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Air Power History

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When the airplane was invented, both European and American military leaders failed to foresee the vital importance of aviation and aviation research. However, while government officials dawdled, private individuals came together to take the lead in air power advocacy. That is the thesis of Adam Jungdahl in his article, “The Influence of the Private Sector on the Diffusion of Military Aviation, 1907-1912.”

Frode Lindgjerdet tells the story of his nation’s resistance against the powerful Luftwaffe for a couple of weeks following the German invasion of Norway on April 9, 1940. Despite the ingenuity of Norway’s Trondelag Air Wing, they ultimately were defeated by the lack of supplies and inadequate communications.

The proliferation of nuclear weapons during the period from 1945 to 1962, resulted in strategists both in the U.S. and USSR painting themselves into a corner. They shifted from a strategy limited only to military targets to a total war. Beginning in 1962, advances in nuclear weapons reached a point where Mutually Assured Destruction, or MAD, made sense. To avert Armageddon, by 1991 the super powers were driven to détente and disarmament negotiations.

While he neither minimizes the importance of ground maneuver forces nor sea power, historian Bill Head’s article, “The Battle for Ra’s Al-Khafji and the Effects of Air Power,” claims that this often-overlooked battle established the efficacy of air power in warfare. In part I of this article Head covers the entry into Khafji. Part II, which will be published in the summer issue of Air Power History, will deal with the withdrawal from Khafji.

This issue also contains the usual outstanding book reviews, History Mystery, upcoming symposia and reunions, plus a sadly long list of In Memoriams. Please be sure not to miss the President’s Message on page 66.
The Battle for Ra’s Al-Khafji and the Effects of Air Power
January 29–February 1, 1991
Part I
The arches into the Saudi city of Al-Khafji. Because the city was within range of Iraqi artillery in Kuwait, it was ordered evacuated on August 18, 1990. (Photo courtesy of the U.S. Marine Corps History Division, study by Paul W. Westermeyer, photo by MGySgt Gregory L. Gillispie.)

(Right) Gen. Khaled bin Sultan bin Saud, a prince of the Saudi royal family, was the Joint Forces Commander and General Schwartzkopf’s opposite number.
which had sortied, the Iraqi leader detailed his Soviet-built MiG fighter aircraft to Iran to prevent them from being destroyed by Coalition aircraft.

Next, the Iraqi dictator unsuccessfully attempted to provoke the Israelis into the conflict in an effort to cause the Arab nations in the Coalition to withdraw. He hoped to make it a strategic war between the Arab world and the western world. The Iraqis fired Scud missiles at random Israeli targets. The Israelis, showing great restraint, refused to take the bait.

Hussein also tried to draw Coalition troops into a costly tactical ground engagement by shelling Saudi and Qatari military positions and oil storage tanks along the border. The Coalition, led by Gen. H. Norman Schwarzkopf, was still in the preparation stages of the upcoming ground campaign and would not be lured into premature action. Gen. Bernard E. Trainor in his book, *The Generals’ War*, claims that Schwarzkopf misunderstood the significance of the Battle of Khafji and that while he was right not to overreact, he never grasped how important Al-Khafji was to Saudi and Iraqi morale and the outcome of the Persian Gulf War.

With his command, control and communications (C³) centers in smoldering ruins and his people suffering deprivations from the air war and the embargo, Hussein ordered the invasion of Saudi Arabia by the 1st and 5th Mechanized Divisions and the 3d Armored Division. Their plan was a multi-pronged incursion toward Al-Khafji, engaging U.S., Saudi, and Qatari forces along the coastline. Hussein’s three divisions had suffered losses during the air campaign but were still intact and ready to fight. Relieved to be taking the fight to the enemy, the Iraqi units planned to attack late on January 29. On that date, the Iraqis brought the war to the Allies front door at Al-Khafji with Iraqi ground forces meeting Coalition forces for the first time. While the parts of this offensive force were initially repulsed by Coalition air and ground units, one major Iraqi column did occupy Al-Khafji. In the resulting combat, air power played a key role. As Daniel R. Clevenger stresses in his study of the battle, “Air superiority is prerequisite for the successful application of maneuver warfare. With air superiority, your ground forces are able to move at will, unimpeded by enemy air attack.” He concluded: “Without air superiority, your ground forces are vulnerable to attack in both day and night, and will be unable to move without risking heavy loss, loss of unit cohesion and possibly lead to your ground units’ destruction.”

**Background of the Battle**

The first Persian Gulf War began on August 2, 1990, when the Iraqi Army invaded and occupied the neighboring state of Kuwait. Kuwait was originally an Iraqi province but in 1899, the British, with local Kuwaiti support, created a protectorate that detached Kuwait and made it a separate nation in order to initially exploit its port facilities and, later, its oil reserves.

The invasion came on the heels of the inconclusive Iran-Iraq War that had lasted from 1980-1988 with President Ronald Reagan supporting Baathist secularist Saddam Hussein against the
Iranian forces of the Ayatollah Khomeini. In the summer of 1990, U.S. Ambassador to Iraq, April Glaspie, seemed to indicate to Saddam Hussein that the U.S. would not object to Iraq retaking their former province. Misinterpreting this message, Saddam Hussein’s troops marched almost unopposed into Kuwait. The invasion culminated three decades of political conflict with Kuwait, offered Saddam Hussein the opportunity to distract political dissent at home and added Kuwait’s oil resources to Iraq’s own during a period of economic crisis and declining petroleum prices.8

With the urging of President George H.W. Bush who was concerned about his public image, the United Nations (UN) passed several resolutions demanding the withdrawal of Iraqi forces from Kuwait. By August, the U.S. feared that Iraq might also invade its important regional ally, Saudi Arabia, and moved to build a coalition to defend the Saudi peninsula and force the Iraqis out of Kuwait. The Saudi government requested immediate military aid from the U.S.9 As a result, the United States initiated Operation Desert Shield, the buildup of American and Coalition forces, weapon systems and supplies, to defend Saudi Arabia and commence the expulsion of Iraqi forces from Kuwait (Operation Desert Storm).10

Caught somewhat off guard by this U.S. led resistance to his occupation of Kuwait, Saddam Hussein attempted to deter Coalition military action by threatening to halt Kuwaiti and Iraqi petroleum production and export. In December 1990, Iraq made preparations to blow up the wellsheads at the Ahmadi loading complex as a prelude to totally shattering Kuwait’s petroleum infrastructure. On January 16, 1991, Iraqi artillery destroyed an oil storage tank near Al-Khafji, Saudi Arabia, and, on January 19, they breached the pumps at the Ahmadi loading complex draining 200,000 barrels of crude oil a day into the Gulf. At the time it was the worst ecological disaster in human history, one that required years to clean up.11

Based on Saddam Hussein’s apparent willingness to do anything to stop the Coalition buildup, many Allied political leaders and military commanders feared he might employ chemical, biological or even “dirty” weapons in the upcoming engagements. Although he did not, Coalition commander, Gen. H. Norman Schwarzkopf, planned and operated as if he might to the very end of the conflict. In fact, what is now clear is that Saddam Hussein’s main focus was to play on Western fears of high casualties and to try to detach the Arab part of the Coalition. His offensive at Al-Khafji was built around his belief that if he could inflict enough damage on the Allies, their citizens would demand they end the war.12 Even U.S. Secretary of Defense, Richard Cheney had declared, “the number one priority of America was to expel Iraq from Kuwait ‘at the lowest possible cost in terms of the loss of U.S. life.’” Certainly, Saddam Hussein had to believe that the longer he could holdout the better his chances were. Tariq Aziz, Iraqi Foreign Minister, told Secretary of State James Baker, “that Iraq could hold out for a year or even two.”13

Despite Iraqi threats of detaining American civilians, creating ecological disasters and raining missiles on Israel, on January 17, the Coalition launched a massive thirty-eight-day aerial campaign that lit up the night skies of Baghdad, totally disabled Iraqi C3, and systematically eliminated its infrastructure, electric grid, food and water supplies, as well as air defense systems. Flying nearly 2,000 sorties a day, U.S., British, French and other Coalition aircraft negated the Iraqi Air Force and seized control of the skies. As noted, on the third day of the campaign, nearly all the remaining Iraqi pilots flew their aircraft to Iran to be interfered rather than risk their destruction.14

Some sources reported that Saddam Hussein told his commanders, “An air force has never decided a war.” Even though it is clear he was concerned about the effect the air campaign might have on Iraqi morale, he was convinced the U.S. was not willing to suffer many casualties in a ground action. Thus, he believed if Iraq could weather the air campaign and draw Coalition ground troops, especially the inexperienced Saudi and Qatari soldiers, into a decisive battle and win, the enemy’s alliance might fracture. He also sought to provoke the previously mentioned land battle by firing Scuds at Israel and continuing to threaten the destruction of oil facilities in Kuwait. These efforts proved futile and, thus, he decided to launch a limited offensive in Saudi Arabia designed to inflict heavy casualties on the Coalition and damage their will to fight.15

To quote Paul Westermeyer’s examination of the battle: “Despite the Scud distraction and the focus on strategic rather than operational targets, the air campaign had an obvious and significant impact on Iraqi forces inside Kuwait. It isolated units from the national command authority, degraded troop morale and made even simple movements difficult, often requiring days of detailed planning.”16

Saddam Hussein entered the conflict supremely confident that, even if he could not tactically defeat the Coalition, he could force them into a strategic settlement. He reasoned that the American public simply did not have the stomach for any war that led to significant U.S. losses. Based on his limited understanding of America’s experience in Vietnam in which she had lost 58,000 killed in eight years, he
believed that unless Coalition air forces won the war he could bring the conflict to a relatively successful conclusion. He rationalized that Iraq had lost 50,000 in one battle against the Iranians on the al-Faw Peninsula in 1986 and survived to fight another day. To this end, Saddam Hussein declared to his staff: “America is not in the prime of youth. America is in the last stage of elderliness and the beginning of the first stage of old age.”

Saddam Hussein expected an air campaign that would last a week or two, followed by the “Mother of All Wars” that would cause the enormous U.S. casualties he wanted. According to captured Iraqi documents, he selected Al-Khafji as his target because “it had two harbors: one designed specifically for exporting oil, and the other the Iraqis believed was a base for Coalition forces.” He supposed that an Iraqi force in control of the abandoned city would “threaten Coalition naval forces in the Gulf.” Further, Al-Khafji was within range of Iraqi supporting artillery in Kuwait. Last, but not least, it would compel the Saudis to attack his force since they could not allow him to “hold any part of their kingdom for long.” They would have to attack, supported by American Marines “bringing on the bloody ground war Saddam wanted.”

Soon after the Iraqi campaign planning sessions ended on January 28, 1991, an event occurred that seemed to contradict the validity of Saddam Hussein’s notions about air power. Even as Iraqi III Corps Commander Maj. Gen. Salah Aboud Mahmoud prepared to disembark from his helicopter, two F–111 fighters destroyed the very building where he was planning to hold his commander’s conference. According to one source, “He leaned over to his executive officer and told him he hoped this was not a bad omen for the upcoming offensive.”

**Events Leading up to the Battle**

As the air war continued with great effect, General Schwarzkopf began to believe that the Iraqis planned to fight a mostly defensive war and that the likelihood of an Iraqi offensive was slim. To this end, he moved the XVIII Airborne Corps and VII Corps 300 miles west in preparation for a sweeping attack that would run around the Iraqi right flank. Schwarzkopf surmised that even if the Iraqis did attack at this point they would launch the offensive from the Al-Wafra oil fields in Southern Kuwait which would have little effect on his plans.

Schwarzkopf already supported the Saudi decision to abandon Al-Khafji since he believed it was tactically indefensible and strategically unimportant. What the planners apparently did not realize was that King Fahd viewed all of Saudi Arabia as sacred. Even when this backwater fell, he urged the Coalition to retake it immediately or utterly destroy it. In retrospect Khaled’s appraisal of the indefensibility of Al-Khafji must be questioned. Surrounded by terrain unfriendly to heavy tracked vehicles, the only access was a two-lane highway that made the town relatively invulnerable. This proved to be the case for the Coalition forces when it came time to push the Iraqis out later.

**You Can’t Tell the Players without a Program: Iraqi Forces**

By the end of January 1991, the Iraqi Army had roughly a half-million troops in theater, organized into fifty-one divisions, including eight elite Republican Guard divisions. Since they normally received the best equipment, on the eve of the war, most of the nearly 1,000 T–72 tanks in the Iraqi
Army were in Republican Guard divisions. The Iraqi Army in the Kuwaiti Theater of Operations (KTO) also included nine heavy divisions, composed mostly of professional soldiers, but with generally inferior weapons. In fact, most non-Republican Guard armored units had older tanks such as Soviet T–55s and T–62s or Chinese Type 59s or 69s. Thirty-four of these divisions were composed of poorly trained conscripts who were positioned to channel Coalition forces through a number of break points along the front, allowing Iraqi’s better forces to isolate them and counterattack. One of the main Iraqi weaknesses proved to be its open western flank. Iraqi planners failed to account for tactics like the ones in the Allies’ Air Land Battle Doctrine made possible by new technology such as the Global Positioning Systems (GPS).  

Iraqi planners crafted their assault plan into Saudi Arabia around the Iraqi III Corps comprised mostly of the 3d Armored Division, 5th Mechanized Division, 1st Mechanized Division of the IV Corps and numerous command units. The overall commander was the III Corps commander, General Mahmoud. In support was the IV Corps, led by Maj. Gen. Yaiyd Khalel Zaki. Its 3d Armored Division had several dozen T–72 tanks, the only non-Republican Guard force that had them. The other armored battalions had T–62 and T–55s, some with Iraqi appliqué armor similar to the Soviet bulging armor or BDD “brow” laminate armor. They also had armored personnel vehicles such as the BMP-1 and scout vehicles such as the BRDM-2. They were supported by numerous types of artillery. They had five infantry divisions along the front that were ordered to remain in their defensive positions hoping to lure the main Allied ground forces into a major engagement.  

Across the border in Saudi Arabia, the Coalition had steadily increased its forces throughout January from approximately 200,000 soldiers, 750 aircraft and 1,200 to 3,600 tanks and more than 600,000 personnel—500,000 of them American. One key aspect of the buildup proved to be the presence of the vast numbers of aircraft. If the Coalition planned to take the offensive at some point—and they did, U.S. doctrine called for a three to one ratio in manpower in order to attack enemy positions. In fact, by January 1991, the actual numbers of ground forces for the two sides were roughly equal. What gave the Coalition an advantage was the multiplying effect that air superiority provided. Senior Allied leaders had formulated a war plan based on the Air Land Battle Doctrine which, as one source declared, “enabled them to exploit the intangible benefits of information dominance and air superiority.” Saddam Hussein’s lack of respect for air power and the constant degradation of his forces by Coalition air forces proved to have a profound impact not only on the outcome of the Battle of Khafji but the Gulf War in general.  

During the buildup of forces, the United States constructed observation posts (OPs) all along the Kuwait-Saudi border to gather intelligence on Iraqi forces. Each OP was placed near a Saudi border fort described by Marines as “Beau Geste” forts. Navy Sea, Air and Land (SEAL), Marine Reconnaissance and Army Special Forces personnel operated these outposts. They located OP 8 farthest east, on the coast, and seven other OPs every twelve miles stretching to the panhandle of southernmost Kuwait, better known as the “Heel.” Since many
KHALED’S CHOICE HAS BEEN CRITICIZED BY SOME ANALYSTS BECAUSE AL-KHAFJI WAS SUR-ROUNDED BY [SALT MARSHES WHICH] FORCED THE IRAQI’S MAIN ASSAULT FORCES DOWN THE MAIN HIGH-WAY...IN ORDER TO AVOID GETTING BOGGED DOWN IN THE MUDDY DESERT

planners believed the coastal highway which ran to Al-Khafji was the likely invasion route, OPs 7 and 8 proved to be the most important because they overlooked this route. Senior leaders placed three companies of the 1st Marine Division at OPs 4, 5 and 6, also known as Task Force Shepard. Personnel of the 2d Light Armored Infantry Battalion of the 2d Marine Division established a screen between OP 1 and the Al-Wafra oil fields.26

Saudi military officials assigned the defense of Al-Khafji to the 2d Saudi Arabian National Guard Brigade and a Qatari armored battalion attached to Task Force Abu Bakr. The Second’s 5th Battalion set up a screen north and west of Al-Khafji, just under OP 7. A Saudi Arabian National Guard Brigade consisted of four motorized battalions, each with three line companies or roughly 5,000 soldiers. The Saudis also deployed: Task Force Tariq composed of Saudi Arabian Marines and a battalion of Moroccan infantry; Task Force Othman comprised of two “Mechanized Ministry of Defense” brigades; and Task Force Omar made up of two Aviation Brigades. These afforded screens at a position two miles south of the Kuwaiti border. They established their main defenses twelve miles south of the screen. Most of the Arab units were commanded by General Khaled. Coalition planners combined the forces around Al-Khafji into Joint Forces Command-East placing Joint Forces Command-North in charge of defending the area between OP 1 and the Kuwaiti-Iraqi border.27

After consulting with senior Saudi and Coalition leaders in August, Khaled had ordered the town evacuated due to its proximity to the Kuwaiti border and the fact that the town lay north of vast “sabkhas” or salt marshes. One Marine Corps captain described it as “a patch of desert that has some kind of underlying moisture that causes a thin, mud like crust to develop on the top, which cracks in the heat, but is easily penetrated by a vehicle and very soft underneath—you get stuck in it in a huge way.” This feature forced vehicles onto the coastal highway and made it difficult to provide large logistics supplies to forces in the town.28

Khaled’s choice has been criticized by some analysts because Al-Khafji was surrounded by the “sabkhas.” This feature forced the Iraqi’s main assault forces down the main highway between Kuwait City and Jabayl in order to avoid getting bogged down in the muddy desert around Al-Khafji. A well defended town might have forced them to find an alternative route or confront withering fire from the Coalition forces facing them. Instead, Khaled was determined to defend the border with “firepower and not manpower.” To quote one source, “the General’s plan was to take them on with air power and with supporting arms.” This seemed to make sense because “the desert afforded the Saudi forces the opportunity to attrit the Iraqis as they crossed the expanses of the desert toward Khafji.” Critical to the success of such a plan was a “trip-wire to announce the Iraqi attack.” Khaled had no such troops. For this reason the Iraqis seized the city without opposition from the Saudis.29 The only thing that saved the Allies from complete surprise was the “eyes” of the E–8A Joint STARS aircraft airborne that night.

Iraqi Objectives

By January 26, 1991, U.S. Marine Corps reconnaissance patrols obtained enough intelligence to estimate that the Iraqi military had massed nearly 60,000 troops and 240 tanks of all kinds near the Kuwaiti town of Al-Wafra. Divided into five divisions, these units were generally under strength since hundreds and later thousands of Iraqi conscripts deserted rather than die defending Saddam Hussein’s dictatorship.30

In retrospect, it seems clear that Iraqi plans aimed at not only seizing Al-Khafji but, if possible, continuing on to capture the vital Dammam oil fields. Tactically, they envisioned a four-pronged assault with the 1st Mechanized Division passing through the 7th and 14th Infantry Divisions to protect the flank of the 3d Armored Division which would provide a blocking force west of Al-Khafji allowing the 5th Division to capture the town itself. With this accomplished, the 1st and 3d forces would pull back into Kuwait, leaving troops of the 5th to wait for the expected Coalition counterattack. As noted, Saddam Hussein hoped the Coalition would suffer terrible casualties in their efforts to retake the town which would erode their resolve to fight. He hoped to capture dozens of Allied troops and use them as a bargaining tool to end the conflict in his favor. The Iraqi dictator ordered his generals to make “a Lightning Strike’ into the ‘Kingdom of Evil.”31

It should be noted that while the Iraqi military was not the greatest army in the world neither was it the worst, nor were their leaders stupid. If they were to realize Saddam Hussein’s goal of breaking up the Arab Coalition, Al-Khafji was the perfect place to make their attack since the area nearby was primarily defended by Saudi and Qatari forces.
Once underway, Coalition leaders could only make an educated guess as to what Saddam Hussein had planned and what Iraq’s objectives might be. Years later, retired Air Force Gen. Charles A. Horner, then, the Joint Forces Air Component Commander, recalled that the defense of Al-Khafji was not high on anyone’s priority list, “because we didn’t really understand what the objectives of the Iraqi army were.” Now we know the Iraqi attack on Al-Khafji was a gamble designed to lure Coalition forces into ground engagement while they could still maneuver their mechanized forces in the KTO and deal the Allies a bloody defeat.

As early as the commencement of Desert Storm on January 17, the Iraqi military had indicated on numerous occasions they wanted to take the initiative and use their tactical units to alter the course of the conflict. The Scud attacks against Israel and Saudi Arabia that began on January 18, bear this out. Roughly two-thirds of these Scud attacks took place over the following ten days. When this failed to initiate a war with Israel, Saddam Hussein ordered two Kuwaiti oil fields set on fire on January 22. They opened the manifolds on offshore terminals pumping oil into the Gulf. This too failed when two F–111 fighter-bomber strikes closed the pumps using Precisions-Guided Munitions (PGMs). The Iraqi dictator was further frustrated as the air campaign expanded its attacks to include hardened aircraft shelters. As noted, this was when (January 25-29, 1991) Hussein dispatched his remaining eighty aircraft to internment in Iran.33

While it is conjecture, one can effectively assume that at this point, Saddam Hussein must have concluded he had misjudged the effectiveness and resolution of the Allied air campaign. By this point, he had to have realized that if the Iraqis were to take the initiative their only choice was to gamble with an immediate mechanized offensive across the Saudi border to engage Coalition ground forces.

One thing Allied intelligence should have known was that during Iran-Iraq War of 1980-1988, Iraqi ground forces often made probing attacks into Iranian defensive lines. Frequently, the Iranians defenders counterattacked only to find they were caught in an Iraqi trap in which they suffered heavy casualties. This was on the minds of the Iraqi planners as the nurtured their plans for Al-Khafji. They realized the assault itself had little chance of a clear-cut victory. Still, they believed they could use their tried-and-true methods and lure the Coalition forces into a pursuit that would leave them badly bloodied and perhaps cause them to reconsider the entire war.

