deck), its propulsion system was unreliable, and it was incapable of launching its fixed wing complement of strike aircraft without the help of a 25-30-knot wind over the deck. Anti-submarine aircraft (S-2 Tracker, S-61 Sea King, and SP-2 Neptune) had received modest system upgrades but were incapable of the sustained operational requirements of armed conflict. Argentine aircrews demonstrated significant bravery just by flying the aircraft without considering they were flying against an extremely well-equipped and well-trained opposition.

Sciaroni's research is extensive and detailed. He included numerous excerpts from personal interviews with senior leaders and line aircrew. Using Britain's Freedom of Information process, he obtained operational reports from Royal Navy nuclear and conventional submarines operating in the theater. Sciaroni also makes a strong case showing that there was at least one submarine from a third-party country operating in the theater during the conflict.

This large format paperback is printed on high-quality paper, so the illustrations are very crisp and clear. However, the translation from the original Spanish is a bit awkward at times, the editing left a lot to be desired, and the binding broke apart by the end of the first read. Despite these problems, the book is a good read on a little known facet of the Falklands/Malvinas War.

Gary Connor, Docent, Smithsonian National Air and Space Museum's Udvar Hazy Center



Boeing B-17 Fortress in RAF Coastal Command Service. By Robert M. Stitt. Sandomierz, Poland: Stratus Publications (MMP Books), 2019. Appendices. Photographs. Illustrations. Maps. Diagrams. Index. Pp.224. \$53.00 paperback. ISBN: 978-83-65281-54- 8

Robert Stitt was born in Kent, England, and spent much of his youth plane-spotting at airports. Following technical training with Hawker Siddeley Aviation, he managed projects at former South-West Pacific battlefields. There, he developed a keen interest in aviation archaeology. After moving to Canada, he documented a variety of specialty aviation types and also authored in-depth articles on rarely covered aviation topics. Stitt has published some twenty-five works to date.

This book is an eclectic compilation of many facets of relatively unknown RAF Coastal Command service. He chronicles a story, often obscured in current-day texts, on the battle of the Atlantic, describing how a small number of aircraft played a critically important role by countering the U-boat threat to Britain's convoy lifeline. This occurred during the most critical period of the Battle, from autumn 1942 to spring 1943. Later in the conflict, these aircraft also helped provide valuable meteorological data for allied weather forecasting. Soon after the start of the war, there was an essential requirement for regular, reliable weather intelligence. This was especially important for long range sorties over lesser known areas of the North Atlantic and Arctic Oceans.

While not having the range and payload of the subsequently used B-24 in Coastal Command service, the B-17 was particularly well suited to remotely based operations which were established in Northern Scotland, Ireland, and the Azores—close to operational areas. The aircraft was easy to fly, stable, dependable, and had a good service reputation. Stitt covers operations in various ocean sectors with early B-17C models (Fortress I); B-17E (Fortress IIA); B-17F (Fortress II); and, finally, B-17G (Fortress III) models. He traces various configurations of armament, Air-to-Surface Vessel (ASV) radar and antennae, ordnance payloads (depth charges and bombs), and even camouflage.

Stitt presents vignettes, often related by participants, on topics such as attacks and battles with U-boats, search and rescue operations, the perils of flying at high altitude, flight testing of various electronic and armament configurations, battling with the elements as well as the enemy, crew training, aircraft and crew vulnerabilities, life on the ground at remote bases, and the often fatal results of equipment failures and accidents. One can find additional detail on topics such as aircrew profiles and casualties, transatlantic ferry documentation, Coastal Command tactical instruction, and Air Ministry bomb disposal via QR codes to material at the MMP Books website.

I liked the book! Its main drawback is the use of a light gray and smallish font that is somewhat hard to read, especially in the italicized photo captions. The formatting

also seems to affect the clarity of most of the black-and-white photos. That being said, the book is a great read. It is a good source book for researchers covering a variety of topics including aircraft histories and specifications, operational profiles, and more. It is also of interest to modelers since it encompasses aircraft coloring, numbering, camouflage schema, and system configurations. It is a good reference on one of the lesser-known aspects of the air war for the bookshelves of aviation enthusiasts, historians, and researchers alike.

Frank Willingham, docent, National Air and Space Museum



Hitler's Personal Pilot: The Life and Times of Hans Baur. By C. G. Sweeting. Place: Potomac Books, 2000 (2019 reprint). Tables. Diagrams. Illustrations. Photographs. Notes. Index. Pp. xv, 334. \$21.95. ISBN: 978-157488-402-9

A quick internet search reveals a dozen memoirs written by people who served or worked directly with Hitler. These books often show a more intimate and sympathetic portrait of the famous dictator than is offered in broader histories. This book seeks to add to our perspective and understanding of Hitler and those around him by describing the life of Hitler's personal pilot. From the 1932 German national elections, when Baur was assigned to fly Hitler, until the latter's death, Hitler is known to have flown with another pilot only once. This is amazing considering Hitler was one of the first (if not the first) politicians to utilize air travel as a campaign tool, and he was a frequent flier. Baur was a trusted subordinate and member of the dictator's inner family circle, although never a power wielder. This should inform the structure and content of the book with a focus on the more personal and intimate aspects of life in Hitler's entourage. That is not, in fact, what this book offers.

