

AIR POWER

SPRING 2019 - Volume 66, Number 1
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History





The Air Force *Historical* Foundation

Founded on May 27, 1953 by Gen Carl A. “Tooe” Spaatz and other air power pioneers, the Air Force Historical Foundation (AFHF) is a nonprofit tax exempt organization. It is dedicated to the preservation, perpetuation and appropriate publication of the history and traditions of American aviation, with emphasis on the U.S. Air Force, its predecessor organizations, and the men and women whose lives and dreams were devoted to flight. The Foundation serves all components of the United States Air Force—Active, Reserve and Air National Guard.

AFHF strives to make available to the public and today’s government planners and decision makers information that is relevant and informative about all aspects of air and space power. By doing so, the Foundation hopes to assure the nation profits from past experiences as it helps keep the U.S. Air Force the most modern and effective military force in the world.

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AIR POWER *History*

The Journal of the
Air Force Historical Foundation
Spring 2019 Volume 66 Number 1

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Air Power History (ISSN 1044-016X) is produced for Spring, Summer, Fall, and Winter by the Air Force Historical Foundation.

Prospective contributors should consult the **GUIDELINES FOR CONTRIBUTORS** at the back of this journal. Unsolicited manuscripts will be returned only on specific request. The Editor cannot accept responsibility for any damage to or loss of the manuscript. The Editor reserves the right to edit manuscripts and letters.

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Periodicals postage paid at Clinton, MD 20735 and additional mailing offices.

Postmaster: Please send change of address to the Circulation Office.

Our first article is by repeat contributor and Foundation award winner William Head, this time with co-author James Tindle. His story is about the attempt to modify aircraft to apply technological support to the conflict in Vietnam. As with so many attempts like this, it didn't seem to provide the edge that was sought after

Our second article is by a new contributor, Frank Blazich, who has attempted to tell the story of claims by the Civil Air Patrol to U-boat sinkings in World War II coastal patrols. Outstanding level of detail in this story by an expert CAP insider, so don't miss it.

Our third article, by noted professor and historian Richard Muller, talks about two bomb groups, one American and one German, and their experiences in World War II. We are fortunate to be able to publish his article.

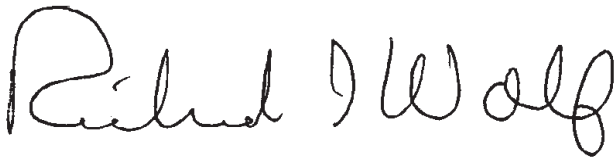
Our fourth article stays with World War II, when longtime contributor Daniel L. Haulman writes about whether the escort fighters provided defensive advantages in the course of their duties or whether they were actually offensive weapons in eliminating enemy forces.

Our fifth and final article is by a first-time contributor, Dan Zamansky, who writes about German air force activities on the Russian Front in World War II. Welcome him to the magazine with a good read.

As usual, we have a bunch of book reviews, beginning on page 50, returning to a larger number this issue after the large volume of article content reduced the number in our last issue. There are some interesting books in those pages.

We also have our regular feature of the "new" History Mystery. Check it out on page 64.

Don't miss the President's Message, beginning on page 4.



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From the President



Dear Members,

As we press on through 2019, I am pleased to note that your Foundation has sustained its velocity. A key goal remains to strengthen our future resources, to ensure an ongoing ability to preserve, protect, and share an accurate and honest account of our Air Force's history. To that end we are pleased to note our Awards Banquet, last November, was the most financially successful in a good many years. The Foundation's participation in the multi-service symposium "In Country: The War in Vietnam – 1968" had great exposure value for us, at very low cost.

We are now actively working an avenue that promises to result in quality updates to our well-known, profitable hardbound books, *The Air Force* and *U.S. Air Force: A Complete History*. Our social media outreach continues to expand and we're beginning to realize a small financial return on our staff's great efforts in producing the daily "This Day in Air Force History" email. We expect good results from re-joining this fall's Combined Federal Campaign. We continue to consider other development opportunities with optimism, and I welcome your ideas and critiques.

We inherited a powerful vision from generations of Air Force Historical Foundation leaders—Spaatz, Vandenberg, Foulois, LeMay, and the dedicated Airmen they led and served. As it has been throughout our history, the Air Force and nation face ever-changing, complex warfighting challenges; including pointed calls in Washington for reorganization to meet them. Thus it's important that the Foundation continue to help today's leaders draw wisdom and energy from the lessons of the past, informing their decisions to shape the best possible future.

Your active support—in ideas, time, donations, or just forwarding "This Day in Air Force History" to others who might find the Foundation's work interesting and worthy of support—*really* matters. Our work is only as *valuable* as it is *known* and *you* are part of that. Thanks for your membership and devotion to Air Force history!

Sincerely,

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

Moon Over The Trail: A Review of Operations *Shed Light And Tropic Moon III*



Close-up of the nose of a B-57G.

William P. Head and James F. Tindle

Often, when developing a new mechanism or component, so much of the process involves trial and error. Such is certainly the reality with military hardware since much of that equipment relies on cutting-edge technology. Nowhere is this trend more obvious than in military aviation. Throughout the history of American airpower, attempts to fill the needs of the United States Air Force (USAF) and develop aerial weapons for the other military branches has required taking chances with new technology. The Air Force entered the post-World War II era prepared to engage in two primary types of warfare: conventional battles on the plains of Europe and all-out nuclear war. In both these scenarios, American leadership expected to oppose the armies and arsenals of the Soviet Union. Aerial vehicles would assume an increasingly crucial role in this environment, and the dominant philosophy surrounding both the design and tactics for these aircraft was “higher and faster.”

The prospect of conflict in Southeast Asia, particularly the undeclared war in Vietnam, presented a whole new set of challenges for American airpower. One truism has long been that the military prepares to fight the last war, and never was this more accurate than during the Vietnam War. Trying to employ high speed fighters and fighter-bombers over three-canopy jungles against troops designed to hide from airborne attacks rendered U.S. planes less than effective, especially with the Air Force’s lack of night and bad weather capabilities.¹

In order to inflict the most damage against enemy supply lines and troop maneuvers, the American military required low and slow platforms which could loiter above targets along important transportation arteries, particularly the infamous Ho Chi Minh Trail. Once in position, these planes needed to selectively and accurately damage or destroy the trucks bringing troops and supplies to reinforce enemies of the pro-American South Vietnamese government such as the Viet Cong (VC) and North Vietnamese Army (NVA). Certain fixed-wing gunships such as the AC-47, AC-119G and K, various models of the AC-130, and medium night bombers such as the B-57B and G proved relatively effective against enemy ground targets. Their efficacy gradually improved as engineers and design experts added advanced sensors, radar, and illumination components to these planes over the course of the conflict.²

However, internal disagreements, inter-service rivalries, financial problems, and political issues within the Washington, D.C. infrastructure constantly impeded this upgrading process. Indeed, trying to get a newly-modified aerial platform in the works often moved at a snail’s pace. With support from power brokers such as Gen. Curtis LeMay, when he was Chief of Staff of the Air Force (CSAF), fixed-wing gunships would eventually arrive in combat and not only prove their utility, but also their value as technological test beds.³

Despite these gains, however, night bombing never seemed to work out in actual combat. From the start, the B-57,

which had begun as a jet-powered replacement for the B-25, B-26, and A-26 during the Korean War, proved underpowered, unable to carry sufficient bomb loads, and highly vulnerable to enemy air defenses. Indeed, the B-57 arrived in service only after the Korean War ended and was a prior-generation aircraft by the time of the conflict in Vietnam. Efforts to upgrade this aircraft's illumination capabilities, self-defense, and targeting systems progressed very slowly, and only near the end of the war did an effective model, the highly modified B-57G *Tropic Moon III*, finally begin operations.⁴

Sadly, this model never got the chance to showcase its full capability. The B-57 experiment, even augmented with *Tropic Moon III*'s cutting-edge technology, appeared to have failed when the U.S. departed Southeast Asia in the early 1970s. However, experts continued to develop these high-tech components and attach them to newer aviation platforms, eventually contributing significantly to the military technological revolution in the first Persian Gulf War. In this way, the development of the B-57G *Tropic Moon III* was a success after all. The program's fits and starts during Vietnam ultimately achieved, nearly a generation later, what the scientists and engineers of the 1960s had envisioned. The following pages examine this formative period in the development of U.S. aviation technology and explore how these innovations contributed to the dominance of modern American air power.⁵

A Specific Problem

As the United States' involvement in the Vietnam War expanded, American military leaders dedicated more and more airpower resources to the conflict. This increasing demand presented numerous challenges to the fledgling USAF, which had literally been born at the beginning of the Cold War and had evolved into a mighty strategic nuclear force during the 1950s and early 1960s. By the mid to late 1960s the low-intensity combat in Vietnam forced airmen to re-examine their tactics and weapons as they attempted to carry out their role. One conundrum proved to

be the necessity to detect targets hidden by thick Asian jungles and to interdict enemy supplies and troops traveling through the bush into South Vietnam at night.⁶

From beginning to end, vehicular and human traffic moving from the North through Laos down the Ho Chi Minh Trail presented a constant problem in the Vietnam War. U.S. leadership explored a wide range of technological innovations to permanently close the Trail, some of which were successful and many of which were not. Among these were the famous B-52 raids known as Arc Light Raids during Operation Commando Hunt I-VII. Project *Tropic Moon III*, although less well-known, had been initiated with similar goals and demonstrated the value of fixed-wing gunships for the roles of detection and interdiction. The B-57 *Night Intruder*, although developed too late for combat in Korea and never totally successful in Southeast Asia, demonstrated under fire the basic qualities that justified its original selection for filling these roles. In December 1965, President Lyndon Baines Johnson, concerned by the inability of U.S. tactical aircraft to stop the enemy's flow of men and supplies through Laos along the Ho Chi Minh Trail, urged the Air Force to improve its night operations. Air Force leaders had already begun working with the Dalmo-Victor Corporation to develop night vision television capabilities for four A-1E aircraft and were also planning to equip cargo aircraft with this technology.⁷

Operation Shed Light

At the behest of the President, science adviser Dr. Donald F. Hornig investigated the possibilities of developing better night sensors. Dr. Vincent V. McRae, of Hornig's staff, and Dr. Richard L. Garwin, head of the Scientific Advisory Council, immediately began conversing with Air Force research and development experts. General Bernard A. Schriever, Commander of the Air Force Systems Command (AFSC), and Lt. Gen. James Ferguson, Deputy Chief of Staff (DCS) for Research and Development at Headquarters (HQ) Air Force, soon became involved as well. The result was the initiation of a program named *Shed Light*.⁸

The basic goal of this program was to create advanced illumination and detection devices that could integrate with existing platforms and fill specialized roles in the war, specifically halting the flow of men and materiel down the ever-expanding North Vietnamese infiltration routes through Laos and Cambodia. Air Force leadership had decided that advanced technology held the key to stopping

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this intrusion, and *Shed Light* was a prime example of this assumption.⁹

At first, the Allies had sought, unsuccessfully, to deter this steady flow of troops and supplies by finding stationary targets during the day. However, enemy forces quickly proved to be experts in the use of weather and darkness to conceal their movement, in order to counteract the decided superiority enjoyed by American air power. The Air Force needed to both develop technology that could handle those conditions and find a plane that could handle the technology. Operation *Shed Light* began on February 7, 1966 with the goal of coordinating a wide variety of technological and communications projects and programs in order to improve the United States Air Force's night and all-weather fighting capabilities. All told, the Air Force Systems command, specifically its Aeronautical Systems Division, experimented with over 100 devices for improving the Air Force's capacity for night combat. Most of this testing took place under the umbrella of Project *Shed Light*.¹⁰

General James Ferguson, Deputy Chief of Staff (DCS) for Research and Development, created this task force within his own staff to "clarify the capability as well as the limitations of the night attack problem."¹¹ At the outset, members of the group created a charter which they finalized in April. It stipulated that its focus should be to:¹²

Identify current equipment, techniques, and procedures being used by the USAF in Southeast Asia. Identify planned modifications and new equipment being developed for Southeast Asia. Survey exploratory, advanced development, and operational support projects having a potential application to the problem, indicating current programs or schedules. Identify voids in our capabilities or efforts. Recommend courses of action to improve and/or provide new attack capability in 1966, 1967, and the longer term.

The program stood up on March 18, with the directive to "achieve creditable tactical night attack capability in the shortest practicable time." During ensuing five months, members of the *Shed Light* Task Force pinpointed nine new weapon systems and seventy-seven research and development "tasks." Plans called for the group, over the next 5-10 years to develop a "self-contained night attack (SCNA) aircraft," on which they expected to satisfy the Air Force operational needs and be functionally useful in all similar night and bad weather situations.¹³

At the beginning, leadership separated *Shed Light* projects into two primary categories. The first focused on developing new technology such as sensors, communication and navigation systems, as well as illumination and target-marking equipment. The second involved modifying existing weapons platforms and improving tactics in order to integrate with the new technology. Too often in Vietnam, ground personnel could not reliably request air strikes or guide them to targets because U.S. aircraft lacked effective communication and navigation equipment. *Shed Light* developed a variety of communication system improvements and navigational aids to remedy this problem, including improvements to the Long-Range Navigation (LORAN)

systems. Specifically, they formulated LORAN-D and incorporated this into the *Shed Light* mission.¹⁴

In the end, few of the *Shed Light* technology programs yielded immediate functional results and most of the aircraft platforms developed under the program did not see action during the Vietnam War. However, like the tactics of World War I which ultimately evolved into successful weapons and tactics in the next conflict, many of the sub-systems and platforms did perform successfully in later wars such as the Persian Gulf. In the end, the most relevant advancements were those done on navigation, communication, and sensor equipment.¹⁵

The Equipment

Among the most important sensors created by *Shed Light* proved to be the aforementioned LLLTV and FLIR, and the Forward-Looking Radar (FLR). Specialists tested a FLIR prototype on a DC-3 aircraft during Project *Red Sea* Eglin AFB, Florida. Results were mixed, so, in September 1965, experts conducted more tests using an AC-47 *Spooky* fixed-wing gunship in South Vietnam. Employing technology derived from these two tests, experts began Project *Lonesome Tiger* which analyzed FLIR units on two B-26 *Invader* aircraft. After-action reports determined that climate, especially humidity, had serious negative effects on the units, leading officials to decline putting this system into widespread use. In subsequent tests, professionals mount improvised "starlight scopes" in the bomb bay of the B-26s. While this placement improved FLIR performance the configuration proved to be largely impractical.¹⁶

Another important aspect of the *Shed Light* project was developing enhanced battlefield illumination. In the mid-1960s, the primary aerial flare was the Mk 24 Mod 0, developed by the U.S. Navy. Given the poor combat reliability of the FLIR units and its lack of availability experts questioned how practical it was to use it. Another major concern, in 1966, proved to be pilot disorientation and poor flare placement. A 1954 program designated Project *Night Owl*, tested flares jettisoned from F-86 *Sabre Jet* aircraft, led to twenty-five percent of pilots reporting some level of vertigo. Other studies also demonstrated that in correcting the dizziness, they experienced insufficient illumination.¹⁷

Just before America's entry into the war in Indochina, Air Force specialists began developing a new illumination flare, designated MLU-32/B99 "Briteye." The projectile burned at five million candle power for more than five minutes and produced an audio signal which warned pilots of impending burn out. "Briteye" became part of the *Shed Light* projects, as did the Navy's Mk 33 Mod 0 flare warhead for the "5" Mk 16 "Zuni" rocket motor. Anticipated delays in the procurement of the MLU-32/B99 caused experts to advocate experimentation with the Swedish *Lepus* flare as an interim measure. The results proved disappointing, with data results showing that the *Lepus* flare was inferior to the MLU-32/B99.¹⁸

At this point, *Shed Light* team members decided the problems involved with the flares made it worth exploring alternative approaches to battlefield illumination. This led

to the development of the Battlefield Illumination Airborne System (BIAS), which utilized two banks of Xenon arc lamps with a total of twenty-eight light fixtures. Test personnel put the lamps on a modified C-123B aircraft. Part of the modification included the installation of a cooling system on the left side of the aircraft to help dissipate the heat generated by the lamps. Test flights in Vietnam revealed that while the illumination devices provided perfect ground lighting, it also afforded enemy gunners a perfect target. As a result, experts removed the system from active service.¹⁹

This setback brought an end to all such operational trials but did not end efforts to find a suitable illumination solution. Experts simply explored increasingly unconventional methods. In one case, they turned to the contractor Astro Systems International, Inc., Bethesda, Maryland, who created a so-called “Quartz Chamber” which burned pure oxygen and aircraft fuel, converting the resulting chemical energy into light. While testing went forward on this scheme, another project, designated *Moonshine*, came into being. This project evolved into a joint effort with the National Aeronautical and Space Administration (NASA) analyzing the feasibility of using geosynchronous satellites to cast light directly on any desired target location.²⁰

At the same time, specialists involved with Project 2531 began work on ground target marking, a vital tactic for day time air strikes. They analyzed target marking munitions by evaluating warheads for the Mk 40 2.75-inch rocket motor. Designers employed a variety of chemiluminescent substances which they planned to load with compounds developed under the Navy’s Target Illumination and Recovery Aid (TIARA) program. At first, they used modified M151 high-explosive warheads, but eventually realized the quantity of usable compounds produced inferior results. *Shed Light* Task Force members turned to a combination of red phosphorus and a flare to make a system capable of use in day or night time. This project never went beyond the developmental stage, but the procedures explored led to more success in other *Shed Light* programs.²¹

The efforts of the *Shed Light* team seemed to have reached a culmination with the development of Project *Tropic Moon*. Air Force officials envisioned this project as a rapid development program to dramatically upgrade the ability of selected aircraft platforms to more accurately attack enemy targets at night and/or in adverse weather. To this end, they continued to develop improved sensor equipment for targeting enemy aircraft and vehicles through clouds, foliage, and darkness. Ultimately, this improved target marking and battlefield illumination equipment, along with enhanced methods for utilizing those systems, represented the fulfillment of *Shed Light*’s technological aims. The next issue was the development of a suitable platform to convey that equipment to the battlefield.²²

While sensors and illumination work transpired, other personnel focused on the creation of a Self-contained Night Attack (SCNA) aircraft possessing what the *Shed Light* Study Report called “the necessary night sensors and weapon delivery capability to find and strike targets at night on the first pass without the use of visible artificial illumination.” Designers planned for a three-phase pro-



Black Spot NC/AC-123K in flight

gram to complete a SCNA platform beginning in early 1966. Initially, experts intended to employ a “Hunter-Killer” aircraft derived from an unmodified conventional strike aircraft which was also capable of spotting and destroying targets at night. However, several problems emerged almost immediately. The design personnel quickly realized they would need a specialized, most likely highly modified, aircraft and the disparity between the “hunter” and the “killer” characteristics might make identifying such a platform difficult.²³

Project *Black Spot*

An early and successful stage of Project *Shed Light*’s search for suitable aircraft involved two C-123K *Providers* which had already been modified in September 1965 as part of a project dubbed *Black Spot*. Since *Shed Light* was designed to act as an umbrella for all specialized programs, officials incorporated *Black Spot* under the new task force’s expansive charter. As events played out and the AS-2D program was scrapped in 1968, the *Black Spot* aircraft became the major part of *Shed Light*’s first phase. Specialists integrated these aircraft into the SCNA program and contracted with E-Systems Inc., Greenville, Texas, to finish the SCNA enhancements. These modifications included a Moving Target Indicator (MTI) and automatic tracking capacity; an Avco FLIR; and a Westinghouse LLLTV and laser rangefinder, with an automatic tracking feature. Experts at the time agreed that the LLLTV system had the highest resolution available. Not only did the aircraft look radically different from its transport cousins, its new equipment caused the nose to be more than fifty inches longer. Original plans in 1966, aimed at building twenty more *Black Spot* aircraft at a cost of about \$64.7 million. They were to be *Black Spot II* aircraft.²⁴

These unique planes carried an armament system which included either BLU-3/B bomblets with an ADU-253/B adapter, or BLU-26/B bomblets using an ADU-272/B adapter. This same system also allowed *Black Spot II* platforms to convey CBU-68/B cluster bombs, but these weapons did not see action in Vietnam. Originally, the AC-123K possessed two manually operated flare launchers

and, later, LAU-74/A automatic launchers which meant that only one loadmaster was needed to operate it. In 1968, officials designated aircraft serial numbers 54-691 and 54-698, NC-123Ks. Roughly a year later, even as experts developed the AC-130s gunships, they were re-designated AC-123K. Air Force leadership sent the NC/AC-123Ks to Osan AB, Republic of Korea (ROK) from August to October 1968. These planes flew operational sorties against North Korean seaborne infiltrators. Based on these operations' relative success, officials sent the NC/AC-123Ks to South Vietnam in November 1968.²⁵

Once they arrived in mainland Southeast Asia, they began flying sorties against North Vietnamese Army (NVA) troops and vehicular traffic bringing supplies and equipment down the Ho Chi Minh Trail. In January 1969, operational commanders moved them to Ubon RTAB, Thailand. Here they began flying two missions per night with two F-4Cs for support. This mission pattern soon changed to A-1E escorts from Nakhon Phanom (NKP) RTAB, due to the dramatic difference in speed and capabilities necessary to protect the lower and slower flying NC/AC-123Ks. For four months, these planes flew in an area about 100 nautical miles east-southeast from NKP. In May 1969, they returned to Hurlburt Field, Florida for new crew flight training, while ground training took place in Greenville, Texas. In October 1969, plans called for two of the four newly-trained crews to deploy to Ubon RTAB. The other two crews were to follow a month later. Before starting operational missions, the crew members attended jungle survival training at Clark AB in the Philippines to prepare for sorties over Laos.²⁶

Ultimately, nothing came of this planned second deployment, since the team's combat missions formally ended in early July 1970. Eventually, personnel refitted the aircraft, returning them to something approaching the standard C-123K. Indeed, when they briefly did return to South Vietnam for transport duty, they were still sporting their camouflage and black underside. In December 1972, they were sent to Napier Field, Alabama. In the end, more ambitious programs, such as *Combat Hornet II*, reconfiguring the C-130 into the AC-130A Gunship and *Combat Hornet III* modifying the C-119 into the AC-119G and K, took precedence over the *Black Spot* program and left only the original two aircraft. While the testing conducted under the program yielded positive results for later experiments, *Black Spot* did not produce the weapons platform the Air Force needed.²⁷

Other Aircraft Attempts

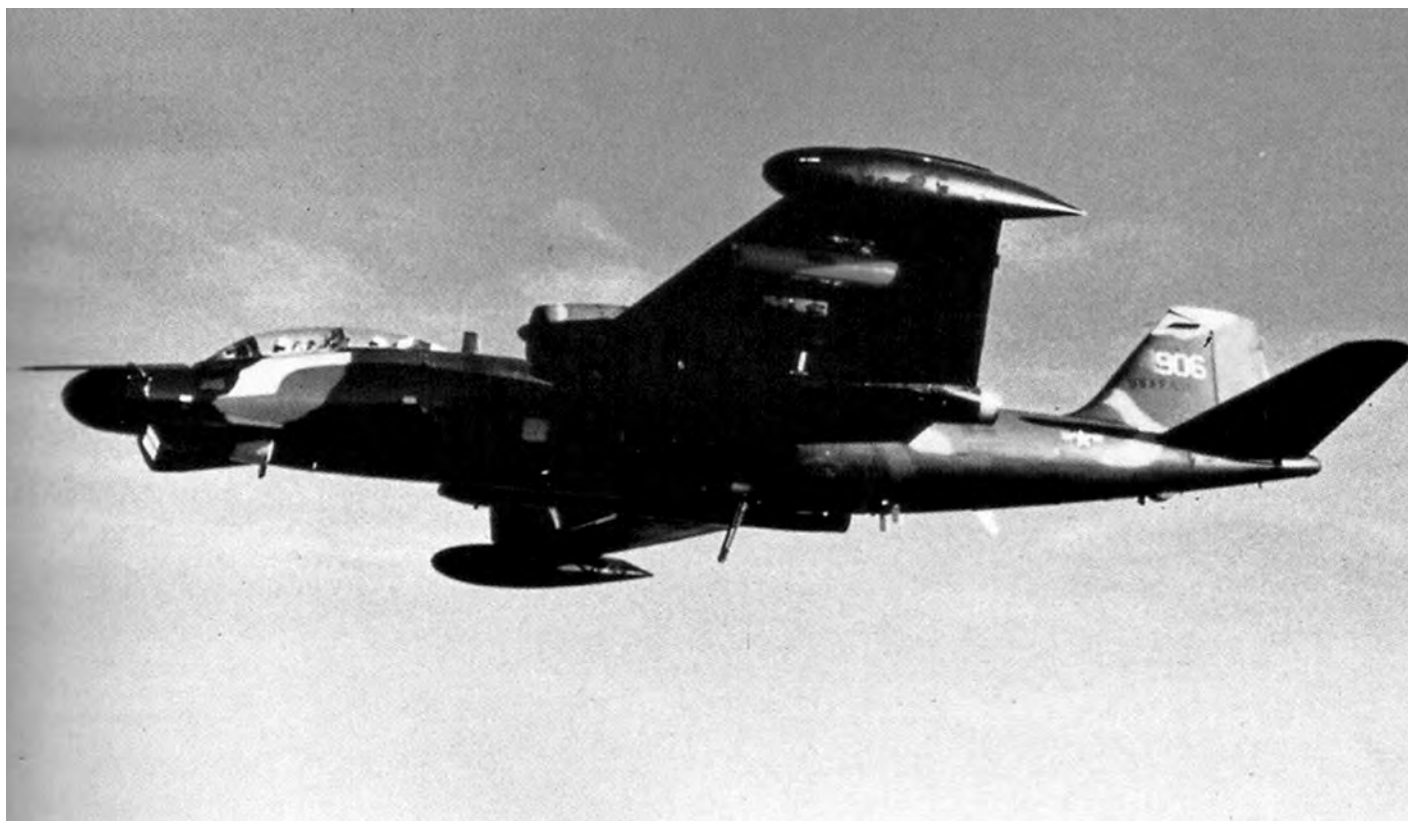
In 1966, the only aircraft in Vietnam suitable for the hunter role were the Army's OV-1B *Mohawk*, the Air Force's recently arrived RF-4C *Phantom II* (reconnaissance version), and the RB-57E (the reconnaissance version of the B-57B bomber). The RF-4C had the advantage of possessing strike aircraft characteristics and could theoretically be modified into a hunter version, designated the RF-4C(H), by replacing the camera equipment with LLLTV, FLIR, and Side-Looking Radar (SLAR) units. The

Mohawk, while a capable plane, was simply too small to carry the required equipment package. In order to save money, Air Force officials transferred the modified *Mohawks* to other duties instead of stripping the new equipment. Many technical professionals were drawn to the RB-57E, but only two of the planes were in country, both participating in an experimental project codenamed *Patricia Lynn*. Another problem proved to be that these bombers were fitted with prior generation Reconofax VI FLIR units, which reduced their usefulness for the *Shed Light* program.²⁸

The project's specialists eventually decided to use a slower bomber or cargo aircraft at first, to be followed by a jet aircraft of some type. This faster aircraft was supposed to be an F-111 *Aardvark*, a multipurpose tactical fighter bomber capable of supersonic speeds. Although a controversial aircraft, the F-111 achieved one of the safest operational records in USAF history and became an effective all-weather interdiction aircraft. Ultimately, Air Force officials expected to spend three to seven years evolving an RF-111 into a hunter-killer by incorporating new LLLTV, FLIR, and FLR sensors. Considering the length of time for this aircraft to become deployable, initial testing was performed using the OV-10 *Bronco* aircraft as an interim measure. They never expected the OV-10 to serve as the final platform since it could not carry all the necessary sensor equipment. Ultimately, while the RF-111A *Raven* did enter testing in December 1967, it was not easily convertible to and from the existing F-111A configuration. With these facts in mind, Air Force leaders sought alternatives. By September 1969, they were forced to terminate the revised RF-111D program due to a lack of funding, and by March 1970, the RF-111A program was also concluded.²⁹

In addition to these setbacks in testing phases, the F-111 also had an uneven record in Southeast Asia. In early 1968, six *Ravens* from the 474th Tactical Fighter Wing (474 TFW) deployed to Takhli Royal Thai Air Force Base (RTAFB), Thailand, as part of *Operation Combat Lancer*. In November, after losing three F-111As in combat, the remaining aircraft were returned to the U.S. after logging fifty-five missions. Major design issues contributed to the losses, most of which were corrected after the three survivors returned home. In September 1972, two squadrons of forty-eight *Aardvarks* from the 474th re-deployed to Takhli to participate in *Operation Linebacker II*. These aircraft flew sorties during the day, at night, and in all weather conditions without electronic countermeasures escort. They proved to be less dependent on aerial refueling than other tactical aircraft. The *Aardvarks* conducted 4,000 missions in total, losing six in combat and two from operational malfunctions. Despite this sterling record, these planes were no longer part of the SCNA project by the end of the war, primarily because *Linebacker II*'s goal was to terminate all American involvement in Vietnam.³⁰

Since the OV-10 had proved impractical, Air Force technicians determined to examine the possibility of using the S-2 *Tracker* aircraft. Plans called for the reconfigurations to include the use of the three main sensors in the S-2 aircraft with a built-in search light slaved to the LLLTV.



B-57G Tropic Moon III in flight.