In the aftermath of the conflict, Air Force analysts concluded that the Iraqis initiated this “major offensive” for five reasons. First, they hoped to improve the morale of the Iraqi troops who spent endless days and nights hammered by Coalition aircraft. Second, they believed they could easily defeat the untested Saudi force and inflict heavy casualties on the Americans. Third, they hoped they could create dissention among the Arab and non-Arab ties on the Americans. Fourth, they anticipated capturing troops that would provide important intelligence. Lastly, they believed from such an attack they could gather more data on the disposition of enemy forces along the border and more information on what they had planned. These Allied experts believed that the primary goals were the first three, especially number two.34

It was with these goals in mind, that Saddam Hussein and his advisers created the III Corps’ offensive. They reasoned the time must be right since Coalition air attacks had concentrated on eliminating the Iraqi integrated air defenses, destroying weapons storage sites and obliterating their C². While air attacks in the KTO intensified, “fewer than 1,000 sorties had been flown against fielded military forces during the first week of the
AIR WAR. Many of these were directed at “the Hammurabi Division of the Republican Guard and other front-line infantry divisions farther west.” Reports by U.S. Central Air Forces planners concluded that as of January 29, Iraqi forces remained at eighty-one to ninety-nine percent of full strength. It was now or never for the Iraqi military!35

The Battle Begins

Between January 25-27, 1991, Saddam Hussein met his two corps commanders in Basra. General Mahmoud assured him that he would take Al-Khafji by January 30. During his return to Baghdad, in a foreshadowing of future events, Saddam Hussein's convoy was strafed and run off the road. Even though the dictator survived, several vehicles were damaged. He was now more determined than ever to strike at the source of his torment. From January 26 to 28, they prepared for the attack.36

One advantage the Iraqis possessed was surprise, and it was probably more of an advantage than they could have guessed. Not that there were not subtle hints and actions that warned Coalition forces along the front, but at headquarters many planners and leaders were convinced the Iraqis could not muster any kind of an attack. To quote Scott Williams' paper on the battle, “the CENTCOM staff suggested that the war was going tremendously well for the allies.” With the Coalition enjoying total command of the skies, many claimed that “the Iraqi command and control apparatus had ceased to function and that the Iraqi III Corps, operating in the KTO, was functioning without direction from Baghdad.” They further argued that “Iraqi logistics capability had been diminished to the point that soldiers in the field were subsisting without adequate food and medical supplies.” In conclusion, they reasoned that, “the Iraqi military situation was so dire that it would preclude offensive actions—or would it?” Much as they had done in December 1944 just before the German offensive in the Ardennes Forrest, staffers misinterpreted the intelligence they received and underestimated their enemy.37

During January 29, Allied intelligence received several warnings suggesting that Iraqis were poised for an attack. The best came from two brand-new E–8A (today E–8Cs) Joint Surveillance Target Attack Radar System (Joint STARS) ISR aircraft which used their highly sensitive computerized radar-tracking capabilities to spot the deployment of Iraqi forces in an area near the Saudi border.38 In addition, OPs 2, 7 and 8 also detected Iraqi troops reconnoitering along the border. Groups of air-naval gunfire liaison Marines called in air and artillery strikes throughout the day due to this increased enemy activity. Armed with this data, Lt. Col. Richard Barry, commander of the forward headquarters of the 1st Surveillance, Reconnaissance and Intelligence Group, dispatched messages to senior commanders warning of the possibility of a surprise attack.39

As the general Iraqi offensive moved toward the Allied defenses through the Al-Wafra forest, they came under attack from Harrier “Jump Jets” employing “Rockeye” cluster bombs. Simultaneously, their supporting convoys were struck by American A–10 Thunderbolt IIs using their GAU-8 Gatling guns mounted in their noses and firing spent uranium armor-piercing rounds. Some of the units were cut to pieces. However, the main component continued on.

Late on January 29, fifty-eight Iraqi tanks, supported by 1,800-2,000 mobilized infantry troops, transported in several armored vehicles, moved against a U.S. Marine Corps screening patrol in and around Al-Khafji. At the same time, the war’s first ground engagement had already occurred near OP 4, built on top of the Al-Zabr police building. Iraqi plans called for elements of the 6th Armored Brigade to take the heights above Al-Zabr. Here they came into initial contact with Coalition units. At 10:00 p.m., Marine Corps personnel at the OP noticed large groups of armored vehicles through their night vision goggles and tried unsuccessfully to communicate with their battalion headquarters. Around 10:30 p.m., Task Force Shepard commanders ordered Coalition soldiers at the OP 4 to fire on the Iraqi column. Thoroughly outnumbered, they were staggered by the overwhelming Iraqi response and directed to withdraw south.40

As the Marines departed, forward fire control
teams to the west also fired and fell back. Forward air controllers (FAC) began calling in air strikes against the Iraqis as they came into the outskirts of the town. Caught at least partly by surprise, Allied leadership now had to evaluate the Iraqi’s intent, contain their forces and eventually retake Al-Khafji. The attack could not have come at a worse moment since Coalition Army units “were in the midst of a three-week redeployment from their positions in the coastal areas to attack positions more than 200 miles west.” Schwarzkopf worried that an alteration of this redeployment would “upset the timetable for the upcoming attack.” Containing the offensive and expelling the Iraqis from Saudi soil was essential. However, his initial comment upon hearing of the attack was that it was “about as significant as a mosquito on an elephant.” In retrospect, it must have been a bloody big one!

When news of the battle became known, Schwarzkopf explained to reporters, “The mere fact that they launched these attacks indicates they still have a lot of fight left in them.” It had been that night around 10:00 p.m. that Joint STARS data on Iraqi movements had begun to reach Brig. Gen. Buster Glosson at the Tactical Air Control Center. After he conferred with Gen. Horner, personnel in the Joint Forces Air Control Center (JFACC) directed a Joint STARS aircraft to aim its search for enemy troop movement over the KTO and concentrate on the area near Al-Khafji. Not only did the E–8A crew see movement by the 5th Mechanized Division as it closed in on Al-Khafji entering its outskirts, but they also identified elements of the 3d Armored Division as it advanced through the adjacent Al Wafra forest. They spotted elements of the Iraqi 1st Mechanized Division west of Al-Khafji as it probed across the border. Soon after these engagements took place, the Coalition withdrawal commenced.

Locating the Iraqi offensive units proved to be an ironic twist since the E–8A crews had expected a routine night mission. With Operation Desert Storm 12 days old and the pre-disposition of forces for the ground campaign underway, E–8 Joint STARS crews had planned to spend most of the night of January 29 probing western Iraq for Scud sites and observing territory in front of American Army’s VII Corps. Around 9:30 p.m. and within minutes of reaching their cruising altitude, they had fanned their sensors over southern Kuwait. It was here they had first spotted the Iraqi units moving on Al-Khafji. While the Battle of Al-Khafji would last about 36 hours and end four weeks prior to the beginning of the main ground campaign in late February, it marked a watershed in the debate over the decisive nature of Air Power against enemy maneuver forces. It demonstrated that Air Power, alone, could halt mobile enemy armored forces at night, on short notice, and without a synchronized ground counterattack. It was a fact not lost on senior airmen. Air Force Chiefs of Staff Gens. Michael J. Dugan, Merrill A. McPeak, and Ronald R. Fogleman later declared, “all have recognized Khafji’s significance as a marker of air power’s increasing ability to meld sensors and advanced weapons under central control to gain the advantage over enemy forces on the ground.”

\[ Bild \]

\section*{Notes}

7. See also, Paul W. Westermeyer, “U.S. Marines in
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25. Westermeyer, “Marines in Battle,” p. 3.


34. Freedman and Karsh, The Gulf War, p. 364; DOD, Conduct of the War, p. 85.


39. Ibid., pp. 28-29; Spirit 03, For a general overview of the Air War and its decisive influence on the outcome, see Hallion, Storm Over Iraq, especially pp. 121-268.


42. The Northrop Grumman E-8 Joint Surveillance Target Attack Radar System (Joint STARS) is a U.S. Air Force battle management and command and control (C2) aircraft which locates and tracks ground vehicles and some aircraft, collects imagery, and relays tactical pictures to ground and air theater commanders. It was still in its early stages of development during the First Persian Gulf War.

43. Williams, “Khafji,” pp. 38-41; Westermeyer, “Marines in Battle,” pp. 22-3; Spirit 03.


48. Ibid., p. 30, 34.
Norwegian Air Guerillas: The Scout Detachment of the Troendelag Air Wing in the 1940 Campaign
For fifteen days following Germany’s April 9, 1940, invasion of Norway, the Troendelag Air Wing (TAW) managed to evade the Luftwaffe. Equipped with obsolete biplanes, the Norwegians escaped the superior German forces in the skies above Norway. Vast expanses made the Norwegians difficult to detect and ski undercarriages enabled them to land and take off from the numerous frozen lakes scattered all over the landscape. However, inadequate command and communications paralyzed them in two ways. First, their movements were hampered by their lack of supplies. Food and gasoline had to be requisitioned from local civilians, and the former commodity could not be found in sufficient quantities, nor of good quality. Second, their lack of communications left them uninformed regarding the location of other friendly units.

During the interwar years, from 1919 to 1939, the Norwegian Army Air Force was unable to do long-term planning due to disputes over organization, and neither could the various civil and military bodies involved agree upon the optimal types of aircraft to acquire. As a result, critically-needed updates were lacking. On the eve of World War II, the Air Force possessed some ninety obsolete aircraft to face the German Luftwaffe. Ten of them were assigned to the scout detachment of the TAW. Nine were Fokker CV biplanes. Entering service in 1928, it was primarily a scouting airplane, but could also deliver a small payload of bombs. In 1940, they still made up almost half of the entire fleet of the Army Air Force. Additionally, the scout detachment had three Tiger Moth trainers, but only one was serviceable. The rest of the TAW consisted of a technical and administrative detachment and an air defense platoon armed with heavy machine guns.

TAW’s main function was to provide aerial reconnaissance for the 5th division of the Norwegian Army, covering central Norway, the counties of Troendelag, Moere, and Romsdal. Their missions also included artillery observation and courier flights.

Guarding Neutrality

When war broke out in September 1939, Norway partially mobilized the military and beginning on September 7, banned all foreign aircraft from entering Norwegian air space. TAW was also put on a war footing. In peacetime its permanent personnel consisted of only three officers. By the time of mobilization for the neutrality guard, these would be Maj. Thomas F. C. Vetlesen, commanding officer TAW, Lt. Per Carlson, chief of the scout detachment, and Lt. Wilhelm Mohr, Carlson’s, second in command.

In all, 500 personnel were assigned to the Air Wing upon mobilization, a ridiculous number according to Per Carlson, considering the small number of aircraft available. However, it was decided that they would serve on a rotational basis. The commander of the scout detachment had further misgivings. He resented being sent into battle in fifteen-year-old crates, a feeling probably shared among his subordinates. This was also fully admitted in an official review in 1937, which stated that the Fokker CVs had to be replaced within the next two to three years. Theoretically they could also carry a 500-pound antishipping bomb, but this never went into production. They did, however, have a stock of 20- to 100-pound bombs. But the drop system was of poor quality and would only work half of the time. Repeated reports from tests failed to produce any improvements. In addition, the unit had only two bomb sights between them. One was out of order and would have had to be sent to the manufacturer in Czechoslovakia, which was impossible to do considering the German occupation following the Munich agreement. Numerous requests for supplies to the divisional quartermaster were also returned.

The scout detachment was also tasked with patrolling the coastline from the Fosen Peninsula north to the border with Nordland County. On most of this stretch they had no radio contact with the home base, and only one radio set between them for the airplanes. In addition, their equipment was incompatible with the ones used by the navy, which was responsible for the sector south of Fosen. Here, naval aviators flying two aircraft of the Norwegian-designed MF. 11 type flew for up to eight hours a day in an open cockpit in wintertime, while the TAW crews complained about lack of flying time. Carlson also conferred with his naval colleagues for advice on maritime reconnaissance. For this he was reprimanded by his superiors. Throughout the interwar years, a fierce debate raged on the merger of the Army and the Naval Air Arm into an independent

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service. Any interservice interaction was sensitive and had to be cleared at the highest levels. The lack of room for pragmatic solutions at the lower levels, however, infuriated Carlson.

During the winter 1939-1940, the morale of TAW personnel was sapped by inactivity. Lack of classrooms (among other things) hampered education, as did the frequent heightened preparedness during the Russo-Finnish War, which meant that equipment had to be packed and ready to be shipped out. The lack of positions corresponding with their background also undermined morale of the officers. Personnel also experienced sudden unexplained recalls of leaves.

**Outbreak of War and Evacuation**

On April 6 1940, only three days prior to the German invasion, Foreign Minister Halvdan Koht summarized the number of violations of Norwegian Air Space: forty-four British; twenty-one German; and at least six Soviet. These became more frequent a month before the invasion. On March 23, three Fokkers from TAW were sent on a wild goose chase after an unidentified aircraft. The scenario would repeat itself three days later. At 12:05 the men were just forming up when they heard aircraft droning above. The cloud cover lay at 2,000 meters and the foreign airplane was cruising above this. First it flew on a course due northeast, later it circled the airbase and disappeared.

Major Vetlesen briefed his crews immediately after the incident, claiming that it had been a twin engine aircraft, flying at about 800 meters. He was just about to dismiss the men when a cook came running with a message. It was orders from the division to engage in a pursuit of the intruding aircraft. They scrambled to their Fokkers and set course at due northwest towards Agdenes, at the mouth of the Trondheim’s Fjord, but no contact was made with the intruder. Later, they were informed that the air warden at Hitra further out by the coast had spotted the foreign aircraft on its inbound flight, but a mix up of the telephone lines ensured that the TAW got the warning much too late for having any hope for getting close enough for a positive identification. The experience was another testimony to the Norwegian airmen of the ineptitude of their airplanes and leadership, especially the fact that clearance from divisional headquarters was needed to engage in a pursuit of intruders.

On April 4, visual observation was made of yet another foreign aircraft. Observers on the ground at the airbase witnessed a four-engine silver-colored machine cruising on a steady northerly course at an altitude of about 4,000 to 5,000 meters. Its speed was estimated to have been between 300 and 400 km/h. The three Fokker crews on standby were scrambled, as were some naval aircraft stationed nearby the coast. But they had no hope of actually intercepting it. The Fokker’s top speed was 250 km/h at level flight and in a steep climb they could not get above 90 km/h. Again, the attempt proved futile. Meanwhile the foreign craft made yet another pass and again disappeared towards the coast. The personnel on the ground could clearly see the German markings and one of the mechanics who had been an apprentice in Germany could identify it as a Grosse Dessauer–Junkers 90.

The Fokker crews returned without having seen the Ju–90. The episode received considerable publicity. The Ministry of Defense issued a statement which said that it was impossible to confirm the identity of the foreign aircraft, much to the surprise and dismay of the TAW personnel who had observed it from the ground. The Germans also denied any knowledge of the incident. Carlson gave a press interview, in which he pointed out that there was little hope of intercepting an aircraft with a speed of 350 km/h given the performance of the Norwegian machines. The Inspector General of the Army Air Force, Colonel Thomas H. Gulliksen, then appeared on national radio assuring the public that Norway possessed top modern fighters. At the time, eleven Gloster Gladiators were deployed by the Norwegians, but they were earmarked for the air defense of the capital Oslo. Hardly modern by 1940 standards, it is questionable if even a Gladiator could have reached the Dessauer, given the terms given to the TAW upon scramble. 5th division then requisitioned fighters to be stationed at Vaernes air base, but none would appear in time for the German attack.

The incident was yet another blow to TAW’s morale and Colonel Gulliksen’s statement did not
make it any better. Whether he wanted to cover up the weakness of Norwegian air power in the eyes of world opinion or not, Carlson considered it a betrayal. The same was the case when Minister of Defense, Ljungberg claimed in the Parliament that the nation was safe since coastal defenses and the air forces had been mobilized. To add to the burden, the commander of the 5th division, Lt. Gen. Jacob Aager Laurantzoon came to visit TAW. Rather than try to encourage the men and brief them on the incidents they had experienced, he only reprimanded them collectively, especially on their drinking habits, and then left.

On April 8, ominous signs pointed to imminent war. Naval aviators made contact with Royal Navy vessels mining the waters outside Hustadvika. Nonetheless, several TAW airmen left for Trondheim and their favorite restaurant, Palmen. Around midnight the staff informed them that foreign warships had entered Kristiansund harbor to the west, but their nationality remained unclear. They returned to Vaernes Air Base around 2:00 a.m. Here tension was high. Major Vetlesen had been chain smoking since a telephone call came through from Oslo with news of foreign warships closing in on the capital. The ships had engaged coastal defenses in the area.

At 3:00 a.m., TAW received orders to evacuate Vaernes and half an hour later they were informed that the Germans had bypassed the fortress at Agdenes and were heading for Trondheim. Then the general alarm went off and by 4:00 a.m., the Air Wing had formed up, 200 men in all. Of these, twenty-one officers and seventy-five men belonged to the scout detachment (air defense included). They were informed of the general state of emergency and that coastal defenses at Agdenes were engaged by a hostile force. Carlson ordered the airmen to be ready to move out in twenty minutes. The Scout Detachment’s own air defense section would follow by bus. Carlson phoned his family in Trondheim, but from the telephone exchange he learned that the town population was oblivious of the imminent arrival of German forces. During the preparations he also observed the commander of the 5th division, Gen. Laurantzoon passing by in a motorcade. Carlson tried to hail him, but he just sped past.

The destination was revealed at takeoff. The scout detachment was to land on the eastern shore of the frozen Selbu Lake south of Vaernes. The men ran to their aircraft, pilots and observers being paired up and assigned to a machine. There does not seem to have been any rehearsed plan on who would fly with whom in what plane. Meanwhile the six 7.92 mm Colt machine guns of the air defense platoon was manned and the rest of the ground crews took cover in a nearby recession. Three platoons from the divisional officer training school also took up positions alongside the men of the TAW.

Between 7:00 and 8:00 a.m. German Arado sea planes from the battle cruiser Admiral Hipper strafed the base. An additional five passes were made by German planes on April 9 and one the following morning. These were reported as “attacks” made by Junkers Ju–52, but were more like attempts to land troop transports. They were all repulsed by TAW’s machine guns, and nineteen crashed landed on a field outside Trondheim, two or three were probably damaged beyond repair. Major Vetlesen himself was reported to have participated as a machine-gunner.

As German activity wound down for the evening of April 9, the remaining TAW personnel formed up around 7 p.m. A rearguard of twelve men were left behind at the base while the remainder evacuated to quarters nearby, probably fearing a German surprise night attack. That evening, the officer cadet unit also retreated northwards. About 7:00 or 8:00 a.m. they were back at the base. Two hours later a German major, named Buchner, showed up and requested a parley. The following order of events is a bit blurred. At first Major...
Vetlesen flatly rejected the German terms, which appeared to have been perceived more as a truce than surrender. The German major warned that 200 to 300 Germans soldiers supported by artillery were ready to attack Vaernes. Around the same time, what seems to have been the de facto divisional command reallocated Steinkjer ten km to the north, phoned and ordered TAW to stand down. Some sources report this call to have taken place prior to the arrival of Major Buchner and that Vetlesen refused to accept the order. In any case, the Norwegian commander gave in about twenty minutes into the parley. There was also a second contact with Steinkjer upon which Gen. Laurantzson gave Vetlesen permission to stand down. Also, the Norwegians were about to run out of ammunition, information that may have reached Vetlesen during the parley.

At 13:30 a German force of 100 men arrived to assume control over Vaernes. The German terms required that Norwegian military personnel stay on the base, not as POWs but to continue their regular duties. A tandem guard post was set up with one German and one Norwegian soldier. The explanation for the German conditions may be fourfold. First, it relieved the Germans of having to guard them as prisoners. Secondly, if simply dismissed there was a danger that the Norwegian military would join other units still fighting. Third, fewer German soldiers would be busy performing administrative duties at the base, and lastly, they would then act as hostages against possible allied attacks. The latter became an issue in a furious argument between Vetlesen and Maj. Holtermann who commanded the Norwegian forces still fighting out of the nearby Hegra fortress (Ingstadkleiva Fort) and who wanted to put the airfield under fire from his guns. The Germans were also dependent on supplies from the Norwegian depots for food and blankets.

Vetlesen soon hustled with German activity. Some 2,000 civilians reported for work on the airfield, putting down a runway which enabled its use by heavier and faster aircraft. Fuel and artillery were flown in, and in one day, twenty-five aircraft flew in some 800 soldiers. The remaining TAW personnel at Vaernes were dismissed on April 13, by which time many had escaped to join other units still fighting, while some officers remained on a nearby farm in order to administer accounts and issue payments. These were finally relieved of their duties on April 24.

The Scout Detachment Soldiering on: Selbu

The scout detachment made a tactical low level flight over the hills and landed on the lake between 04:40 and 05:30 on the morning of April 9. The Fokkers and the Moth were parked along the eastern shore and the crew housed on nearby farms. Above them they could observe German aircraft heading for Vaernes. Later, the air defense section arrived with its twenty-two officers and forty-four enlisted men. Also, the ice that they had landed upon was melting. Carlson got approval from Major Vetlesen to seek out a new base. In his report Carlson said that at that time he was unaware of the mobilization of the 13th Infantry Regiment and the 3rd Cavalry regiment at Steinkjer and Rindleiret respectively, some seventy and forty-five km to the north “as the crow flies,” implying that in hindsight it would have been preferable to link up with these units that also belonged to the 5th division.9

At 4:00 p.m. the scout detachment took off again and set course for Lake Aursund in the southeast. Being further inland and at a higher altitude, they could expect the ice to be more enduring. The Moth was left behind in Selbu for communication purposes, together with the air defense platoon and...
THE MOTH, IN CONTRAST TO THE FOKKERS, COULD FLY ON REGULAR CAR PETROL THAT COULD BE REQUISITIONED FROM THE LOCAL POPULATION.

ground crew. Also, the Moth, in contrast to the Fokkers, could fly on regular car petrol that could be requisitioned from the local population. Only one mechanic followed the pilots and the observers. At low altitude they feared that civilians would mistake them for Germans and take potshots at them with their hunting rifles. The Fokkers, therefore, split into two groups and tried to avoid populated areas. One followed an eastern route across Tydal, the other flew more directly south over Haldalalen. Pilots of the latter group reported to have spotted up to eleven Ju–52, six Ju–86 and one Ju–90.

Observer Lt. Carl F. Kolderup, who stayed behind in Selbu, later remembered being told dramatic stories of how the Norwegians and Germans flew so close that they almost crashed into each other and that hair-raising twist and turns were made through narrow valleys and up gorges. However, none of the pilots own reports reflected the same drama. At about 6:15 p.m., they landed in a blizzard on the western part of Aursund.

Back in Selbu, the TAW personnel were sought out by all kinds of characters who offered their assistance in the fight against the Germans, even the steward of the Palmen restaurant who had been a machine gunner in His Majesty's Guard, but whose physique was now clearly marked by the good food served at the place. The “wanna-be” helpers also brought with them tales of confusion in Trondheim. Trondheim's peninsular location aggravated the panic when people rushed the bridges for fear that the city would be bombed and the bridges blown up. According to the many rumors circulating, TAW had neither weapons nor provisions to offer them any meaningful tasks.

The Scout Detachment Soldiering on: Aursund

The men were accommodated on farms on the western end of the lake, five or six on each and up to a couple of kilometers apart. The following day, radio broadcasts gave some news on political developments, and they reported that Vidkund Quisling claimed to have formed a new government. When Major Vetlesen “surrendered” at Vaernes, all contact with higher command was lost for the time being. On April 11, Carlson decided to hand over command to Lieutenant Mohr and head back to Trondheim in an attempt to get in touch with divisional headquarters. He assumed he would be back around 7:00 p.m. the next day, but he was not heard from for over a week. Soon after Carlson left on skis to the nearest railway station, the Moth which had been left behind in Selbu landed on Aursund, piloted by Sgt. Hagen with observer Lieutenant Kolderup as passenger. Upon arrival they updated Mohr on the developments at Vaernes and returned to Selbu to await Carlson’s return. When he did not show up, they flew back to Aursund. Carlson had met some of the divisional staff in Trondheim, now under German occupation, but returned to Vaernes on April 14 without having received any orders or guidelines. According to his own report, he then tried to reach Aursund through Gauldalen, but had to give up due to the fighting in the area and return to Vaernes. At the railway station he phoned the air base and learned about Vetlesen’s arrangement with the Germans and that Mohr had discharged the troops in Selbu. He drove up there, only to find the Moth gone.

On April 13, Mohr himself piloted the Moth to Selbu, arriving about 8:00 p.m. After conferring with the personnel there, he and Second Lt. Fritz Løberg drove into Vaernes in civilian clothes and accessed the base with forged identification documents. At this time, the Germans appear to have had very lax security measures on Vaernes and several trips were made to and from the base. Mohr could not find, but learned that Major Vetlesen was at the home of one of the other officers in the nearby village. He sought him out and got the whole story.
of how he had resigned his command and given his word of honor to the Germans not to participate in further resistance. He encouraged Mohr to do the same, but the young lieutenant refused. Vetlesen also told Mohr about Major Holtermann and his mobilization of troops at Hegra as he worried that his colleague there would shell Vaernes. Being also notified about the German troop transport via Vaernes, Mohr left for Hegra to brief Holtermann on the impending threat.

