AIR POWER History

SUMMER 2021 - Volume 68, Number 2
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know the past
.....*Shape the Future*

Center: McConnell. Clockwise from Top Right: Doolittle and LeMay, Chapman, Leavitt, Phillips, James and Olds, Pitsenbarger.

Can you name 75 Great Airmen?

Help AFHF Choose

The Air Force Historical Foundation is preparing a book featuring **75 Great Airmen** who served between 1947 and today. Look for the book in 2022 to celebrate the Air Force's 75th Anniversary. Send your nominations to 75Great@afhistory.org

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Features

Book Reviews

Departments

COVER: The U–2R (front cover), introduced in 1967, was significantly larger than the original U–2. Its wingspan was 103 feet rather than 80 feet. The new aircraft took advantage of a more powerful engine.

The Air Force Historical Foundation

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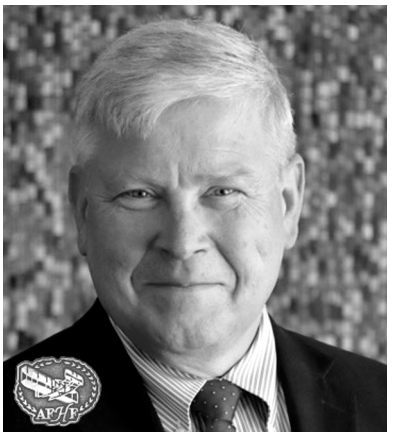
From the President

Dear Foundation Members and Friends,



From June 2017 to June 2021, I have been honored to serve as President of the AFHF. I am grateful to my many predecessors for their stewardship of the Foundation, especially Maj Gen Dale Meyerrose who led us successfully to fiscal sustainability and created the major award programs that now highlight AFHF each year. Even more, I am immensely indebted to the many Board members and our staff who contributed wisely and well to the Foundation over the last four years; their dedication brought us through the pandemic intact and poised us for new vibrancy, even as the Department of the Air Force prepares to celebrate its 75th Anniversary.

As we pause to look back to the Foundation's beginnings in 1953, we can take pride in an Air Force Historical Foundation created and led by the towering figures of American combat aviation and the United States Air Force. Over the years, AFHF has done truly unique and valuable work in documenting and analyzing Air Force history. The Foundation and those who write military history have told the stories of people, air and space systems, technologies, bases, missions, valor, and innovation. They have recorded how Airmen assured the preservation of America's freedom and prosperity through the Cold War and since its end, in peacetime and combat, everywhere on the globe and in orbit above it. Throughout its almost sixty-eight years of operation, the Foundation has highlighted successes and failures while recognizing the unfailing dedication and quality of Airmen and civilians who have generated America's air and space power. As historians, members, and supporters of the Foundation you have been essential to that unique and valuable work.

As we approach the 75th Anniversary year of 2022, AFHF will contribute in several tangible ways. It's likely our Fall awards will be held in-person, for what should be a memorable and enjoyable event! We are resuming book-publishing efforts as well, with one book fully committed to coincide with the USAF's 75th anniversary in 2022. Entitled "75 Great Airmen," it is meant to be an inspirational work that tells the stories of men and women who made a difference over the decades since 1947.

Looking to the future, the U.S. Air Force and the U.S. Space Force now share a Military Department, a powerfully innovative technological heritage, and an exacting and truly global responsibility. The initial and ongoing partnership between these two Services should be a source of great pride for our nation, Air Force, and Foundation. The challenges our nation faces are ever more complex and historians face an even more daunting task in documenting, analyzing, and sharing insights, based on fact, that can inform and inspire action. This will be the hallmark of the coming era, as American society's attention is pulled in innumerable directions and the discipline of history—and military history in particular—is less present in secondary and university education and more politicized in broader society. Assuring national security is growing more difficult in every respect—demanding more capable and more interconnected people, technologies, organizations, laws, relationships. Making it comprehensible and accessible to people who should read it will be a challenge that today and tomorrow's historians must take on. And while today's serving Airmen and Guardians are admirable, indispensable professionals, their love of history can't be assumed—it must be cultivated, and the Foundation will need to evolve how it reaches them and what it offers to succeed in that vital pursuit.

I have great confidence that the Board whose election is just now concluding will be superbly led and energetic as it seeks to expand our resources, ambition and electronic presence; sustain impeccable documentation of American military power; and enhance AFHF's impact on all we reach. Beyond the Board, our Foundation depends greatly on the vitality and contributions of its membership—what you think, give, and do matters greatly!

As I conclude seven years on your Board and four as President and Chairman, I thank you for your faithful support now and in the years to come. It has been a privilege to serve.

With Best Regards,

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

From the Editor

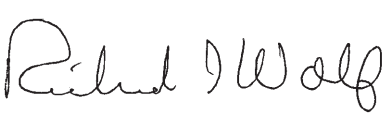
Our first article is by long-time contributor William Cahill, who writes about the development of the peacetime reconnaissance capability of Strategic Air Command.

Our second article is from Jonna Doolittle Hoppes, a Foundation Board member and granddaughter of Gen. Jimmy Doolittle, who writes an appreciation of Gene Deatrick, Air Force officer and possessor of a most notable career. He recently passed away, and his departure prompted an examination of the events of his life and career.

Our third article is by John A. Schell who updates the scholarship surrounding the 1960 shootdown of a U–2 over the Soviet Union, which resulted in the public trial of its pilot Francis Gary Powers and upended U.S.-Soviet relations. There is a great deal of clarification of the fuzzy sequence of events.

The final article in this issue is by a first-time contributor,Cynthia Buchanan, who writes about the Mexican contribution to the air combat of World War II. It's an oft-neglected area, so take advantage of the opportunity to read about it. Don't skip over it to get to the reviews of which there are 21 this time..

The President's Message begins on page 3. Don't miss Upcoming Events on page 62, although I fear you must take all dates in that section as still uncertain at this point. If you see something scheduled, be sure to check with the organization sponsoring the event to ensure it will take place. It's still a most uncertain world. And the closing story is this issue's Mystery. Enjoy!



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Air Force Historical Foundation

Financial Report

Through Q3 2020-21

Air Force Historical Foundation

2020-21 Financial Results through Q3 (2/28/2021)

Revenues		Expenses	
Events	$0,000	Events	$0,000
Dues	$24,386	Salaries/Taxes	$82,904
Corp. Support	$10,000	Air Power History	$22,222
Ind. Donations/Other	$26,150	Audit/Tax Filing	$7,420
Investments (Withdrawals)	$55,000	Overhead	$10,719
Total	$115,536	Total	$132,265
Budget .75 x 175,000)	$131,250	Annual Budget	$131,250
% 3rd Q Budget	88.03%	% Annual Budget	100.77%

Air Force Historical Foundation

Investments and Cash

	3/31/2020	3/01/2021
Investments - Bequest	1,268,996	$1,444,011
Investments - Other	$6,776	$8,516
Cash on Hand - M&T Bank	$3,419	$3,419
Total	$1,267,197	$1,469,216

As of 1/31/2021 (pre- Coronavirus crash) $1,307,072

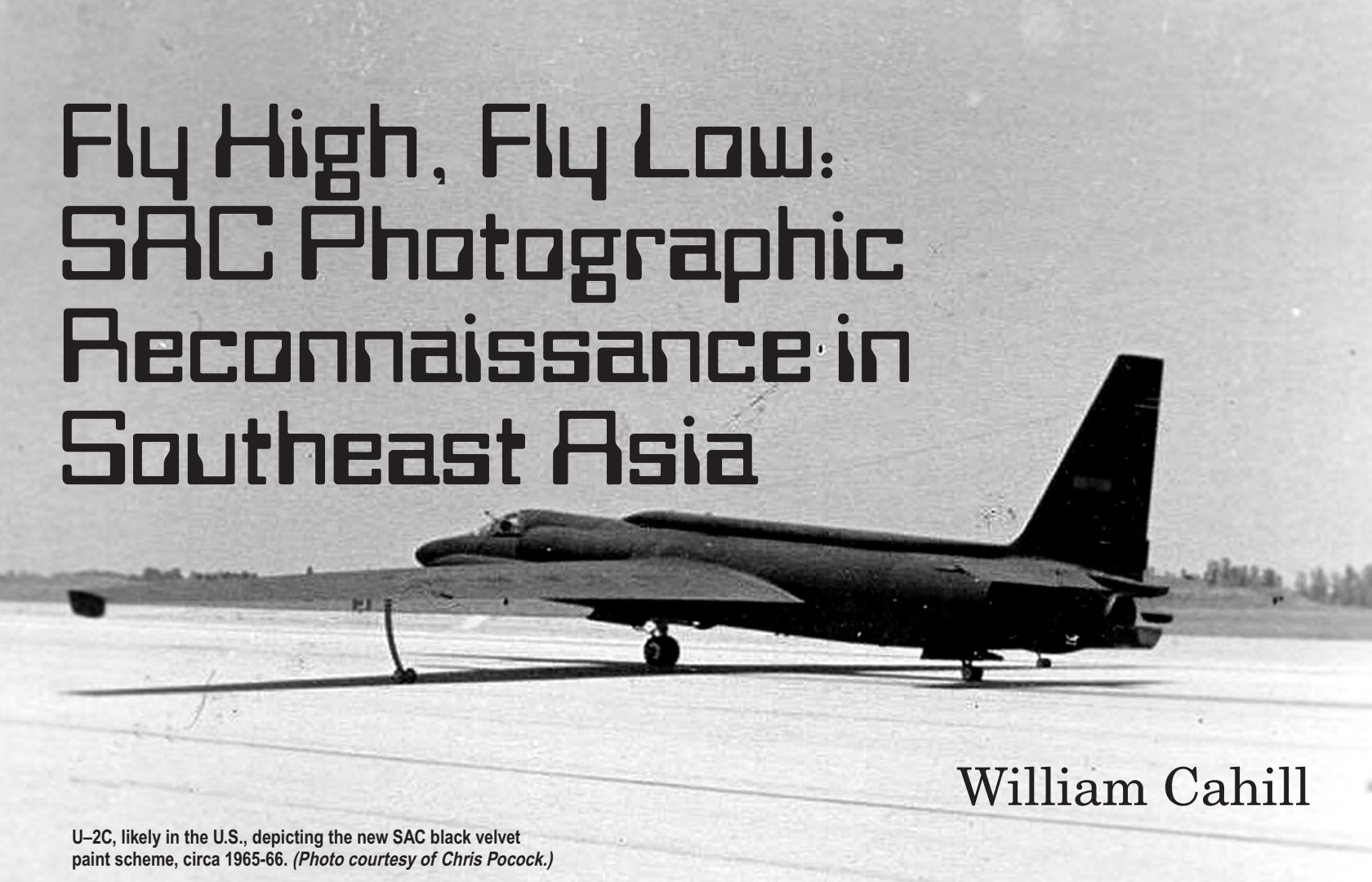
Air Force Historical Foundation

Membership Tally

	4/15/2019	4/15/2020	4/01/2021
Associate	146	152	127
Sustaining	398	368	345
Contributing++	106	89	88
Institutional	205	201	123
Life	276	273	275
Total	1,131	1,083	958

Purged 114 in February 2021 for 3 yrs non-payment

Fly High, Fly Low: SAC Photographic Reconnaissance in Southeast Asia



William Cahill

U–2C, likely in the U.S., depicting the new SAC black velvet paint scheme, circa 1965-66. *(Photo courtesy of Chris Pocock.)*

The Second World War provided ample opportunity for America's airmen to validate their theories from the Air Corps Tactical School at Maxwell Field. One point made clear in retrospectives on the European and Pacific strategic bombing campaigns was the necessity of strong strategic reconnaissance forces to find targets for the bombing force and measure the success of the ongoing bombing campaign. Strategic Air Command (SAC) validated this concept in the Korean conflict, with SAC reconnaissance assets ranging across the theater to not only find targets, but to also assess the intentions of Chinese Communist forces across the border (see the author's *"The Korean War and the Maturation of SAC Reconnaissance,"* in Fall 2012 *Air Power History* for more details on SAC's role in this conflict). Under the guidance of General Curtis LeMay, SAC became singular in focus: the organization existed to accomplish the SAC Emergency War Order (EWO), its planned execution of this future air war. Within this framework, SAC viewed its reconnaissance mission in two phases: pre-hostilities and wartime.[1]

Pre-hostility, reconnaissance forces were to "establish, determine, and confirm the potential enemy's order of battle" to assist in the constant updating of the EWO. Once ordered to war, reconnaissance forces would confirm enemy defenses and, if need be, confirm target locations for bomber missions as well as conduct post-strike reconnaissance for follow on bomber attacks. These missions were centrally controlled in the United States by SAC, with an added layer of control in Washington during peacetime. In 1964 the Joint Chiefs of Staff (JCS) established a Joint Reconnaissance Center (JRC) which served the purpose of providing a single focal point for sensitive peacetime reconnaissance. Through the JRC, the JCS would direct reconnaissance operations during periods of tension prior to open hostilities. SAC's Strategic Reconnaissance Center (SRC) acted as a clearing house and coordination center for SAC, directing and controlling SAC's reconnaissance fleet to collect intelligence data essential for SAC's EWP. Within SAC, organization for reconnaissance followed command lines, e.g., the commanders of the Second, Fifteenth and Sixteenth Air Forces, and Third Air Division. Subordinate to them were the forward area (OL) commanders who were designated to command the reconnaissance forces overseas.[2]

While there was a significant amount of pre-hostility signals intelligence that could be accomplished by flying an aircraft off the coast of a hostile nation, there was little for photographic reconnaissance to do to prepare for war (see the author's *"Strategic Air Command SIGINT Support to the Vietnam War,"* in Winter 2019 *Air Power History* for more details on SAC's SIGINT mission in Southeast Asia). Save a few excursions such as Project HOMERUN overflights of the Soviet Union in 1956 SAC's photographic reconnaissance assets had little to do operationally after the conclusion of the Korean conflict. That would be altered as tensions heated up in Southeast Asia.

US National Interests – 1960

After the neutralist Laotian Government collapsed in December 1960, a new Laotian Government asked the United Nations for aid against an invasion from the Democratic Republic of Vietnam (DRV – North Vietnam) or Communist China. Alarmed over the possible introduction of foreign troops, President Eisenhower requested more intelligence on the matter. To meet the President's needs, the Special Group directed the Central Intelligence Agency (CIA) to deploy U–2 aircraft.[3] The Special Group, a subcommittee of the National Security Council, was responsible for coordinating government covert operations such as the CIA's U–2 reconnaissance aircraft, a program which gave the US Government low visibility collection operations with a minimal footprint. The joint US Air Force (USAF)/CIA U–2 reconnaissance project was known as IDEALIST and had been flying operational missions since 1956. In the Far East, joint CIA-Republic of Chinese (ROC) Air Force U–2 missions were executed under Project TACKLE and had already flown missions over Communist China.[4] In January 1961, under Operation POLECAT, the CIA flew seven missions over Southeast Asia (SEA) from Naval Air Station Cubi Point in the Philippines. Operation EBONY in August 1961 was a similar activity with one mission over the DRV. In addition to conducting photographic reconnaissance, the aircraft flew with the System VI Electronic Intelligence (ELINT) sensor and were able to map Chinese and probable DRV radar sites.[5]

The need for intelligence slowly grew, and in October 1961 four RF-101C photographic reconnaissance aircraft from the 15th Tactical Reconnaissance Squadron arrived at Tan Son Nhut Air Base to conduct operations over the Republic of Vietnam (RVN – South Vietnam) and Laos.[6] In February 1962 the CIA commenced regular flights in SEA using the Project TACKLE U–2s operating from T'ao-yuan Air Base, Taiwan.[7] In March 1962 TACKLE operations were expanded to cover Commander in Chief, Pacific (CINCPAC)-requested targets in south China and the DRV necessary to understand China's intentions in SEA.[8] These additional missions were flown from Takhli Royal Thai Air Force Base (RTAFB), Thailand, a location previously used by the CIA for missions against the Chinese-Indian border and Tibet.[9] The first sortie was flown on December 27, 1962 and imagery from this mission revealed "significant new military activities" in the DRV while a sortie from Taiwan revealed additional activity in south China. Based on this intelligence, the Director of Central Intelligence (DCI) requested additional missions over both areas to further investigate what was occurring. The CIA continued to fly missions until May 1963 when operations were paused due to weather.

William Cahill is a retired Air Force intelligence officer who contracts for DoD in the Washington D.C. area. An Intelligence Weapons Officer with squadron and wing-level experience, he has also served on the Air Staff and in an inter-agency capacity outside of DoD. Mr. Cahill is a graduate of San Jose State University and has MS degrees from Embry Riddle Aeronautical University and the National Defense Intelligence College. Mr. Cahill has been published in Air Power History, FlyPast, *the* USAF Weapons Review *and* C4ISR Journal.

Lockheed U–2A Serial Number 56-6951 of the 4028th Strategic Reconnaissance Squadron taxiing at Bien Hoa Air Base, RVN in early 1965. RVN AF Douglas A–1H Skyraiders and USAF Martin B–57B Canberras are in the background. U–2D 56-6951 crashed on October 19, 1966 on the runway at Davis Monthan AFB, Arizona, during a practice approach and landing. The pilot survived without injury.

The weather in SEA had a large influence on high altitude flight operations. A contemporary study revealed January through May having an average of six "good" (less than 25% cloud coverage) days per month for high altitude reconnaissance. This dropped down to one to two through the summer monsoon months of June, July and August before recovering in September.[10] Monthly CIA U–2 missions over DRV resumed from Takhli in October 1963 but shifted back to Taiwan after November, which continued to support sorties over DRV and Laos until Takhli operations resumed the following March. On January 23, 1964, the Special Group authorized collection over RVN to support the strategic hamlet program. Requirements for photographic reconnaissance in SEA, though, continued to build. Military Assistance Command, Vietnam (MACV) and Department of Defense (DoD) put forth the need for daily coverage of infiltration routes through Laos and Cambodia as well as additional coverage of RVN. In a Special Group meeting on February 24 to discuss these new requirements, DCI McCone called it illusory to believe daily imagery coverage "would result in consistent comprehensive coverage of Viet Cong infiltration and build up."

McCone's comments notwithstanding, the Special Group recommended SAC deploy three U–2 aircraft to Saigon and the CIA increase the tempo of its U–2 operations in order to fulfill the MACV and DoD requirements. The National Reconnaissance Office, responsible for coordinating CIA and DoD reconnaissance activities, recommended that SAC U–2s cover RVN, Laos, and the DRV up to 30 miles from the Chinese border while CIA TACKLE U–2 missions flown by ROC pilots would be responsible for south China and the DRV south of the Chinese border. The

Imagery from a Ryan 147S/AQM-34L operational mission flown over the DRV on October 6, 1968. The Model 147S took horizon to horizon imagery, which is a strip at lower right; the main photo is an enlargement of the top third of the image strip depicting a DRV AAA site disguised to look like an SA-2 site

Special Group reviewed the proposal and concurred with the deployment of SAC U–2s, but limited their operations to RVN.[11] On March 17, 1964 the Special Group transferred responsibility for the target list in the DRV and Laos from the Committee on Overhead Reconnaissance (COMOR), which coordinated CORONA satellite and CIA U–2 collection, to the Commander of MACV.[12] The nature of the war as well as the CIA's role was rapidly changing; in a little over a year the CIA had gone from strategic monitoring to tactical support.

SAC Enters the Fight

SAC activated the 4080th Strategic Wing (SW) on May 1, 1956 to operate the Martin RB-57D high altitude reconnaissance aircraft flown by the 4025th Strategic Reconnaissance Squadron (SRS). The 4028th SRS stood up to operate the U–2A the same year, though the first aircraft did not arrive until June 1957. The SAC U–2s would spend the next few years flying high altitude air sampling missions around the globe to monitor Soviet nuclear tests, retaining their photo reconnaissance capability for wartime employment. The CIA had been monitoring the Soviet arms buildup in Cuba with its own U–2s since October 1960, but as things started to heat up in the Caribbean in October 1962 the USAF and Secretary of Defense McNamara successfully lobbied to transfer the mission to SAC and the 4028th SRS. SAC U–2s came to the forefront during this operation and proved their ability to fly true strategic reconnaissance missions in an environment similar to what was envisioned during times of war.[13] In late 1963 and early 1964 SAC would fly a few peripheral ELINT missions against the USSR but the U–2 fleet was still underutilized from a strategic reconnaissance perspective. That would soon change.[14]

In February 7, 1964 CINCPAC Admiral Harry D. Felt requested the Joint Chiefs of Staff (JCS) provide U–2s to aid in supporting Op Plan 34A, the DoD covert action campaign against the DRV. Deputy Secretary of Defense Cyrus Vance ordered SAC to dispatch three U–2 aircraft and seven pilots to the Philippines, ostensibly for one flight to cover two targets. On February 11, 1964 SAC deployed three U–2E aircraft from the 4080th SW to Clark Air Base (AB), Philippines. The aircraft arrived at Clark, designated Operating Location 15 (OL-15), the following day but apparently the deployment was not well coordinated in Washington as neither the appropriate channels in State Department nor the Special Group were aware of the action. Within 24 hours of arrival the first LUCKY DRAGON sortie was launched on February 13. Two other missions were flown, on the 15th and 16th, though of these three only one produced usable imagery due to clouds in the target area. On February 19th OL-15 was directed to deploy all its assets to OL-14, Andersen AB, Guam, while things were sorted out in Washington. On March 5, 1964, the aircraft finally arrived at their designated home, Bien Hoa AB, RVN and set up OL-20. The next day the wing flew its first sortie, with two sorties per day being flown for the remainder of the month.[15]

Intelligence requirements increased as the US was drawn inexorably into the conflict in SEA with the operations tempo starting to strain the IDEALIST/TACKLE program. The loss of a U–2 on a training mission off Taiwan brought the Agency inventory down to six aircraft; with new requirements on the books to surveil French nuclear tests and monitor the Chinese-Indian border, something had to give. The CIA needed relief from what was turning into a tactical DoD requirement and worked with the NRO to develop a solution. At a meeting of the Special Group on April 23, 1964 the Acting DCI, Lt Gen Marshall Carter, proposed transferring all tasking that contributed to the tactical mission – all of RVN, Laos, the DRV up to the Chinese border, and 30 miles deep into Cambodia – to SAC U–2s. The Special Group unanimously approved, keeping the 30 mile limit into Cambodia but allowing SAC to fly an unlimited number of flights as locally required.[16]

SAC quickly settled into a routine with missions flown from OL-20 under the authority of SAC Operations Order (OPORD) 60-66-07 to "conduct photo reconnaissance of military objectives in Southeast Asia as specified by JCS, COMUSMACV and Defense Intelligence Agency (DIA) validated requirements."[17] Between May 18 and June 14 seventeen LUCKY DRAGON U–2 flights were flown to include missions over the DRV. The targets for the U–2 were largely selected by MACV and CINCPAC for tactical intelligence, including airfields, military installations, and lines of communication. COMOR maintained the target list, forwarding to SAC through DIA for collection. The U–

Ryan Model 147SDL being carried on the wing of a DC–130 in flight as viewed from the cockpit of the DC–130. A U–2R flies in formation off the port wing of the DC–130 to show the reconnaissance airframes associated with the 100th SRW. Circa 1972-74

2 flights were not just for intelligence purposes – the Johnson Administration considered the twenty missions per month "messaging on intent" to the DRV.[18]

The facilities at Bien Hoa AB were far from optimum, with overcrowded buildings, limited ramp space, and a local threat literally right outside the perimeter fence. As OL-20 adjusted into a routine, SAC reduced the assigned U–2 aircraft from three to two as the tasking settled into an average of one sortie per day when the weather allowed it. The U–2 sorties averaged about five hours, with weather causing 86 stand down days in the first year of flight operations. In October 1964 SAC directed its U–2s to be painted from the initial grey and aluminum paint schemes to a black velvet scheme, mirroring the aircraft flown by the CIA. In mid-December 1964, the SEA mission program name transitioned from LUCKY DRAGON to TROJAN HORSE, with the OL-20 U–2 missions retaining this name for the next three years.[19]

The 4028th SRS deployed with two Type B cameras as well as one A-2 mapping camera, the A-2 seeing use on initial missions over RVN to create a mosaic in support of military requirements. For operations up north, the Type B was the primary sensor and was the same sensor used on CIA overflight missions.[20] That same month, SAC deployed the Strategic Air Relocatable Photographic Facility (SARPF) to Ton Son Nhut AB to support U–2 and Ryan Model 147 operations in RVN and replace the initial photo processing capabilities brought from Clark AB in April 1964.[21] Though deployed for their photographic capability, all U–2 sorties flew with Systems I and III signals intelligence (SIGINT) payloads for collecting against DRV radar and communications. Tapes from these payloads were downloaded and flown to Offutt Air Force Base (AFB), NE for processing by the 544th Aerospace Reconnaissance Technical Wing. Initially, the SIGINT capability of the SAC U–2s was marginal at best. Soon SAC fielded Systems IV and IV-A, but with the emergence of the SA-2 Surface to Air Missile (SAM) additional capability was required. The QRC-192 worked with Systems IV and IV-A to target the SA-2's Fan Song target tracking radar and was mounted in two wing pods, opening up the sensor "Q-Bay" aft of the cockpit for cameras. The QRC-192 used an above-fuselage 'ram's horns' antenna configuration and provided a direction finding capability which could help plot out SA-2 locations—a vast improvement over the simple omni-directional capability of Systems IV and IV-A. The system had been trialed off Cuba in August 1963 but was still being tinkered with when it deployed to SEA in September 1965.[22] Technicians worked to refine the QRC-192, but until then OL-20 would have to make do with the existing SIGINT sensors as well as System XII, which fielded in mid-1965 and also covered the frequency range of the Fan Song.[23]

While the CIA maintained its on again, off again missions over southern China from Taiwan, SAC continued to expand its effort over the war zone.[24] By January 1965 the SAC U–2s were up to 25 missions per month to cover requirements in Laos, Cambodia, RVN and the DRV.[25] The next month, CINCPAC requested that TROJAN HORSE missions be used to follow the progress of the deployment of SA-2 SAMs to the DRV.[26] February also witnessed CIA TACKLE missions return to operations, likely after a month-long stand-down following the loss of a TACKLE aircraft over Inner Mongolia. Missions were flown over the northern part of the DRV and southern China, often toting SIGINT payloads and servicing targets such as airfields, military installations, and industrial complexes.[27]

In March 1965, the tensions ratcheted up once again with the initiation of Operation ROLLING THUNDER on March 2. ROLLING THUNDER was the Johnson Administration's plan to apply selective pressure against Hanoi to compel it to end aggression in the RVN. ROLLING THUNDER brought a sustained bombing campaign to SEA—a campaign in need of targets, intelligence on threats, and bomb damage assessment (BDA) of strikes. During the first six months of 1965 SAC launched 135 sorties from OL-20. The DRV reacted to ROLLING THUNDER by bringing into operation an integrated air defense system of MiG fighters and SA-2 SAMs controlled by their air arm, the Vietnam People's Air Force (VPAF). With the discovery of the SA-2 in the area of Hanoi and Haiphong on the April 5 TROJAN HORSE mission, U–2 flights were restricted to routes outside a 30 NM circle around known SAM sites.[28] Soon the "Oscar Sierra" unit, a display for the pilot to indicate an SA-2 being launched already in CIA U–2s, was installed in SAC U–2s along with the System 13 SA-2 jammer.[29] There was a constant battle within SAC over what electronic countermeasures systems to field to OL-20 and what to reserve for EWO use only. A similar fight had occurred 15 years prior in the skies over Korea with B–29 defensive measures. At times it was better to just avoid the threat; as the SAM threat increased, the 4028th SRS started to fly SIGINT missions over the Gulf of Tonkin, some with F–4 escort due to air threat.[30]

The time was coming to a close for CIA U–2 operations in SEA. On December 30, 1965, the Secretary of Defense ordered a stand down of all U–2 flights over South China to eliminate possible conflicts with efforts to enter peace

A dark painted Ryan Model 147J mounted on the wing of a DC–130 at Bien Hoa AB, RVN, April 1966, the same month the Model 147J model, a 147G model optimized for low altitude work, started operations in SEA. Between April 1966 and November 1967 the Model 147J flew 94 sorties with a 65 percent recovery rate.

negotiations with the DRV. In early January two CIA U–2s at Edwards AFB were transferred to SAC for use in SEA.[31] Shortly thereafter the CIA detachment at Takhli closed up shop and redeployed back to the US. Though a few more TACKLE missions would be flown in mid-1966, the south China mission had largely transferred to a different asset – SAC unmanned reconnaissance drones.