They also arranged to add crew protection and the armament system consisting of ten SUU-24/A munitions dispensers in a revised bomb bay. Moreover, they intended to have six wing hard points to carry additional conventional munitions including bombs, rockets, cluster munitions and dispensers, as well as gun pods. They anticipated employing XM-9s as the primary under-wing ordnance. The Army's XM-9 was nearly the same kind of weapon as the SUU-7/A low-drag dispenser pod modified for the UH-1B/C *Iroquois* helicopter. Planners decided to designate the two planned pre-production aircraft the YAS-2D and the production aircraft the AS-2D. Even though this seemed to be a workable solution, money problems, difficulties prying these aircraft away from the Navy, and delays in finalizing the modifications caused Air Force officials to scrap the S-2 based SCNA program in January 1968.³¹

The Martin B-57 *Canberra*

In 1967, after the delay or failure of several trial projects experimenting with different planes, Air Force officials ultimately looked to the Martin B-57 *Canberra* to begin filling the required role. First manufactured in 1953 by the Glenn L. Martin Aircraft Company with a license that resembled a version of the British/English Electric *Canberra*, a total of 403 B-57s had entered the USAF before production ended in early 1957. This plane was the last tactical bomber used by the United States Air Force, being engaged in combat operations during the Vietnam War (1963–1971). It performed a wide variety of missions as a twin-jet tactical bomber and reconnaissance aircraft designed

to replace the B-26 and A-26.³²

Initial Martin-built models were virtually identical to their British-built counterparts, but Martin later modified the design to incorporate larger quantities of US-sourced components, producing the aircraft in several different variants. The B-57 holds the distinction of being the first jet bomber in U.S. service to drop bombs during combat. The *Canberra* saw extensive use during the Vietnam War while other versions like the RB-57D served as high-altitude aerial reconnaissance platforms. The B-57 *Canberra* was also exported to customers abroad, allowing it to serve in the Pakistani Air Force during the Indo-Pakistani Wars of 1965 and 1971. In 1983, the USAF opted to retire this exceptional line of aircraft, marking the end of the tactical bomber era. The three remaining flightworthy WB-57Fs are assigned to the NASA Space Center at Ellington Field, Houston, Texas. They serve as high-altitude scientific research aircraft and are also for testing and communications in the U.S. and Afghanistan.³³

In order to understand Operation *Tropic Moon*, one must grasp the role the B-57 played in the program. The specific B-57 model employed in *Tropic Moon III* was the B-57G. As noted in the official Air Force history of *Tropic Moon III*, "Conceived in 1967 as Project *Tropic Moon III*, the B-57G was the first jet bomber specifically configured for self-contained night attack sorties in Southeast Asia."³⁴ During the last months of 1967, Martin and Westinghouse corporation personnel modified three planes from the 3rd Bombardment Group to function as night intruders during the Vietnam War. These B-57Bs were tail numbers 52-1518, 52-1580, and 52-3860 and they were fitted with a



Bombing mission by B-57Bs during the Vietnam War.

newly-developed LLLTV system placed in a pod underneath the port wing. Experts followed this refitting with operational trials in Southeast Asia between December 1967 and August 1968, the lion's share of these missions being conducted over the Ho Chi Minh Trail. The outcome of these trials proved encouraging enough for Air Force officials to award a production contract to Martin and Westinghouse for the modification of sixteen B-57Bs into B-57G night attack bombers.³⁵

Early in 1969, Westinghouse experts installed a state-of-the-art sensor system in a new nose section designed by Martin. The new nose contained a LLLTV camera plus a FLIR set and a laser guidance system. Plans called for a sensor specialist to operate this new equipment from their position sitting in the rear cockpit. The operator received and relayed pertinent data into the cockpit's panel array so the pilot could select the appropriate combination of weapons to attack the selected target. The laser guidance system made it possible to carry four 500-pound "smart bombs" attached to the underwing pylons. To compensate for the extra weight of the sensor equipment, engineers removed 20-mm cannon mounted on the wing. Leaders redesignated the modified aircraft the B-57G, easily recognizable by their bulbous "chins" that housed the LLLTV equipment.³⁶

In July 1969, Air Force leadership reactivated the 13th Tactical Bomb Squadron (13 TBS) at MacDill AFB, near Tampa, Florida. They sent the first B-57G to the 13th, while retaining a second aircraft for their technical experts to conduct assorted tests and trials. Tragically, this aircraft crashed in December 1969 during an asymmetric approach, killing test pilot Robert Turner. In September 1970, 13 TBS personnel deployed to Ubon in Thailand with eleven B-57Gs, becoming part of the 8th Tactical Fighter Wing (8 TFW). At the same time, four B-57Gs remained at MacDill AFB for conversion training with the 4424th Combat Crew Training Squadron (4424 CCTS). Those in Thailand began missions over the Ho Chi Minh Trail employing laser-guided bombs (LGBs), often coming within 15 feet of night time targets. On December 12, a B-57G was lost to anti-aircraft artillery (AAA) fire during a night-time sortie over southern Laos. The crew members success-

fully parachuted from the stricken plane, landed safely, and were subsequently rescued. Later investigation determined that since a Cessna O-2A *BirdDog* Forward Air Control (FAC) aircraft failed to return from the same area that night, it was very likely the two aircraft collided in the darkness.³⁷

Operations with the B-57G continued until April 1972, when the 13th TBS withdrew from service in Vietnam and deactivated once again. Operating these B-57Gs proved to be expensive and the aircraft were hard to maintain in the field. Nevertheless, the B-57G was one of the first self-contained all-weather night interdiction bombers to serve with the USAF, and its operations in Vietnam provided useful information for subsequent weapon system trials. The surviving B-57Gs transferred to the 190th Bombardment Group (Tactical) of the Kansas Air National Guard. They served until 1974, when they were consigned to storage at Davis Monthan AFB.³⁸

It is known that there was some discontent among some of its major participants. Before being promoted to CSAF, Gen. Ryan, then Commander in Chief of the Pacific Air Forces (CC PACAF), complained following the initially weak showings from the *Tropic Moon II* program that he was "tired of buying everything they send us." In turn, he requested that his staff draft a message that would allow him to send "this thing [the *Tropic Moon II* B-57B] to CONUS [Continental United States]." Even in regard to the development of the *Tropic Moon III* aircraft, the ASD engineers were forced to admit that the myriad of delays had been caused by "reduced quality control" springing from the "crash" nature of the program.³⁹

Shed Light itself became a desperation project which was largely left unsupervised. Senior officers directed specialists to undertake research and development of almost any piece of equipment that might help with the mission outlined in its charter. This created a shotgun effect with dozens of voices speaking all at once with very little focus or direction. As a result, few of the programs came to fruition and fewer still left a definitive mark on the conflict. The developments under *Shed Light* were quickly eclipsed by new aircraft produced under the *Project Gunship* program such as the AC-130 creation under the Gunship II project and the AC-119G/K under the Gunship III project. They were fitted with many of the sensors developed under *Shed Light* but took on a life all their own.⁴⁰

Origins of *Tropic Moon III*

As mentioned previously, Project *Tropic Moon* eventually emerged as *Shed Light's* most successful combination of technological experiments and potential aircraft platforms. At first, the *Shed Light* team developed two LLLTV systems, both to be fitted into pods so they could be fitted on to aircraft already in the Air Force inventory. The first one was built by Dalmo-Victor Company; San Carlos, California. It was a company that had great experience in such radar-scanner systems having successfully developed a radar scanner for the U.S. Navy in 1942. From that time forward, it manufactured multi-various kinds of radar and



B-57G *Tropic Moon III*.

communications equipment. They were acquired by Textron Inc. in 1953 and later sold to Singer. This program was known as Project 1533 and involved only a LLLTV. In fact, plans were in place to add a laser range finder. Originally, they intended to fix it to A-1E *Skyraider* single-engine propeller-driven attack aircraft. The overall weapon system was designated *Tropic Moon I*.⁴¹

Technicians at Westinghouse Inc., Pittsburgh, Pennsylvania, produced the second LLLTV, through Project 698DF. This system already contained both the LLLTV and a laser ranger finder. Plans called for it to be put on either an A-1E or a B-57 *Canberra* bomber. After a brief debate, officials decided to put it on the B-57B. They named this second program project *Tropic Moon II*. Somewhat predictably, *Tropic Moon I* proved to be all but obsolete before Air Force leadership could even deploy it. Indeed, once contractors completed all the required tests, their results confirmed its obsolescence. Ultimately, personnel equipped only four A-1Es with Project 1533 LLLTVs. The results of the field tests were very poor, and the data gathered from the *Tropic Moon II* B-57B tests proved almost as discouraging. During 182 field sorties, the B-57Bs spotted 456 trucks but could only confirm 39 kills. Things went so badly that officials removed both systems from the theatre by late 1968.⁴²

While so much of *Shed Light's* initial phase turned out stillborn, the second phase eventually produced its most successful pairing of a detection and illumination system with a weapons platform: *Tropic Moon III* affixed to a B-57G model. The sleek bombers were already in Southeast Asia and test personnel had previously put it through its paces during the original sensor evaluations during *Tropic Moon II*. After due consideration, experts believed they could finally create a SCNA out of *Tropic Moon III* by fixing the considerable issues which faced *Tropic Moon I* and *II*.⁴³

To execute *Tropic Moon III*, specialists turned to a completely new version of the B-57, the G model. They incorporated cutting-edge systems far more proficient than those previously installed on other aircraft. The B-57G possessed a redesigned nose section to house an enhanced sensor package. Even though the program experienced significant delays, the reconfiguration workforce used their time to equip the new aircraft with a laser target designator that had been derived from a first-generation LGBs known as *Pave Ways*. Thus, *Tropic Moon III* evolved into a versatile system, capable of using either conventional ordnance or LGB weapons, during the day or night. In October



B-57G bomb load.

1970, B-57G crews flew their first combat sorties during Operation *Commando Hunt V*. The reported kill rates per sortie found that the B-57Gs destroyed about 2,000 trucks—mostly using their precision guided munitions (PGMs), while AC-130A and E models, annihilated 10,000 to 12,000 vehicles. There could be no doubt which was the dominant “truck hunter.” As B-57G operations continued, experts tried to improve its performance by adding components from the gunship. They enhanced one B-57G with an Emerson TAT-161 turret with a single M61 20mm cannon under Project *Pave Gat*. Ironically, even as this program seemed to be on the verge of great success, the advent of the AC-119G/K, and especially the AC-130A side-firing gunship, brought the development of the system into doubt. While certainly more successful than any previous bomber models, the B-57G's capabilities could not match the deadly effectiveness of the AC-130.⁴⁴

While the B-57Gs were in many ways the advent of the use of LGBs, they also employed a wide variety of conventional ordnance, such as M36 incendiaries, cluster dispensers, and 500-pound iron bombs. They used this ordnance since the PGMs were just being developed and the Air Force often experienced shortages of these unique new weapons. In the end, the B-57Gs would continue operations along with the AC-130s and depart in May 1972. Unlike the AC-130s which would remain in the active inventory, the B-57G program fell victim to post-war spending cuts. The B-57Gs were created to fight a war and fulfilled that mission for two years. While they were not as successful as their younger AC-130 cousins, they ushered in a new era of combat aviation technology. The following section more fully explores the development and service of this unique aircraft.⁴⁵

Tropic Moon Development

The men and aircraft of the 13th BTS Squadron went home in early 1968 while the last nine aircraft in 8th Squadron followed in October 1969. Of ninety-four B-57Bs deployed to Vietnam, fifty-one, more than half, were lost, including thirty-eight to enemy fire. It seemed all B-57s



B-57G Forward Cockpit.

had seen their last days in Vietnam, and perhaps anywhere.⁴⁶

However, even as the B-57Bs were leaving, the concept of a modified B-57G had begun to germinate in August 1967, when members of the Air Staff allowed their counterparts at AFSC to circumvent the usual bureaucratic managerial procedures and, develop the B-57G prototype “immediately!” They also directed the B-57G development team to make concurrent plans for “simultaneous procurement of a full B-57G squadron.” To be sure, Air Force leadership considered the *Tropic Moon III* prototype ready for testing by September 1968. Moreover, they wanted 15 B-57Gs “to be deployed as soon as possible.”⁴⁷

Even though senior leaders wanted the B-57Gs immediately, funding still had to be found at a time when numerous other programs and projects were also demanding development money. In late 1967, even the most austere projections estimated that project cost would come to at least \$50 million. In early 1968, management shifted funds from lower priority programs and \$25 million was added to the overall budget for fleet modification. At this point, Air Force officials prepared to send out for industry bids to meet their requirements.⁴⁸

On March 8, specialists in the Aeronautical Systems Division of the AFSC advertised for bids to reconfigure government-furnished B-57Bs in to a new “G” model by integrating government and contractor furnished equipment (GFE and CFE). Guidelines, issued by ASD, declared that the basic airframe, engines, electronic countermeasures (ECM) equipment, and communications sets would be supplied by the Air Force. In turn, the contractor was to provide the weapons delivery and navigation systems as well as modify the airframes. The phase of the *Tropic Moon* program for designing the “G” configuration began in May 1968.⁴⁹

Contract provisions also established specific guidelines for the kinds of avionics to be fitted on the B-57Gs. Plans called for the aircraft’s FLR to have, at least, the equal capabilities of the state-of-the-art AN/APQ-126 which Ling-Temco-Vought Inc., Dallas, Texas, was going to install on the Air Force A-7D fighter jet (a cousin of the Navy A-7 Corsair). The modification team fitted an extremely accu-

rate weapons delivery computer and navigation system on *Tropic Moon III*. They added thick armor plating around crew areas and new ejection seats to increase crew protection. Last, but not least, they added self-sealing fuel tanks in the aircraft fuselage.⁵⁰

In April 1968, bids arrived from North American Rockwell, Cedar Falls, Iowa, General Dynamics, West Falls Church, Virginia, Ling-Temco-Vought, and Westinghouse, eclipsing Air Force projections by more than \$30 million. Worse, by May and June 1968, the required dollar amount was not available. At this point, Air Force decision-makers faced three clear choices. First, they could drop the project, which they seriously, but only briefly, considered. The second alternative called for a reduction in the number of aircraft, and/or remove some of the high technology items. Instead, experts in ASD argued for lower performance re-configuration aircraft sensor, radar, and communications packages. Officials approved this third proposal on June 29. On July 15, Air Force funding personnel awarded the prime contract to Westinghouse Defense and Space Center, Baltimore, Maryland. They agreed to complete the work for \$78.3 million, well over the original amount. In addition, Martin Marietta, Marietta, Georgia, subcontracted to inspect and repair the aging B-57Bs chosen for modification and Texas Instruments, Greenville, Texas, to prepare the FLIR and laser range finder for installation on the bombers.⁵¹

At this point, Air Force officials hoped to start using the *Tropic Moon III* B-57Gs in combat by April 1969. From the outset, this date proved to be unrealistic, and, thus, leaders altered it to December. At first, the various aspects of the enhancement project proceeded smoothly, however, Westinghouse’s category (CAT) I tests were soon delayed when the Air Force failed to deliver essential GFEs on time. To make matters worse, in August, Texas Instruments’ deliveries of FLIR sensors gradually began to fall behind. The Air Force also failed to deliver the ECM components and equipment on time. On December 16, 1969, a B-57G crashed, near Baltimore, Maryland, while undergoing CAT I flight tests flown by Martin Marietta test crew members. The subsequent investigation revealed the aircraft’s minimum speed was too slow to carry all the new additions and projected bomb loads. Soon, it became clear the November 30, 1969 initial delivery date would not be met either. To add to everyone’s frustrations, flying mishaps in February and May 1970, exposed further mechanical flaws which, although minor, required correction. At this point, test experts referred those involved to the fact that in 1968, under *Shed Light* development, the performance trials on *Tropic Moon II* B-57s had proved disappointing, due mainly to the LLLTV and navigation short-falls mentioned earlier.⁵²

In mid-1969, Westinghouse announced the cost to complete the project would require at least \$3.5 million more. By June 1970 this figure reached \$4.95 million. While these delays and cost overruns irritated Air Force leadership, the performance problems mentioned previously were not only disconcerting but also had a ripple effect by affecting crew training and testing of new devices and muni-



Tropic Moon III

tions. On October 28, 1969, the Air Force accepted the first B-57G and began CAT II testing. As 1970 approached, Air Force officials, concerned about the constant setbacks, began to wonder if the *Tropic Moon III* would provide the solution to their interdiction needs in Southeast Asian problem. They resigned themselves to hoping that the B-57G and F-111D might represent “evolutionary steps toward the development of a high speed, fully-integrated, self-contained night and all-weather weapon system of the future.”⁵³

While private companies like Westinghouse provided technical expertise and research for the project, most of the actual aircraft modification took place at the Warner Robins Air Material Area (WRAMA) in Georgia. The complicated logistics necessary for preparing and testing the B-57G were, in the words of one study, “a very rocky road.” In many ways, WRAMA personnel grew weary with the seemingly endless setbacks, feeling “as though a modern civilization had been hurled back into the dark ages by an atomic holocaust” every time they had to return to the drawing board for the project.⁵⁴

Finally, members of the Air Staff lost patience with the delays. On February 12, 1970, they sent the WRAMA Commander, Maj. Gen. A.J. Beck, and his staff to Texas Instruments to see if they could not speed up the development of a sensor package. On March 11, 1970, the Chief of Staff of the Air Force (CSAF) declared that the September 1970 deployment date would be met. The B-57G CAT III tests, conducted at the Tactical Air Warfare Center between April 29 and July 27, indicated, except for the FLIR, the bomber’s avionics package met basic requirements. The CSAF, Gen. John D. Ryan acknowledged the aircraft’s performance was close to the original specifications and ordered the 13 TBS to deploy to Ubon AB, Thailand, on September 15. As mentioned earlier, only four ever made it to Vietnam. Eleven of the fifteen B-57Gs were assigned to the squadron, leaving three at MacDill AFB, Florida to train replacement crews. One other B-57G stayed behind to serve as a “test bed” for future enhancements.⁵⁵

While the engineers at Texas Instruments and Westinghouse, had worked diligently to upgrade the FLIR,

even spending two million dollars, the system never worked like it was supposed to. In September 1971, they conducted the first combat tests and gave the sensor about a “C+.” On the other hand, the B-57G’s airframe and its new J65-W-5D engines, proved to be as good as advertised. In addition, experts placed the experimental B-57Gs in projects like *Pave Gat*, which proposed to mount a remote-controlled 20mm turret in the bomb bay. This was never completed due to cost and the fact that the U.S. was leaving Vietnam.⁵⁶

Tropic Moon III in Action

On May 22, 1970, the members of the 13th TBS accepted their first B-57G. Seven days later, they executed their initial operational training flight at MacDill AFB, Florida. On August 31, officials finalized the B-57G spares and repair process program designating it Project Code 253. As plans evolved for the initial deployment the General Officers’ Board members recommended, for a myriad of safety and security reasons, the contractor remove all the sensors prior to departure for Southeast Asia. These components were to be reinstalled once they reached Thailand. Finally, on September 5, Gen. Ryan gave the final approval for the bombers’ deployment. The overall transfer of the eleven B-57Gs was completed on September 30, less than two weeks before they entered combat.⁵⁷

From the time the 13th TBS deployed to Ubon RTAB in September 1970, the B-57Gs flew interdiction missions over the Ho Chi Minh trail claiming 2,000 trucks destroyed. By the time they B-57G were sent home, “they had helped pioneer night-attack and precision-strike techniques that are now routine in the U.S. military.” Air Force leadership officially retired the last training and reconnaissance B-57s in 1982. However, three specially modified WB-57F weather reconnaissance planes remained active with NASA and were even deployed to Afghanistan in 2012 to serve as airborne command posts (BACANs).⁵⁸

After only about eighteen months in combat, the bombers returned to the U.S. on April 12, 1972, and the program that began the bomber’s development was can-



B-57G and crew in a revetment.

celed on the 20th. Despite their successes, all those involved constantly had to return to the centerpiece of the project, the LLLTVs' ability to detect movement beneath thick jungle foliage in bad weather and at night. Even though specialists had mostly validated the existing technology, difficulties constantly arose when trying to integrate it into the B-57Gs or any other aircraft. *Tropic Moon I* and *II* had also employed camera pods with no success. When these packages were installed on AC-130 gunships, the technology worked flawlessly, even against heavily defended targets along the Ho Chi Minh Trail like the Mu Gia Pass between North Vietnam and Laos. However, danger from Surface-to-air Missiles (SAMs) restricted AC-130s from missions over this area. In addition, until AC-130s were eventually fitted with 105mm howitzers, they were less effective against targets like tanks. Originally, the B-57Gs were supposed to address this problem, but they only partially solved this, and many other combat issues.⁵⁹

In a foreshadowing of future developments, B-57Gs and AC-130s participated in several joint mission tests in early 1970. The AC-130 gunships filled the hunter role with their more advance sensors, while the B-57G's superior armament filled the killer position. One study claimed that as a team, "the two aircraft destroyed targets that either working alone could not have attacked." This relation-

ship, which never achieved its full potential in Vietnam, would eventually achieve success when the descendants of the *Tropic Moon* technology integrated with the AC-130 airframe in later years.⁶⁰

Upon the B-57G's redeployment to America, on June 23, 1972, Gen. Horace M. Wade, Vice CSAF, decided to keep the B-57Gs in the Air National Guard rather than mothball the remarkable aircraft, and the planes were stationed at Forbes AFB, Kansas. As for the crew members of the 13th TBS, they were sent to Clark AB on December 24, 1972. The unit was renamed the 13th Fighter Squadron the following July, but this designation did not last long. On September 30, 1973, the name was once again changed to the 13th Bombardment Squadron and it was inactivated.⁶¹

Conclusion

Overall, the B-57G *Tropic Moon III's* performance proved to be less than hoped for during its tenure in Vietnam from 1967-1972, leading to frustration for all involved in the project, including the personnel at the Warner Robins Air Material Area. However, many of the components later became important first-steps in the development of next-generation high-tech aircraft and weapon systems, rendering all the headaches and man-hours



B-57G Tropic Moon III on night mission during the Vietnam War.

worth the struggle for all involved, both in the private sector and the dedicated personnel at the Warner Robins Air Material Area. The efforts of those who labored on the *Tropic Moon* aircraft produced and refined essential components that would eventually evolve into highly successful sensor and radar networks that the modern USAF could not function as effectively.

Developing these cutting-edge sensors, advanced illumination equipment, and other sensitive technologies takes time and requires much trial and error. Just as the P-51 only rose to prominence after the installation of advanced Merlin engines, so did *Shed Light's* most successful programs, namely *Black Spot* and *Tropic Moon*, undergo several iterations before finding the correct solution. *Tropic*

Moon III originated in these mostly failed experiments and eventually improved ground illumination, sensors, and other vital equipment, despite never displaying its full potential in combat. Many experts consider the *Shed Light* and the B-57G *Tropic Moon III* programs relative failures because of the subsequent success of gunships such as the AC-119G/K and AC-130A/Es. However, to do so ignores the crucial role that earlier partnership played in the post-war development of nearly every one of the sensors, radars, FLIR, FLR, LLLTV, etc. components eventually affixed to later aircraft. Within a generation, a new cohort of fighters, gunships, and cargo planes had received better versions of all these devices, changing the USAF irrevocably.⁶²

In his definitive work *Storm over Iraq*, airpower expert



Tropic Moon III in flight in Vietnam.



Undercarriage view of a B-57.

Richard P. Hallion points out the importance of the post-Vietnam War evolution in high tech in the U.S. Air Force, calling the period from the end of Vietnam to the Gulf War an aviation technology revolution. He argues the success of Operation *Desert Storm* was the product of two decades of profound changes in the U.S. approach to defense, military doctrine, and combat operations. He also asserts the ascendancy of precision air power in warfare fulfilled the promise that air power had held for more than seventy-five years and reflected the groundbreaking adaptation of a

war strategy that targets things rather than people, allowing one to control an opposing nation without destroying it. In fact, so many of the communication, radar, sensors, avionics, and other equipment operating on F-15 and F-16 fighters, B-2 and B-52 bombers, and cargo and fixed-wing gunships employed in the early 1990s came from frustrated systems in Vietnam like *Tropic Moon III*. In short, victory was born out of the failures of an earlier generation. Today, this evolution continues with even more remarkable systems in better and more modern aircraft.⁶³ ■

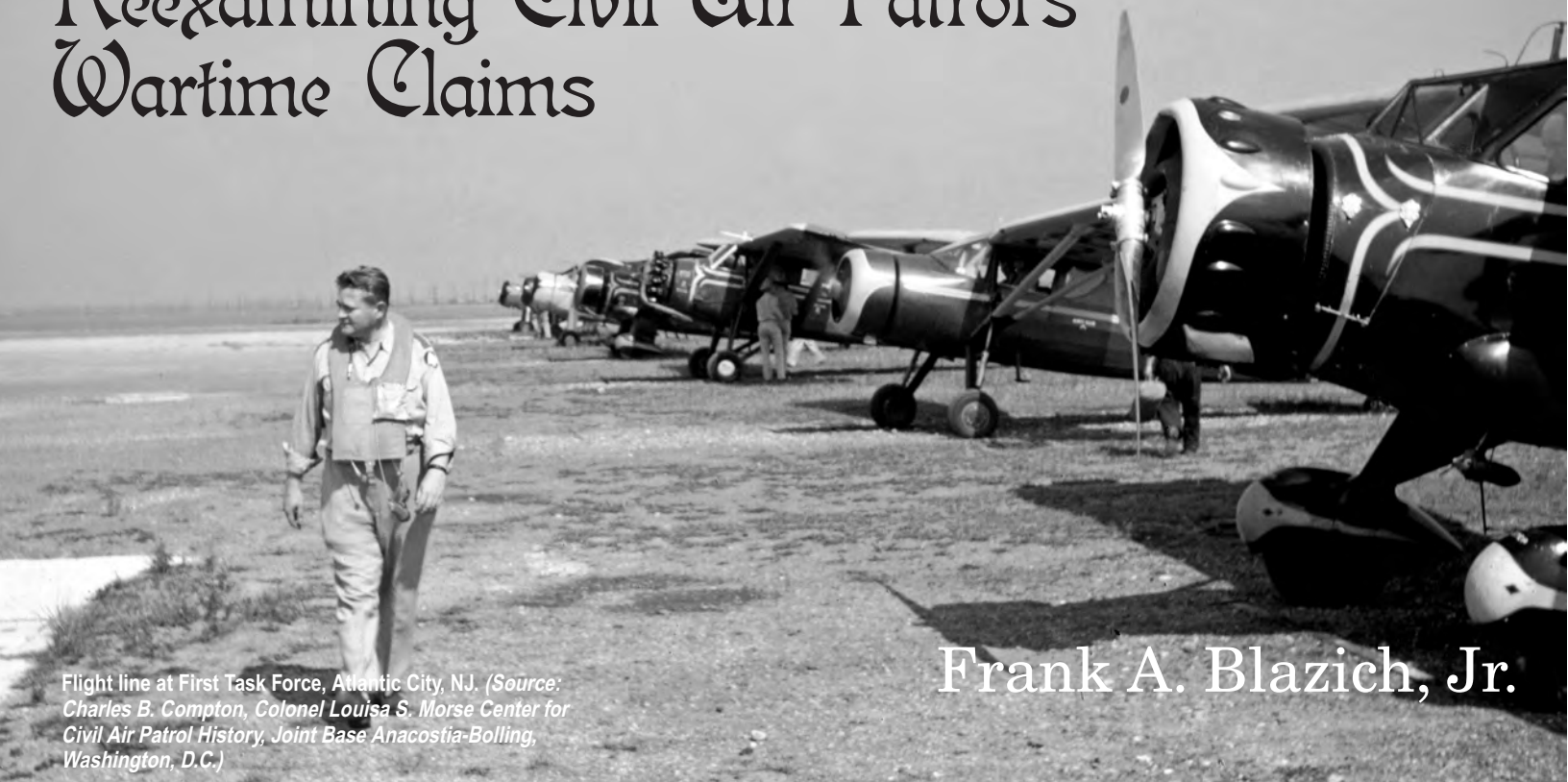
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“Definitely Damaged or Destroyed” Reexamining Civil Air Patrol’s Wartime Claims



Flight line at First Task Force, Atlantic City, NJ. (Source: Charles B. Compton, Colonel Louisa S. Morse Center for Civil Air Patrol History, Joint Base Anacostia-Bolling, Washington, D.C.)

Frank A. Blazich, Jr.

The headline shouted “Flying Guerrillas” for a feature in the May 15, 1943, issue of the *Saturday Evening Post*. The article opened dramatically:¹

Early one gray, icy morning last winter, the captain of a Nazi U-boat, surfacing a few miles off the coast of Florida, got the surprise of his life. Out of a fog bank barely a thousand feet overhead dived a flea-sized civilian plane, a hedge-hopper so skimpy that he must have felt like laughing it away. But under its thin belly gleamed what looked to be a crude bomb rack. It was the last thing that captain ever knew. A husky demolition bomb burst sprang on his conning tower, blasting captain, crew and U-boat clear out of the water.

The plane was a 90-horsepower Stinson Voyager with a top speed of 100 miles per hour, the pilot a retired business man of sixty. They were in the service of the Civil Air Patrol.

In a period of wartime secrecy, this stunning attack in American waters by a humble civilian volunteer against a marauding enemy submarine sounded unbelievable – because it was. This attack never happened. In May 1943, however, such an action did exist in the realm of plausibility in an environment of wartime secrecy.

In a December 28, 1943, restricted “Report of the Civil Air Patrol” to the Assistant Chief of Air Staff, Operations, Commitments and Requirements, Civil Air Patrol’s (CAP) National Headquarters included a detailed summary about the coastal patrol operation that ran from March 5, 1942 to August 31, 1943. Among the figures listed are two highlighting the military nature of these civilian-flown missions. Namely, a report of eighty-two “bombs dropped against enemy submarines” and a claim of two “enemy submarines definitely damaged or destroyed.”² In February 1944, the U.S. Navy published the August 1943 War Diary for the Eastern Sea Frontier, which also included the cumulative CAP coastal patrol statistics. The Navy war diary prefaced the information by noting that “the CAP Coastal Patrol left an interesting record of service.”³

Since the fall of 1943, CAP has believed that its eighteen month-long coastal patrol operation definitely damaged or destroyed two German U-boats. Following the conclusion of the war, this claim evolved within the organization to become a claim of destroying two enemy submarines, albeit with only circumstantial supporting evidence. CAP’s wartime history is oftentimes ignored by scholars, although several dismiss CAP’s claim to sinking submarines while acknowledging the contribution CAP made to the overall success in the Battle of the Atlantic.⁴ Nevertheless, articles or press releases from CAP, the U.S. Air Force, or other accounts of CAP’s coastal patrol effort repeat the claims of destroying submarines.⁵



CAP Coastal Patrol Bases. Graphic: Erik Koglin

The surviving CAP coastal patrol records have never before been subjected to academic scrutiny, but a reevaluation of the claim of damaging or destroying two enemy submarines is long overdue. Through the use of previously lost or unavailable primary source material, this article seeks to explain how privately-owned civilian aircraft came to be armed and the actual results produced from this effort.