At Hegra, Mohr got an entirely different reception. Here there was a “fabulous guard post with all kinds of obstacles and apparently real war” in Mohr’s own words, but the men preparing to meet the German onslaught there were desperate for medical supplies. Mohr promised to help them out and returned to Selbu. Probably inspired by the mood at Hegra, he discharged most of the men there and encouraged them to join other units still resisting the German invasion. Back at Aursund the next morning the despair and isolation soon took hold again, but the unit finally had a mission. It was decided to try to get hold of the medical supplies from Sweden. Second Lt. Ola B. S. Tolgensbakk and Pilot Lt. Henrik Stenwig were picked out for its execution, the former for being the best skier in the unit. They landed on a small lake near Teveldal Railway Station close to the border with Sweden. Tolgensbakk put on civilian clothes and approached the border where Swedish guards spotted him, however, and tried to stop him. Tolgensbakk turned around and went downhill with Swedish warning shots whistling over his head. Tolgensbakk returned to the Railway Station and put his uniform back on and approached the border again, this time following the railway line.

He reported his mission to the Swedish guards at Storlien and was soon presented with a whole railway cart filled with medical supplies which was rolled down the track to the Norwegian side of the border and then by train further to Hegra. On arrival, Tolgensbakk received a hero’s welcome. He tried to sleep inside the fortresses, but soon gave up and returned on skis to Selbu. Some reports state that Tolgensbak passed through Vaernes and met Carlson who now had returned in civilian clothes and had relinquished his command over the scout detachment. Medical supplies were also acquired in Sweden for Roeros Hospital in a similar fashion.

By April 16, contact had been achieved with Norwegian ground units in the area, and a meeting was arranged with Capt. Gert Munthe who had assembled an improvised force in the Roeros area. His men had set up roadblocks and guard posts on bridges to provide an outer security perimeter for the TAW on Aursund. However, the men lacked sufficient weaponry to provide any decent cover if the Germans made an effort to break through their lines. In return, Mohr promised to provide what air support he could. However, only one such mission seems to have been preformed, on April 23 and the reports do not mention its purpose. Munthe later claimed that his men scavenged Fokker wrecks for their machine guns.

The situation for TAW at Aursund was becoming critical. Without sufficient maintenance and fuel there was a limit to how long they could continue to operate. Another requisition patrol for fuel was made on the 16th, but they were unlikely to have come across anything of sufficient quality for the Fokkers. Mohr considered making it to Hatfjelldal in Nordland, where there was a landing strip and a fuel depot and then continue north to join Haalogaland Air Wing which were engaging the Germans in the Narvik sector. Another option was to try to make it over to the British Isles, or simply dismantle the aircraft and discharge the entire unit. Before a final decision was made, Mohr would await the return of Lt. Fritz Lorck who had set off with orders to try to get in touch with division headquarters.

Around April 16, the question of whether they were still at war came up. The conclusion reach independently in at least three reports was that as long as there was a general mobilization and the government fought on, neither Carlson nor Vetlesen were authorized to order TAW to surren-
One of the pilots, Sergeant Arnt Hvinden, had been discharged by Vetlesen. At Aursund they considered him missing but he later turned up in Sweden where he had reported for service at the Norwegian legation in Stockholm. Three other TAW officers were dismissed by Carlson, but decided to continue serving. Two of them, the above mentioned Tolgensbak and Second Lt. Taasen continued to serve with the Norwegian ground forces still resisting the Germans southwest in the Gauldal area.

Unlike Carlson, Mohr did not risk being cut off from his unit and instead gave Lorck orders to find divisional headquarters. Lorck had flown to Selbu on April 11, according to his own report, and finally returned to Aursund on April 19, having been unsuccessful in establishing contact. But some action had to be taken. German activity in the air above had increased, and the local population had grown restless about TAW’s presence, fearing that it might trigger a German bombing. They also complained that the airmen were depleting their food supplies. Mohr noted in his diary that the civilians were whining all the time. It was decided to move to Brekken at the eastern shore of the lake. But before they made the transfer the men wanted to try to access Vaernes and retrieve whatever personal effects they could. The men who had been staying in Selbu had made several trips to the base and it was hope that they even could sneak out some petrol for the aircraft as well.

Mohr and three or four of the aircraft (sources diverge) flew to Selbu, and then traveled to Leksdal, halfway to Vaernes where they spent the night. Mohr phoned Carlson and met with him the next morning. Their former commanding officer flying disowned them as foolish to still play war and called their attention to the agreement with the Germans. As mentioned above, the TAW men still serving disputed Vetlesen’s authority to order surrender. But only by accepting surrender could they now acquire their personal belongings and in addition, receive whatever pay the Air Force owed them. The Germans had tightened security at the base, so sneaking in to fetch petrol was also deemed out of the question. The administrative officers at Frigård would not even let them onto the premises while still being in uniform, fearing that the Germans might retaliate (their wives also resided with them).

After the gloomy affair, the airmen left again for Aursund, but those who now remained with the unit must have been highly motivated since they had passed up the opportunity to quit. Mohr had now settled for trying to keep the scout detachment intact until they could get inside the chain of command and be put to good use. On April 20, Lts. Svein Hoff and Germundson went to Roeros to get passports and then continued to Sweden in hope that the Norwegian military attaché in Stockholm could be helpful. Also they acted on a rumor circulating widely at the time. As the Russo-Finnish War of 1939-1940 drew to a close, fighters bound for Finland were held back in Sweden and were supposedly now mothballing at an airbase near Östersund. In addition to petrol, they now sought to acquire these machines. They arrived in Stockholm on April 22, but no one at the legation had heard about any hidden aircraft. They were however given orders to establish a flying courier route that would provide regular communications between the military attaché in Stockholm and the Norwegian forces with headquartrs at Namsos and Lesja.

On April 21 the remaining aircraft (until then four were wrecked in accidents) and the thirteen remaining crewmembers assembled at Brekken.

In peacetime TAW was activated for twenty days each summer when the reserve pilots came to do their annual duty.
notice. The ice at Brekken was also starting to break up and the scout detachment was desperate to establish a new landing strip. A Sami reindeer herder was nearby with a flock of 3,000 deer and at the request of the TAW airmen he led the animals to and fro across an open field until the snow became sufficiently packed to land the Fokkers on it. The herder was happy to be rewarded with a bottle of moonshine.

Through Nesheim they learned that French and British troops had landed in Namsos and Aandalsnes and that the latter had linked up with Norwegian forces at Dombaas. But at the same time, German air activity was mounting and their ground forces had reached Koppang in the south. Rumors had it also (unfounded) that Roeros and Os had been bombed. And worse, that German troops were supposedly heading for Brekken. Mohr gave orders to head via Sweden on skis and join the Norwegian forces still fighting in the North. The aircraft not operational was ordered to be destroyed. Those who crossed the border on April 26 were taken care of by Swedish border guards. They were transported to Fjällnäss where they met officers from other units who had crossed over the previous day. However, their Swedish colleagues were scornful and threw sneering remarks about the Norwegians who had cowardly fled in panic.

As they took off on April 27, the scout detachment of TAW ceased to exist as a unit. En route to Lesja, Mohr drew fire, most probably from German machineguns positioned at Tynset Railway Station in Oesterdal. His rudder shattered and the petrol tank pierced, Mohr was forced to land at Fokkstua on the Dovre Mountain Plateau. As far as the reports goes, this is the only known incident in which the TAW came close to a fight. He was able to contact Captain Erling Munthe-Dahl from Oestlandet Flyavdeling and could continue to Lesja after having refueled and made repairs.

In the meantime, Fritz Lorck had continued his search for the divisional command. On April 27 he and Hagen set course for Nord-Troendelag and landed at Nordli where their mission was to receive a situation report on the fighting in the area on behalf of the Army headquarters of Southern Norway. They continued to Grong where they found General Laurantzon on a remote farm. On their return, they ran into Captain Vethe who candidly informed them that real command over the remnants of the Division was in the hands of the colonels Getz and Wettre and asked for this information to be included in the report to commander in chief of the Norwegian Army, General Otto Ruge in Molde. Laurantzon had reported sick and officially

**The Scout Detachment is Disbanded**

At 2:00 p.m. on April 25, Mohr gave new orders. The move may have been ordered by Oen, but this cannot be confirmed. Observers and pilots who lacked aircraft were to travel from Hydkroken to Namsos while the pilots were to return to Brekken. Three would fly north and one would go south to Lesja. Also, one aircraft would be stationed in Lierne to keep contact with troops still fighting in the North. The aircraft not operational was ordered to be destroyed. Those who crossed the border on April 26 were taken care of by Swedish border guards. They were transported to Fjällnäss where they met officers from other units who had crossed over the previous day. However, their Swedish colleagues were scornful and threw sneering remarks about the Norwegians who had cowardly fled in panic.

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handed over the command to Getz on April 27, but Laurantzon seems never to have assumed effective command over the troops mobilizing in Nord-Troendelag in the first place.21

On the afternoon of April 28, Lorck and Hagen took off for Lesjaskogvatnet. During the night they traveled to Molde and reported before General Ruge. Afterwards they attempted to return to Lesjaskogvatnet, but the Germans beat them to it. Instead they offered their service to the Chief of the Army Air Force, Capt. Oen. They were later demobilized in Ørstavik.22 Lieutenant Svein Hoff on his part had left Stockholm on April 26 and arrived at Hamrafjäll on the border the following evening as the scout detachment ceased to exist. En route he had unsuccessfully tried to acquire a Fokker that had been flown to Frösöen outside Oestersund by Major Engvik. From Hamrafjäll Hoff skied across the border on the night of the 28. But as he approached Roeros, he met refugees fleeing before the Germans who were closing in on the town. He turned around and headed back to Hamrafjäll where he met up with a number of Norwegian airmen. Here the final mission of the scout detachment came to life. The planning was led by Major Gundersen from the legation in Stockholm. Meanwhile some officers were sent across the border to Essandsjoen to reconnoiter a station for mail drops and pickups to connect forces in the North and South, as well as the Military Attaché in Stockholm.

When Lts. Dahl and Ullevold crossed back into Norway to establish the station, they ended up at Vektarstua on the banks of Lake Stugusjoen, a site not quite as desolate as Essandsjoen. But the fighting was winding down in Southern Norway. On May 3, Sergeant Hvinden dropped a message from the legation in Stockholm to the Army headquarters, which had moved north. It was picked up by Sergeant Waaler flying a Moth the next day. On May 4, Hagen flew in from the north, looking for more messages, but there were none. After a couple of days with no couriers coming by, the two packed it up and crossed into Sweden at Sylan. They phoned the legation and were ordered to Oestersund where they learned that the aircraft used by the legation had crashed at Frösöen.

Epilogue

Six of the former TAW personnel entered allied forces after the Norwegian capitulation and of these Bjørn Haakon Ness was shot down and killed—the only casualty of the unit members through the whole war. Lieutenant Wilhelm Mohr would continue his service and became a lieutenant general and chief of the Norwegian Air Force (1964-1969). Others returned to Vaernes for dismissal and payment. During the war, Carlson held several quasi military posts in Quisling’s Nazi puppet regime and was convicted for treason after the war; his position was in his own words inspired by his experience during the 1940 campaign. A board of investigation that was set up after the war also gave Vetlesen harsh criticism for his conduct. The only extenuating circumstance was that General Laurantzon showed just as much indecisiveness and bungling in the critical days of April 1940.

Vetlesen and Laurantzon’s performance in terms of leadership present a stark contrast to that of young Mohr. Aged only 22 he picked up the gauntlet when Carlson made his sortie on April 11. At the beginning he could not even be certain of who were friend and foe or what decisions were made at the political level. The lack of supreme leadership the first ten days was so profound that they were oblivious to even basic ideas of the overall Norwegian defense strategy; neither was the position of adjacent friendly units known for some time. Decision making appears to have been collective among the officers and NCOs of the scout detachment, but Mohr’s burden of command was carried with a significant part of integrity.

TAW suffered under the same limitation in resources as the rest of the Norwegian military in the period leading up to World War II. But the experience of the scout detachment and the few feats
they did accomplish, gives an indication of what advantages were presented to a defending air power given the geography and atmospheric conditions in Norway in April 1940. Long distances made German command of the air difficult to achieve in the first place. In addition, the Wehrmacht was spread thin and confined to a restricted number of roads by snow and mountainous terrain, which in turn made Aursund a relative safe haven for the scout detachment. This, together with a lack of adequate air strips for fast and modern German fighters, made it possible for outdated Norwegian biplanes with ski undercarriages to operate in the outback relatively unharmed. In other words, conditions favored the exact kind of operations for which TAW was prepared (scouting, observation, taxi- and courier flying).

Despite that the use of temporary airfields for operational flexibility and to escape destruction on the ground had been part of the planning since the late 1920s; no such facilities were accessible within range for the scout detachment during the campaign. When the unit was disbanded on April 27, it was just as much because of a final breakdown in logistics as the German advance. With access to stocks of fuel, spare parts and munitions, the scout detachment might have done more than what they did, but if it had possessed significant air-to-air and air-to-ground capabilities, it might also have attracted more attention from the Germans.

NOTES

1. The Norwegian term of the time was “ving”, more or less equivalent of a British squadron. A direct translation into “wing” is avoided as this denotes a unit above squadron level later also to be adopted by the Norwegians.


6. The sources diverge within half an hour of the exact moment; see Report from Lieutenant Germundson, Stockholm May 11, 1940; Second Lt. Arne Hørlock, Report #16 1940; Carlson 1941 & Report from Lieutenant Truls W. Dahl, Stockholm May 15, 1940.


10. Op Cit. Other Reports put the take off at 17:20 (Dahl 1940) and “about 5 pm (Kolderup 1963, p. 11).

11. Wilhelm Mohr, Operasjonene i Sør-Trøndelag, gives the number ten, Carlson “11 aircraft escorted by fighters.” Lt. Germundson, Report, Stockholm May 11, 1940, set it to 19 and also provided a specification of types.


13. Carlson 1941, p. 16.


17. Mohr, Dahl and Germundson.


19. Mohr 1953, p. 3.


Public Influence on the Proliferation of Military Aviation 1907-1912

Adam Jungdahl
Today the United States and its European allies possess the most advanced, sophisticated military aviation technology in the world. This technology has been put to the test in the Balkans, Iraq, Afghanistan, and elsewhere and has proven time and again the extraordinary value of aerial military operations. Indeed, recent experiences in Kosovo, Libya, and Yemen portend a future in which air power can, and will, serve as the sole means of military intervention abroad. This future has been made possible by generous governmental support for aeronautic research, development, and experimentation over the past several decades. That military air power is vitally important to national defense is without question.

In the earliest days of aviation, however, the value of aerial military operations was uncertain. On both sides of the Atlantic conservative opinion held that fixed-winged aircraft, like the Wrights’ Flyer, were more a curiosity than a deadly weapon of war. Though some early advocates emerged, there was a general sense among the political and military elite that aviation was untired, untested, and quite dangerous even under the most ideal conditions. This perception was only exacerbated by a series of testing mishaps—some quite serious—among members of the early aviation community.1

Beyond the safety issue there was the larger issue of combat effectiveness. Few at the time understood fully the possibilities and prospects of military aircraft in battle. The haphazard manner of aviation innovation and experimentation meant that reliable evidence of system performance and technical capability was limited. Military planners were uncertain how, exactly, to organize, integrate, and support this new weapons platform within the existing military organizational structure. No existing aerial doctrine was available to guide strategic and operational planning. Together the concerns over safety and the uncertainty of capabilities delayed the adoption of military air power for several years. Though the first Wright Flyer took to the sky in 1903, no military buyer emerged until the end of the decade.

Despite the absence of a coherent governmental support program, the early international aviation community thrived. While government and military officials dawdled, private citizens the world over were captivated by these ‘heavier-than-air’ flying machines. Driven by an innate fascination with modern technology, a strong nationalist streak, and an overwhelming fear (particularly in Britain) of enemy aerial supremacy, a constellation of private sector entities came together to advance the cause of military aviation. In the United States, France, Germany, Britain, and elsewhere a series of innovative inventors, wealthy enthusiasts, media moguls, and concerned citizens went about pressuring their national governments into purchasing military aircraft. Often this pressure was applied directly through correspondence, but also indirectly through the enlistment of the mass public in aviation fundraising and letter writing campaigns. Many rapidly expanding mass media outlets—newspapers, novels, aviation journals—contributed by inciting fear and awe at the wonder of flight. Together these early aviation advocates were able to play on the power of the mass public in order to push indecisive military and political leaders into pursuing military air power. This paper looks at the role played by these entities in accelerating the proliferation of military aviation across Europe and the United States in the early twentieth century.

The Political-Military Response to the Wrights’ Revolutionary Machine

On December 17, 1903, Orville and Wilbur Wright completed their first powered ‘heavier-than-air’ flight over the sand dunes outside Kitty Hawk, North Carolina. Though an amazing achievement, these first flights exposed the limitations of the Flyer’s design. Post-Kitty Hawk success the brothers returned to Ohio to refine and improve their revolutionary machine. In January 1905, after two years of further research and testing, the brothers set about marketing their new and improved Flyer to the U.S. military. Confident that “governments often appropriate inventions useful in war,” Orville and Wilbur wrote their local congressman, the Hon. R. M. Nevin, for assistance in securing a government contract.2 The Wrights understood that their machine possessed enormous potential as a reconnaissance and communications platform. Uncumbered by natural terrain features an aircraft could observe enemy movements and report on troop strength and maneuvers back to headquarters. This information would be invaluable to commanders in the field. Thus, in their letter to the Nevin, the Wrights argued that their Flyer could “be made of great practical use in various ways… (including) that of scouting and carrying messages in time of war.”3

The Wrights’ proposal was directed to the U.S. Army’s Board of Ordnance and Fortifications. The Board was not, however, overly impressed with the Wrights’ proposition. Unclear exactly what the Wrights were offering and wary of their claims of success, the government refused to commit to purchasing an aircraft. In Maj. Gen. J. C. Bates’s reply to the Wrights, the general acknowledged that the department received many unfulfilled requests for funding and that this particular proposal was inadequate in its current state. He noted that before the Board could consider the matter further the Wrights would have to “furnish (the) Board with the evidence of performance and feasibility that would make them a candidate for a government contract.”4

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approximate cost of the completed machine, the date upon which it would be delivered along with drawings and descriptions necessary for its construction.\(^4\)

The Wrights were confused by these demands. They had made it clear that their machine was fully functional and ready for delivery. In a reply to Bates’s letter the brothers stated flat out, “we have no thought of asking for financial assistance from the government” given that the “experiments (had been) finished at (their) own expense.”\(^5\) Instead, they requested a list of military requirements for a flying machine. The Board refused to specify these requirements. During a meeting of the Board in October 1905 the membership agreed that “Messrs. Wright be informed that the Board does not care to formulate any requirements for the performance of a flying-machine…until a machine is produced which by actual operation is shown to be able to produce horizontal flight and to carry a passenger.”\(^6\) The Board, it seems, simply refused to believe that the Wrights’ had produced a successful flying device.

As negotiations with the U.S. government floundered, the Wrights turned their attention abroad. Great Britain was the first of the major European powers to take interest. The British representative, Lieutenant Colonel John Edward Capper of the Royal Balloon Factory, arrived in the fall of 1904. Capper set about engaging the Wrights at their shop in Dayton, Ohio with the express purpose of confirming the rumors of American aeronautic success while assessing the comparative progress of British aviation. The Board refused to unveil the aircraft without a contract in place. Inevitably the British demand for proof of concept and the Wrights’ unyielding secrecy stalled negotiations.\(^8\) Talks continued at a snail’s pace into 1906, even as European aviators in France began taking flight themselves.

From 1903 to 1906, other European governments expressed a mild interest in the Wrights’ machine. In France, at the time the most likely challenger to the American monopoly on ‘heavier-than-air’ flight, there were doubts about the validity of the Wrights’ achievements. Among the elite there were those who simply refused to believe that the Wrights, a rather inauspicious pair of American bicycle makers, could have conquered the mystery of powered flight. Led by the influential aristocrat Ernest Archdeacon, skeptics intimated that the Wrights had lied about their aviation achievements and were, in fact, “outright frauds.”\(^9\) Archdeacon and his compatriots found it difficult to believe that France had been beaten so remarkably by their rivals on the other side of the Atlantic. Even among those accepting the Wrights’ claims there was a degree of confusion over what this new invention meant for the future of warfare. Conservative military thinkers of the day viewed the aviation community, vested at the time in kites, gliders, and other contraptions, as primitive in nature and inherently dangerous. Indeed, French General Ferdinand Foch famously noted in 1910: “though the aeroplane is an interesting technology, its practical value c’est zero.”\(^10\)

In Germany, military leaders kept an eye on American aviation developments but, like their neighbors to the West, ultimately chose to pass on the Wrights’ invention. The Prussian War Ministry made initial overtures to the brothers requesting further information on the quality and capabilities of their machine. Like the British, the German’s tacit negotiations were all for naught. For their part, the second tier military powers—Russia, Italy, and Austria-Hungary—expressed varying degrees

\(^3\) The Wright Flyer circa 1905.

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\(^10\) From 1903 to 1906, other European governments expressed a mild interest in the Wrights’ machine.
of enthusiasm for the Wrights’ invention as well. But again, each government failed to secure a formal agreement. Not until summer 1909 would any government take the first official delivery of a military aircraft.\textsuperscript{11}

Several factors inhibited Orville and Wilbur’s early sales attempts. For one, the brothers’ initial proposal diverged considerably from the standard military procurement practices of the day. Orville and Wilbur were, at least in their early years, interested more in the inventing process and less so in the business of producing their machines on a vast scale. As such, they proposed to sell a single copy of their machine, the patent covering the device, and the design schematics to the government for a single fixed price of $200,000.\textsuperscript{12} The government was then expected to find a separate contractor to go about manufacturing future copies of the \textit{Flyer}. Deeply fearful of potential patent infringement (and rightfully so),\textsuperscript{13} the brothers also insisted that the sale be agreed to before a public testing process was conducted. These requirements irked acquisition officials who balked at the massive asking price.\textsuperscript{14} The U.S. Ordnance Board’s response reflected these concerns, albeit in a rather confusing manner.

Second, the hesitancy on the part of American and French officials is largely attributable to the political fallout from previous failed attempts at using public funds for aviation projects. The prime example in this regard was Samuel Langley’s failed attempt to produce a functioning flying machine in 1903. At the time Langley was one of America’s most respected scientific minds. As secretary of the Smithsonian Institution he possessed considerable sway with the government in matters of scientific inquiry. As such, his request for $25,000 in government funding, later raised to $50,000, was accepted by the Board of Ordnance and Fortifications. Though doubts persisted, Langley went about constructing an elaborate flying machine, the \textit{Aerodrome A}, atop a complex floating launch platform on the Potomac River outside Washington.\textsuperscript{15} On October 7, 1903, with government officials and the media watching, Langley’s craft slid off the platform and glided for a few precious feet before nose-diving into the river. The machine was a total loss. The following day the \textit{New York Times} proclaimed, “Prof. Langley’s Airship Proves a Complete Failure.”\textsuperscript{16}

The French had a similar experience. After having displayed some early progress in 1890, the French Ministry of War offered to subsidize the experiments of Clement Ader over a five year period from 1892 to 1897.\textsuperscript{17} Ader’s \textit{Avion} series of aircraft were, like Langley’s \textit{Aerodrome}, rather complicated, complex machines that varied considerably from that of the Wrights. In October 1897, the inventor’s most advanced design, the \textit{Avion III} was tested at an airfield at Satory outside of Paris. The results were disappointing. Shortly thereafter official government funding dried up.\textsuperscript{18} In both France and the United States these expensive early failures cooled government sentiment towards aviation.