Drones to the Front

In February 1962, the BIG SAFARI program office, a USAF organization specializing in the rapid acquisition of systems derived from existing aircraft, awarded its first contract to Ryan to modify their BQM–34 target drone into the Model 147 FIREFLY Special Purpose Aircraft. When the program name FIREFLY was compromised it was changed to LIGHTNING BUG. As the program matured, the 4080th SW was identified as the unit to operate the photographic reconnaissance drones and in March 1963 Headquarters SAC directed the wing to send personnel on temporary duty (TDY) to Holloman AFB, NM to train on Ryan 147 drones and GC–130 (soon named DC–130) launch aircraft. Airmen also received maintenance training with Ryan as well as the sub-contractors who built avionics and payloads for the drones. In March 1964, the wing deployed one DC–130 and three Ryan drones to Eglin AFB, FL for two months to continue training.[32]

On the heels of the August 4, 1964 Tonkin Gulf incident the JRC directed the SRC to deploy personnel, Ryan 147B drones, two DC–130s, and ten Ryan technical representatives to OL-8 at Kadena AB, Okinawa, Japan under control of SAC OPORD 63-65, HIGH BAR, which covered worldwide drone operations. SAC FRAGO 63-65B, BLUE SPRINGS, was a JCS-directed project to accomplish aerial photography in SEA. The 4080th SW Task Force charged with drone operations would launch the drones from DC–130s over the South China Sea for missions against southeast China with drone recovery in Taiwan. The drones would then be ferried by DC–130 back to OL-8 for refurbishment and follow on missions. The first BLUE SPRINGS mission was flown on August 20, 1964. After a few missions, the detachment rotated to OL-20/Bien Hoa AB for eight days to fly missions over the DRV with drone recovery at Da Nang AB, RVN. The 4080th SW Task Force supporting BLUE SPRINGS returned to OL-20 for good on October 8, 1964, launching its first mission three days later.[33]

By January 1965, the Ryan 147B drones were scheduled for eight missions against China and the DRV. For the first six months of 1965, SAC launched 22 missions of which 14 were recovered and 12 were considered effective.[34] OL-20 had one DC–130 and up to 11 Ryan 147s in August 1965, averaging five to ten BLUE SPRINGS Ryan 147 missions per month. On July 1, 1965, the 4025th RS was formed to provide structure to the detachment and operate the DC–130A and Ryan 147 aircraft.[35]

Though deployed for photographic reconnaissance, the Ryan 147s entered into the SIGINT business in a rather dramatic way. Project LONG ARM surfaced as a concept to fly an expendable Ryan 147 drone within lethal range of a hostile SA-2 SAM site and, perhaps, even be "killed" by a SAM. The drone would relay ELINT received by its sensors to specially-configured RB–47Hs flying nearby but outside of the lethal range of the SAMs. Ryan developed two Model 147D drones for the purpose, taking a standard photographic reconnaissance Model 147C drone and equipping it with radar receivers. The Ryan 147Ds and the two modified RB–47H aircraft were ready to go for an operation over Cuba in December 1962, but the action never materialized and the two drones were put in storage.[36] In October 1963, the operation was back on and Headquarters USAF directed SAC to prepare a concept of operations and an initial statement of requirements. SAC complied, acquiring three Model 147E drones—essentially an updated Model 147D—and bringing its modified RB–47Hs back into the proper configuration as well as training personnel. The project again waxed hot and cold until early 1965 when SAC started test flights. After three months of test flights in Arizona, California and Florida the system was working reliably enough for overseas deployment.[37]

The JCS directed Project LEFT HOOK as a combined CINCSAC, CINCPAC, and National Security Agency operation that would have the older Ryan 147D drones locate SA-2 sites for follow-on attack by fighter aircraft. The Ryan 147s were packed and shipped to the Pacific and the LONG ARM RB–47Hs deployed for flight operations from OL-7 in the Philippines. The Ryan 147D drones were launched by 4080th SW DC–130s out of Bien Hoa—the first on August 20, 1965, the second on August 31. Both drones were knocked down by ground fire with little to show for their effort. With both drones expended, the project was terminated, and operations rolled into Project UNITED EFFORT using the Model 147E drones. The first operational mission took place on October 16, 1965 but the North Vietnamese failed to engage the drone and it was recovered. The second and third UNITED EFFORT missions, flown on October 20 and November 5, were deemed a partial success. Though both drones were lost, they did capture some

SIGINT data but not the critical fuzing signal. Operations were temporarily halted while the sole remaining Ryan 147E was returned to the US for rework. It was not until February 13, 1966, on the fourth mission, that the signal was successfully captured, the Ryan 147E relaying critical signals before it was destroyed. With no more Model 147E drones and the signals captured the LONG ARM RB–47s deployed back to Forbes AFB.[38]

An unknown number of Model 147G drones were modified as a follow-on to the Model 147E. On September 27, 1966 one LONG ARM RB–47H arrived at OL-7 and flew five OLD BAR missions between October 5 and November 10 along with a flight to Bien Hoa AB to do telemetry checks with the Model 147G; one operational 147G mission was flown in this time period. At least one additional drone ELINT flight was planned against a Chinese SA-2 site at Canton on January 12, 1967 but after failing checkout on the DC–130 was never flown. The LONG ARM RB–47H deployed back to the US, returning on June 20, 1967 to OL-7 after a telemetry check at Davis Monthan AFB with the 4080th SW. This last LONG ARM RB–47H TDY lasted less than two months and it is unknow if any additional 147G SIGINT missions were flown during this time period.[39]

ELINT birds notwithstanding, the Ryan 147B continued to be the standard drone in use for most of 1965. The imagery provided by the Model 147Bs was not the best, but the sheer volume made up for this shortfall. The National Photographic Interpretation Center (NPIC) in Washington compared early mission imagery to "poor quality U–2 imagery." Film was originally processed by SAC's Third Air Division at Anderson AFB, Guam and shipped to NPIC for exploitation but transitioned to the SARPF at Ton Son Nhut AB in September 1965.[40] In late October 1965 the first four Model 147G drones joined the effort, an improvement on the B model with better sensors, range and altitude. The Model 147G flew its first operational mission on October 31, 1965 with a further 12 launches completed before the end of the year. Once the Ryan 147G had proven to be operationally acceptable the Model 147B was retired, the initial model racking up 78 sorties with a 61% recovery rate. During 1965 Ryan 147s accounted for 33 of the 63 SA-2 sites discovered in the DRV.[41]

Southeast Asia's monsoon season dictated an operational need for a low altitude drone to fly under the weather. Three early test Model 147C drones were modified for low altitude work and deployed in September 1965 with the first flight on October 1; all three launches resulted in crashes. The Model 147J model, a G model optimized for low altitude work, started operations in April 1966.[42] Low level drones would normally operate around 1500 ft above ground level, making them vulnerable to anti-aircraft artillery (AAA) but hard for SA-2s to hit. The high level drones such as the 147B and 147G operated at 63,000-69,000 ft, above AAA but vulnerable to the SA-2.[43]

In the original Ryan 147 design, the drone deployed a parachute at the end of its mission to land near a designated recovery area. This often damaged the airframe and reduced operational life and availability. In late 1964 a program to develop a mid-air retrieval system where the drone would deploy a parachute at medium altitude, usually around 15,000 feet, and as it was floating down it would be snagged by a helicopter in a method similar to that used to recover CORONA film capsules. The mid-air retrieval system (MARS) encountered a difficult gestation period and would not become operational until early 1966.[44] On April 3, 1966 the first CH-3C MARS helicopters arrived in Vietnam and by mid-June work began on a heliport at Da Nang AB for Det 10, 4025th RS, the helicopter detachment associated with SEA drone operations.[45]

Ryan AQM-34L "TOM CAT" mounted on the wing of a DC–130 at U-Tapao RTAFB, Thailand, in 1972. This drone had the record for largest number of completed sorties (68) and finally was lost on sortie 69, September 25, 1974. Standing beside the AQM–34 is one of her Launch Control Officers, Major John Dale

In early 1966 ten standard BQM-34A target drones were modified as Model 147N decoys and were launched to accompany both G and J model drones to lure away VPAF MiGs which had started to engage the Ryan drones. A follow on order of an additional ten N models was made in August 1966. The N models started to have an adequate survival rate and would return to crash into their pre-programmed ditch point as they were not built for recovery. The full potential of the Model N was realized with the acquisition of the Model NX, a decoy fitted with a recovery parachute and a cheap, low resolution camera for "bonus" intelligence collection.[46] Another improvement fielded at this time was the Microwave Command Guidance System (MCGS), a line of site link from the drone to the DC–130 that allowed the Launch Control Officer to maneuver the drone back onto course to take into account inertial navigation system drift. The MCGS would later be used to maneuver the drone when there were indications that VPAF MiGs were airborne and stalking the vehicle for a kill.[47]

On June 25, 1966, the 4080th SW and subordinate units underwent a name change, the wing becoming the 100th SRW and the 4025th RS the 350th SRS.[48] As the air war expanded in Southeast Asia, the need for intelligence went up. The growing surface to air threat from the SA-2 pushed more and more of the photographic reconnaissance burden over the DRV onto the 350th SRS. Missions over southern China continued, with eight G model high alti-

U–2E Serial Number 56-6707 at Bien Hoa AB, RVN shortly after deployment from Davis Monthan AFB, AZ in February 1964. The aircraft is shown in the original SAC light gray scheme before being painted black velvet. This aircraft was converted to a U–2F and later modified for the ALSS program and survives on display at Laughlin AFB, TX. *(Photo courtesy of Chris Pocock.)*

tude drones being launched in the second half of 1966.[49] The mission tempo continued to increase in 1967, with more missions flown that year than the previous two and a half years. The majority of the missions were flown by the low altitude J model. Between April 1966 and November 1967 the Model 147J flew 94 sorties with a 65% recovery rate. The H model, a replacement for the G featuring a redesigned modular payload nose and jamming equipment targeting the SA-2, flew its first operational mission on March 17, 1967 while the last G mission was on September 1, 1967. High altitude G and H missions were often accompanied by the NX series decoys to complicate VPAF targeting of both SA-2s and MiGs.[50] The mission name changed from BLUE SPRINGS to BUMBLE BUG on August 1, 1967, but the tasking remained the same. Flights continued to be scheduled to cover most of the DRV and the southern China, with three of the five H model missions over China in the first half of 1967 being lost.[51]

The planned replacement for the low altitude Model 147J, the Model 147S, was encountering delays in production and development and it was feared the 350th SRS would run out of J models before the S model was fielded. Interim low altitude versions of the Model N, the NP and NQ, were produced to cover the gap. The night reconnaissance Model 147NRE was also deployed at this time, mounting cameras that were synchronized with a flashing light source on the underside of the drone. The NRE was used to track PAVN night movements, with the first operational mission taking place on May 25, 1967. The Model 147S finally fielded in 1968 and went through many variants, including an SRE night low altitude version.[52]

U–2 flights continue

A decade of operational use had taken a toll on the CIA U–2 fleet. Attrition of two to five aircraft per year had eaten away at the inventory, and the loss of four aircraft in the first half of 1966 was being felt by the operational detachments. By the summer of 1966, the Agency was down to six flyable U–2s—two deployed to Taiwan and four at Edwards AFB—while an additional two aircraft were with Lockheed undergoing repair. SAC was little better off, only boasting eight operational aircraft on its books. On August 1, 1966, the DCI and the Secretary of Defense placed a joint order with Lockheed for eight new U–2s. The new-built aircraft, christened the U–2R, was a revised design with expanded fuselage and wing to accommodate the additional equipment added to the original aircraft over their operational life. Before delivery, the order was increased by four, with the first of the new twelve aircraft flying on August 28, 1967. Included with the new airframe were thirteen Type H cameras, their development bugs finally ironed out.[53] But the U–2R was still in the future, and the hard pressed Agency and SAC pilots continued to deliver intelligence with their increasingly antiquated early model U–2 aircraft.

To help prolong the life of its original U–2s, SAC started to upgrade its U–2A to U–2C configuration in October 1965, cycling airframes back to California for rework. The SAC U–2C standard was similar to the CIA's aircraft with the J-75 engine replacing the J-57 and providing 23% more thrust, fed through enlarged intakes. The aircraft also had increased fuel capacity, better sensor accommodation, and an upgraded SIGINT system. The first U–2C arrived at Bien Hoa in April 1966, OL-20 making do with two loaned CIA U–2G aircraft in the interim.[54] Even the upgraded U–2C, though, was beginning to show its age. Not only was it vulnerable to SAMs, enemy fighter aircraft were starting to threaten missions over the DRV. On February 6, 1966, a VPAF MiG-21 attempted to intercept a TROJAN HORSE mission. To confront this new threat, fighter escort was sometimes provided for the U–2 missions, to include protection from Chinese fighters crossing the border. The SAM threat continued to evolve, with a U–2 pilot noting two Fan Song radars tracking him on January 29, 1967 followed by an attempted MiG-21 intercept.[55] But the mission went on.

On June 25, 1966 the 4028th SRS became the 349th SRS and on October 8, 1966 a U–2 was lost returning from an operational mission after it departed from controlled flight.[56] The target set remained unchanged, though with the proliferation of SA-2s throughout the DRV more and more airspace was ceded to the enemy and had to be covered by Ryan 147 operations. Still, OL-20 maintained its same footprint of three pilots and two aircraft and flew 92 missions in the first six months of 1967. Sorties over the Gulf of Tonkin continued, including five flown between April and July 1967 to try out a new camera.[57]

Up to this point in the conflict, the intelligence community had been serving two masters. While SAC reconnaissance was meeting MACV's needs for the operational fight by tracking weapons within the DRV and personnel and supply movements from the DRV south to RVN, policy makers in Washington were concerned about the strategic implications of the war for the region. With the Korean police action still in the back of their minds, CIA analysts were looking for signs that pointed to a shift in the nature of the conflict—the introduction of 'game changing' weapons systems such as surface to surface 'offensive' mis-

U–2R fitted with SENIOR SPEAR SIGINT payload at U-Tapao RTAFB, Thailand in April 1975. SENIOR SPEAR did not arrive in Thailand until late 1974 and would have seen service for the last missions flown over Laos and the Gulf of Tonkin before the fall of RVN. ***(Photo courtesy of Chris Pocock.)***

siles or new air defense, ground, and naval systems. This activity required "nearly daily readable photographic coverage" of rail yards and ports.[58] Washington also requested monitoring of southern China and lines of communication for indications of the introduction of Chinese forces into the fight—a hint that the war was widening.[59] These strategic intelligence requirements kept the CIA in the fight and required the introduction of a radical, new collection platform —the Lockheed A–12.

OXCART to the Rescue

The Lockheed A–12 OXCART was conceived as a follow-on to the U–2 to enable operation within a more capable and threatening air defense environment. When the decision was made to proceed with the OXCART in 1959, it followed a joint CIA-USAF development program similar to that of the U–2. The CIA awarded a development contract to Lockheed Aircraft Corporation in January 1960 with the first test flight occurring in April 1962, with the USAF SR–71 variant first flying in December 1964. The A–12 was flown by a single pilot and was designed for peacetime overflights compared to the two-man SR–71 which had a wartime mission. With one less crewman and associated life support equipment and ejection seat, the A–12 was lighter and subsequently could fly higher and faster than her USAF partner.[60]

The OXCART reached IOC on December 1, 1965.[61] Studies undertaken in early 1966 proved that the OXCART was the only platform able to meet urgent requirements as well as operate with relative immunity to communist air defenses. Though deployment of the OXCART to SEA had been considered since March 1966, concerns about how China would interpret the introduction of such an advanced platform kept it in the US for over a year.[62] Finally, on May 16, 1967 the OXCART was directed to deploy to Kadena AB under the name BLACK SHIELD. Civilian A–12 pilots would fly missions approved, planned and directed by Headquarters CIA in Washington in 'sterile' aircraft that had no markings other than a tail number.[63]

Three aircraft were ferried non-stop across the Pacific and the CIA detachment was in place on May 26, flying the first operational mission five days later. Many of the A–12 missions were flown against DRV SAM sites and chased the alleged DRV surface to surface missiles that kept Washington analysts awake at night.[64] Though the BLACK SHIELD missions provided tremendous assistance in covering these target sets as well as lines of communication between the DRV and China, policy restrictions kept them from flying into China.[65] The A–12 operated with impunity over DRV SA-2 sites due not only to its high altitude and speed but also a robust electronic countermeasures system carried aboard the aircraft.[66]

Even before the shootdown of Frank Powers over the Soviet Union in May 1960 the CIA knew the U–2 was living on borrowed time. Even with ECM similar to that carried by the A–12, the lower performance margin did not guarantee survivability. The loss of five TACKLE jets between 1962 and 1968 only highlighted the obvious. The Director of Program B at the NRO noted in a letter to the Director, NRO, in 1965 that the U–2 had a "useful life" limited by the introduction of "unfavorable defensive environments."[67] Still, the IDEALIST program soldiered on in the Far East. Missions continued to be flown against China, with a mission that covered the border with the DRV being flown on July 20, 1967 for good measure. In all, though, only six operational missions were flown by Agency U–2Cs between July 1 and September 8, 1967. The loss of a Taiwanese-piloted TACKLE mission on September 8, 1967 caused a stand-down of the TACKLE program. The arrival of OXCART came just in time - the entire U–2 program was grounded between November 6 and 18, 1967 after SAC discovered cracks in the wing of one of its OL-20 U–2s causing all SAC and CIA U–2s to have ultra-sonic inspections.[68]

The SAC U–2s were flying at a higher operational tempo than their Agency brethren as DoD still found utility in its high altitude platform. 100th SRW U–2s were flying on average 2-3 missions per week in 1967, with planning for these sorties starting with target requirements being forwarded to Headquarters SAC at Offutt AFB. Planners would plot the targets and build flight paths called Route Packages to cover the photographic reconnaissance targets. SAC would then transmit a tasking message to OL-20 citing the specific route (i.e. T914, T909 Mod 3, etc.) to be flown on a specific day. In 1967, the majority of the routes and missions were not in the DRV but covered communist infiltration routes in Cambodia and Laos. Routes within the DRV continued to keep a 30 mile bubble around known SA-2 sites, the location of which was derived from SAC SIGINT assets in theater such as the RB–47H and RC–135C/D, replaced by the RC–135M in November 1967. Weather impacted missions, forcing cancellation or recall of missions and causing SAC to direct 86 stand-down days from July 1, 1966 – July 1, 1967. VPAF continued to attempt intercepts with MiG-21s and engagements with SA-2s, resulting in a SAC OPORD dated July 1, 1967 that directed U–2 pilots to

U–2R Serial Number 68-10340 taxiing out for a mission from Bien Hoa AB, RVN in 1969. ***(Photo courtesy of Chris Pocock.)***

abort a mission if an attack was attempted or the aircraft fired upon.[69] As SA-2s started to proliferate outside of the Hanoi-Haiphong corridor, this OPORD became more and more relevant. In response to PAVN artillery attacks against US Marine Corps bases at Con Thien and Gio Linh in northern RVN near the DMZ, in September and October 1967 ARC LIGHT B–52 missions were tasked to attack known and suspected communist artillery locations. A U–2 supporting this mission on October 29 had to abort when three SA-2s were fired at one of the B–52s.[70] Instances such as this were starting to impact the operational tasking of the TROJAN HORSE mission, changed to GIANT DRAGON on July 1, 1967. Another impact was the strain that the SAC U–2 fleet was feeling.

Maintenance of the OL-20 deployment was putting stress on the 100th SRW. With 25% of the 349th SRS aircraft inventory deployed overseas, there was little room left for training and aircraft scheduled maintenance. A training accident on June 1, 1967 dropped the squadron inventory to seven U–2 aircraft and further pressure was coming from the pilot pool. The 3-4 pilots on 60 day TDYs to OL-20 represented 20% of the U–2 qualified pilots within SAC, eliciting assistance from Offutt AFB when the 349th SRS dipped to 17 combat ready crews.[71] Relief came in the form of reduced tasking as the A–12 took up more missions over the DRV.

With the A–12 now shouldering the load in the Far East, requirements for the supersonic platform started to subtlety change. In late November 1967 Washington reduced their strategic target deck and placed greater emphasis on supporting ROLLING THUNDER with surveillance of SA-2 sites and other targets under the DRV SAM umbrella. The A–12 was slowly shifting away from the surface to surface missile and Chinese intervention strategic target set into more of an operational role supporting DoD air strikes.[72] With this change in tasking, it was only a matter of time before the SR–71 would replace the A–12. In September 1967, the Executive Committee (ExCom) of the National Security Council had already requested the National Reconnaissance Office provide a comparison between the two platforms. Ever protective of their covert overflight capability, especially in light of the dwindling utility of the IDEALIST U–2 program, elements within the CIA had fought a rear-guard action to keep their program alive but to no avail. Based on a study completed by the Bureau of Budget, DoD and CIA, on December 19, 1966 President Johnson made the decision to phase out the OXCART program by December 1967.[73] The introduction of the SR–71 was a slow process as two major deficiencies were found with the program – the lack of a defensive ECM capability and sensor performance.[74] As a result, two three month extensions were made in order to allow time for the modifications to be made to the SR–71 – the first on October 23, 1967 and the second on December 29, 1967. The A–12 continued to fly missions, but it was only a matter of time before a different black bird arrived on Okinawa.

1968 – A Year of Change

The Tet Offensive was launched on January 30, 1968 by the Viet Cong and PAVN against RVN and US forces throughout much of the RVN. Though it had little direct impact on the SAC forces and their tasking, its impact was felt in Washington. On February 1, 1968, the 303 Committee (the new name for the Special Group after 1964) decided to suspend a group of overflight approvals for the month of February and called for 'mission by mission approval' until tensions were lower. CIA U–2s in Taiwan flew an overflight of southern China along the DRV border on March 16, the first overflight of China since a TACKLE mission had been shot down the previous September. The CIA detachment in Thailand re-appeared and flew two missions over Cambodia on March 27 and April 3, the first missions flown from Thailand since early 1966. This one time push for one to two missions over Cambodia was the result of a request that went to the White House from the NRO two weeks prior. These turned out to be the last contribution of CIA U–2s to the conflict in SEA. The State Department opposed any further overflights, citing the risk of increasing Chinese air defense effectiveness.[75] The risk of losing an aircraft over China drove the intelligence community to make do with satellite reconnaissance and the 7-12 foot resolution imagery the CORONA KH-4 system was providing at the time.[76]

The three pilots and two U–2Cs still assigned to OL-20 continued to fly through 1968, marking the 1,000th SEA mission for SAC on June 15. The tempo was much reduced, with many missions canceled in the second quarter by SAC – April and May seeing only 7 of 17 scheduled sorties flown over the two month period.[77] Reflecting the unwritten reality that most of the DRV was too high of a threat for the U–2, SAC restricted operations of the airframe to south of the 20° North Parallel in April 1968. In July 1969, the long in the tooth U–2C aircraft started to be replaced by the new-built U–2R airframes and soon the 349th SRS started to fly a mission that would be all consuming by the end of the conflict – SIGINT collection flights over the Gulf of Tonkin.[78]

Ryan 147 operations in 1968 started out with no change from the previous year, targets running the gamut from air-

fields to infrastructure. Overflights of southern China were suspended starting on March 27, 1968 and did not resume until the following year.[79] With the cessation of bombing north of the 19° North on March 31, 1968, the Ryan 147s suddenly became the sole focus of VPAF air defenses. The low-level Model 147S drone flight plans were altered to reduce altitude down to 500 feet, normally flown at a speed of 500 knots, to increase survivability. The halt of ROLLING THUNDER and the bombing of the DRV on November 2, 1968 appeared to have little impact as Ryan 147 operations continued at a pace of about one per day. What was new was a different SAC partner over the DRV – the SR–71A.

The USAF worked to resolve the remaining issues with the SR–71A and was ready for deployment in March 1968, with the last CIA BLACK SHIELD mission over the DRV being flown on March 8, 1968. The next day the first of three SAC SR–71A aircraft arrived at OL-8, Kadena AB, with the last aircraft in place by March 13 to support the first mission on March 21, 1968. During its operational time at Kadena, the A–12 flew 26 missions in support of the war in SEA. The last operational mission for the OXCART was against North Korea, flown May 5, 1968; in late June, the remaining deployed aircraft were ferried back to Palmdale and mothballed.[80]

The SR–71A flew with a variety of photographic reconnaissance payloads to include the high resolution Technical Objective Camera (TEOC), the Terrain Objective Camera (TROC), and the Operational Objective Camera (OOC). These sensors were mounted in the chine bays of the aircraft while the High Resolution Radar (HRR) was nose-mounted. [81] The SR–71 was also fitted with SIGINT sensors and flew its first SIGINT mission on May 11, 1968. Tasking for the Blackbird centered on the high threat area targets in Hanoi and Haiphong and it was only a matter of time before the DRV SAM operators took a shot. On July 26, 1968 the first of many failed SA-2 engagements was tried against the SR–71.[82] The three original SR–71s were replaced in September 1968 and sent to Plant 42 at Palmdale, CA for depot work, with a similar rotation taking place in spring 1969.[83]

When the November 1, 1968 bombing halt over the DRV took effect, tactical aerial reconnaissance was restricted to operating south of the 19° North Parallel, leaving coverage of the critical Hanoi-Haiphong region as well as the rail lines to China to the SR–71, Ryan 147 and CORONA.[84] A review of collection four months into the bombing halt revealed that while coverage south of the 19° North Parallel was adequate, photo reconnaissance north of the line was not satisfying JCS requirements mainly due to weather. While low level Ryan 147 drone flights provided high quality imagery, the narrow swath of the flight path limited collection.[85] It would take some tweaking of flight routing and increasing the capability of the drones to slowly close the gap.

Drones

In 1969, the U.S. Air Force redesignated the Ryan 147 vehicle as AQM-34, although the manufacturer-assigned

U–2R fitted with SENIOR BOOK SIGINT payload as seen in the UK, circa late 1970s. The SENIOR BOOK payload used the Melpar HARC II sensor controlled by a ground station at Nakhon Phanom Royal Thai Air Force Base to provide COMINT collection over Laos and the Gulf of Tonkin. ***(Photo courtesy of Chris Pocock.)***

numbers remained in popular use. Also beginning in 1969, the JCS directed SAC to conduct 25 drone sorties per month over SEA while maintaining an ability to surge to 45-50 sorties per month when directed. Though these underlying requirements would remain unchanged through mid-1972, drone reconnaissance activity peaked in 1969 as SAC worked to fulfill all the collection requirements being tasked north of the 20° North Parallel. 437 BUMPY ACTION drone missions, the program name since December 1968, were flown that year on missions requiring high resolution photography or when targets scheduled for the SR–71 were under heavy cloud cover. The majority, 392, were flown by Model 147SC/AQM-34L low-level birds. Model 147H/AQM-34N high altitude missions continued into 1969, with the new high altitude Model 147T/AQM-34P model fielding that year as well. Though the high altitude drones were usually at risk for intercept from MiG-21s and SA-2s, even the low altitude missions had risk beyond just AAA. On February 4, 1969 imagery from a drone near Haiphong revealed two MiG-21 fighter aircraft attempting to down the AQM-34 with AA-2 Atoll IR guided missiles. The drone led a charmed existence and survived at least three missile shots and emerged unscathed.[86] When possible, RC–135M or other COMINT platforms would relay MiG intercept activity to the DC–130, allowing the Launch Control Officer to use the MCGS datalink to 'maneuver' the AQM-34 to throw off the aim of the MiG pilot.

Though the AQM-34 had been re-approved to fly over China on March 22, 1969, various reasons ranging from the North Koreans shooting down a US Navy EC-121 to President Nixon's trip to the region kept flights in abeyance. After discussions in the 303 Committee, President Nixon acted on the recommendation of National Security Advisor Henry Kissinger and approved Ryan drone flights no deeper than 200 miles into China for the tactical intelligence required by DoD against Chinese installations in the DRV, Laos and Burma border regions. Even with a State Department non-concur, high altitude AQM-34N/P overflight of south China resumed in October 1969 with

the first mission flying on the 17th followed up by three more before the end of the month.[87] Although one U–2 mission could collect the same amount of imagery as four AQM-34s sorties, the political reality dictated manned missions were not going to happen even though the threat environment in the area was conducive to U–2 operations.[88] Four additional drone overflights of southern China were tasked in November 1969.[89]

The continuation of the bombing halt and the sporadic peace talks in Paris gave Washington time to tinker with the rules governing operations in the combat zone. In November 1969, the JCS defined broad restrictions for reconnaissance activities in SEA. High and low altitude drone photographic reconnaissance as well as SR–71 photographic reconnaissance and ELINT operations were authorized over all of Southeast Asia, though when operating over Laos, the SR–71 had a 10 NM buffer with the Chinese border. U–2 imagery operations were permitted in all areas of Southeast Asia except the DRV.[90] That same month, the JCS also directed that high altitude AQM-34 missions be reduced to 1-2 sorties per month in order to retain enough high altitude drones in case new air defenses precluded SR–71 use. Though recovery rate was steadily climbing, there were also concerns about the navigation capabilities of the drones. In 1970, the AQM-34L low altitude drones hit only 38% of tasked targets, this improving only slightly to 40% the following year. The usable swath of imagery was only 1-3 miles wide, so minor deviations as well as excessive banking in turns could cause a target to be outside the imagery. Attempts to update the update the AQM-34's position via the MCGS produced mixed results.[91]

On July 4, 1970 OL-20 closed down, with 349th and 350th SRS operations moving to U-Tapao RTAFB, Thailand, designated OL-RU. Since the drones were still recovered over the Gulf of Tonkin, the CH-3 recovery helicopters remained at Da Nang AB. The drones continued to concentrate on low altitude day missions, but during the winter of 1970-71 the remaining AQM-34N and some new AQM-34P high altitude drones flew a few missions. Sortie rate in 1971 was about 20 missions per month, the majority being low altitude AQM-34L drones that flew 277 missions in 1971.[92] With the loss of two of the three AQM-34N missions flown in July 1971, SAC stopped high altitude photographic reconnaissance drone flights as the SR–71 assumed responsibility for all high altitude missions over the DRV.[93]

The Dragon Continues to Prowl

In July 1969, the SAC U–2 missions in SEA changed designations once again with the GIANT DRAGON program transitioning to GIANT NAIL. U–2 missions continued over Laos and Cambodia, reinforced by a July 1970 DIA request for high resolution imagery coverage of eastern Cambodia that was likely looking for the return of communist forces after the US-ARVN offensive in the area conducted earlier that year.[94] Most of the Cambodia tasking was accomplished by a single U–2R flying GIANT NAIL missions, though some bonus imagery of border

Four 4028 SRS personnel posing at Bien Hoa AB, RVN, circa 1965. Shown are pilots Bob Spencer, Pat Halloran, Don McClain and navigator Ray Pierson. ***(Photo courtesy of Pat Halloran.)***

areas with the DRV was captured by SR–71 overflights of this nation. U–2s also imaged Laos and parts of RVN to satisfy national and CINCPAC requirements, with the majority of the missions over Laos to monitor PAVN troop movements and road construction. Occasionally, the U–2 would fly a stand-off mission in the Gulf of Tonkin to image littoral DRV with the Itek Iris II camera, a long range photographic sensor delivered in 1969.[95] Though not near the threat level of the DRV, even Laos and Cambodia were starting to become too contested for the U–2. Sometime in the 1969-1970 timeframe, the threat from VPAF MiGs in Cambodia and Laos dictated an escort of USAF fighters for U–2s and DC–130s flying in this airspace. During this same time period, reduced tasking enabled SAC to drop the number of deployed U–2R airframes at OL-RU to one.[96]

With more survivable photographic reconnaissance platforms available in the form of the SR–71 (or expendable in the form of the AQM-34) the U–2 was made available for other missions. A December 1970 review of airborne COMINT operations by DIA considered collection against DRV from the Tonkin Gulf to be critical.[97] On May 13, 1971 the Deputy Secretary of Defense approved SENIOR BOOK, the U–2 SIGINT operation in Southeast Asia, for collection of COMINT in the Gulf of Tonkin. Test flights began on August 17, 1971, with signals collected from the orbiting U–2R using the Melpar HARC II sensor relayed via a Sperry multi-channel datalink to a ground station at Nakhon Phanom RTAFB, Thailand. USAF Security Service linguists translated the collection real-time and could relay resulting intelligence via SAC KC-135 Luzon Radio Relay aircraft to USAF fighters in the region.[98] After ten test flights, operational missions began on October 1, 1971. Each mission lasted about ten hours, providing eight hours of orbit time over the Gulf of Tonkin in Track Z-108. With an anticipated requirement of daily SENIOR BOOK missions, SAC deployed two additional U–2Rs to OL-RU in September, raising the number of U–2s in Thailand to three. Unfortunately, late 1960s telecommunication technology was not 100% reliable and many SENIOR BOOK missions were deemed unsuccessful due to poor communications links. Sperry worked to upgrade the datalink re-

A U–2F refueling as seen from the refueling boom operator's position. The U–2F was a refuellable U–2C while the U–2E aircraft that deployed in 1964 was a U–2A aircraft modified for inflight refueling. ***(Photo courtesy of Chris Pocock.)***

sulting in increased performance by 1972.[99] On April 11, 1972 SENIOR BOOK became OLYMPIC TORCH but the mission remained the same.