The book is actually a short history of, and commentary on, Hitler and Nazi Germany with occasional reference to the titular main character. Baur is a bit player in most of the book. He features most prominently in the beginning (before Baur began working for Hitler) and the end (after Hitler was dead). In the majority of the book, Baur shows up periodically for a paragraph or so with a cursory description of a trip to pick up a foreign head of state or some limited information about operations of the leader's squadron. The rest of the book is devoted to a fairly commonplace history of the rise of Nazism in Germany and the course of the regime to the end of World War II. There are occasional anecdotes about life in Hitler's inner sanctum, but these are not relevant to either the professed topic (Baur) or the actual one (Hitler and the Nazis).

This book is supposed to be a biography, and it's barely that. The information specific to Baur could be condensed

to a short magazine article and, even then, a not very informative one. In the introduction, Sweeting states Hitler turned to Baur for all kinds of aviation-related advice out of proportion to his roles as his pilot and commander of the leader's squadron. He goes on to say the mystery of why Hitler would do this may never be solved. He doesn't help solve the mystery, since he doesn't offer a single instance of Hitler asking Baur's advice! If it is a biography of a pioneering aviator (successful World War I flier and one of the first designated flight captains for Lufthansa), where is information about Baur's career including discussion of the training or qualification process for his military or civilian roles, and his pioneering new routes and equipment and procedures? There is none. Sweeting never mentions even a single incident or accident in decades of flying, but there is no comment on Baur's safety record. Baur was given tremendous responsibility as not only Hitler's pilot but also commander of the squadron responsible for flying the Third Reich's other leaders. He must have managed these jobs exceptionally well; but, again, there is no discussion of Baur's leadership of anything. Disappointingly, there are few quotes from Baur on anything. There is no attempt to get to know Baur or what he thought or believed until the very end of the book. Even then, the reader gets only a very casual explanation for his continued reverence for Hitler.

The book is well written and very readable, which makes all of its shortcomings that much more disappointing. If Sweeting focused on his subject, it could have been a very good book; his focus is just misplaced. There are some minor issues including Baur's name being spelled differently on the front and back covers; the only map is of Hitler's East Prussian Headquarters (completely irrelevant); and there are other misspellings. On the positive side, there are lots of interesting photographs.

When all is said and done, this is a reasonable thumbnail sketch of the Nazis and the Third Reich. For anyone looking for insights into the minds of those around Hitler or previously unknown information, there is nothing here.

Golda Eldridge, Lt Col, USAF (Ret), EdD



The Desert Air War 1940-1943. By Anthony Tucker-Jones. Place: Barnsley, UK: Pen and Sword Military, 2018. Photographs. 128Pp. \$24.95 paperback. ISBN: 978-152671108-3

There are over 218 titles in Pen and Sword Military's "Images of War" series, and all of them follow the same format of "maximum images and limited narrative." The books assume the viewers (it would be inappropriate to refer to them as a "readers") have some existing knowledge of the subject matter such that detailed written explanations are unnecessary.

While the North African desert is considered a major

part of the Mediterranean Theater, the book feels unbalanced because it also includes major segments on varied non-desert topics such as Mediterranean convoys. It mentions the use of Egyptian bases for training while excluding any discussion of Gibraltar. Tucker-Jones states that Malta is of special interest, but he presents little new information or insight. Sutherland and Cantwell's Images of War title *Malta GC* presents a much more complete profile of the Island Fortress.

Not that *The Desert Air War 1940-1943* is without its strengths. It offers interesting images of the Regia Aeronautica for those unfamiliar with Italian Air Force aircraft. And later chapters of the book humanize the subject by including more images of people, places, and personal gear. Tucker-Jones improves his short narratives by including the occasional quotation or extracts from periodicals. The quality of images is good, although a few are cloudy/fuzzy. All images are monochrome. With so little narrative in the book, the image captions become critical, and they are surprisingly uneven. Some offer information that adds to the introduction to create a more fulsome narrative. But too many are little more than a few words that offer little insight or explanation.

I think there is a place in libraries for album/portfolio books such as this one. A picture can be worth a thousand words if it is the right picture presented in the right context. But, with the huge amount of free indexed imagery available through web-based image catalogs, I wonder if there will continue to be a market for this genre of books.