The failures of the Ader and Langley experiments were particularly damaging at a time when lighter-than-air craft were increasing in popularity. Though balloons had been around for some time, it was not until the turn of the century that the military and commercial potential of dirigibles came to the fore. Throughout Europe rigid and semi-rigid airship designs were being introduced and marketed as both a military innovation but also a com-
mmercially viable form of mass transportation. Compared to the early ‘heavier-than-air’ craft, these airships were far superior in terms of range of operation, duration of flight, and payload capacity. The British Navy, for instance, recognized the value of dirigibles as a means of surveilling enemy ship movements. In February 1909 the British Parliament recommended allocating some £45,000 to the acquisition and testing of rigid and non-rigid airships for this purpose. The allocation of funds for dirigibles came at the expense of the airplane.

Nowhere was the competition between ‘heavier-and lighter-than-air’ craft fiercer than in Germany. The massive rigid-design Zeppelins produced by the famed Otto Von Zeppelin enjoyed considerable support from the government and public alike. These huge airships dwarfed those under construction elsewhere in Europe and served as a symbol of nationalist German pride in the pre-war era. When one of Zeppelin’s inflatable creations was brought down by a storm in August 1908 the German people rallied behind the famous inventor initiating a fundraising campaign to replace the fallen giant. Within a few months some seven million marks had been raised. These donations came in addition to the support provided by the Prussian War Ministry. This same support was not afforded to the embryonic ‘heavier-than-air’ industry. To the contrary, Ministry officials were loath to devote public funds to experimental airplane projects instead choosing to outsource the risk of prototyping and testing to the private sector.

Finally, it is important to note that the Wrights’ invention offered a direct challenge to the existing military doctrine, organization, and tactics of the day. A wholly new weapon of war, the airplane disrupted traditional service structures by competing for roles with other army and navy units. For centuries armies had been arranged into infantry, cavalry, artillery, and supporting elements. The airplane did not fit neatly into any of these existing categories. The prospect of using aircraft for scouting and reconnaissance negated the need for cavalry skirmishes. The potential of aerial bombing challenged the value and utility of the artillery in softening enemy positions and disrupting enemy troop movements. Powerful vested interests in both branches were reasonably concerned that this new class of machines could usurp their roles and responsibilities within the military hierarchy. To make matters worse, there was, at the time, no cadre of experienced aviation officers, no roadmap for establishing an aviation arm, and no proper guidance on how best to employ aircraft on the battlefield. Instead, those who chose to advocate on behalf of air power usually did so at their own professional expense. Often these officers were labeled eccentric or uncooperative and deemed unfit for promotion.

Though advocacy grew throughout 1907 and 1908, the most common response to military aviation was a general feeling of confusion and uncertainty. Until 1909, few individuals had personally witnessed or experienced ‘heavier-than-air’ flight. There was an air of mystery about it. How far could one fly? How much control might they have? How safe was this revolutionary innovation, particularly in light of Orville’s major accident at Ft. Myer in 1908? The capabilities and limitations of the device were largely unknown. This confusion was exacerbated by the Wrights’ secrecy. The dearth of basic intelligence on the device itself led to caution and skepticism on the part of potential military purchasers.

Even when the Wrights’ Flyer became accessible its rather mundane and flimsy appearance did not endear it to the military. Composed primarily of two large cloth wings laid over a complex skeleton of “second growth ash” and bracing wire, the Wrights’ machine appeared much as a large kite—useful for idle peddling around the fields of southwest Ohio but scarcely a fearsome weapon of war. If one could get past its unassuming appearance there was also the issue of safety. In these early days the simple act of going aloft entailed considerable risk. Many an aviator had suffered serious injury or even death from their ill-advised aerial endeavors. Adding a combat element to this only complicated things further. Not only would a soldier need to keep the aircraft aloft in the face of enemy countermeasures, he was also expected to fully perform his assigned duties and return safely to base before his mission could be considered a success.

Lastly, the confusion over the capabilities and limits of early aviation is largely attributable to the rapid acceleration in aviation technology in those first few years. After decades of minimal progress the pace of aviation development accelerated quickly from 1903 to 1908. From 1908 to 1912, altitude, distance, and duration records were broken on a near weekly basis. Case in point, Orville’s first powered flight at Kitty Hawk lasted some twelve seconds and traveled a distance of 120 feet. By 1905, Wilbur was able to stay aloft for nearly forty minutes covering roughly twenty-four miles. By the end of 1908, the French aviator Andevour, flying a Wright model B, went aloft for two hours and twenty minutes covering a distance of some seventy-eight miles. Each progressive step challenged the perception that fixed-wing aircraft were inadequate for military purposes. An aircraft that could travel seventy-five miles per hour and stay aloft for well over an hour was substantially more valuable in military terms than one barely capable of lifting off the ground. Eventually this progress was useful in changing the minds of more conservative policymakers.

Military Aviation Takes Off 1909 to 1912

From the fall of 1908 through early and mid 1909, interest in fixed-wing military aviation accelerated rapidly. The sudden surge in popularity came from a series of events that began with Wilbur Wrights’ flying demonstration in France in 1908. This demonstration, held at a race course at Hunaudieres outside of Le Mans, offered the European aviation community a glimpse at how far
American aviation had progressed. To this point, European aviators were capable of producing short, erratic flying exhibitions with little control over sustained flight. Having not yet recognized the importance of ‘roll control’, many a test pilot had succumbed to unanticipated wind gusts or weight shifts. The majority of European flights lasted no more than a few minutes.25

The Wrights, with their wing-warping principle firmly tested and confirmed, were capable of sustained, controlled flight over long distances. On August 8, 1908, Wilbur took to the sky over Hunaudieres, circled the track twice while performing a series of banked turns and maneuvers before softly touching down in the grass. He followed this with a series of demonstrations including much longer flights and more courageous maneuvers. This culminated with two hour and twenty minute flight at nearby Auvours artillery testing ground later that fall.26

The European aviation community was shocked. The rumors of American flyers had been around for some time but honest belief in the extent of their successes was rare. One skeptic, the popular balloonist Edouard Surcouf, proclaimed that underestimating the Wrights was “the greatest error of the century.”27 Upon witnessing Wilbur’s maneuvers the Frenchman Leon Delagrange, a chief rival to the Wrights, threw up his hands and exclaimed, “we are beaten! We simply do not exist!”28 The French newspapers followed, alternating between despair at having fallen behind and admiration for what they had witnessed. Visiting foreign officials were impressed by the display and eager to relay their observations back home. With some foresight British Major B.F.S Baden-Powell stated simply: “That Wright is in possession of a power which controls the fate of nations is beyond dispute.”29

The successes of the Hunaudieres and Auvours demonstrations was followed by two major events in the summer of 1909. The first was the crossing of the English Channel by French aviator Louis Bleriot on July 25. This flight, his second attempt after having earlier crashed into the channel, marked a massive leap forward in aviation. The feat garnered considerable attention from the press and
public alike. In Britain, news of Bleriot’s crossing was met with a mix of admiration and anxiety. Now capable of traversing great distances over natural terrestrial impediments, the aeroplane presented a considerable threat to civilian populations. The specter of large scale aerial attack or even invasion was now within the realm of possibility. Ultimately, “the shock to the British people was comparable to that produced in the United States by the Japanese attack on Pearl Harbor in December 1941.”

Britain was, indeed, no longer an island.

Bleriot’s crossing was followed one month later by the massive air exhibition at La Champagne outside of Reims, France. Bringing together the top aviation talent from around the world (with the crucial exception of the Wrights themselves) the ‘Grand Aeronautique Week’ involved several days of aviation competitions and exhibitions capped off by the ‘Grand Prix de La Champagne’. The winner of the Grand Prix received the James Gordon Bennett Trophy and a $10,000 prize. The competition was fierce. Aviation records in speed and duration were broken and re-broken several times over the course of a few days. Most importantly, however, the air show provided an opportunity for aviators and enthusiasts to come together to observe recent aviation innovations, compare their own progress and designs, and bring home new ideas and concepts for further experimentation.

Bleriot’s flight in July and the Reims airshow in August accelerated the growth of the burgeoning aviation industry. Both events showcased the increasing capabilities and safety of heavier-than-air flight. Interest in individual aircraft ownership spiked as a good portion of the European elite turned their attention away from motor car races and towards aerial competitions. The increase in demand came quickly. Within two days of Bleriot’s successful landing at Dover he received some 100 orders for copies of his monoplane design. Playing on his victory in the Reims air races, the American Glen Curtiss took several orders for his Reims Racer design in late 1908. The Wrights took a similar tack, traversing Europe and providing demonstrations to public and private citizens alike. The brothers also established the Wright Company in Germany with the backing of local investors and immediately began producing models for sale.

Taken together the Wrights’ demonstrations at Hunaudieres, Bleriot’s cross-channel flight, and the Reims air meet represent a year-long turning point in military aviation history. From late 1908 to the start of 1910, heavier-than-air flight evolved from a limited curiosity to a broadly accepted technological marvel. In January 1910, *Flight*, the official journal of the Aero Club of the United Kingdom, noted that “phenomenal progress has been made (in 1909)….where at the beginning of the twelve months the number of confident flyers and their machines could almost be reckoned on the fingers of one hand, to-day [sic] their number must run well into three figures.”

This evolution is evident in the expansion of military aircraft acquisitions. In July of that year the first military aircraft was delivered to the U.S. Army. Two months later the French War Ministry released funds for the purchase of three military aircraft of varying designs. Britain, Germany, and Russia followed shortly thereafter. Once the ball was rolling events proceeded quickly. As Budiansky notes, “at the start of 1909 there were zero military aircraft worldwide, by 1910
there were fifty, and by 1911 the device had been used in combat.\textsuperscript{39} The expansion of aerial military forces continued up through World War I. On the eve of war in 1914, there were an estimated 1,000 operational military aircraft in service among the major belligerents.\textsuperscript{40}

Yet, despite these advances in military aviation, pockets of resistance remained. Often this resistance was aimed at the financial investment that was required to create even a modest fixed-wing aviation element. In Britain a special committee was established with the express purpose of evaluating the utility and potential of the military aircraft as a weapon. In February 1909 the Report of the Sub-Committee of the Committee of Imperial Defence on “Aerial Navigation” found that fixed-wing aircraft presented little threat to British forces, little practical offensive utility for British commanders, and were generally not worth the cost when compared to lighter-than-air alternatives. Thus the committee recommended the government “stop all the money at Farnborough (the British aviation experimentation and production site) which was being spent on aeroplanes.”\textsuperscript{41} Instead, fixed-wing aviation would be left to private sector inventors and manufacturers.

Beyond the expense there were others who refused to acknowledge the military value of flying machines. When asked his thoughts on aviation in 1909 British Gen. Sir Douglas Haig remarked that “flying can never be of any use to the Army” and that officers who learned to fly were “wasting their time.”\textsuperscript{42} Upon witnessing one of Orville’s Ft. Meyer flights in September 1908, U.S. Secretary of War Luke E. Wright (no relation) reiterated his belief that aircraft were simply not ready for the battlefield environment. He noted, “I can’t see that these aeroplanes are going to be especially practical just yet...until they are further developed, I do not think they will be of much service from a military standpoint.”\textsuperscript{43} The U.S. Secretary of the Navy Victor Medcalf echoed this sentiment. Regarding potential maritime aviation Medcalf stated that aircraft simply “held no promise.”\textsuperscript{44} Indeed from 1907 to 1911 the U.S. Congress failed to appropriate funds for military aviation. What funds were available were repurposed from other army accounts.\textsuperscript{45}

**The Role of the Public in Promoting Military Aviation**

As governments began warming to the prospects of military aviation, vast segments of the public were out front and pushing for more official support. Nascent curiosity in the idea of a flying machine had been building for some time, but with the Wrights’ public exhibition at Reims a new wave of public enthusiasm emerged. This enthusiasm fed into, and off of, the efforts of well-placed individuals and organizations lobbying on behalf of the aviation community. Together this diverse constellation of private individuals, interested organizations, and the mass public applied pressure on policymakers to expand aerial military forces. Their success in doing so set the stage for the massive leap forward in aeronautics during WWI.

Of the early influences on military aviation the most profound, and perhaps the most obvious, came from the individual aircraft inventors and experimenters themselves. Beginning late in the 19th century, potential would-be flyers sought out official government support for experimentation and research into powered flight. Just as the Wrights had done in 1905, many of these early aviators and inventors directly lobbied their governments on behalf of their small but growing industry. These efforts were driven by a mix of national pride and individual self-interest. Often fund seekers were firmly convinced of their ability to deliver a workable flying machine. Yet, as the Langley and Ader examples showed, money directed for purely experimental research provided no guarantee of success. Only with the Wrights’ first flight and later the early hops of Santos-Dumont, Ferber, Voisin, Bleriot, and others did a respectable cadre of aviator-inventors really emerge. These early pioneers attained celebrity status, attracting accolades and attention on both sides of the Atlantic.\textsuperscript{46} This status was then used to promote further aviation development. Thus a virtuous cycle emerged in which new aeronautical advances drew more interested parties who then put forth ever-newer advances.

Supporting these early inventor-aviators were a myriad of aeronautical clubs, flying leagues, and aviation associations that sprung up across Europe and the United States. Organizations like the Aero-Club de France, the German Air Fleet League, the Aero Club of America and the Imperial All-Russia Aero Club varied considerably in structure and purpose but were united around a common mission: the promotion and advancement of aviation. At times they competed for membership and influence. Other times they worked together to achieve common goals. For example, in Britain an agreement among the Aeronautical Society of Great Britain, the Aero Club of the United Kingdom, and the Aerial League of the British Empire in April 1909 clarified the complementary roles of each organization. The Aeronautical Society was made responsible for pro-
moting the scientific and technical aspects of aviation while that Aero Club dealt with training pilots and studying the “art of flying”. The Aerial League, then, served as a patriotic lobbying unit tasked with officially promoting aviation to the government. This arrangement allowed each organization to focus their attention on a particular sector of British society in hopes that their combined efforts would enhance the profile of, and encourage support for, aviation development.

For the most part the aviation associations operated as purely private entities. But in some instances governments sought a more direct affiliation with aerial club members. For example, in Russia the Czar provided a subsidy to the Imperial All-Russia Aero Club for the express purpose of establishing airfields, acquiring aircraft, and training pilots. These pilots and their equipment became, in effect, a ready reserve for the Imperial Army in times of war. In Britain the government’s refusal to allocate adequate funds for pilot training meant that flight instruction was outsourced to the private sector. In 1911, potential pilots in the newly established Engineer’s Air Battalion were required to secure a Royal Aero Club certificate at a private flight school at their own expense before stepping into a government aircraft.

The Aero club community also played an important role in the expansion of print media outlets focused on aviation developments. Chief among these were the aviation-related journals, magazines, and bulletins that began to appear in the latter half of the decade. Several publications, including titles like Flight, Aeronautics, L’Aerophile, and Flugsport, offered a host of information on recent aerial achievements, technological progress, upcoming events, and general aviation-related news. The sophistication of these publications varied widely. Some more technical journals focused on the scientific elements of flight like aerodynamics, propulsion, and stability control. Others targeted a broader audience by including editorial commentaries, fictional stories, illustrations, and cartoons. The variation among the competing journals made aeronautic information accessible to a wide range of aviation enthusiasts.

Despite their growing popularity, the reach of aviation-related journals paled in comparison to that of the major newspapers of the day. Though the early news of the Wrights’ success at Kitty Hawk had traveled slowly, by the end of the decade media coverage of aeronautics became nearly ubiquitous. By 1910 some of largest news outlets in the world including dailies like the Daily Telegraph, the Berliner Lokal Anzeiger, and the Herald were covering major aviation events and publishing regular updates on the progress of inventors and their inventions. Several newspapers produced editorials imploring their national governments to take notice of the advances in aircraft design and capability. Nowhere was this more evident than in Britain where the great newspaper proprietor Lord Northcliffe used his primary outlet, the Daily Mail, to wage a personal campaign in support of British military air power. Both in this personal correspondence with Secretary of State for War R.B. Haldane and through dozens of editorials, Northcliffe beseeched the government to heed the aeronautic advances in Europe and prepare itself for the coming age of aerial warfare. Indeed, it was Northcliffe who had offered the original prize of £1,000 that precipitated Bleriot’s crossing of the English Channel. This event was, of course, covered extensively in the pages of the Daily Mail.

Bleriot’s reward was one of dozens of similar prizes for aviation achievement. Often these awards were sponsored by newspapers, aeronautic societies, and wealthy patrons interested in publicly supporting the aviation community. Some were quite lucrative by the standards of the day. For example, the Daily Mail offered a healthy £10,000 prize to the first British aviator to fly from London to Manchester. For the first circular flight of at least one kilometer the Aero-Club de France offered the Grand Prix d’Aviation Deutsch-Archeacon grand prize of some 50,000 francs. In the United States the New York Times awarded $10,000 to Charles Hamilton for the first flight from New York to Philadelphia and back. Finally, in 1910, famed newspaper publisher William Randolph Hearst offered an astonishing $50,000 to the first pilot to traverse the United States coast to coast in less than 30 days. To put this in perspective, the entire aviation budget of the U.S. Army in 1912 was only $125,000.

In addition to news and journal reports there were also a series of fictional works centered on aeronautical subjects, particularly the aircraft’s potential as a weapon of war. Many of these early science fiction novels accurately foreshadowed the future of aerial warfare. Among the most important of these were Jules Verne’s The Clipper in the Clouds and The Master of the World, George Griffith’s Outlaws of the Air, and H.G. Wells’ The War in the Air. The latter offered a tale of aerial armadas laying waste to London in a massive bombing attack. Wells’ work both fascinated and terrified the British public. This is borne out in the phantom airship scare of 1909 in which a series of Zeppelin and aircraft sightings in southern England set off a national wave of panic. Though these fears were ultimately unfounded, the impact of the aviation revolution on the English psyche was profound.

Finally, the most persistently influential segment of society on the issue of military aviation was the wildly enthusiastic mass public. Sparked by the Wrights’ display at Reims and fueled by newspaper accounts, aeronautic events, fictional narratives, and a stinging sense of national pride, the public fascination with flight became an almost transnational obsession. Public enthusiasm was evidenced by the enormous turnout at air events. Over the course of a week, an estimated 500,000 spectators paid to attend the air exhibition at Reims. In London, Bleriot’s channel crossing aircraft was displayed in a downtown department store drawing a crowd of 120,000 paying customers. This enthusi-
asm lingered for years as entrepreneurial aviators and promoters arranged a series of barnstorming exhibitions across Europe and the United States. These events drew hundreds of thousands of onlookers enthralled by both the technological marvel of flight and the audacity of these early stunt pilots.

Perhaps the most telling evidence of the public adoration for heavier-than-air flight came in the form of the national aviation fundraising campaign. Across Europe and in the United States aviation enthusiasts sought to harness the public’s infatuation with the feats of Wright, Santos-Dumont, Bleriot, and other early aviators by soliciting donations for the express purpose of purchasing aircraft and equipment for their national military services. For example, in 1912, the Italian Aero Club of Padua proposed a national subscription to secure two million lira in order to purchase 100 aircraft for the government. Within a few months the subscription had collected nearly twice that amount. A similar experience was had in Germany where the National Aviation Fund raised some 7.2 million marks to finance the acquisition of 62 aircraft and the training of 162 pilots. In Russia, the Czar sanctioned the Imperial All-Russian Aeroclub to issue a subscription to create a national aviation fleet. Following on this path the Russian Grand Duke Alexander Mikhailovich took it upon himself to redirect some 1.7 million rubles in publicly solicited funds to aviation-related projects. Some of these funds were used to establish a flying school and construct airfield facilities but bulk of the money was used to purchase Farman, Bleriot, Antionettes and other French aircraft designs for military purposes. Together these public campaigns contributed an additional $7.5 million to the burgeoning military aviation industry allowing for the significant expansion of national military aviation services.

Urged on by industrial interests, aviation enthusiasts, and a captivated public the advance of military aviation accelerated from 1910 to 1914. The surge in support allowed the aviation community to overcome the reticence of narrow-minded government officials. This early technological incubation period was crucial in setting the stage for the explosion in aviation technology in World War I.

NOTES

1. While Orville was conducting a test flight for the U.S. Army prior to its purchase of a Wright Flyer in September 1908 the aircraft experienced a major structural failure resulting in a devastating crash. The accident severely wounded Orville and resulted in the death of his passenger Lt. Thomas Selfridge. Selfridge became the first military aviator to lose his life in an aviation accident. See David Chenoweth, “Testing the Military Flyer at Fort Meyer 1908-1909,” Air Power History 49 (2002): pp. 4-11.


8. Ibid.


11. On July 30, 1909, the Wright’s final flight successful flight test allowed the turnover of their Flyer to the Army Signal Corps. See Chenoweth 2002.


13. The well documented legal battles over patent infringement with Glen Curtiss would haunt the Wrights for several years and almost certainly arrested the expansion of the early American aviation industry. See Seth Shulman, Unlocking the Sky: Glenn Hammond Curtiss and the Race to Invent the Airplane (New York: Harper Perennial, 2003).

14. Adjusted for inflation, the Wrights’ asking price of $200,000 amounts to roughly $4.8 million in 2010 dollars.


25. According to Gibbs-Smith, at the time of the Wright’s demonstration the longest European flight was roughly 20 minutes by Henry Farman in a Voisin-Farman I-bis. By contrast Wilbur Wright took an improved Flyer model aloft for nearly twice that some three years earlier in October 1905. See Gibbs-Smith, Aviation, p. 234.

26. Ibid.


28. Ibid.


31. See Villard, Contact!, p. 71.


35. Morrow, The Great War in the Air, p. 18


37. This first Army aircraft purchase only came about after President Theodore Roosevelt became personally involved in the matter. Having heard of the Wright’s achievements from contacts in the Aero Club of America the forward-looking Roosevelt instructed the War Department to look seriously at the Wright’s proposal. See Charles Chandler and Frank Lahm, How Our Army Grew Wings: Airmen and Aircraft Before 1914 (New York: Ronald Press Company, 1943), pp. 143-51.


42. Budiensky, Air Power, p. 47.


46. See Villard, Contact!.


54. Penrose, British Aviation, p. 87.

55. Ibid.

56. Crouch, Wings, p. 87.


58. Villard, Contact!, p. 136.

59. This was the first year Congress allocated funds directly to military aviation. To this point money spent on military aircraft had come out of Army Signal Corps accounts. Gurney, A Chronology of World Aviation, p. 14.


63. Penrose, British Aviation, p. 88.


65. Buckley, Air Power in the Age of Total War, p. 34


67. This figure comes from: Crouch, Wings, p. 135.
Armageddon’s Shortening Fuse: How Advances in Nuclear Weapons Technology Pushed Strategists to Mutually Assured Destruction, 1945-1962

Robert P. Jameson
Introduction: The Old Cold War, 1945-1962

In the latter half of the Cold War between the United States and the Soviet Union, nuclear conflagration hung like the sword of Damocles above the world. Over the course of approximately four and a half decades of standoff, the U.S. alone produced some 70,000 nuclear weapons for various purposes. Exploded simultaneously at its 1960 peak, this vast arsenal would have yielded the explosive equivalent of 1.37 million atomic bombs of the sort dropped on Hiroshima, Japan on August 6, 1945. Turnover and obsolescence, however, largely kept the arsenal to within a range of roughly 22,000 weapons from the early 1960s through the 1980s. The rapid build-up of such an arsenal in the 1950s created a super-abundance of weapons, in contrast to their earlier scarcity in the late 1940s. With no cause to worry over supplies of warheads, strategists responded by shifting American nuclear strategy from one limited only to military targets to a total war, aimed at devastating Soviet society. With the whole world hostage to the super powers, the new Cold War had begun.