Blackbird Reigns over the DRV

With increased threats to both high altitude drones and U–2s from VPAF MiG-21s and SA-2s, the SR–71 became the only survivable high altitude imagery platform in SEA. In spring 1970 OL-8 increased to four SR–71A with the base averaging two flights per week, the majority of which was over the DRV. On October 30, 1970 OL-8 at Kadena AB was re-designated OLRK, changing again to OLKA on October 26, 1971, but operations continued unabated. By 1971 aircraft rotation had slowed to every twelve months vice the prior requirement of every six months. The detachment started to suffer some aircraft losses, but not due to enemy fire; on May 10, 1970, an aircraft crashed in Thailand due to loss of control while a second SR–71 was lost while landing in high cross winds on July 20, 1972. [100]

By 1971 most GIANT SCALE missions were flown with the High Resolution Radar (HRR) synthetic aperture radar photographic payload mounted in the nose of the aircraft, enabling all-weather photographic reconnaissance operations through cloud cover but at a much decreased resolution. SR–71s also carried the Electromagnetic Reconnaissance (EMR) ELINT payload, with thirteen ELINT missions flown in FY72. [101] The FY73 budget reduced the SR–71 budget by 20% which resulted in 100th SRW authorized aircraft dropping from 12 to 9 on July 1, 1972 with a plan to reduce to 6 by January 1973.[102] Cuts such as this would have had a dramatic impact on the number of deployable airframes, but DRV actions saw otherwise.

The Easter Offensive

In late December 1971, the drone sortie rate doubled as tensions grew and the US prepared for a five day bombing campaign starting on December 26. The higher tempo continued into the new year, with the AQM-34s concentrating on Hanoi and Haiphong. While some drones were launched from northern Laos, the majority were launched from the Gulf of Tonkin.[103] Increased threat levels necessitated escort for DC–130s flying further north than the 18° 30' North Parallel over the Gulf of Tonkin.[104] The threat over Cambodia and Laos, on the other hand, was downgraded and the order for fighter escort for the DC–130s over these nations was rescinded in January 1972.[105]

Drone activity during this time was restricted to the low altitude AQM-34L. In response to the DRV 'Easter Offensive' invasion of RVN on March 30, 1972, President Nixon authorized the bombing of the DRV up to the 18° North Parallel. On April 8, the JCS extended the line up to 19° North. As the bombing campaign increased, so did the tasking for SAC reconnaissance assets. SR–71s and low altitude AQM-34L missions were tasked to provide BDA against key logistics sites struck by SAC B–52s between April 9 and 23. The U–2 Iris II Optical Bar Camera (OBC) was modified to fit in the SR–71 and a single prototype deployed to Kadena AB in April was used to support these operations. The OBC provided stereo coverage with superior resolution to the existing OOC sensor and better coverage than the TEOC but, being mounted in the nose bay, displaced the HRR. Also joining the Kadena team in April was an SR–71 Mobile Processing Center (MPC) to expedite processing and reporting of imagery. Prior to the arrival of the MPC, the 548th Reconnaissance Technical Group at Hickam AFB, HI processed all SR–71 imagery.[106]

Bombing operations expanded on May 9 with Operation LINEBACKER, a systematic interdiction campaign that went further north into the DRV. The drones and SR–71s were tasked with pre- and post-strike photography to support these efforts as well as the Operation POCKET MONEY mining of Haiphong harbor that had started the previous day. Increased photographic reconnaissance requirements, including daily coverage of POCKET MONEY facilities, drove the Kadena Blackbirds to 30 missions in May, more than double the 14 flown in April. In addition, AQM-34s were tasked to cover DRV activity in the RVN's overrun Quang Tri province. Drone sortie rate for the first half of 1972 averaged 37 missions per month, all executed with the existing two CH-3s, though a third DC–130 was deployed to U-Tapao in February 1972. The SR–71s delivered 28 sorties in June, continuing to image DRV logistics efforts.[107]

Accompanying SAC's reconnaissance missions were drones of another flavor - Tactical Air Command (TAC) Model 147NC/AQM-34H drones originally built to lay chaff screens but modified to dispense propaganda leaflets. These TAC drones, assigned to the 355th Tactical Fighter Wing, were launched by 350th SRS DC–130s and flew 28 night low altitude leaflet sorties between July and October 31, 1972. [108] SAC also flew their own modified drones during this time. On June 8, 1972, Headquarters USAF directed SAC to configure three of its five remaining Model 147H/AQM-34N high altitude drones stored at Davis-Mon-

The Lockheed SR–71A offered a good platform but its sensors initially limited its utility. Even after receiving better optical cameras, it was essentially limited to cloud-free days as its all weather radar imagery payload had poor resolution. This SR–71 is depicted post-war, possibly at RAF Mildenhall, UK.

than AFB into SIGINT vehicles optimized against SA-2 beacon downlink signals similar to the earlier Model 147E UNITED EFFORT mission. The three modified drones, nicknamed COMPASS COOKIE, were designed, flight tested, and deployed to U-Tapao RTAFB by August 24, 1972. Four missions were flown between September 9 and September 29, with the AQM-34 sending its SIGINT back to the DC–130. The program was a success with the drones capturing the required signal at a cost of one of the modified AQM-34N vehicles. [109]

As peace negotiations continued to grind on in Paris, intelligence analysts in Washington knew that once a treaty was signed they required timely photographic reconnaissance collection against DRV targets to confirm the actions and intentions of Hanoi. CORONA imagery, infrequent and delayed in exploitation, was not considered ideal for this type of work so some form of aerial collection was needed. When the bombing halt over DRV took effect on October 23, 1972, tactical aerial reconnaissance was restricted to operating south of the 20° North Parallel, leaving coverage of the critical Hanoi-Haiphong region as well as the rail lines to China to the SR–71 and AQM-34, similar to the condition that occurred after the 1968 bombing halt.[110]

On November 1, 1972 100th SRW OL-RU was redesignated 99th SRS. On that same date, the Ryan 147 drone recovery operation and its CH-3s moved from Da Nang AB to Nakhon Phanom RTAFB, Thailand, designated OL-NB. The CH-3 movement started on September 29 and was completed on November 24. The standup of the 99th SRS was part of a plan to field the Advanced Location Strike System (ALSS), a program that required three U–2C aircraft to be airborne at the same time to rapidly geolocate signals of interest. However the ALSS, which would have brought six modified U–2C aircraft to Thailand in January 1973, was not fielded. Surveillance of POCKET MONEY targets between November 19 and December 1, 1972 was done exclusively by AQM-34s as the Blackbirds concentrated on monitoring DRV repair and rebuilding efforts post-LINEBACKER as part of Operation POST WATCH. The SR–71 was the primary platform to collect on the 176 high priority POST WATCH targets, with target revisit rate varying from near daily to once per week depending on the category.[111]

Linebacker II

With peace talks in Paris not appearing to be making any headway, the Nixon administration decided to resume bombing in an effort to stimulate conversation. On December 15, in anticipation of the attacks, the JCS directed SAC to photograph 32 targets in the DRV with SR–71 and AQM-34 missions. Two days later, on December 17, the JCS directed SAC to initiate a maximum, sustained reconnaissance effort against the DRV with these same assets. On December 18 President Nixon ordered bombing north of the 20° North Parallel to resume.[112]

SR–71s were tasked to provide daily coverage of targets in the DRV beginning on December 19, using either conventional or HRR photographic reconnaissance sensors. AQM-34s were tasked with multiple missions per day against highly defended areas such as Hanoi and Haiphong. US Navy BLUE TREE tactical reconnaissance assets would be used to supplement as needed, as the target list expanded from the original 32 to 139 by the end of the bombing campaign. With the re-opening of the bombing of the DRV, SAC's Fifteenth Air Force notified the 100th SRW to prepare to augment U–2 and AQM-34 operations. The first step of this witnessed two additional U–2 pilots arriving at U-Tapao RTAFB on December 23 to augment the five pilots deployed with the 99th SRS. After Christmas, an additional U–2R and pilot were deployed to Southeast Asia along with a third DC–130 and associated crew as well as additional maintenance personnel. These augmentation forces would remain in place until the end of January 1973. Supporting imagery distribution was

CIA U–2C on a test flight over the western US. Article 682 remained a CIA asset until transfer to NASA in 1971 and is representative of the Agency U-2s deployed for Far East operations. ***(Photo courtesy of the Nevada Aerospace Hall of Fame via TD Barnes.)***

Lockheed A–12 article 928 in testing at Groom Lake, Nevada. When deployed, the A–12 only was marked with its tail number. ***(Photo courtesy of the Nevada Aerospace Hall of Fame via TD Barnes.)***

GIANT CIRCLE, the movement of SR–71 intelligence products from Kadena AB to Saigon as well as Washington. Four KC-135As were eventually committed to this effort that delivered processed imagery to decision makers within 24 hours of sortie completion.[113]

Unfortunately, weather bedeviled SR–71 reconnaissance operations during LINEBACKER II. Though the north-east monsoon season is generally drier, it can bring heavy rains in the early months – which was the case in 1972. Low cloud ceilings resulted in the SR–71 using the HRR payload on all but two days – the missions flown on December 21 and 27. The mission scheduled to fly the day after Christmas was also weather delayed for 24 hours. The HRR was used primarily against ports and waterways, target types optimized for radar imagery. Though radar imagery could, under certain conditions, be used against targets such as bridges and airfields, overall it had limited utility in performing bomb damage assessment against facilities. SR–71s were also tasked with SIGINT collection, flying a night mission on December 28 and a day mission on December 29 looking for updated ELINT associated with VPAF SAM operations.[114]

The low cloud ceilings that caused challenges for SR–71 operations brought AQM-34L operations to the fore. Most of the photographic reconnaissance support to LINEBACKER II operations was delivered by AQM-34 missions. Forty two Ryan drone missions were launched during the eleven day bombing operation, with four lost. 34 of the 38 recovered drones delivered valuable imagery, covering 36% of the 944 targets they were tasked to cover and bonus collection on another 366 targets.[115] On average, four low level BUFFALO HUNTER missions were flown daily to support BDA.[116] A mini-surge on December 15-16 saw four missions per day, with operations scaling back to two on December 17th and 18th before resuming four per day. December 27th and 28th were also reduced sortie rates of only three missions. During December 1972 seventy five AQM-34L missions were flown, 2/3 supporting BDA efforts for Linebacker II. Between December 20, 1972 and January 19, 1973 one hundred AQM-34 missions were flown, 27 of which were flown the third week of December.[117] One challenge to the AQM-34 arose mid-way through the bombing campaign. On December 21, one of the OL-NB-based CH-3Es became unserviceable and was out for the duration of the bombing campaign, the drone operations relying upon a single CH-3E and two crews.[118]

The 99th SRS started surging with two OLYMPIC TORCH U–2R missions per day on December 18, one flying 0800-1600 local time (0100-0900Z) over the Gulf of Tonkin and the second timed to be over the Gulf during the B–52 attacks, usually 1900-0500 (1200-2200Z). The U–2 was tasked primarily for COMINT collection supporting the LINEBACKER strikes and the SRC coordinated complementary missions with the RC–135M. SIGINT analysts discovered that VPAF tracking of their own MiGs was being done on communication links that only the U–2 payload was capable of intercepting. Most of the RC–135 missions were flown on track F710 in the Gulf of Tonkin from 1300-0100Z, with a second sortie flown approximately every third day from 2200-1000Z in the F711 track south of the DMZ. As the campaign started to gain steam, on December 20th CINCPAC requested the SRC change the OLYMPIC TORCH station time to 1650-0900Z, but SAC did not alter operations. The U–2R maintained its tempo throughout the bombing campaign, though only one mission was flown on Christmas during the bombing pause. U–2Rs ended up flying 39 OLYMPIC TORCH missions in December 1972.[119]

LINEBACKER II continued until 2359Z on December 29. Though offensive action north of the 20° North Parallel was halted at this time, SR–71 and AQM-34 reconnaissance missions continued unabated. Talks in Paris resumed on January 8 and concluded with the signing of the Paris Peace Accords on January 27, 1973, ending US involvement in the wars in Southeast Asia. While the talks were ongoing, SAC reconnaissance tempo was nearly equal to that of December, with 62 AQM-34 sorties logged in January, most north of the 20° North Parallel, with the last sortie occurring on January 27.

According to the treaty signed in Paris, the United States would stop "all military activities against the terri-

A–12 imagery depicting Gia Lam airport, Hanoi, DRV, 19 July 1967. The A–12 provided national decision makers and theater commanders with a responsive reconnaissance asset for high threat areas over the DRV, proving out technology and flight operations for the follow-on SR–71A. ***(Photo courtesy of the Nevada Aerospace Hall of Fame via TD Barnes.)***

The Lockheed SR–71A replaced the A–12 in overflight of high threat DRV targets. The speed and operating altitude of the SR–71 enabled it to operate with impunity at high altitude over the DRV, complementing the under the weather low altitude AQM–34 to support air strikes in 1972.

tory of the Democratic Republic of Vietnam by ground, air and naval forces, wherever they may be based."[120] In addition, the United States would "respect the independence, sovereignty, unity and the territorial integrity of Vietnam." The challenge existed on how to monitor DRV compliance with the peace accords while complying with the accords themselves. The Nixon Administration resolved this thorny issue by tasking the CIA with flying airborne reconnaissance against DRV target sets from international waters 12 miles off the coast. Though it was near death, the IDEALIST Program was still capable of responding in the time of need. The Agency dispatched several pilots to Taiwan and the first SCOPE SHIELD mission flew on March 30, 1973. Weather contributed to a marginal collect, though a second mission flown the next day provided better results. The monsoon season halted all flight activity until July 21, 1973, when the first of two missions approved May 7 was flown. Issues with the Type H camera lowered the image quality, but it was still usable. Even before the first SCOPE SHIELD mission was flown, DCI Schlesinger had requested for up to five SR–71 missions to be flown to gather critical intelligence and demonstrate US resolve until the final American POWs were returned. Two SR–71 overflights of the DRV were flown, one on April 19 with the prototype CAPRE imaging radar and the second on April 24 with conventional cameras, to ensure the DRV was complying with the terms of the Paris accords. The last SCOPE SHIELD mission was flown on January 6, 1974.[121] Joining the Agency U–2s over the Gulf of Tonkin were 99th SRS U–2Rs, initially flying daily OLYMPIC TORCH COMINT missions to monitor DRV adherence to the peace accords. An orbit was also established over Laos for similar purposes, providing different look angles and access into the DRV. Moving into 1974, SAC continued to fly reconnaissance in the region, with AQM-34, U–2 and SR–71 aircraft relatively active over RVN, Laos and Cambodia. The SR–71 even did at least one overflight of the DRV on March 28, 1974.[122]

The BUFFALO HUNTER program continued to average 25 missions per month through the end of 1974 and was relied upon heavily by the DIA and Pacific Command to understand communist activities and intentions in RVN.[123] With the fall of RVN in 1975, there was little left to do, but SAC reconnaissance had one last mission to perform. In support of the action to recover the SS Mayaguez in May 1975, U–2s from U-Tapao RTAFB acted as communications relay between engaged forces and headquarters elements in Thailand. With this last gasp, the conflict in Southeast Asia was over and the SAC operating location in Thailand was finally shuttered in April 1976.[124]

Like the Korean conflict two decades prior, the Vietnam conflict helped solidify the role of reconnaissance in the eyes of SAC. Though SAC flew operational reconnaissance missions every day during the Cold War in the form of SIGINT missions off the coast of the various adversarial states, the Vietnam experience was different. SAC had to use photographic reconnaissance assets to locate targets and perform battle damage assessment – two wartime functions it was not able to accomplish during peacetime. Headquarters SAC also had to integrate SIGINT with imagery to produce updated orders of battle and plan missions around these threats. This construct – built with the global thermonuclear war in mind where deconfliction could only be accomplished with a single integrated plan - worked in a lower operations tempo such as ROLLING THUNDER or ARC LIGHT but not for a high intensity bombing campaign such as LINEBACKER II. Centralized planning of missions started to unravel during LINEBACKER II as witnessed by mounting B–52 losses and would give SAC and an entire generation of planners grist to mill over the two decades leading up to Operation DESERT STORM. Reconnaissance assets, though, worked as advertised. Flawed centralized planning aside, in LINEBACKER II all the operational components of SAC worked as advertised - SAC SIGINT located threats, SAC photographic reconnaissance located targets, and SAC bombers destroyed targets. In some ways, SAC did get it right. ■

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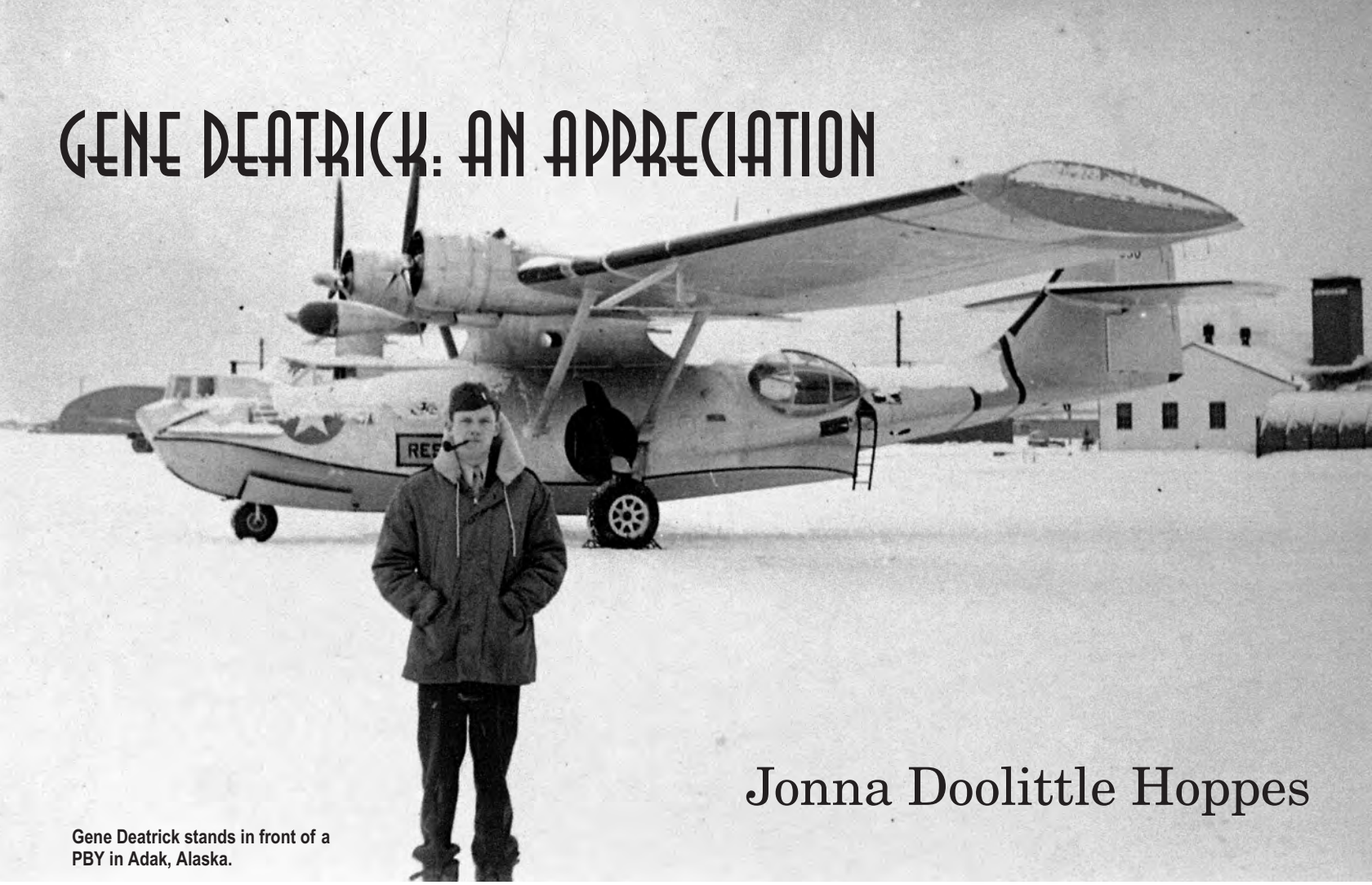
GENE DEATRICK: AN APPRECIATION



Gene Deatrick stands in front of a PBY in Adak, Alaska.

Jonna Doolittle Hoppes

It has been said that there are old pilots and there are bold pilots, but no old bold pilots. The truth is there are a few and, on Fridays around noon in a small private dining room at the Army Navy Country Club in Arlington, Virginia, a group of these legendary pilots gather to discuss the good old days, current events and the future. Over the years that luncheon included Buz Carpenter, David North, Frank Gallo, Nordy Norwood, Jenna Dolan, Whitey Feightner, Dick Hallion, Scotty Crossfield, Heather Penney, John Alison, and many others whose love of flying pushed them to great heights – both literally and figuratively. For years, at the head this table, sat a pilot who was a walking encyclopedia of Air Force history. His was first-hand knowledge. Colonel Eugene "Gene" Peyton Deatrick, Jr. was a great facilitator, a guy who genuinely liked people. He'd sit there chin up, eyes focused middle distance, pipe in hand, and preside over what was frequently an intense discussion. And sometimes, when things got particularly passionate, Gene, with a mischievous twinkle in his eye, would inject some levity, and simply crack everybody up.

Born in 1924, he lived through the Great Depression but never focused on life's negatives. The only child of two university professors, he spent most of his childhood in Morgantown, West Virginia and Washington, D.C. Gene assumed he would follow in his parents' footsteps. But that changed as World War II began to unfold in Europe. His mother asked if he'd ever considered attending the United States Military Academy. Gene admitted his only association with West Point was that they played Navy every year and beat them. He received an appointment from Senator Jennings Randolph.

"I never knew one man could be so mean to another as they were up there. I'd come from a very friendly family." Gene quipped in a West Point oral history. "'Shoulders back! Head up! Shut up!' It was quite a change. The only thing I remember thinking is, if Patton and Bradley can do it, so can I."

Gene hated to admit that he wasn't a kid who built model airplanes and dreamed about flying. No, what made him want to fly was an exercise during his plebe year. Company C-1 was on maneuvers up in Watertown. They were on a long march when a T–6 simulated a strafing run that drove them all into the wet weeds. As Gene looked up he saw the pilot wave and thought, "If I ever go to war, that's the way I want to go." When offered the opportunity for flight training he took it.

Gene became an unofficial member of General Jimmy Doolittle's family in 1944. Christmas leave wasn't long enough for him to take the train to West Virginia so he joined his classmate, John Doolittle, for the holiday. Mrs. Doolittle had a small apartment on Connecticut Avenue in Washington, D.C. It was crowded that weekend since Jim, Jr., his wife and son, were visiting. At bedtime that first night, Mrs. Doolittle told Gene, "You're sleeping on the kitchen floor, and if you want breakfast, please get up, we eat at eight o'clock. If you don't, why, we'll just step over you."

His years at West Point were memorable and were captured in the 1946 *Howitzer*

The comedy began when this West Virginian strolled through the sallyport one July morning. Because Dea was a hive, he had no trouble from the Academic Department; but his troubles with the femmes brought many a laugh to C Co. The Air Corps gained Dea's attention early in cadet life, and his one ambition was to become a "hot pilot." Exemplary of his ability, Dea chose a branch in which he is certain to go high.

A member of the last West Point class to take flight training, Gene received his wings on June 1, 1946, from General Carl Spaatz.

The former Air Force Historian, Dr. Richard P. Hallion stated in a recent interview:

Gene graduated at an interesting time. Not only were the services transforming and he was seeing that air power was gaining status as a separate military force but also we were seeing tremendous changes in technology. We were going from the era of propeller driven airplanes to the era of jets. We were going from the era of subsonic flight to transonic and supersonic flight. The shape of the aircraft was transforming dramatically going from airplanes with broad high-aspect-ratio wingspans and fuselages that were relatively short to wings growing much smaller, lower aspect ratio, and the fuselage is growing much longer – there's a whole series of problems – handling problems, flight dynamics, issues like that. And then in the external world, we have the beginnings of what we will see emerge as the computer revolution. We also have a complete transformation in weaponry where we go from conventional high explosives to atomic weaponry, then within ten years to thermonuclear weaponry. On top of that we have a very unstable global crisis emerging, the Cold War. We had defeated three great powers that were causing problems for the rest of the world – Nazi Germany, Fascist Italy, militarist Japan – but now all of a sudden we're confronting new adversaries – one dating to 1917 (the Soviet Union) but then after 1949 Communist China and then, from the late 1950's onwards, all the problems we have with so called "Third World" – two major blocks of power are grappling to really secure – if you will – global dominance over the other and the Third World as well. And that's the environment that shapes largely what Gene ends up doing as a professional military aviator and test pilot. It's interesting that if you take a look at him – he plays into issues and circumstances and situations that influence that war – that cold war, occasionally hot, as he witnessed in Vietnam – all the way to the point where he retires from the military.

Gene Deatrick (front) and Bryce Moore at Adak, Alaska.

As Dr. Hallion noted, these challenges are the backdrop to Gene's Air Force career. Gene liked to say that Air Force assignments were like haircuts, you get a few bad ones but for the most part, they're pretty good. One of those "good haircuts" was in Alaska where Gene learned to fly in adverse weather conditions. After transitioning into multi-engine aircraft in Enid, Oklahoma and a short stint at MacDill Air Force Base, Gene volunteered for the 10th Air Rescue Squadron in the Aleutians under the command of Colonel Bernt Balchen, the famed Norwegian explorer and first airman to fly over both of the Earth's poles.

Balchen wanted a PBY Catalina for rescue missions in the Bering Sea so he contacted his Navy friends and secured a wonderful little machine that was very hard flown. Gene, who had "shot over 100 takeoffs and landings in a light airplane up in Anchorage" grants that he was a little overconfident when he tried his first heavy takeoff. He re-

Ms. Doolittle Hoppes is the author of two published books. Calculated Risk: The Extraordinary Life of Jimmy Doolittle *is a memoir of her famous grandfather, aviator Jimmy Doolittle and his equally extraordinary wife, Joe. Her second book,* Just Doing My Job *is a collection of biographical stories from World War II. Her third book,* The Wrong Stuff*, General William Lyon's autobiography, is due to be released in the near future. Her next project,* Athena's Voice*, is a collection of stories of American women who have served in combat, many currently serving in our military. Her articles have appeared in a number of magazines. She is a board member for the Air Force Historical Foundation, and a current advisor to the Flying Tiger Historical Foundation.*

called his experience in an oral history for the Society of Experimental Test Pilots (SETP). "I never realized a takeoff in choppy water in a PBY yields full-stall takeoff … every wave you hit you lose another knot. Pretty soon it will break and just as we did the right wing went down, caught a wingtip. We turned around and pulled the power off, and I heard, 'glug, glug, glug.' It split the hull and it sank….I should have done more practice." With a shake of his head he continued, "That's my claim to fame. I'm probably the only Air Force pilot that's ever sunk a PBY!"

Gene had a second accident that week. Returning from Shemya in wet conditions, he heard a Gooney Bird land and thought, "Hell, if he can get in, I can." He set the B–17 right on the end of the runway, a beautiful landing, but he went down the runway with a 5-knot tailwind in the rain and off the end into a ditch. Scotty Crossfield liked to introduce Gene as the most efficient Air Force pilot he'd ever met, claiming that Gene did it to save the Air Force a whole lot of money by having only one Accident Board.

Flying in the Aleutians was quite an experience. Their rescues ranged across the entire northern tier of North America and the techniques they developed are the acknowledged standard used today in cold weather search and rescue operations. As one can imagine, the conditions were often treacherous. Gene remembered a safety meeting where Balchen told them, "I know that I've asked you to fly in weather that no one should be flying in, but with an emergency we try to go. I do expect losses…But I would appreciate, if you crack up an airplane, when writing the accident report, please say something other than, 'that's all there is for this son-of-a-bitch.'"

Air Force regulations stated that if a pilot had three major accidents within five years, they were required to meet with a Flying Evaluation Board at Warner Robins. Gene had three. After meeting with the board and reestablishing currency, he was called into the Commander's office for a 'father-and-son' chat. As they walked out the General put his arm around Gene and said, "Deatrick, don't ever forget. Unless you crack up an airplane now and then, no one will ever know who you are."

Gene's next assignment was Bombing Engineering Test Pilot for the 3759th Electronics Test Squadron where, as the nucleus of the Air Armament Center, they focused on the development of new radar bombing equipment.

His most memorable event from that assignment was when he picked up General Copeland's son from Virginia Military Institute. Apparently the kid bailed out when the right engine caught on fire. Gene, focused on controlling the plane, didn't realize he was missing until they landed. Luckily the General was in the right seat.

In 1951, he was offered a slot in the first class of the Experimental Test Pilot School at Edwards AFB. Just prior to departing for his new assignment, he visited General and Mrs. Doolittle in New York. He told them he was heading to the school and Doolittle suggested he look up an old friend. Gene arrived at Edwards late Friday afternoon and headed to the Officers Club that evening. He asked his commander, Colonel Boyd, if he knew Doolittle's friend, someone named Pancho Barnes. Gene later stated that it was like asking Noah if he knew where the ark was.

Gene Deatrick and Pancho Barnes.

An assignment to Bomber Flight Test Division at Wright Patterson Air Force Base, Ohio, followed test pilot school. Between 1954 and 1956, Gene participated in the testing of nuclear and thermonuclear weapons. The first tests in Arizona using a B–29, focused on the effect dropping nuclear weapons had on pilots. Subsequent testing, a series of high yield test detonations conducted at the Pacific Proving Grounds, included Operation Castle and Operation Redwing by Joint Task Force 7 at Bikini Atoll and Eniwetok Atoll. Gene flew co-pilot with Jim Bauer in both operations. The tests focused on load survey studying thermal and overpressure effects of an atomic blast on aircraft in flight. He remembered the tests in an oral history for the SETP. "There are things that happen when you explode the bomb: heat, pressure, and radiation. Radiation isn't too bad because you can get away from it. It's the heat and pressure wave. So they would try to position us from the bomb site somewhere in the various attitudes…so that we'd only get probably about eighty percent of the load. The problem was, no one could estimate what the hell the yield of the bomb was going to be. One of the first hydrogen tests, they were looking at eight megatons and it went fifteen."

On that particular flight, when the bomb went twice as high as expected, the question was, "What the hell do we do now?" They had to land light because of the short runway at Eniwetok, so they usually flew around for about an hour at low level to burn off fuel. But they weren't sure what an explosion at fifteen megatons had on the airplane. If the flaps were unusable, they'd go off the end of the runway. If the flaps went down partway and stuck, they wouldn't be able to reach Guam or anywhere for that matter. So the decision was made to leave the flaps up and fly to Hawaii where the length of the runway at Hickam could accommodate a no-flap landing.