Coastal Patrol Overview

The CAP coastal patrol effort commenced in March 1942, in response to the German submarine offensive off the East and later Gulf Coasts. To supplement the efforts of the Navy's Eastern Sea Frontier together with the Army's Eastern Defense Command, the Army Air Forces initially established a 30-day experiment on February 28, 1942, to evaluate the feasibility of using light civilian aircraft to patrol the coastal shipping lanes. Flying from fields in Atlantic City, New Jersey and Rehoboth Beach,

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Summary of CAP Coastal Patrol Operations

Missions flown	86,685
Hours flown	244,600
Submarines on which positions were reported by radio	173
Vessels reported in distress	91
Irregularities observed at sea	836
Special investigations made at sea or along the coastline	1,046
Floating mines reported	17
Survivors reported	363
Dead bodies reported	36
Bombs dropped against enemy submarines	82
Enemy submarines definitely damaged or destroyed	2
Special convoy missions performed on request of the Navy	5,684
Airplanes lost	90
Fatalities	26
Personnel seriously injured	7

Source: War Diary, Eastern Sea Frontier, August 1943, pg. 40, NARA, College Park, MD (NARA) (via Fold3)

Delaware, the Army Air Forces ordered CAP personnel "to establish an inshore anti-submarine patrol for the purpose of reporting the locations of enemy submarines and friendly vessels in distress." Typical patrols consisted of two-ship formations with two-man crews (pilots and observers), flying from dawn to dusk at altitudes ranging from a few hundred to perhaps a thousand feet above the waves for hours at time up to fifteen miles offshore. Aircraft were instructed not to approach closer than 1,500 yards to any surface vessel. Equipped with two-way radios, patrols would submit contact reports for any observed hostile submarines, vessels in distress, or unusual activities to military authorities.⁶

From the first flights of March 5, 1942, CAP coastal patrols proved useful to military officials. The unsophisticated CAP aircraft, flying slow, low-level patrols over the ocean proved ideal for spotting small objects easily missed by high speed military aircraft.⁷ CAP's aircraft provided an inexpensive and conveniently visible deterrent to U-boat surface operations. Aircraft in general posed the greatest threat to U-boats because of their speed, small size, and the vulnerability of the submarine's pressure hulls to damage from bombs. U-boat doctrine entailed crash diving upon sighting an aircraft, which involving submerging as quickly as possible and fleeing the area in case of retaliation, thereby breaking off potential attacks.⁸ From the initial two bases, the CAP coastal patrol effort expanded into September 1942, to number twenty-one bases with 423 aircraft in operation, stretching from Maine to the Texas-Mexico.⁹

The first CAP coastal patrols were almost entirely improvised affairs – trial and error.¹⁰ Aircraft assigned to coastal patrol duty had to be rated with ninety horsepower or greater engines, equipped for instrument flying and feature a two-way radiophone transmitter.¹¹ The aircraft themselves, all prewar commercially produced models, represented a mix of over nineteen different manufacturers and a dozen engine types.¹² Navigation depended on pencil and paper although crews also relied on



Typical CAP coastal patrol, consisting of two aircraft flying in formation low over the water. Source: Morse Center.

known navigation fixes, such as lightships, buoys, or shipwrecks.¹³ Instruction for aircrews came internally, either from among task force personnel or from civilian aviation experts.¹⁴ CAP task forces turned to the Army Air Forces for specialized antisubmarine warfare training, who admittedly had little for its own aircrews.¹⁵ CAP received some training materials from I Air Support Command for familiarization with U-boat tactics to help improve spotting accuracy.¹⁶ Other training materials from the Navy were distributed to CAP coastal patrol personnel over the course of the year.¹⁷

Armed Civilians at War

The events leading to the arming of the CAP coastal patrol force originate in May 1942, during a period of significant shifts in the Battle of the Atlantic for both CAP and the Navy. That month, the Navy's first escorted convoy sailed south from Hampton Roads, Virginia, on May 14, while a northbound escorted convoy sailed from Key West, Florida the following day.¹⁸ Convoys, demanded for months both in and outside the Navy, brought an almost immediate reduction in shipping losses along the eastern seaboard. With easy, unescorted targets no longer available on the East Coast, German Vice Admiral Karl Doenitz, Commander of Submarines (*Befehlshaber der Unterseeboote*), shifted his U-boats' operations southward along the Florida coasts, the Caribbean, and into the Gulf of Mexico where aerial defenses were in short supply.¹⁹

In the first week of May, three U-boats – *U-109*, *U-333*, and *U-564* – plied the waters off Florida near Morrison Field, West Palm Beach, home to CAP's Third Task Force. Between the three submarines from May 1-9, six ships went to the bottom with another three merchantmen damaged. During this period, patrols from the Third Task Force located survivors from the freighters *Ocean Venus* and *Eclipse*.

Around dusk on May 6, a CAP aircraft reported sighting a U-boat just off Cape Canaveral "in such shallow water that the U-boat rammed its prow into the mud bottom while attempting to escape." CAP First Lieutenants Thomas C. Manning (pilot) and Marshall E. "Doc" Rinker (observer) circled nearby for forty-two minutes and radioed for help but none arrived until well after the boat had vanished.²⁰

Although the identity of the enemy submarine cannot be conclusively determined, this incident, coupled with the increased U-boat activity further south in the Palm Beach area caused a stir in Washington.²¹ Assistant Secretary of the Navy Ralph Bard wrote to Vice Admiral Frederick J. Horne, Vice Chief of Naval Operations, and reported a phone call he received from a "very responsible man" reporting the attacks off Palm Beach. He stated that no Navy ships assisted the survivors while the Army bombers at Morrison Field had "no bombs, and no authority to do anything but reconnaissance. . . ." ²² Lieutenant General Henry H. "Hap" Arnold, chief of the Army Air Forces, passed Bard's letter to U.S. Army Chief of Staff, General George C. Marshall and mentioned his receiving a report of a submarine seen "in such shallow water that it required some 20 to 25 minutes to get clear. All this time one of our small reconnaissance planes was yelling for help while it circled above." In reply, Major General Follett Bradley, commanding First Air Force, stated the destruction of submarines remained a Navy matter.²³

Arnold decided to strike back. He telegraphed Bradley, ordering First Air Force to "equip the Civil Air Patrol airplanes operating under the First Air Support Command with one hundred pound bombs for use against submarines."²⁴ Arnold next wrote Marshall, suggesting that all Army air units on antisubmarine activity be placed under the immediate control and authority of the commanding generals of the defense commands and to arm all small reconnaissance aircraft with 100-pound bombs.²⁵ On May 11, Brigadier General Laurence S. Kuter, Deputy Chief of Staff, Army Air Forces, directed that all "puddle jumpers" on antisubmarine patrol, ergo, CAP aircraft, be modified to carry and release 100-pound bombs.²⁶ Five days later, I Ground Air Support Command included language in its letters of instructions for the Fifth through Eighth Task Forces that read "Airplanes of the C.A.P. units when equipped with suitable racks *are authorized to carry and drop bombs*."²⁷ By late June, I Ground Air Support Command updated all the Task Force mission statements for CAP patrols to include the phrase "to take all action within their means to destroy any enemy sighted."²⁸

From May to July 1942, the Army Air Forces further expanded the CAP coastal patrol effort. Additional bases were activated in Florida, Georgia, South Carolina, Louisiana, Texas, Mississippi, and North Carolina.²⁹ In July, the War Department authorized all CAP members to wear military-style rank and regular Army uniforms with certain distinguishing features, particularly garish red shoulder loops.³⁰ Then unbeknownst to the American forces, on July 19, 1942, Doenitz withdrew the last two U-boats off Cape Hatteras (*U-754* and *U-458*) and transferred operations to the mid-Atlantic. Postwar, Doenitz remarked



A Fairchild 24 armed with a pair of AN-M30 100-pound general purpose demolition bombs, Fifth Task Force, then Daytona Beach, Florida circa June 1942. Source: Richard G. Van Treurin.

that despite his shift in priority, “American waters were nevertheless still worthy of exploitation in any area in which the defensive system was found to be still defective.”³¹ By late September 1942, CAP operated twenty-one coastal patrol bases, completing a network of inshore coastal air coverage for the entire Eastern Seaboard and Gulf Coast.³² The collective blanket of Army, Navy, and CAP air coverage, as observed in a 1945 Army Air Forces study, “undoubtedly exercised a determining influence in the enemy’s strategic withdrawal” although it remained clear the enemy was not defeated but had “merely concentrated his efforts in other areas.”³³

Arming the CAP coastal patrol posed a challenge for I Ground Air Support Command. By June 1942, only eighty-two of 137 coastal patrol aircraft were equipped with bomb racks.³⁴ To further alleviate the situation, on August 22, I Bomber Command, under First Air Force, took over general supervision, administration, training, and operations of the CAP coastal patrol bases and delegated administrative, training, operational control for CAP to the I Patrol Force through the 59th and 65th Observation Groups. I Patrol Force would see to the complete arming of all CAP aircraft and develop tactics and techniques for coastal patrol.³⁵ On September 4, I Patrol Force removed the 15-mile patrol limitation for the CAP coastal patrols, authorizing future operations to “extend such distance off shore as the capabilities of personnel and equipment will permit.”³⁶ In due course, CAP aircraft began to venture upwards of 60 to 100 miles off shore for antisubmarine patrol, convoy escort duty in the shipping lanes, or special missions.³⁷ Three days later, the patrol force issued a new mission statement for all CAP coastal patrol units:³⁸

To conduct a continuous patrol over coastal shipping lanes during all daylight hours for the purpose of protecting friendly shipping and or locating and reporting enemy submarines, enemy warships, or suspicious surface craft and to take such action as equipment permits in destruction of enemy submarines; to conduct such special missions as are directed by this headquarters.

As with the arming of the aircraft, the removal of patrol restrictions represented the military’s growing confidence in the proficiency of the CAP personnel and their deterrent capability.

On October 15, 1942, the War Department activated the Army Air Forces Antisubmarine Command (AAFAC). All twenty-one CAP coastal patrol bases, including 365 aircraft and 1,663 personnel, subsequently fell under the operational control of AAFAC. CAP’s personnel continued to operate under previously issued policies and directives.³⁹ By November, AAFAC organized the twenty-one CAP bases under the command of either the 25th and 26th Antisubmarine Wings headquartered in New York and Miami, respectively, coinciding with the Eastern and Gulf Sea Frontiers.⁴⁰ CAP coastal patrol bases organized within the sea frontiers were assigned to the respective wing, and the commanding officer of the respective wing exercised operational control of the CAP bases.⁴¹ AAFAC tasked CAP coastal patrol units with essentially the same mission statement as I Patrol Force.⁴² AAFAC provided CAP with specific patrol and operational guidance far exceeding previous instructions. All coastal patrol bases would also maintain two aircraft with combat crews on alert during daylight hours on call for on-command missions. Patrols would now be limited to no more than sixty miles offshore.⁴³ By summer 1943, AAFAC provided opportunities for CAP coastal patrol personnel to receive formalized instruction in bombing and antisubmarine warfare techniques.⁴⁴

In fall 1942, however, the CAP coastal patrol armament situation proved disappointing. Since September 1939, the British had recognized that a 100-pound bomb, even with a direct hit – difficult with even the best of bomb-sights, did not guarantee the sinking of a U-boat unless the pressure hull was breached. Furthermore, larger, Torpex-filled aerial depth charges proved the ideal weapon.⁴⁵ At the time of AAFAC’s establishment, less than half of CAP coastal patrol aircraft had bomb shackles installed capable of carrying AN-M30 100-pound general purpose demolition bombs, or in far smaller numbers, the AN-M57 250-pound demolition bomb or Mk 17 325-pound depth bomb.⁴⁶ AAFAC did report that a minimum charge of 30 pounds of TNT was the “smallest that with reasonable assurance will afflict lethal damage in direct contact.” For larger ordnance, like the Mk 17, a bomb drooped within a 17- to 25-foot radius of a submarine’s pressure hull would be lethal. Ergo, a small bomb’s lethal radius equated to a contact hit, whereas a large bomb gave more variability for a kill.⁴⁷ Bomb sights and training for bomb runs in turn would be required to increase the probability of accurate attacks. Less than half the CAP coastal patrol aircraft, however, were equipped with simple bombsights.⁴⁸ Nonetheless, the primitive equipment or limited training did not deter CAP aircrews from attacking when opportunity allowed, with seventy bombs expended in fifty-one attacks by October 14, 1942.⁴⁹ But, as the Navy noted, safety considerations required CAP to drop 100-pound demolition bombs at appreciable altitudes “which precludes any consistent accuracy.”⁵⁰ Even lightly armed, however, CAP aircraft could strike at the enemy.



Grumman G-44 Widgeon of the First Task Force, seen here armed, as flown by CAP Major Wynant G. Farr and Captain John B. Haggin on the incident of July 11, 1942. Source: CAP Colonel Charles B. Compton, Morse Center.

July 1942 Attacks

The majority of documented CAP coastal patrol submarine attacks date from May to November 1942. Throughout this period, approximately forty-two U-boats patrolled at varying points along the East and Gulf coasts, during which time CAP reported thirty-nine attacks on enemy submarines.⁵¹ CAP's two incidents claiming to damage or destroy a submarine both occurred a day apart in July. The first incident occurred on July 10, 1942 approximately fourteen miles off Cape Canaveral at position 28.43N, 80.30W. Aircraft from the Fifth Task Force, Daytona Beach, Florida, had only just begun armed patrols on July 1, with racks and simple bomb sights installed by Army mechanics at Orlando Army Air Base.⁵² All base aircraft carried AN-M30 bombs, either as singles or as a pair.⁵³

Details of the incident are fragmentary at best, but according to CAP and U.S. Tenth Fleet records, a CAP coastal patrol aircraft dropped three bombs on a reported submerged submarine at 1314 hours, presumably from at least two aircraft. The incident is not mentioned in the Fifth Task Force yearbook, but Tenth Fleet gave the incident two record numbers and the Joint Army-Navy Assessment Committee evaluated the results as "H" (insufficient evidence of presence of submarine) and later "J" (insufficient information to access or inconclusive).⁵⁴ That same July day, a Type VIIC submarine, *U-134*, commanded by *Kapitänleutnant* Rudolf Schendel, was sitting on the ocean floor, 26 miles from Cape Canaveral, but he reported no attacks nor sounds of explosions in his *Kriegstagebücher* (KTB), or war patrol diary.⁵⁵

The second incident forming CAP's damaged or destroyed claim has more substantial supporting evidence. Coincidentally, it occurred the day after the incident off Florida. Unlike the Fifth Task Force, Atlantic City's planes sported an array of bomb racks installed at Mitchel Field to carry the smaller 100-pound demolition bombs, but also the more formidable AN-M57 or Mk 17 bombs. None of the base aircraft had bomb sights.⁵⁶ On July 11, 1942, one of the morning patrol aircraft from the First Task Force, Atlantic City, reported spotting a U-boat cruising on the surface off the coast of Absecon, New Jersey. After reporting patrol returned to base, a Grumman G-44 Widgeon seaplane flown by CAP Major Wynant G. Farr and Captain John B. Haggin flew to the reported position and began a search for the submarine. Locating a faint oil slick, the men tracked its origin and concluded that the submerged submarine was moving parallel to shore. After patrolling for several hours over the location of the target, the men reported the submarine rose to periscope depth, at which point they dropped the Widgeon's two Mk 17 bombs, producing a spreading oil slick and bringing fragments of wood to the surface. Farr believed he saw the bow of the submarine break the surface of the water before sinking below.⁵⁷

The Eastern Sea Frontier war diary entry for July 11, 1942, reports CAP sighting a submerged submarine at 39.07N, 74.13W, on course 280°, later revised to 39.15N, 74.13W, with "globs of oil appearing at distances of fifteen feet and spreading." The entry notes that the latter position was three miles west of the wreck of the cargo ship *San Jose*, sunk after a collision on January 17, 1942. There is no



The Early Years, 1972, by artist Robert C. Sherry, is a fanciful depiction of a CAP coastal patrol attack. This painting hangs in CAP's National Headquarters, Maxwell AFB, Ala. Source: *Civil Air Patrol*.

mention of CAP attacking the object, but a Navy blimp, OS2U Kingfisher aircraft, patrol boats, and several coast guard cutters depth charged other positions in the area, bringing up wood and oil on the same day.⁵⁸ The Tenth Fleet assigned the attack incident no. 1083, occurring at 1545 hours, with a Joint Army-Navy Assessment Committee evaluation of "J."⁵⁹

As with the incident of July 10, 1942, German war records show that a Type VIIC submarine, *U-89*, was patrolling slowly on a south/southwesterly course within sixty nautical miles of the shore. On the eleventh, the boat's commander, *Kapitänleutnant* Dietrich Lohmann, did not report any aircraft sightings much less attacks, in his KTB, with the boat approximately fifty-three miles from the reported position of the CAP attack. Two days later, *U-89* was spotted and attacked by an aircraft approximately fifty miles east of Rehoboth Beach, Delaware, with three bombs causing slight damage to the submarine. CAP did not report this attack, which German researcher Axel Niestlé credits to a B-18 bomber of the Army Air Force's 2nd Bomb Group.⁶⁰

Claim to Credit

The reports of July 10 and 11, 1942, from the First and Fifth Task Forces arrived at CAP National Headquarters in short order for compilation with reports of the other task forces. Colonel Harry H. Blee, CAP's operations officer, oversaw the CAP coastal patrol effort during the war and received weekly reports from the task forces detailing total missions and hours flown, submarine sightings and/or attacks, irregularities at sea, floating bodies, or mines. Blee in turn submitted a weekly report tabulating the weekly figures for CAP's National Commander, Major Earle L. Johnson. In his report to Johnson of July 16, 1942, covering the period of July 9 to 14, 1942, inclusive, Blee reported "Civil Air Patrol planes dropped a total of seven bombs against enemy submarines. These bombing attacks resulted in the

definite destruction of one submarine and the apparent damaging of another."⁶¹ This assessment of damage or destruction appears to originate from Blee's analysis of the daily S-3 intelligence reports from the First and Fifth Task Forces, evidently independent from the assessments of Tenth Fleet, confirmed postwar by the surviving records of the German U-boat force.⁶² A following report, issued months later by CAP National Headquarters on October 20, 1942, details that from June 25 to July 29, 1942, CAP coastal patrol aircraft "definitely damaged" two enemy craft.⁶³ By April 1943, prior to CAP's transfer from the Office of Civilian Defense to the War Department, a report authored by Captain Kendall K. Hoyt, CAP National Headquarters' intelligence officer, stated "2 enemy submarines have been destroyed or damaged by bombs from CAP planes."⁶⁴ This claim of two submarines damaged or destroyed subsequently found its way into the draft of the biennial report of the Army Air Forces.⁶⁵

At the conclusion of the coastal patrol service on August 31, 1943, the CAP tabulated its data. In August and September 1943, the Bureau of Public Relations for the War Department received data on coastal patrol operations "through channels" as reported by CAP National Headquarters.⁶⁶ The War Department released this CAP information in a press statement about the Antisubmarine Command on December 10, 1943, and CAP National Headquarters released its own version of this release, approved by the War Department's Bureau of Public Relations, one week later.⁶⁷ This official CAP statement of December 17, 1943, listed 173 submarines spotted, with 57 attacked with bombs or depth charges, and noted that CAP was "officially credited with sinking or damaging at least 2 [submarines], in addition to those sunk by Army or Navy aircraft called for the kill by CAP."⁶⁸ A restricted "Report of the Civil Air Patrol" published weeks later on December 28, 1943 by the CAP National Headquarters for the Assistant Chief of Air Staff, Operations, Commitments and Requirements, included a summary of CAP coastal patrol operations postdated September 3, 1943. This statistical summary reported eighty-two "bombs dropped against enemy submarines" and listed two "enemy submarines definitely damaged or destroyed."⁶⁹ The only record or source that corroborates official credit appears to be Blee's July 1942 assessment of reports from the two CAP task forces.

In March 1944, the Army Air Forces Air Inspector released his report of an investigation of the CAP from January to February 1944. Among the facts in the report, the document includes the September 1943, coastal patrol summary data "reported by the Civil Air Patrol," further reproduced by the Navy in the February 1944 war diary. The investigator wrote:⁷⁰

Because of the conclusion of these operations, no detailed study of the accuracy of these claims was made. However, access was had to the evaluations given by the Navy to all claims of sinking submarines and it was determined therefrom [sic] that in the case of four claims made by the Civil Air Patrol, one was evaluated "No damage"; two, "Insuffi-



July 4, 1942 celebration at the Fifth Task Force, six days before the incident off Cape Canaveral. Source: Richard G. Van Treurin.

cient evidence of presence of submarine”; and a fourth, “Insufficient evidence of damage.”

The armament carried by CAP planes during these operations was 100-pound demolition bombs. The question is presented as to how much damage a bomb of that weight and character could inflict upon a submarine under most favorable circumstances.

The report raised clear doubts about the credibility of the CAP claims. On August 31, 1944, Johnson sent a reply detailing assorted corrections in response to the Air Inspector's report. Johnson does not mention, question, or rebuke the inspector's statements regarding the coastal patrol summary data.⁷¹ In June 1945, when CAP National Headquarters submitted a historical report for the official history of the Office of Civilian Defense, the history noted CAP as “officially credited with sinking or damaging at least two [enemy submarines] in addition to those destroyed by planes or ships summoned by CAP.”⁷²

After the fall of the Third Reich, the records of the *Kriegsmarine*, notably those of the U-boat arm, were captured by the Allied forces. Analyzed in conjunction with the Ultra intercepts (decrypted German radio traffic), the Joint Army-Navy Assessment Committee was able to account for the fate of all of Germany's 1,154 U-boats. Of the fourteen submarines confirmed sunk off the American Eastern and Gulf seaboards from March 1942 to August 1943, none were confirmed sunk by the CAP; indeed the committee did not assign CAP credit for any U-boats.⁷³ The question of CAP damaging U-boats was not studied, but of those CAP attacked that received Tenth Fleet incident numbers, the most promising evaluation recorded is “F”, for “insufficient evidence of damage.”⁷⁴

During the period of CAP coastal patrol operations from March 1942 to August 1943, Allied forces destroyed fourteen U-boats in either the Gulf of Mexico or off the Eastern Seaboard of the United States and Canada. Of the fourteen, American military forces, supported by physical or documentary evidence, received credit for definitively sinking eleven submarines.⁷⁵ The *Kriegsmarine* never reported any submarine missing sent to American wars over the same period, and contemporary studies of all available data on the fate of the 1,154 U-boats corroborate the German record.⁷⁶

Summary

From an examination of the existing archival evidence from Army, Navy, and German sources pertaining to CAP's coastal patrol effort, several conclusions are reached. CAP aircraft neither destroyed nor damaged any enemy submarines from March 5, 1942 to August 31, 1943.

The claim by CAP of damaging or destroying enemy submarines appears to originate from within CAP's own national headquarters based on reports from the organization's coastal patrol task forces. The U.S. military did not formally credit the CAP with the destruction or damage of two enemy submarines, either during or after the conclusion of World War II.

What is known today is that German U-boat *Kriegstagebüchern* war patrol diaries record how observing aircraft had an adverse effect on submarine operations. While not clearly indicating who the observed aircraft were, it is likely that some of these observed aircraft were CAP coastal patrol planes. So long as the war in Europe continued, the claim of two damaged or destroyed submarines as published in the fall of 1943 was considered



Colonel Harry H. Blee, Operations Officer, CAP National Headquarters, seen here receiving the Legion of Merit from General Carl Spaatz, circa 1946. Colonel Earle L. Johnson, CAP national commander, is seen in the background. *Source: Morse Center.*

valid, or at least publicly acceptable.

The CAP damage or destruction claims are now known to be without factual evidence; however, the CAP coastal patrol service proved a viable component to the nation's overall antisubmarine defense plan. For eighteen months, civilian volunteers flew privately-owned civilian aircraft over the Atlantic Ocean and Gulf of Mexico in defense of the United States. With a minimum of funding from the federal government, private industry, and often the wallets of the volunteers themselves, CAP's coastal patrol service provided a stopgap measure when the nation's armed forces lacked the assets to deter and constrain enemy submarine operations.

Although armed, destruction of submarines was never

the primary duty of CAP coastal patrol. Rather, CAP coastal patrols were flown to inhibit enemy submarines from sinking merchant vessels and to deter attacks off the nation's coasts. Working in conjunction with the nation's armed forces, CAP ensured the safety of the nation's coastal waters in the critical period after entry into World War II. Statistically separating out CAP's distinctive contribution to defeating enemy operations from those of the armed forces has proven impractical; however, as part of a larger effort CAP's contribution proved valuable enough to sustain for eighteen months. This contribution is best measured not in destroyed submarines, but rather the untold numbers of men, ships, and war materiel that arrived safely on foreign shores to help defeat the Axis powers. ■

NOTES

1. John Kobler, "Flying Guerrillas: America's Aviation Bugs Harass the Axis" *Saturday Evening Post* 215, no. 46 (May 15, 1943): 24.
2. National Headquarters, Civil Air Patrol, "Report of Civil Air Patrol," December 28, 1943, Appendix D, "Summary of CAP Coastal Patrol Operations," September 3, 1943, folder 4, Box 1, Earle L. Johnson Papers (ELJ), Western Reserve Historical Society, Cleveland, OH (WRHS).

3. War Diary, Eastern Sea Frontier, August 1943, pg. 40, National Archives and Records Administration, College Park, MD (NARA) (via Fold3). The U.S. Air Force Historical Study about civilian volunteer activities during World War II lists the same figures in the December 28, 1943 report, but attributes them to a report from December 31. Mae M. Link, U.S. Air Force Historical Study No. 19: *Civilian Volunteer Activities in the AAF* (Washington, D.C.: Government Printing Office, 1944), 82-83.

4. Publications specifically about CAP include Robert E. Neprud, *Flying Minute Men: The Story of the Civil Air Patrol* (1948, repr., Washington, DC: United States Air Force, 1988); Louis E. Keefer, *From Maine to Mexico: With America's Private Pilots in the Fight against Nazi U-boats* (Reston, VA: COTU Publishing, 1997); Frank A. Burnham, *Hero Next Door* (Fallbrook, CA: Aero Publishers, Inc., 1974); and William B. Mellor, Jr., *Sank Same* (New York: Howell, Soskin, Publishers, 1944). Works mentioning CAP's coastal patrol effort in some detail: Andrew Ten Eyck, *Jeeps in the Sky: The Story of Light Planes in War and Peace* (New York: Commonwealth Books, Inc., 1946); Wesley Frank Craven and James Lea Cate, *Plans and Early Operations, January 1939 to August 1942*, vol. 1 of *The Army Air Forces in World War II* (1949; repr., Washington, DC: Office of Air Force History, Government Printing Office [GPO], 1983); Samuel Eliot Morison, *The Battle of the Atlantic, September 1939 – May 1943*, vol. 1 of *History of the United States Naval Operations in World War II* (Boston: Little, Brown and Company, 1947); Michael Gannon, *Operation Drumbeat: The Dramatic True Story of Germany's First U-Boat Attacks along the American Coast in World War II* (New York: HarperPerennial, 1991); Homer Hickam, *Torpedo Junction: U-Boat War Off America's East Coast, 1942* (Annapolis: U.S. Naval Institute Press, 1996). Works explicitly stating CAP did not sink any submarines include Morison, *Battle of the Atlantic*, 276-81; Samuel Eliot Morison, *The Two-Ocean War: A Short History of the United States Navy in the Second World War* (Boston: Little, Brown and Company, 1963), 131; Ed Offley, *The Burning Shore: How Hitler's U-boats Brought World War II to America* (New York: Basic Books, 2014), 157-58.

5. "Serving, Saving, Shaping: Maj. Gen. Mark Smith guides CAP mission for state, nation and Air Force," *AIRMAN Magazine*, January 22, 2019, <http://airman.dodlive.mil/2019/01/22/serving-saving-shaping/>.

6. Headquarters I Air Support Command to Civil Air Patrols Authorities, "Letter of Instructions Number 1," March 8, 1942, with attachments, Reel A4064, Air Force Historical Research Agency, Maxwell AFB, AL (AFHRA).

7. Morison, *Battle of the Atlantic*, 278.

8. Assistant Chief of Air Staff, Intelligence, Historical Division, U.S. Air Force, *Historical Study No. 107 – The Antisubmarine Command* (Washington, DC: U.S. Army Air Forces, April 1945), 34; Oberkommando der Marine, *The U-boat Commander's Handbook*, ed. E.J. Coates, trans. U.S. Navy, 1943 (Gettysburg, PA: Thomas Publications, 1989), 24-25, 78-81.

9. Memorandum from Harry H. Blee to Earle L. Johnson, "Coastal Patrol Activities of Civil Air Patrol, April 22 to 28, 1943, inclusive," April 29, 1943, Folder "Civil Air Patrol," Box 7, Entry 233, Director's Office, Feb. 1942 – June 1944, CAP – Budget Estimates, RG171, NARA; Office of Civilian Defense, Civil Air Patrol, Operations Orders No. 1, "Activation of CAP Coastal Patrols," November 30, 1942, Folder 2, Box 6, ELJ, WRHS. The total bases included Atlantic City, NJ (1st), Rehoboth Beach, DE (2nd), Lantana, FL (3rd), Parksley, VA (4th), Daytona/Flagler Beach, FL (5th), St. Simons Island, GA (6th), Miami, FL (7th), Charleston, SC (8th), Grand Isle, LA (9th), Beaumont, TX (10th), Pascagoula, MS (11th), Brownsville, TX (12th), Sarasota, FL (13th), Panama City, FL (14th), Corpus Christi, TX (15th), Manteo, NC (16th), Suffolk, Riverhead, NY (17th), Falmouth, MA (18th), Portland, ME (19th), Bar Harbor, ME (20th), and Beaufort, NC (21st).