Beginning with the Cuban missile crisis in October 1962, Americans expected nuclear war to come, when it did, almost without warning—a sudden barrage of missiles carrying thermonuclear warheads and then, silence. This apocalyptic vision was the result of specific developments in American nuclear weapons technology in the period 1945-1962. Advances in explosive yield-weight ratios, thermonuclear weapons, long-range jet bombers, missile guidance and targeting systems, warhead production, and intercontinental ballistic missiles drove a revolution in planning for nuclear war that imagined parallel Soviet advances, grew paranoid about American vulnerability to a first strike, and increasingly stressed rapid response and massive retaliation. The fast pace of technological breakthroughs in weapons technology created this arguably defensible paranoia as a matter of course. There was no room for error. Every contingency had to be planned for—if American weapons scientists could create it, so could the Soviets, and newer technologies were called for by military strategists to counter the enemy’s imagined advantages. By the end of the Cold War in the early 1990s, the United States possessed 116 different nuclear delivery systems, including 11 types of ballistic missile, 11 types of strategic bomber, and 3 types of ballistic missile submarines. Strategists had to scramble to accommodate these new technologies in their war games. This frenetic process brought about the invulnerable strategic triad of air-launched atomic bombs, submarine-launched ballistic missiles, and land-based inter-continental ballistic missiles, and with it, an ability to plan around the concept of mutually assured destruction (MAD) based on mature nuclear delivery platforms.

Therefore, by 1962, technological developments—and nuclear strategists’ accommodation of those new technologies in their war plans—brought about the ‘new’ Cold War Americans remember, a hair-trigger away from mutual destruction. This paper will examine the leading, often unplanned, role technological developments played in influencing planners and policy-makers to create the mature, stable Cold War situation of MAD that ultimately resulted in the détente and disarmament negotiations that characterized the late Cold War world from 1962-1991.

Atomic Monopoly, 1945-1949

The first years of the atomic age, from 1945 to 1949, witnessed a nuclear America both supreme and impotent. No rival on the world stage, even its erstwhile ally, the Soviet Union, could not match the stunning show of weapons technology America had demonstrated at Hiroshima and Nagasaki. Simultaneously, a limited nuclear arsenal and technical problems with deployment curtailed strategic nuclear efficacy. What Robert L. Perry, an analyst with the RAND Corporation described as “the attractive myth of American exclusiveness” formed the basis of thinking for the scientists and military strategists responsible for running America’s nuclear weapons program. There were dissenting voices, such as Bernard Brodie, a prominent nuclear strategist, who argued presciently in 1946 that the Soviet Union would be able “to produce them [atomic bombs] in quantity within a period of five to ten years,” but it seems complacency reigned supreme for most American scientists and strategists during those years.

In hindsight, it seems clear that the Soviets were catching up with the Americans, and rapidly, with their first successful atomic bomb test on 29 August 1949. These first Soviet tests were a shock to the Americans and a spur to further weapons development, but were not as worrying as their later thermonuclear tests. That program, the Soviet effort to build a hydrogen bomb, had been under development since June 1948. Even the paramount American military in the late 1940s possessed an unimpressive arsenal by any standards. Atomic bombs were an immensely challenging weapon, expensive and technically demanding to produce. President Truman had only thirteen atomic bombs at his disposal on June 30, 1947. A year later, in July 1948, there were fifty weapons in the American nuclear quiver, but with only thirty B-29 bombers modified to carry them. Nor was this a force capable of raining nuclear fire on the Soviets. Preparation for a single bomb’s flight

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could take thirty-nine men more than two days. Even these specialist teams of bomb assembly workers were disbanded at the end of World War II—and no permanent new teams had been trained as late as the spring of 1947—demonstrating the initially marginal and constrained role of atomic weapons in American strategy.

Of course, these were all bombs, unwieldy and carried only by purposely-fitted, long-range strategic bombers. The bombs were not standby, ready-at-a-notice weapons; they “could remain ready for only forty-eight hours before having to be partially disassembled to recharge the batteries,” a technical problem that tended to mean bombs remained unassembled and unready for action. The American nuclear force at this time “placed heavy emphasis on an atomic air offensive” in war plans such as FROLIC and HALFMOON, because ballistic missiles—which would later compose two of the strategic triad’s three arms—were not yet developed.

This method of air delivery had its problems. In the first years of American nuclear supremacy, “from 1945 through the summer of 1948,” only one bomber group, the 509th (medium) group, was actually “capable of delivering atomic weapons” to pre-selected targets. It was difficult to surprise the enemy—the bombers’ speed was insufficient. Another problem was the limited unrefueled combat radius of propeller-driven, long-range bombers, such as the B–29 or B–36, which were the workhorses the Strategic Air Command (SAC) relied on to deliver atomic payloads against Soviet targets. In October 1948, any “atomic air offensive launched from Great Britain, the Suez area, and Okinawa would be the primary U.S. war effort in the event of general war,” due to limited heavy-bomber range. Wider-ranging B–52 jet bombers would not replace these aircraft until the mid-1950s. Earlier versions of jet bombers “greatly enhancing SAC striking power,” such as the B–47 Stratofortress, were also unavailable to SAC until after 1949.

Swift nuclear holocaust was, therefore, not in the cards between 1945 and 1949. Although the successful detonation of the first Soviet atomic weapon gave American planners serious pause, causing “some second thoughts about Soviet backwardness in technology,” according to Robert L. Perry, technology’s limits necessarily bound the hands of nuclear strategists and the military at this time. Bomber fleets and individual warheads were scanty, the distance to targets was considerable, and, from the American perspective, even several dozen atomic bombs dropped on the vast Soviet land mass could hardly redress the grievous Soviet advantage in conventional forces, poised to over-run Western Europe. David Rosenberg, a military historian, concluded, “The atomic power of the United States during its vaunted era of ‘nuclear monopoly’ was thus seriously limited. The small size of the stockpile, limitations on production capacity, the complex and unwieldy nature of the weapon itself … all contributed to constraining available options,” a true case of technology creating new policy options (the use of atomic weapons in warfare) while constraining policy-makers’ options and shunting American strategic policy down specific corridors.

From the Soviet perspective, 1949 marked the infancy of their atomic weapons program. They needed time to stockpile their own nuclear arsenal, and if possible to “catch up and surpass” their American rivals. They were already behind, especially as the prevalent belief at the time was that “war between the Soviet Union and the United States would in most respects resemble World War II,” signaled by “a massive production buildup.” Far-reaching and fast flying, a breakthrough in ballistic missiles capable of carrying nuclear payloads could have dramatically sped up timetables for nuclear war planners, who could then anticipate striking the enemy within hours, not days. Why did planners continue to rely on the SAC and its limited nuclear warfare conducted by long-range bombers?

Breakthroughs in ballistic missile technology proved elusive throughout the latter part of the 1940s. The story of the ballistic missile’s ultimate
triumph as the pre- eminent weapon of American and Soviet nuclear strategy is a long one, but it begins in the 1940s, with inter-service rivalries between different branches of the U.S. military, unreliable research funding, and intractable technical problems. Indeed, a decade later, in 1958, President Eisenhower remarked “for the next several years the greatest threat to destruction continues to be the military aircraft; missiles will not be ready in such quantity,” to significantly affect American nuclear strategy. The unanticipated importance of ballistic missiles in American nuclear strategy soon after this statement belied Eisenhower’s confidence, but his doubts were rooted in the late bloom of ballistic missile technological breakthroughs.

Several obstacles were in the way of developing the kind of intermediate and, later, intercontinental range ballistic missiles that characterized the bulk of the American nuclear arsenal between 1962 and the present. The “inadequacy of technology” was the single greatest obstacle. Scientists had to overcome various hurdles, including “guidance accuracy, thrust requirements, and re-entry,” leading eventually to serious “disagreement about the real operational capability of the missiles themselves,” within the technical community. Seated before the Senate Special Committee on Atomic Energy in December 1945, Vannevar Bush, director of the government’s Office of Scientific Research and Development (which had run the Manhattan Project till 1943), confidently proclaimed that long-range nuclear-armed ballistic missiles were too complex for the near future. The Soviets or “anybody in the world” could build them only with great difficulty. He felt “confident it will not be done for a long period of time to come.” This was surprising; German scientists worked extensively on ballistic missiles in the last war. However, rockets such as the V-2s developed late in the war had to cross a very short distance. Early on in the American atomic weapons program, by contrast, technicians worked under demanding standards of accuracy for nuclear-armed ballistic missiles that, armed with only kiloton payloads, tolerated far less deviation from targets without greatly diminished efficacy.

Moreover, in the late 1940s the technical focus was on smaller atomic bombs with greater yields. The yields of atomic bombs multiplied by more than twenty-five times between 1948 and 1952, for example. Planners were familiar with the by-then traditional delivery system of using long-range heavy bombers to deliver higher-yield fission weapons. Such familiarity influenced nuclear strategy. Tapp Taves, a Navy analyst quoted in Sharon Ghamari-Tabrizi’s study of gaming nuclear war, noted that “a considerable amount of intuition enters into [decision makers]’ judgement [sic],” and that using their intuition, they saw a future of more bombs, carried forth by faster bombers with farther unrefueled ranges. Not ballistic missiles.

Even so, there were stirrings in the technical community, whose long-term interest in ballistic missile development was evident from the end of World War II. As far back as 1946, work had already begun on a ballistic missile program whose “nominal or ultimate goal was a 5,000-mile ballistic missile,” although no one involved had any “illusions about the military utility of anything that could be built in the foreseeable future.” A program to develop ballistic missiles in 1947 did not move forward due to budget cuts. The Soviets, that same year, began their “gradual development” of ballistic missiles. Ultimately, of course, ballistic missiles would be the predominant force delivery system for American nuclear strategists. This change in emphasis, from aircraft to missiles, would be the result of “the pace of technology—which certainly had been more rapid for ballistic missiles than for weapons contemporary with them,” even though “For nearly a decade objections to reliance on ballistic missiles focused on the contention that the missiles were technologically incapable.”

Even by 1949, as the brief window of American atomic monopoly ended, the age of missiles had yet to arrive. The technology would mature, but more than a decade would go by after 1949 before ballistic missiles became “the chief instruments of strategic warfare” and the centerpiece of American plans for nuclear war against the Soviet Union.

Soviet Atom Bombs, Confrontation, and SAC Strategic Dominance, 1950-1960

Entering the 1950s, the United States was no longer as confident about its advantages, atomic and otherwise, over the Soviet Union and the apparently monolithic threat of global Communism. After a long civil war, Mao Zedong’s Communist forces gained control of China, the Soviets exploded an atomic device, and in 1950 President Truman chose to commit the U.S. (under a UN banner) to resist North Korea’s invasion of the south. These shifts in the global alignment of forces led strategic planners to reassess their previous assumptions, such as the “ace card” nature of American atomic monopoly.

especially the floodgates of military spending they opened, played a major role in stimulating nuclear weapons technology. In 1950, for instance, the U.S. Air Force had renewed its previous 1947 effort to develop operational ballistic missiles carrying nuclear warheads and capable of advanced range. Called the MX-774 project, it initially had a time-frame of fifteen years due to high research and development (R&D) costs and limited budgeted funds. At the onset of war, however, the money issue faded. In 1951, defense contractor Convair (Consolidated-Vultee Aircraft) received a contract from the U.S. Air Force to develop a ballistic missile "with a 5,500 mile range and an 8,000 pound warhead" which was renamed the Atlas ICBM in March 1952. This sudden burst of wartime funding helped ballistic missile technology clear its formidable initial technical thresholds.

Through the rest of the 1950s, an explosion of scientific and technical innovation created faster, farther-ranging, more accurate ballistic missiles while simultaneous work in electronics miniaturization and thermonuclear warheads made missiles far deadlier and more destructive. Thermonuclear warheads had to wait until the successful conclusion of physicist Edward Teller’s work with the November 1, 1952, Ivy Mike test of the hydrogen bomb at Enewetak atoll in the Pacific. Considering such favorable developments, one might surmise that ballistic missiles immediately became the new mainstay of American strategic planning. In fact, this was not so. As Robert L. Perry pointed out, “until 1952 [and after!] a reluctance to depend over much on missiles was evident,” in large part because “as yet there was no convincing indication that the Russians were paying much attention to them,” a mistaken conclusion since Soviet development of ballistic missiles had begun in 1947.

Mistaken or not, however, American perceptions of Soviet advances (or lack thereof) set the pace of urgency for research and development in nuclear weapons technology. Ballistic missile development continued at a desultory pace throughout the early 1950s, with each service pushing for its own nuclear weapons (if only for budgetary in-fighting). The U.S. Air Force’s Atlas program evolved into a more advanced intermediate range missile called Thor, itself a rough contemporary of the Army’s pet missile, Jupiter. The Joint Chiefs pushed the Navy to accept modified Jupiter missiles, a move it later rejected in favor of lobbying for its own service-specific ballistic weapon, a solid-fueled missile launched from mobile submarine platforms. These early ballistic missiles were problematic. Capable for the most part of only intermediate range and reliant on complex, expensive and volatile liquid fuel, these missiles did not fundamentally alter American grand nuclear strategy.

Despite rapid progress in ballistic missile technology, the mainstay of the American nuclear strike force in the 1950s remained the Strategic Air Command (SAC) fleet of long-range heavy bombers. While atomic bombs in the late 1940s had been clumsy and laborious to assemble, the perfection of sealed pits (the cores of implosion weapons) in the early 1950s enabled weapons to be stored fully assembled, reducing preparation time for launch. By 1959, these were the majority of weapons that a more flexible, responsive SAC possessed. Other problems, like “a shortage of bombs, aircraft equipped to deliver them, crews trained in nuclear operations, and poor target intelligence on the Soviet Union,” were challenges the SAC faced and to some extent overcame in the 1950s. Approximately 3,000 jet-powered strategic bombers came into active service that decade.
Led by such vigorous (and controversial) veterans of the Second World War as Curtis LeMay, SAC was convinced of the Air Force’s preeminent role in American nuclear strategy and the assured place of the long-range heavy bomber in that strategy.\(^51\) No other delivery platform, it believed, was more efficient at striking targets deep within the Soviet Union on short notice, or capable of recall in an emergency. It is an exaggeration to describe American strategy in the 1950s as one emphasizing “long range strategic air power, relying on nuclear weapons,” with SAC as “the mainstay of national security policy after 1954” through the first deployment of long-range intercontinental ballistic missiles (ICBMs) in the later 1950s and early 1960s.\(^52\) To ensure prompt readiness, SAC frequently kept bombers aloft, equipped with nuclear warheads and skirting the Arctic Circle near Greenland and northern Europe close to the Soviet Union. This airborne alert force was ready to retaliate against targets in the Soviet Union at any time, very different from the days it would have taken to assemble bombs and dispatch bombers in the late 1940s.\(^53\) The early 1950s were truly the halcyon days of the SAC and a bomber-centered nuclear strategy.\(^54\)

At the height of its success and influence in nuclear strategy, SAC’s window of dominance was closing. The Soviet acquisition of a true two-stage thermonuclear bomb in November 1956, panicked strategic planners, who rightly understood that if only a few Soviet long-range bombers made it through, American cities were vulnerable, as was SAC’s retaliatory capacity—strategists had nightmare visions of the American nuclear bomber fleet annihilated on the ground.\(^55\) Soviet acquisition of thermonuclear weapons laid the U.S. open to a Soviet first strike, shifting planners to a reliance on their deterrent’s ability “to inflict greater loss against the enemy than he could reasonably hope to inflict upon us.”\(^56\) Soviet thermonuclear capacity led to considerations of deliberately striking first before the Soviets could become an even greater menace.\(^57\) Fear of a Soviet first strike strengthened due to “mirroring”—the American strategists presumed the Soviets, with fewer nuclear weapons, would necessarily plan to strike the U.S. first in a surprise attack to eliminate American nuclear forces and then press their conventional military advantage in Europe.\(^58\) After all, that is what American strategists considered doing in the Soviets’ place. Preemption appeared less consequential, and therefore more attractive, prior to ballistic missiles and instant, mutually assured destruction to both belligerents.

Concerns about the vulnerability of the SAC bomber wings to sudden, overwhelming surprise Soviet attack gave fresh urgency to ballistic missile research programs. As the Eisenhower administration looked to balance budgets in the mid-1950s, after the rapid expansion of defense outlays during the Korean War, one obvious target seemed to be the multiple, overlapping ballistic missile programs the separate services ran.

Organized to recommend canceling costly missile development programs, instead the von Neumann group [led by famed computer scientist John von Neumann] in February 1954, urged expansion, acceleration, and extensive restructuring of the established but definitely undernourished ballistic missile program to give the U.S. a definitive advantage in the emerging alternative to SAC’s long-range bombers.\(^59\) In 1954, such ballistic missiles as Atlas or Jupiter “could have been used only for massive retaliation (or first strike),” were therefore of limited flexibility for planning purposes, and were unavailable in the kind of numbers needed to supplant SAC’s keystone role in American nuclear defense.\(^60\) One result of this new push for ballistic missile research was development of the Titan intercontinental missile beginning in 1956, a long-range ICBM that could complement Atlas, with greater range and heavier payloads.\(^61\) Surprisingly, even with the new emphasis on developing ballistic missiles, “early force planning called for deploying only twenty to forty ICBMs, and not until 1958 were there serious recommendations within the Air Force to deploy more than 200.”\(^62\) More than anything, this demonstrated just how tenacious the concept of atomic weapons that bombers delivered was within the Air Force and planning/research institutions it had fostered, like the RAND Corporation.\(^63\) Bombers’ command of the sky would not change overnight. Even as late as 1957, the Gaither report “Deterrence and Survival in the Nuclear Age” recommended an acceleration of U.S. ballistic missile programs to President Eisenhower, because the committee felt the military was moving too slowly to keep pace with Soviet advances.\(^64\)

The U.S. Air Force did not sit idly by while SAC’s predominant role waned, arguing that ballistic missiles were expensive, unreliable, and inaccurate. Missiles lacked the precision of manned bombers—they were truly a terror weapon, too inaccurate to be part of a counterforce strategy hitting only Soviet military targets.\(^65\) Of necessity, the mis-
AIR POWER

AS LATE AS 1960,... PRESIDENT EISENHOWER SUGGESTED USING POLARIS MISSILE[S]...TO CLEAN UP TARGETS THAT LONG-RANGE HEAVY BOMBERS FAILED TO DESTROY

siles would target cities. In turn, the Air Force argued, Soviets might target American cities. Any initially limited nuclear engagement would become a general conflagration.

In hindsight, the Air Force’s arguments against switching American nuclear strategy may seem quaint. At the time, those arguments reflected serious doubts about the readiness of ballistic missiles for the limelight. The technical challenges were significant; the Air Force simply failed to anticipate technicians’ success in overcoming them. Liquid-fueled missiles, of a class with the Atlas, Jupiter, and Thor IRBMs, and Titan ICBMs developed in the early to mid-1950s, were cumbersome, expensive, and volatile. By themselves, they were certainly no threat to SAC bomber command of nuclear strategy. The Air Force was the victim of the “hyper-modern domain of future war-planning, where one had only a few years … before the strategic picture altered with the phasing-in of a novel component.” Only an inexpensive, reliable solid-fuel missile—ready around-the-clock for firing—could seriously challenge SAC.

While such a missile was a long time coming, technical breakthroughs in the 1950s, especially with the Air Force’s Minuteman missile and the Navy’s Polaris, made SAC bombers obsolete over time. Developing solid-fuel ballistic missiles was difficult. Nozzles that could “direct the gas exhaust that propelled and steered the missile” posed “major conceptual and manufacturing problems” that frustrated technicians. High performance solid fuel was tricky to manufacture at appropriate scale; it was more challenging still to find a way to pour it into missile casings in a way that allowed “uniform flight performance and long storage before use,” an absolute prerequisite for a reliable ballistic missile.

Finally, there was “as yet no reliable way to terminate the burning of the fuel and hence the engine’s thrust, which were critical in the missile’s hitting its target.” These difficulties lent weight to Air Force arguments against ballistic missiles centering on their finicky nature, unreliable performance, and inaccuracy compared to manned bombers. The 1955 breakthrough for Minuteman and Polaris rested on the demonstration of the reliability of “large-grain, double-base solid propellants” that, with further research, overcame the previous hurdles to inexpensive, quick-launched, far-ranging ICBMs. Despite technical breakthroughs, the missiles (Polaris and Minuteman) that formed the core of the emerging strategic triad of nuclear forces in the U.S. arsenal still did not come online until the early 1960s. The first test flight of a Minuteman missile took place only on 1 February 1961, despite more than half a decade of research and development. Fears of Soviet ballistic development, meanwhile, along with their consequences for SAC’s vulnerability to a surprise first strike, spurred the Navy’s calls for the (theoretically) invulnerable Polaris’ inclusion as a full member of the triad.

Fear of Soviet ballistic capabilities rose to new heights in the wake of the Soviets’ successful launch of Sputnik, the first artificial satellite, in October 1957. It also loosened purse strings. For the Navy’s Polaris program in particular, “acceleration of the original program and substantial funding authorizations followed Sputnik,” now that all the talk in American political circles revolved around fears of a ‘missile gap’ with the Soviets. This fear was greatly exaggerated—only in 1957 had the Soviets demonstrated a ballistic missile capability; as late as 1958, the Soviets had only begun to deploy early medium-range ballistic missiles—nevertheless, it motivated missile deployment decisions and acceleration of production. According to Jeremi Suri, an international historian, Sputnik and other reports of Soviet technological development affected even the unflappable Eisenhower, and “shook some of the president’s self-assurance.” The Gaither Committee report entitled “Deterrence and Survival in the Nuclear Age,” did not offer the president consolation, but warned ominously that by 1959 Soviet capabilities might extend to fully equipped ICBMs with thermonuclear warheads, “against which SAC will be almost completely vulnerable under present programs.” A surprise Soviet “Sunday Punch” was not out of the question.

In large part, the late arrival of fully-capable ICBMs in American nuclear strategy is traceable, not to technology, which developed with astonishing rapidity, but to planners’ failure to incorporate novel technologies into coherent war plans. Ballistic missiles, Robert L. Perry of RAND claimed, were “marvelously contrived weapons capable of being bent to purposes about which few had thought,” leading to long debates over their command-and-control, deployment, production, and future as an integrated part of nuclear strategy. As late as 1960, upon reviewing the Single Integrated Operational Plan (SIOP) for using nuclear weapons against the Soviet Union, President Eisenhower suggested using Polaris missile submarines simply in a support role, to clean up targets that long-range heavy bombers failed to destroy in SAC’s initial strike. One has the sense that Eisenhower, along with technical advisers, strategists, and military senior staff, struggled with the notion that, “with the evolution from the medium-range bomber in 1945 to the intercontinental ballistic missile in 1957, full-blown nuclear war could be initiated within a few hours of the executive decision.” The unrelenting pace of technological development left no space for those unsure of what to do with ballistic missiles, of how to fit them into the scheme of nuclear strategy. “The rapid development of nuclear technology, exemplified by the mating of the thermonuclear weapon to the long-range missile,” George Reed commented, “required accompanying developments in organization and doctrine,” a challenge the new Kennedy administration and its fresh-faced technocrats, like Defense Secretary Robert McNamara, would soon take on.

MAD Comes of Age

By the time John F. Kennedy assumed the presidency in January 1961, the strategic landscape of
nuclear weapons had changed dramatically. While the SAC and its heavy bombers still dominated, the pendulum had swung irrevocably toward intermediate and long-range ballistic missiles as the nuclear delivery platform of the future. Both the new president and his defense secretary, Robert McNamara, were enthusiastic proponents of missiles. Kennedy made the decision, early in his term, to increase the stock of Minuteman and Polaris missiles, moving toward the fully mature strategic nuclear triad that was the basis of strategic planning in the ensuing decades. According to George Reed, “in speeches and budgets the [Kennedy] administration signalled its intention to rely on missiles for the majority of U.S. strategic defense,” and thus began a new kind of Cold War, riskier and faster than before, a true war of mutually assured destruction.