Gene noted in the SETP interview another matter of concern. You couldn't get alcohol on Eniwetok, so the crew members would pick it up when they visited other bases and store it in the back of the plane. "Fortunately the guys at Hickam were more enamored by the airplane than searching it. They never found all the whiskey we had onboard."

In August of 1955, Gene was "signed off" in the Boeing B–52B, the first B model, by Colonel Guy Townsend. It was extensively instrumented to measure thermal blast and gust effects of a nuclear explosion. Pilot Charles G. "Andy" Anderson and Deatrick participated in eight "shots" in this aircraft including *Cherokee*, the first airdrop of a three-stage thermonuclear design. Over the course of his assignment to the Bomber Flight Test Division, Gene participated in thirty-eight nuclear tests but *Cherokee* stood out in his mind. "I'll never forget that. Fortunately, the position was such that we were just going away on the peripheral of the bomb blast. They brought in an airplane out from Albuquerque. I don't know much about the bomb system but he was doing a run going from visual to radar. Somehow it got screwed up, and he ended up with a 100 – 150 knot tailwind. I'll never forget, the countdown started, '60 seconds, 50 seconds, 40 seconds', and then the navigator yells, 'Get the hell out of here!' It went off early. Fortunately we were going away so we were well positioned, but, boy, I'll tell you, the bump when it comes, you know it! God help us if we ever use them."

Gene viewed one of the drops on Bikini from Eniwetok. In the SETP interview, he noted, "When the shot comes and the wind blasts, it's terrific. You could feel the surge of wind when it passes down there. I've long had a philosophy, if we get into a war and they shoot a thousand our way and we shoot fifteen hundred their way, what everyone should do is go out and watch it because it will be the most exhilarating sight you've ever seen. And then pray to God that you die three minutes later."

When Gene returned he wanted to get on the B–58 program but was told, "You've been here long enough. You're going to have to find a new job." That new job was as executive officer to General Howell Estes, Jr. According to Gene, Estes didn't really want an aide. He wanted someone who could fly with him, thus making Gene the highest paid copilot in the Air Force. Gene was fond of saying that "the only reason [Estes] didn't fire me was he liked my wife and knew she'd starve to death if he did, and so I stayed on. It was an interesting job."

When asked why he volunteered for Vietnam in 1965, Gene replied, "I was a graduate from West Point and the purpose of it is to fight for your country. I spent five years being an executive officer to a four star general who was commander of Military Transport at the time. I decided if I was ever going to fulfill my pledge to be a warrior, I had to volunteer to go to Vietnam before it ended and that's what I did."

Initially Gene wanted to fly F–100s and asked General Estes to help him get into them. But a chance meeting with General Pete Everest, an old test pilot at Edwards and a good friend, resulted in some advice. "You've never been in

Express-20 A-1 Skyraider Class.

Tactical Air Command (TAC), and if Estes gets you into F–100s, I can assure you that you'll probably spend your whole tour in Saigon behind a desk. My advice is you volunteer for the A–1, which no respectable fighter pilot would be caught in, but if you can get through a year successfully with that, you can get into TAC and do what you want."

That's what he did. After relocating his family to Los Angeles, he called a friend at Douglas Aircraft. "Can you get me a dash-one on an A–1 so I know what the devil I'm going to be flying?" His friend did better than that. He flew Gene up to Naval Air Station Lemoore. The first thing Gene noticed was that the A–1 had the R-3350 engine, the same engine they had on the B–29, which had an unfortunate tendency to catch on fire. His first thought was, "My God, I've volunteered for the wrong airplane!" The Navy captain that took him around gave Gene some advice, "Colonel, I want to tell you something. This is a 6G airplane with a 40G cockpit. Don't ever leave it." Gene flew 402 combat missions, never lost an engine and never bailed out.

General Michael Dugan remembered when Gene showed up at Hurlburt Field to train in the A–1. "All the people there had combat experience in T–28s or A–1s and here was this older lieutenant colonel who came from Military Airlift Command, I mean, he wasn't a fighter pilot like we were… he'd wear his wheel cap on the flight line and set it on the other seat… so there was a little snickering about that… It turns out that nobody looked up his background…It didn't take very long to figure out that this guy hasn't been where I've been but he knows a lot about where I've been and he knows where he's going."

The same thing was true when Gene assumed command of the 1st Air Commando Squadron located at Pleiku, Republic of Vietnam (RVN) in March 1966. According to General Dugan, who served under Gene in Vietnam, "The fighter pilots he commanded learned that he was a substantial aviator and grew himself into a fighter pilot as a senior officer. Not many people make that transition." In discussing Gene's leadership skills, Dugan went on to say, "A–1s had a terrific loss rate…the second highest loss rate

Gene Deatrick (center) with Simpson (left) and Eleazar Parmly.

in terms of pilots in Vietnam. We did quite well when Gene was in charge."

The squadron's primary mission was close air support and the A–1 was good plane for the job. You could fly at 1500 feet, stay for three or four hours, and do a lot of very good close air support. This was before the surface-to-air missile came along. That changed a lot when you had shoulder-fired missiles coming at you.

Gene's most memorable flight took place in July 1966 when he spotted Navy pilot Dieter Dengler. On February 1, 1966, Lieutenant Junior Grade Dieter Dengler launched from the USS *Ranger*. Visibility was poor and luck was not with him when he rolled his Skyraider in on the target. Hit by antiaircraft fire he went down in Laos. He was captured two days later and survived five months of torture before escaping on June 29, 1966. His son, Rolf Dengler, recalls Gene telling the story of his father's rescue, "Pipe in hand, eyes aiming up left towards the sky as if being back in his aircraft, Gene would begin..."

"It was a once in a lifetime coincidence. We were assigned that morning to take off at about eight o'clock."

The day's mission was scrubbed twice because of mechanical difficulties with the planes. Determined to get in at least one mission that day, Gene and his wingman, Andy, took off after lunch with full loads of napalm. The target area in northern Laos was a free fire zone, meaning anything that looked like the enemy could be bombed. The mountains, tops shrouded in fog, peaked at about 1500 feet with maybe 500 – 1000 foot visibility beneath the ceiling. Andy flew high to maintain contact with Danang. Gene went down on the deck.

The landscape was dense jungle with a river running down from the mountains. Because the wings of the A–1 are set into the fuselage right under the canopy, the pilot can see the ground directly below him only when he banks ninety degrees, and only for a few seconds. There was a bend in the river and when Gene made that ninety degree bank to the left, he saw a fisherman standing on a rock in the water waving what looked like a white net. Gene continued on for about ten minutes but something just didn't settle right. Natives don't wave to fully loaded airplanes. This was enemy territory with no friendlies. There wasn't a village in sight. It just seemed strange. He circled back over the river. The fisherman continued to wave.

Gene circled a third time and asked Andy if he could see anything.

"It looks like he's trying to write SOS."

They pulled off to the side and Gene called Airborne Command's C–121 controller in the area and asked if anyone had been shot down.

Negative.

Picking up somebody in enemy territory could be risky. The fisherman might be an enemy combatant calling for a rescue and, when pulled into the helicopter, set off an explosion and take them down. But the nagging voice that something was off kept at him. After a lengthy conversation that went all the way to Saigon they secured two Jolly Green Giants.

Two of his squadron mates escorted the helicopters in from the coast and Gene took the lead helicopter to the site. It couldn't get down very low because of the mountains. Gene held his breath when they dropped the penetrator cable and pulled Dieter into the plane. He only released it when the helicopter pulled away and didn't blow up. "I was scared to death," he remembered, "that he'd get up there and blow himself up."

Dieter and the six other prisoners escaped in pairs. He and Duane Martin, an Air Force helicopter pilot out of Military Airlift Command, made their way through the jungle together, barefoot. Unfortunately they ran into a couple of tribesmen and one of them decapitated Duane. Dieter fled back into the jungle and wandered around for another week before ending up on that rock. He later told Gene that he was trying to write SOS and just couldn't remember how to make an S.

People frequently congratulated Gene for finding Dieter but that's not how he remembered the rescue. "I didn't find him, God did. The fact that both airplanes had problems that morning on takeoff, the fact that we were in a free fire zone, just the fact that on the river we went the right way and I could see him….otherwise I would have just flown over and never knew he was there."

That wasn't the only time Gene conducted a rescue mission while stationed in Vietnam. Task Force Prong, commanded by Eleazar Parmly, was ambushed by the North Vietnamese Army (NVA) Sixth Battalion forces in the Plei Trap Valley near the Cambodian border on November 10, 1966. With the battle turning against him, Parmly radioed Captain Partridge, a Forward Air Controller working in the area. Gene related the conversation in an oral history.

"Do you know Colonel Eugene Deatrick, CO of the 1st Air Commando Squadron at Pleiku?"
"Sure do."
"Tell him his classmate is in deep shit down here."
"So they called me and I got a pair of us airborne and we did some close air support and got Lee home."

As Commander of the 1st Air Commando Squadron, Gene worked closely with the ground forces. He strengthened the bonds between the pilots and the people on the ground in a number of ways. He made arrangements with the general on the ground to fly their pilots in the empty right seat of the A–1, reinforcing the feeling that the Air Force had a good picture of the camps. He also sent his pilots into their camps so that the Air Force would understand what was going on when the troops were under attack - the perimeter, the firing, and everything - and if they were to escape, how they would go. "Each camp had one of my pilots go through it, which brought us closer together. They were Special Forces camps. It helped us provide close air support for them."

Gene had a couple of close calls during his deployment to Vietnam. One he related to Dana Kilanowski in his SETP oral history. "I was getting ready for a two week R&R in Hawaii with my wife. We went on a bombing mission on a bridge, dropped the bombs, and climbed up to 5,000 feet. I'm flying along and I smelled smoke. A couple of red lights came on. I opened the window a little bit and, from under the right seat, a sheet of flame came up and went out the window. I closed the window. The fire had burned through my controls to the aileron. I was having a hell of a time. I was going down and wondered, 'should I bail out or stay with the plane?' Then I remembered something Bob Hoover said, 'If you're faced with a forced landing, fly the thing as far into the crash as possible.' So I kept going… Fortunately, my wingman realized I was in trouble so he guided me over to a marine base where I bellied in. I called my wife and explained that I wouldn't be meeting her in Hawaii. I just couldn't go and have a good time and then come back to all that bullshit."

There was another time Gene was almost shot down. He ended up bellying in at Pleiku. As he climbed out of the cockpit, an intelligence officer ran out to the flight line, "I won the bet!" "What bet?" "I bet you'd climb out of the cockpit with your pipe in your mouth."

In typical Gene fashion, when Dana asked him about receiving the Distinguished Flying Cross, the Air Medal and the Bronze Star for Valor, he answered, "Oh, a couple of little missions, someone put me in."

They weren't just "little missions." For example, Gene received the Bronze Star with the V for Valor when the base at Pleiku was mortared one night. The attack only lasted about ten or fifteen minutes but as Gene recalled it, "They just walked mortars right down from one end of the base down past our containment. I went out and moved some airplanes while they were on fire, got them out of there. They were loaded... I wasn't thinking. I shouldn't have done it. We saved a couple of good airplanes."

Toward the end of his tour in Vietnam, Gene went down to Bangkok and met with General Ferguson, Commander of Air Force Systems Command. At dinner that night General Ferguson offered Gene his dream job. "How would you like to be Commandant of the Test Pilot School?" "When I got my ears wrung out and my head back on top, why, I said, 'I'd love it!'"

When asked about his biggest disappointment in the field of flight test, Gene said, "Having to leave it." He went on to say that commanding the Test Pilots School was one of the two highlights of his career, the other was commanding the 1st Air Commando Squadron in Vietnam.

After Test Pilot School, Gene attended the National War College and went on to the staff of the Joint Chiefs of Staff. His last assignment was Director of Test, Air Force Systems Command, Andrews Air Force Base, Maryland. He retired in 1974.

Gene flew more than 50 different types of aircraft and accumulated more than 12,000 hours of flying. He was awarded the Legion of Merit with one oak leaf cluster, the Distinguished Flying Cross with one oak leaf cluster, the Bronze Star with Valor and one oak leaf cluster, and the Air Medal with twenty-two oak leaf clusters.

When asked about his least favorite airplane, Gene replied, "There wasn't any least. I enjoyed every moment in every one of them. Perhaps the biggest thrill was finally checking out in the B–47. I always said the two most exciting flights were when I took off. Being essentially a bomber pilot, when I was forced to check out in the P–51, I never felt so much power in my life, so I had an enjoyable time flying that for a while. And when I had the school, I checked out in the F–104, and my first flight in that, I was going through 5,000 feet, my brain was still back on the runway. Those were two of the most memorable takeoffs that I can ever remember. But I enjoyed every one."

Those who knew Gene were struck by his humanity. Kathy La Sauce, the first female C–141 aircraft commander stated, "He was ahead of his time. He understood the importance of letting women serve… He took me under his wing." General Fogleman talked about Gene's kindness toward a number of retired officers including General Eaker, "Gene, without ever making a big deal about it…almost became an aide [to Eaker] in retirement." After he passed, Gene continued to look after his widow, Ruth. There are hundreds of stories of his thoughtfulness.

Perhaps, in closing, General Fogleman's words say it all, "Gene Deatrick led an exemplary life in terms of the kinds of contributions he made to our Air Force both as an active duty officer, a warrior, and also in retirement in the way he represented the Force. The National Aviation Club, Quiet Birdmen, and every organization he touched, his participation always made it better and he did it in the humblest of ways. As a result he's got a tremendous number of now aging folks who so greatly respected him." ■

The SA–2 and U–2: Secrets Revealed

John A. Schell

Francis Gary Powers (right), downed U–2 pilot on trial in Moscow.

Cold War overflight of the USSR provided critical intelligence updates of Russian long-range bombers, nuclear warhead production, ICBMs, and nuclear submarines. Collection of IMINT, ELINT, COMINT, and TELINT from airborne overflight provided intelligence data for U.S. nuclear weapons planning and targeting. Equally important, it was a basis for National Intelligence Estimates (NIE) and justification of congressional funding for more U.S. nuclear weapons, intercontinental bombers, land and submarine-based ICBMs.

In the early Cold War period, only airplanes were used for overflight and peripheral flight. These included RB–17, RB–29, RB–36, RB–45, RF–86F, P2V, RB–47, RB–50, RB–57, RB–69, RF–100, and the U–2. There were hundreds of missions. Many peripheral flights were intercepted, forced down or shot down with lives lost.[1] By the mid-fifties, Soviet air defense forces had improved, necessitating much higher altitude for overflight. The RB–57D was the first to establish a "somewhat safe" altitude (65,000 ft) through modifications. The U–2 was the first airplane specifically designed to fly higher than interceptors. The initial U–2s could reach a maximum altitude of 72,000 ft.

Wishing to avoid further provocation from overflight, President Eisenhower proposed "Open Skies" at the Geneva Conference in July 1955 to Premier Khrushchev. It would give the USSR access to U.S. air bases and U.S. overflight in return for the same within the USSR. Almost immediately Khrushchev rejected Open Skies.[2] U–2 flight test and pilot training were already underway. With the U–2, overflight could continue from a "safe" altitude. But there was disagreement within intelligence circles. Some thought it only a matter of time until the U–2 would be shot down by a surface to air missile. President Eisenhower was reluctant to approve overflights, believing they could poison mutual relations and possibly lead to hostilities.

Author's Note: My research began as a collaboration with U–2 historian Chris Pocock to construct a new map of the May 1st, 1960, U–2 shoot-down, as it truly occurred. That map with a discussion is posted by Chris on this link. https://dragonladyhistory.com/2020/05/01/u-2-mayday-shootdown-gary-powers/

This article provides new information on the shoot-down which has never been published in the English language. First-hand accounts of the Russian participants and records of SA-2 operation were classified and immediately hidden in Russian Military Archives. Translations from the Archives were used in preparation of this paper and secrets are now revealed, some sixty years later. Although the full story may never be complete, hopefully what follows will fill some important gaps. To provide context, I will begin by describing the U–2 and its sensors, the early U–2 overflights, and the SA-2 and its operation.

A-2 camera configuration. *(CIA photo.)*

Initial U–2 Configuration

All USSR overflights were conducted by the CIA. The rationale was a "CIA spy plane" would be less hostile to the USSR than a USAF military overflight. The cover story was that NACA (National Advisory Committee for Aeronautics which later became NASA) was conducting high altitude weather research.

For the early overflights, a Hycon Model 731 (A-2 camera) was installed in the Q-bay. It was a three-lens configuration providing overlapped stereo pair images on 9x18 inch frames of film. The cameras pointed straight down and +/- 37 degrees left and right. Each f8 lens had a 24-inch focal length resulting in 4-ft spatial resolution, looking straight down (nadir) at 70,000 ft altitude. The field of views were overlapped, providing stereo coverage in a 5x10 mi area at nadir. The collection coverage was 36 miles wide, 18 miles to either side.

U–2 Configured for CIA with NACA markings. *(NASA)*

Each film canister contained 1,800 feet of 9-inch-wide film, sufficient for recording a contiguous strip of imagery 2,856-mile-long. Typically, the cameras would be turned on/off over the target areas during the mission. The recorded image film was air transported to the U.S. for processing and analysis by the CIA after each mission.

The U–2s carried an ELINT receiver which made magnetic tape recordings of radar signals. A COMINT receiver made recordings of voice and low frequency radar. ELINT and COMINT recordings were analyzed after each flight. There were no U–2 defensive countermeasures for SAM radar systems or for SAM threat warning to the pilot.[3]

A drift sight was used to observe the terrain for navigation, observe the cloud cover, and align the cameras. It could be pointed up for day and night celestial navigation. Thru the drift site, the pilot could sometimes see interceptors coming up from below.

Verifying the "Bomber Gap"

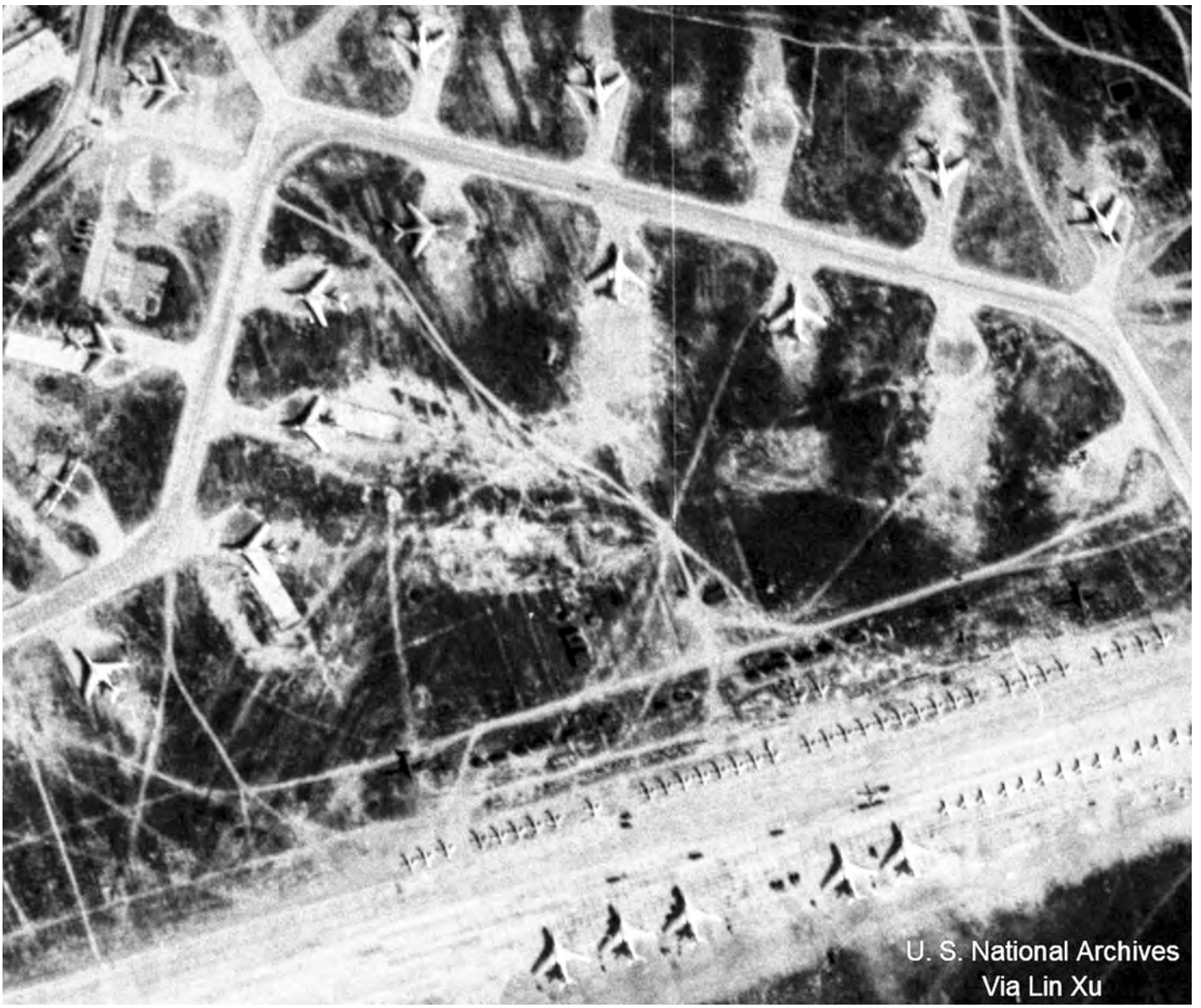
Starting with the May Day parade in 1955, the Soviets began showing their new, jet-powered long-range M-4 "Bison" bombers at parades and air shows. The same bombers encircled and flew repeatedly past spectators, giving the false appearance that there were up to 30 operational Bisons. At the same time, they were developing a new, turbo-prop long-range bomber, the Tu-95 Bear.

U.S. journals, magazines and newspapers carried articles speculating on a Russian lead in long range nuclear capable bombers. The U.S. Congress demanded concrete information about a presumed "Bomber Gap" of the Bison relative to B–52s. SAC generally supported the notion of a Bomber Gap which might result in additional funding for B–52 production. Although the CIA was much more conservative on the number, President Eisenhower approved initial CIA U–2 overflights to collect imagery.

The first overflight of the USSR occurred on July 4, 1956. Mission A-2013 was piloted by Hervey Stockman. Primary targets were the suspected long-range Bison airfields around Minsk and Leningrad.

The second overflight was the very next day. Mission A-2014 was flown by pilot Carmine Vito. He flew directly over Moscow and became the only U.S. pilot to overfly the Soviet capital city. As Vito's U–2 left Wiesbaden AB, it was immediately detected by long range early warning radars

John Schell graduated with a BSEE and MSEE in April 1970 from Penn State University and a reserve commission in the USAF. Entering active duty at Wright-Patterson AFB, he worked as a radar research engineer at the Air Force Avionics Lab (now Sensors Directorate). There he became project engineer on the spotlight mode synthetic aperture radar. That radar was the world's first high resolution (SAR) imaging system with controlled errors and consistent image quality. Subsequently, in 1976, he was assigned to the SR–71/U–2 Project Office at WPAFB. There he led the development of ASARS-1 and ASARS-2 radar prototypes for the SR–71 and U–2R, also serving briefly as the Chief Avionics Engineer, responsible for all SR–71 and U–2 mission systems. After separating from the Air Force in 1980, he supported ASARS testing and fielding, development of several image exploitation systems, and development of the RQ-4 Global Hawk. Retiring from industry in 2016, he lives in Dayton, Ohio and serves as a volunteer at the National Museum of the USAF. His passion is the Cold War era, about which he has made multiple presentations and written papers on the U–2 and SR–71.



U–2 Image of Baranovichi (Belarus) Airfield. ***(U.S. National Archives via Lin Xu.)***

inside East Germany. In his cockpit view sight, Carmine could see some of the MiG–17 and MiG–19 interceptors coming up well below. As he approached Moscow, the early warning radar near Smolensk detected his inbound U–2. Carmine flew over the Fili Bison airframe plant in southwest Moscow, and over Red Square. CIA analysts claimed that this one flight provided as much intelligence as was typically gained over a whole year.

Although the Air Force claimed that the Soviets had over 100 new M-4 Bison, the U–2 imagery proved this wrong. Not a single Bison or Bear was found at any of the nine long range bomber airfields imaged on the first two overflights. And there was no indication of significant production at the Bison plant. As seen above, Baranovichi Airfield had numerous interceptors and medium range Badgers, but no Bisons or Bears.

Mission A-2014 was planned to overfly Moscow at 0808 in the morning. The clock was recorded during flight onto the image film. It shows the U–2 was on schedule. As it flew directly over Moscow, a break in the clouds allowed an image of the Red Square and Kremlin. This is the only image of Moscow from a U–2 overflight.

As a result of both missions, the White House denied emergency USAF requests for more B–52 funding. By the end of 1956, with additional U–2 evidence, the CIA concluded that there was no "bomber gap".[4] The U.S. eventually built over 750 B–52s and the Russians built about 90 Bisons.

U–2 image of Moscow. ***(U.S. National Archives via Lin Xu.)***

SA-2 missile and launcher in the Urals. ***(VPK News. Ru [with permission.])***

Although Vito's U–2 overflew the USSR for over four hours and was detected shortly after leaving Wiesbaden, it was not shot down.

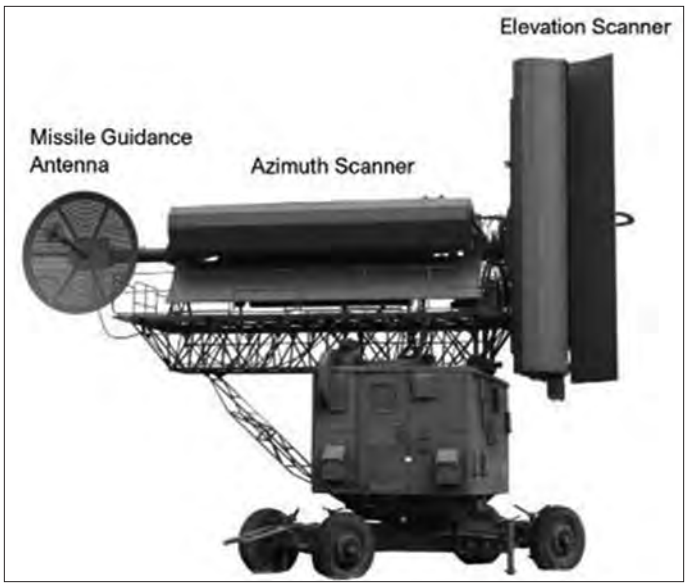
SA–1 Berkut surface to air missile sites encircled Moscow, yet the U–2 was not attacked. There was massive confusion within the Troops of the Soviet Air Defense (PVO). The missiles were not on their launch pads - they were in storage when the U–2 flew over! Something better was needed. And the Soviets were already working on it, the SA–2 Guideline Surface to Air Missile (SAM) System.

A SAM Designed to Reach U–2 Altitudes

The SA–2 Guideline began operation in January 1958. It was deployed to protect large cities, defense plants, and critical military sites. SAM defense was part of Soviet Air Defense (PVO), which also included air interceptor aircraft. Primary interceptors at the time were the MiG–17 and MiG–19 which had altitude limits of 55,000 and 60,700 ft. respectively. Neither of them could reach the U–2 cruise altitude of 65,000 – 70,000 ft. The pilot might see the interceptors coming up from below in his drift-sight, but they were not a threat unless a mechanical problem had forced the U–2 to fly lower.

Initially, the SA–2 Guideline missiles had max altitudes of 72,000 – 88,5000 ft and were fully capable of hitting the much slower moving U–2. And the U–2 pilot had no electronic warning. If he did see a missile coming up in the drift sight, the pilot could make a hard turn to avoid being hit. (The U–2 had a shorter turn radius than the missile.)

The question became, could Soviet radars detect and continuously track a U–2? CIA analysts confirmed from the ELINT tapes that U–2s were surely being detected, but they were unsure of the continuous tracking by SA-2 radar required for a kill.



Fan Song Radar (RSN-75). ***(SIMHQ [public forum])***

Detecting a U–2

Detection was the easy part. Initial low frequency early warning (EW) radars such as the Knife Rest and Token had about 150-mile range. By 1959, improved EW radars (Tall King and Bar Lock) provided 250-mile detection range and could determine elevation, range and bearing of an incoming U–2. This was electronically reported to PVO District HQ which could scramble interceptors and alert the appropriate SAM Battalions and their missile batteries.

Tracking a U–2

Tracking was complex both in terms of the radar operations, launch operations and procedures. Once the approaching U–2 information was received, incoming target acquisition was made by radar. All battalions had a Spoon Rest (P-12 Yenisei) radar for acquisition. Its antenna rotated 360 degrees and measured U–2 range, elevation, and bearing out to about 125 miles. The P-12 had an IFF interrogation function to separate friend from foe.

Rapid acquisition was important for timely tracking initiation by the Fan Song (RSN-75). Hand off was verbal (by radio) and electronic (to a remoted display inside the RSN-75 operator van). The RSN-75 radar was slewed to the bearing and elevation angle of the incoming U–2 to initiate track. Operation proficiency was essential to successful SA–2 launch. One RSN-75 was at each battery, capable of simultaneously tracking one target and three missiles. A salvo of three missiles was used to increase the probability of kill to about 90 percent.

It had a folded lens scanner design. The scanners each had a rotating feed horn at their ends which caused the beams to move left-right (azimuth) and up-down (elevation). The U–2 was tracked in x-y-z coordinates (range, azimuth, and elevation) without physically moving the antenna. It could establish a U–2 track at about 60 mile (100km) range. Tracking data was fed to a computer which

Spoon Rest Radar (P-12 Yenisei). ***(Wikimedia Commons.)***

determined when a missile could be launched. Once launched, the missile was tracked and guided by the small parabolic antenna. It is important to note that although tracking and guidance could be performed manually, automatic tracking and guidance were normally used.