Gary Connor, Docent, Smithsonian National Air and Space Museum's Udvar Hazy Center



PROSPECTIVE REVIEWERS

Anyone who believes he or she is qualified to substantively assess one of the new books listed above is invited to apply for a gratis copy of the book. The prospective reviewer should contact:

Col. Scott A. Willey, USAF (Ret.)
3704 Brices Ford Ct.
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Walter J. Boyne 1929-2020



Colonel Walter J. Boyne, USAF (Ret.), an internationally recognized author and aviation historian, flew his final mission out of Silver Spring, Maryland on January 9, 2020. He was 90 years old and kept his quick wit and loving nature to the end. He is survived by his much loved and devoted wife Terezia "Teri" Boyne. He was the loving father of Molly Boyne, Katie Teague, Bill Boyne, Peggy Coleman and five grandchildren. Walt was predeceased by his first wife, Jeanne Quigley. Funeral Services were held at St. Bernadette Catholic Church in Silver Spring, MD on Saturday, March 28 at 11am. He will be interred in the Arlington National Cemetery at a later date.

Walter Boyne was born in East St. Louis, Illinois, and enlisted in the Air Force in May, 1951. He graduated from flying school in 1952 and subsequently flew bombers in the Strategic Air Command and Air Force Systems Command. He was a veteran of the Cold War

and the Vietnam War and remained a vocal exponent of air power.

He joined the National Air & Space Museum in its infancy in 1974 and rose to be the Director of the National Air & Space Museum from 1981 to 1986. While at the NASM he founded the magazine *Air&Space/Smithsonian*, and arranged for the transfer of land from the Federal Aviation Administration to the Smithsonian for the Udvar-Hazy facility.

Col. Boyne began his writing career in 1962, and subsequently wrote more than a thousand articles and published over 60 books. During the course of his writing career he became a familiar figure on television, doing broadcasts on all the major news and cable stations.

During his career, he received many domestic and foreign honors, including the Bronze Star, induction into the National Aviation Hall of Fame in 2007, a lifetime achievement award from the Air Force Association in 2010, induction into the American Combat Airman Hall of Fame and numerous literary awards. However, he felt that his greatest reward and pleasure was his work in mentoring several hundred writers.

Coming Up



Compiled by
George W. Cully

March 13-14, 2020

The **Society for History in the Federal Government** will hold its annual meeting at the Robert C. Byrd Center for Congressional History and Education at Shepard University in Shepherdstown, West Virginia. The theme of this year's gathering is "Stories from the Heart of Government: Politics and History." For more information, see the Society's website at <http://shfg.wildapricot.org/>.

March 17-19, 2020

The **American Astronautical Society** will host its annual Robert H. Goddard Memorial Symposium at the Tommy Douglas Conference Center in Silver Spring Maryland. This year's theme is "Innovation and Sustainable Exploration." For more information, see the Society's website at <https://astronautical.org/events/goddard/>.

March 18-21, 2020

The **National Council on Public History** will hold its annual meeting at the Westin Peachtree Plaza Hotel in Atlanta, Georgia. The theme for this year's assembly will be "Threads of Change." For registration and schedule details, see the Council's website at ncph.org/conference/2020-annual-meeting/.

March 30-April 2, 2020

The **Space Foundation** will host its 36th annual Space Symposium at the Broadmoor Hotel in Colorado Springs, Colorado. For registration and other details, visit their website at www.spacefoundation.org.

April 2-5, 2020

The **Organization of American Historians** will hold its annual meeting and conference at the Marriott Wardman Park Hotel in Washington, D.C. The theme for this year's gathering will be "(In)Equality." For registration and other details, see their website at www.oah.org/meetings-events/oah20/.

April 9-11, 2020

The **Vietnam Center and Sam Johnson Vietnam Archive** and the **Institute for Peace & Conflict at Texas Tech University** will jointly host "1970: Nixon and Discord during the Vietnam War". The conference will be held at the MCM Elegante Hotel in Lubbock, Texas. For reg-

istration and other information, see the Center's website at https://www.vietnam.ttu.edu/events/2020_Conference/.

April 16-17, 2020

The **American Airlines CR Smith Museum** and the **University of Texas at Arlington** will co-host the 55th Annual Webb Lecture Series, "Flight Culture and the Human Experience." The Series will feature new and emerging research into the transformation brought by the advent and extension of aviation technologies. For more information as it develops, check the UTA History Department's website at <http://www.uta.edu/history/research/webb-lecture-series/index.php>.

April 22-24, 2020

The **Army Aviation Association of America** will host its annual Mission Solutions Summit at the Gaylord Opryland Hotel and Convention Center in Nashville, Tennessee. For more details see the Association's website at www.quad-a.org/.