Kennedy was not alone in recognizing the importance of the transition from bombers to ballistic missiles. Soviet Premier Nikita Khrushchev, in a January 1960 speech to the Supreme Soviet, stressed reducing Soviet conventional forces in Europe by a third and adopting nuclear tactics. Possession of only a limited intercontinental bomber force, this strategy would allow the Soviets to achieve strategic parity with America cheaply via missiles, instead of a ruinously expensive bomber fleet. American assessments of how quickly the Soviets could produce and deploy a significant missile deterrent differed substantially, though it quickly became clear that the feared ‘missile gap’ on which Kennedy had campaigned did not exist.

Still, a world where both the Soviet Union and the U.S. possessed long-range ballistic missiles capable of instant devastation was a potential game-changer. In the “era before ballistic missiles, preemption appeared to be both militarily and constitutionally feasible,” since a Soviet attack might take days or even weeks to materialize, and the U.S. would have substantial warning. In the world that was taking shape for Kennedy-era nuclear strategists, missiles meant surprise attacks could come with only minutes of warning. This demanded sophisticated early warning systems, computerized command-and-control, integrated joint operational plans, satellite surveillance of enemy capabilities, and a whole world of strategic war-gaming for weapons never tested in combat, whose field effects were uncertain. “After all,” Gordon S. Barrass, a veteran Cold War intelligence analyst, observed, “especially after they [Soviets and Americans] had entered the missile age, they feared that even if they did launch a surprise attack the other side would still be able to retaliate with devastating and unacceptable consequences.” It was a world of uncertainty.

Secretary of Defense Robert McNamara and other top Kennedy administration officials responded by putting in place a coherent, integrated nuclear strategy that formed the basis for mutually assured destruction. First on the docket was decreasing SAC’s relative dominance of American nuclear strategy in favor of the triad. McNamara was unsympathetic to SAC’s assertion that bombers were indispensable. It became increasingly clear to defense planners, moreover, that Soviet air defenses made it potentially far more costly to rely on bombers to penetrate to their targets deep within Eurasia. They felt that small, precisely targeted ICBMs, unstoppable by Soviet air defenses, were a safer choice of deterrent. The administration felt it had to alter nuclear deployments. By the early 1960s, “technology had come along so rapidly during the previous decade [it] made the first generation missiles [Atlas, Jupiter, Titan, Thor] as obsolete as B–17s.”

A former RAND Corporation man, McNamara brought a new emphasis on systems analysis and planning for nuclear war to the White House. As Antoine Bousquet, a historian of international relations, observed, in the Kennedy White House, “mathematical and logical models and simulations of warfare became fetishized for their promises of predictability and control.” While this “fetishization” may seem extreme, it was a measured contrast to the previous decade and a half, when the U.S.
lacked a system for coordinating all nuclear weapons and strikes into a single, unified plan that would assign each weapon in the arsenal a particular target and time for attack.\(^98\) As strategists understood, rapidly changing weapons technology, as well as technical advances in surveillance and early warning, necessitated almost constant planning, and revisions of planning, for nuclear war.\(^99\)

The Kennedy administration's turn toward missiles, then, reflected the desire for integrated nuclear strategy across military services and weapons platforms to ensure coherent retaliatory capability—shaping American nuclear forces into a "precision tool" compared with the "indiscriminate bludgeon" Eisenhower and Truman wielded.\(^100\)

Regardless, missiles were the *sine qua non* of American nuclear strategy up to the present day. "The Soviets," observed George Reed, "would be deterred primarily by the threat of immediate, devastating, and unstoppable retaliation by U.S. missiles, not attack by bombers."\(^103\) The nature of war "had changed ... as a result of the marriage of nuclear weapons and the long range, low cost, high speed ICBM."\(^106\) In the race to develop the technologies of mutual destruction, the logic of planning, deployment, and strategy those same technologies had made possible bound the hands of Americans and Soviets alike.\(^107\) The Kennedy administration developed a nuclear strategy that would change remarkably little up to the present.\(^108\) The iconic Cuban Missile Crisis of October 1962 sealed the issue: the age of missiles, instant devastation, and mutually assured destruction had dawned.\(^109\)

**Conclusion: A New Age, A New Cold War**

"Mr. President, I'm not saying we wouldn't get our hair mussed, but I do say no more than ten to twenty million killed, tops, uh, depending on the breaks."—Buck Turgidson in *Dr. Strangelove or: How I Learned to Stop Worrying and Love the Bomb*

"The Americans, who had the good fortune of having forward-based radar stations in Greenland, could hope to know of a missile attack some twenty minutes before they arrived; the Kremlin had no more than ten minutes and, because of the relatively short distance from the missile launch sites in the Western Soviet Union, let alone Eastern Europe, the Elysée and No. 10 had just four."—Gordon S. Barrass. The *Great Cold War*, p. 96

These two quotes represent different mental images of the Cold War; arguably, they present us with two different Cold Wars entirely. When "Dr. Strangelove" was released, in 1964, its plot focused on a rogue SAC general who had ordered a bomber wing to strike targets within the Soviet Union, initiating nuclear war. In the film's ninety-five minute run, there is time for war-room bickering, planning for the future of the human race, and attempts to recall the wayward bombers. Although the character Buck Turgidson's casual line about "ten to twenty million killed, tops" supposedly captured, in humorous fashion, war strategists' disregard for human life, it is not far off as an assessment of the kinds of casualties (in the tens of millions) that might have been expected from a nuclear conflict.
between super-powers in the 1950s. Extended warning of nuclear strikes was available, which meant there was less pressure on strategists to develop hair-trigger plans with no margin for error. At least during the 1940s and, as we have seen, into the early 1950s the Soviet atomic threat was negligible. It was a different degree of Cold War, as different in degree as to be different in kind as well.

This is not to say that the “old Cold War” was not dangerous. The imbalance between American and Soviet nuclear forces created the temptation for either side to strike first, the Americans from strength, the Soviets from weakness, hoping surprise might carry them through. The absence of effective satellite or over-flight reconnaissance, at least until the late 1950s and U-2 flights and, later, satellites in 1960, made the ‘enemy’ and his capabilities into a cipher. The mystery of what the Soviets might be able to do, how far along their missile or anti-aircraft defense technology had come, threw American planners into frenzy. The arms race resulted. Every contingency needed a plan, every target should be struck by one; no two; better make that three atomic bombs. Abundant nuclear weapons posed their own danger.

The slower potential pace of nuclear conflict between super-powers in the 1950s had real advantages, though. Bombers were subject to recall; missiles were not. The time it took to glue atomic bombs together and ready them for a strike on Soviet targets was time to defuse tensions, and stow the bombs away. With only twenty minutes to decide whether to push the button for missile launch, however, there was little margin for error and tensions had no time to dissipate. The American nuclear deterrent of the 1940s and ’50s was vulnerable; caught in a surprise attack, the annihilation of SAC’s bombers was a real threat. Rapid development of ballistic missile technology in the 1950s created an invulnerable deterrent, and ushered in mutually assured destruction. A super-abundance of nuclear warheads poised on missiles left populations constantly on tenterhooks. Technological developments, often unplanned and initially poorly integrated into strategy, were the driving force behind the ascension of the ballistic missile as the cornerstone of American nuclear strategy after 1962 and the ‘new’ Cold War it created. Once the Soviet Union developed its own strategic nuclear triad, the world laid a heartbeat from destruction for more than twenty years. Mutual vulnerability to mutual destruction, though, was the beginning of rapprochement between the Soviet Union and United States. Long before the legendary personal rapport and ground-breaking arms reduction treaties of President Reagan and Premier Gorbachev, leaders on both sides in the 1960s realized that missiles had made instant devastation too risky, and too costly, for anyone to declare victory. Détente had effectively begun, unheralded, a backing away from the brink brought on by the same technological developments that brought the U.S. and Soviet Union to the precipice in the Cuban Missile Crisis of 1962.

NOTES


6. The 1958 Kistiakowsky report to President Eisenhower stated that “progress in weapons technology” was creating a situation wherein “warning time [is] diminishing and ... the strategic indicators of enemy intent that will be available in the missile age will be increasingly ambiguous.” Suri, “America’s Search,” p. 426.


9. “In the spring of 1948, depending on where atomic bombs were assembled, it would still have required seven to nine days for the three existing U.S. atomic bomb assembly teams to load twelve armed bombs into combat aircraft for launching at enemy targets. At the time where these teams were [sic] only thirty-two B–29 aircraft modified for carrying atomic bombs still operational, and only twelve fully qualified and eighteen partially qualified crews capable of making a combat drop with an atomic bomb, all in the 509th Group.” David Alan Rosenberg, “Toward Armageddon: The Foundations of United States Nuclear Strategy, 1945-1961” (Ph.D. dissertation, University of Chicago, 1983), p. 108.


11. Bernard Brodie, “The Development of Nuclear Strategy,” *International Security* 2, no. 4 (Spring 1978): 65. A contrasting view – “In 1947 ... only a few isolated scientists argued the probability that the Russians could build their own atomic bombs.” Perry, “Decisions,” 5. And Rosenberg describes the confused state of scientific estimates of Soviet capability well – JWPC 416/1 of 14 December 1945 stated that the Soviets might develop the bomb “In five years, or thereabouts ...” while an interim committee established by President Truman reported a range “from a low of possibly three years, to a high of twenty” for American atomic monopoly. It seems fair to say confusion reigned. Rosenberg, “Toward Armageddon,” p. 31, 34.

12. “The Soviet atomic explosion ... did not immediately alter the world military situation. Intelligence estimates ... projected that the U.S.S.R. would not acquire a large enough stockpile or the necessary delivery systems to threaten the United States before 1951 at the earliest, and more probably 1953 or even 1955.” Rosenberg, “Toward Armageddon,” p. 140.

13. Truman did not know that in June 1948 Soviet scientists had told Stalin that they could build a bomb that would be far more powerful than anything the Americans had. A delighted Stalin immediately gave them the go-ahead.” Barrass, *The Great Cold War*, p. 63.

14. Rosenberg, “Toward Armageddon,” p. 90. The situation was worse in April 1947, just a few months previously, when President Truman was “profoundly shocked to learn ... that the number of atomic bombs in the American stockpile was ‘zero.’ In terms of usable atomic bombs, the number was correct. The United States did have the components for constructing about ten bombs, but in order for these to work they would literally have to be glued together.” Barrass, *The Great Cold War*, p. 53.


19. Rosenberg, “Overkill,” p. 13; “In the winter of 1948, the Air Force ... was the only service capable of delivering an atomic attack of any kind.” Rosenberg, “Toward Armageddon,” p. 102.


26. The Soviet population, inured to hardship because of their recent experience in World War II, was also a factor. Americans feared the Soviets might not give up easily: The small American arsenal meant that “if only a small number of bombs could be deployed, it would be necessary to ensure that a high percentage of them would reach their intended targets ... Specific military targets, rather than area bombing, would have to be the objective in any atomic offensive,” of the late 1940s. Rosenberg, “Toward Armageddon,” p. 72.


28. “As late as 1952, the Joint Chiefs of Staff were working from a Central Intelligence Agency estimate which projected that the Soviet Union had only about 50 bombs and 800 TU–4 bombers. The TU–4 bomber, nicknamed ‘Bull’ in intelligence reports, was virtually identical to the American B–29. With a combat radius of only 1,500 to 2,000 miles, Soviet TU–4s could only reach the United States on one-way ‘suicide’ missions.” [Emphasis added]. Rosenberg, “Toward Armageddon,” p. 157.


33. Perry, “Decisions,” p. 6. Bush’s full statement read “I say technically I don’t think anybody in the world knows how to do such a thing [make an accurate, nuclear-armed intracontinental ballistic missile] and I feel confident it will not be done for a long period of time to come.”


38. Reed, “Policy,” p. 32. “The first ballistic missile program, the MX–774, undertaken by the Consolidated-Vultee Aircraft Company (Convair), was cancelled in 1947 as a result of budget cuts by the Truman administration.”
40. Ibid., pp. 29, 25.
41. Ibid., p. 23.
42. Plans to use nuclear weapons as part of a “massive retaliation” strategy against Soviet or Chinese conventional forces changed when the Soviets acquired the bomb, for example, according to The Nation, cited in: Rosenberg and Moore, “Smoking Radiating Ruin,” 4; August 15, 1950, saw the adoption of war plans BRAVO, ROMEO, and DELTA, where “first priority was assigned to the destruction of known targets affecting the Soviet capability to deliver atomic bombs,” instead of the previous priority given to the retardation of advancing Soviet troops. It was important to neutralize newly-acquired Soviet atomic capabilities first. Rosenberg, “Toward Armageddon,” pp. 156-57.
43. Reed, “Policy,” p. 32.
44. “Had it not been for the sudden increase in military appropriations that attended the expansion of fighting in Korea … it is unlikely that the Atlas program would have obtained even the relatively slight financial support needed to get it past the preliminary research stage.” Perry, “Decisions,” p. 10.
45. The “thermonuclear breakthrough” in nuclear weapons heralded a future with “warheads with a yield of one to two megatons, yet weighing less than 3,000 pounds — small enough to be carried by ICBMs … These developments were paralleled by engineering advances in the key areas of missile guidance and warhead reentry systems.” Reed, “Policy,” pp. 33-34.
47. “In 1955 [Defense] Secretary Wilson approved the development of an Air Force intermediate range missile (Thor) based on Atlas-derived technology and an Army-developed intermediate range missile evolved from Redstone (Jupiter).” Ibid., p. 16.
48. “In 1956 … because of technical, safety and political reasons the Navy argued the Jupiter was unsuitable for deployment with the Fleet, and instead sought authority to proceed with the independent development of a solid fuel missile. In December, the Navy received authority for the Polaris program.” Reed, “Policy,” p. 61.
51. They had reason to be confident. “Although material and personnel deficiencies continue to plague SAC into the 1950s, its nuclear capable aircraft … increased from 60 in December 1948 to over 250 by June 1950,” and “by the end of 1953, SAC contained ten heavy and 25 medium bomb and reconnaissance wings, nearly 23 of which were considered combat ready, along with 28 refueling squadrons, totaling in all over 1,500 aircraft, including 1,000 nuclear capable bombers,” a far cry from the beleaguered force of the late 1940s. Rosenberg, “Toward Armageddon,” pp. 119, 189.
52. Reed, “Policy,” p. 17.
54. “By the time President Truman left office [1953], atomic strategy had emerged from the confusion of the immediate postwar period into a semblance of maturity.” Rosenberg, “Toward Armageddon,” p. 154.
56. Ibid., p. 34.
57. Ibid., p. 35.
58. In a study for the RAND Corporation, Jack L. Snyder, an analyst, warned against the temptations of mirroring Soviet strategy or technical achievements based on American experience. “Up to a point, modern weapons technology poses obvious and, in many ways, similar con-

60. Ibid., p. 23.
61. Ibid., p. 16.
63. The slow death of planners’ reliance on atomic weapons delivered by SAC’s long-range bombers was in part institutional failure to move forward, and belied the RAND Corporation’s foundational mission to think broadly and “conduct research on intercontinental warfare, other than surface, with the object of advising the Army Air Forces on devices and techniques.” Reed, “Policy,” p. 24.
64. It placed particular emphasis on developing the Polaris submarine-launched intermediate-range ballistic missile (IRBM) because of its “advantages of mobility and greatly reduced vulnerability.” Rosenberg, “Overkill,” p. 48.
65. “It [the ballistic missile] was not a counterforce weapon, that is, one suitable for use in precision strikes against enemy military facilities [sic]. Missiles would be fired in mass launch as a single salvo. If directed to launch, a missile unit would launch all its missiles within a 15-minute period.” Reed, “Policy,” p. 58.
67. Led by veterans of the air war over Korea, Europe, and Japan, the Air Force had difficulty coping with “a dynamic age in which strategic problems arising from the deployment of any single generation of weaponry were transitory — to be supplanted by the next cycle of the arms race — the watchwords of the day were flexibility, adaptability, and alterability.” Ghamari-Tabrizi, “Unthinkable,” 172-73.
68. Reed, “Policy,” p. 52.
69. Ibid.
70. Ibid.
72. The mature strategic nuclear triad (SAC bombers, submarine-launched missiles, land-based ICBMs) would not coalesce until approximately 1962, at the end of the period under examination here. Polaris and Minuteman both come online within six months of each other, July 1960 and February 1961, taking full advantage of technological developments in warhead miniaturization and electronics miniaturization. Perry, “Decisions,” p. 18. See also: Barrass, The Great Cold War, p. 124-25, which refers to the “emerging consensus” of the late 1950s that a strategic triad of nuclear forces was necessary for invulnerable retaliatory capacity.
73. Reed, “Policy,” p. 189.
75. “Before Sputnik cut the purse strings, Minuteman could have been developed only at the price of limiting expenditures on one of the larger liquid-rocket missiles.” Perry, “Decisions,” p. 19; “The Soviet launching of the first artificial space satellite, Sputnik, on 4 October 1957, ignited a popular American outcry for greatly increased military appropriations.” Suri, “America’s Search,” p. 418.
76. Ibid., p. 18.
77. Ibid., p. 2, 16-17.
“Advances in the long-range striking capability, accuracy, speed, and fire power of American nuclear forces led prominent Soviet military thinkers, like Nikolai Talenskii and Vasili Sokolovskii, to place newfound emphasis on strategic nuclear weapons (aircraft and rockets) and the importance of surprise in modern warfare.” [Emphasis added; Suri, “America’s Search,” p. 441.]

[1]. Full: “Technological factors, and matters relating to the efficient direction of technology, were its sources [development of ballistic missiles]; an institution devoted itself wholeheartedly to the advancement of the technologies of missilery for most of a decade and at the end of that period had shaped a succession of marvelously contrived weapons capable of being bent to purposes about which few had thought.” Perry, “Decisions,” p. 24.


[3]. Antoine Bousquet, “Cyberneticizing the American war machine: science and computers in the Cold War,” Cold War History 8, no. 1 (February 2008): 91


[6]. Reed, “Policy,” p. 203; “From these considerations [of the no-win scenario of strategic nuclear war] flowed a belief that an era of mutual deterrence was emerging between the U.S. and U.S.S.R. Secretary McNamara believed it was approaching; the new Chairman of the Joint Chiefs of Staff, Army General Maxwell D. Taylor, believed it had already arrived.” Ibid., p. 242-43.


[8]. “By the fall of 1961, U.S. intelligence estimates indicated that the Soviets had no more than ten to twenty-five missiles installed on launchers, and predicted they would have no more than 125 by the middle of 1963.” Reed, “Policy,” p. 170; earlier, “Eisenhower’s intelligence estimates indicated that the Soviets might have 10 prototype ICBMs available by 1959.” Ibid., p. 47; while looking forward “U.S. intelligence estimates in July 1962 indicated the Soviets might have a maximum of 800 missiles deployed by mid 1967, and the added Minuteman deployment aimed in part at offsetting a Soviet buildup.” Ibid., p. 221. Note the prominent use of ‘indicated’ throughout. Accurate assessments of Soviet capability were difficult to obtain, even in the White House.

[9]. “It was estimated that even after the first wave struck there would be time to blunt an attack, since it would take up to thirty days for the Soviets to deliver all of their nuclear weapons.” Rosenberg, “Toward Armageddon,” pp. 197-98.

[10]. “Not only were simulations of nuclear or future war used to generate data, but … they [Army game designers] discovered that there was no available information about how to pinpoint fire from an anti-tank weapon. A field experiment was performed, and the resulting data were plugged into the original SYNTAC game,” and “Given the uncertainties involved in plotting weapons effects phenomena … it was impossible to determine any major parameter of a war definitively and positively,” Ghamari-Tabrizi, “Unthinkable,” pp. 201, 206-07. Indeed, “weapons were developed and deployed sometimes before the rationale for their use had been fully tested in war games.” Schwartz, “Atomic Audit,” p. 6.


[12]. “The technical horizon within which future wars would be fought would change constantly, albeit uncertainly.” Ghamari-Tabrizi, “Unthinkable,” 164.

[13]. McNamara’s antipathy centered on two issues: the increasing vulnerability of bombers before launch and during flight, and their long flight times, which reduced their usefulness in attacking time sensitive Soviet nuclear targets.” Reed, “Policy,” p. 213.

[14]. “The rapid qualitative and quantitative improvements in Soviet air defenses, for example, were obviating one of the main principles around which U.S. bomber doctrine had been built since the 1930s – high altitude penetration.” Ibid., p. 227.


[19]. “Planning for nuclear war was a particularly urgent task during the Cold War and required continuous reviewing as the technology and availability of bombs and missiles were subject to rapid change;” in fact all in all a rational defense policy demanded planning the unthinkable – “systems analysis, game theory and the whole range of available mathematical and statistical instruments were the only means to rationalize Armageddon.” Bousquet, “Cyberneticizing,” p. 91. For information on early warning system developments and their influence on nuclear war planning, see: Rosenberg, “Overkill,” pp. 32, 49; Ghamari-Tabrizi, “Unthinkable,” 184-185; Suri, “America’s Search,” p. 425; Bousquet, “Cyberneticizing,” p. 85; Rosenberg, “Toward Armageddon,” pp. 192-94 as excellent resources. For the development of American surveillance capabilities and their impact on nuclear strategy, see: Rosenberg and Moore, “Smoking, Radiating Ruin,” 16; Rosenberg, “Overkill,” pp. 9, 12; Perry, “Decisions,” p. 17; Suri, “America’s Search,” p. 423; and Reed, “Policy,” p. 132.

[20]. “The defense decisions reached early on in the [Kennedy] administration and built on thereafter fundamentally shifted the composition of American strategic forces from reliance on bombers and heavy liquid fuel missiles to small, solid fuel missiles. Whereas in some ways American strategic nuclear forces and war plans before Kennedy could be characterized as an indiscriminate bludgeon, after Kennedy they were more a precision tool … the Administration turned toward missiles and away from bombers.” Reed, “Policy,” p. 200.

[21]. Ibid., pp. 298-99

[22]. “Computers were another major problem … all of this [computerized launch and control] hinged on the development of high performance computers to supervise the missiles while in the silos and direct them in flight … because of the weight of the missile and the comparatively lower performance of solid fuel, the on-board computers would have to be much lighter than any currently in production.” Ibid., p. 85. However, computers were necessary for “effective and rapid processing and transmission of … incoming information,” in a world where “the time available for detection and interception of bombers potentially carrying nuclear weapons shrank.” Bousquet, “Cyberneticizing,” p. 85.


[24]. Ibid., p. 4.

[25]. Ibid., p. 274.

[26]. Ibid., p. 292.

[27]. “Both became captives of forces that were practically independent of their own will and comprehension.” Barrass, The Great Cold War, p. 92.

[28]. In 1962 the World Wide Military Command and Control System was completed, allowing “centralized global command-and-control of American troops through a broad spectrum of telecommunication systems including military satellites, marking the extension of command-and-control structures across the globe and establishing total cybernetic system closure over the world,” which was an integral structural asset for all future American strategists and force commanders. Bousquet, “Cyberneticizing,” p. 87.

[29]. In 1963 … Secretary McNamara noted that, during the previous two years, the number of U.S. strategic nuclear heads doubled … With regard to missiles in 1961 the U.S. had 63 deployed; by 1963 the total was 631 land- and sea-based strategic missiles.” Reed, “Policy,” p. 239.

London's Airports is definitely a niche book. It is targeted towards readers who are primarily fascinated by the civil airline industry and, specifically, London. The book is divided into five primary chapters, each devoted to one of the five London airports. Before discussing each airport, the authors begin by detailing the process of flying a transcontinental round trip from Gatwick IAP to Denver IAP and return. This introduction helps set the stage for the book by describing things from the pilot's prospective. After outlining a transcontinental flight, Bowman and Simons provide a relatively brief, but solid, history and description of the British National Air Traffic Control Services (NATS) that provides the air traffic control services for the United Kingdom's fifteen major airports.