Launching and Arming a Missile

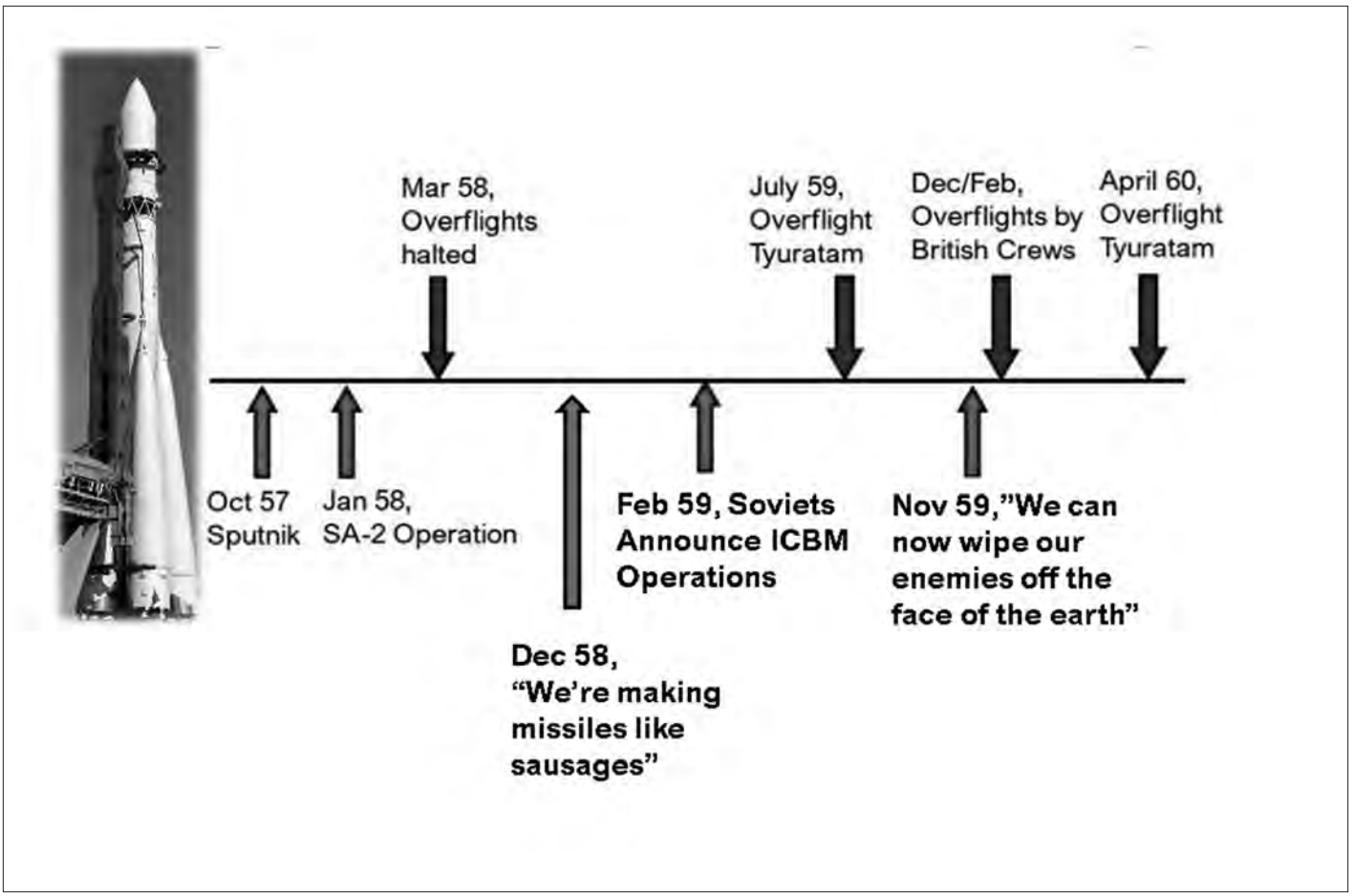
Up to three missiles could be launched five seconds apart. A launch command was given by the battery commander and executed by the launch officer. After the first stage solid fuel rocket separated (four seconds), the second stage liquid fueled rocket ignited. A beacon near the tail transmitted a signal to Fan Song. By comparing the missile x-y-z location to the U–2 x-y-z location, the computer determined the intercept point and generated command guidance corrections needed for intercept. Command guidance was uplinked to the missile.

Once the missile was within lethal distance of the aircraft, an arming command was given by the battery commander and executed by the launch officer. The arming signal was sent by uplink thru the guidance antenna. Once armed, a radio beacon in the missile determined proximity to the U–2 for warhead detonation. If intercept did not occur, the missile self-destructed about a minute after launch. If not armed, the missile fell inertly to earth.

Verifying the "Missile Gap"

Shortly after the USSR launched Sputnik (using the rocket that later became its first ICBM), the SA–2 Guideline became operational. Although the U–2 provided high value imagery, not available through other means, President Eisenhower was increasingly worried that further overflight would poison upcoming arms talks. He withdrew overflight authorization in March 1958. By then, 19 USSR overflights had been flown by the U–2.

Just as the Soviets had previously goaded the West into believing they had a long- range nuclear bomber advantage, they now began a propaganda campaign to assert an ICBM nuclear missile lead. The CIA had observed in-



Timeline leading to May 1, 1960. ***(J. A. Schell)***

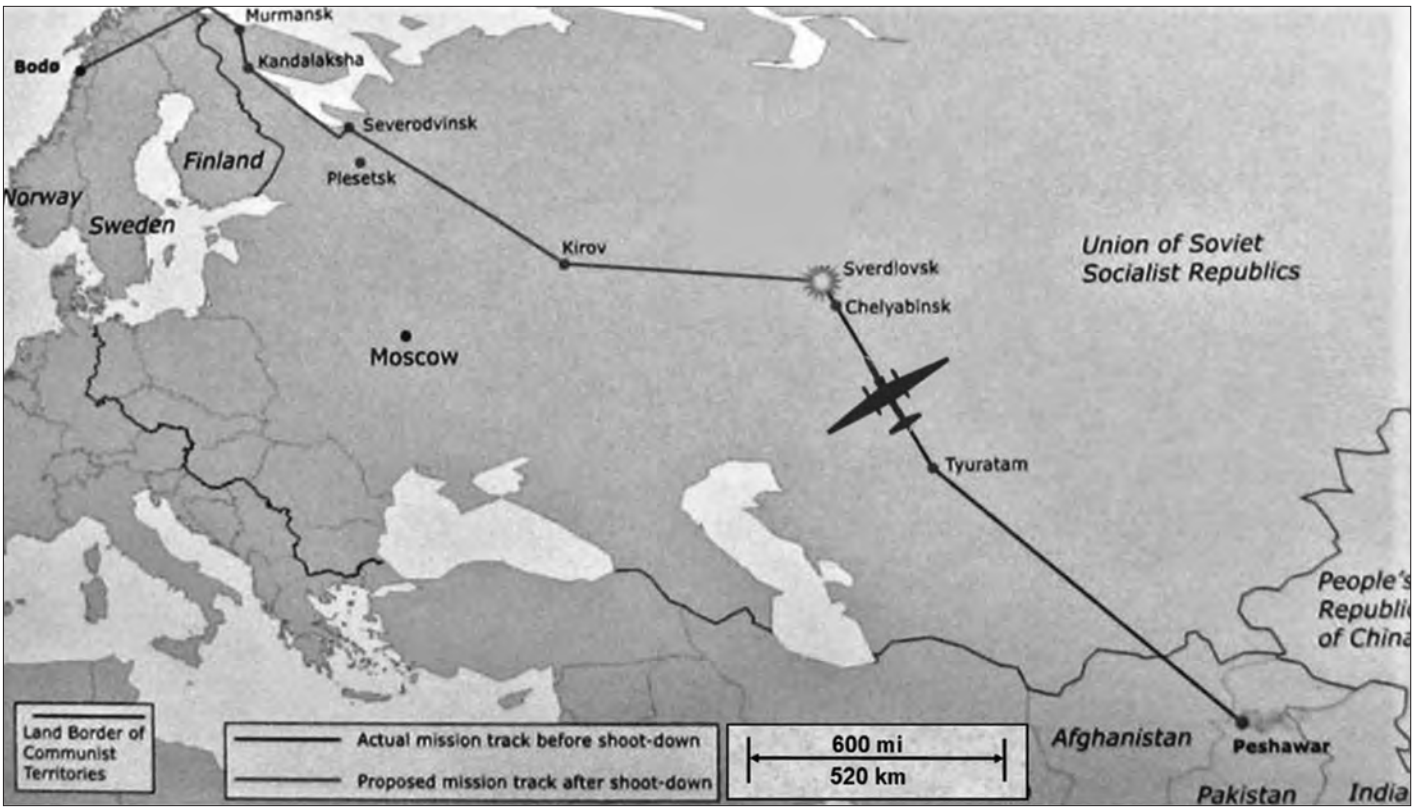
creased construction of ICBM facilities from imagery already collected. In February 1959, the Soviets falsely announced operational readiness of their R-7A ICBM missile. Premier Khrushchev added to the hype with public announcements such as "we're making missiles like sausages" and "we can now wipe our enemies off the face of the earth". Once again, the U.S. press and Congress demanded more information on a presumed "missile gap". In December 1959, the U.S. SECDEF estimated a future (5 year) Soviet 500 ICBM advantage which could wipe out SAC and all major U.S. cities. The CIA, with more information at hand, was not so sure the USSR had a ready capability. ELINT and TELINT was being collected by ground sites in Turkey, and peripheral flights by RB–47 and U–2 during Soviet ICBM range tests. The intercepts revealed that the Soviets significantly lagged U.S. ICBM launch procedures and operational readiness – but that information was highly classified at the time and was not releasable.

Under pressure, President Eisenhower reluctantly approved resumption of additional, limited overflights. Four U–2 more missions were flown between July 9, 1959 and April 9,1960. Targets included the ICBM test range at Tyuratam, the SA–2 training site at Saryshagan, the nuclear weapon test site at Semipalatinsk, and rail lines which transported the ICBMs.

From 1957, the U–2s were equipped with the new HYCON HR-73B. The panoramic B–Camera had seven "stop and shoot" positions of a single lens with overlapped frames to allow stereo viewing and height extraction. With improved f10, three-inch aperture lens design, the 36-inch focal length camera had a nadir resolution of 2.5 feet from 70,000 ft altitude. It recorded onto two overlapping 9 x 18 inch frames fed by two film contra-winding film magazines. If the inner three lens positions were used, a ground swath of 25 miles resulted. If all seven lens positions were used (mode 1), a panoramic ground swath of 650 miles (horizon to horizon) resulted. The extra wide coverage was used for analyst orientation to the main collection areas near nadir. The B–Camera had 3,600 mi of contiguous coverage, 25 mi wide, with full film load.

Overflights lasted four to nine hours, sometimes directly over a SA–2 battery. Yet the U–2 was never fired upon. After the April 9th mission, a high-level Soviet investigation revealed insufficient training on SA–2 radars and a serious lack of operations protocols. The SA–2 had been fielded for a year in the overflight areas and yet the PVO was unable to effectively operate it. The investigation also identified multiple missile maintenance issues and missile shortages. [5]

Khrushchev was outraged. Many PVO officers were reprimanded and demoted. Khrushchev personally blamed Air Marshall Biryuzov for not anticipating the routes and concentrating his forces. The entire Air Defense chain of command was now highly tense, and they began to anticipate possible future U–2 routes. This was the backdrop for the next overflight – that of Francis Gary Powers on May 1, 1960.



Grand Slam route. ***(C. Gibson and R. Hopkins, Spyflights and Overflights, Vol. 1, with permission of Crecy Publishing.)***

Operation Grand Slam

Operation Grand Slam was the twenty-fourth and final U–2 overflight. It originated from Peshawar, Pakistan and was to be flown no later than May 1. Originally planned for late April, there were multiple delays due to weather enroute and NATO exercises in Norway, the landing area. The Grand Slam route was 3,800 miles of which 2,900 miles was within the USSR. Estimated flying time was 9 hours, 55 minutes.

Francis G. Powers, with an ID as "USAF Air Weather Service GS-12, Francis G. Palmer", was selected to fly the mission. The U–2 selected was Article 360 (SN 56-6693). In his book *Operation Overflight*, Powers stated Article 360 was referred to as the "dog" for the many problems it had. Reportedly, a common problem was inability to consistently feed all wing tank fuel to the engine. (As it turned out, the autopilot failed four hours into the mission, but Powers decided to continue under manual control.) Article 360 was equipped with two slipper pods on its wings, each carrying 100 gal of reserve fuel. And it had the more powerful J75-P-13 engine which supplied 17,300 lbs. of thrust. It could climb to 75,000 ft. Grand Slam cruise was at 70,500 ft.

Targets included the ICBM test range at Tyuratam, a plutonium processing facility at Chelyabinsk, ICBM factories near Sverdlovsk, the now operational ICBM site at Plesetsk, and nuclear submarines at Murmansk.

Soviet EW radar (likely the Tall King and Bar Lock) detected the U–2 when it was still over Afghanistan. They were not present on the last (April 9) overflight. All Soviet commercial and general aviation were grounded as the U–2 approached Sverdlovsk from the south. As it approached, the Soviet Minister of Defense repeatedly called PVO Air Marshall Sergey Biryuzov, requesting U–2 status. Before he left for the May Day Parade, Premier Khrushchev also called Biryuzov. "It's a scandal", Khrushchev said, "the country gave all the necessary resources to the Troops of the Air Defense, yet you can't destroy a subsonic plane!"[6] Around Sverdlovsk, six SA–2 missile battalions were awaiting the U–2. They had been activated a few hours earlier that morning. And they were equipped with the latest Guideline, a Desna 13D missile which had a max altitude 27 km (88,500 ft), a max range of 34km (21 mi) and a kill zone radius of 32km (20 mi). [7]

The May 1 Shoot-Down – As It Actually Occurred [8]

As the U–2 entered the Sverdlovsk region, it approached the 5th Battalion from the south, but there was a delay in launch. The U–2 failed to respond to the Spoon Rest IFF as it should have. As the U–2 entered the kill zone, Brigade HQ gave the order to open fire. But there was a contradiction between Spoon Rest's moving target indicator and coordinates provided from Brigade HQ. This delayed the decision to fire. As the U–2 began to depart, the conflict was resolved and a command to launch two missiles was given by Commander Lt Col Novikov. Now there was another delay. The Launch Officer had forgotten to move the missile launch controls from "test" to "operate". A single missile was finally launched at 0846 AM just as Powers made a left turn to line up the U–2 on next leg toward southwest Sverdlovsk. He was now at the edge of the kill zone. The second missile never launched.

The missile and U–2 were automatically radar tracked. When it was within range, the missile was armed. It exploded and fragments hit the U–2 from behind. It is believed that the U–2 engine protected missile shrapnel from hitting Powers. This strike, which brought down the U–2, occurred at 0847 AM, about 25 miles south of Sverdlovsk and at the edge of the kill zone (19 miles) for the 5th Battalion.

After the strike, Powers was able to level the wings, but unable to control pitch. The nose just kept going up. That was because the tail section had separated, and the U–2 went into an inverted spin. Powers eventually pushed his way out, leaving a spinning U–2, tail section, and missile fragments moving toward another missile battery at Kosulino. The 2nd Battalion at Kosulino was able to launch a missile at 0852 AM. There was a launch delay until the Fan Song could establish track on a now much lower U–2. Launch occurred when the inbound U–2 was about ten miles away. After launch, automated radar tracking was engaged, although the warhead was never reported armed. This, the second missile strike, hit the U–2 at about 0853 AM. The airplane broke into several sections which fell near Kosulino. The 2nd Battalion was never able to launch a second missile.

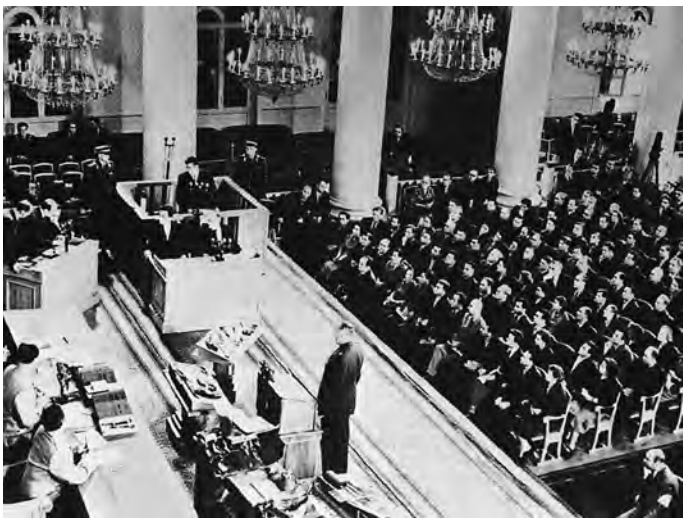
About 19 miles to the north of Kosulino, the 1st Battalion, at the direction of its Brigade HQ, fired three missiles at 0855 AM. But the U–2 was out of range, and all fell to earth unexploded. Although the HQ for the air interceptor forces and four of the SAM Battalions shared the same building at Koltsovo airfield, the staff did not coordinate with each other. Even worse, there was competition for the kill. The air interceptor commander, Gen Savitsky, disbelieved the initial SAM report. He sent a Su–9 airborne from Koltsovo with orders to search for and "ram the U–2". The Su-9 was unarmed, but it could climb to altitude. When it returned unsuccessful, he hurriedly ordered two MiG–19s aloft at 0843 AM. In their hurry to leave, it is believed the MiGs forgot to reset their IFF transponders from April to May

About 24 miles to the west of Kosulino, the 4th Battalion eventually detected one of the MiG's on its Spoon Rest within their zone. They did not receive a proper IFF response and believed it to be the U–2 at a lower altitude. They were given permission to fire from their HQ at Koltsovo. Three missiles were launched at 0922 AM. One of them made an intercept, bringing down the MiG–19 and killing Soviet 2nd Lt Sergei Safronov at 0923 AM. This was over 30 minutes after the U–2 was first hit.

Gary Powers was captured, sent to trial, imprisoned, and eventually traded for a Soviet spy. Lt Safronov was posthumously awarded the order of the Red Banner. Eight missiles from four SA–2 battalions had been fired in less than one hour. One U–2 and one MiG–19 had been destroyed.

Secrets Were Hidden

Air Marshall Sergey Biryuzov met with his General Staff at Air Defense HQ in Moscow. With only fragmented



Gary Powers at his trial. ***(CIA via C. Pocock.)***

reports from the field, he needed something coherent to report to Khrushchev. They came up with a story and Biryuzov hurried to the May Day parade.

Whispering into Khrushchev's ear, he said, "Two missiles were launched against two close targets that had merged as one blip on the radar display. After the airplanes separated, one missile struck the U–2 and the other missile stuck a MiG–19 which had given chase." [9] From the missile launch cards, we know this is not even close to the actual chain of events that morning. And Biryuzov knew it too.

On May 2nd and before the official investigation, the Soviet press informed the Russian citizens and global community that a foreign spy plane had been shot down near Sverdlovsk by Air Defence units led by Maj M.R. Voronov and Capt N.I. Sheludko.[10] Soviet TV interviews followed. Voronov, Sheludko, and members of the 57th Brigade received many awards. (Air Marshall Biryuzov was later promoted to Chief of General Staff.)

During interrogation and trial, Gary Powers disclosed the route, the mission, the explosion from behind with tail separation, the inverted spin, his escape, and capture.

Yet it was 5th Battalion of the 37th Brigade commanded by Lt Col Novikov that really shot down the U–2. Even without the second strike, the U–2 was down. But they received absolutely no recognition. Today, all accounts of the shoot-down discuss only missiles fired from the 2nd Battalion commanded by Maj Voronov.

Although the investigation report went to the Minister of Defense, neither he nor Premier Khrushchev were provided a complete or accurate account. The debriefing notes, the missile launch cards, and all records pertaining to the shoot-down were immediately classified and sent to the Ministry of Defense archive at Podolsk. Missile crews were told by a Colonel conducting the investigation; "It's easy to be wise after an event, you should never discuss this (your involvement) with others." For over fifty years, they held their silence, although most knew the official report did not hold water. In February 2012, after years of research in the archives, Col (Ret) Boris Samoylov published a series of unclassified articles discussing the investigation, the surveillance/firing cards,

Air Marshall Sergey S. Biryuzov. *(Mil.ru)*

and personnel interviews. (Samoylov was a trained radar engineer and was the deputy commander of the 5th Battalion under Novikov.

It is obvious to me that the records were immediately classified and buried to protect the Air Defense Forces and their Commander from further criticism. Especially so, in view of the recriminations after the April 9, SA–2 failures. Official reports which cast further doubt on their capability would assuredly lead to further reprimands and demotions.

There was a severe shortage of trained personnel, a shortage of missiles, and a lack of cooperation between the fighter interceptor troops led by Gen Savitsky and the surface to air missile troops led by Gen Kuleshov. The lack of cooperation went all the way down the chain of command.[11]

Secrets Revealed – The Investigation Report

The following information was recovered from the classified archive by Col (Ret) Boris Samoylov. The extracts are from the official investigation report from Commander Air Defense Forces Marshall S.S. Biryuzov to Minister of defense Marshall R. Ya. Malinovskiy.

Investigators interviewed all battalions in the Sverdlovsk region. The 5th Battalion was able to provide detailed descriptions of their engagement but they were disbelieved. The SA–2 had never engaged a target that was departing. The rules of engagement only dealt with approaching targets. In addition, the investigators tried to persuade members of the 5th battalion that the U–2 turned 180 degrees after their missile was fired, thereby avoiding a strike. But their radar cards documented otherwise.

Investigation Report: "The 5th battalion carried out the first launch, but the U–2 was out of range."

This ignores the fact that the U–2 was in range, as established by reconstruction of Maj Powers account of where and when the U–2 was hit. After the shoot-down, SA–2 rules of engagement were modified to allow SA-2 missile launch at departing targets.

Investigation Report: "The U–2 was hit from the rear by missiles from 2nd and 1st Battalions".

This obviously is tailored to fit the narrative told to Khrushchev at the Parade. We know (from Gary Powers recollection in his book) that he was hit from behind about 25-30 miles south of Sverdlovosk. At that location, the missile could only have come from the 5th Battalion. The second missile to strike the U–2 was fired by Voronov of the 2nd Battalion. It is believed that after the second strike the U–2 broke into pieces which fell around Kosulino and were recovered. And the U–2 never entered the kill zone of the 1st Battalion whose missiles fell undetonated.

Investigation Report: "The U–2 turned 180 degrees as it approached the 2nd Battalion. Passive radar jamming from the U–2 was observed on displays".

Again, tailored to a narrative. The U–2 did not turn 180 degrees. Powers had already pushed his way out, and the U–2 was in an inverted spin as it entered the kill zone of the 2nd. If it had not been struck and pushed toward Kosulino, the U–2 would have never entered the 2nd Battalion zone.

The U–2 had no passive or active jammer for the SA–2 radar. Their Fan Song was detecting the disintegrating U–2 and fragments of the first missile, which they attributed to chaff. They had never been trained on a target at high altitude and were unfamiliar with what their display should look like after warhead detonation.

Investigation Report: "The 4th battalion was given the job of finishing off the U–2. A MiG–19 was mistaken for the U–2 and was shot-down".

This is misleading and covers up a lack of PVO staff coordination. The U–2 was on the ground when the MiG was shot down. If the Commanders coordinated , the two MiGs would have been returned to base after the first missile hit the U–2.

And if they had set the proper IFF, a missile would not have been launched. The Spoon Rest IFF interrogator at 4th battalion had tested good earlier that morning, so it should have operated properly.

Secrets Revealed – SA–2 Operations and Maintenance

The Archives documented several missile crew training proficiency errors. SA–2 operation was complex and highly technical. Most crews had only partial training. Only one crew, the 5th, had trained on a target at U–2 altitude.

The rules of engagement (ROE) were incomplete and were not formally documented. This, almost a year after the SA–2 became operational in the Sverdlovsk area. And missiles were in short supply.

There had been an extensive radar calibration at the 5th Battalion on April 30. Their Spoon Rest acquisition radar should be working properly. The incoming U–2 was being forwarded from a radar at Brigade HQ over a land line. This had a small time delay. The delay was likely the cause of the discrepency in hand-off of U–2 coordinates from Brigade to the 5th Battalion's Spoon Rest. While we are uncertain how this was resolved, we do know it delayed the launch decision by several minutes. Much further delay would have resulted in the U–2 escaping shoot-down.[12]

Launch of the first missile was additionally delayed by the launch officer at the 5th leaving the firing switches set to "test" rather than "operate". An electronic test is performed at start-up and the switch should have been changed to "operate" at the conclusion of the test.

It is unknown why the 5th could not launch a second missile - except to say it was reported as a "technical failure". This would indicate an electrical or mechanical malfunction and a possible maintenance problem.

It is worrisome that there were several instances of crews not being able to understand what the Fan Song radar display was showing and quickly taking appropriate action. They attributed fragments from the detonated missile and U–2 debris as "passive jamming".

Two of the six SAM sites surrounding Sverdlovsk were inactive with radar maintenance problems that should have been found and fixed the night before. The sites were activated only two hours before the U–2 arrived that morning.

Summary

Khrushchev's boasts were propaganda to project Soviet strengths in areas of weakness. He was in fact fearful that the U.S. would discover how far the Soviets were behind.

According to his son Sergei, Khrushchev had brought home an Open Skies brochure that President Eisenhower gave to him at the 1955 Geneva Conference. It had high resolution aerial photos which impressed the Premier with their detail. The reason he denied Eisenhower's Open Skies offer was "Father feared that the West might be tempted to launch (a first) nuclear strike if it learned how weak its opponent really was."

We know from overflight that the Bisons deployed to air bases in limited numbers, and factory production did not appear to be high. We know from RB–47 ELINT and actual telemetry from ICBM testing that the Soviets were far behind in their refinement of launch and control procedures for ICBMS. We learned from U–2 imagery the actual status of ICBM site construction and operation.

Some 60 years later, the full account of May 1, 1960 is still unfolding. There are many discrepancies in reporting, some by "fog of war" and some on purpose. I hope that "The SA–2 and U–2, Secrets Revealed" provides both a perspective and further clarity on what truly occurred on that fateful day, May 1, 1960.

Postscript

On October 27, 1962 Maj Rudolf Anderson was shot down by an SA–2 after imaging Soviet MRBM sites in Cuba.

Within the next few years, the Soviets mastered operation and maintenance of the SA–2 system. Thousands of PVO troops accompanied the SA–2 introduction into North Vietnam in 1965. Initially they performed all operation and maintenance, and eventually they trained the North Vietnamese. Our Wild Weasels became a critical resource to offset the significant SA–2 threat to U.S. air operations over North Vietnam.

The SA–2 was the most widely deployed SAM system of all time. It is now retired from all locations.

The U–2 has continued to operate and improve its reconnaissance capability for both strategic and tactical needs. Today it employs worldwide real time transfer and processing of data. Only the B–52 has a longer operational lifetime in the USAF. Without question, the U–2 is the most prolific U.S. reconnaissance airplane of all time. . ■

NOTES

Acknowledgements

I want to thank Chris Pocock, the world's foremost U–2 historian and author, for generously supplying source materials and his time to thoroughly review this work. I could not have completed the research or this paper without his expert help.

I also want to thank Lin Xu, a Cold War historian, for contributing U–2 camera information and imagery that he gathered from the U.S. National Archives. Lin's help has greatly improved this paper.

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4. *Ibid*.
5. Ret Col Alexander Orlov, "The U–2 Program: A Russian Officer Remembers" CIA/CSI Public Symposium, Sep. 17, 1998.
6. Pocock, *50 Years of the U–2*.
7. Steven J. Zaloga, *Red SAM: The SA-2 Guideline Anti-Aircraft Missile*" Osprey Publishing, 2007. The maximum Desna 13D missile range is exact, the kill radius is a calculation.
8. Launch times are from the missile launch cards recorded by each missile battalion, stored in the Ministry of Defense Archive at Podolsk, as reported by Col (Ret) Boris Samoylov
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10. Boris Samoylov (Col Ret) "The Secret of the May Day Shootdown 1960", Translation from *VPK* (Military Industrial Courier) *News*, Feb 2012
11. Pocock, *50 Years of the U–2*.
12. Report — Commander of 4th Air Defense Division report to Marshall Biryuzov, May 5, 1960 as referenced by Samoylov.

Mexicans in World War II: America's Ally of the Air

SS Potrero del Llano was an oil tanker built in 1912. She survived service in the First World War, only to be torpedoed and sunk by a German U-boat during the Second World War while sailing under the Mexican flag off the coast of Florida. Her sinking contributed to Mexico's decision to enter the war on the side of the Allies.

Cynthia Buchanan

In the face of Germany's casus belli in 1942, when Nazi submarines sank Mexico's oil tankers and killed her merchant sailors in the Atlantic, Mexico declared war on the Axis Powers. The Mexico-United States Defense Commission marked a monumental alliance under the aegis of Franklin D. Roosevelt and president Manuel Ávila-Camacho. Never before in Mexico's history had this republic ever fought on foreign soil. In 1944, her government sent the Mexican Expeditionary Air Force to the United States to train under the U.S. Army Air Corps.

The legendary Escuadrón 201 de Pelea, known as "Aguilas Aztecas," consisted of 300 volunteer airmen, thirty-six of them pilots, and all marched across the international bridge at Laredo, Texas, bound for San Antonio ("Alamo City") to enlist at Randolph Army Air Field. On the Texas-Mexico border and Gulf Coast they piloted P–47 Republic Thunderbolt fighter-bomber aircraft, the famous "Jug" that would serve them in 1945 combat, as part of the USAAF 58th F.G. in the Pacific, under the command of Gen. Douglas MacArthur. Based on Luzon, 201st Mexican Squadron flew long-distance fighter sweeps plus a mission to support a battle ship bound for Okinawa, in the event of kamikaze attacks.

After the atomic bomb was dropped on Japan in August, the "Aztec Eagles" remained in the Philippines to mop up Japanese' intense resistance in the mountains. In October the unit sailed for California to board their "victory train" heading through a Southwest that once belonged to Mexico and were wildly cheered by crowds at whistle stops in Arizona, New Mexico, and Texas, pausing in Del Rio, San Antonio and Laredo before crossing the Rio Grande to travel on to Mexico City.

The national November 20 holiday commemorating the Revolution was held two days early to celebrate historic Mexican Expeditionary Air Force, whose leaders Gen. MacArthur recommended for U.S. medals. Escuadrón 201 put its country on the map as an international presence, defending Mexico's honor with valor, announced President Manuel Ávila-Camacho, decorating them at a heroes' parade.

Dedicated to the Memory of Dr. Bruce Ashcroft (1951-2007)
US Navy & Naval Reserve (Ret.)
Staff Historian AETC Training Command Randolph AFB • San Antonio

President Franklin D. Roosevelt and President Manuel Avila-Camacho at a state dinner in Mexico in 1943.

The Good Neighbor Policy

The "Good Neighbor Policy" for U.S. ties with Latin America was in place long before World War II. This cross-border urgency, among other stimuli, dated back to Germany's sub rosa role in the Mexican Revolution overlapping the years of the Great War 1914-1918 and not to exclude German spies, U.S. intrigue and Krupp arms for the Revolution shipped to Mexico through the Texas border region.

During the epochal violence in Mexico, along the Texas frontier daredevil U.S. government pilot Jimmy Doolittle in 1919, flew a biwing DeHavilland 4B, patrolling the border against incursions by Pancho Villa and his Golden Cavalry. At Del Rio on a dare Doolittle flew under the high bridge that spanned the yawning canyon of the Pecos River.