10. Isaac W. Burnham, II, "History of CAP Coastal Patrol No. 4," (ca. 1943), pg. 8, Reel 44592, AFHRA.

11. Office of Civilian Defense, Civil Air Patrol National Headquarters, Confidential Letter of Instruction No. 2, "Organization of Coastal Patrol Bases," April 16, 1942, Reel 38907, AFHRA. All aircraft were required to have a sensitive altimeter, airspeed indicator, compensated magnetic compass, tachometer, turn-and-bank and rate of climb indicators, and a clock with a sweep-second hand. Office of Civilian Defense, Civil Air Patrol

National Headquarters, Harry H. Blee, Operations Directive No. 23-A, "CAP Coastal Patrols," August 26, 1942, A. William Schell Collection (AWS), CAP National Archives and Historical Collections, Colonel Louisa S. Morse Center for Civil Air Patrol History, Joint Base Anacostia-Bolling, Washington, DC (CAP-NAHC).

12. Office of Civilian Defense, Civil Air Patrol National Headquarters, "Aircraft on Active CAP Coastal Patrol Duty by Type of Plane," April 28, 1943, Folder "Submarine – Aircraft Disposition," Box 4, Secretary of War, Office, Expert Consultant to the Secretary of War, Correspondence and Reports, Re: Edward L. Bowles, Anti-Sub Warfare, Record Group 107, NARA. In terms of manufacturers, the non-inclusive list includes Aeronca, Beechcraft, Bellanca, Cessna, Curtiss Robin, Fairchild, Fleet, Grumman, Harlow, Howard, Luscombe, Monocoach, Rearwin, Ryan, Sikorsky, Stinson, Travelair, and Waco. Engine manufacturers included Warner, Jacobs, Pratt and Whitney, LeBlond, Ken Royce, Franklin, Challenger, Ranger, Lambert, Lycoming, Wright, Wasp, and Continental. Over half of the aircraft on CAP coastal patrol service consisted of either the Stinson Voyager 10A or the Fairchild 24. "List of Aircraft with Engine Types on Active CAP Coastal Patrol Duty," October 8, 1942, Reel 38919, AFHRA.

13. William Paul Bridges, interview by Lester E. Hopper, tape recording, Manteo, North Carolina, October 10, 1983; Keefer, *Maine to Mexico*, 46-47; Office of Civilian Defense, Civil Air Patrol National Headquarters, memorandum from Harry H. Blee to all regional, wing, and base commanders, "Organization and Operation of Coastal Patrol Bases" (Confidential Letter of Instruction Number 5), May 11, 1942, Reel 38907, AFHRA.

14. Keefer, *Maine to Mexico*, 10, 38; John A. Keil, "Civil Air Patrol Coastal Patrol No. Three, Lantana, Florida," 1943, Kendall King Hoyt Papers (KKH), CAP-NAHC. Almost every coastal patrol base drafted manuals or instructions to help orient and train new personnel. Burnham, "History of CAP Coastal Patrol No. 4," (ca. 1943), pg. 8, Reel 44592; 12th Task Force, Civil Air Patrol, Brownsville, Texas, Memorandum No. 12-01, July 17, 1942; Jack R. Moore, General Orders No. 12, "C.A.P. Coastal Patrol No. 8, Charleston, S.C.," March 20, 1943; Civil Air Patrol Coastal Patrol No. 15, Operations Directive No. 1-A to all officers, CCP No. 15, and all pilots, observers, radio operators, and others concerned, October 15, 1942; CAP Coastal Patrol No. 18, Falmouth Airport, Hatchville, Mass., Directive – Memorandum No. 12-01, September 7, 1942; Civil Air Patrol, Civil Coastal Patrol No. 15, Instructions – Bulletin #1, August 4, 1942, Reel 38920, AFHRA.

15. CAP task forces were re-designated as "Civil Coastal Patrol #" on July 26, 1942 and then re-designated again as "Civil Air Patrol Coastal Patrols" on August 20, 1942. Memorandum from Edward J. Culleton to all concerned, "Redesignation of Civil Air Patrol Units on Coastal Patrol" (General Memorandum Number 1), July 26, 1942; Office of Civilian Defense, Civil Air Patrol National Headquarters, Harry H. Blee, Station List No. 1 – CAP Coastal Patrols, August 20, 1942, Reel A4064, AFHRA.

16. Assistant Chief of Air Staff, Intelligence, Historical Division, U.S. Air Force, *Historical Study No. 107 – The Antisubmarine Command* (Washington, DC: U.S. Army Air Forces, April 1945), 215-16; Headquarters I Air Support Command, "Notes for Aircraft on Anti-Submarine Patrol," April 15, 1942; Headquarters Army Air Forces Anti-Submarine Command, "Whales, Not Submarines," October 27, 1942, AWS, CAP-NAHC; Timothy Warnock, "The Battle Against the U-Boat in the American Theater" (Washington, DC: Air Force History Support Office, Bolling AFB, 1994), 9-10.

17. Copies of photographs taken by the Navy on June 22, 1942, of an S-class submarine crash diving were provided to CAP coastal patrol bases to help aircrews identify what a crash-diving submarine would look like. Some of these images have been mislabeled as CAP photographs of suspected German U-boats. Memorandum from Navy Chief of the Bureau of Aeronautics to

Chief of Naval Operations (Training Section), "Photographs, forwarding of," July 7, 1942, attached to envelope of photographs, Folder "A10(4) A/S Publications (S/M)," Box 1, Tenth Fleet, Anti-Submarine Measures Division, Administrative Files, A10(2) – A10(8), Record Group 38, Records of the Office of the Chief of Naval Operations (RG38), NARA; memorandum from Headquarters I Bomber Command, Howard Moore, Information Bulletin No. 16, "Series of Pictures Showing an S-Type Submarine Crash Diving, with Surface Speed at Time of Dive – 10 Knots," August 10, 1942, Reel A4085, AFHRA.

18. Gannon, *Operation Drumbeat*, 387; Clay Blair, *Hitler's U-Boat War: The Hunters, 1939-1942* (New York: Random House, 1996), 568-69, 573-74; War Diary, Eastern Sea Frontier, May 1942, Chapter 1, 1-4; Chapter 4, 1-10, NARA (via Fold3).

19. Karl Doenitz, *Memoirs: Ten Years and Twenty Days* (New York: World Publishing Company, 1959), 220-21; Williamson Murray and Allan R. Millett, *A War to Be Won: Fighting the Second World War* (Cambridge, MA: The Belknap Press, 2000), 251-52; Craven and Cate, *Plans and Early Operations*, 530-531; Morison, *Battle of the Atlantic*, 137-42; Blair, *U-boat War*, 578-88; U.S. Air Force, *Antisubmarine Command*, 35.

20. John A. Keil, "Civil Air Patrol Coastal Patrol No. Three, Lantana, Florida," 1943, KKH, CAP-NAHC; Neprud, *Flying Minute Men*, 18.

21. The U-boat in question may have been *U-109*, which reported being near Bethel Shoal, east of Vero Beach and south of Cape Canaveral, Florida intent on closing in on and attacking a tanker in shallow water but which broke off attack due to a circling aircraft. To the untrained eye, the maneuvering boat in shallow water may have appeared to have run aground. KTB for Fifth War Patrol of *U-109*, entry for 6 May 1942, <http://uboatarchive.net/KTB109-5.htm>. *U-109's* KTB mentions maneuvering in water 16-18 meters and that the targeted tanker is aground in 8 meters of water. The submarine fired a torpedo which missed.

22. Ralph A. Bard to Frederick J. Horne, May 9, 1942, Box 165, Henry Harley Arnold Papers (HHA), Manuscript Division, Library of Congress, Washington, DC (LC).

23. Memorandum from Henry H. Arnold to George C. Marshall, "Submarines Off Florida Coast," May 9, 1942, Box 165, HHA, LC.

24. Telegram from Henry H. Arnold to Follett Bradley, undated (estimated May 9-15, 1942), Folder "Military Official Nos. 270-273, Box 177, HHA, LC. The original document, despite opening "confirming telephone instructions this date" does not have any date marking of any type. On May 20, Arnold received a memorandum from Major General Dwight D. Eisenhower, Army Assistant Chief of Staff for Operations, providing the Air Forces chief with additional supporting authority and requesting immediate steps to equip all planes with racks to carry bombs and/or depth charges and bomb sights where possible. Eisenhower also mentioned that "It is understood that C.A.P. planes which carry bombs cannot be insured. Have necessary action taken which will protect the owners of the planes in event of their damage or loss." Memorandum from Dwight D. Eisenhower to Henry H. Arnold, "Action to Improve Anti-Submarine Operations," May 20, 1942, Reel A4063, AFHRA.

25. Memorandum from Henry H. Arnold to George C. Marshall, "Anti-Submarine Operations," May 10, 1942; memorandum from Millard F. Harmon to Henry H. Arnold, "Anti-Submarine Operations," May 11, 1942, Box 165, HHA, LC. Arnold also mentioned that no bombsights would be installed on the small aircraft.

26. Card index, "Puddle Jumpers," May 11, 1942, Box 57, HHA, LC.

27. Headquarters I Ground Air Support Command to Civil Air Patrol Authorities, "Letter of Instructions Number 4," May, 16, 1942 (for Fifth, Sixth, Seventh, Eight Task Forces), Reel 38920, AFHRA. Emphasis added. On May 20, I Ground Air Support Command issued a new letter of instructions to the First and Second Task Forces with a mission statement that included ". .

. . to take action to destroy, by bombing attacks, any enemy submarines sighted." The instructions noted that no CAP unit would carry or drop live bombs or depth charges until specifically directed by the Army. Headquarters, I Ground Air Support Command, John P. Doyle, Jr. to Civil Air Patrol Authorities, First Task Force, Atlantic City, New Jersey, Second Task Force, Rehoboth Beach, Delaware, Letter of Instructions Number 1," May 20, 1942, Reel A4064, AFHRA. The War Department re-designated I Air Support Command as I Ground Air Support Command in April 1942. Maurer Maurer, *Air Force Combat Units of World War II* (1961; repr., Washington, DC: Office of Air Force History, GPO, 1983), 440.

28. Headquarters I Ground Air Support Command to Civil Air Patrol Authorities, 9th Task Force, New Orleans, La., "Letter of Instructions Number 8), June 29, 1944, Reel 38920, AFHRA.

29. Office of Civilian Defense, Civil Air Patrol, Operations Orders No. 1, "Activation of CAP Coastal Patrols," November 30, 1942, Folder 2, Box 6, ELJ, WRHS.

30. Office of Civilian Defense, Civil Air Patrol National Headquarters, memorandum from Earle L. Johnson to all unit commanders, "Uniform, Insignia, and Rank (GM-45)," July 17, 1942; Office of Civilian Defense, Civil Air Patrol National Headquarters, memorandum from Earle L. Johnson to all unit commanders, "Qualifications for Appointment with Rank, Commissioned and Non-commissioned Officers" (Addendum to GM-45), July 17, 1942, binder, "Civil Air Patrol – Establishment of Charts, Staff, General Memoranda, Training Memoranda," Box 2, Entry 205, Processed Documents Issued by the OCD – CAP; Office of Civilian Defense, Civil Air Patrol National Headquarters, memorandum from Jack Vilas to all regional, wing, and coastal patrol commanders, "Rank and Grade Designated for Civil Air Patrol Coastal Patrols (GM-50)," July 29, 1942, Folder "Civil Air Patrol July 15, 1942," Box 21, Entry 16A, General Correspondence, 1941 – May 1945, Civil Air Patrol, Record Group 171, Records of the Office of Civilian Defense, National Headquarters (RG171), NARA.

31. Morison, *Battle of the Atlantic*, 254-55; Gannon, *Operation Drumbeat*, 385-88; Offley, *Burning Shore*, 240-41; Murray and Millett, *A War to Be Won*, 251-52; Doenitz, *Memoirs*, 237.

32. Earle L. Johnson to Henry L. Stimson, July 28, 1942, Barry L. Spink Collection (BLS), CAP-NAHC; Office of Civilian Defense, Civil Air Patrol, Operations Orders No. 1, "Activation of CAP Coastal Patrols," November 30, 1942, Folder 2, Box 6, ELJ, WRHS.

33. U.S. Air Force, *Antisubmarine Command*, 36.

34. Memorandum from Headquarters I Ground Air Support Command, E.H. Eddy to Commanding General, Air Forces, Eastern Defense Command and First Air Force, "Requirements for Civil Air Patrol Services between June 18, 1942, and December 31, 1942," June 22, 1942, Reel A4064, AFHRA.

35. Memorandum from Charles L. Carlson to Henry H. Arnold, "Civil Air Patrol," July 21, 1942, Reel A4064; memorandum from Louis E. Boutwell to Chief of Staff, Headquarters, I Bomber Command, "Plan of Organization and Operation, I Patrol Task Force," August 15, 1942; Headquarters, Air Forces, Eastern Defense Command and First Air Force, General Order Number 50, August 17, 1942, Reel A4050; memorandum from Robert W. Harper to Henry H. Arnold, Hugh A. Drum, and James E. Chaney, "Amendment of Policy on Operational Control of the Civil Air Patrol," August 25, 1942; memorandum from Charles L. Carlson to Westside T. Larson, "Plans for Organization and Training," and Enclosure #1, Plan for General Supervision of C.C.P. Units and for Control, Organization and Training of Observation Units, August 18, 1942; memorandum from Louis E. Boutwell to all C.C.P. Units, "Change of Command," August 22, 1942; memorandum from Earl J. Nesbitt to Commanding General, EDC & First Air Force, Mitchel Field, New York, "Letter of Transmittal," September 17, 1942 with attachment, "Plan for General Supervision of C.A.P. (Coastal Patrol) Units Administration, Operations and Training of the 59th and 65th Observa-

tion Groups, Reel A4064, AFHRA; telegram from 65th Observation Group, Langley Field, Virginia to CAP Coastal Patrol Base No. 16, Manteo, North Carolina, August 15, 1942, Coastal Patrol Base No. 16 Collection, CAP-NAHC. The general order is dated August 17, while the telegram of August 15 reports "effective this date." From the commencement of the CAP coastal patrol effort, Colonel Harry H. Blee at CAP National Headquarters provided operational and administrative guidance to the CAP coastal patrol bases, and Blee in turn received instructions from First Air Force governing the coastal patrol missions.

36. Antisubmarine Command Historical Section, "CAP History of Operations (First Narrative)," October 12, 1943, pg. 3, Reel A4057; memorandum from Earle L. Johnson to Louis E. Boutwell, "Removal of 15-Mile Limitation – CAP Coastal Patrols," September 4, 1942; memorandum from Louis E. Boutwell to James E. Chaney, "Removal of 15-Mile Limitation – CAP Coastal Patrols, 1st Indorsement," September 5, 1942; memorandum from Charles L. Carlson to Westside T. Larson attention I Patrol Force, "Removal of 15-Mile Limitation – CAP Coastal Patrols, 2nd Indorsement," September 10, 1942, Reel A4064, AFHRA.

37. House Committee on Military Affairs, *Civil Air Patrol: Hearings on H.R. 1941 and H.R. 2149*, 79th Cong., 1st sess., 1945, 3, 6, 23.

38. Headquarters I Bomber Command, I Patrol Force, Louis H. Boutwell to all Civil Air Patrol Coastal Patrol Units (thru CAPCP National Headquarters, Washington, D.C.), Letter of Instructions Number 1, September 7, 1942, CAP-NAHC.

39. Headquarters A.A.F. Anti-Submarine Command, I Patrol Force, memorandum from Louis E. Boutwell to Earle L. Johnson, "Change of Command and Command Channels," October 19, 1942; memorandum from Louis E. Boutwell to Westside T. Larson, "Report of Inspection: CAP Units," October 3, 1942, Reel A4064, AFHRA.

40. Craven and Cate, *Europe: Torch to Pointblank*, 378; Maurer, *Combat Units*, 388-89, 437, 452; memorandum from Commanding General, Headquarters, AAF Anti-Submarine Command, I Patrol Force, to National Commander, Civil Air Patrol, October 19, 1942, CAP-NAHC.

41. Headquarters, Army Air Forces Antisubmarine Command, Operational Instructions, Annex No. 1, Letter of Instructions Number 1, November 27, 1942, CAP-NAHC.

42. Headquarters, Army Air Force Antisubmarine Command, to commanding officer, 25th Wing AAF Antisubmarine Command, commanding officer, 26th Wing AAF Antisubmarine Command, and all CAP Coastal Patrol Units, Letter of Instructions Number 1, November 27, 1942, CAP-NAHC.

43. Headquarters, Army Air Forces Antisubmarine Command, Operational Instructions, Annex No. 1, Letter of Instructions Number 1, November 27, 1942, CAP-NAHC.

44. Office of Civilian Defense, Civil Air Patrol National Headquarters, Harry H. Blee, Coastal Patrol Circular No. 50, "Instruction in Technique of Antisubmarine Warfare," May 24, 1943; War Department, Headquarters Army Air Forces, Civil Air Patrol, Harry H. Blee, Coastal Patrol Circular No. 53, "Instruction in Bombing," June 4, 1943, Reel A4063, AFHRA.

45. Max Schoenfeld, *Stalking the U-Boat: USAAF Offensive Antisubmarine Operations in World War II* (Washington, DC: Smithsonian Institution, 1995), 7, 14-15.

46. As of October 1, 1942, only 193 of 415 CAP aircraft assigned for coastal patrol duty were armed. Memorandum from T. Jefferson Newbold to Harry H. Blee, "Bomb Rack Installation," October 16, 1942, Reel A4064, AFHRA. CAP predominantly carried and deployed AN-M30 100-pound general purpose demolition bombs, either singularly or in braces of two or three. The handful of larger aircraft on coastal patrol frequently carried either AN-M57 250-pound general purpose demolition or Mk 17 325-pound depth bombs.

47. Army Air Forces Antisubmarine Command, "February 1943 Monthly Intelligence Report," pgs. 24-25, Reel A4057, AFHRA.

48. Several simple bombsights were created for CAP coastal patrol use. "Inexpensive Bombing for Civil Air Patrol," *Air Force: Official Service Journal of the U.S. Army Air Forces* (January 1943): 34; "Bomb Sight for Light Airplanes," *Aero Digest* 41, no. 2 (August 1942): 214. CAP National Headquarters requested data from all 21 coastal patrol bases in October 1942 about installed bomb racks, bombsights, and ordnance stocks. Office of Civilian Defense, Civil Air Patrol National Headquarters, Coastal Patrol Circular No. 17, "Report of Special Equipment and Supplies," October 29, 1942, AWS, CAP-NAHC; summation of CAP coastal patrol base reports, Folder "Civil Air Patrol Coastal and Liaison Patrol Special Equipment, 1942/11, CAP Item Number 128," Reel 44599, AFHRA.

49. Office of Civilian Defense, Civil Air Patrol National Headquarters, "Civil Air Patrol Coastal Patrol Operations," October 20, 1942, Reel 38919, AFHRA. Every coastal patrol base received a detail of four enlisted Army Air Forces ordnance personnel to handle the arming and disarming of all CAP aircraft. CAP aircrews were authorized to drop ordnance, as well as remove and install safety pins in the bomb fuses, but not handle the weapons otherwise. Memorandum from Headquarters I Ground Air Support Command, E.H. Eddy to Commanding General, Air Forces, E.D.C. and First Air Force, "Ordnance Service for Civil Air Patrol Units," June 26, 1942; memorandum from William P. Winslade to Henry H. Arnold, "Ordnance Service for Civil Air Patrol Units, 1st Indorsement, June 30, 1942; memorandum from F.H. Monahan to Commanding General, Air Forces E.D.C. and First Air Force, "Ordnance Service to Civil Coastal Patrol Units," August 11, 1942; memorandum from Charles L. Carlson to Commanding General, I Bomber Command, "Ordnance Service to Civil Coastal Patrol Units, 3rd Indorsement," September 3, 1942, memorandum from Harry H. Blee to Louis E. Boutwell, "Ordnance Supplies and Services for Civil Air Patrol Coastal Patrols," November 4, 1942, Reel A4064, AFHRA.

50. Memorandum from Royal E. Ingersoll to Atlantic Fleet, "Civilian Air Patrol Coastal Patrol," October 28, 1942, file "COM-INCH 1942 Secret A16-1 National Defense," Box 255, Headquarters COMINCH, 1942 – Secret, A14-1 to A16-1(1), RG38, NARA. AAFAC instructed CAP aircraft when carrying demolition bombs to patrol at an altitude of no less than 600 feet. Headquarters, Army Air Force Antisubmarine Command, memorandum from G.A. McHenry to Commanding Officer, 25th Antisubmarine Wing, Commanding Officer, 26th Antisubmarine Wing, and All CAPCP Units, Letter of Instructions Number 1C, December 31, 1942, Reel A4063, AFHRA.

51. The figures for patrolling U-boats are taken from a review of KTBs with the assistance of Jerry Mason (Captain, USN, retired) and his website, <http://www.uboaarchive.net>. The figure for CAP attacks is both a review of information from the Eastern and Gulf Sea Frontier War Diaries and the records of the U.S. Tenth Fleet's Antisubmarine Warfare (ASW) Analysis and Statistics Section files in Record Group 38 held in the National Archives. For the latter records, from May 22 to November 5, 1942, there are 32 incidents listed, albeit with two incident numbers for the same CAP attack. The Navy's Eastern and Gulf Sea Frontier War Diaries list additional CAP attacks, bringing the total to 39 by November 5, 1942. Between November 5, 1942 to August 31, 1943, CAP records only list an additional 6 attacks on enemy submarines, for a wartime total of 45.

52. Claude Y. Nanney, Jr., *CAP Coastal Patrol Base No. 5, Flagler Beach, Florida, May 19, 1942 . . . August 31, 1943* (n.p.: Florida?, 1943), 12-15. The Fifth Task Force commenced operations at Daytona Beach Airport with its first patrols operating on May 19, 1942. In October, the base relocated to Flagler Beach, completing the move on October 28. CAP First Lieutenant John R. Tamm described the bomb sight as "very simple – two paper clips attached 'just so' to the fuselage. We practiced at about a thousand feet until we could hit a target by lining up the target with the two clips. The pilot kept his right hand on his observer's

knee and when he squeezed, his observer released the bomb.” Keefer, *Maine to Mexico*, 122.

53. Memorandum from Julius L. Gresham to Harry H. Blee, “Report on Special Equipment and Supplies Furnished CAP Coastal Patrol #5,” November 11, 1942, Reel 44599, AFHRA. Gresham noted 23 installed bomb sights and 27 total bomb racks. Of the base’s 23 aircraft, four had a brace of bombs, while 19 were armed with single bombs. Memorandum from Julius L. Gresham to Earle Johnson, “Airplanes Stationed at Our Base,” July 13, 1942, Reel 38919, AFHRA.

54. “Attack Record by Date,” entries for July 10-11, 1942, incident no. 1062 and 1072, folder “Chronological 1 May 42 – 30 June 42,” Box 204, Tenth Fleet, ASW Analysis & Stat. Section, Series VIII: Assessments of Probable Damage Inflicted in Specific Anti-Submarine Warfare Incidents 1941-1945, Preliminary Evaluations – Attacks on U/B Assessments No. 1 1943; Incident No. 1062 and 1072, Box 72, Tenth Fleet, ASW Analysis & Stat. Section, Series VI: Reports and Assessment of Individual Anti-Submarine Warfare Incidents, 1941-1945, RG38, NARA; memorandum from Harry H. Blee to Lawrance Thompson, “History – CAP Coastal Patrol Operations,” February 18, 1944, Reel 38920, AFHRA. The Tenth Fleet lists incident 1062 on July 10, 1942 and incident 1072 on July 11, 1942, but the incident details are practically identical, notably the same location, time, and distance from land, leading the author to conclude these are one and the same incident.

55. KTB for Sixth War Patrol of *U-134*, entry for July 10, 1942, <http://uboatarchive.net/U-134/KTB134-6.htm>.

56. Memorandum from Wynant C. Farr to Harry H. Blee, “Report on Special Equipment and Supplies,” November 9, 1942, Reel 44599, AFHRA.

57. Neprud, *Flying Minute Men*, 18-19; Gregory Weidenfeld, *The Search for the Haggin – Farr Sub Kill* (McGuire ARB, NJ: New Jersey Wing Headquarters, 1997), 5-8. Farr wrote a letter of the incident to Johnson on July 12, 1942, who in turn passed the letter to Lieutenant General Arnold who read the report aloud in an off-the-record session of a Senate Appropriations Committee. Earle L. Johnson to Wynant C. Farr and John B. Haggin, July 17, 1942, New Jersey Wing Archives, Joint Base McGuire-Dix-Lakehurst, New Jersey.

58. War Diary, Eastern Sea Frontier, July 11, 1942, 1307 EWT (Eastern War Time), NARA (via Fold3).

59. “Attack Record by Date,” entry for July 12, 1942, incident no. 1083, folder “Chronological 1 May 42 – 30 June 42,” Box 204, Tenth Fleet, ASW Analysis & Stat. Section, Series VIII: Assessments of Probable Damage Inflicted in Specific Anti-Submarine Warfare Incidents 1941-1945, Preliminary Evaluations – Attacks on U/B Assessments No. 1 1943; Incident No. 1083, Box 72, Tenth Fleet, ASW Analysis & Stat. Section, Series VI: Reports and Assessment of Individual Anti-Submarine Warfare Incidents, 1941-1945, RG38, NARA.

60. KTB for Second War Patrol of *U-89*, entries for July 11 & 13, 1942, <http://uboatarchive.net/KTB89-2.htm>; database of air attacks off U.S. east coast reported by German U-boats from 1942-1943, provided to author by German U-boat historian Dr. Axel Niestlé.

61. Memorandum from Harry H. Blee to Earle L. Johnson, “Coastal Patrol Operations, July 9 to 15, 1942, Inclusive,” July 16, 1942, folder “Civil Air Patrol,” Box 7, Entry 1, Miscellaneous Records, Director’s Office, Feb. 1942 – June 1944, CAP – Budget Estimates, RG171, NARA.

62. Memorandum from Harry H. Blee to Lawrance Thompson, “History – CAP Coastal Patrol Operations,” February 18, 1944, Reel 38920, AFHRA.

63. Office of Civilian Defense, Civil Air Patrol National Headquarters, “Civil Air Patrol Coastal Patrol Operations,” October 20, 1942, Reel 38919, AFHRA.

64. Office of Civilian Defense, Civil Air Patrol, Kendall K. Hoyt, “Special Report of the Civil Air Patrol,” April 1943, pg. 7, Reel A2992, AFHRA. In a second, “Brief Report on Civil Air Patrol

of April 1943, Hoyt reported CAP being “credited with destroying or damaging two” submarines. Office of Civilian Defense, Civil Air Patrol, Kendall K. Hoyt, “Brief Report on Civil Air Patrol,” April 1943, Reel A2992, AFHRA.

65. Assistant Chief of the Air Staff, Intelligence, Historical Division, “Draft for Biennial Report of the Army Air Forces, July 1, 1941 to June 30, 1943,” pg. 86, Folder “Military Report General May 1943,” Box 183, HHA, LC.

66. Memorandum from Kendall K. Hoyt to Historical Division, Assistant Chief of Air Staff, Intelligence on “Civil Air Patrol, Week ended 20 November 1943,” 20 November 1943, folder 4, Box 1, ELJ, WRHS.

67. Memorandum from Kendall K. Hoyt to Historical Division, AC/AS, Intelligence on “Civil Air Patrol, Week ended 18 December 1943,” 18 December 1943, folder 4, Box 1, ELJ, WRHS.

68. Civil Air Patrol National Headquarters, *CAP Bulletin* 2, no. 51 (December 17, 1943): 1-2.

69. National Headquarters, Civil Air Patrol, “Report of Civil Air Patrol,” December 28, 1943, Appendix D, “Summary of CAP Coastal Patrol Operations,” dated September 3, 1943, folder 4, Box 1, ELJ, WRHS.

70. War Department, Headquarters of the Army Air Forces, Dudley M. Outcalt to Air Inspector, on “Survey of the Civil Air Patrol,” March 8, 1944, pgs. 30-31, folder 3, Box 5, ELJ, WRHS.

71. Earle L. Johnson to Commanding General, Army Air Forces, on “Report of Air Inspector’s Investigation of Civil Air Patrol, dated 8 March 1944,” August 31, 1944, folder 3, Box 5, ELJ, WRHS.

72. Earle L. Johnson to Elwyn A. Mauck, June 21, 1945, with attachment, “History of CAP,” June 25, 1945, pg. 11, folder “Civil Air Patrol June 1-,” Box 21, Office of Civilian Defense, National Headquarters, General Correspondence, 1941 – May 1945, Civil Air Patrol, RG171, NARA.

73. Navy Department, Chief of Naval Operations, *German, Japanese and Italian Submarine Losses – World War II*, (OPNAV-P33-100 (Washington, DC: GPO, May 1946), 3-9. CAP-USAF was informed of this by November 1973 in response to an inquiry to the Department of the Navy’s Naval Historical Center. D.C. Allard to William T. Capers, III, November 27, 1973, Reference Files, Operational Archives, History and Archives Division, Naval History and Heritage Command, Washington Navy Yard.

74. “Attack Record by Date,” entries for June 2, 1942, incident no. 777, folder “Chronological 1 May 42 – 30 June 42,” Box 204, Tenth Fleet, ASW Analysis & Stat. Section, Series VIII: Assessments of Probable Damage Inflicted in Specific Anti-Submarine Warfare Incidents 1941-1945, Preliminary Evaluations – Attacks on U/B Assessments No. 1 1943, RG38, NARA. The closest enemy submarine, the Type IXB submarine *U-106*, reported no attack on June 2, 1942 and was approximately 300 miles away from the reported time and position of the attack.

75. The 11 submarines sunk by the U.S. military include eight sunk by the Navy (*U-656*, *U-503*, *U-85*, *U-158*, *U-576*, *U-166*, *U-84*), two by the Coast Guard (*U-352*, *U-157*), and one by the Army Air Forces (*U-701*). Regarding the three other boats sunk off the U.S. East Coast, they are the *U-215*, sunk by the British Royal Navy antisubmarine trawler *HMS Le Tiger*; *U-754*, sunk by a Royal Canadian Air Force Hudson bomber; and *U-176*, sunk by the Cuban Navy patrol boat *CS 13*. Axel Niestlé, *German U-boat Losses During World War II: Details of Destruction* (London: Frontline Books, 2014), 41, 56, 71, 78, 86, 114, 121-22, 124.