After tracing the history of each airport, Bowman and Simons discuss the airport's development. Included in their discussion are excellent summaries of the issues, whether political or geographic, each airport faced, including noise abatement, space limitations, and flight limitations.

Where pertinent, the authors included discussions on the development and/or demise of the principal airlines serving a particular airport. Among the airlines discussed are Britannia, BOAC, DAN Air, and British Airways. The chapters are well appointed with color and black-and-white photographs of not only the airport facilities but also the airlines and aircraft that operate from each airport. To provide readers a better geographic understanding of each airport, the authors include a map that includes runways, taxiways, ramps, and significant buildings.

Each of London's five airports has a unique focus and history. Gatwick, with a name dating back to 1241, is one of London's two major transcontinental airports and has the distinction of being the busiest single-runway international airport. Heathrow is the "world's busiest international airport" with its two runways in use more than 98 percent of the time. Of the five airports, London City is the closest to city center. Located near the London docks, London City's short runway limits operations to Short Take-Off and Landing (STOL) aircraft such as the BAE 146. Luton is the fourth busiest of the London Airports and has only a single runway.

While supporting many charter-vacation companies, it has established itself as a business airport. Finally, Stansted is a low-cost airport, with easyJet and Ryanair operating the majority of its flights. The authors conclude with useful facts about London, directions for transfer between airports, and shopping facilities.

London's Airports is not for readers specifically interested in air power and military aviation. Those topics simply aren't its focus. But, for readers who are fascinated by airline operations or the city of London, this book, with its excellent photographs and descriptions, is definitely an interesting and insightful read.

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


Strategic Vision is Zbigniew Brzezinski's most recent of a long list of books on geopolitical and strategic national issues. In it he articulates the global role that the United States must embrace in the coming decades, and the complex developments facing America, both domestically and internationally.

Brzezinski is a senior statesman with peerless credentials as an academician and foreign policy expert. He served as President Carter's national security advisor; on his watch, the United States and China normalized relations, SALT II was signed, the Soviet Union invaded Afghanistan, and the hostage rescue attempt in Iran failed. He previously served as chairman of presidential candidate Hubert Humphrey's foreign policy task force and later was co-chairman of the senior Bush's National Security Advisory Task Force. In 1990 he cautioned against the post-Cold War euphoria and was a strong advocate of NATO expansion into eastern and southeastern Europe.

Strategic Vision is concise; however, it covers a lot of territory in its relative brevity. Brzezinski, looking ahead several decades, with 2025 as a watershed year, addresses several major geostrategic concerns that the United States should address if it is to remain relevant as a global power.

He first states that the United States, as the only superpower left standing, squandered its unchallenged leadership position and influence at the Cold War's end. He goes on to propose that as regional powers grow economically and militarily, the United States should seek partnership and not confrontation and engagement with these partners. Brzezinski, looking ahead to the coming decades, focuses especially on four rising regional powers: China, India, Turkey, and Russia.

Looking back at the recent past, Brzezinski states that the stand-alone mindset on the eve of the Iraq invasion and the resources wasted in that war only served to tarnish America's global image and erode its global leadership role. He warns us that there is a danger of America turning inward at this critical juncture in history. This short sightedness is, in his view, exacerbated by the average American's ignorance of the world beyond U.S. borders. Brzezinski strongly advocates the revitalization of the United States as the world's leading innovator and technologically advanced power.

Many of the author's examples of points of friction in need of dialogue are not concerns for which we have the luxury of time to address. Only recently, Secretary of State Hillary Clinton, as cited in a May 2012 Economist magazine article, acknowledged China's importance to U.S. national interests. She stated that "the two countries [China and the United States] cannot solve all the world's problems, but unless they cooperate, no global problem is solvable." In nearly the same instance, the South China Sea rim-states are again seeking stronger ties with the United States to balance China's insistence that she has sovereignty over the sea's territories and, consequently, their economic exploitation and access.

This book is well suited as a basis for further discussion, in greater detail, of issues that the author has highlighted.

Col. John Cirafici, USAF (Ret.), Milford, Delaware


Noted airlines historian and author R.E.G. Davies died in July 2011, shortly after completing this final work on the air-transport industry. Davies, who had retired to his native England after a distinguished career as Curator of Air Transport at the National Air and Space Museum, was involved in writing more than twenty books about the airlines and their aircraft.
In general, this effort picks up where his 1960s classic, *A History of the World’s Airlines*, left off. After devoting the first quarter of the book to a summary of airline history through the mid 1960s, the author initially looks at new aircraft and changing regulations. From there, he takes the reader on an extensive around-the-world tour in an ambitious effort to summarize the past forty years of airline developments.

Along the way, Davies addresses political and economic issues that deeply affected the airline industry. He offers an interesting perspective on changing demographics and market trends. It is highly unlikely any other airline historian could have attempted to cover so much in one volume.

As a reference work, this is a good place to start for anyone interested in learning more about a particular airline or aircraft. However, I found that reading it from cover to cover was a daunting task. Accessing specific items requires the use of the extensive index, for the most part a handy tool. For example, more than 100 airlines are listed under the Boeing 737. Surprisingly, one of those omitted is Lufthansa, a rather significant oversight since it was the launch customer for the world’s most-widely built airliner. The 737 is, however, listed under the Lufthansa entry.

In hindsight, a better approach might have been to treat the topic from an encyclopedic, rather than a narrative, standpoint. Essays reflecting overall trends (e.g., rising fuel costs, deregulation, collapse of national airlines, collapse of the Soviet bloc) along with brief entries for individual aircraft types and airlines would have made the information much easier to access. Another approach might have involved multiple volumes—one dealing with aircraft types and the others with various geographical regions.

Despite a commendable effort to achieve comprehensive coverage, there are shortcomings. For example, Alaskan aviation, aside from references to Alaska Airlines, is totally ignored. Pacific Northern Airlines (Boeing 720), Reeve Aleutian Airways (Boeing 727 and Lockheed L-188 Electra) and Wien Air Alaska (Fokker F–27 and Boeing 737) all would seem to qualify for at least a mention.

Another concern is the apparent absence of copy editing and fact checking, certainly an enormous undertaking when dealing with something this comprehensive. Despite the nitpicking, this work deserves to be included in the collection of any first-rate reference library. Commercial-aviation enthusiasts should find it useful as well.


*Mission to Tokyo* tells the story of B–29 bombing missions against the home islands of Japan in World War II and does so from two different perspectives: as experienced by the men who flew the missions, and as seen by the senior leaders who planned and directed the missions. The primary focus is on the firebombing of Tokyo, which began in February 1945, and reached its peak on the night of March 9–10, 1945, when nearly sixteen sixteen square miles of the city were destroyed and between 80,000 and 100,000 people were killed.

Dorr has a genuine appreciation for the human side of warfare; this is most evident when he writes about the crews and airmen who flew the missions against Tokyo and other Japanese cities. To tell their story, he conducted more than 160 interviews including dozens with World War II veterans. The resulting narrative, in which we get to know the members of several B–29 crews, is the book’s strongest feature.

The book opens with a description of how the crews reacted on the morning of March 9, when they began to learn about the unique nature of the mission they would fly that night. The raid—known as Operation Meetinghouse—would be flown at low altitude (6,000-8,000 feet), and machineguns, gunners, and ammunition would be left behind to allow for greater bomb loads. The idea of flying over Tokyo at low altitude with no means of self-defense was unsettling, and some crews simply ignored orders and took their guns, gunners, and ammo along.

After leading the reader to a point several hours before the mission was launched, Dorr then shifts gears and goes to the “big picture,” describing America’s bombing operations in the Pacific Theater in the months following the attack on Pearl Harbor; to include Jimmy Doolittle’s morale-boosting attack on Tokyo in April 1942.

This interweaving of the two perspectives, moving from stories about individuals to high-level views of the bombing campaign and back again, takes place throughout the book. Dorr is an exceptionally readable author, and he does an excellent job of shifting smoothly between the two perspectives and telling both stories.

One disappointing aspect of the book is the number of factual errors it contains, especially considering the fact that Dorr is the author of dozens of books about the Air Force (and its predecessor organizations) and air warfare. Among others, the errors include a handful of inaccurate statements about the atomic bombing missions against Hiroshima and Nagasaki; a statement about the U.S. military becoming an all-volunteer force in the 21st century when, in fact, the draft was terminated in the 1970s; and an inaccurate description of the power settings on the B–29 engines. Whether due to faulty research or poor editing, such inaccuracies detract from the value of the book and make the reader wonder whether other errors have gone unnoticed.

But, as noted above, Dorr has an exceptional understanding of war from the perspective of the individual airman and is a skilled writer who captures this perspective very well. For the reader who wants an appreciation of what air warfare was like for individuals and crews and is willing to overlook factual misstatements, the book is well worth reading.

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

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As times passes, the number of new firsthand accounts from members of the Greatest Generation dwindles, so anytime someone finds a way to share one of these voices, we should all take notice. In *Before They Were Black Sheep*, Peter Dunbar presents his father Carl’s wartime letters chronicling his journey from civilian to naval aviator culminating in his assignment to the Southwest Pacific as a member of VMF-214, the famous Black Sheep Squadron. The title comes from the fact that Carl Dunbar served with the unit before the flamboyant Pappy Boyington assumed command and the squadron achieved its reputation as black sheep.

The book contains seventy-nine letters Carl wrote home starting with military training and ending when he returned from the Pacific theater after two combat tours on Guadalcanal, a battle that has rightly assumed a position of honor in American military history. Anyone who fought there truly deserves the title “hero.” Carl’s letters, though, do not dwell on the heroic or contemplate the
deeper meaning of the conflict he is fighting. Rather they are the musings and observations of an intelligent young man who seeks to do his duty as so many others did. His letters are clear and engaging and provide a window into how a young man dealt with the stresses and excitement of first learning to fly and then taking that skill into combat. Carl is someone we can all relate to; it is a pleasure to read that he returned safely from one of the hardest fought battles of the war.

While the letters themselves are entertaining and informative, the supporting narrative is not always so. Peter tries to place the letters in the context of historical events—e.g., discussing Doolittle’s raid on Japan and how that impacted Carl and others on the home front. This is useful when the information is accurate, but there are times when the information is so wrong as to be embarrassing. His description of some elements of the Battle of Midway is particularly bad. He states there were four U.S. carriers at Midway (there were three) and that the U.S.S Kitty Hawk was the first dispatched from Pearl Harbor (it was commissioned in 1961, nineteen years after the battle). He goes on to state correctly that during the battle Japanese fighters savaged the low flying American torpedo bombers and consequently left no top cover over the fleet. He then incorrectly states the high flying TBD-1 Devastator torpedo bombers came in to decimate the Japanese carrier force. It was actually SDB Dauntless dive bombers that came in high and managed to sink initially three of the four Japanese carriers after their torpedo brethren inadvertently decoupled the fighters down to wave top height. Dunbar cites the popular books Fire in the Sky and Flyboys as his sources for these two key pieces of information. Neither of these books contains these errors, so I am at a loss to figure out where he got this information. Since he isn’t a professional historian, I place a burden on the editors. They obviously didn’t do their job.

That said, this is still a worthwhile book. The maps are excellent and there are numerous images of the letters themselves, even one of a navigation chart Carl drew during training. The photographs are well selected and add to the sense that this is almost a family album remembering Carl’s service. I applaud Peter for making his father’s letters available to us all and only wish he had been better served by his publisher.

Lt. Col. Golda Eldridge, USAF (Ret.), Ed. D., Fredericksburg Virginia


Good English-language works on the Japanese side of World War II are rare. The language barrier and the lack of available source documents make creating top-notch scholarship on the subject daunting. This book, sadly, is not among the pantheon of good works on the subject.

All sources in the two-page bibliography are English language, limited, and quite dated. The author passed away in 1992, before he could get the manuscript published, so any intervening scholarship is not included in the book. By mining the relevant issues of Jane’s heavily, Edwards provided a wealth of technical information of the aircraft and ships of the Imperial Japanese Naval Air Service. This is the strength of the work.

After providing this information, Edwards then sought to relate technical factors to operational and strategic matters. He failed at this, asserting on more than one occasion that the lack of self-sealing fuel tanks, armor, and other technical attributes lost the air war for Japan. Objective analysis of the conduct of the Japanese military in China is never presented. Biased scrutiny of other nations, particularly the United States, is rampant.

His account of the 1921 Washington Naval Conference is novel, overly emotional, and unsubstantiated by any of the listed sources in the bibliography. He has an entire chapter devoted to theories of Amelia Earhart’s disappearance. He often delves into flights of fancy regarding intelligence and espionage. He asserts, without sourcing, that the capital ships HNS Repulse and Prince of Wales were sunk by American treachery as much as Royal Navy ineptitude and Japanese skill. No mention is made of the impact of American code breaking in association with the Washington Naval Conference, even though this was well known before the manuscript was complete. Of course, recent revelations, from 1998, that Lord William Sempill, leader of the 1921 Royal Air Force mission to Japan, was a spy for the Japanese after completing his assignment are missing from this account.

Finally, the book has numerous editorial, stylistic, identification, and spelling errors that annoy and frustrate (e.g., Earhart’s husband was George, not Fred, Putnam; the Doolittle raiders did not launch from the carrier Enterprise; the largest Japanese battleship was the Yamato, not the Yamamato; it is Hickam, not Hickham, Field; the C–47 was designed and built by Douglas, not Curtiss; and Edwards cannot decide if the HMS Hermes or the HJMS Hosho was the world’s first aircraft carrier (Hermes was the first purpose-designed, built, and launched aircraft carrier, but the Hosho was commissioned before it).

For those who want good works on this subject, try Kaigun: Strategy, Tactics, and Technology in the Imperial Japanese Navy, 1887-1941, by Mark Peattie and David Evans or Sunburst: The Rise of Japanese Naval Air Power, 1909-1941 by Peattie. Both encompass much more than the very few strengths evident in Edwards. They avoid the many weaknesses and flaws by providing detailed bibliographies, technically sound explanations of items, use of Japanese language sources, and sound reasoned analysis of facts and events.

John G. Terino, Jr., Associate Professor, Air Command and Staff College, Maxwell AFB, Alabama


Have you ever wanted to know how your favorite historian approaches the historical method? For modern-day Civil War historians, How Historians Work opens us mere mortals to the minds of deities such as James McPherson, Gary Gallagher, Steven Woodworth, and other major thinkers of the period. Edited by Judith L. Hallock, this book is a transcription of John C. Waugh’s and Drake Bush’s interviews of numerous historians on their approach to history. The first ninety pages consist of interviews of various historical thinkers, such as a professor who distinguished himself as an educator, a genealogist (or family historian), and an editor of the Jefferson Davis Papers. The remaining nearly 200 pages are dedicated to some of the most distinguished historians of the Civil War era. Overall, How Historians Work is a must-read book for those discerning a career in history and for history majors (both undergraduate and graduate) on the various approaches to the historical method.

Gallagher, author of The Confederate War and editor of numerous books on individual battles of the Eastern Theater, provides his insight into the historian’s craft. Among his advice for historians is to let sources and evidence lead the analysis. He
bemoans historical works that are thesis-driven, ignoring evidence that may suggest something contrary to the author’s opinion. Gallagher recommends that historians be honest and acknowledge evidence that may disagree with their positions. Finally, he advises that the vast majority of research should be completed before the writing process, a point that most of the interviewed historians agreed upon.

McPherson, the author of numerous books including Pulitzer Prize-winning Battle Cry of Freedom, echoes much of Gallagher’s advice. When writing a small work, McPherson completes ninety-five percent of the research before writing. For him, the exceptions were the bigger projects (Battle Cry of Freedom and Ordeal by Fire) which he researched and wrote in chapters at a time. Like Gallagher, McPherson recommends not ignoring evidence that conflicts. Rather, historians must be flexible in their conclusions, acknowledging the possibility of opposing conclusions. Furthermore, he recommends that historians approach conflicting evidence by finding more sources that agree with a certain point. If this approach fails, however, McPherson uses intuition.

The last interview presented is of the late David Herbert Donald, winner of two Pulitzer Prizes and author of one of the best Abraham Lincoln biographies, Lincoln. Donald reveals that he learned to write by reading fiction, stating that “if you’ve grown up on Charles Dickens . . . you’re not likely to write arid prose.” Like the other included historians, Donald recommends finishing the research phase before writing. He advocates, however, writing without research notes, believing in a “fluency in language” in writing in such a manner. He also begins writing in the middle of the story in order to better introduce it. Once he completes the first draft he immediately begins his second. Following this step, however, he puts it aside up to two months before picking it up again. Finally, Donald recommends approaching conflicting evidence like a lawyer, asking oneself which was more reliable. However, he advises acknowledging the other conflicting evidence in a footnote.

How Historians Work is a must-read for any aspiring historian. Undergraduate students should use it in order to help discern a historical career and learn the historical method. Graduate students would find it useful in learning how to approach their seminar papers, theses, and dissertations. For those researching articles or books, How Historians Work contains practical strategies of use in one’s own works.

Adrien D. Ivan, Ph.D., Vernon College, Wichita Falls, Texas


This is an absolutely fascinating story about a German ace who had 158 confirmed kills of Allied aircraft, 151 in the North Africa theater of operations. Of those 151 kills, only four were bombers; the remainder were hurricane, P-40, and Spitfire fighters. Marseille flew the Bf 109 in several variations. He finally died in September 1942, killed on impact with his plane’s tail section while bailing out after engine problems filled his cockpit with smoke. He was only twenty-two years old.

Heaton and Lewis refer to Marseille as a “rogue ace who dominated the WW II skies.” They are correct on both counts. Marseille was a strongly individualistic, irreverent, and outspoken person who boozed freely, led young ladies astray, attended formations when it pleased him, ignored restrictions to quarters, flew unauthorized missions, and generally made himself a pain in the rear to a succession of squadron commanding officers. Only his flying and fighting skills allowed him to keep his wings and avoid prison or worse. He was also a superb pilot who could withstand higher “G” forces than most fighter pilots and an outstanding marksman. He set records in the Luftwaffe for least cannon and machine gun ammunition expended per kill.

Under a regime that had banned jazz music, he ignored all rules and regulations and kept a number of American swing and jazz records and played them freely in his quarters. He was an accomplished musician and, at a formal affair in Berlin with Adolph Hitler present, played several works by approved German composers and then launched into a forbidden jazz piece. Needless to say the room got very quiet. He survived that incident. Hitler had recently presented him with the coveted Oak Leaves and Swords to his Knight’s Cross for one hundred aerial victories.

He did not take pleasure in killing his opponents, usually aiming at the engine rather than the cockpit. He also, on several occasions, made unauthorized flights to British airfields in the desert to drop information about a captured or downed airman, so that the man’s family would know what had happened to him and not wonder about a “missing in action” report.

It is a mark of his air fighting skills that he frequently shot down multiple aircraft during a single mission or a series of missions during one day. He shot down seventeen fighter aircraft during three missions on September 1, 1942.

The book is very well researched and written. The authors contacted a number of surviving Luftwaffe veterans who had known or flown with Marseille. Their accounts show him “warts and all” as he was at the time. The only fault I find in the book is the lack of a table of equivalent ranks and a definition or two.

Capt. John F. O’Connell, USN (Ret.), docent, National Air and Space Museum


James Hornfischer’s name isn’t widely recognized among aviation history readers. That may be because he specializes in the naval surface engagements of the Pacific War. His Last Stand of the Tin Can Sailors and Ship of Ghosts relate, respectively, the destroyer action off Samar in October 1944, and the USS Houston’s lonely and heroic action in the Java Sea in early 1942. Our “Black Shoe Navy” friends’ gain is our loss: this fellow can write!

The Navy had earlier won vital carrier engagements at Coral Sea and Midway. But the first land offensive against the Japanese—the August 7, 1942, invasion of Guadalcanal—revealed serious flaws in naval strategy; significant material deficiencies in American ships; inefficient and insufficient logistics; and, particularly, shortfalls in American naval training and leadership. As the U.S. lost two of its precious carriers (Hornet and Wasp) and suffered damage to the remaining carriers, the theater commander and his commanders afloat became more cautious. Their decision to withdraw carrier support soon after the Marines’ landing on Guadalcanal was highly resented by Marine Corps leadership (to say nothing of the troops on the ground).

With the carriers held back in reserve, the task of stopping the “Tokyo Express” that resupplied Japanese forces on Guadalcanal (and pounded the Henderson Field airstrip nightly with heavy naval bombardments) fell to the U.S. Navy’s surface force. Its initial encounter was a disaster. The August 8-9 Battle of Savo Island was the worst defeat the U.S. ever suffered at sea. Four heavy cruisers (three American, one Australian)
were sunk by an equal strength but decidedly more skilled Japanese force. The combination of intensive training in night fighting, bold Imperial Japanese Fleet leadership (compared to that of the Allied forces) and Japan’s fearsome “Long Lance” torpedoed brought that nation’s ships an overwhelming tactical superiority.

How the U.S. reversed that superiority is the powerful tale of this book. Some of its parts are well known: the skill and courage of the Marines who held vital Henderson Field, the accomplishments of the aviators who flew in the ragtag “Cactus Air Force,” and the infusion of new leadership into the Southern Pacific (SOPAC) theater, beginning with aggressive Admiral William F. Halsey as its commander. Others, such as how (and how costly) the tactical lessons were learned, may not be familiar to aviation readers. Hornfischer relates stories of individual heroism that match anything the reader will find in our more familiar aviation annals (the Navy lost more than three times as many men as did the Marine Corps and Army ashore). The loss of the cruiser Juneau alone, with the five Sullivan brothers aboard, poignantly reminds the reader of the stakes in this campaign. Hornfischer’s heroes aren’t just the individual sailors but the leaders and innovators as well, particularly Admiral Willis A. Lee, America’s premier battleship commander and gunnery expert, who teaches the Navy how to manage a gun battle with its superior radar systems, overcoming Japan’s advantages to win the defining night battles of November 1942. Finally, the superb leadership and unflappable strength of Pacific Theater Commander Admiral Chester Nimitz shows through in virtually every chapter.

The book is well documented, with useful maps and tables. I recommend it for even the most “air-centric” student of World War II. It provides amore complete understanding of the debt we owe our Navy brothers in arms and reminds all that extraordinary courage and dynamic leadership can be found wearing any color uniform.

Lt. Col. J. Ron Davis, USAF (Ret.), Director, Valiant Air Command Warbird Museum


For those interested in the development of early U.S. national security space policy, this is both an important and useful book. Sean Kalic, a professor at the Army’s Command and Staff College, surveys and explains the thinking of the Truman, Eisenhower, Kennedy, and Johnson administrations on how best to use outer space for national security purposes. Significantly, this book pushes the discussion back in time from the often-written-about post-Sputnik Eisenhower era to a decade before in the Truman presidency. Kalic thus illustrates the thinking in U.S. national security space policy well before Sputnik in 1957. He shows that the idea of peaceful and non-aggressive use outer space quickly became the enduring cornerstone idea of U.S. space policy. After Truman, the stage was set for the three following presidential administrations to advocate against creating a new theater of war by placing weapons in space—weapons that could be targeted either towards other space vehicles or Earth-based targets. This position culminated in the Johnson administration’s advocacy of the Outer Space Treaty of 1967 that prohibited many potentially aggressive and nationalistic space activities, including orbiting weapons of mass destruction and establishing military bases on celestial objects. By doing this, the treaty codified and made international a long-standing U.S. policy relating to the uses of outer space.