In World War II, as retaliation for Pearl Harbor, five months later he led a swarm of B–25 medium bombers off the Pacific aircraft carrier USS *Hornet*. "Doolittle's Raiders" undertook the first strike against Japan on April 1942, boldly bombing Tokyo and the main islands of this ancient Nippon. Doolittle was awarded the Medal of Honor.

Thirty three days after Doolittle's bombardment of Imperial Japan it happened that German U-boats torpedoed and sank two Mexican oil tankers in the Battle of the Atlantic. On May 22 when Mexico declared war on Germany and its Axis henchmen, Mexico's role as an Allied Power kicked in monumentally.

In the meantime, Jimmy Doolittle as a lieutenant general in the Mediterranean Theater of Operations was gearing up with the Western Allies for the Anglo-American invasion of Nazi-occupied North Africa. History-cracking desert war meant Rommel's Afrika Korps with Tiger tanks on the ground and Goering's *Luftwaffe* in the skies.

After Allied victories of 1942 and 1943, the sub-Saharan climes were dotted with camp tents and barbed wire enclosing German prisoners by the thousands. Round about lay obliterated tanks of the SS Panzer Korps and blackened hulls of Messerschmitt bombers and fighter aircraft. It was then Doolittle, as commander of North African Strategic Air Forces, hosted Col. Antonio Cárdenas Rodriguez, chief of the Mexican Air Force on his good will tour, a reflection of Mexico-U.S. Defense Commission.

A military pilot educated at Escuela Militar de Aeronáutica and Colegio Militar de México, Cárdenas was no stranger to deserts. Born in the rugged, revolutionist state of Coahuila bordering Texas, he was deployed at conflicts in the Sonoran Desert neighboring Arizona once. That combustive engagement was the least of his experiences in the xeriscapes of the Mexican wilderness. His formal duties in Mexico City, Distrito Federal, led to Cárdenas meeting Doolittle during the pilot's diplomatic venues in Latin America when the Great Powers keened to the drums of war. Apparently, Col. Cárdenas was among officials to greet Medal of Honor winner Jimmy Doolittle. History's man, who taught Japan a mindless air raid by its Imperial Navy at Pearl stirred up the "sleeping dragon" of the American war machine, indeed.

When Mexico entered the war as a belligerent in 1942, the Mexico-U.S. Defense Commission was already in place as hemispheric protection. The U.S. State and War Departments lost no time in arranging Col. Cárdenas' trip across the Atlantic to liaise with war zone leaders in 1943. He flew to Britain, then with a handful of officials toured the Mediterranean in his role of observer and commander of the Mexican Expeditionary Air Force while in the U.S. select MEAF pilots were flying new war planes supplied by President Roosevelt's ongoing mobilization and urgent programs.

In the Philippines in 1945 as Escuadrón 201 entered

Cynthia Buchanan holds an M.A. in Creative Writing from the University of the Americas in Mexico and was awarded a Fulbright grant in Creative Writing in Spain. She has published in The New York Times, The Washington Post *and* Newsweek, *among others. Her first novel* Maiden, *taught as an American classic at Harvard, NYU and UCLA, was optioned for film by Lily Tomlin. In 2021, Buchanan has finished two darkly comic novels.* The Scarlet Spaniard *is about Spain's Civil War and anti-Fascist guerrillas.* Cowgirl Polygamy *as satire is set in the Spanish Southwest. "Mexicans in World War II," the result of Buchanan's interviews with Squadron 201 veterans, is from her book project* Aztec Eagles of World War II: Mexico's Heroes, America's Brothers. *Taught as micro-history at the Naval Academy by Capt. Chris Hemler, USMC, the curricula is also under consideration at the U.S. Air Force Academy. Links for educators are at* www.bit.ly/fictionforce *and* https://www.gofundme.com/hispanic-heritage-graphic-novel-for-education.

Col. Antonio Cárdenas Rodriguez, chief of the Mexican Air Force.

combat under the momentous command of Douglas MacArthur they knew that during his titanic career the General had "been to" Mexico. Considered himself a friend of the Mexican Republic. In South Pacific offensives "Aztec Eagles" saw undeniably how he coordinated the Army Air Forces with the sea-dominant campaigns of the U.S. Navy's Adm. Chester Nimitz.

Japanese for generations settled in Mexico as did Germans in the pre-Revolution empire and during the Great War were a geflecht of espionage and intrigue, Germany shipping arms to Mexican revolutionaries. By the 1930s Hitlerian propaganda and Axis foment added a nightmarish ambiance to daily life in Mexico and it was feared Japan would invade at Mexico's vulnerable Pacific coast in World War II.

On the Atlantic in 1940 an antiquated bomber of the Mexican Air Force on anti-submarine patrol near Tampico spotted a U-boat. The pilot released his modest payload but missed the invader altogether. In 1942 and 1943, when U-boats in the Battle of the Atlantic sank Mexico's government-owned oil tankers leaving Tampico in the Gulf of Mexico, the tonnage was headed to the U.S. Whether the Allies and Hitler-ravaged Britain needed crude oil or fuel oil for war production, petroleum-rich, tungsten-rich Mexico was crucial to President Roosevelt's focus on the Republic of Mexico. By 1943, Germany's submarine fleet had torpedoed eight Mexican oil takers, sending sailors and a captain to their deaths in the Atlantic. It was during the "Operation Drumbeat" U-boat offensive that the United States almost lost the war—"our darkest hour"—while the exuberant Kriegsmarine called this death circus on the high seas "The Happy Time." ("Die glückliche Zeit.) After U-boats sank Mexican ships in the Atlantic, president Manuel Ávila-Camacho in 1942, offered to send a military force to the U.S. as martial compadrazgo. His proposal was still being negotiated by diplomats of both countries well into 1943.

Col. Antonio Cárdenas Rodríguez, commander of the Mexican Air Force and the new and untested Escuadrón Aéreo de Pelea 201, was a year away from deployment in the South Pacific. In spring 1943 he was still touring that Mediterranean Theater of War, welcomed at the Supreme Headquarters of Allied Expeditionary Forces and hosted by 5th Army officers. Having met Gen. F.W. Clark as well as Col. Elliott Roosevelt of the USAAF, the Mexican officer visited North African bases to observe Anglo-American troops, gaining a grasp of Allied Armies at Casa Blanca, Algiers, and Tunis. His Saharan junket provided Cárdenas a view of Bizerte prison camps, 800 German POWs behind barbed wire..

All said, his most exhilarating education under the Western Allies was the mentorship of none other than SHAEF's Gen. James Doolittle. It was the stuff of warfighting daydreams for military pilot Cárdenas when Doolittle, commanding general of the Fifteenth Air Force in the Mediterranean, embedded his Mexican guest in the 97th Heavy Bomber Group out of French North Africa. B–17 Flying Fortresses protected by P–38 fighters were preparing to demolish the Luftwaffe's air base at Castelvetrano, Sicily, for one. Doolittle arranged for Cárdenas to attend briefings and finally, to "collaborate in bombing missions over the enemy front," for an entire month, as Cárdenas effused in his 1949 memoir Mis Dos Misiones. Doolittle's coaching and solicitation empowered the Mexican aviator to achieve "my goal of learning about modern air war."

Upon Col. Cárdenas's return from Mediterranean battle sites, he received a glowing testimonial typed on letterhead of the Strategic Air Force of Northeast Africa and signed by Doolittle to memorialize Cárdenas' trip to the combat zone plus his role in four bombing missions against targets in Italy, flying with 97th Heavy Bomber Group. It was a pleasure "to have you with us...so you could have the opportunity of going on bombing missions and participating in our operations" that proved "an advantage for us and we'll always be at your service and the nation you represent." The letter was dated May 22, 1943, one year to the day after Germany's "unspeakable aggression against Mexico" which provoked its declaration of war against a tripartite Axis of Germany, Italy and Japan.

Thirteen months afterwards Doolittle led the Eighth Air Force in the Allied invasion of Normandy on June 6, 1944, while Antonio Cárdenas was in Mexico and in the U.S. training the MEAF's 300 volunteers. Five weeks later they crossed the international frontier at Nuevo Laredo, destination "Alamo City" San Antonio, Texas. At Randolph Field—"The West Point of the Air"—the Mexicans were processed per ground crew assignments to support 36 pilots. Some of the "Aztec Eagles" visited the Alamo, and preumably took in cinema at gilt-pillared Aztec Theater, perhaps John Wayne in "The Fighting Seabees." After their Randolph Field programming the Mexicans were dispersed throughout the U.S. to train and to "stand ready to

shoulder your share of the burden of combat" against the brutal empire of Japan. "Do not underestimate this enemy."

The Air War in the Pacific was in the hands of Gen. George C. Kenney when the Mexican Expeditionary Air Force fought as part of USAAF. As mentioned, many of the 201st Squadron pilots were polished aviators, some having trained in the U.S. in the Navy and Army Air Corps. As collaborating brass Lt. Col. Arthur Kellond assigned the Mexican unit to the 5th Fighter Command in the Philippines on the island of Luzon 4,500 miles west of Hawaii. Clark Air Field had been bombed by Japan on December 8, "the other Pearl Harbor," considered worse than the enemy raid at Honolulu since Clark Field's B–17's and P–40 fighters were wiped out on the ground as U.S. forward defense in the Pacific.

During 1945 and this ongoing Battle of Luzon the 58th Fighter Group was led by air ace Major Ed Roddy of Cleveland, Ohio. The squadron base lay a distance from Clark Field, outside the village of Porac, where pilots used air strips built by the former occupying Japanese. Col. Antonio Cárdenas, however, was officed at Clark Field for his multiple decisive meetings with his corresponding American officers. He would eventually come to see dual command was not without its conflicts up against USAAF brass.

The "Aztec Eagles'" day-to-day operations were supervised by a brilliant aviator named Radames Gaxiola Andrade, who also led some flight formations in the 201st. A veteran of the European war, in the invasion of Normandy he co-piloted a twin-engine heavy bomber in the cockpit beside an American flier. Born on Mexico's Pacific coast at Mazatlán, Sinaloa, Gaxiola was fluent in English from his youth, educated in American schools. His leadership skills and advanced pilot training in Texas at San Antonio's Randolph Field, coupled with his fluency in English made Gaxiola the quintessential combat pilot to represent Mexico and invade Nazi-occupied Europe on D-Day 1944.

It was in Mexico at Escuela Militar de Aviación that his aeronautical exceptionalism had led to his being taken up as assistant to Gen. Gustavo Salinas, chief of the fledgling Mexican Air Force. A pioneer aviator during the Mexican Revolution, he had fought under charismatic Pancho Villa. In fact, many fathers of "Aztec Eagles" were once revolutionist soldiers under Villa or division generals elsewhere.

Mexico's Minister of Defense during World War II was Gen. Lázaro Cárdenas del Rio (no relation to Col. Cárdenas). Thirty years earlier a leader in the Constitutionalist Army during the Mexican Revolution he was a figure of heroic dimensions. Elected president of Mexico in 1934 and serving until 1940, he nationalized petroleum, expropriated foreign oil companies and created government oil company PEMEX.

Lázaro Cárdenas' sweeping reforms are cited by Latin American historian Frederiche Schuler in describing the modernization of the Mexican military under President Cárdenas. By the 1930s, "the Mexican armed forces, as an institution, was in need of a new permanent mission as part of the postrevolutionary state" and such a metamorphosis "took place within an international environment preparing for large scale war."

Javier Martínez Valle.

Scholar María Emilia Paz examined the gradual organic change in Mexico's army "in accordance with the necessities of modern warfare." Mexico had to protect itself in a spirit of democracy, nourishing alliances with the U.S. and buttressed by President Roosevelt, who sent select aircraft to Mexico, planes for anti-submarine patrol and otherwise boosted Mexico's archaic air force.

That the American Chief of State had a burning heart for Mexico and the "Good Neighbor Policy" to guard the hemisphere against German, Japanese and Italian infiltration, espionage and sabotage was not lost on the U.S. Army Air Forces or the world of diplomats.

In July 1944, after Fuerza Aerea Expedicionaria Mexicana boarded their troop train in the capitol and crowds wept and sang "Las Golondrinas" and "Adios a Un Soldado," thirty-six hours later they reached Rio Bravo del Norte on July 24. Marching across the bridge at Nuevo Laredo, the FAEM was received mid-bridge by American dignitaries in a ceremony that can only be called historical. The "Aztec Eagles" thereupon paraded robustly down Laredo's main street flanked by binational crowds cheering these exquisite moments in time.

One of the caveats to join Mexican Squadron 201—whether pilot, mechanic, armorer, radio operator, artilleryman, cook or in any role without which a combat squadron could not be operational—that airman had to speak English. How fluently was never established.

Reynaldo Perez-Gallardo of Squadron 201 on the wing of his P-47D Thunderbolt in the Pacific. Mexican Expeditionary Air Force was a unit of the US Army Air Corps 58th Fighter Group in 1945.

At the 201's headquarters in Greenville, Texas, at Majors Field they trained under American officers planning the graduation ceremony in early 1945, and presentation of Mexico's battle flag. Those U.S. commanders and certain instructors were fluent in Spanish. A number of the "Aztec Eagles" were bilingual since childhood, educated in the U.S. and such was the case with Javier Martínez Valle.

As a boy he had migrated with his family to Houston. His military career began in Mexico in 1936 when he joined a regimiento aéreo. At Heróico Colegio Militar he then became a cavalry cadet and later served as flight instructor at Escuela Militar de Aeronáutica. Soon the Mexican Air Force sent Teniente Piloto Aviador Martínez to train at the U.S. naval air base in Corpus Christi, Texas. Returning to Mexico he taught flying again at the Military Aviation School.

In March 1945, at Brownsville Army Air Field on the Texas Gulf Coast when he crashed during aerial gunnery practice, Martínez had just scored hits on a target towed by a B–26 before his P–47 collided with the cable, plunged into the marsh at South Padre Island and exploded. He was the unit's second fatality. The first occurred three months earlier elsewhere in Texas; Cristoforo Salido Grijalva crashed on a runway during training, possibly having misunderstood the tower's radio instructions in English.

Shaken by the fiery death of talented comrade Javier Martínez at South Padre Island, the "Aztec Eagles" forged ahead, rehearsing air-to-air combat and were soon deployed in the Philippines to support Gen MacArthur's "island hopping" campaign to defeat the Japanese. The Mexican squadron's missions included flying cover for American and Filipino ground forces, bombing and strafing railways, bridges and ammunition factories of the Japanese occupiers.

The 201st fighter sweeps to South China Sea and Formosa (Taiwan) meant flying long-distances challenging fuel supply despite extra tanks in the new P–47D Thunderbolts with a bubble canopy.

While training in Texas the "Aztec Eagles" learned to identify enemy ships marked with the "Rising Sun" of Japan, red disk on white background. Or on Mitsubishi bombers or Zero fighters in the sky or parked on an air strip. Japan's sacred red disk Allied fliers called "the meatball" was ripe for gunnery on the Texas coast, where "Rising Sun" targets mounted on a wharf-track awaited Mexican flyboys attacking Japan in low-altitude exercises. They dropped bombs at designated ranges—an eight-mile strip along the Rio Grande and off the coast at Matagorda Island.

Pilots and ground crew trusting the P–47 knew this warplane was the workhorse of the Air Corps on European fronts as in the Pacific. One can but imagine late night bull sessions about the tough P–47 beloved by battle-hardened aviators while others claimed "The Jug" was impossible for dive-bombing, even suicidal.

Certain of the pilotos aviadores before the Mexican squadron was formed received dive-bombing training at U.S. military bases such as the Coast Guard Air Station at St. Petersburg, Florida.

During a 2004 interview in Texas, Col. Carlos Garduño-Nuñez told me he learned to dive-bomb in San Diego, California. Then during combat in the Philippines, when he put his P–47 into a dive, he swooped so low he was 500 feet above the water. "I had to pullllllllll up on the stick like....thiiiissss!" into his lap, lest he plunge into the Pacific Ocean as was the fate of young Fausto Vega Santander. His P–47 stalled at high speed during dive bombing practice off coastal Luzon and crashed in the sea, exploding. Nothing was found of the valiant "eaglet" but that life jacket and the oil slick.

Escuadrón 201 flew 59 tactical support combat missions from June 4 to August 9, 1945, remaining in the Pacific war zone for ten weeks after the first atomic bomb was dropped on Hiroshima August 6 and the second one three days later on Nagasaki.

By war's end the "Aztec Eagles" had flown 96 sorties. After the surrender of Japan, the 58th Fighter Group and 201st Mexican Squadron were still flying cover for American and Filipino ground troops mopping up pockets of fierce enemy resistance in northern Luzon.

Sixty thousand starving Japanese soldiers battled to the end, hidden by rain forest canopy or holed up in jungle mountain redoubts riddled with tunnels. When a Mexican pilot swooped into a canyon, enemy artillery firing from the mouth of a cave left flak damage on the tough hide of "The Jug.'"

The surrender of Japan on September 2, 1945, was formalized in a ceremony aboard the 450,000 ton battleship USS *Missouri* in Tokyo Bay, MacArthur officiating while the dazed representatives of "Sun God" Emperor Hirohito signed the staggering instruments of surrender, "the unthinkable." After the Japanese dignitaries, there came the signings by Gen. MacArthur, Adm. Nimitz and Gen. Jonathan Wainright emaciated from three years of starvation and brutal torture in POW prisons. Among Allied commanders to witness Japan's historic surrender was Col. Cárdenas of the Mexican Expeditionary Air Force. ■

Balloons and Airships: A Tale of Lighter than Air Aviation. By Anthony Burton. Philadelphia: Pen and Sword Transport, 2019. Photographs. Illustration. Bibliography. Index. Pp. 208. $25.38. ISBN: 978-1-52671-949-2

Anthony Burton is an author and broadcaster who specializes in the history of transportation and technology. His objective is to provide an all-encompassing history of lighter-than-air (LTA) flying from the 1780s to the present day.

Burton begins with the familiar story of the Montgolfier brothers and their flights in 1783 leading to the first untethered, manned flight that was witnessed by thousands of enthusiastic spectators.

Ballooning remained a pastime for the entertainment of the public, with limited practical application. To become useful, balloons would have to overcome an essential challenge, that of control. Balloons flew wherever the wind took them. Aeronauts could dictate whether their craft would climb or descend, but directional control required control surfaces (elevators, rudders) and power sources that would enable balloonists to navigate a desired course through prevailing winds.

In the latter half of the 19th century, practical use was made of balloons in military operations. In the Civil War, the Union Army employed Thaddeus Lowe's balloon corps for artillery spotting and reconnaissance. Several years later, during the Franco-Prussian War, besieged forces in Paris used balloons to transport mail and messages to their provisional government in Tours.

The first successful steerable balloon or dirigible came in August 1884 when two French army officers designed and built a balloon with a propeller powered by an electric engine. For the first time, a balloon could land at a place of the pilot's choosing. It could handle only light winds but was an important advancement.

The most important breakthrough came from a German, Ferdinand Graf von Zeppelin, whose research program addressed all aspects of ballooning technology. In 1909, after several successful designs for the army, Zeppelin formed the world's first commercial airline. By the start of World War I, the airline had flown over 100,000 miles and carried 10,000 passengers. During the war, the Zeppelins' most important role was that of reconnaissance aircraft.

In the 1920s, the Zeppelin company established trans-Atlantic passenger service and expanded its commercial program into an ambitious round-the-world flight in August 1929, on which the *Graf Zeppelin* airship carried passengers in luxury, traversing the globe in 21 days. The Zeppelin era came to a tragic end when the *Hindenburg* crashed and burned at Lakehurst NJ.

Airships played a major role in attempts to fly over the North Pole. Norway's Roald Amundsen partnered with Italy's Umberto Nobile to fly Nobile's *Norge* airship over the Pole. They did so on May 12, 1926, but were seemingly beaten by USN Commander Richard Byrd and pilot Floyd Bennett, who claimed to have flown over the Pole in an airplane three days earlier. But Amundsen's bigger objective was to traverse the Arctic Ocean and land in Alaska, a feat the team accomplished several days later. Nobile, frustrated that he had to share the glory of the polar flight with others, returned to Italy. A flight in his new airship *Italia* ended in disaster when the ship crashed, killing half of the crew.

Burton achieved his objective of telling most, if not all, of the story of LTA aviation. Nevertheless, the book has several shortcomings. First, British use of commas and other punctation sometimes makes it difficult for a reader of American English to follow the sentences. In addition, Burton is inconsistent in his spelling of place names and names of individuals. This might seem trivial, but it's an unacceptable error when committed by a professional writer and editors.

Second, and more importantly, the book has notable omissions. Burton pays surprisingly little attention to controversial aspects of the events he describes, and this detracts from a full understanding of the events. He barely mentions the loss of the *USS Macon* in 1935, doesn't tell us that Byrd's claim to have flown over the North Pole was disputed at the time and has since been largely discredited, and devotes only a few words to describing the extreme hostility between Nobile and his detractors in the Italian government. One has to wonder why he makes no mention of the use of airships by Goodyear, whose advertising blimps have been one of the most visible presences in the world of LTA aviation for decades.

Those interested in the history of balloons and airships would be better served by looking at two older works, *The Aeronauts* and *The Giant Airships*, volumes in the Time-Life Epic of Flight series.

Lt. Col. Joseph Romito, USA (Ret), Docent, National Air and Space Museum

Beaufighters: Over Sea, Sand and Steaming Jungles. By Jack Colman and Richard Colman. Stroud UK: Fonthill Media Ltd., 2020. Photographs. Appendices. Pp. 320. $40.00. ISBN: 978-1-78155-746-4

This is the second of a two-volume set of the personal memoirs of Jack Colman, an RAF pilot during World War II. Volume I recounts his flight training (he was qualified as both pilot and navigator) and early operational career flying Liberators for Ferry Command and Coastal Command. Volume II picks up with his assignments to Bristol Beaufighter units and his operational career through the end of the war.

Jack Colman was an extremely gifted writer. His prose is smooth and unhurried. When describing postings in Southwest Asia, he included a lot of local words and phrases but explained them and used them conversation-

ally. His son, Richard, edited both volumes but makes clear these books are his father's work.

The Bristol Beaufighter was a twin-engine, light bomber/attack aircraft used against land and sea targets. The platform was also modified to carry torpedoes, resulting in the "Torbeau." The closest American platform was the Douglas A–20, while the closest Luftwaffe plane was the Henschel Hs 129. The twin-engine configuration of this class of aircraft permitted payloads and weapons configurations much greater than those carried by single-engine attack aircraft. *Beaufighter* makes clear that Colman and the Beaufighter were a perfect fit.

Writing in the first person, Colman brings the reader into the cockpit. He talks about the locations of controls and instruments and seamlessly describes visual cues from the cockpit when attacking land and maritime targets. On one mission, two of his four 20mm cannons exploded and blew the bottom off his airplane; the reader can feel the explosions, hear the noise, and feel the air streaming into the cockpit.

Much of *Beaufighters* describes Colman's service in Southwest Asia. For the uninitiated, Britain's war effort in this theater is usually described as the "Forgotten War." Fought largely with colonial troops and second- or third-tier equipment, the British Fourteenth Army and its supporting elements were charged with stopping the Japanese advance through Burma and into India. The chapter describing Colman ferrying a Beaufighter to Burma demonstrates the vastness of this theater. It took him over a month to deliver his one Beaufighter from the UK to Burma.

As the war in the European Theater drew to a close, newer equipment began to make its way into the theater, and Colman was expected to trade in his beloved Beaufighter for a deHavilland Mosquito. He didn't like it one bit. Considering the reputation of the "Mossie," this came as a surprise. Colman's criticisms are numerous (metal construction vs. wood, control wheel vs. stick, radial engine vs. inline, and so on). His most significant operational criticism was that the Beaufighter's Hercules radial engines were relatively quiet, and the pilots could sneak up on targets. On the other hand, the Mossie's Merlins were so noisy that potential targets could hear them coming in time to take cover.

The last quarter of the book talks about Colman's time in India following his operational tour. While not always aviation related, many of his observations are insightful. For example, he compares the English class social system to the much-criticized Indian caste system. He talks openly about the discrimination shown to British personnel who married foreign nationals.

I unequivocally endorse this book to the armchair aviation/military historian. I'm going to go back and read volume I.

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

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Showdown in Western Sahara Volume 2: Air Warfare over the Last African Colony, 1975-1991. By Tom Cooper, Albert Grandolini, and Adrien Fontanellaz. Havertown PA: Casemate, 2020. Maps. Tables. Photographs. Illustrations. Notes. Glossary. Bibliography. Pp. viii, 80. $29.95 paperback. ISBN: 978-1-91-286629-8

This book is well-researched, intricately sourced, has over 120 photos, and has a wealth of information about a topic rarely explored in the English language. However, it needs a more accurate title. Since the air campaign in Western Sahara was focused on close air support, resupply of ground troops, and suppression of battlefield short-range air defenses, it is impossible to write this story without a lengthy and detailed description of ground operations. A third of the illustrations and photographs are of ground operations. A more fitting title would read "Warfare in" *vice* "Air Warfare over," or something along those lines.

The authors do an excellent job describing a complicated strategic situation where insurgents either battled forces of, or received support from, five nations from 1975 until the 1991 ceasefire. Some nations came into the fight later, while others changed sides as other national priorities took shape. The book breaks all of this down, describing the complicated conflict in a chronological manner, and highlighting key actions to give the reader a taste of the fight. Additionally, the sheer volume of photographs (especially of ground actions) gives the reader the feel of witnessing the conflict first-hand.

I especially liked the placement of the glossary in the front of the text. Because there were so many end notes, it was convenient to be able to quickly refer to the front of the book to find an acronym meaning, while simply flipping to the back to find a source.

Unfortunately, the book is in dire need of a good copy editor, additional maps, and a general overhaul of its chapter structure. It is impossible to understand the context without reading the introduction, even though the first chapter includes a bit of detail about the geo-political situation in the Western Sahara. Additionally, although Morocco receives a full chapter devoted to its military organization, none of the other players does—this complicates understanding of the relative strength of each side, and goes a long way in the book's failure to explain how the insurgents traveled undetected (but in mechanized columns) several hundred miles from a non-adjacent African country (Mali) to conduct strikes in the Western Sahara. Finally, the limited number of chapters (six) meant that (with the exception of the chapter specifically devoted to the Moroccan military) the chapters lacked common narratives internally. They tended to run together to make the book feel like a combat chronology—even though the chapters themselves are not necessarily presented in chronological order.

While the book has eight maps, most are in the second half of the book and are of the same area and scale. There are no maps that show areas in greater detail, or even a macro-map that shows how insurgents received logistics support from Libya and Mali, despite the shifting stance of Algeria. There are also factual errors. In the section describing the key Battle of Amgala, the authors state the battle occurred in January 1977, although the accompanying map and text clearly specify the battle occurred in January 1976. Because most readers will probably have little previous knowledge or understanding of the conflict, such a serious error in dates makes one wonder if this is a one-time typo or if there are similar errors throughout the text.

Overall, the book provides a good holistic look at the situation in the Western Sahara, designed for either the casual observer or as an introductory text to a future specialist.

Capt. George W Runkle IV, USA, III Corps Command Historian

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Ho Chi Minh Trail 1964-73: Steel Tiger, Barrel Roll, and the Secret Air Wars in Vietnam and Laos. By Peter E. Davies. Oxford UK: Bloomsbury Publishing, 2020. Maps. Photographs. Notes. Tables. Sources. Glossary. Index. Pp. 96. $24.00. ISBN: 978-1472842534

The Trails War was a series of campaigns (the so-called "secret war") to cut the Ho Chi Minh Trail, the supply routes Communist forces depended on in Laos, Cambodia, and South Vietnam. This short book contains a chronology, discussion of both sides' capabilities, US objectives, and a short analysis on why the US failed to close the trail.

On December 14, 1964, Operation Barrel Roll—the US air war in northern Laos—began. On April 3, 1965, Operation Steel Tiger began as a covert aerial interdiction to impede the flow of men and materiel from the Democratic Republic of Vietnam (DRV) via the trail. Therefore, America was really fighting in four separate theaters: "in-country" South Vietnam, an air war over North Vietnam, a campaign against the Ho Chi Minh Trail, and supporting allies in a civil war in Laos.

Davies notes that the US held air superiority. Their arsenal eventually included propeller aircraft (T–28, C–47) and jets (F–105, F–4, F–8), helicopters (CH–3, HH–53), gunships (AC–47, -119, and -130), and unique "one-of-a-kinds" (EC–121R, QU–22B). Their bombs and rockets improved over time, especially with the arrival of laser-guided weapons. Tactics changed as needs arose or technology permitted. Discussed are both slow and fast forward air control aircraft and an electronic fence to find and destroy infiltrators. However, terrain, vegetation (triple canopy jungle), weather (monsoons), a slash-and-burn agriculture (smoke and haze), and political considerations limited, and sometimes prevented, successful interdictions.

General Giap was the DRV's architect for successful infiltration of men and material. Under constant threat of air attack and enduring heavy losses, thousands of North Vietnamese troops and civilians devised ingenious means to survive attacks. They traveled in trucks or by foot, day or night, sometimes pushing bicycles laden with ammunition and rice. Resourceful engineers and construction crews frustrated US efforts. The trail was an intricate maze of roads, foot and bicycle paths, and truck parks. Supply bunkers, storage areas, barracks, hospitals, and command-and-control facilities were concealed from aerial observation by an intricate system of natural and man-made camouflage. The DRV responded to aerial threats through increased use of heavy concentrations of AAA. By 1968, it was mainly 37mm and 57mm radar-controlled weapons. In 1969, 85mm and 100mm guns appeared. Eventually, over 1500 guns defended the system. In 1972, the Soviets made more SA-2s and SA-7s available to the DRV. Their use made the trail even more deadly.

Davies shows US and South Vietnamese interdiction efforts were impacted by weather from mid-May to mid-September. Since the road network was generally dirt, most military efforts the trail supported were conducted during the dry season. Eventually, the bulk of the trail was either asphalted or hard packed, thus allowing large quantities of supplies to be moved even during the rainy season. Due to the increased effectiveness of US interdiction efforts, DVR transportation units usually took to the roads only at dusk, with traffic peaking in the early morning hours. Just as US aircraft came on station, traffic would subside until just before dawn, when fixed-wing gunships and night bombers returned to their bases.

As more territory within South Vietnam came under Communist control, the DRV could extend the trail into that country. American fighting methods proved counterproductive. US firepower was so destructive that it killed thousands of the civilians it was meant to "save." Nevertheless, the campaign had a profound effect on the course of the war.

This book is well written and an easy read. It provides points to ponder when it comes to the application of airpower within the greater context of international diplomatic, informational, military, and economic efforts.