76. Combining American, British, Canadian, and German records, Axel Niestlé’s work is the most exhaustive study of the fate of all of Germany’s U-boats in World War II. Niestlé also graciously shared his database of reported air attacks against U-boats off the East and Gulf Coasts of the United States from March 1942 until August 1943. No attacks, including those where the attacker remains unknown, match reported CAP attacks in the Eastern or Gulf Sea Frontier war diaries. Niestlé, *German U-boat Losses*.

A TALE OF TWO BOMB GROUPS: THE LUFTWAFFE'S II. GRUPPE, KG 4 AND THE USAF'S 452ND BOMB GROUP (HEAVY)



The two bomb groups meet for the only time in the war. Flares from II./KG 4's Heinkels illuminate parked B-17s of the 452nd and 388th Bomb Groups at the shuttle base at Poltava, Ukraine, June 21, 1944

Richard R. Muller

Two Bomb Groups: Parallel Lives?

Over a quarter of a century ago, noted air power historian Kenneth P. Werrell made an eloquent case to the readers of this journal. He argued that the neglected field of aviation unit history should be given some overdue attention.¹ In the ensuing years, historians have heeded his call, and many fine such histories have appeared. This article seeks to add a comparative dimension to the study of noteworthy air units by examining two representative bomber units—one German, one American. It will compare and contrast them in light of their doctrine, training, personnel policies, equipment, combat effectiveness, and ability to adapt to the changing demands of a global war. Of interest is that the two groups actually crossed paths—II./KG 4 bombed the 452nd on the ground at Poltava in the USSR after the shuttle raid of June 21, 1944. Their stories serve as microcosms of the life and fate of two Second World War bomber arms.

The paper draws on the extensive preserved records of the 452nd Bomb Group² (BG) housed at the USAF Historical Research Agency, Maxwell AFB, Alabama, the outstanding collection of the National Museum of the Mighty Eighth Air Force in Pooler, Georgia, as well as the secondary literature on the Eighth Air Force and the bomber offensive. The group also has a very active veterans' association, which publishes a quarterly newsletter featuring material from veterans and their families.³ There is no published scholarly history of the Group, although one is in preparation. Assembling the II./KG 4 story is a bit more problematic, as the group's operational records did not survive the war. However, there is enough surviving Luftwaffe primary material from higher command echelons, as well as a useful German language unit history of KG 4,⁴ to support a reasonable comparison.

The Bomb Groups: II./KG "General Wever" 4 and 452nd Bombardment Group (H)

The second Gruppe of Kampfgeschwader (Bomber Wing) 4 (normally abbreviated II./KG 4) came into being in May 1939, with the re-designation of II./KG 253.⁵ It was given the honor title of "General Wever" after the first Luftwaffe Chief of Staff, General Walther Wever, the strategic air power advocate who was killed in a 1936 air crash.⁶ II./KG 4's battle record encompasses the Third Reich's war of aggression and conquest: Poland, Scandinavia, the Battle of Britain, the Blitz, the Mediterranean, and the USSR. The unit spent over half of its war in the Soviet Union, flying a wide range of operational and tactical missions. It was one of the very few Luftwaffe bomber units to not disband—it remained a bomber (and transport) unit to the very end of the war.

In contrast to the long journey across Europe, the Mediterranean, and the USSR trod by II/KG 4, the 452nd BG's story is clean and concise. The Group was created on June 1, 1943 at Camp Rapid, South Dakota, with operational training commencing shortly thereafter at Geiger Field, Washington. Its specialist personnel trained at bases across the south and southwest United States before crossing the Atlantic (the aircrews in their bombers, the ground echelon by troop ship). Its motto was *Labor ad Futurum* ("Work Toward the Future").⁷ It was not one of the storied bomb groups; it does not even rate a mention in the AAF Official History. It was, to use Shakespeare's phrase, a "Bomb Group for the working day." The Group, part of the enormous bow wave of U.S. technological and manpower mobilization, joined the strategic air offensive in Europe just as that campaign was reaching a crescendo. It was in continuous combat from February 1944 to April 1945. Its battle honors included Big Week, Berlin, the Oil Campaign, Normandy, Cobra, and ended with humanitarian (food dropping) missions in Holland.

Equipment

The aircraft operated by the groups reflected the air forces' differing views of what bombardment aviation was intended to accomplish, as well as the capabilities and limitations of the national aircraft industries. II/KG 4 operated the Heinkel He 111 exclusively. This was a twin engine bomber of 1934 design; its first flight was in early 1935. It proved a highly successful design for the times, its high speed seemingly eliminating the need for heavy armament. The 111 went to war with only three handheld machine guns. Combat experience led to changes, including the addition of more defensive armament and armor. Despite upgraded engines, these modifications exacted a performance penalty and the He 111 disappeared from the

daylight skies over the UK, and by 1941 from the Western Front altogether. It remained a frontline bomber on the Eastern Front until 1944, serving in a wide variety of roles. The aircraft, known as "our faithful, reliable 111,"⁸ was extremely pleasant to fly, as former KG 4 pilots attest.⁹ The Spanish Air Force flew the bomber until the early 1970s.

The 452nd also trained on and operated a single make and model of heavy bomber—the Boeing B-17G "Flying Fortress." Designed the same year as its German counterpart, the prototype flew only a few months later. Its larger airframe was capable of much more extensive development. Unlike the 111, the B-17 was designed to do one job very well: high altitude precision bombardment. It too was a product of hard won combat experience; unescorted B-17s proved no less vulnerable over Europe than the Luftwaffe's bombers over Britain. The G-model embodied hundreds of design changes, most notably the chin turret intended to cope with the Luftwaffe's dangerous head-on attacks. Unlike the aging German warhorse, the B-17G, accompanied at long last by long-range escort fighters, was at the peak of its effectiveness as a weapons system by 1944; like its German counterpart, it was beloved by its crews.

Comparison of Heinkel He 111H-6 and Boeing B-17G¹⁰

	Heinkel He 111H-6	Boeing B-17G
Length	54 feet	75 feet
Wingspan	74 feet	104 feet
Engines	2 Jumo 211F-1, 1300 HP	4 Wright R-1820-97, 1200HP
Defensive armament	6 7.9 mm mgs 1 20 mm	13 .50 cal guns
Bomb Load	4400 lbs (5500 if carried ext)	4000 lbs (internal)
Speed	258 mph (max); 224 (cruise)	300 mph (max), 260 (cruise)
Range	1740 miles	2000 miles
Ceiling	25,500 feet	37,500 feet

There is no question that by 1944, the B-17G outclassed the 111 in nearly every performance category, but this simple side-by-side comparison does not tell the whole story. Every aircraft design is a tradeoff—the Heinkel maximized bomb load and versatility, while the B-17 emphasized defensive armament and range, relying on formation flying and better bombing accuracy to make the most of its payload. The Heinkel bomber in 1939-1941 was every bit the equal of the best Allied bombers in frontline service—and certainly more combat-effective than the handful of early model B-17s then trickling into Army Air Corps squadrons. More significant is the complete failure of the German aircraft industry to provide a successor—the 111 was never intended to still be in service by 1943-1944. But with the miscarriage of every major German follow-on bomber program (most notably the Heinkel 177, Fw 191, and Junkers 288) the 111 remained in production. Many German frontline bomber units at the end of WWII still operated essentially the same hardware with which they en-

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ROUND 1

Missions of

452 BOMB GROUP (H)

No.	Date	Mission	No.	Date	Mission	No.	Date	Mission
1	FEB. 5	ROMILLY	34	APR. 22	HAMM	67	JUN. 5	CAP GRISNEZ
2	FEB. 6	ROMILLY	35	APR. 24	FRIEDRICHSHAVEN	68	JUN. 6	CAEN
3	FEB. 8	FRANKFURT	36	APR. 25	DIJON	69	JUN. 6	ARGENTAN
4	FEB. 10	BRUNSWICK	37	APR. 26	HILDESHEIM	70	JUN. 6	ARGENTAN
5	FEB. 15	N. FRANCE	38	APR. 27	N. FRANCE	71	JUN. 7	NANTES
6	FEB. 20	POSEN-TUTOW	39	APR. 29	BERLIN	72	JUN. 8	TOURS
7	FEB. 21	BRUNSWICK	40	APR. 30	CLERMONT	73	JUN. 10	MERLIMON PLAGE
8	FEB. 24	POSEN	41	MAY 1	N. FRANCE	74	JUN. 11	PONTAULT
9	FEB. 25	REGENSBURG	42	MAY 1	METZ-BRUSSELS	75	JUN. 12	BERNAY-SMARRON
10	FEB. 29	BRUNSWICK	43	MAY 7	BERLIN	76	JUN. 14	BRUSSELS
11	MAR. 3	BERLIN	44	MAY 8	BERLIN-BRUNSWICK	77	JUN. 15	MISBURG
12	MAR. 4	BERLIN	45	MAY 8	N. FRANCE	78	JUN. 15	N. FRANCE
13	MAR. 6	BERLIN	46	MAY 9	JUVINCOURT	79	JUN. 18	BREMEN-HAMBOURG
14	MAR. 8	BERLIN	47	MAY 11	BRUSSELS	80	JUN. 19	CORME-ECLEUSE
15	MAR. 9	BERLIN	48	MAY 12	BRUX	81	JUN. 20	MAGDEBURG
16	MAR. 15	BRUNSWICK	49	MAY 13	OSNABRUCK	82	JUN. 21	BERLIN
17	MAR. 16	AUGSBURG	50	MAY 19	BERLIN	83	JUN. 21	Badland-Elsterwerda
18	MAR. 18	AUGSBURG	51	MAY 20	BELGIUM	84	JUN. 22	MELUN
19	MAR. 20	FRANKFURT	52	MAY 22	KIEL	85	JUN. 23	N. PARIS
20	MAR. 22	BERLIN	53	MAY 23	BREITIGNY-TROYE	86	JUN. 24	BREMEN
21	MAR. 23	BRUNSWICK	54	MAY 24	BERLIN	87	JUN. 24	S. FRANCE
22	MAR. 26	N. FRANCE	55	MAY 25	LIEGE	88	JUN. 29	WITTENBERG
23	MAR. 27	BORDEAUX	56	MAY 27	STRASBOURG	89	JULY 4	S. PARIS
24	MAR. 28	CHATEAUDUN	57	MAY 27	ST. VALERY	90	JULY 6	N. FRANCE
25	APR. 1	LUDWIGSHAVEN	58	MAY 28	KONIGSBURG	91	JULY 6	N. FRANCE
26	APR. 8	ACHMER-RHEINE	59	MAY 29	LEIPZIG	92	JULY 7	LEIPZIG
27	APR. 9	POSEN-FAIRMUNDLE	60	MAY 30	REIMS	93	JULY 8	ROUEN
28	APR. 10	COURCELLES	61	MAY 31	SCHWERTHE	94	JULY 11	MUNICH
29	APR. 11	ROSTOCK	62	JUN. 2	WIMEREUX-BOULOGNE	95	JULY 12	MUNICH
30	APR. 13	AUGSBURG	63	JUN. 2	ACHERS	96	JULY 13	MUNICH
31	APR. 18	LUNEBURG	64	JUN. 3	WIMEREUX-BOULOGNE	97	JULY 14	S. FRANCE
32	APR. 19	LIPPSTADT	65	JUN. 4	Le CHATELET	98	JULY 16	STUTTGART
33	APR. 20	N. FRANCE	66	JUN. 4	VILLENEUVE-ST-GEORGES	99	JULY 17	N. FRANCE

100 JULY 18

KIEL

Mission board of the 452nd Bomb Group, displayed prominently in their headquarters at Deopham Green. They would eventually fly 250 combat missions. (Photo courtesy of the National Museum of the Mighty Eighth Air Force.)

tered the war in 1939. The USAAF flew a state of the art aircraft with a successor (the B-29) already in mass production.

Doctrine

Both the Heinkel 111 and the B-17 were ideally suited to the basic strategic and operational doctrines of their respective air forces. Since 1926, Luftwaffe theorists espoused a concept known as *operativer Luftkrieg* (operational air warfare), according to which the Luftwaffe would contribute—in conjunction with the other services—to the overall conduct of the war. This meant concentrating on gaining and maintaining air superiority, both to enable the Luftwaffe to focus on other tasks and to provide the surface forces freedom of maneuver. Next was a combination of direct and indirect army support—close air support and interdiction. Finally, especially in the case of a prolonged war, the Luftwaffe—primarily its bomber forces—must be able to carry the war to the enemy’s “centers of national resistance.” Fast, flexible, medium bombers such as the 111 seemed tailor made to implement such a concept. Both the hardware and the concept ultimately failed the test of the total war upon which Germany embarked, yet Luftwaffe ingenuity and flexibility for a time masked this failure.



B-17Gs of the 452nd Bomb Group, marked with the group’s “Square L” symbol, in formation en route to a target in Germany. (Photo courtesy of the National Museum of the Mighty Eighth Air Force.)

The 452nd’s B-17s and the Army Air Corps doctrine of high altitude, daylight precision bombing also grew up together. By the time the 452nd arrived in theater, however, the prewar doctrine had been modified. No longer was “unescorted” part of the concept—from early 1944, the Eighth’s heavy bombers penetrated German airspace protected by ever increasing numbers of escort fighters. The focus was still on specific target systems—aircraft production, POL, etc.—but the defeat of the Luftwaffe was the first priority in early 1944. And as much as airpower purists might balk, supporting the impending cross-Channel assault was also part of the AAF’s mission.

Organization

The organization within which the bomb groups operated reflected these differing visions of aerial warfare. The Luftwaffe deployed air power in what were essentially miniature air forces, capable of executing a wide range of missions, assigned to a particular geographic area. The largest combat formation was the Luftflotte (“air fleet”), containing a mixture of bombers, fighters, dive bombers, and reconnaissance machines. The Air Fleet was subdivided into Fliegerkorps (Air Corps) or Fliegerdivisionen (Air Divisions), which preserved the mix of combat capabilities. The largest flying unit to operate the same type of aircraft was the Geschwader (wing) of 90-120 aircraft. II/KG 4’s parent wing, KG 4, contained three Gruppen of 30-40 aircraft. Each Gruppe in turn was divided into three Staffeln (squadrons); II/KG 4 contained 4., 5., and 6. Staffeln. At any time, small task forces could be created from units transferred from various commands. And individual units were frequently transferred to other Luftflotten; this happened many times to II/KG 4.

Not surprisingly, the United States Army Air Forces in Europe adopted a very different presentation of forces. Two numbered strategic air forces, the Eighth (in the UK) and the Fifteenth (in Italy) each contained powerful bomber and fighter units, and concentrated almost exclusively on



A Heinkel He 111H-16 bomber of KG 4, stuck in the mud at an airfield in the USSR. (Photo courtesy of the National Air and Space Museum.)

bombing the Nazi war economy. Other numbered air forces (the Ninth and Twelfth) focused on tactical support of the armies with fighter-bombers and medium bombers.

The Eighth Air Force bomber strength was organized into three Bombardment Divisions. 1st and 3rd BD contained B-17 groups, with the B-24 groups in 2nd BD. To simplify mission planning, 3-4 bomber groups were formed into Combat Wings. The 452nd Bomb Group fought throughout the war as part of the Third Bomb Division's 45th Combat Wing. The 452nd's four Bomb Squadrons (728th, 729th, 730th, and 731st) could put up a total of 48 planes for a group "maximum effort." On most missions, the 452nd put up between 24 and 36 bombers. As with its aircraft, the Eighth Air Force was developed to do one very important thing very well.

Operational Employment, Adaptation, Combat Effectiveness

II./KG 4 fought from the first day of the war almost to the last.¹¹ Its bombers attacked Polish airfields and interdiction targets in September 1939. The unit spent the months after the fall of Poland training for maritime operations, and put its new skills to the test in the Scandinavian campaign of April 1940. For the invasion of the Low Countries and France, it was back to tactical and operational tasks in support of the German advance. The Gruppe had a somewhat atypical experience in the Battle of Britain. It spent the first part of the Battle training for and conducting night minelaying operations, sparing it from the bloodletting suffered by most of the German

bomber units that summer. Its rare appearances in the day battle resulted in few losses during the summer and fall of 1940. Its biggest setback was on September 10, 1940 when an RAF night raid on its Eindhoven base destroyed 8 He 111s and damaged two. There were no personnel losses however, and a reequipped II./KG 4 participated in the night Blitz (including the Coventry raid) until redeploying to Vienna in March 1941.

Its aircraft bombed Belgrade in early April before a rapid transfer to Sicily; in the space of a few weeks attacking Malta and mining the Suez Canal. Perhaps most unusually, 4./KG 4 served briefly as part of an ad hoc battle group (FFü Irak/Sonderstab Junck) sent to the Middle East in May 1941, to support Rashid Ali's coup against the pro-British regime in Iraq. The squadron deployed to Mosul airfield sporting hastily applied Iraqi insignia¹² and attacked the besieged RAF base at Habbaniya and the advancing British relief column with some effect, only to lose most of its aircraft in combat and to the harsh operating conditions.¹³ The remnants of the squadron then rejoined the rest of the unit in Rumania for Barbarossa and the rest of its war.

In the campaign against the USSR in 1941-1943, II./KG 4 executed a wide range of missions: from minelaying in the Gulf of Finland to strategic bombing of Moscow to emergency aerial resupply. Yet gradually, direct support of the German Army came to dominate all other tasks. Recalled the chief of the Luftwaffe operations staff, "In the critical situations which arose...the GAF was often the only effective means by which it was possible either to stop the surprise thrusts of the enemy or at least to delay them.

Since there were not sufficient ground-attack formations for this task, bomber formations were frequently used for it.”¹⁴ It is likely that the Gruppe would have been completely annihilated in costly army support missions, but it was granted a reprieve: in fall 1943, all of KG 4 and several other Eastern Front bomber wings were pulled out of combat and sent to a lengthy period of reconstitution and retraining for night attacks on the Soviet armaments industry. II. and III./KG 4 were handpicked as “pathfinder” and “illuminator” units, and trained to use a variety of electronic navigation and target marking technology.¹⁵ The planned attacks on the armaments industry never occurred, but the “strategic attack corps” (IV. Fliegerkorps) under General Rudolf Meister, in a conscious imitation of Allied practice, began attacking the Soviet rail network in March to considerable effect.

Just as II./KG 4 readied itself for its strategic mission, the 452nd BG arrived in the theater. All was not smooth sailing in its first period of intense operations. Lt Col Herbert O. Wangeman, the commander who had led the group from the beginning, failed to return from the third mission. The loss of an experienced leader and a series of interim commanders contributed to a loss of efficiency—missed take-off times, abnormally high “abort” rates, and a general sense of slackness combined to put the 452nd near the bottom of the Group rankings in 3rd BD.¹⁶ Some of the group’s early travails were no doubt the predictable result of a green unit meeting a still unbroken Luftwaffe fighter defense force. The Group’s turnaround began with a leadership change: an experienced leader and organization man, Lt Col Thetus Odom, took command. Odom’s hands-on yet judicious leadership style instilled much needed efficiency; mission ready rates increased and mechanical aborts declined. Despite his reforms, the 452nd faced a period of continuing heavy losses as the campaign against well-defended German synthetic oil plants began in May 1944. The group’s worst day of the war by far was the May 12, 1944, Brux mission, “the dark and magnificent day,” during which the Luftwaffe exploited a gap in the fighter escort and from which fourteen of the group’s planes failed to return.¹⁷

By summer of 1944 the group seems to have found its footing. It operated effectively in support of the Normandy landings, and participated in the COBRA carpet bombing of the German front line at St. Lô in July. The group participated in two “Shuttle Runs” to the USSR. Losses to fighters dropped in late spring 1944, but flak remained dangerous...and on occasion the Germans would husband their fighter forces and the Group would be hard hit. One such occasion was the December 31, 1944, Hamburg mission. At noon, Fw 190s conducted a relentless twenty-five-minute attack, knocking down five B-17s from the low squadron. Friendly fighters were “elsewhere,” and the mission after-action report contained a sober reminder: “A check should be made to see that all ships have the proper amount of .50 caliber ammunition for all missions.”¹⁸ Losses to fighters continued to fall through the spring, but on April 7, 1945, the group lost four aircraft to a desperate massed ramming attack by the hastily trained Luftwaffe

“total commitment” unit *Sonderkommando Elbe*. The group flew its final combat mission on April 21.

One can conclude from this brief review of the two bomb groups’ histories that II./KG 4 was by far the more flexible organization, but one must ask whether this flexibility was a strength or a weakness. Its ability to function in a wide variety of roles meant that it was asked to function as a sort of fire brigade, plugging gaps in an overstretched German front line, flying supplies to cut-off garrisons, or other tasks ill-suited for a highly trained bomber unit.¹⁹ The 452nd didn’t have to flex because there was no need to. The Ninth Air Force, the USAAF’s air transport command, and other dedicated USAAF units picked up the tasks II./KG 4 and the rest of the German bomber force were compelled to assume.

Finally, it is worth noting that both units drew inspiration from RAF Bomber Command. In developing its navigation and target-marking capability, II./KG 4 explicitly patterned its operations on those of Sir Arthur Harris’ force—even to use of British-inspired terms “bomber stream,” “pathfinder,” “master of ceremonies,” and even “Christmas trees.”²⁰ In the bad weather of northwest Europe, the 452nd also developed a Pathfinder capability, and one of the devices used was the H2X “Mickey” target-finding radar—a copy of the British H2S. A crew from the 452nd even did a short exchange tour with a neighboring RAF Lancaster squadron.²¹

Leadership and Personnel

Leading from the front was a characteristic of both bomb groups; accordingly, so was turnover. Both of them lost group commanders in action; II./KG 4’s Major Dietrich von Massenbach was shot down over Britain in June 1940 and became a POW; the loss of the 452nd’s Wangeman has already been noted.²² Both groups also lost squadron commanders in combat. The units served as “proving grounds,” as successful commanders were promoted to higher echelons. Odom went to HQ, Strategic Air Forces in Europe in July 1944, and two II./KG 4 *Gruppenkommandeure* went on to command the entire wing. The 452nd had the perhaps dubious distinction of having the largest number of group commanders in all of Eighth Air Force.²³ The long war taxed both air forces in terms of replacing quality personnel and experienced leaders. German documents speak of the necessity of thrusting “very young officers...who do not possess the necessary technical or operational experience” into leadership positions.²⁴

The Luftwaffe’s aircrew training program was a casualty of its long war and lack of strategic planning. The peacetime training establishments, which produced small numbers of highly trained aircrews, failed to expand under the pressure of war. Attrition of bomber crews over the UK and Russia eroded the quality of the force, and as the instructor crews were squandered in emergency air transport operations at Stalingrad and Tunisia, the Luftwaffe essentially devoured its seed corn.²⁵ Yet again II./KG 4 managed to avoid the worst effects of this trend. The Luftwaffe High Command’s decision to pull selected bomber



Ambulances await the return of the 452nd Bomb Group's aircraft to their home base at Deopham Green. (Photo courtesy of the National Museum of the Mighty Eighth Air Force.)

units out of action for retraining in fall 1943, permitted an almost unheard-of respite. Rested, retrained, and augmented by experienced crews from disbanded units, II./KG 4 in early 1944 was probably in a better personnel position than at any time since the beginning of the war.

In general, by 1944, the USAAF held most of the advantages in terms of aircrew training, with a vast stateside establishment just getting into high gear. Yet there are indications that the 452nd and other new bombardment units arriving in theater were less thoroughly trained than their predecessors, as the training schools were under pressure to make good the losses of fall 1943, and to man the many new Groups forming.²⁶ The 452nd BG operations officer, Major David Rowland, an experienced pilot who transferred in from another group in early 1944, recalls that the training of newly arrived crews, particularly in the difficult art of formation flying, was not always up to snuff.²⁷

In fact, it is safe to say that the average II./KG 4 bomber crew in early 1944 was more experienced than its 452nd BG counterparts. Information on specific individuals in II./KG 4 is scarce, but a logbook from a typical pilot in I./KG 4 reveals a pilot who joined the unit in August 1943, who by March 1944 had flown 175 combat missions. He finished the war with 311 operational flights, totaling 692 hours 9 minutes and 198,550 km flight distance.²⁸ Yet many of his flights were quick hops over the front line, spending less than 10 minutes over enemy territory; he sometimes flew several of these on a single day. USAAF

bomber crews were expected to complete a “tour” of 30-35 missions by late spring of 1944 before they could expect home rotation. Though never a hard and fast policy—local commanders had much discretion in its application—most 452nd BG veterans viewed the 35 missions (30 for lead crews) as sacrosanct.²⁹ For crews joining the unit late in the war the “tour” was moot; the war ended before many had reached this milestone.

Missions and Losses

One would like to offer a rigorous statistical examination of mission totals and losses, but lack of German data makes a complete accounting problematic. For the 452th BG, the totals are readily available: the group completed 250 combat missions from February 1944 to April 1945, plus five humanitarian airdrops to the Dutch. These ranged from “milk runs” to savage maulings by the German defenses. The Luftwaffe did its record keeping a little differently; it tracked “sorties” (the number of missions flown by a single airplane) rather than missions flown by the Gruppe as a whole. II./KG 4 flew its 10,000th sortie on March 9, 1943; it reached the 15,000 sortie milestone on May 2, 1944. It finished the war having flown just under 20,000 sorties. This is by any measure impressive, but it needs to be emphasized that many II./KG 4 missions were short flights over the front as opposed to the painstakingly organized, multi-hour USAAF penetrations into German airspace.

The 452nd BG lost 110 of its B-17s in combat. Total loss figures for KG 4 and its Gruppen are not available, as even the thoroughly researched unit history by Karl Gundelach admits. Yet KG 4's pattern of losses—especially in Russia—seems to have been in the form of slow and steady attrition, rather than spectacular individual disasters such as the 452nd endured at Brux. And many of its losses involved damaged aircraft abandoned for lack of fuel and spare parts during retreats—something the 452nd never faced.

Base life

Nowhere is the contrast between Luftwaffe and USAAF bomber units more stark than in the area of operational basing. II./KG 4 shifted bases no less than 53 times in the course of the war. Starting from well-appointed peacetime bases in Germany, II./KG 4 leapfrogged to airfields in occupied Denmark, Norway, and the Netherlands. Brief stopovers in Greece, Sicily and (for one squadron) Iraq were followed by a lengthy series of moves—north and south, forward and backwards—across the Soviet Union.³⁰ A very few of these were to well-appointed bases (to include periods of reconstitution and training at Prowehren, East Prussia and Bialystok), but many were bare-base forward airfields with tent accommodations and open-air maintenance facilities. Amenities and creature comforts were few; written accounts and photographs portray a makeshift bar, dining *al fresco*, and individual airmen providing musical entertainment.

The 452nd BG, except for brief stopovers in the Ukraine for Operation FRANTIC, spent its entire war at Station 142, Deopham Green in Norfolk. This was not one of the permanent prewar RAF bases taken over by the USAAF, yet still offered plenty of amenities. It was constructed during 1942-43 with a 2000-foot main runway, two 1400-foot auxiliary runways, hardstands for each bomber, and taxiways—all concrete.³¹ Nissen huts were austere yet generally comfortable—if a bit cold in winter.³² The base had clubs for all ranks—officers, NCOs, and men. The unit history speaks of the Roco Dero Club which boasted “clean wholesome fun with plenty to eat and drink;” the bars (“where men are men”), the dances, the unit-produced musical, visiting performers, and sporting events. The 452nd had one of the best dance bands in the Eighth AF—the ever-popular “Sky Liners.” One skilled bass player was excused from onerous military chores to focus on his playing.³³ Major milestones called for pulling out all the stops—the 100th and 200th Mission Parties were elaborate affairs.³⁴

These differences extended to dealings with the local population. Once the war broke out, II./KG 4 was stationed almost exclusively in occupied territory, and was rarely in one place long enough to form any lasting bonds even if the locals had been receptive (and in the USSR this was hardly ever the case). The 452nd on the other hand was a welcome guest—to this day there are civilians near Deopham Green with warm memories of the 1944 Christmas party put on for the local kids. II./KG 4, in common with other German

bomber units, does not seem to have elicited similar feelings from the host communities.

A Fateful Encounter: Poltava, the Ukraine, June 21/22, 1944

Under normal circumstances, a German bomb group fighting in the Soviet Union in 1944 would never cross paths with an Eighth AF Flying Fortress group based in the UK. By the summer of 1944, USAAF Eastern Command had succeeded in gaining permission from the Soviet authorities to temporarily base heavy bombers on Soviet soil. The 452nd sent a detachment as part of the second such “shuttle” mission, code-named Operation FRANTIC. On June 21, 1944, the 45th Combat Wing struck the hydrogenation plant at Ruhland, then flew on to several bases in the Ukraine. The 452nd landed at Poltava. The formation was tailed by German aircraft; follow up photos revealed long lines of B-17s and their P-51 escorts on the ground at Poltava, Piryatin, and Mirgorod.³⁵

IV. Fliegerkorps and the KG 4 pathfinders had been preparing for another night raid on the Soviet rail system. In the space of a few hours, the attack was redirected against the shuttle bases. The KG 4 pathfinders, based at Bialystok, did not need to relocate, but the rest of the strike force (KG 53 and KG 55) redeployed to jumping off bases in the Minsk area. II./KG 4 was assigned the task of route and target marking to Poltava, while its sister III./KG 4 was assigned to Mirgorod. II./KG 4 performed its task flawlessly; marking Poltava with high-intensity flares. III./KG 4 through navigational error, missed its target at Mirgorod and also marked Poltava; the KG 55 commander designated “Attack Leader Mirgorod” decided to add his bombers’ tonnage to the Poltava strike. For thirty minutes, the German bombers flew virtually unmolested over Poltava, dropping 46,000 lbs of ordnance, almost none of which fell outside the target area. The 452nd BG’s bombers were drawn up in neat rows in what the German commander called “a peace-time lineup of the assembled aircraft”—the routine that served the Group well back in the UK proved dangerous on a forward airbase within range of the Luftwaffe. II./KG 4’s performance elicited admiration from friend and foe alike: Meister decorated the pathfinder group commander, and an RAF observer at Poltava noted that “the accuracy of the attack suggests specially trained crews.”³⁶ An AAF photo interpreter captioned an aerial photo of the carnage with the notation “Proof, if proof was needed, that the German Air Force was still able to muster some bombardment strength of its own and to direct it at the most unsuspecting targets...” Of the seventy-three B-17s at Poltava, forty-three were totally destroyed, and a further twenty-six were damaged. The Group suffered no loss of life...but twenty-two of the twenty-six 452nd B-17s were destroyed.³⁷ “And those were brand new B-17Gs!” recalled the Group’s operations officer.³⁸

USAAF General Carl Spaatz later commented that Poltava was “the best attack the Luftwaffe ever made against the AAF.”³⁹ Yet from this height of Luftwaffe success, the two bomber groups’ fates rapidly diverged. The

Soviet summer offensive broke the very next day, and the carefully husbanded strategic bomber force found itself thrown yet again into the costly business of direct support of the hard pressed German Army. In Meister's words, "Disintegration then proceeded apace."⁴⁰ By the end of the summer most of Fliegerkorps IV's bomber wings were disbanded for lack of fuel and aircraft. II/KG 4 was one of the fortunate ones in that it remained operational, though

it served mostly in the emergency aerial resupply role, notably at Breslau and finally Berlin in the final weeks of the war. The 452nd, quickly reequipped with new Fortresses, resumed its daylight war against the Third Reich. Its last missions in April 1945, were also resupply, but of starving Dutch civilians during Operation MANNA. And so it is that the tale of two bomb groups ends not with a bang, but with what the USAF calls "trash hauling." ■

NOTES

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Fighter Escorts for Bombers: Defensive or Offensive Weapons

Daniel L. Haulman

Consolidated B-24 Liberators roar over the already damaged refineries of Ploesti, following the first group of bombers.