April 24-26, 2020

The **American Aviation Historical Society** will hold its annual meeting in San Francisco, California with visits to the San Francisco Airport Museum, the Hiller Aviation Museum and San Carlos Airport, and the Oakland Aviation Museum. For more details as they become available, see the Society's website at http://www.aahs-online.org/annual_meeting_2020.html.

April 30-May 3, 2020

The **Society for Military History** will hold its 87th annual meeting at the Crystal Gateway Marriott Hotel in Arlington, Virginia. The theme of this year's meeting is "Policy By Other Means." For registration and other information, see the Society's website at www.smh-hq.org/index.html.

May 4-7, 2020

The **Association for Unmanned Vehicle Systems International** will present Xponential 2020, its premier annual convention and exhibition at the McCormick Place Exhibition Center in Chicago, Illinois. For registration and other details, see their website at www.auvsi.org/events.

May 6-10, 2020

The **Council on America's Military Past**

will host its 54th annual Military History Conference in Baltimore, Maryland. For more details as they become available, see the Council's website at <http://campjamp.org/upcoming-2020-conference>.

May 19-21, 2020

The **Vertical Flight Society** will present Forum 76, its annual forum and technology display at the Palais des congrès de Montréal in Québec, Canada. Forum 76 is the longest-running and most established vertical flight event in the world. For more information, including paper topic presentations, see the Society's website at <https://vtol.org/annual-forum/forum-76>.

June 15-19, 2020

The **American Institute of Aeronautics and Astronautics** will present its annual premier event, the AIAA Aviation Forum and Exposition, at the Reno-Sparks Convention Center in Reno, Nevada. The Institute bills this as "only aviation event that covers the entire integrated spectrum of aviation business, research, development, and technology." More details are at the Institute's website: https://www.aiaa.org/aviation?_ga=2.81927830.1817712024.1549286902-252629489.1507741022.

July 8-12, 2020

The International Womens Pilot Association, better known as **The Ninety-Nines**, will hold their annual meeting on the SS Queen Mary moored in the harbor of Long Beach, California. For registration, see their website at <https://www.ninety-nines.org/conference.htm>

July 14-16, 2020

The **American Astronautical Society** will host its annual John Glenn Memorial Symposium at the Huntington Convention Center in Cleveland, Ohio. For more information, see the Society's website at <https://astronautical.org/events/john-glenn-memorial-symposium/>.

Readers are invited to submit listings of upcoming events. Please include the name of the organization, title of the event, dates and location of where it will be held, as well as contact information. Send listings to:

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History Mystery Answer



Shortly after the start of the Korean War in 1950, the U.S. Air Force quickly gained air superiority of the infant North Korean Air Force (NKAF). In November 1950, MiG-15s (shown) flown by Soviet pilots entered combat. The American counter was the North American F-86 Sabre (shown). For the next three years (Dec 1950 – 1953) flying primarily from Kimpo and Suwon Airbases in South Korea, F-86s pilots flew North to engage MiG-15s over MiG Alley. or the next three years, communist MiG-15s and American F-86 Sabres fought for control of skies of North Korea. The American pilots would gain an 8:1 kill ratio. The ultimate deciding factor in guaranteeing American Air Superiority proved to be the American fighter-pilots training. The first pilot to score a aerial kill while flying a F-86 was Lt Col Bruce Hinton (shown right). The first F-86 Ace was James Jabara (shown left). He would go on to become a triple ace and the second highest scoring American Ace with 15 kills.

To learn more about the Korean Air War go to:

MiG Alley: <https://media.defense.gov/2011/Mar/10/2000282650/-1/-1/0/110225-D-LN615-001.JPG>

F-86: <https://www.nationalmuseum.af.mil/Visit/Museum-Exhibits/Fact-Sheets/Display/Article/196118/north-american-f-86a-sabre/>

James Jabara: <https://www.nationalmuseum.af.mil/Visit/Museum-Exhibits/Fact-Sheets/Display/Article/196383/first-jet-vs-jet-ace-capt-james-jabara/>

Soviet's flying MiGs in Korea: <https://www.nationalmuseum.af.mil/Visit/Museum-Exhibits/Fact-Sheets/Display/Article/196389/soviet-pilots-over-mig-alley/>

MiG-15: <https://www.nationalmuseum.af.mil/Visit/Museum-Exhibits/Fact-Sheets/Display/Article/196115/mikoyan-gurevich-mig-15bis/>



This issue's quiz:

The Korean War represented the first jet-versus-jet combat for the recently established U.S. Air Force. Flying from air fields in South Korea, Air Force pilots flew north to engage their communist adversaries over the skies of North Korea (and southern China). The area near the North Korean/Chinese border where many of the jet dogfights took place became known as MiG Alley. This quarter's questions are about the air war in MiG Alley. What was the primary North Korean/communist jet fighter? What U.S. fighter jet became the dominant dogfighter over MiG Alley. For a bonus question, who was the first ace in that aircraft.



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