Joseph D. Yount, USAF (Ret) and NASM Docent

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French Bombers of WWII. By José Fernandez and Patrick Laureau. Havertown PA: Casemate Publishers, 2019. Tables. Diagrams. Illustrations. Photographs. Pp. 288. $62.00. ISBN: 978-83-63678-59-3

While the French Air Force (or *le armée de l'Air*) didn't play much of a role in World War II, it did have dozens of types of bomber and attack aircraft in its inventory in the

period leading up to and during the war. Little has been written about these. The authors' goal is to document the French bomber fleet in a single-volume, English-language reference work. They approached the task with what amounts to a three-part narrative: French bomber design and manufacture in the interwar period, the military operations that led to France's surrender, and an encyclopedic look at each French bomber type.

With its success in World War I and its abundance of raw materials, French aviation in the 1920s and 1930s had great potential, but the potential was never realized. In the years immediately following World War I the French military did not develop a clear operational concept for the Air Force. Air units were seen as subordinate to the Army. And the Army, believing the Maginot Line provided adequate protection against a possible German invasion, placed more emphasis on defense rather than offense. This defensive mindset did not offer opportunities for effective employment of air power, particularly a bomber force. French bomber designs did not move far beyond the capabilities that had existed during World War I, and not a single truly noteworthy airplane design entered service in the 1920s. By the time Germany fired the first shots of World War II in 1939, many French bombers were obsolete, and even their best bombers were either past their prime or were flown in insufficient quantities to constitute a robust force. Recognizing their shortfall, French authorities turned to the US, placing orders for hundreds of Douglas DB–7s (US A-20 Havoc) and Martin 167s (RAF Maryland).

For those unfamiliar with the first 9-10 months of the war in Europe, the authors provide a useful recap of the period from August 1939 to June 1940. Hostilities began with Germany's invasion of Poland, which prompted Britain and France to declare war on Germany. Then followed the so-called "Phony War," which saw little ground action but nonetheless included bombing and reconnaissance missions by French units. Major combat operations resumed in April/May 1940 with Germany's invasions of Denmark and Norway, followed by attacks on the Low Countries (Belgium, the Netherlands, Luxembourg) and then France. France surrendered on June 22, essentially bringing an end to the existence of the French Air Force. Some air units were integrated into the Royal Air Force and the Soviet forces to fight on the Allies' side, while units under control of the Germans were redesignated the Armistice Air Force.

The rest of the book is devoted to a detailed discussion of each aircraft. Covering 32 types designed and built by 15 French companies and three American firms, the authors categorize these aircraft as old-generation bombers, modern bombers, attack aircraft, imported types, trainers, and prototypes under test when the war began. Each aircraft gets a thorough discussion of its design, development, production, and operational employment; and the narrative is supplemented by numerous photos and excellent full-color illustrations.

The book is well-researched and exceptionally well written. If the subject of French World War II bombers interests you, this would be a great addition to your library. The authors clearly achieved their objective of giving us a single-volume reference source for an aspect of World War II aviation that usually receives scant attention.

Lt. Col. Joseph Romito, USA (Ret), docent, National Air and Space Museum

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Arado Ar 234 Bomber and Reconnaissance Units. By Robert Forsythe and Nick Beale. Oxford UK: Osprey Publishing, 2020. Photographs. Illustrations. Pp. 96. $24.00 softcover. ISBN: 978-147284439-2

Any reader familiar with the Osprey Combat Aircraft series, knows exactly what kind of book *Arado Ar 234 Bomber and Reconnaissance Units* will be before they open the cover. They will find a clearly written narrative on the subject matter. Research and citations will be brief but adequate. Photographs will illustrate salient concepts. And there will be illustrations—lots of illustrations.

The first quarter of this book serves as an introduction to the Ar 234 itself. Often overlooked in favor of the Me 262 Schwalbe, the Blitz was a significant step forward in medium bomber and reconnaissance capability. The number of similar platforms that emerged in the world's air forces in the late 1940s (e.g., English Electric Canberra, Ilyushin Il–28 Beagle, North American B–45 Tornado) pays homage to the technology and design significance of the Ar 234. The book goes into some detail on the teething problems of the Blitz. Especially interesting is the discussion of bombsights and experiments designed to determine if the optimum weapon delivery profile was level or glide bombing. Disappointingly, there is not a parallel discussion of reconnaissance systems.

The remainder of the book addresses the brief operational career of the Blitz. Fortunately, it draws heavily on the memoirs of Erich Sommers as published in his highly recommended autobiography *Luftwaffe Eagle***.** Sommers had the space to tell a more complete story, whereas Forsyth and Beale offer a brisk narrative, compressing an 18-month operational career into a few pages. When the authors take the time to tell a more complete story, as they do with the Remagen Bridge campaign, they show themselves to be competent storytellers.

My greatest complaint about the book is the presentation of the written text. As with many Osprey books the text is presented on the outer two-thirds of the page with the inner third reserved as "white space." This means there is sufficient room to either use a larger, more readable font or keep the smaller font and expand the material presented. In this book, the publisher gives you the worst of both options.

Arado Ar 234 Bomber and Reconnaissance Units is an adequate introduction to a unique and transitional aircraft. But the book's real value is as a starting point for further research and reading.

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

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***Luftwaffe* Aces in the Battle of Britain.** By Chris Goss. South Yorkshire, England. Air World Books, 2020.Tables. Photographs. Bibliography. Pp. 286. $42.95. ISBN:978-1-52675-421-9.

Chris Goss, a former RAF Wing Commander, has written extensively on the Luftwaffe in World War II, with more than forty books to his credit. His latest effort builds on several of his earlier books on Luftwaffe fighter pilots in the Battle of Britain. *Luftwaffe Aces in the Battle of Britain* is a compendium of pilots who claimed five or more victories in the period between the start of the war in Europe on September 1, 1939, and the end of the Battle of Britain on October 31, 1940. All pilots listed claimed at least one, if not all, of their victories during the Battle.

Not surprisingly, the book concentrates on the Luftwaffe *jagdgeschwaders* (equivalent to a USAAF group) flying the single-seat Messerschmitt Bf 109 and their pilots. The introduction gives tables of statistics that cover operations during the Battle: the number of aces by *jagdgeschwader*, total victory claims by *jagdgeschwader*, the top twenty highest-claiming pilots, and a list of aces by *jagdgeschwader*. There is a similar statistical section for the smaller number of *zerstörergeschwader* (heavy/destroyer fighter group) that flew the Messerschmitt Bf 110 in the Battle, though Goss notes that the records for these units are less accurate and complete than the records for the single-engine fighter units.

The bulk of the book consists of short biographies of the 204 Bf 109 pilots claiming five or more victories up to October 31, 1940. The biography includes pre-war service in the Luftwaffe, victory claims achieved prior to the Battle, claims during the Battle, and the pilot's service after the Battle of Britain. A table listing the pilot's claims during the Battle gives the date of the claim, the aircraft claimed, the time, and the approximate location, if known. In some cases, Goss has been able to link claims and losses with corresponding pilots in the Royal Air Force. Some of the biographies include excerpts from RAF combat reports and memories of Luftwaffe pilots. The biographies often include a photograph of the pilot, sometimes from the Battle of Britain period and sometimes alongside an aircraft the pilot flew during the Battle.

A point that comes out from reading these biographies is that many of the Luftwaffe pilots, unlike their RAF counterparts, flew in combat for the entire period of the Battle of Britain, making their first victory claims in the early-July skirmishes and their final claims at the end of October. This was true for the Luftwaffe's top scorers during the Battle: Adolf Galland, Werner Mölders, Helmut Wick, and Walter Oesau, all of whom averaged around 100 days between their first and last claims. Most of the RAF's leading fighter pilots averaged around 50 days on operations. Also noticeable are the losses in this group of Luftwaffe pilots. During the Battle, 46 out of the 204 pilots claiming five or more victories by the end of the Battle had been killed or made prisoners of war. A further 91 pilots were killed in the years following the Battle. By the end of the war, nearly half were dead.

This book will be of most interest to those with a particular fascination with the Battle of Britain or the careers of Luftwaffe aces. The general reader may get more out of Goss' other books on the Luftwaffe in the Battle of Britain.

Edward M. Young, PhD, volunteer, Museum of Flight, Seattle WA

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War in the Far East: Japan Runs Wild 1942-1943. By Peter Harmsen. Oxford: Casemate Publishers, 2020. Maps. Photographs. Notes. Bibliography. Index. Pp. v, 210. $34.95. ISBN: 978-1-61200-625-3

In this book, Peter Harmsen takes the reader on a whirlwind tour of the main battles and campaigns that took place during 1942-1943 following Japan's initiation of war against America, Britain, and the Netherlands. This is the second volume in a planned trilogy of books on the aptly named *War in the Far East*. Harmsen brings to this work twenty years of experience as a journalist in East Asia and a fluency in Mandarin. He has previously written two well-received books on the Sino-Japanese War, *Shanghai 1937: Stalingrad on the Yangtze* and *Nanjing: Battle for a Doomed City*. The first volume in his planned trilogy, *Storm Clouds Over the Pacific 1931-1941*, covers the origins of the Sino-Japanese conflict that led, ultimately, to Japan's decision to go to war with America and the colonial powers in Southeast Asia, and ends with the Japanese attack on Pearl Harbor.

This second volume begins with the sinkings of the *Prince of Wales* and *Repulse* on December 10, 1941, and then describes Japan's rapid advance through the Philippines, Malaya and Singapore, the Dutch East Indies, and Burma—a brilliantly conceived campaign that shocked, overwhelmed, and humiliated the Allied armies who vainly, and with great sacrifice, tried to stop Japan's advance. He proceeds month by month through the rest of 1942, covering most of the major naval battles and the beginnings of the Allied offensive in the Southwest Pacific with the landing on Guadalcanal. During 1943 the Allies began to turn the tide against the Japanese. The battles

for New Guinea and the Solomon Islands brought Japanese expansion to a halt, and the invasion of Tarawa began the American campaign across the central Pacific. Meanwhile, the bulk of the Japanese army remained committed in China, to the great benefit of the Allies fighting in the Pacific.

Narrative descriptions from many participants, from different nations and of different ranks, reflect the shock of the early defeats by a badly underestimated enemy, the misery of fighting in the jungle, and the lessons gained through painful experience. Harmsen provides brief summaries of both Allied and Japanese strategies.

This book is a concise introduction to the first two years of the war against Japan. In covering two years of intensive fighting in only 164 pages, the book can be little else. It is well-written, and the narrative is fast-paced. It would be a good starting place for someone who is unfamiliar with the subject, but for the knowledgeable reader it adds little to what has previously been written, as Harmsen relies almost exclusively on secondary sources. The benefit of the book is his argument, expressed in the trilogy's title, that the war against Japan was much wider than the Western-centric focus on the battles of the Pacific and in Burma and involved many more participants than are commonly acknowledged. He links events in China to the war in the Pacific and places China within the larger context of Allied strategy against Japan. Curiously, he does not mention the furious debate within American military and political circles between those favoring Stilwell and a ground campaign in China and Chennault's argument for an exclusively air offensive as the best means of supporting China. Perhaps this will appear in the third volume.

An extensive bibliography serves as a guide to further reading.

Edward M. Young, PhD, volunteer, Museum of Flight, Seattle

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V2: A Novel of World War II. by Robert Harris. New York: Random House, 2020. Pp. 364. $28.95 paperback. ISBN: 978-0-525-65671-5

The unconditional surrender of all German forces in early May 1945 triggered a mad dash by the Allies to exploit the defeated enemy's jet aircraft and ballistic missiles. While some thought ballistic missiles could be used in the continuing conflict against the Japanese, they actually had no effect on World War II. However, they were considered the weapon of the future and were, thus, coveted by the US, Soviet Union, Great Britain, and France.

In Harris' latest novel, the V2 ballistic missile is the lead player. The missile had a range of 225 miles, but an advanced model on the drawing boards was supposed to be able to reach the continental US. After the German "rocketeers" achieved successful launches, Hitler directed it be placed in production. He perhaps fantasized that indefensible attacks on England would induce the British to withdraw from the conflict, thus allowing Germany to shift its military force to defeat the Soviet Union. But Britain, under Winston Churchill, stood firm. The source for the Harris' description of the V2 ballistic rocket was Michael Neufeld's *The Rocket and the Reich: Peenmunde and the Coming of the Ballistic Missile Era*. His portrayal is so accurate that I would have described *V2* as a "nonfiction novel."

The story is set in November 1944 when V2 rockets rained down on London. It involves two imaginary characters whose lives intertwine: On the defensive side of the German rocket bombing is Kay Cotan-Walsh, an English officer in the Women's Auxiliary Air Force. Lt. Cotan-Walsh is determined to play an active role in the conflict. On the offensive side is Dr. Rudi Graf, a rocket engineer and longtime associate of Dr. Wernher von Braun. Graf is possibly based upon a young Luftwaffe officer posted to the rocket program. In his memoir, *The Peenemunde Wind Tunnels* (a source Harris used), Peter P. Wegener reveals that he witnessed the horrible treatment of slaves in the underground rocket factory. This induced him *not* to join Von Braun.

Harris notes that apart from such well-known historical figures as Wernher von Braun and SS General Hans Kammler, his cast of characters and their particular adventures are all purely imaginary. While Von Braun is well-known, General Kammler is not. Trained as an architect, he is known to have designed and supervised the construction of both Auschwitz in Poland and the underground rocket production factory at Nordhausen, Germany. He is, without doubt, the personification of the devil, something readers will draw from the novel.

Harris is a talented writer and has orchestrated an especially interesting and suspenseful storyline that not only creates realistic and sympathetic characters, but also informs the reader of the historic introduction of ballistic missiles to modern warfare. But, as he notes, it was a costly military asset that contributed nothing to Nazi Germany's military prowess.

Robert Huddleston, author and combat veteran of World War II, Chapel Hill NC

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Oswald Boelcke: Germany's First Fighter Ace and Father of Air Combat. By Brigadier General R.G. Head. London: Grub Street. 2019 (paperback reprint of hardback published in 2016). Photographs. Notes. Bibliography. Pp. 240. $24.95 paperback. ISBN: 978-191162142-3.

The original hardcover issue of Head's biography of the great German World War I ace was very well received and earned numerous accolades. The substance of the book has

not changed, so there is no reason to reduce the praise he earned.

Essentially, it is equal parts biography and history. Head takes the time to put Boelke's life into context. He uses meticulous research to justify the praise he heaps on Boelcke, explaining why the facts are significant both in and of themselves, but also in the context of the aerial campaigns of the Great War.

Much of Boelke's success as an aviator stemmed from him being in the right place at the right time and having access to the right technology. It is difficult for the aviation historian of today to grasp just how fast aviation technology was advancing at that time. In the 21st century, it is not uncommon for a new aircraft design using cutting-edge technology to take a decade to go from a design to a fielded weapon system. During the Great War, designers were expected to make the same generational leap every 60-90 days. Emerging technologies could provide the user with aerial supremacy and inflict horrible casualties on the opposition.

Boelcke was able to ride the wave of technological advantage twice—once with the Fokker Eindecker and, later, with the Albatross D.I/II. He was also fortunate to be in a non-operational assignment during periods of Allied dominance. To his credit, he used his down time to develop the Dicta Boelcke, codifying the elements of aerial tactics needed to survive and thrive in aerial combat.

When Boelcke was given command of *Jasta* 2 (Fighter Squadron 2), he used his Dicta as the core of a training program for all assigned pilots. Newly assigned personnel might spend months learning their profession. This sharply contrasts with the British model which frequently threw new pilots into combat with 10 hours flight training and no training in tactics or doctrine. In fact, the British did not seem to have any tactics or doctrine other than Trenchard's insistence on offensive action—even when he did not have the personnel or equipment to conduct them without suffering horrific losses. This insistence on discipline and structure was probably Boelke's greatest contribution to aerial combat. It is the reason he is still studied today.

Without question, Head's book deserves the praise it receives. My only criticism is of the book itself. Images are frequently 1 inch x 1 inch—so small as to be unviewable. But that is a small criticism of a very worthwhile read. Recently, a new book was released titled, *Roland Garros, the First Fighter Pilot.* It will be interesting to see if its author builds as strong a case for Garros as Head did for Boelcke.

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Robert A. Lovett and the Development of American Air Power. By David M. Jordan. Jefferson NC: McFarland & Co., 2019. Photographs. Notes. Index. Bibliography. Pp ix, 258. $39.95 paperback. ISBN: 978-1-4766-7549-7

The author, a successful attorney, is best known for his baseball histories, particularly those concerning the A's or Athletics, whether in Philadelphia, Kansas City, or Oakland. He has also authored biographies on 19th century American military officers and the 1944 United States presidential campaign. In this effort, he tackles the story of one of the more remarkable personalities of the 20th century. While the title emphasizes Lovett's contribution to the success of the strategic bombing campaign in World War II, that period of his life as Assistant Secretary of War for Air (1940-1945) makes up less than a third of the text.

As an undergraduate attending Yale University in 1916, Lovett learned to fly as part of the Yale unit, a group of students who financed their own flight training with encouragement from the U.S. Navy. Lovett would become Naval Aviator 66 and serve in World War I. Hungry for action, he flew as a gunner on British Handley Page bombers attacking German submarine bases in Belgium. Historians have suggested that this experience influenced Lovett's views on strategic bombing by striking the enemy's infrastructure, a theory he would zealously pursue in World War II.

Having earned a law degree after the war, he joined the Wall Street investment firm of Brown Brothers Harriman, becoming a partner in 1925. He also became a director of the Union Pacific Railroad in 1926; and, once again, his insight into surface transportation might have influenced his thoughts on strategic bombing.

As the civilian manager of the Army Air Forces, he faced many challenges. First and foremost was boosting production, something for which he was ideally suited, given his business background and military experience. He emphasized quality over quantity and successfully promoted the four-engine bomber—the Boeing B–17, Consolidated B–24, and Boeing B–29—to take the war to the enemy's heartland.

After the war, Lovett took a brief break before returning to the Truman administration as the Assistant Secretary of State under George Marshall. Because of Marshall's travel commitments and health issues, Lovett effectively managed the department much of the time. Perhaps his greatest accomplishment was implementing the Marshall Plan, the U.S.-funded effort to revitalize the shattered postwar economies of Western Europe.

Lovett briefly left government service, but Truman came calling, convincing him to become Secretary of Defense, a post he held through much of the Korean War. In the years that followed, he resumed his business activities with the railroad and bank, but he also maintained his ties with Washington. He became a confidant of Presidents Dwight Eisenhower and John Kennedy. Perhaps his great contribution during this period was serving on a committee that was highly critical of the Central Intelligence Agency's

ability to mount successful covert operations.

This work examines in sufficient detail the career of one of the most influential American statesmen of the World War II and early Cold War years. However, readers familiar with the behind-the-scenes development of the Army Air Forces in World War II likely will be disappointed. James Fanton's dissertation *Robert A. Lovett: The War Years, 1939-1945* does an equally, if not superior, job concerning Lovett's World War II years.

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

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Through Adversity: Britain and the Commonwealth's War in the Air 1939-1945: Volume 1. By Ben Kite. Warwick UK: Helion, 2019. Maps. Photographs. Figures. Annexes. Notes. Bibliography. Index. Pp. v, 492. $44.17. ISBN: 978-1-912866-23-6

Ben Kite's first book, *Stout Hearts: The British and Canadians in Normandy 1944*, was an excellent study of the British and Canadian armies in the Normandy campaign. As an experienced British Army combat officer, his intention was to document how an Army actually conducts operations. He examined the infantry, artillery, armor, engineers, intelligence, and other branches to understand how they fought, and to convey the experiences of soldiers during the campaign.

Through Adversity is the first of two volumes covering British and Commonwealth air forces during World War II. His goals with these two volumes are three-fold: 1) describe the main themes or elements in the British and Commonwealth air war; 2) explain, in detail, tactical and operational techniques employed; and 3) use memoires and oral history interviews to show what it was like to go against German fighters, fly a bombing mission over Germany, patrol the seas searching for submarines, or fly off a pitching carrier deck to patrol a convoy.

Part I covers the expansion of the RAF during the 1930s and how the RAF conducted flight training. The remaining three parts cover air superiority (II), the bomber offensive (III), and the maritime air war (IV). Each includes details and observations on strategy, evolution of tactics, operations, and aircraft. In the section on air superiority, Kite covers successes (the Battle of Britain, night fighter defense over Britain, and the defense of Malta) and failures (loss of air superiority to the Japanese over Malaya, Singapore, and Burma). The bomber offensive is organized around the conduct of a bomber mission over Germany, from preparation to return. The final section on the maritime air war covers Coastal Command's war against the U-Boats, anti-shipping missions, and operations of Fleet Air Arm (FAA) aircraft carriers. Throughout, Kite is frank about the challenges faced in developing suitable aircraft and tactics, particularly the limitations of bombers at the start of the war and the RAF's failure in the interwar period to maintain an effective maritime anti-submarine capacity and to provide support for the FAA. The loss of air superiority to the Japanese shows the danger of underestimating one's enemy.

Through Adversity is not a strictly chronological account, though it does follow the sequence of air operations following the start of the war and includes descriptions of several notable air actions. Kite does provide a good overview of the different applications of air power. His book is particularly good at taking appropriate selections from the extensive list of memoirs cited in his bibliography to illustrate and support his observations on operations and tactics. His descriptions are often cast in the words of those who flew on the various missions. He made good use of often unexploited oral-history interviews from the Imperial War Museum and the Australian War Memorial. What comes across are key themes Kite identified as leading to successful application of air power: innovation, flexibility, cooperation, leadership, courage, and determination.

However, there are a surprising number of minor errors which might have been avoided with more careful fact checking: B–17s and B–24s did not fly missions over Europe between 32,000' and 38,000'; German night fighters were not armed with 40mm cannon; and the F4U Corsair had six, not four, wing guns. Despite these, the book is informative and valuable to the study of British air power in World War II. The second volume, *Undaunted*, will cover air transport, photographic reconnaissance, air intelligence, and close air support.

Edward M. Young, PhD, volunteer, Museum of Flight, Seattle WA

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Memoirs of a Stuka Pilot. By Helmut Mahlke (translated by John Weal). London: Frontline Books, 2019. Illustrations. Photographs. Appendices. Pp. xiv, 306. $18.00. ISBN: 978-1-52676-078-4

Helmut Mahlke commanded a Stuka dive bomber group for much of World War II, leading his unit in combat in Poland, France, Dunkirk, the ramp-up to the planned invasion of England, Malta, North Africa, Crete, and the Russian front.

Mahlke had several objectives in writing this book: 1) tell the story of one Stuka group during wartime; 2) use his experiences to bring about a deeper understanding of the past while recording human values such as compassion, courage, and selflessness that deserve to be preserved; and 3) hope his memories would help answer questions from post-war generations who would want to understand how German citizens in the 1930s-1940s could have allowed Adolf Hitler to do what he did.

It is the third objective that generates my only criticism of the book. As a group commander, Mahlke was focused on the day-to-day challenges of the war: training and leading his subordinates, planning for and carrying out repeated redeployments as his unit moved from theater to theater, and maintaining his combat proficiency. At their level, soldiers and airmen fought for each other and fought to accomplish their assigned missions. They probably gave relatively little thought to the rhetoric expressed by their national leaders. Mahlke's third objective could not be achieved by simply documenting his wartime experiences.

That issue aside, this is an excellent memoir that deserves the highest possible marks. It paints a vivid picture of air combat in flying the airplane that played a critical role n Germany's early blitzkrieg operations. It is exceptionally well written, thanks to both the author and his translator. In most translated works, occasional words and phrases suffer in translation; but there is none of that in Mahlke's story. The entire narrative is captured in clear, American English.

Mahlke enlisted for naval pilot training in 1931, expecting to serve as a dive bomber pilot on an aircraft carrier that was under construction. The carrier was never completed, so his unit was unexpectedly transferred to the newly formed Luftwaffe in 1935. Initially he flew the Heinkel He 50, an airplane designed primarily for the Japanese Navy and not well suited to the dive bombing mission. The group took a huge step forward when it converted to the Junkers Ju 87B Stuka in September-October 1939. Its first operational mission came in May 1940, a blitzkrieg operation against French forces, in which Mahlke's men flew as many as four missions in a single day against tank formations, troop concentrations, bridges, and roads—anything that would disrupt the flow of enemy communications, supplies, and troop movements.

Mahlke's group flew almost without a break throughout the war, only occasionally standing down for brief periods to rest crews and refurbish aircraft. His descriptions of the unit's frequent redeployments give the reader a good appreciation of the pace of combat operations and of the importance of the Stuka in supporting ground units.

On the Russian front, Mahlke twice had to make forced landings because his airplane sustained significant damage. His accounts of how he survived in enemy territory and returned to friendly forces are particularly interesting. He was the first surviving member of his group to receive the Knight's Cross. After recovering from severe burns and other injuries, he spent the remainder of the war in ground assignments, most of them on the Russian front. He remained on active duty after the war, eventually retiring as a *Generalleutnant* (equivalent to a two-star general). He died in 1998 at the age of 85.

Lt. Col. Joseph Romito, USA (Ret), docent, National Air and Space Museum

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US Air Cavalry Trooper versus North Vietnamese Soldier Vietnam 1965-1968. By Chris McNab. Oxford UK: Osprey Publishing, 2020. Index. Photographs. Illustrations. Maps. Pp. 80. $22.00. ISBN 978-1-4728-4175-9

In early 1965 while at Fort Benning, Georgia, I witnessed an incredible sight. Actually, I heard it first, and it sounded as if I were inside a beehive. Suddenly, an armada of helicopters with Mohawk reconnaissance aircraft leading the way and Caribou transports to either side emerged low over the trees. I had no idea that what I was seeing was the future of combat operations—the employment of airmobile forces on the battlefield. The 11th Air Assault Division (Test) was completing its final phase and, within months, would be redesignated as the 1st Cavalry Division and sent to combat in Vietnam. Airmobile warfare, leads directly to this monograph's subject: the air cavalry trooper versus the soldiers of the People's Army of Vietnam (PAVN).

McNab is quick to focus on the key components of success by the respective opponents. The Air Cavalry was a true product of combined arms warfare, employing vertical envelopment on the battlefield while supported with incredible firepower. The PAVN had the impressive ability to quickly adapt their tactics to diminish the air cavalry's advantages and to inflict maximum casualties on assaulting troopers before withdrawing.

The cavalry utilized technologies to enhance success on the battlefield. The latest advances in radio communications permitted rapid responses to a fluid situation on the ground, and scout helicopters allowed for eyes-on-the-battlefield command and control. Helicopters could rapidly insert forces and shift them as the battlefield evolved.

Although the 1st Cavalry led the way with new tactics, mobility, and technology, it still had to fight conventionally once on the ground. While it inflicted significant casualties—especially because of the firepower at its command—it, too, suffered large losses. One should read Hal Moore's firsthand account of the Ia Drang battle, *We Were Soldiers Once and Young*, and the 2020 book, *Death in the Highlands: The Siege of Special Forces Camp Plei Me*, to grasp the ferocity of the fighting. By the time the division was withdrawn, it had suffered more casualties than any other US division in the conflict.

To illustrate the respective tactics of the 1st Cavalry and the PAVN, McNab draws on the engagements fought in 1966-1967, in particular (particularly Operations Crazy Horse and Masher) and the battles of Tam Quan and the Vinh Thanh Valley. He mentions the PAVN's uncomplicated method to neutralize airpower and artillery. Their soldiers were to quickly close with US troops and "hold the enemy's belt." In other words, get inside the safe zone for American forces where artillery and airstrikes were equally dangerous for both sides. If they did not, then the PAVN's units would by mauled with significant losses.

This is a first-rate monograph, with one exception.

McNab failed to acknowledge Air Force members who were organic to the 1st Cavalry Division (indeed all Army combat divisions and independently operating battalions)—the Forward Air Controllers (FAC) and Tactical Air Control Party. There was a special bond that allowed unit FACs to work closely with Army leadership, have hands-on knowledge of operational planning and execution, and be familiar with the troops in the field. Otherwise, this monograph brings much to the table: It is flush with excellent illustrations and photographs that greatly enhance the narrative and is supported by highly usable maps with descriptive keys. It is a valuable reference tool.

John Cirafici, Milford DE

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Inferno: The True Story of a B–17 Gunner's Heroism and the Bloodiest Military Campaign in Aviation History. By Joe Pappalardo. New York: St. Martin's Press, 2020. Photographs. Index. Pp. 343. $28.99. ISBN 978-1-250-26423-7

All too often, stories of Medal of Honor (MOH) recipients are confined to brief narratives of the action that earned them the honor. In this well-researched biography, Joe Pappalardo, former associate editor of *Air and Space Smithsonian*, addresses the distinctive qualities of the Eighth Air Force's Maynard H. Smith—a man with a troubled reputation. On May 1, 1943, he was the ball turret gunner on a 306th BG B–17 heading for the submarine pens at St. Nazaire. After bombing, Smith's group tragically turned too soon for England and flew directly over well-defended Brest, France. Heavy and accurate flak and fighters badly damaged Smith's plane. Emerging from his turret, Smith found fires blazing, wounded crew, and enemy aircraft queuing up. He calmly and methodically fought the fires; tended to the wounded; and, when enemy fighters came too close, responded with the B–17's .50-cal. waist guns.

Smith's actions in saving his plane merited the MOH. It is likely a review would eventually have picked it up. However, in mid-1943, Eight Air Force was waging a battle of public opinion. There was a search for heroes. The 306th BG gave the story of Smith's fateful flight to reporters. Soon it spread across the country, and officialdom determined he deserved the MOH. Secretary of War Stimson presented it on July 16, 1943. Finding Smith's repeated infractions of military discipline irresistible, the press dwelled on them. Thus began the legend of habitual reprobate that dogged Smith throughout his life.

Pappalardo found that the true story is more complex. Smith was rebellious from childhood. By 1942, with a considerable trail of debts, legal infractions, and wrecked automobiles in his wake, a judge gave him a choice of jail or the military. Smith chose the military. He excelled in his training courses and, in April 1943, was shipped to England as a replacement gunner.

This book argues that despite his intractability, Smith was intelligent, articulate, rational, adaptable, and resilient. These traits may have paved the way for the unusually complete record of his life that has survived the decades.

Smith had little patience with the unwritten, but time-honored, expectation of reticence on the part of those who have received the nation's highest military honor. He took advantage of his status to obtain privileges, passes, and other luxuries before official patience wore thin. Back home, the War Department put Smith on a cross-country morale tour. Here he was in his element with the cheering crowds, introductions by local dignitaries, street-spanning banners, handshaking, and motorcades. After the war, he regularly made speeches, signed autographs, and posed for photos. He sold autographed, poster-sized cards detailing his MOH mission; freely discussed his combat experiences; and saved every laudatory article, photo, and program. Advantageously, people in whom Smith confided later provided many revealing interviews to researchers; and his extensive documentation collection was a bonanza of research material.

Intended for the casual reader, the book is lively and engaging. It establishes a context for Smith's brave action with a summary of the desperate, deadly air war over Europe in 1943.