During the 1930s, the Army's Air Corps began acquiring heavy bombers that could outfly the fighters that might be launched to stop them. The bombers could fly faster, higher, and farther than the standard fighters of the time. The B-17 Flying Fortress, for example, was vastly superior to the P-26 Peashooter. The fighter could fly at a maximum speed of 234 miles per hour, had a range of 360 miles, and a service ceiling of 27,400 feet. The B-17 could fly at a maximum speed of 300 miles per hour, had a range of 1,850 miles, and a service ceiling of 35,000 feet. If the enemy were flying fighters comparable to the P-26, they could never reach the B-17s.¹

Air Forces around the world, by the time war erupted in Europe in 1939, had developed more advanced fighters than the P-26. Both American and foreign fighters, by the end of the decade, could fly as fast and as high as the four engine bombers that formerly outflew them, and some could fly faster and higher. Yet the bombers continued to have more range. That meant that if the bombers flew a long distance over enemy territory, they could not have fighters to protect them all the way to the target. As a result, the bombers became more vulnerable. Designers of the B-17, and later the B-24, a comparable four-engine bomber, equipped them with ample guns so that they could defend themselves against enemy fighters, even if they had no escorts. The guns were positioned all around the aircraft, on the top, on the bottom, in the front, in the back, and on each side. Mechanized turrets were included on the top and bottom, and eventually in the nose and tail. Some of these turrets could swivel in all directions. The most famous was the ball turret in the bottom.²

Bomber formations enhanced the effectiveness of the guns. If the bombers were in large enough numbers, flying in formations at the same altitude, with other formations at other altitudes and in certain patterns, the gunners could reinforce each other, and the bombers could minimize the chances of shooting down each other. By flying the bombers as close together as possible, the pilots could discourage enemy fighters from attempting to fly through them, and at the same time, better insure that the bombs they dropped would land in the same general area for greater accuracy and damage. When the United States entered the war at the end of 1941, many of the leaders of the Army Air Forces, into which the Air Corps had been organized, believed the bombers could survive without fighter escorts, since, at the time, those escorts lacked the range to stay with them all the way to the target, and there were not enough escort fighters available.³

Early daylight bombing attacks on targets in Germany convinced Major General Ira C. Eaker, commander of the VIII Bomber Command and later the Eighth Air Force, that the bombers could not successfully defend themselves against enemy fighters without fighter escorts. Two raids on Schweinfurt in August and October 1943 had resulted in the loss of sixty bombers on each raid, because long-range fighter escorts were not yet available.⁴ Once the fighters that accompanied the bombers at the beginning of their missions turned around to return to their bases in England, the bombers became



The Consolidated Liberator B-24.

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relatively easy prey for German Me-109 and FW-190 fighters. Eaker ordered the VIII Fighter Command fighters to stick with the bombers, because if the fighter escorts chased after enemy fighter decoys and left the bombers unprotected, the B-17s and later B-24s became easy pickings for other enemy fighters lurking nearby.⁵ When the Twelfth Air Force was activated for the Mediterranean Theater in North Africa later, many of the Eighth Air Force's fighters were reassigned to it, leaving Eaker with not enough escorts for the bombing missions.⁶ He insisted that the relatively few fighters he had stick with the bombers to provide as much protection for them as possible.

Eaker's "stick with the bombers" policy in the VIII Bomber Command and Eighth Air Force was more popular among the bomber groups and squadrons than among the fighter groups and squadrons of the VIII Fighter Command under Brigadier General Frank O'D Hunter. Although Hunter followed Eaker's orders, he was not happy. His fighters carried auxiliary fuel tanks that allowed them to stay with the bombers for longer distances, but those tanks slowed down the fighters and reduced their maneuverability for aerial combat. In addition to that, they made the fighters much more likely to burn or explode if they were hit. If the fighters dropped their auxiliary fuel tanks when facing enemy fighters, they did not have the extra



Boeing B-17F in flight.

fuel they needed to continue with the bombers farther to the target. Despite his qualms, Hunter followed Eaker's policy, and ordered his fighter pilots to stick with the bombers and not go after enemy fighters unless they were attacking the bombers and posed an immediate threat to them. Some of the fighters were to keep their fuel tanks and continue to escort the bombers, even if their fellow fighter pilots might be outnumbered by the enemy airplanes. When Major General William Kepner succeeded Hunter, he also followed Eaker's policy, but wished that he could turn his fighters loose to chase enemy fighters instead, even if the enemy fighters were far from the bombers.⁷

Eaker's policy of having the fighter escorts "stick with the bombers" and not leave them unprotected was not new. Herman Goering, Hitler's head of the Luftwaffe, had ordered his own fighters to protect the German bombers attacking Britain during the Battle of Britain in 1940. Goering reasoned that without the protection of his able fighters, his bombers would fall in greater numbers to the capable Hurricane and Spitfire pilots. There was some debate about whether Goering made a mistake in keeping the fighters close to the bombers to protect them, instead of going after the British fighters.⁸ If he had destroyed the British fighter forces, a German invasion of Britain might have become more feasible. Without control of the air over the English Channel, the Germans could not hope to cross, because of the formidable Royal Navy and Air Force. Major General Carl A. Spaatz, who commanded Eighth Air Force when Eaker commanded VIII Bomber Command under it, generally supported Eaker's "stick with the bomber" policy.⁹ When Spaatz deployed to North Africa to provide leadership of General Dwight D. Eisenhower's air component there, Eaker remained in England in charge of the American heavy bombers and their escorts.¹⁰

While Eaker was busy building the Eighth Air Force in England, and increasing its potential to destroy German industry, Major General James H. "Jimmy" Doolittle served

with Spaatz in the Mediterranean Theater. Doolittle, who had become famous for his air raid on Japan from an aircraft carrier in April 1942, assumed leadership first of the Twelfth and later of the Fifteenth Air Force in Italy. The Twelfth Air Force flew tactical missions in support of surface forces, both Army and Navy, while the Fifteenth Air Force was a smaller version of the Eighth Air Force, with heavy B-17 and B-24 bombers escorted by fighters.¹¹

When Eisenhower and Spaatz moved from the Mediterranean Theater of Operations to England at the beginning of 1944, they wanted Doolittle to remain with them as they prepared for the Allied invasion of northern France. They had experience together in the invasions of North Africa, Sicily, and Italy, and they wanted the same teamwork in England. Doolittle replaced Eaker as head of the Eighth Air Force in England and was promoted to the rank of Lieutenant General. Eaker was also promoted to that rank, but was reassigned to command the Mediterranean Allied Air Forces in Italy, which exercised command over the Twelfth and Fifteenth Air Forces and some British air units in that theater. At the same time, Major General Nathan F. Twining replaced Doolittle as commander of the Fifteenth Air Force, but became subordinate to Eaker, who took his "stick with the bombers" policy with him to the Mediterranean Theater of Operations. Spaatz later promoted to the rank of full General, became commander of the United States Strategic Air Forces in Europe, which exercised operational control over both the Eighth Air Force in England and the Fifteenth Air Force in Italy. The Fifteenth Air Force thus came under the authority of both Spaatz and Eaker. Eaker, however, had no authority over Doolittle's Eighth Air Force, and Doolittle had no authority over Eaker's and Twining's Fifteenth Air Force.¹²

When Doolittle arrived in the Eighth Air Force, he learned that the VIII Fighter Command had the primary mission of bringing back the heavy bombers back safely. In a famous scene he described in his own autobiography, he saw a sign in the office of the VIII Fighter Command com-



Republic P-47D Thunderbolt.

mander that read “The first duty of the Eighth Air Force fighters is to bring the bombers back alive.” He told Kepner to take that sign down and put up another one that said, “The first duty of the Eighth Air Force fighters is to destroy German fighters.” He gave the fighter pilots permission to leave the bomber formations and chase after enemy fighters to destroy them. He reasoned that the more enemy fighters were destroyed, the fewer of them there would be to attack bombers in the future.¹³

At first Doolittle’s policy of allowing fighters to abandon the bombers more readily to chase after enemy fighters was extremely unpopular among the bomber crews, who thought he was using them as bait for destroying the Luftwaffe. Their primary mission as to destroy strategic enemy targets such as oil refineries and factories, and not to merely lure enemy fighters up for destruction. Doolittle assured them that in the long run, the destruction of the Luftwaffe would allow the bombers to fly with less enemy fighter opposition. In addition to that, allowing the fighters to roam farther away from the bomber formations would enable them to catch the enemy fighters as they prepared to attack the bombers. Doolittle’s bottom line was that the fewer enemy fighters there were, the fewer there would be to oppose future bomber raids.¹⁴

Doolittle’s policy of destroying as many German fighters as possible, rather than only protecting the heavy bombers of the Eighth Air Force, also helped pave the way for the Normandy invasion, which would require control of the air over the breaches. His destruction of enemy fighters, in conjunction with bombing raids on German aviation industries and fuel supplies in the first half of 1944, greatly reduced the threat of German fighters over northern France by the time of D-Day. Eisenhower and the British

generals had the vital air superiority they needed when the invasion was finally launched in June.¹⁵

Eventually, Doolittle had enough fighters to allow some of them to stick with the bombers and some of them to go after enemy fighters not directly threatening the bombers. In addition to that, he could rotate the bomber escort duties among several groups so they could take turns, since the fighters by then were faster than the bombers, and could catch up with them. If a fighter group was ending its turn at escorting bombers, it could drop its auxiliary fuel tanks and strafe enemy airfields and shoot down enemy airplanes on the way home.¹⁶ In addition to having more and more fighters, though never as many as bombers, the quality of the escorts also became better, with speedy long-range P-51s supplementing and later replacing the P-38s and P-47s.

The number and quality of escort fighters also improved in the Mediterranean theater. The Fifteenth Air Force gradually replaced its P-47s with P-51s, although it retained a number of P-38s. Eaker’s “stick the with bombers” strategy remained Twining’s policy, and Spaatz did not overrule them in favor of Doolittle’s policy. In the spring of 1944, the Fifteenth Air Force had twenty-one bombardment groups, but only six fighter groups to escort them. Eaker decided to move another fighter group from the Twelfth Air Force to the Fifteenth Air Force to give him more fighters to protect the bombers. The group he chose was the 332nd Fighter Group, which was unique, not only because it was the only black fighter group in the theater, but also because instead of having three fighter squadrons, like all the other fighter groups, it had four, with more fighter pilots and airplanes than any of the others. The all-black 99th Fighter Squadron which had previously flown



North American Aviation P-51 Mustangs.

attached to various white fighter groups, was reassigned to the 332nd Fighter Group so that all the black fighter squadrons were in the only black fighter group.¹⁷

Colonel Benjamin O. Davis, Jr. served as commander of the 332nd Fighter Group. A strict disciplinarian who had graduated from the U.S. Military Academy at West Point, and whose father was the first and then only black general in the Army, strictly followed Eaker's "stick with the bombers" policy. He ordered his fighter pilots not to abandon the bombers they were protecting in order to build up their aerial victory credit totals. Their goal was to bring the bombers back safely, and not to become aces by shooting down more enemy airplanes. The only enemy airplanes they were to go after were those that came into the immediate vicinity of the bombers. Davis ordered his fighter pilots not to be lured away from the bombers by enemy fighter decoys, because he knew that other enemy fighters were probably waiting to pounce on the B-17 and B-24 bombers once they were left without fighter protection.¹⁸

Eaker's "stick with the bombers" policy applied not only to the 332nd Fighter Group but also to the other six fighter escort groups of the Fifteenth Air Force. A Fifteenth Air Force history from the time notes "the fighters always maintained close escort. The original policy of the Air Force, in fact, stipulated that the fighters were never to leave the bombers in order to make an attack unless enemy aircraft were obviously preparing to strike at the bomber formation. As enemy fighter opposition declined, however, one squadron, at the discretion of the group commander, was sometimes detached for a fighter sweep against the enemy. This was done on withdrawal only, and in no case before the bombers had reached the target."¹⁹ Statistics suggest

that the 332nd Fighter Group followed this policy more closely than the other groups. Some of the members of those groups might have remembered when Doolittle had been head of the Fifteenth Air Force, and he was more willing to let the fighters stray farther from the bombers to go after enemy fighters. As a result, the other six fighter groups in the Fifteenth Air Force shot down many more enemy fighters than the 332nd Fighter Group. The 332nd Fighter Group, on the other hand, lost fewer bombers. Between early June 1944 and the end of April 1945, when the 332nd Fighter Group was serving the Fifteenth Air Force, its pilots shot down 94 enemy airplanes, and had no aces. Each of the other three P-51 groups (three of the other groups flew P-38s) in the Fifteenth Air Force shot down more than 200 enemy airplanes in the same period. Each of the other P-51 fighter groups also had at least ten aces in the same period.²⁰ They prided themselves on how many enemy fighters they shot down, while the 332nd Fighter Group was prouder of losing fewer bombers to enemy airplanes. The average number of bombers under escort of the other groups that was shot down by enemy airplanes was 46.²¹ The 332nd Fighter Group lost 27.²² The 332nd Fighter Group lost significantly fewer bombers than the average of the other fighter groups in the Fifteenth Air Force. The Tuskegee Airmen lost bombers it escorted, to enemy fighters, on only 7 of the 179 bomber escort missions it flew for the Fifteenth Air Force.²³

Whether the "go after the enemy fighters" policy of Doolittle or the "stick with the bombers" policy of Eaker and Davis was more effective in protecting the bombers is still a matter of debate. Doolittle's defenders argue that his policy destroyed the Luftwaffe and protected more bombers in the long run because there were fewer enemy fighters

left to shoot down his bombers. Eighth Air Force statistics show that the number of bombers lost to enemy airplanes in the European Theater of Operations declined significantly after Doolittle instituted his new policy. But Doolittle had the advantage of greater numbers of escort fighters, and he could better afford to let some of them leave bombers because there were others that could remain with them. At the same time, German fighter opposition de-

clined greatly in 1944, not only because Doolittle's fighters were shooting so many of them down, but because heavy bombing raids were destroying the fuel supplies the Germans needed to train replacement pilots. Statistics of the Fifteenth Air Force support Eaker's "stick with the bombers" policy in that the fighter group that lost the fewest bombers was the one that shot down the fewest enemy airplanes. ■

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Germany's Air War on the Eastern Front: a Flying Reminder



Dan Zamansky

The Fw 190 in flight. This image ©2019 John M. Dibbs/Flying Heritage & Combat Armor Museum.

A remarkable event occurred on December 2, 2010. The Flying Heritage & Combat Armor Museum in Everett, north of Seattle, made the first post-restoration flight with a German Focke-Wulf Fw 190 fighter of the Second World War, powered by its original engine, the BMW 801. Very few such aircraft have survived to the present day, and this is the only flying example which retains its wartime engine, rather than a modern Chinese or American substitute.¹ The museum, founded by the recently-deceased Microsoft co-founder Paul Allen, was able to obtain this aircraft following an extraordinary set of events that began with the aircraft crash-landing on the Eastern front on July 19, 1943.² Now, three quarters of a century after it was lost and eight years after it flew again, documents from the Soviet military archives allow the story of its loss to be told.

The Strategic Situation

Nazi Germany was facing an exceptionally acute strategic crisis on July 19, 1943. British and American forces had invaded Sicily nine days before and the Axis forces on the island were on the verge of collapse. Only two dozen serviceable Luftwaffe planes remained on Sicily and 1,100 destroyed or abandoned Axis aircraft would eventually be found on the island.³ The disintegration of the Axis forces on Sicily had made such an impression on American commanders that they abandoned their previous hesitance concerning a prospective invasion of Italy, which Churchill had pressed for. Eisenhower recommended to the Joint Chiefs on July 18, "carrying the war to the mainland of Italy immediately Sicily has been captured".⁴ The next day American bombers flew the first heavy raid on Rome, which shocked Italy.⁵ The dictators of Germany and Italy, Hitler and Mussolini, spent July 19 in a meeting at Feltre in northern Italy, where Mussolini made a desperate appeal for more support from his Nazi ally. Before the next week had ended, Mussolini had been overthrown.⁶

Under the pressure of the crisis in Italy, Hitler's strategy was falling apart. He had gambled on a great offensive against the Soviet-held Kursk Bulge in the centre of the Eastern front to stabilise the situation in that theatre. On July 13, eight days after the German attack commenced, Hitler called in his commanders and told them that in view of the situation in Sicily, the offensive would be cancelled. The generals were dismayed, as General Manstein had just inflicted a heavy defeat on the Soviet 5th Guards Tank Army at Prokhorovka the day before.⁷ However, the German commanders had underestimated not only the crisis in Italy, but also the strength of Soviet reserve forces. Two Soviet army groups with almost half a million men between them attacked Manstein's flank south of the Kursk Bulge on July 17. This was the same day on which the II SS Panzer Corps, Manstein's primary armoured striking force, had been ordered to withdraw



A German Focke-Wulf Fw 190. (Sa-kuva 155390/Immola/28.06.1944).

and prepare to move to Italy. Hitler vacillated for two weeks, before reaching an untenable compromise decision – one of the three SS armoured divisions was sent to Italy, while most of the rest of the corps stayed in the Ukraine to stabilise Manstein's defence.⁸

German forces were so overstretched that vast areas, like the northern sector of the Eastern front, were defended by a patchwork of very weak units. German Army Group North had a grand total of forty tanks and self-propelled guns, and a miniscule six serviceable fighter aircraft in the First Air Fleet.⁹ This air fleet possessed neither bombers nor attack aircraft among its total strength of 163 serviceable planes, apart from sixty-four training biplanes used as night harassment aircraft.¹⁰ Thus, a small fighter-bomber squadron, 4. (Jabo)/JG 54, was at this time effectively the only Luftwaffe combat flying unit along a frontline which stretched from the outskirts of Leningrad to just north of the town of Velikiye Luki, 250 miles (400 kilometers) away to the south. The squadron had only been

recently established, primarily with planes and pilots transferred from other units. Starting on May 10, it flew ground-attack sorties in flights of two or four aircraft from bases in the Leningrad area. The unit's tactics, the small number of aircraft and the performance of the Focke-Wulf 190 as a fighter bomber all contributed to a very low loss rate. Until July 19, it had lost just one aircraft written-off, which had crashed on take-off on July 8.¹¹

The Combat on July 19

The German fighter-bombers would encounter a new opponent on July 19. This was the 22nd Independent Armoured Anti-Aircraft Train of the Volkhov front, a Soviet army group positioned immediately to the east of Leningrad. The term 'independent' in the train's designation denoted the fact that it reported directly to the army group, rather than any of its subordinate commands. On the night of July 15, the armoured train was ordered to move from the rail station of Cherentsovo, located far in the rear of the Volkhov front, to Pupyshchevo. The latter station was thirty-eight miles (sixty kilometers) to the northwest, on the western bank of the Volkhov river and on the main east-west rail line to Leningrad.¹² This railway possessed considerable operational importance. A Soviet counter-offensive had established a narrow land bridge to Leningrad in mid-January 1943, along the southern shore of Lake Ladoga. However, German forces had yet again held on to their positions blocking the main railway around the town of Mga, which the Red Army had not been able to recapture despite repeated attempts over the course of many months.¹³ The Soviet command was therefore preparing yet another offensive against Mga, which would start on July 22.¹⁴

Pupyshchevo station was closer to the frontline, yet it

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A mechanic works on a Focke-Wulf 190. (Adam Thompson collection.)

was still a backwater. The closest German positions were held by the 217 Infantry Division twenty-eight miles (forty-five kilometers) away, just to the west of the village of Lodva.¹⁵ From the train's arrival at its new location to the morning of July 19, its crew observed two daytime and two night-time overflights by German reconnaissance aircraft. Two of these aircraft were fired on, without any hits being observed. Predictably, this activity was followed with an air raid at 15:20 Moscow time on July 19. According to the Soviet report, four Focke-Wulf Fw 190 fighter-bombers attacked the station and scored two hits on one of the rail tracks, damaging the track and interrupting traffic. The armoured train put up a substantial volume of fire and one Focke-Wulf was claimed as '*podbit*', a Russian term for aircraft damaged in combat. However, this claim is not substantiated by evidence from German sources.¹⁶

The most important events of the day occurred during the second raid on the station. The armoured train's crew recorded that five Focke-Wulf 190s were observed at 18:45, flying on a heading of 93 degrees at an altitude of 13,100 feet (4,000 meters). The anti-aircraft gunners opened fire on the raiders once they had approached within five miles (eight kilometers) of the station. The confused report in the train's war diary reflects the violence of the action that fol-

lowed. Three fighter-bombers were claimed shot down. One was "shot down in the air with a direct hit", another "crashed one mile (one and a half kilometers) from the station and exploded together with its bombload" and the third "fell in a forest in the area of Bol'shaya Vloya".¹⁷

The Focke-Wulfs had near-missed the train with one 550-pound (250 kilogram) bomb, which caused heavy damage. The armoured steam engine's tender was put out of action and three out of four 76.2 mm guns, as well as the sole rangefinder, were knocked out. The tender and the guns required factory overhaul.¹⁸ Two gun crew chiefs, *Efreytor* (Warrant Officer) Anatoly Zaytsev and *Mladshy Serzhant* (Sergeant) Alexander Chekanov, were killed at their guns.¹⁹ Another four men were badly wounded and eight received minor wounds. All five rail tracks and two platforms at the station were damaged, but two of the tracks were re-opened within three hours.²⁰ The main consequence of the raid was that the armoured train was rendered ineffective, since its remaining armament consisted of just one 76.2 mm gun, six heavy machine-guns and one triple-barrel Maxim gun of First World War vintage. Two 25mm and a single captured German 20mm automatic cannon were also mounted on the train, but they needed replacement barrels. It was a stroke of good fortune for the gunners that the weak German air force in the area made no further attacks on the station either on July 19 or the following day. Two days after the raid, on the evening of July 21, the artillery commander of the Volkhov front ordered the armoured train withdrawn to the rear for repair.²¹

The anti-aircraft gunners filed an incident report for each of the three claims made during the combat. Two of these were written on the day of the action and contained little further detail, other than the statement that a visit to the location where a Focke-Wulf had supposedly crashed and exploded revealed "a propeller blade, electrical fittings and various small aircraft parts". The third incident report was filed almost as an afterthought on July 23, and stated that an Fw 190 had crashed in a forest "on a bearing of 97 degrees two and a half miles (four kilometers) from the ground observer post at Bol'shaya Vloya".²² This was a small hamlet eleven miles (seventeen and a half kilometers) south-west of Pupyshevo station, which did not survive the war.²³

As a stark contrast to the various Soviet claims made on the day, German aircraft loss reports listed only two incidents involving the Focke-Wulf 190s of 4. (Jabo)/JG 54 on this day. One aircraft was damaged in a crash landing on a non-operational flight. The other, which has since become famous, went missing in grid square 36 East 20142.²⁴ These wartime Luftwaffe grid coordinates translate into a map position less than a mile west of Pupyshevo.²⁵ The aircraft was flown by *Feldwebel* (Staff Sergeant) Paul Rätz, who led a pair of aircraft in a dive-bombing attack on the Soviet train. It appears that in the heat of combat the Soviet gunners counted two German aircraft as five. Rätz's wingman lost sight of his leader when they both pulled up into the sun after the attack run. He heard Rätz reporting over the radio, "My engine is damaged, I must force-land



A Focke-Wulf 190 F-8 fighter-bomber (Jabo) of I./SG 5 (Sa-kuva 155392/Immola/28.06.1944).

in Russian territory. Engine stopped". After that, all contact was lost.²⁶ Rätz was lucky enough to crash-land his aircraft among saplings in a forest and walk away from his aircraft unharmed. It was his aircraft that the observers in Bol'shaya Vloya had correctly confirmed as shot down. Rätz's plane was a Fw 190 A-5/U3, a modification of the basic fighter design into a fighter-bomber through the addition of extra armour and bomb racks.²⁷ It happened to



Man resting on bomb. (Sa-kuva 157653/Immola/28.06.1944.)

be the only factory fresh aircraft of the sixteen Focke-Wulfs received by the unit upon its formation in May.²⁸ It had been built in Bremen in April and carried the factory number 0151227 and manufacturer's identification code letters DG-HO.²⁹ Rätz's attempt to walk back to the German lines ended abruptly at 03:00 on July 21, when he was captured by Soviet forces south of the settlement of Polyana, located twenty-three miles (thirty-eight kilometers) west of Pupyshovo along the rail line.³⁰ Rätz falsely stated that he was a member of Stabstaffel/JG 54, but also gave his interrogators correct and valuable information, that the other units of his fighter wing had been transferred either to the Kursk area or to France.³¹ Rätz was released only in 1949.³² By then, the U.S. had repeatedly put the USSR under pressure to release German prisoners of war and hundreds of thousands of those still imprisoned were repatriated between 1947 and 1949.³³ Of the total three million Germans estimated to have been taken prisoner by the Soviet Union during the war, 750 thousand died in captivity and some 30,000 were released only after Stalin's death in 1953.³⁴

Even before he walked away from his crash-landed Focke-Wulf, Rätz had been a lucky pilot. While a member of I./JG 54, a very successful fighter squadron, he had been wounded in two previous aircraft crashes. On July 26, 1942, his Messerschmitt Bf 109 G-2 number 10397 was written off in a crash at Jesau in East Prussia, when returning from the Leningrad area for a rest. Returning to the front, he survived the almost complete destruction of his Fw 190 A-4 number 145793 in a crash-landing at the frontline base of Krasnogvardeysk near Leningrad after a

combat sortie on March 20, 1943.³⁵ In spite of this, he completed 117 operational sorties, claimed three enemy aircraft shot down.³⁶ A winner of the *'Frontflugspange'* combat

pilot flying's clasp, in gold, Paul Rätz died in 1989. In that same year, his final aircraft was found in the forest and started its long journey to Everett.³⁷ ■

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Acknowledgments: I thank Larry de Zeng, Steve Coates and Andy Mitchell for their kind comments, and The Flying Heritage Museum for sharing information.

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18. TsAMO, War diary of the 22nd Independent Armoured Anti-Aircraft Train [Журнал боевых действий 22 обрп ПВО], f. 22 op. 134614 d. 2, l. 56 and annex.
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20. TsAMO, Chief of the Military Transport Service of the Volkhov Front, 19 July 1943 [Начальник Военных Сообщений Волховского Фронта, 19 июля 1943], f. 204 op. 89 d. 1088.
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24. Information from digital database of Luftwaffe losses by Michael Balss, summarising the Bundesarchiv-Militärarchiv (BAMA) file "Flugzeugunfälle und Verluste bei den Verbänden", BArch RL 2-III/1191.
25. The map coordinates are 59°54'10"N 32°5'0"E. Conversions from the Luftwaffe grid to map coordinates can be performed using the excellent LUMA converter, developed by the anonymous FrankieS and available at https://www.gyges.dk/reporting_grids.htm (accessed December 3, 2018.)
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The Propeller Under the Bed: A Personal History of Homebuilt Aircraft. By Eileen A. Bjorkman. Seattle, Wash.: U of Washington Press, 2017. Photographs. Illustrations. Notes. Bibliography. Index. Pp. xii, 212. \$21.00 ISBN: 978-0-295-74144-4

Dr. Bjorkman is a retired USAF colonel who spent much of her career in flight testing. She is currently the Deputy Director of Test and Evaluation in Headquarters USAF. Her father, Arnold Ebnetter, was a USAF fighter pilot who later spent several decades working in the safety arena for Boeing. He also holds the straight-line distance record for class C-1aI aircraft (reciprocating engine in an aircraft with an all-up weight of no more than 500 kg) in the E-1 he designed, built, and flew himself.

Bjorkman has masterfully woven three stories into one smoothly flowing narrative: her father's life and careers; the designing, building, and flying of the E-1 homebuilt aircraft; and the overall story of the ups and downs of the homebuilt aircraft movement in the US.

Ebnetter's story is similar to that of many youngsters who grew up during the Great Depression. Once he caught the flying bug, he scrounged enough money to buy rides and take lessons, eventually earning a pilot's license. He had a number of different jobs and went to several universities to earn an aero engineering degree. He spent 22 years in the USAF flying the F-86 and, primarily, the F-100, including several tours in Vietnam. Following that, he worked for Boeing for several decades. But what makes Ebnetter's story quite unique is the E-1, the idea for which started in his days at Texas A&M in the 1950s. He wanted to apply all of his skills to completely designing and building an aircraft in which he could set a record. Because of career and family demands, over 50 years elapsed before he could take the concept to the reality of the record.

Throughout Ebnetter's story, Bjorkman has intertwined about as much of the complex history of homebuilts as one can in just over 200 pages. While she acknowledges that a lot of aircraft and events had to be left out because of the book's size, she has done a fantastic job of capturing the seminal events in what is a major part of the story of aviation in America. From the Heath Parasols and the Pietsenpol Air Campers of the late 1920s; through the torturous history of CAA and FAA regulations and policies; Paul and Tom Poberezny and the Experimental Aircraft Association; the terrible years of litigation in the general aviation market; Burt Rutan, Jim Bede, and Richard VanGrunsvan and their design and marketing problems and triumphs: the story is well told and demonstrates some of the reasons it took a half century for the E-1 flight to happen.

The bottom line is that Arnold Ebnetter flew his own design that he built himself (an aircraft that weighed 498.9 kg at takeoff) from Paine Field, Everett Wash., to Fredericksburg Virg. (a record distance of 2328 miles) on July 25-26, 2010—the record being set when he was nearly 82 years old!

Bjorkman has done a superb job of interweaving the story of Ebnetter and his family and careers, the E-1 aircraft and its record, and the history of homebuilts into one very readable book. Personally, I hope she writes a few more books that, perhaps, encompass some of the programs she worked on in the Air Force.

Col Scott A. Willey, USAF (Ret), Book Review Editor, and Docent, NASM's Udvar-Hazy Center



Combat Over the Trenches: Oswald Watt, Aviation Pioneer. By Chris Clark. South Yorkshire, UK. First published as *The Highlife of Oswald Watt: Australia's First Military Pilot* in 2016 by Sky Publishing, Newport NSW, Australia. Reprinted by Pen and Sword Books, 2017. Maps. Diagrams. Photographs. References. Bibliography. Index. Pp 306. \$50.00 ISBN:978 1 52671 501 2

Chris Clark has long been associated with Australian defense and national security affairs, with assignments including the Departments of Defence and Foreign Affairs, the Prime Minister, and Cabinet. He retired in 2003, after nine years as RAAF Historian and Head of the Office of Air Force History. With that in mind, he is an excellent author to recount the history of the "Father of Australian Aviation" and the "Father of the Flying Corps."

Walter Oswald ("Toby") Watt was born in 1878 into one of the pillars of Sydney society. His early years offered no inkling of his later interest in aviation. Following the collapse of his marriage in 1913, he found himself in Egypt—first in Cairo, later in Heliopolis. Heliopolis, it turns out, had an airdrome that was frequented by flyers from all over Europe flying all manner of aircraft. Watt, who had learned to fly in 1911, was enthused and purchased his own Bleriot XI in 1914, making him the first British subject to fly in Egypt. With the onset of the war in August, Watt volunteered himself and his Bleriot for service in France. He flew patrol and reconnaissance missions on the French northeastern front until 1916 when Australia established the Australian Imperial Force (AIF) to consolidate Australian flying units in support of the war.

Watt became Commander of B Flight in Squadron 1, based again in Heliopolis, doing patrols and fighter support against Germans and Turks over Sinai, especially the Battle of Romani, which was the last attack by the Central Powers on the Suez Canal (3-5 August 1916). Shortly after Romani, Watt was made Commander of Number 2 Squadron and transferred to Harlaxton Manor in England to train the squadron for deployment to the combat zone. That occurred in the early spring of 1917. By May 1917, fitted out with new Airco DH.5 aircraft, Number 2 Squadron deployed into France, in the vicinity of Saint-Omer. This location put the squadron in the midst of the Battle of Cambrai, November 20–December 7, 1917. Al-

though universally recognized for its performance at Cambray, Number 2 Squadron had lost half its pilots and some 27 aircraft, a toll that Watt never forgot.

In February 1918, Watt was assigned to command the Number 1 Australian Training Wing in England, which consumed his attention until the end of the war. Upon his return to Australia, Watt focused on three things: advocacy for establishment of an Australian Flying Corps as a separate entity from the Army and Navy (which resulted in establishment of the Royal Australian Air Force in 1921), advocacy for establishment of federal regulations for commercial aviation (which resulted in the Air Navigation act of 1921), and care for veterans from the war. Watt died by accidental drowning in 1921.

Clark's book provides insight into an important aviation figure who, unfortunately, has drifted off the screen outside his native land. Watt was a complex figure who popularized aviation in Australia, both civil and military, with long-term consequences. This book is an excellent way to meet him again.

Douglas R. Norton, Docent, National Air and Space Museum, Smithsonian Institution



Curtis Papers: Canadian Aerospace and Joint Studies Vol II. By Various. Ontario: Canadian Forces College, 2017. Tables. Diagrams. Notes. Pp. 311 (English side), 353 (French side).

This book is a collection of papers written by students at the Canadian Forces College, the country's mid-level professional military education school. The papers cover a broad array of topics from technical to territorial issues and are argumentative and meant to convince the reader of the author's position on the subject. The authors are all career military officers with significant experience in their areas of expertise. All six essays are from the 2010-11 academic year, so some of the information is somewhat dated. Interestingly, most articles (even the technical ones) have a sociological focus. This isn't a drawback—just a different way to approach subjects often treated with a less people-oriented perspective.

The first chapter discusses the use of narrative and counter narrative in influence activities as practiced by the Canadian military. Given our adversaries' widespread use of social and other types of media in telling their story, the information is relevant and informative.

Chapter two discusses the strategic impact of using CF-18 fighter aircraft in the Libyan intervention in 2011 (including conflicts in the former Yugoslavia). While he claims the paper is not an argument for buying the F-35, that is essentially the conclusion drawn. One unique aspect of this paper was that since there is not much official history within the Canadian Air Forces, the author relied on

first-person interviews for much of his data. One minor complaint is the author refers to the Canadian military employment during Oka, a domestic incident involving a standoff with Mohawk tribesmen with no explanation of what it was or what happened. A Canadian might be familiar with this incident, but most others would not. A note from the editors here on what happened and the Canadian military involvement would be helpful.

Chapter three presents the case for the reintroduction of airships (think something between the Goodyear blimp and the Hindenburg) as heavy airlift vehicles. He argues such vehicles could fill a gap between conventional airlift like the C-17 which carries tens of tons of cargo and sealift which, while carrying vastly greater cargos, is drastically slower. The airships proposed could carry between 200-400 tons of cargo great distances. The author presents a good discussion of a very nontraditional solution including the economic and technical sides of the issue. Schematics or drawings of traditional vs notional vehicles would have been helpful.

Chapter four discusses retention and its impact on the future Canadian military. This paper is timely given that the German military is considering enlisting EU citizens (non Germans) to fill its ranks in the absence of enough qualified and willing German citizens. Using a sociological lens, the author focuses on the differences between why people leave the military—what he calls dissatisfiers (factors internal and structural to the military)—and the tools used to try to retain people (external motivators such as pay and bonuses). He argues that reducing the negative impact of dissatisfiers will be more successful in the long run than any external motivators. Having served in the U.S. Air Force throughout the 1990s and early 2000s and watched the effect of retention efforts focused on bonuses versus institutional change, I have to agree.

Chapter five focuses on arctic sovereignty, an issue of especial importance to Canada given its vast arctic territory and the small military and governmental structure with which to police and protect it. This was the weakest of the six papers. The editing and writing were not as good and the author makes some questionable assertions unsupported by sources. He also presents an overly rosy view of Russian intentions in the Arctic. He does present an innovative and reasonably low-cost alternative for arctic surveillance using locals who live and hunt the areas to augment a limited military presence. Maps in this section illustrating some of the issues of distance and size would be useful.

The final chapter concludes with a sociological examination of Canadian Special Forces Command (CANSOFCOM), the newest element of the Canadian military. The author presents the evolution and future directions for this very small, but key element, of Canadian military power. He uses USSOCOM as a template acknowledging the significant differences between both the countries and commands in question. This article is heavy on sociological

theory, but the author uses it well and has a good discussion of the subject.

This book is not for the casual reader. The good news is the book is available free online at <http://www.rcfarc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/publications.page>. This edition compares favorably with similar volumes I've read from U.S. professional military education institutions. These authors are thoughtful and professional, and their contributions are worth the reading time.

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



History of Rocketry and Astronautics (AAS History Series, Vol. 48). Pablo de Leon (ed.). San Diego, Calif.: Univelt Inc., 2017. Tables. Illustrations. Photographs. Pp. xix, 492. \$75.00 paperback ISBN: 978-0-87703-642-5

This volume is a compendium of nineteen papers that were presented at the Fiftieth History Symposium of the International Academy of Astronautics (IAA), which occurred in Guadalajara, Mexico, in 2016. The papers are grouped into four parts: I—Memoirs and Organizational Histories; II—Scientific and Technical Histories; III—History of Mexico & Latin America's Contribution to Astronautics; and IV—50th Anniversary of IAA History Symposium. Parts I and II have become standard for the series. A Part III that explores contributions of the host country to astronautics is also the norm. The papers are collected by the American Astronautical Society (AAS) and published in the year following the symposium.

The quality of the papers is generally high, and the array of topics broad. They range from matters that would interest a broad segment of the aerospace community to narrow topics that would likely interest only specialized readers. Examples of the former might include "Engineering the Saturn V: Personal Recollections of the Development and Testing of the Rocket That Transported Man to the Moon," or "Anti-Satellite Systems: The Hidden Face of Space." In the latter category, "Karl Poggensee—A Widely Unknown German Rocket Pioneer: The Early Years, 1930-1934" or "Sud Aviation X 407 Casseur: The Unknown Stepping Stone to Diamant and SBS."

One of the criteria for acceptance of papers for presentation at the symposium is a "Twenty-Five Year Rule": the subject matter of the paper must be at least 25 years in the past to be regarded as "historical." So, if one plans to offer a paper at the 2019 symposium, its subject matter can be no more recent than the early 1990s.

The first IAA History Symposium was held in Belgrade in 1967, and the event has recurred annually. All of the papers presented over a half century—now some 775 in number—are compiled in the previous 47 volumes of this series. At the publisher's web site (<http://www.univelt.com/History.html>), the tables of contents for all but the earliest few are available for review (the web site includes information on the latest volume, No. 49, but the table of contents is not posted at this writing). A sorely needed Subject Index volume for the series is said to be in preparation.

Whatever aspect of the history of rocketry and astronautics is of interest to you, it seems likely that a manual search (albeit tedious) through the contents of this series' volumes would reveal useful relevant sources. While it's not likely that your local library will have these on its shelves, an interlibrary loan request to an academic library may well prove rewarding. Your local reference librarian stands ready to assist!

Frank Van Haste, Alexandria VA



Tiger Check. By Steven A. Fino. Johns Hopkins University Press, 2017. Maps. Tables. Diagrams. Illustrations. Photographs. Notes. Glossary. Bibliography. Index. Pp. x, 378. \$50.00 ISBN: 978-142142327-2

Just about anything a reader could possibly want to know about the U.S. Air Force approach to air-to-air combat between 1950 and 1980 can be found in this book. The principal air-to-air fighters of that three-decade period—F-86 Sabre, F-4 Phantom II, and F-15 Eagle—are covered in lengthy detail, as are the tactics adopted (or not) in light of changing technology and previous habits.

Fino did not fly all three aircraft, but he did fly the Eagle (F-15). Plus, to add to his credentials, he is a graduate of the Air Force Academy—so no stranger to the subject—as well as the Fighter Weapons School at Nellis AFB, Nevada, the badge of envy of most USAF fighter pilots.

The theme of this book and Fino's major point hinge on a phrase he uses throughout: myth of the fighter pilot. By this he refers to the image of aerial skill, aggressiveness, superiority (and, yes, confidence) that began in World War I. Fino would contend that, even then, the myth was more popular than real and has continued in more modest forms through the Eagle.

Fino argues that the inevitable progress in technology (e.g., weapons, radars, computers, and flight agility) often collided in this period with old thinking—often with unhappy outcomes. The highly favorable kill ratios of Korea in the F-86, for instance, were not duplicated in Vietnam in the F-4, at least in part because of holdover tactics and unreliable weapons.

Clearly, the F-15 represented a significant leap forward—along with better training—at the end of the period covered. Fino concludes that the myth of the fighter pilot, as it survives in an acceptance and use of technology, is desirable. He applauds a "tiger-like" attitude, fully integrating whatever flying skills are necessary with full

employment of advanced weapons systems. It's not a question of either "flyer or scientist" but a combination of both.

Adding to the credibility of the book, Fino included in his research the opinions of a number of respected fighter pilots, among them former Chief of Staff Gen Larry Welch and the former Historian of the Air Force, Col Dick Anderegg.

With almost 100 pages of footnotes, countless in-depth explanations of complex subjects such as cockpit controls and the inner workings of radars and missiles, and flight-briefing-level layouts of tactics, this book is more than adequately researched and documented. A reader will frequently be tempted to skip hefty passages to get to the next meat.

Full disclosure: I was a career fighter pilot (myth and all) in the USAF, and flew both the F-4 and the F-15, among others.

Mike Nelson, National Air & Space Museum Docent



1001 Aviation Facts: Amazing and Little-known Information About All Aspects of Aviation. By Mike Machat, editor. Forest Lake Minn.: Specialty Press. 2017. Photographs. Pp. 332. \$24.95 ISBN 978-1-58007-244-1 (Paperback).

1001 Aviation Facts is the latest in a successful series of 1001 Fact books published by Specialty Press and its companion publisher, CarTech. In *1001 Aviation Facts*, editor Mike Machat leads a team of seven other authors to create a list of 1001 facts to tell the story of aviation. The contributors have a wide range of experiences and areas of expertise ranging from aviation artists, pilots, and authors. Each fact is attributed to its author. The differences in writing styles of the authors, while minor, are easily noted.

To tell the story of aviation in 1001 facts, the book is divided into eight chapters or focus areas: The Beginning (Facts 1-121); Military Aviation (Facts 122-445); Experimental Research Aircraft (Facts 446-490); Commercial Aviation (Facts 491-678); General and Sport Aviation (Facts 679-757); Aviation in the Media (Facts 758-816); Pilots, Designers and Personalities (Facts 816-945); and Aircraft Models (Facts 946-1001). The largest of the chapters is the chapter on military aviation, which is subdivided by U.S. military service.

The book's primary focus is on American aviation. While this is interesting to American readers, it is extremely limiting in addressing the contributions the rest of the globe has made to aviation. The largest amount of international coverage relates to the Concorde supersonic airliner.

At times the fact placement appears disjointed. For example, a fact about QANTAS Airline flights during World War II was placed in the Navy and Marine Corps section

of the military aviation chapter (Fact 195). Additionally, several facts appear to be reused with slight modification and nuancing. An example is declaring the U.S. Navy SBC Helldiver being the last "combat biplane" (Fact 196) and the last "biplane fighter" (Fact 205). In addition to these shortfalls, the book fails to follow chronological order, even within chapters.

Pictures are thoughtfully placed throughout the book to accent the facts. The images are all clear, sharp, high-quality. Many of them are previously unseen or rarely published.

The book concludes with a chapter on model airplanes. While interesting to some, the facts about the introduction of plastics in model kits (Fact 983) and the cover art on the boxes of model kits (Fact 1001) actually have more to do with toy making and hobbies than they do with aviation. Ultimately the authors would have been better served to include more international aviation facts.

With the text divided into individual facts, the book is a light and easy read. Readers can bounce around in the book and read as many facts as time permits. Many of the facts are interesting. The text represents a mildly interesting blend of aviation facts ranging from significant aviation records and events to the odd facts about the first "eye in the sky" traffic reports (Fact 120).

In summary, the list of interesting aviation facts included in the text butts up against the facts excluded from the text. The limited number of facts related to international aviation is a serious shortfall to this work. While casually interesting, *1001 Aviation Facts* is **not** a must-read book for aviation enthusiasts.

Lt Col Daniel J. Simonsen, USAF (Ret), Bossier City LA



Carrier Aviation in the 21st Century: Aircraft Carriers and Their Units in Detail. Thomas Newdick, ed. Houston Texas: Harpia Publishing, 2017. Tables. Diagrams. Illustrations. Photographs. Appendices. Pp 252. \$64.95 paperback. ISBN: 978-0-9973092-2-5

This collection of nine essays describes the state of carrier aviation as of late 2017 for nine different nations: Brazil, China, France, India, Italy, Spain, Russia, the United Kingdom, and the United States. Each nation's capabilities are detailed by a different writer. For the most part, Newdick, who also is editor-in-chief of the United Kingdom's well-regarded *Airforces Monthly* magazine, has done a fine job of bringing consistency to each chapter—never an easy task when working with a variety of writers. In addition, some of the contributors probably lacked the convenience of expressing themselves in their native language.

As might be expected, about one quarter of the content is devoted to the U.S. Navy. No other country has more

than one aircraft carrier, though China and the UK are expected to each add a second one within the next several years.

The chapter on Italy provides an example of how the content is organized. The text begins with an historical review of carrier aviation in the Italian navy followed by a discussion of vessels currently in active service. Here things grow a bit murky, since an amphibious assault ship, the *Garibaldi*, is introduced into the conversation along with the far more capable *Cavour*. However, the *Garibaldi* was omitted from the appendix listing carrier characteristics, while the U.S. Navy's *Wasp* amphibious-assault class was included. The ship's various radar and ancillary suites are mentioned. A discussion of the aircraft, in this case the AV-8B+ Harrier, along with a variety of helicopters, follows. The expected acquisition of the Lockheed F-35 Lightning II (now becoming a reality) is covered in a couple of paragraphs. The chapter concludes with a chart showing the composition of an Italian carrier wing and a typical carrier battle group. Also included in each chapter is a diagram showing the possible deployment of the battle group's assets.

The first appendix details the various vessels' characteristics. It also includes a detailed diagram of the flight deck as seen from above. The second appendix shows the same view side-by-side in the same scale, thus allowing a simple comparison. This is followed by a list of the number and type of aircraft in a representative air wing for each nation.

The production quality is first-rate using gloss paper with mostly color photographs. There are, however, several minor deficiencies. Biographical sketches of the contributors should have been included. Further, a comparison of the aircraft would have been helpful as well as more detail concerning electronic systems.

Overall, this book provides a nice foundation for understanding the state of carrier aviation into the first seventeen years of this century. To keep up with what has happened since then requires turning to more current sources. For example, a quick search of the internet leads to the UK's Ministry of Defense website that provides timely information on the progress of the HMS *Prince of Wales*, Britain's second Queen Elizabeth-class carrier.

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



Phantom Boys Volume 2: More Thrilling Tales from UK and US Operators of the McDonnell Douglas F-4. By Richard Pike, editor. London UK: Grub Street, 2017. Photographs. Pp. 184. \$39.95 ISBN 978-9106900-39-0

With over 5,000 produced and flown by 12 nations, the F-4 Phantom II is one of the most produced modern fighter

aircraft. Having first flown in 1958, it is still in operational service today. The F-4 is one of the most successful modern jet fighters. Through the years, the Phantom has become known by numerous nicknames: the rhino, the double ugly, the flying brick, the world's largest distributor of MiG parts. It has both earned the respect of aviators and developed a near-cult following. In his latest book, Pike adds to the lore by sharing an additional set of tales from those who operated the F-4.

As he did in his first volume of *Phantom Boys*, Pike weaves an excellent collection of "there I was stories" to create an enjoyable collection of Phantom Phlyer tales. This second volume shares eighteen more stories. The primary focus is on UK Phantoms with sixteen of the stories. The remaining two stories are from the USAF.

"There I was stories" are often focused solely on combat experiences. With a British focus (as would be expected from an RAF pilot), there are fewer Phantom combat tales to tell. These stories cover a spectrum from mid-air collisions to challenging flights during military exercises, in-flight emergencies, and battling the British and European weather.

Pike has done an excellent job of drawing the reader into the cockpit and then into the skies. The shared tales are engaging and quickly read. While each tale is relatively short—typically less than fifteen pages—all are packed with the details, sights, and sounds of flying one the modern age's most iconic jet fighters. Military pilots, regardless of their airframe, will obviously relate to many of the tales told, while Phantom Phans will enjoy this latest addition to the collective history of a storied aircraft.

The most fascinating tale came from RAF pilot Archie Liggat. In 1990, Liggat was part of a two-ship of Phantoms deployed to the Falkland Islands tasked to escort an Argentinian KC-130 as it transited through the Falkland Inner Conservation and Management Zone to monitor a large piece of the Wilkins Ice Shelf that had broken off and was drifting in the South Atlantic. Only eight years after the Falkland conflict, the KC-130's transit flight was the first after the war. While escorting the Hercules tanker, Liggat and his navigator, in jest, extended their refueling probe to pretend that they wanted to refuel. The KC-130 initially played along and reeled out their refueling drogue. The political tension was broken. What is fascinating about this particular story is that three years later, Liggat met an Argentinian colonel who was aboard the KC-130.

In a departure from just pilot stories, Pike also includes the stories of a fighter controller, Flight Lieutenant "Penny" Smith. Her tales tell the other side of working with Phantoms as she directed them to their targets. It is an interesting counterpoint to the pilot stories.

As the title indicates, the focus of the book is the tales themselves. As a result, the book has a minimal number of images. Each chapter, or tale, typically has one or two images. The images are generally no more than a third of a page but provide an excellent accent to each tale.

While an enjoyable read, the text is in a smaller-than-typical font size. For older readers, this can be a challenge. Certainly this was done to save printing costs by reducing the page count.

This book hits the mark of scratching the itch of both fans of flying and those devoted to the F-4. With the Phantom having flown literally around the globe and in the armed services of 12 nations, there are certainly countless F-4 tales waiting to be shared. Hopefully, Pike continues to capture and share additional stories.

Lt Col Daniel J. Simonsen, USAF (Ret), Bossier City LA



Brazilians at War: Brazilian Aviation in the Second World War. By Santiago Rivas. Solihull UK: Helion and Company, 2017. Maps. Tables. Illustrations. Photographs. Appendices. Bibliography. Pp. 88. \$39.95 paperback. ISBN: 978-1-911512-58-5

As a World War II history buff, I thought I was fairly knowledgeable about that conflict; but I had no idea the Brazilians were actively engaged in combat both off their own coast and in the European theater. This book provides a very focused look at a little known aspect of what was truly a global conflict. Part of the *Latin America at War* series, this book tells in brief the story of the Brazilian Air Force's (Força Aerea Brasileira, FAB) development prior to their participation in World War II, focusing on actual combat (antisubmarine warfare off the Brazilian coast and fighter employment in Europe). Rivas is a freelance writer from Brazil specializing in aviation and defense matters and focuses on Latin American aviation. His attention to the subject shows in the wealth of information in what is a short book. The book is full of photographs (some color) and has a section of beautiful color plates of the various aircraft flown by the FAB during the war. Six appendices cover Europe (types of operations, all fighter aircraft used in combat (all P-47s), targets destroyed or damaged); antisubmarine operations in home waters (a list of all known German subs active in Brazilian waters and their disposition (lost or surrendered), merchant ships lost); and FAB officer ranks.

The book's greatest strength is the obvious effort Rivas took in collecting and preparing his information. He draws from official sources and intersperses frequent personal anecdotes from pilots to support the narrative making it more immediate and compelling. The Brazilian's perseverance and tenacity comes through when one realizes that of the original fifty-one pilots trained and deployed to Europe, sixteen were lost in combat and six more in accidents—a staggering 43% loss rate. The text reads smoothly, and I attribute numerous misspellings to poor editing rather than any issues in translation. The appendices are clear and useful to any student of FAB operations.

While I wouldn't call them shortcomings there are a couple of areas where Rivas could have added information to provide a more rounded picture of the FAB during World War II. There is very little discussion of the training establishment prior to and during the war and none about other aviation activities (cargo, liaison, etc.). The fighter pilots deployed to Europe trained in Panama with the USAAF, an interesting story of its own directly relevant to the Brazilians' later success in combat. Some mention of other aspects of FAB operations would also add to the story. Finally no military force is exclusively combat troops. Adding information about, and even anecdotes from, ground crew and support personnel would have added depth and a different perspective.

At \$39.95 the book is expensive for the casual reader but worth the money for anyone serious about this aspect of World War II.

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



Atomic Cannons and Nuclear Weapons: A Mystery of the Korean War. By Arthur G. Sharp. Palisades New York: History Publishing Company, 2017. Appendices. Bibliography. Pp vii, 211. \$18.95. ISBN: 978-1-940773-45-2.

Arthur Sharp previously wrote three popular histories for Simon & Schuster as well as *The Siege of LZ Kate*, a Vietnam-war story. In addition, he edits *The Graybeards*, the bi-monthly journal of the Korean War Veterans' Association, and *The Old Breed News*, the First Marine Division Association's quarterly magazine.

While posing the possibility the U.S. Army deployed its 280-mm atomic cannon to Korea as a means to hasten the end of the Korean War, Sharp is equally concerned with the nuclear-weapon policies of the Truman and Eisenhower administrations, a period spanning sixteen years. Whether the use of such weapons should, or could, have shortened the war will remain one of those Monday-morning quarterbacking discussions along with the long-term geopolitical consequences if they had been employed.

Some veterans he has met are convinced *Annie* appeared in Korea. Since he has confirmed the firing of only one nuclear shell, in Nevada, in May 1953, it seems highly unlikely that the weapon was shipped to Korea before fighting ceased in late July. He teases the reader with rumors that perhaps the Communists' awareness of this weapon hastened their desire to reach an armistice.

The early North Korean success prompted Truman to deploy nuclear weapons from California to Guam in August 1950. Their appearance in theater, as the late Carl A. Posey pointed out in his fine article on the B-29 bombing campaign in the July 2015 issue of *Air & Space Magazine*, apparently made no difference to the Communist Chinese who shocked U.N. forces when they intervened in November.

Suitable targets and serious disapproval by United Nation allies such as Great Britain and France made the A-bomb's use even more questionable. Most historians, including Sharp, consider the death of Josef Stalin in March 1953 as the most important factor leading to the end of hostilities.

Unfortunately, he tap dances around the most fundamental question regarding the use of nukes in the late 1940s and early 1950s: the absence of any coherent doctrine. The technology had outpaced the ability of commanders to employ it. The same thing, of course, happened with the machine gun, the airplane, and the tank.

This topic is best suited for a lengthy magazine article rather than a book. Sharp relies almost entirely on personal observations concerning *Atomic Annie*. Disorganization is another apparent shortcoming as he meanders among a number of serious topics. For the war in general and Truman and Eisenhower, he relies on the standard secondary sources. Credible primary sources are few and far between. He does provide a concise chronology of the Korean War in the second chapter.

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



Boeing 707 Group: A History. By Graham M. Simons. Philadelphia, Penn.: Pen and Sword Aviation, 2017. Tables. Diagrams. Photographs. Illustrations. Appendices. Bibliography. Index. Pp. 320. \$39.95 ISBN: 978-147386134-3

Englishman Graham Simons is a professional aviation writer, publisher, and historian. He has an engineering background and membership in several aviation societies. Previous works include *B-29 Superfortress: Giant Bomber of World War 2 and Korea*; *The Airbus A380: A History*; *B-17 Memphis Belle*; and *Boeing B-17: The Fifteen Ton Flying Fortress*.

This latest book examines the Boeing's 707 evolution from development and testing of its Model 367-80 prototype; parallel progression of its multi-variant cousin, the C/KC-135; and its legacy of influence even today as an iconic aircraft type.

Simons introduces his book by refuting Boeing claims that the 707 and its derivatives marked the beginning of the jet transport age and that it was the world's first commercially successful jet airliner. He is quick to point out that, in relation to shortcomings of the de Havilland Comet and other early jets (e.g., Avro Jetliner and Sud Aviation SE.210), the 707 itself had design and performance problems. When pushing the knowledge envelope, there is always risk. With this out of the way, any aviation enthusiast can settle down to a very good read!

The book begins with a short history of The Boeing Company, including William E. Boeing, from its First World

War beginnings through the interwar years, where the Boeing Air Transport System had its start. This era saw the spin-off of commercial development from military aircraft and engine designs. He discusses the influence of major airlines on the air travel infrastructure and transport aircraft design through the post-World War II period.

He next covers jet engine development from the 1930s to the 1950s—crucial not only to the military but also to the dawn of the commercial jet age. The German surrender yielded substantial data on wartime aeronautical development as well. This information was critical to the design of Boeing's B-47 Stratojet medium bomber. The design and operational performance of this aircraft was, in itself, influential on the Model 367-80 and subsequent 707 designs.

Simons next discusses commercial jet aircraft design in the post-World War II period. Designs by Vickers, de Havilland, Avro, Tupolev, Lockheed, and Chase are presented first. Early Boeing design options for their soon-to-be prototype jet tanker are shown. An entire chapter of the book is focused on the Model 367-80 design, development, operational test and evaluation; military (cargo and tanker) and potential passenger applications; and the influence of commercial air carriers on design revisions leading to the 707.

Development of the C/KC-135, a separate and forerunning branch of the 707-family tree conceived from the 367-80 prototype, is discussed as well. Simons provides information on a myriad of variants. This section of the book has two significant and interesting sidebars: a refueling operation supporting redeployment of twenty-four F-16 fighters from Europe to the U.S., and a review of the saga of finding a replacement for the aging KC-135 tanker design (KC-X).

Simons devotes a lengthy section to 707 variants, with many photographs of different airline liveries and promotional material from the heyday of 707 service. He includes a particularly poignant section on the causes of selected accidents: pilot error, human intervention, systems malfunction, and natural causes. This is followed by an interesting chapter on the introduction to service and use of previously owned 707s for group charter service. A DANAIR captain describes the complex scheduling and operations of such a service and the impact on aircrews.

Simons goes on to write about military 707s such as the E-3 Sentry (AWACS), E-6 Mercury, E-8C (JSTARS), and VC-137 (Air Force One). He tells about the military's harvesting of retired 707 spares for use on these aircraft. He ends with an interesting tale tracing the history of John Travolta's 707-138 and the difficulty of researching over 1,000 airframes for this type of information with any degree of accuracy.

I liked this book! It is an excellent source for the engineer, historian, and aviation enthusiast alike. It is replete with aircraft photographs, diagrams, and airline promotional material in support of the text. The book is well worth the price and will provide many hours of intriguing

reading and research support. It is a good addition to one's aviation bookshelf.