Most of the photos appear here for the first time. There is no bibliography, but sources appear in the informative footnotes. Readers may want to compare Smith's story with those of fellow MOH recipients John C. Morgan (Simmons, 2018) and Red Erwin (Erwin and Doyle, 2020), both of whom saved their planes and crews in dire combat situations. Possessed of different backgrounds and values than Smith, the reader will find vivid contrasts to him in both men.

As a study of the elusive quality called courage, this book is a convincing study of a complex individual who lived his long and eventful life largely—and arguably successfully—on his own terms. It is highly recommended reading.

Steven Agoratus, Hamilton NJ

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Operation Colossus: The First British Airborne Raid of World War II. By Lawrence Patterson. Barnsley UK: Greenhill, 2020. Maps. Photographs. Notes. Appendix. Glossary. Bibliography. Index. Pp xx, 236. $32.95. ISBN: 978-178438-378-7

Lawrence Patterson is best known for documenting Germany's World War II submarine operations through more than a dozen books. Here, he ventures into an entirely different aspect of military history: the beginning of

Britain's airborne forces. The Soviet Union is generally considered to be the first nation to seriously pursue the development of parachuting infantry onto the battlefield. The Germans demonstrated the value of airborne units during their invasion of Belgium and the Netherlands in May 1940. The actions inspired British Prime Minister Winston Churchill to demand his army train 5,000 paratroopers.

Patterson details the selection of the training cadre and the initial soldiers (all volunteers) who formed the first operational unit—designated as X Troop—for the mission described in this book. Those responsible for creating the airborne force recruited civilian parachutists as instructors, some of whom had performed for Britain's traveling aerial shows in the late 1920s and 1930s. By late 1940, British commanders had selected a target. About three dozen paratroopers would be dropped into southern Italy with the goal of destroying what was believed to be a critical aqueduct.

The Royal Air Force reluctantly provided a few Armstrong Whitworth Whitley Mk II bombers for training and the actual operation. With the arrival of the first of nearly 2,000 Douglas Dakota (C–47) transports more than two years distant, these were the most suitable aircraft available. Technicians removed the ventral turret, thus providing a hole in the bottom of the fuselage through which the troops could exit the aircraft.

As typically happened in World War II airborne operations, troops and equipment seldom landed where they were intended. So it was on the dark night of this February 1941 operation. Despite some difficulties, enough of the troops with limited explosives secured the target area and damaged the aqueduct.

The extraction plan proved to be very unrealistic. All concerned were captured by the Italians. One, an Italian internee from a British detention camp who agreed to participate, was executed. All British personnel either escaped to Switzerland or were later liberated from German prison camps.

While the attack had almost no impact on the Italian infrastructure, the British learned some of the shortcomings of dropping troops and equipment. The next mission—a successful effort to obtain a portion of a German radar site in coastal France in 1941—definitely benefited from the previous experience.

Aside from the references to the use of Whitleys as transports and the value of aerial photography, or the lack thereof, aviation enthusiasts will find little of interest. On the other hand, this story will remind readers of the consequences of inadequate mission planning and command-and-control shortcomings. Furthermore, detailed accounts of the British paratroopers' actions after the attack on the aqueduct should fascinate those seriously interested in survival, evasion, resistance, and escape (SERE).

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

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Airpower Over Gallipoli, 1915-1916. By Sterling Michael Pavelec. Annapolis MD: Naval Institute Press, 2020. Maps. Photographs. Notes. Bibliography. Index. Pp. 205. $40.00. ISBN 978-1-6125-1023-1

A widely published author and professor at the Air Command and Staff College, Pavelec tackles one of the most ignored topics of the First World War—Allied and Central airpower operations outside of the more well-known Western Front. Outside T. E. Lawrence's *Seven Pillars of Wisdom* and a few movies such as *Lawrence of Arabia* (German two-seater bombers) and *Shout at the Devil* (Portuguese pusher observation aircraft), airpower in Africa and the Middle East is rarely discussed by historians or in popular culture. This book focuses on the men and aircraft that operated in the skies of the Dardanelles Strait and Gallipoli Peninsula during one of the most controversial British-French land-sea operations of the First World War. During the campaign, three Allied (two British and one French) seaplane tenders and three land-based squadrons (two British and one French) flew and fought against two combined German-Ottoman squadrons and the extreme weather in the crossroads between Europe and the Orient.

In March 1915, Allied forces launched an ill-fated combined naval campaign on Turkish forces in the Dardanelles Strait in northwestern Turkey. The goal was to take control of the strategically vital strait separating the country. The failure of the campaign at the Dardanelles, along with the land campaign later that year in Gallipoli, resulted in heavy casualties and a serious blow to the reputations of Allied leaders, including First Sea Lord and future Prime Minister Winston Churchill. The withdrawal of the Allies solidified the reputation of German General Carl Liman von Sanders, militia attaché to the Ottoman Government and actual commander of the Turkish forces in the Dardanelles. Finally, the defeat of the Allies helped the political aspirations of Turkish General Mustafa Kemal Ataturk, who would go on to become of the "Father of the Turks" in post-war Turkey.

The nine-month aerial contest did not determine the outcome of the Dardanelles campaign; it did demonstrate that airpower was expeditionary; flexible; and, with the right mix of personalities, able to operate jointly. *Airpower Over Gallipoli* provides both a chronology of the build-up of Allied forces (including aircraft) and the German-Ottoman counter moves. Next the book follows several early and influential airpower leaders from Britain, France, and Germany who saw the long-term value of aviation technology, even if the equipment itself did not live up to promises. Finally, the book highlights the joint air, land, sea, and coalition tactical operational nature of the entire campaign, addressing both the advantages and challenges of such operations that are still relevant today.

Airpower Over Gallipoli, 1915-1916 is both well written and cited, using a variety of resources from across the British Commonwealth, France, Germany, and (when available) Turkey to take an objective assessment of air operations during the campaign. What is lacking from an otherwise insightful book are proper maps showing the locations of both the combatants' airfields and squadrons and the general location of the seaplane tenders in the Dardanelles Strait. *Airpower Over Gallipoli* adds to the list of scholarly work on a subject fading with the passing of time. It also provides future historians with a foundation on how to assess the public perceptions of controversial military operations and the employment of a new technology; a lesson that could very well apply to future assessments of the long wars in Afghanistan and Iraq.

Col Jayson A. Altieri, USA (Ret), former Army aviator and paratrooper; Asst Professor, Air War College, Maxwell AFB AL.

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The Battle for Heraklion. Crete 1941: The Battle Revealed Through Allied and Axis Accounts. By Yannis Prekatsounakis. Warwick UK: Helion & Company, 2020. Photographs. Maps. Notes. Bibliography. Index. Pp. xii, 294. $39.95 paperback. ISBN: 978-913336-01-1.

In his first published work, the author, a retired Greek naval officer and native of Heraklion, chronicles the 10-day battle for his hometown fought in May 1941. From the beginning, it is readily apparent that he has spent much of his lifetime researching the battle. Unlike the typical German and British Commonwealth accounts of the fighting, he includes the perspective of the native Greeks attempting to defend their homeland from the Nazi invaders.

Military historians typically remember the Crete campaign for two reasons: first, the Commonwealth's inability to repel the invaders despite superior numbers; and second, the extraordinarily high losses absorbed by the German paratroopers. After achieving considerable success through bold airborne assaults in the spring of 1940, the losses Germany's elite troops suffered on Crete led Adolf Hitler to forbid their use in similar operations for the remainder of the war. They did fight as infantry, however, particularly on the Western Front in 1944.

Drawing on letters, diaries, and interviews, the author traces the story from pre-assault preparations on Greece proper to the final outcome—surrender of the city after withdrawal of most Commonwealth forces. The Germans made the capture of the city on Crete's north-central coastline a top priority. On its outskirts was one of the island's most capable airfields—a necessary asset for planned reinforcements.

The stubborn Commonwealth and Greek defenders turned back repeated assaults to the east and west of the city. In this account, most of the small-unit firefights are described in detail. In many instances, the gravesites of many German paratroopers are documented.

With a couple of exceptions, the impact of the *Luftwaffe* and absence of the Royal Air Force are seldom mentioned. Of course, the venerable Junkers Ju 52 transports provided the Germans with the initial airlift on May 20 and with later reinforcements. In an attempt to force a surrender after direct assaults had failed, the *Luftwaffe* threatened to destroy the city. The defenders refused. On May 23, the *Luftwaffe* followed through, inflicting enormous damage but causing relatively few casualties. Citizens and soldiers alike found sufficient shelter in the centuries-old city walls.

Despite the pounding, the defenders resisted effectively over the next few days. Eventually, however, the Germans linked up their forces south of the city. This action isolated the defenders from reinforcements and supplies. During the early morning hours of May 29, Royal Navy destroyers evacuated Commonwealth troops from the small harbor. Later that day the Greek forces surrendered.

Readers interested in small-unit combat will find this book highly satisfying. It has all the necessary elements—detailed personal accounts from those involved, very good maps, and an excellent combination of "then-and-now" photographs. Anyone interested in the Crete campaign and a devotee of battlefield visits will find this work to be an indispensable guide.

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

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The Yugoslav Air Force in the battles for Slovenia, Croatia, and Bosnia and Herzegovina, 1991-1992, Volume 1. By Aleksandar Radi . Warwick UK: Helion & Company, 2020. Notes. Maps. Tables. Photographs. Pp. 88. $29.95. ISBN: 978-1-912866-35-9

Helion is highly regarded for the scholarship of its authors and their subject knowledge. They often have extensive firsthand experience with their topics and are often native speakers of the subject country's language. This is true with Aleksandar Radi , a former affiliate of the Yugoslav military, who is well acquainted with the events, personalities, lay of the land, equipment of the Yugoslav Air Force, and how the weaponry and aircraft were tactically employed.

Radi immediately impresses a reader with his detailed knowledge of the Yugoslav military (JNA) and especially the Air Force. His level of familiarity with the subject and personal contact with actual participants during the crises discussed in this monograph provide details otherwise difficult to access. Equally formidable is his thorough grasp of the political situation that precipitated a brutal struggle between several of the seceding constituent republics of federated Yugoslavia.

Radi takes the reader step-by-step on parallel tracks leading to Yugoslavia's internal war. One track follows the changing nature of the JNA's war plans taking it from its traditional role in resisting a conventional invasion to a new direction—engaging former members of Yugoslavia in warfare. Radi argues that the JNA was ill prepared for a conflict within Yugoslavia, because the focus had been on defeating an invading force—NATO or the Warsaw Pact—and not an internal war between the federated state's various republics. The other track follows Yugoslavia's political evolution from a communist state to the re-emergence of nationalism embraced by the various ethnic groups. This led to secession.

Radi parallels his account of the disintegration of Yugoslavia with the evolving role of the Yugoslav Air Force during the crises as the tactics and use of force changed from non-violent intimidation to all-out combat. This incredibly detailed account of the conflict, however, seems to represent the Yugoslav military as ambivalent about conducting combat operations within Yugoslavia. One must keep in mind that the JNA was allied with Serb paramilitary groups responsible for horrific atrocities visited on the Croats and later on the Muslim Bosnians. The JNA's hands were not clean in any of this; they shared culpability for the wanton destruction.

I was a witness to that destruction in Croatia, Dalmatia, and Bosnia Herzegovina. Having been there in Bosnia and Croatia during the actual conflict in 1993, preparing for what would have been the Vance-Owen Peace Plan, I can attest to the accuracy of Radi 's accounts.

While reading this monograph, one should keep in mind that the 1991-92 fighting discussed in here (the first volume covering the conflicts) eventually led to direct US involvement with imposition of a no-fly zone in 1993, airstrikes in Bosnia in 1995, and deployment of ground forces there under NATO direction. Later, in response to genocide in Kosovo, the US entered direct combat with Serbia in 1999.

I am impressed with the author's knowledge and play-by-play description of the crises, and recommend this monograph as an important primer to understanding the events taking place as Yugoslavia fell apart.

John Cirafici, Milford DE

Spying from the Sky: At the Controls of U.S. Cold War Aerial Intelligence. By Robert L. Richardson. Philadelphia: Casemate Publishers, 2020. Illustrations. Tables. Photographs. Notes. Appendices. Index. Pp. x, 301. $34.95. ISBN: 978-1-61200-836-3

Air Force Colonel William Gregory played an important role in some key events of the Cold War. This book covers his life from 1920 to the current day (still going strong at age 100), but the primary focus is his years in aerial reconnaissance.

Born into a sharecropper family in Tennessee, he discovered his love of flying in the Civilian Pilot Training Program. In September 1941, Gregory joined the Army Air Corps Cadet Program in order to assure himself of the greatest opportunities to fly during the upcoming war.

Gregory's first operational assignment was in the P-38 fighter, in which his squadron supported the Allied invasion of North Africa and the invasion of Sicily. Gregory completed 50 bomber-escort and ground-attack missions. He returned to the States in late 1943 as both an instructor and ferry pilot.

Gregory left active duty in 1947 and joined the Reserves. After being mobilized for Korea, he decided to resume his active-duty career. He served in a B–47 squadron briefly before being asked to participate in Project Black Knight, the Air Force's high-altitude surveillance program. Black Knight was a recognition that the U.S. intelligence community had not been effective in the years following World War II, having foreseen neither the Berlin Blockade in 1948 nor the USSR's first nuclear detonation in 1949. The U.S. needed better intelligence on Soviet capabilities and intentions. The only way to gather the essential information was by conducting high-altitude overflights of the Soviet Union and other areas.

Gregory's first reconnaissance airplane was the RB–57D Canberra. The airplane was later upgraded to the RB–57D-2, with enhanced cameras and electronic collection devices. With a cruising altitude of 70,000 feet, it could avoid being shot down by Soviet missiles and fighters. In the mid- to late-1950s, Gregory led deployments to Japan, Alaska, and the UK. It was during this time that his work became highly classified, and he was not permitted to tell his family what he was doing, where he was going, or when he would return.

In 1960, Gregory was brought into the U–2 program as commander of a detachment at the Edwards AFB. He was to develop and maintain an operational U–2 capability while supporting developmental and testing activities. Deployments included basing U–2s in the Philippines to surveil Vietnam and Laos and then to Texas for overflights of Cuba as part of the run-up to the Bay of Pigs invasion in 1961. He spent two-thirds of his time away from home and family.

In August 1962, his detachment discovered Soviet surface-to-air missiles in Cuba, leading to the Cuban Missile Crisis in October. U–2s continued to conduct Cuban overflights until the final flights in November confirmed that Soviet weapons and personnel had been removed from the island. This was the high point of his career in aerial reconnaissance.

He continued working on challenging U–2 developmental projects, and left flying to serve on the Air Staff in the Pentagon. He retired from the Air Force in 1975, took a job with the state government in Austin TX, and then retired for good in 1992.

The book also looks at U.S. surveillance programs that didn't directly involve Gregory. These informative, well-written excursions address an overall view of strategic reconnaissance in the decade or so immediately following World War II, the need for and development of the A-12/SR-71, and development of the Corona photo reconnaissance satellite. These sections add to the book's value as a primer on aerial reconnaissance.

The book contains a few factual errors that are insignificant and have no impact on the story. Richardson has produced a well-researched, well-written book that achieves his objective of introducing us to Colonel William Gregory and helping us understand his role in preserving the peace during the Cold War.

Lt. Col. Joseph Romito, USA (Ret), docent, National Air and Space Museum

World War II US Gunships: YB–40 Flying Fortress and XB–41 Liberator Bomber Escorts. By William Wolf. Oxford UK: Osprey, 2020. Tables. Diagrams. Illustrations. Photographs. Bibliography. Index. Pp. 80. $22.00 paperback. ISBN: 978-1-4728-9

In this book, Dr. Wolf has put together, for the first time, the saga of one of the odder concepts pursued during the Second World War—the heavy bomber escort aircraft. I've known about the YB–40 and XB–41 since I was a kid, but retired dentist and World War II historian Wolf has finally provided readers with the complete story, thanks to his usual superb research work.

The USAAF had been watching the war in Europe. Germany and the UK were proving that the widely believed doctrine of "the bomber will always get through" was not entirely true. Even before America's entry into the war, Army leaders were concerned that their primary heavy bomber, the B–17 Flying Fortress, might not live up to its name. It was probably going to be especially vulnerable from frontal attacks. With no long-range fighters available to any of the combatants, other means of additional defense were needed. By September 1941, the Army had issued specifications for what a bomber converted to a bomber escort should look like.

When the US entered the war, development of the concept moved into high gear. The first project was the XB–40, a B–17F modified with a two-gun chin turret, another two-gun turret on top, twin vs. single guns at the waist positions, and the bomb bay converted to be a magazine for extra .50-cal ammunition. All told, the aircraft carried nearly 14,000 rounds of ammo and had over a ton of additional armor for the crew and vital aircraft systems. Unfortunately, this made it about two tons heavier than a standard B–17. The airplane first flew on 10 November 1942.

Twenty-two YB–40 service test models were ordered starting in early 1943. A highly experienced B–17 pilot, Lt Col Paul Tibbets, Jr. (later to command the 509th Composite Group), was selected to lead the evaluation team. With recommended changes, twelve of these aircraft were sent to the 92nd Bomb Group at RAF Alconbury in the UK. During a two-month operational period, 59 YP-40s were dispatched (48 were credited) on 14 different missions, usually in the most vulnerable positions in the formation. All told, they were credited with five fighters shot down and two probables, while losing one of the YB–40s. These aircraft had slower times to climb and had troubles keeping up with the regular bombers, especially after they had dropped their bomb loads. With the incoming P-38, P-47, and P-51 fighters, the bomber escort program was cancelled before the end of the year.

Meanwhile, one B–24 had been similarly configured as the XB–41. Its flight test revealed many problems, and it was not pursued. Also, one YB–29 was built as an escorter. It featured 18 .50-cal guns and one 30mm and four 20mm cannons! It, too, was dropped from further consideration.

The only meaningful change that came out of the program was inclusion of nose turrets in late B–17F aircraft and all of the B–17Gs built. The B–24 ended up with a different turret in its nose. This afforded much greater frontal defense for the majority of America's heavy bombers.

This is an interesting story, well told, of one attempt to protect the bombers. Profusely illustrated and loaded with photographs, this is the sourcebook for an interesting project that didn't work anywhere close to the hopes of those who pushed it.

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

PROSPECTIVE REVIEWERS

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

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Compiled by
George W. Cully

In light of the coronavirus pandemic, events listed here may not happen on the dates listed here, or at all. Be sure to check the schedules listed on the individual organization's web sites for the latest information.

July 7-10, 2021
The **International Womens Pilot Association**, better known as **The Ninety-Nines**, will hold their annual meeting on board the SS Queen Mary moored in the harbor of Long Beach, California. For registration, see their website at https://travelplannerstexas.swoogo.com/99s2021/333555.

July 13-15, 2021
The **American Astronautical Society** will present its annual John Glenn Memorial Symposium in an on-line format. For details, see the Society's website at John Glenn Memorial Symposium | American Astronautical Society.

July 25-31, 2021
The **International Committee for the History of Technology** will hold its 26th annual meeting in virtual form. This year's theme is "Giants and Dwarves in Science, Technology and Medicine." For registration and more information, see the Committee's website at ICHST 2021.

August 2-6, 2021
The **American Institute of Aeronautics and Astronatics** will host its annual Aviation Forum in virtual form. For more information, see the Institute's website at Virtual Event FAQs | AIAA.

August 16-19, 2021
The **Association of Unmanned Vehicle Systems International** will present Xponential 2021, its premier annual symposium and convention at the Georgia World Congress Center in Atlanta, Georgia. For registration and other information, see the Association's website at AUVSI XPONENTIAL 2021: FAQs.

August 19-22, 2021
The **American Fighter Aces Association** will hold its 2021 Reunion at the DFW Airport Marriott South Hotel in Dallas, Texas. For registration and other details, see the Association's website at AFAA21 2021 Hotel Info (militaryreunionplanners.com).

August 23-26, 2021
The **Space Foundation** will host its 36th annual Space Symposium at the Broadmoor Hotel in Colorado Springs, Colorado. For registration and other details, see the Foundation's website at https://www.spacesymposium.org/.

September 9-11, 2021
The **National WWII Museum** will host "Memory Wars: World War II at 75," an international conference to address the shifting landscapes of popular memories of this world-altering conflict. The gathering will be held at the new Higgins Hotel & Conference Center in New Orleans, Louisiana. For more information, see the Museum's website at Home | The National WWII Museum | New Orleans (nationalww2museum.org).

September 9-11, 2021
The **Tailhook Association** will hold its annual symposium at the Nugget Resort in Reno, Nevada. This year's presentation will focus on NAVAIR's role in the Air War over Vietnam. For details, see the Association's website at http://www.tailhook.net.

September 18-21, 2021
The **Air Force Association** will host its annual convention at the Gaylord Convention Center in National Harbor, Maryland. This will be immediately followed by the Association's annual Air, Space & Cyber Conference at the same site. For more details as they become available, see the Association's website at https://www.afa.org/events.

October 5-6, 2021
The **Aviation Engine Historical Society** will conduct its annual gathering at the Hilton Doubletree Hotel in Dearborn, Michigan. Expected site visits include the Henry Ford Museum, Greenfield Village, Automotive Hall of Fame and the Yankee Air Museum. For further information as it becomes available, see the Society's website at http://www.enginehistory.org/.

October 22-25, 2021
The **Society of Experimental Test Pilots** will hold its 65th Annual Symposium and Banquet at Disney's Grand Californian Hotel and Spa in Anaheim, California. For registration and a schedule of events, see the Society's website at The Society of Experimental Test Pilots (setp.org).

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October 11-13, 2021
The **Association of the United States Army** will present its Annual Meeting and Exhibition at the Walter E. Washington Convention Center in Washington, D.C. For registration and other details, visit the Association's website at Home (ausa.org).

October 11-13, 2021
The **American Astronautical Society** will present its annual Wernher von Braun Memorial Symposium in Huntsville, Alabama. For additional details as they become available, see the Society's website at Wernher von Braun Memorial Symposium | American Astronautical Society.

October 13-17, 2021
The **Oral History Association** will hold its annual meeting in virtual form. See the Association's website at Oral History Association for scheduling information as it becomes available.

October 21-24, 2021
The **Institute for Korean Uniication** (IKU), Pusan National University is hosting an international conference on the United Nations and Korean War (1950-1953): Politics, War and Peace. https://iku.pusan.ac.kr/iku/54496/subview.do.

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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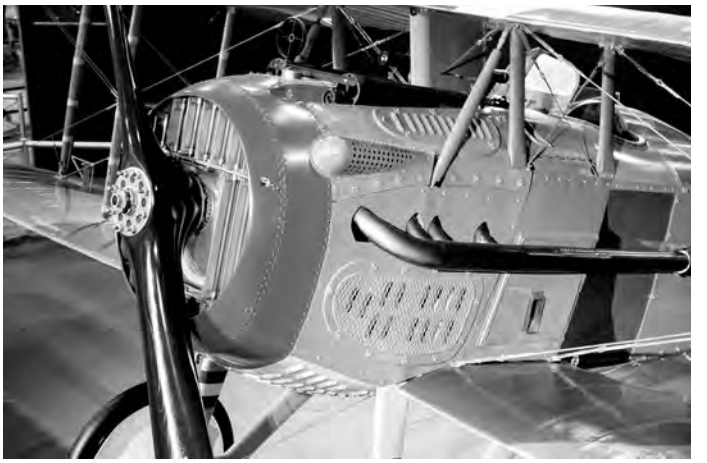
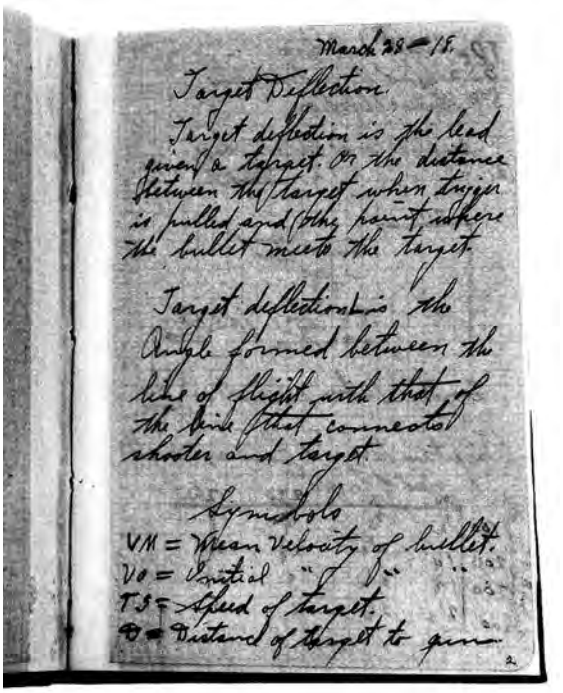
History Mystery Answer




March 28 – 18.

Target Deflection

Target deflection is the lead given a target. Or the distance between the target when trigger is pulled and the point where the bullet meets the target.

Target deflection is the Angle formed between the line of flight with that of the line that connects shooter and target.

Symbols

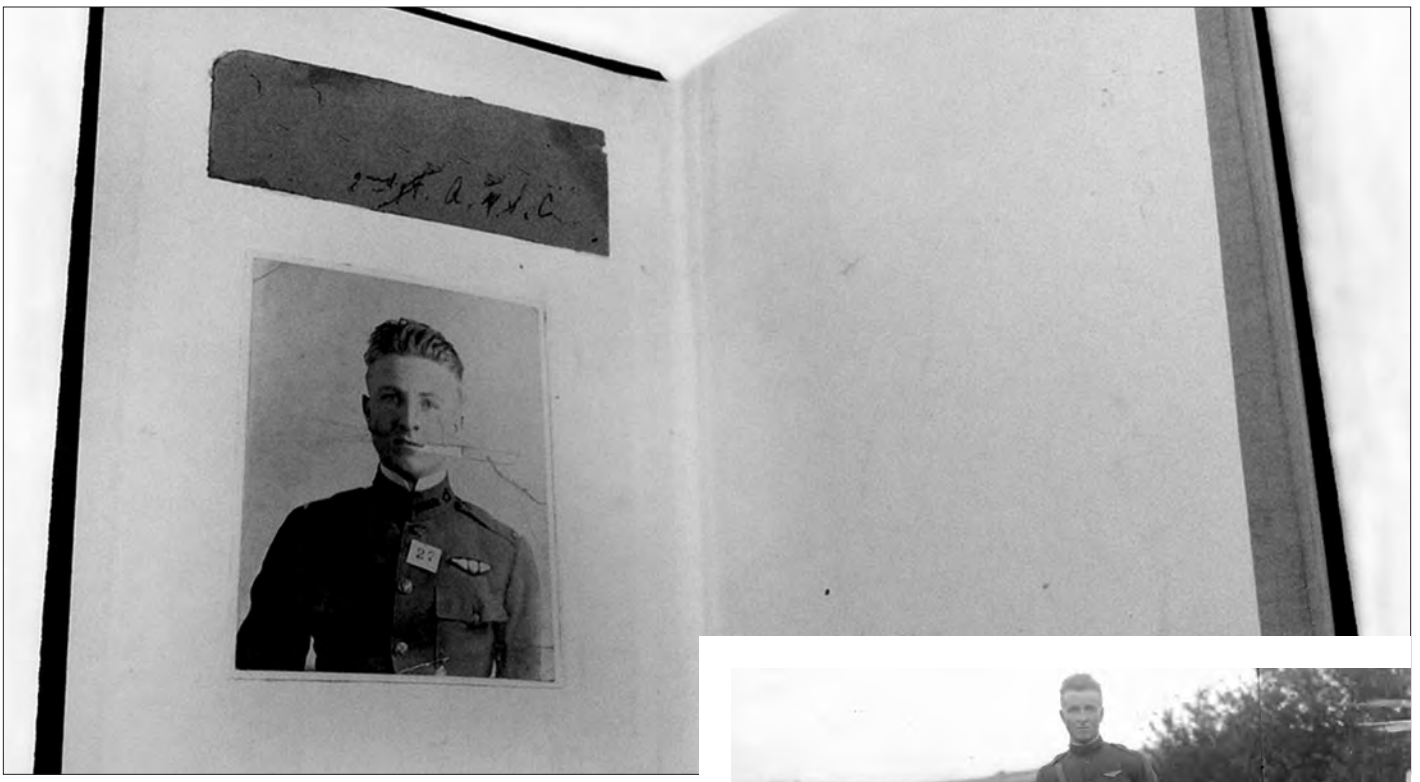
VM = Mean Velocity of bullet.
Vo = Initial " " "
TS = Speed of target.
D = Distance of target to gun

During a span of less than two months, Second Lieutenant Frank Luke shot down 4 airplanes and 14 balloons. Because of his 14 balloons kills, Frank Luke became known as the "Arizona Balloon Buster." Thirteen of his kills came during just one week in September. What makes this feat even more impressive is that he did not fly for two of the days that week. Assigned to the 27th Aero Squadron, 1st Pursuit Group, 2Lt Luke flew a French built SPAD XIII. The 2th Aero Squadron had orders to attack balloons, and that Frank Luke certainly did. Frank Luke preferred to fly alone, which led fellow pilots to think of him as fearless as well as "Wild and Reckless." On September 29th, 1918 Frank Luke took off at sunset for what would become his last sortie. During his final sortie he shot down three balloons before being engaged and chased by the eight German aircraft protecting the balloons. Luke was wounded and forced to land. Hailing from Phoenix Arizona, in 1949, Luke Air Force was named in his honor. Frank Luke was only 21 years old. His remains are buried in the American Meuse-Argonne Cemetery in Romagne, France.

To learn more about:
Frank Luke: https://www.afhistoryandmuseums.af.mil/About-Us/Fact-Sheets/Article/994275/2nd-lt-frank-luke-jr/ https://www.afhistory.af.mil/FAQs/Fact-Sheets/Article/639654/luke-2nd-lt-frank-luke-jr/
Frank Lukes' Congressional Medal of Honor Citation: https://www.cmohs.org/recipients/frank-luke-jr
SPAD XIII: https://www.nationalmuseum.af.mil/Visit/Museum-Exhibits/Fact-Sheets/Display/Article/197399/spad-xiii-c1/
The Army Air Services during World War I: https://media.defense.gov/2010/Oct/13/2001329758/-1/-1/0/AFD-101013-007.pdf

New History Mystery

by Dan Simonsen



This issue's quiz:

This Medal of Honor winner hailed from the state of Arizona. Among pilots who only served with the American Expeditionary Force, his tally of air-to-air victories is only second to that of Eddie Rickenbacker. He enlisted in 1917 into the Army Signal Corps and earned his wings in 1918. He was assigned to the 27th Aero Squadron [Today the 27th Fighter Squadron flies the F-22A Raptor]. His air-to-air victories are a combination of balloons and aircraft. After being killed in action, he was awarded the Congressional Medal of Honor. An Air Force Base is named in his honor. Name this American World War I Ace. What was his Nickname? How many victories did he have? As a side note, the image of the notebook is of his notebook that is currently stored at the National Museum of the Air Force.

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