Frank Willingham, NASM Udvar-Hazy Center docent



Thud Pilot: A Pilot's Account of Early F-105 Combat in Vietnam. By Victor Vizcarra. Stroud UK: Fonthill Media, 2017. Photographs. Maps. Pp. 160. \$24.95. ISBN: 978-1-78155-645-0

Victor Vizcarra was an Air Force F-105 pilot assigned to the 80th Tactical Fighter Squadron sitting nuclear alerts at Yokota (Japan) and Osan (Korea) air bases in the early 1960s. Events in the Gulf of Tonkin on August 2, 1964, changed that. Over the next three years, he completed three forty-five-day temporary duty assignments (TDY) from bases in Thailand completing fifty-nine missions over Southeast Asia. These are the scope of this memoir.

At the very beginning of his work, Vizcarra makes sure anyone from a novice to experienced aviator will understand the pages that follow. "Fighter Pilot Talk 101" is a very brief introduction of the aircraft (his and the enemy's), the anti-aircraft, the environment that he operated in, and the jargon used.

Descriptions of fourteen of his most significant sorties are accompanied with a map showing his route from base to refueling track to target. He describes several sorties from each TDY. On his first TDY, one of his missions was to target some of the first surface-to-air missiles, the SA-2, used in North Vietnam. It is also on this TDY that CBU-2 cluster bombs were first employed. Most missions, however, were to fly cover for the rescue of shot-down Air America pilots. His second TDY had him flying much longer missions with greater payloads with many more aircraft. The significant event of his final TDY was being shot down, rescued by a UH-2A helicopter, and delivered to the cruiser *USS Halsey*.

Perhaps he is most famous for the markings on his aircraft, Pussy Galore (F-105D, 62-4357) and Pussy Galore II (62-4364), named after the Bond girl in the movie *Goldfinger*. It seems that boom operators were having trouble connecting with the refueling receptacle, so Vizcarra painted a nude around the receptacle. He just gave them something to aim for!

Vizcarra concludes *Thud Pilot* in a unique way. In the final chapter, readers are introduced to his wife Pat (his teenage sweetheart), their two small sons (who both later became naval aviators) and daughter, and neighborhoods lived in Japan. He describes himself as a lucky man for her letting him do something he'd wanted to do since high school (fly fighters) and her support for him that never wavered though the numerous moves of his twenty-four-year USAF career.

The one thing most refreshing about this work is the lack of criticism of the White House and Pentagon. Only in

one or two very brief mentions does he describe any displeasure with them. However, the main problem with this work is not editorial but publishing. Vizcarra has written much about his experiences. Fonthill chose to chronicle them with very small text and very narrow margins—text that may be too small for many readers. The numerous photos and maps are not glossy. Because of this packaging, the book seems excessively priced.

I found *Thud Pilot* to be a very enjoyable memoir of a fighter pilot flying the biggest single-engine aircraft over increasingly hostile airspace during three TDYs. For those interested in the early air war over Southeast Asia, *Thud Pilot* is a great place to start.

Scott Marquiss, National Air and Space Museum docent, Mall and Udvar-Hazy Center



The Rise and fall of the French Air Force: French Air Operations and Strategy 1900 to 1940. By Greg Baughen. UK: Fonthill Media, 2018. Photographs. Maps. Appendices. Endnotes. Bibliography. Index. Pp. 320. \$45.00 ISBN 978-1-78155-644-3

Greg Baughen was educated at Sussex University, where he obtained a mathematics degree. His interest in military aviation was sparked by curiosity over the defeat of British and French forces in the Battle of France in 1940. He has sought out explanations for many years and traced the origins of power in both countries through the Cold War. Baughen's other books include *Blueprint for Victory*, *The Rise of the Bomber*, *The RAF*, and *The Fairey Battle*.

At the end of World War I, the French possessed the most effective air force in the world. They had effectively used tactical bombing as battlefield mobile artillery, strategic bombers for longer-range bombardment of industrial targets, reconnaissance aircraft to support battle planning, and fighters to gain air superiority. In May 1940, the French possessed an air force on a par, in numbers at least, with Great Britain and Germany. Yet, six weeks later, France had been defeated. What went wrong? Inferior aircraft performance? Unused reserves? Inappropriate governmental policies? Poor battlefield leadership? Baughen examines some of these questions going back to the days of French aviation dominance after the First World War. He describes mistakes and bad luck that persistently affected French efforts to modernize its air force in the 1920s and 1930s. He observes how decisions made in the final months before the German attack further debilitated the air force.

Baughen suggests that persistent military and government reorganization, leadership squabbling, and air-policy change in the Post-World War 1 period hampered ability of aircraft designers and manufacturers to stay abreast of constantly shifting requirements. The overriding view was

that France was best served by a powerful long-range strategic bombing force intended to deter German attacks on French cities. While foreign policy was to be shaped by the bomber, the French didn't consider a strong fighter defense to be a deterrent. This view changed somewhat with lessons learned by observing air operations in the Spanish Civil War. A resultant vision was adopted for smaller, more-specialized combat planes, with smaller high-speed bombers, specialized reconnaissance aircraft, single- and two-seat fighters, and twin-engine interceptors. This was all to be supported by ground stations and, possibly, radar. However, time was running out! A weak French economy and limited industrial capacity impacted both production and testing of newer aircraft. In addition, inconsistent government procurement policies were disruptive. Ultimately, as the German invasion began, the French had forgotten the lessons of the Great War and were not adequately prepared for the blitzkrieg.

Baughen explains these problems in detail and supports the text with tables in the appendices which address French reequipment and expansion plans, performance of various aircraft, and French aircraft deliveries. He also describes French units and squadrons to which aircraft were allocated. Included are photographs of operational aircraft throughout the interwar period.

This book is an excellent reference for students of the French Air Force and of air power policy and modernization.

Frank Willingham, NASM Docent



Reckless: Henry Kissinger and the Tragedy of Vietnam. By Robert K. Brigham. New York: Hachette Book Group, 2018. Endnotes. Index. Pg. xviii, 297. \$28.00 ISBN: 978-1-61039-702-5

The Vietnam War has been, especially during this past year, a very popular subject for historians. Consistent with the trend, Brigham's goal, with this well documented and highly critical book, is to set the record straight on Henry Kissinger and his supposedly successful diplomacy in bringing an end to the war. Brigham makes it abundantly clear that he is presenting his fact-driven book as a counterweight to Kissinger's voluminous writings, which Brigham views as often disingenuous and self-serving in nature.

Reckless examines Kissinger's management of the peace negotiations, beginning in 1969 under President Nixon, that supposedly followed the mutually supporting tracks of diplomacy and military strategy, with the ultimate objective of extricating the United States from the war without appearing weak or doing so dishonorably. Brigham first visits Kissinger's views on the war while he was still an academician and reveals some interesting con-

trasts. As a Harvard professor, Kissinger identified some glaring shortcomings in how President Johnson and his advisors prosecuted the war. In contrast to the optimistic views of Johnson's so called "wise men," Kissinger's own conclusions on the administration's conduct of the war pointed to a nearly complete breakdown between military and national security objectives. In other words, Johnson's conduct of the war was both irrational and directionless and, thus, a failure from beginning to end.

Brigham's assessment is that when Kissinger's turn came to salvage the war, he totally failed to achieve any of his objectives; in fact, his actions needlessly prolonged US involvement. He cites numerous senior officials and military officers of the era who have criticized Kissinger's own glowing accounts of his role during the peace talks and point to his efforts to conceal his own culpability in the Vietnam War fiasco. Brigham's research has revealed that Kissinger's unwarranted optimism during his secret talks with the North Vietnamese carried over to making false and highly misleading representations to Nixon, Congress, and South Vietnam's president. Ultimately, a frustrated Nixon unleashed a full-blown air campaign against North Vietnam in order to force agreement to a face-saving peace accord that had no value and reflected little of what Kissinger had sought aside from US departure from the war and the return of POWs.

One might conclude that the peace accord reflected the reality of the war at that time and the greater strategic goals of both North Vietnam and the United States. Nixon badly wanted to extricate the US from the war and he achieved that, while leaving the Saigon government to fend for itself. The North, however, was in the catbird seat, allowing it to go the final lap and reach its ultimate goal of unification under a communist government.

Looking at Kissinger's *realpolitik* from a perspective that goes beyond the Vietnam War, however, puts a different shine on his legacy. His successful talks leading to rapprochement with China are a significant example of his "World Order" view of balance of power between nations (see the *Air Power History* Summer 2015 issue for a review of Kissinger's "World Order"). Yet, Brigham makes only vague references to the central philosophy behind Kissinger's efforts as Nixon's National Security Advisor and as Secretary of State. Kissinger's goal of freeing the US of the Vietnam War "albatross" so that a broader national security strategy could be pursued, did bear fruit with China. However, as this book clearly demonstrates, Kissinger role during the Vietnam War was not his "finest hour."

Col (Ret) John Cirafici, Milford DE



"The Man Who Took the Rap": Sir Robert Brooke-Popham and the Fall of Singapore. By Peter Dye. Annapolis. Naval Institute Press. 2018. Maps. Diagrams.

Photographs. Notes. References. Bibliography. Index. Glossary of Acronyms and Abbreviations. eBook edition also available. Pp. 410. \$44.95 ISBN: 978-1-68247-358-0

Peter Dye is a retired RAF Air Vice Marshal who was awarded the Order of the British Empire for his support to Operation Jaguar during the first Gulf War. He is eminently well suited to review the career of Sir Robert Brooke-Popham, one of the founding leaders of the RAF.

Sir Robert is best known to popular history as the Commander in Chief Far East leading up to the fall of Singapore in early 1942, hence the subtitle of the book. But Dye paints a more complete story of a highly successful and varied career beginning at Sandhurst in 1896. It was a career that touched on many aspects of early British military flying: combat on the Western Front in World War I, to research and development, to military education (mid-career and senior levels), to logistics and support. Brooke-Popham was Commander of Fighting Area (predecessor of Fighter Command of Battle of Britain fame) and helped to develop the command and control system that networked observers, acoustic sensors and, eventually, radar into the management of the battle space some twelve years later. As Commander of Air Defense of Great Britain (ADBG, 1933-1935), he strengthened these initial steps and integrated the scientific community more deeply in the problem of defense of Great Britain. Brooke-Popham was a colleague of Trenchard and Dowding and helped provide training and mentorship to many of the preeminent military leaders of the World War II generation through his leadership at the Royal Air Force Staff College (1922-1926) and at the Imperial Defence College (1931-1933). He was sent to Iraq Command in 1928 and was Governor of Kenya from 1937-1939, during which times he developed an effective diplomatic style. Recalled from retirement in 1940, he was assigned to Singapore as CinC Far East.

British military policy at this time was driven by the reality that Britain could not afford to sustain a major naval presence in both the Atlantic and the Pacific. Given the pressure of the war in Europe, the fleet was focused there. The planning assumption was that Japan would not attack first into the south but would take advantage of Hitler's invasion of Russia to consolidate its control in north Asia (Korea, Manchuria). As substitute for the absent British fleet, the thought was to establish a major naval facility in Singapore to which the fleet could be deployed when available. Brooke-Popham's overall task was three-fold: strengthen the local air and ground forces in Malaya; build cooperation and collaboration in military planning among others in the region (Australia, the US in the Philippines, China); and deter Japanese military action as long as possible. In some ways, these were mutually exclusive, since presenting a strong deterrent face to Japan undermined his ability to claim precious resources from home. He was replaced as CinC Far East before the fall of Singapore, but many people ultimately blamed him for the

loss of Singapore and Malaya.

Dye provides an excellent historiographic analysis of Brooke-Popham's career and how he struggled in Singapore against intimidating odds. In doing so, Dye provides vital balance to the historic record that allows the seminal achievements of this important RAF leader to be visible once more.

Douglas R. Norton, Docent, National Air and Space Museum, Smithsonian Institution



Flight Risk: The Coalition's Air Advisory Mission in Afghanistan, 2005–2015. By Forrest L. Marion. Annapolis MD: Naval Institute Press, 2018. Illustrations. Maps. Photographs. Tables. Appendices. Notes. Bibliography. Index. Pp. 376. \$39.95 ISBN: 978-1-68247-336-8 and 978-1-68247-361-0 (ebook)

Forrest Marion is a retired U.S. Air Force Reserve colonel and has a Ph.D in U.S. history from the University of Tennessee. He is an oral historian and staff historian at the Air Force Historical Research Agency, Maxwell AFB Ala. He deployed as joint task force historian to the southern Philippines (2002) and as historian for the air advisor wing in Afghanistan (2009 and 2011).

Marion presents an oral history, developed through literally hundreds of personal interviews with military and civilian personnel, supported by archival research. The book begins with an overview of Afghan air power from its meager beginnings in 1919 to its low point in 2005. During this period, air power in Afghanistan evolved to its somewhat limited capabilities supported, principally, by foreign interests. In later years, primary support came from the Soviet Union. Soviet support continued even after withdrawal from their ten-year Afghan incursion in 1989. But by 2005, the Afghan air service was in poor health, characterized by the loss of infrastructure, administrative systems, and personnel.

The study goes on to focus on the attempted reestablishment of a professional Afghan air arm, which itself was dependent on institutionalization of a U.S. air advisory mission. This was accomplished in part by activation of the 438th Air Expeditionary Wing under the US Central Command. In addition to advising, the scope of rebuilding included operations to support transport of human remains, tactical airlift, medical evacuation, and humanitarian airlift. Professionalization and command and control (C2) for the Afghan Air Force were also of critical concern. By 2011, as relevant institutional change was about to take place, nine air advisors were assassinated at the Afghan Air Command and Control Center, precipitating a potential cessation of the air-advisor program.

However, as Marion points out, the air-advisory program was continued after the 2011 disaster through the

end of the period of this study (2015). There was limited success with fixed-wing aircraft, and more rotary-wing aircraft became available than there were pilots to operate. Institutional success remains elusive in large part because of major cultural chasms, inability to integrate females, criminal patronage networks, meager language skills, poor leadership and personnel policies, unqualified individuals, and ineffective C2. These continued to plague the Afghan Air Force and the air advisory mission itself. One has to wonder whether it is at all attainable.

Marion's book provides sobering insight into the byzantine effort to build and provide advisory services to a foreign government under siege. It captures both the optimism and frustration to build and maintain a professional relationship with people of a vastly different—and not well understood—social, political, and religious culture. Marion offers valuable lessons learned for anyone interested in governmental advisory missions.

Frank Willingham, docent, NASM's Udvar-Hazy Center



A Brotherhood of Spies: The U-2 and the CIA's Secret War. By Monte Reel. New York: Doubleday, 2018. Photographs. Notes. Bibliography. Index. Pp 342. \$28.95 ISBN: 978-038554020-9

Monte Reel, an experienced newspaper reporter with two best-selling books (*Last of the Tribe* and *Between Man and Beast*), examines the roles of key individuals responsible for developing effective aerial surveillance of denied territory from the mid 1950s into the early 1960s. Some of the characters—Lockheed's Kelly Johnson and U-2 pilot Francis Gary Powers—will be familiar to most readers of *Air Power History*; others, such as Polaroid's Edwin Land and the CIA's Richard Bissell, perhaps less so.

In a straightforward manner, Reel begins by tracing the emergence of the Lockheed U-2 reconnaissance aircraft and the optical technology that made it so successful. This program, championed by Land as a governmental scientific advisor, caught the interest of the CIA, where Bissell became the primary proponent. For political reasons, the Eisenhower administration initially chose to place the program under civilian control, much to the chagrin of USAF leaders.

To develop the U-2, the CIA turned to Lockheed and Johnson. As the program matured, the CIA recruited Air Force pilots to work as civilian contractors. Powers, of course, survived the downing of his aircraft over the Soviet Union in May 1960. His trial and imprisonment by the Soviets would forever cast a shadow over his loyalty to the United States.

Reel also examines the role of aerial surveillance during the 1962 Cuban Missile Crisis. Major Rudolf Anderson perished when a Cuban-based SA-2 surface-to-air missile,

the same weapon used in the downing of Powers, destroyed his aircraft. Reel briefly mentions the Lockheed A-12 and SR-71 Blackbird spy planes and the D-21 drone as well as the Northrop Grumman RQ-4 Global Hawk unmanned aerial vehicle. The last chapter provides a postscript for the careers of Land, Bissell, Johnson, and Powers and the U-2.

This work, while well written and an easy read, is best suited for readers with a casual interest or those who are totally unfamiliar with the Cold War and the U-2 story. Reel relies almost entirely on secondary sources, mining nuggets from appropriate biographies. The selected bibliography is disappointing. One of the most frequently cited sources for the early days of the U-2 program, *The Central Intelligence Agency and Overhead Reconnaissance*, is omitted. A quick internet search reveals that it is available through the CIA website. Further, the publisher does the reader a great disservice with a very cheap format. The book omits any numerical notations in the text, resulting in an awkward and time-consuming searches for citations. Readers must turn to the notes section where, if lucky, they may find a page number followed by the first few words of a statement (usually a quote) and the source. Furthermore, it calls into question where the "fact" ends and the writer's assessment begins. Despite its shortcomings, this format is better than none at all, so common in popular histories.

The so called "secret war" alluded to in the title is ignored. Secret war with whom? The Soviets? Cuba? CIA targets in what became known as the Third World? If that was not enough, the Russians' successful "honey trap" of Washington columnist Joseph Alsop in a homosexual encounter or how many times Powers and his wife made love during a conjugal visit in Moscow seem totally extraneous. And U-2 operations from Taiwan flown by Nationalist Chinese pilots are totally ignored. The title promises a lot, but well-informed readers will be disappointed.

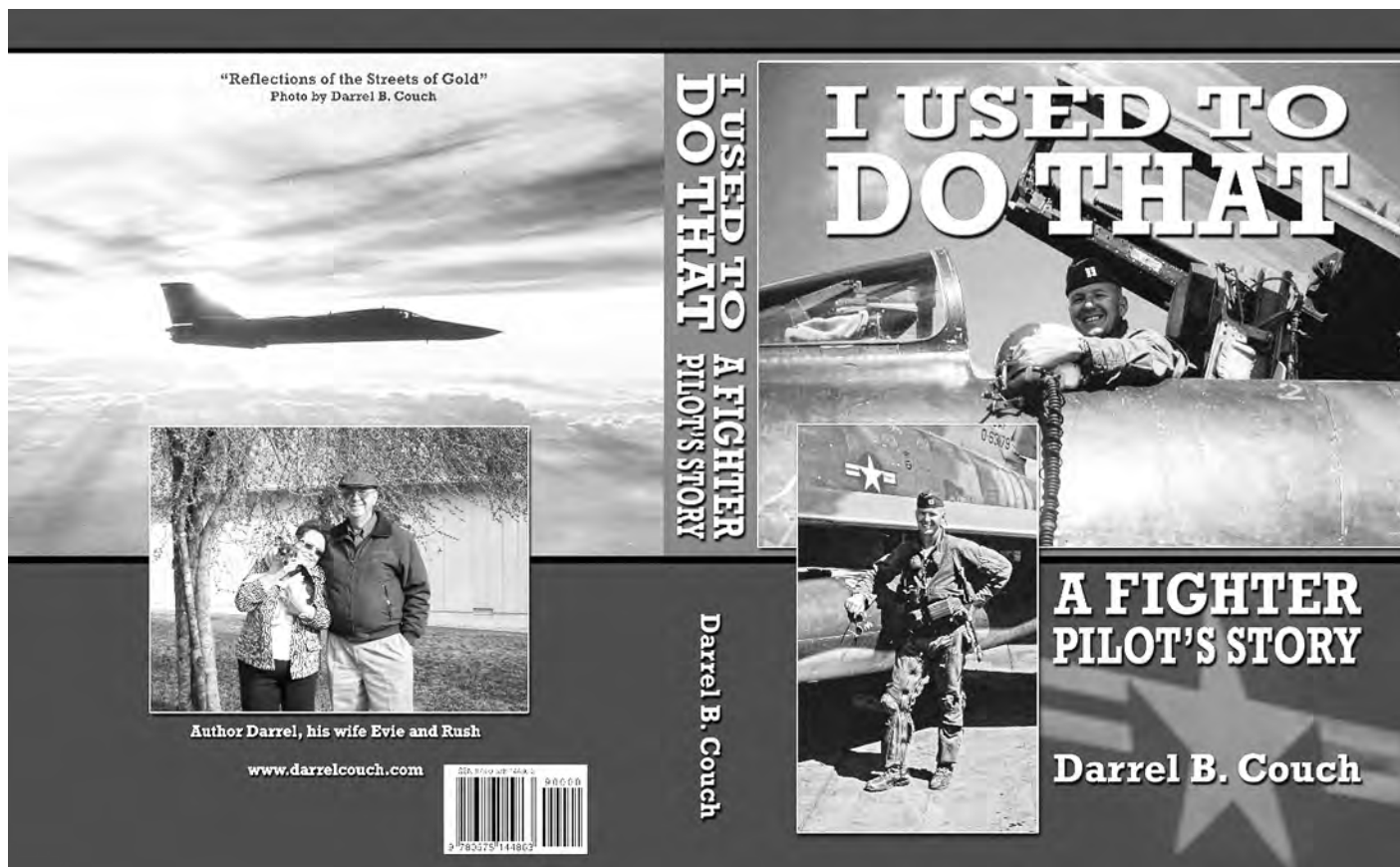
Steven D. Ellis, Lt Col, USAFR (Ret), docent, Museum of Flight Seattle.



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:

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Tel. (703) 620-4139
e-mail: scottlin.willey@gmail.com



My self published book is not currently available at my website.
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Hard cover: 8.5 X 11.0 inches table top style, 400 pages, 687 short stories, and 212 pictures with 90 pictures in color.
eBook: 645 short stories with 8 pictures.

Description : Come – Take a walk with me! Travel down a 100 year long memory lane. Experience the sheer exultation of my most improbable dreams being fulfilled beyond my wildest expectations.

Starting my career as a poorly rated 1956 high school student, I become a seventeen year old USAF enlisted man working on B-52 and B-47 electronics. With time, work, and the grace of God, I became a USAF pilot. I eventually achieved the coveted aviation pinnacle of becoming a cold war and Vietnam War single seat single engine fighter pilot. This memoir covers my entire life. It also includes selected stories taken from my 426 Vietnam combat missions and my grandfather's and father's lives. Through the 687 stories in this book, relive history as few today know how it really was. Let your easy chair, recliner, or rocking chair, become your ejection seat in the complex supersonic office of the fighter pilot. Your ability to enjoy the experience is limited only by your imagination.

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As a Forward Air Controller, in a 100 mph O-1 Bird Dog, hear and feel the shock waves of countless passing supersonic bullets; all aimed at you. Feel the crushing concussion of urgently requested bombs exploding way too closely to your brothers, husbands, fathers, and grandfathers.

Sit on top of a thermonuclear weapon and learn of what you are really made, and believe.

Experience riding an explosive initiated and rocket boosted ejection seat into the unknown.

Grow old and experience the real cost of war and political in-difference.



Coming Up



Compiled by
George W. Cully

March 27-30, 2019

The **National Council on Public History** will hold its annual meeting in Hartford, Connecticut. For more information see the Council's website at <http://ncph.org>.

March 28-29, 2019

The **University of Alabama in Huntsville (UAH)** and **NASA's Marshall Space Flight Center** will co-host a symposium to honor the 50th anniversary of the Apollo Lunar Exploration Program and the Alabama Statehood Bicentennial. This event will take place on the UAH campus in Huntsville, Alabama. For more information, see the Marshall Space Flight Center's website at www.nasa.gov/centers/marshall/history/nasa-in-the-south-symposium.html.

April 3-6, 2019

The **Council on America's Military Past** will present its 53rd annual Military History Conference in Tucson, Arizona. For more information as it becomes available, see the Council's website at <http://campjamp.org/upcoming-2019-conference>.

April 4-9, 2019

The **Organization of American Historians** will hold its annual meeting at the Philadelphia Downtown Marriott in Philadelphia, Pennsylvania. This year's theme will be "The Work of Freedom." For details, see their website at www.oah.org/meetings-events/meetings-events/call-for-proposals/.

April 8-11, 2019

The **Space Foundation** will present its 35th annual Space Symposium at the Broadmoor Hotel in Colorado Springs, Colorado. For registration, see their website at <https://www.spacesymposium.org/>.

April 14-16, 2019

The **Army Aviation Association of America** will present its annual Mission Solutions Summit at the Gaylord Opryland Hotel and Convention Center in Nashville, Tennessee. For registration and other information, see the Association's website at <https://www.quad-a.org/>.

April 25-26, 2019

The **Society for History in the Federal Government** will hold its annual meeting at the National Archives Building in Washington, DC. For further information, see the Society's website at <http://shfg.wildapricot.org/Annual-Meeting>.

April 25-27, 2019

The **Vietnam Center** at Texas Tech University will host a conference entitled "1969: Vietnamization and the Year of Transition in the Vietnam War" on the University's grounds in Lubbock, Texas. For details, see the Center's website at www.vietnam.ttu.edu/events/2019_Conference/cfp.php

April 29-May 2, 2019

The **Association for Unmanned Vehicle Systems International** will hold Xponential 2019, its annual symposium and exhibition, at the McCormick Place Exhibition Center in Chicago, Illinois. For more information, see their website at <https://www.xponential.org/xponential2019/Public/Enter.aspx>.

May 6, 2019

The **American Society of Aviation Artists** will open its 33rd Annual International Aerospace Art Exhibition at the National Museum of the United States Air Force in Fairborn, Ohio. The exhibit will remain on display until February 19, 2020. For additional information, see the Society's website at <http://asaa-avart.com/asaaawp2014/2019-call-for-entries>.

May 9-12, 2019

The **Society for Military History** will hold its 86th annual meeting on the campus of the University of Ohio in Columbus, Ohio. This year's theme will be "Soldiers and Civilians in the Cauldron of War." For more details, see the Society's website at <http://www.smh-hq.org/smh2019/index.html>.

May 13-16, 2019

The **Vertical Flight Society** will hold its 75th annual Forum and Technology Display in Philadelphia, Pennsylvania. This year's theme will be "The Future of Vertical Flight." For more details, see the Society's website at <https://vtol.org/annual-forum/forum-75>.

June 17-21, 2019

The **American Institute for Aeronautics and Astronautics** will host Aviation 2019, its annual premier aviation and aeronautics forum and exhibition, at the Hotel Anatole in Dallas, Texas. For registration and other information, see their website at <https://aviation.aiaa.org/>.

July 16-21, 2019

The International Organization of Women Pilots, better known as **The Ninety-Nines**, will hold its annual convention on the grounds of the University of Dayton in Dayton, Ohio. For more details, see their website at www.ninety-nines.org/who-we-are.htm.

July 22-27, 2019

The **International Committee for the History of Technology** will hold its annual meeting in Katowice, Poland. This year's theme will be "Technology and Power." For registration and additional details, see the Committee's website at <http://www.icohtec.org/w-annual-meeting/katowice-2019/call-for-papers/>.

July 23-27, 2019

The **History of Science Society** will hold its annual meeting in Utrecht, the Netherlands. For details as they become available, see the Society's website at <https://hssonline.org/>.

September 5-8, 2019

The **Tailhook Association** will host its annual meeting at the Nugget Casino Resort in Reno, Nevada. For more information, see the Association's website at <https://www.tailhook.net/>.

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



The Mercury Seven astronauts included one Marine Corps pilot (John Glenn), three Navy pilots (Scott Carpenter, Wally Schirra, Alan Shepard), and three Air Force pilots. The three Air Force pilots were Gordon “Gordo” Cooper, Virgil “Gus” Grissom, and Donald “Deke” Slayton.

Donald “Deke” Slayton never flew in a Mercury spacecraft. Originally scheduled to be the second Mercury astronaut to fly, Slayton was diagnosed with an irregular heart rhythm which kept him grounded through both the Mercury and Gemini programs. Slayton would fly be medically cleared to fly in the 1970s and flew as part of the Apollo-Soyuz Test Project.

Virgil “Gus” Grissom was the first Air Force pilot and second member of the Mercury Seven to fly. Grissom and the Liberty Bell 7 reached an altitude above 102 nautical miles and it flew 262.5 nautical miles downrange. Liberty Bell 7 is on display at the Cosmosphere in Hutchinson, Kansas. Grissom would go on fly on the first Gemini flight (Gemini 1). Tragically he died during a fire on the launch pad as a member of Apollo 1. Grissom Air Reserve Base is named in his honor.

Gordo Cooper was the last of the Mercury Seven astronauts to fly. Cooper flew aboard the Faith 7. Cooper and the Faith 7 completed twenty-two earth orbits. Cooper was the last American to fly solo in space. Faith 7 spacecraft is on

display at Space Center Houston, in Houston, Texas. Cooper would later fly in space onboard Gemini 5.

To learn more about,

Project Mercury:

<https://www.nationalmuseum.af.mil/Visit/Museum-Exhibits/Fact-Sheets/Display/Article/198106/mercury-spacecraft/>

https://www.nasa.gov/mission_pages/mercury/missions/program-toc.html

Deke Slayton: <https://history.nasa.gov/40thmerc7/slayton.htm>

Gus Grissom: <https://history.nasa.gov/40thmerc7/grissom.htm>

Liberty Bell 7: https://www.nasa.gov/mission_pages/mercury/missions/libertybell7.html

Gordon Cooper: <https://history.nasa.gov/40thmerc7/cooper.htm>

Faith 7: https://www.nasa.gov/mission_pages/mercury/missions/faith7.html



This year marks the fiftieth anniversary of when man walked on the moon for the first time. Before the Apollo program successfully put a man on the moon, NASA's Mercury and Gemini programs served as stepping stones to develop the technology necessary to go to the moon. Project Mercury was the United States' first manned space program. NASA used a rigorous selection process to select the first seven astronauts, who became known as the "Mercury Seven." Candidates had to undergo a rigorous selection criteria. Candidates had to be younger than 40 years of age; shorter than 5'11;" be in excellent physical condition; have a bachelor's degree (or equivalent), be a test pilot school graduate and be a jet pilot with at least 1,500 hours of total flying time.

Several of the Mercury Seven Astronauts were Air Force pilots. Name the Air Forces' "Mercury Seven" astronauts.



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