The strong and continuing advocacy of not deploying overly offensive weapons in space did not mean these presidents were reluctant to use space for military purposes. This is a key distinction Kalic makes clear. Eisenhower, Kennedy, and Johnson clearly understood and very much supported the role of space assets in supporting U.S. military operations and broader national interests. Hence arose the important, but sometimes murky, distinction between the militarization of space and the weaponization of space. Space was militarized, but the governing idea behind these presidents’ military space policy was for space to remain free of in situ armed conflict, and “this new ocean” (a phrase used by JFK) was to be used for peaceful and non-aggressive purposes such as weather forecasting and navigation. Presidents, however, were also not naive to the threats presented by the Soviet Union in this era; ground-based anti-satellite weapons were, to varying degrees, supported by these presidents as a defense against Soviet space-based weapons such as theFractional Orbiting Bombardment System (FOBS).

As Kalic states, this book is not meant to be a complete history of U.S. military space activities in the period under investigation, and specific programs of the era are not discussed in any detail. But this work is an important contribution to today’s vigorous debate over U.S. space-policy circles centering on the need (or not) for U.S. “space dominance.” These debates include discussions on the continued viability of a policy based solely on the peaceful uses of space. Therefore, the book adds to these discussions by elaborating exactly how subsequent presidential administrations in the early Space Age set the stage for this enduring U.S. policy of a weapons-free space environment, and the 1967 treaty emanating from this policy. With its extensive footnotes and references, Kalic’s pithy book also serves the interested reader who might wish to investigate the topic further. In sum, this work gives us a better understanding of where we might go in the future by giving us a better understanding of how the United States arrived at its current space policies in the first place.

Lt. Col., Joseph Bassi, Ph. D., USAF (Ret.), Embry-Riddle Aeronautical University/Worldwide Campus, Lompoc, California
21st Century excels. This is a highly recommended book for anyone interested in the subject, or with joint force responsibilities for planning, overseeing, or executing long-range strike.

Dr. Richard P Hallion, Florida Polytechnic University


These two volumes in the popular Owners’ Workshop Manual series represent an excellent value for their price and are highly recommended to those seeking reliable and informative references on both of these notable aircraft.

The gracefully F-86 is one of aviation history’s most evocative aircraft, one whose elegant lines bespeak both excellence of design and, for its time, outstanding performance. Master of the MiG–15 in the Korean War, the Sabre was, quite literally, the “right aircraft at the right time.” It is daunting to think what might have happened in Korea had the UN Command not possessed the air superiority that the Sabre’s pilots earned.

That said, it was a close thing. The Sabre began life as a straight-wing design which was produced (for the Navy) as the FJ-1 Fury, a tubby (if still somewhat attractive) airplane of clearly subsonic performance. Master of the MiG–15 in the Korean War, the Sabre was, quite literally, the “right aircraft at the right time.” It is daunting to think what might have happened in Korea had the UN Command not possessed the air superiority that the Sabre’s pilots earned.

In the same vein, Paul and Louise Blackah’s DC–3 volume is an excellent reference that, like Linney’s book on the F–86, benefits both from the previous writings of DC–3 aficionados and experts such as Carroll Glines and Arthur Pearcy and their own extensive research. Richly illustrated, this is a book that is a must for civil aviation enthusiasts. Moreover, the military story under the many designations used for the design—including participation in such iconic operations as the Normandy invasion, the assault on Arnhem, and the postwar Berlin Airlift—is also very well covered. Like its companion volumes in the Owners’ Workshop Manual series, this book is a very good value, and is highly recommended to Air Power History readers.


Flying at night—let alone fighting at night—was relatively new in the late 1930s. In World War II Europe, the protagonists used the darkness to enhance the possibility of successful attacks on the opponent’s homeland. Each experimented with several approaches to respond to these attacks. The Germans coupled searchlights and fighters as one solution. The British, with their early advantage of radar, developed a sophisticated system coupling ground-based and airborne radars.

In the U.S., the Army Air Corps, Navy, and Marines each had their approach. In this book, Magruder uses the historical novel format to document the wartime career of his father, who was instrumental in developing and implementing the Marine Corps approach.

One major question was a platform on which to base night fighters. The Army initially went with a derivative of the Douglas A–20 Havoc, the P–70. The Navy turned to the Lockheed PV-1 Harpoon for both themselves and the Marines. While the first nightfighter squadron to deploy, VMF(N)-531 did in fact fly the PV-1, it was soon recognized that this platform was wholly inadequate and something more was needed. The planes of choice became the P4U Corsair and F6F Hellcat. This choice of a single-seat fighter for night fighting was a major departure from British, German, and U.S.AAF practice. The idea of one person managing a high-performance airplane at night, taking direction from a ground-based radar intercept operator, and intercepting and ultimately shooting down another airplane was viewed with understandable skepticism by many. Here is where Marion Magruder enters the story.

His career up to the beginning of the war mirrored that of many Marine aviators: duty with a fighter squadron and a stint at headquarters. After the attack on Pearl Harbor, Magruder was one of ten Marines sent as a group to Britain to study night fighting. Upon his return, then-Maj Magruder was assigned as the first commanding officer of VMF(N)-533, tasked with developing tactics, training, and standing up the new Hellcat-equipped squadron. His success is illustrated by VMF(N)-533’s record as the highest-scoring Marine nightfighter squadron.

The son does a good job of detailing the development and implementation of a training syllabus, the importance of being both a good commander and strong leader, and the integration of the ground-control intercept (GCI) operators with pilots. The dependence of the pilot on the GCI operator as the sole source of information setting up the intercept and, more importantly, getting the pilot safely back to base is well described. Also discussed is LtCol Magruder’s frustration with friendly fire and the undisciplined actions of the fleet over which the squadron was operating.

Overall, this is an interesting book. Magruder used both primary and secondary sources and included appropriate maps and pictures, especially those of the members of the squadron. The use of the novel form is, in itself, interesting. The attribution of comments to particular individuals sometimes required some suspen-
sion of reality. Also, more aggressive editing was needed. Pelican Press is not noted for publishing books in this genre, and the editing makes this apparent, which is too bad. But, for anyone interested in the development of nightfighters by the Marines and what it took to make it happen, the book is useful.

MSgt. Al Mongeon, USAF (Ret.), Fairfax, Virginia

America's Secret MiG Squadron: The Red Eagles of Project Constant Peg

Between the Korean and Vietnam Wars, the Air Force’s air-to-air combat training atrophied. Risk-adverse “bomber generals” in charge after Korea decided the future of the Air Force centered primarily on nuclear weapons delivery, maintaining a comfortable Washington D.C. lifestyle, and minimizing peacetime training accidents. Two decades of inattention turned the 15:1 U.S. kill ratio in Korea into a pathetic 7:1 ratio in the opening days of Rolling Thunder. Airmen were going into aerial combat against modern Soviet-supplied MiG aircraft that were highly maneuverable, well-armed, and very difficult to see. Most U.S. airmen had never trained in aerial combat beyond the traditional intercept role, and airmen found training on MiGs; and the challenges faced by the program. Along the way the reader is introduced to a cast of innovative characters such as Glenn Frick and David “DL” Smith who, along with Peck, because the “gang of three” within the Pentagon MiG program. The squadron had eight commanders during its ten years; each is discussed in one of Peck’s chapters to describe challenges faced by the different leaders. A host of money-men, scrappers, and fixers is also introduced which makes this treatment of the Red Eagle story far more personal than Davies’ book. By far the longest chapter is devoted to recollections provided by Red Eagle members themselves. The story concludes by looking at what the Air Force harvested from this project—from the combat performance over the Gulf of Sidra, to the war in the Balkans, to the skies over Iraq. Combat success was the goal, and that success is a tribute to the U.S. military. These pioneers provided the capstone on the training program that produced the American fighter pilots of our era.

We do not know what the future holds for the next air combat location or adversary. But, we do know that we, as a country, have had a “100 percent” fail rate at predicting where and when we will fight next. As we look into an uncertain future, it serves us well to consider the lessons taught and re-enforced in the skies over the high deserts. The collapse of the Soviet Union injected some honesty into the war-fighting business. Today’s combat fighter pilots are now openly trained by one of several Aggressor squads that are augmented by contractor pilots of Air USA who are equipped with several types of foreign aircraft, including Soviet-built MiG–29s. Perhaps this is the best testimony to the need and importance of the combat capabilities invented by the Red Eagles.

Dr. Gary R. Lester, Air Force Operational Test and Evaluation Center Deputy Historian

Japanese Experimental Transport Aircraft of the Pacific War

Over the last half-century, Western knowledge and appreciation of Japan’s aeronautical heritage has increased steadily thanks to a small band of scholars who have mined corporate and governmental records and the recollections of various participants. Chief among them have been René Francillon, Robert Mikesch, Eiichiro Sekigawa, and Shorzo Abe. To this august cadre may now be added the name of Giuseppe “Joe” Picarella.

While articles and books on Japan’s various warplanes—the Mitsubishi A6M Type 0 “Zero” foremost of all—have consumed unnumbered trees, if not forests—studies on less glamorous types, particularly transports, have received far less attention. This is now remedied by Picarella who has written a thoroughly researched and remarkably detailed history of Japan’s wartime military transport effort.

Picarella’s book follows a standard format for such works, with detailed technical descriptions accompanying numerous photographs and line drawings. However, what separates it from run-of-the-mill aircraft histories is the wide-ranging research he has undertaken—the breadth of coverage, and, of course, the largely unexamined and untreated nature of the subject.

The book is somewhat mistitled, as there is far more to this volume than merely a collection of what-might-have-been experimental prototypes and proposals. Picarella has included extensive essays on Japanese army and naval air transport development, organization, and operations, expanding upon Eiichiro Sekigawa’s path-breaking study on Japan’s civil airline and military air-trans

Picarella has included a number of additions that make the book of particular value including extracts and copies of contemporary Allied intelligence reports, numerous rare and mostly previously unpublished photographs, and some remarkable images taken of Japanese surrender-delegation aircraft and captured examples.

The book is slightly marred by occasional typos and lack of an index, and its relatively high price will certainly deter many who might otherwise purchase it. Nevertheless, this book closes an important gap in what has been available on Japanese civil and military aircraft development; and, with it, Picarella has himself vaulted into the foremost ranks of historians of Japanese aeronautics. Highly recommended!

Dr. Richard P. Hallion, Florida Polytechnic University


John Plating has crafted a marvelous work that goes well beyond the standard accounts of flying the treacherous Hump airlift route to China during World War II. The best-known works regarding this major strategic airlift operation are memoirs such as Gen Tunner's autobiography Over the Hump, or Otha Spencer's Flying the Hump: Memories of an Air War. Rarely do these books offer more-than-exciting accounts of operational difficulties; “there I was…” stories; or details of hardships and infighting between administrative units, combat pilots, and national organizations. Plating actually succeeds in surmounting these standard views by relating how strategy, ways, and means were interconnected through employment of innovative aviation technology, organization, and capability.

Like the writers of the aforementioned accounts, Plating is a transport pilot. However, he also proves himself a gifted historian by crafting a superior argument that marshals significant evidence to prove his points while capturing the challenge, danger, and uniqueness of operations in that theater. He approaches the operation as more than a collection of interesting stories or a matter of logistics. Plating successfully articulating that Hump flying was an expression of air power no less significant than strategic bombing, close air support, or carrier operations. He demonstrates how and why civilian air transport expertise was invaluable in developing the operation and was often superior to the go-getting military methodology so prevalent in other theaters. Plating explains how the operation was a crucial and changing component of Allied strategy as it went from being a show of force or support, to a significant element of operational strategy in its own right. Ultimately it was a real manifestation of one component of U.S. national power with significant implications for Cold War strategy.

Organizationally, the book is largely chronological and describes how the airlift expanded under political, geographic, and operational pressures. Plating details technological, political, organizational, operational, geographic, and meteorological pressures that influenced the goals and patterns of the operation. He provides detailed explanations that go beyond the hyperbole and sensationalism of many accounts. In one chapter, he diverges from chronological accounting to detail the influence of terrain, weather, pilots, and planes in a manner that will help any novice understand many of the particulars that other authors struggle to explain adequately. Finally, he peels back some of the layers of hyperbole and grandstanding that often accompany any account that includes William Tunner to show that he may not have been quite as successful or gifted as he often presents himself to be. Stylistically, the book is lavish in cogent explanations; robust in employment of sources and notes; and chock full of useful maps, diagrams, and photographs. My one minor issue is with his description of General Joseph Stilwell as having a New England demeanor or briskness. While all New Yorkers are Yankees, not all Yankees are New Yorkers. Stilwell was born and raised in Yonkers, New York. Since he is not a native of the one of the six states that comprise New England, he is not a New Englander!

I enthusiastically recommend this book as the best single account of the airlift operation known as “the Hump.” Plating masterfully weaves the strategic, operational, and tactical dimensions of the airlift and goes well beyond the traditional in creating an outstanding book that illustrates how airpower influences strategy but can also be strategy. The Hump is a must for the bookshelf of any true airpower historian and extremely useful for anybody interested in the CBI theater the campaign against Japan.

John G. Terino, Jr., Associate Professor, Air Command and Staff College


This is the third book by Sarah Byrn Rickman related to the history of the Women's Auxiliary Ferrying Squadron (WAFS) pilots of World War II. After detailing the origins and exploits of the entire group in her first book, The Originals, and their leader in, Nancy Love and the WASP Ferry Pilots of World War II, her latest work is devoted to one of the regular line pilots of that organization, Nancy Batson Crews.

There are numerous accounts of average soldiers, sailors, and airmen from World War II that help clarify and codify the experiences shared by many from that epic war. Often these accounts show how everyday people accomplished a lot during that time and returned to lead normal lives after leaving their uniforms behind. This book tells a similar tale of a woman who did extraordinary things in her youth by becoming a professional pilot and then returning to normalcy after the war was over. Crews was not Jacqueline Cochran, Amelia Earhart, or Nancy Harkness Love, to name several of her famous contemporaries. Therefore, her story is useful for what it tells of how the less-than-famous viewed their war role and the impact it had on them later in life.

Nancy Batson grew up in Birmingham, Alabama. She attended the University of Alabama, learned to fly in the school's Civilian Pilot Training program, and became one of the first twenty members of the WAFS. As a WAFS and later a Women Airforce Service Pilots (WASP) member, she ferried a wide variety of military aircraft, including pursuit planes, and experienced firsthand many of the challenges and events that these female aviators encountered. Many of these stories and events are also chronicled in Rickman's other books or in other works on the contributions of these women to the war.
Where this book makes its most enduring contribution is in detailing how Nancy Crews lived her life in and out of aviation after the war. Her life, in many ways, parallels that of many veterans who returned to “normalcy” after the upheavals of the war. By the late 1960s, she, like many women of her generation, began to reenter the workforce after raising families. Crews returned to aviation and became involved in gliding, airport management, and other aspects of flying. She also became an active participant in WASP reunions and served as the president of the organization in the early 1970s. She ultimately was involved in local politics in California and real estate development upon her return to Alabama.

There are better books on the politics of the WASP, their leaders, and their wartime contributions (including Rickman’s), but this may be the best one on a regular Jane who lived an ordinary, but not so ordinary, life. Overall, the book is engaging and readable. The most annoying flaw, and it is minor, is that the author constantly refers to the King Air aircraft as a jet. This is decidedly not accurate and is odd because she accurately reported it as a turbo-prop in her first book, The Originals.

If you are looking for a book that chronicles the life of a female war vet and want to know more about the WASP or ferrying aircraft, you would be hard pressed to find a better one than this.

John G. Terino, Jr., Associate Professor, Air Command and Staff College


Career Army officer and Texas A&M University alum Thomas Smith previously explored the history of the U.S. Army in 19th century Texas in two separate works. His latest book reflects on his year (June 2003 to June 2004) in Vietnam as commander of Detachment 2, Joint Task Force-Full Accounting (JTF-FA). This Department of Defense agency is responsible for locating, identifying, and returning remains of U.S. service personnel lost in combat to surviving family members.

Two other detachments operate in Southeast Asia (one in Thailand and one in Laos). With few exceptions, Smith’s experiences were limited to Vietnam, where he had served more than thirty years earlier while in the U.S. Navy.

Smith proceeds in chronological order, his account reads like a journal or diary. The focus is entirely from his perspective; he makes no attempt to introduce other points of view. His passion for the mission and respect for the dedicated American civilian and military team members come through time and again. So, too, does his high regard for the Vietnamese people and the Vietnamese government representatives with whom he frequently worked. He takes the reader to isolated crash sites or remote villages for a behind-the-scenes look at how investigations and field work are conducted.

Smith details his negotiations with local Vietnamese while contracting for laborers and other support. He repeatedly expresses his admiration for their culture. It is apparent that he’s quite comfortable working with the Vietnamese and feels the need to accommodate their interests if his staff is to be successful in recovering the remains of Americans lost during the Vietnam War (known as the American War to the Vietnamese).

He expresses his opinions bluntly. After a Boeing C–17 transport suffered a mechanical failure in Da Nang after being loaded with highly sensitive navigation and communications gear, the crew went to a nearby resort while waiting for repairs. Two security police accompanying the mission remained with the aircraft to handle security. Smith described the crew “as nice folks. But they were reservists.” I suspect Air Mobility Command appreciates reservists more than Smith does.

Perhaps it was best Smith was assigned to Vietnam rather than nearby Laos. Comparing Vientiane and Hanoi, Smith noted that Laotian drivers seemed polite and less likely to honk their horns than their Vietnamese counterparts. On the other hand, “the Lao are hardheaded than their Vietnamese counterparts. On the other hand, “the Lao are hardheaded and neither handsome, graceful, refined, nor sophisticated unlike the Vietnamese.” While my Vietnamese acquaintances might find Smith’s assessment amusing, I doubt my Laotian friends would share his point of view.

Overall, this work is basically a travelogue of Vietnam from nine years ago. The descriptions of the recoveries during Smith’s tenure tend to get lost in the narrative. While he provides some details on successfully resolved cases, a larger-scale map would have been helpful as would a table or chart listing each recovery. Smith is justifiably proud of what he and his staff accomplished during his year in Vietnam. Some readers might prefer more insight into the circumstances surrounding the loss of the individuals recovered, however.

On a personal note, in October 2008, the remains of Ensign Eldon Wyman were interned in Portland, Oregon, thanks to the efforts of JTF-FA. His 93-year-old sister (my father’s first cousin) cherished that moment. Her brother was lost in action aboard the U.S.S Oklahoma on December 7, 1941. He had been buried in a mass grave along with several other unidentified shipmates. His identity was established by matching her DNA from a sample taken several years before. This is an example of the service provided by people like Smith.

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


As a fourth-generation California National Guardsman, I am always eager to read something new about that component—the historic militia. This book served that purpose.

Though it is primarily about one of the eighteen National Guard divisions that fought in World War II, it gives useful background about the entire Guard. It starts with the earliest history of the militia and builds up to the Second World War. The book’s main attention focuses on the period 1939-1945 when a collection of ill-equipped and ill-trained citizen-soldiers were transformed into an effective fighting force.

Weaver doesn’t pull any punches in describing units and individuals of the “Bucket of Blood,” “Keystone” Division. He misses on a few facts, but these errors don’t really impair the story. The Map Key is useful in deciphering the eleven maps, but the maps themselves fail to explain actions as well as they might have. Somewhat similarly, the ten photographs could have been augmented by shots of soldiers in the Hürtgen Forest or in the Bulge.

This book should be of interest to many readers, even those without a Guard background. It does a good job of covering the entire mobilization of the war period and is recommended especially for that reason.

Brig. Gen. Curtis H. O’Sullivan, ARNG (Ret.), Santa Rosa, California
The North African Air Campaign
U.S. Army Air Forces from El Alamein to Salerno
Christopher M. Rein

“A thorough, comprehensive, judicious, and utterly riveting account of how the USAAF adapted pre-war airpower theory to the tactical realities of WWII’s Mediterranean battlefield. Despite the adaptive successes of this important period, Christopher Rein argues that the USAF made some critical strategic and organizational decisions and drew some theoretical conclusions that had adverse consequences throughout the Cold War and beyond.”—Douglas Porch, author of The Path to Victory: The Mediterranean Theater in World War II

“An insightful and much-needed analysis of real-time battlefield adaptation and innovation, Rein’s book allows us to see how American airmen learned and honed the war-fighting skills that are vital—indeed essential—in a modern combined arms setting.”—Tami Davis Biddle, author of Rhetoric and Reality in Air Warfare

296 pages, 7 photos, 6 maps, Cloth $34.95

America’s Space Sentinels
The History of the DSP and SBIRS Satellite Systems
Second Edition, Expanded
Jeffrey T. Richelson

The original edition of Jeffrey Richelson’s study quickly established itself as the definitive book for understanding a crucial component of our national defense capabilities. It focused on the emergence and evolution of the Air Forces Defense Support Program (DSP) satellite system, which came on line in 1970. For this new edition, Richelson covers significant developments during the last dozen-plus years relating to the deployment of these satellites, especially the struggles to develop and launch its successor—Space-Based Infrared System (SBIRS)—beginning in the late 1990s and continuing up to the present. The result is a book that remains the first and best source of information regarding these vital programs.

“An especially important and welcome addition to the literature of the military space program. Should be required reading for all who are interested in the strategic defense of the United States in the nuclear era.”—Journal of Military History

392 pages, 26 illustrations, Cloth $39.95, Paper $24.95

University Press of Kansas
Phone 785-864-4155 • Fax 785-864-4586 • www.kansaspress.ku.edu

In 1998, Naval Institute Press originally published this work as a hardback. Now, fourteen years later, it has released it as a paperback. Presumably, the paperback edition is identical to the original; there is nothing to indicate otherwise. Regardless, Wildenberg’s interest and insight into the development of the U.S. Navy after World War I and before World War II is obvious. His other books have discussed the development of the torpedo bomber and the process of underway replenishment. Proceeding for the most part in a chronological sequence, Wildenberg examines how the arrival of the first American aircraft carriers (Langley, Lexington, and Saratoga) in the late 1920s began to affect Navy doctrine. Far from focusing solely on the technical advances that eventually would lead to precision dive bombing as the most efficient method by which to sink maneuvering vessels at sea, Wildenberg offers interesting insight into the personalities that drove naval aviation’s formative years. For good reason, Joseph Reeves and William Moffett receive special attention.

The book examines the annual fleet exercises in detail, as the old-school admirals sometimes struggle to integrate the force-multiplying effect of the carriers. Whether to emphasize the carrier’s offensive (search and strike) or defensive (local air superiority) capabilities leads to discussions about the optimum complement of specialized aircraft—fighters, torpedo bombers, and scouts.

As the years go by, experts in ordnance and aeronautics, along with critical decision makers, conclude that the development of a dedicated dive bomber offers the best opportunity to destroy an enemy’s fleet. Of course, the emergence of the all-metal, low-wing monoplane in the second half of the 1930s accelerates this emphasis. Nevertheless, not until the Battle of Midway in June 1942, is the concept fully validated when four Japanese carriers are sunk in exchange for one American carrier.

Without question, this is an exceptional work and highly recommended. Besides offering an easy read, Wildenberg has done a superb job of answering one of the critical questions when examining military history: why things happened the way they did. Anyone with the slightest interest in naval doctrine between the wars will find their time well spent with this work.

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

Guidelines for Contributors

We seek quality articles—based on sound scholarship, perceptive analysis, and/or firsthand experience—which are well-written and attractively illustrated. The primary criterion is that the manuscript contributes to knowledge. Articles submitted to Air Power History must be original contributions and not be under consideration by any other publication at the same time. If a manuscript is under consideration by another publication, the author should clearly indicate this at the time of submission. Each submission must include an abstract—a statement of the article’s theme, its historical context, major subsidiary issues, and research sources. Abstracts should not be longer than one page.

Manuscripts should be submitted in triplicate, double-spaced throughout, and prepared according to the Chicago Manual of Style (University of Chicago Press). Use civilian dates and endnotes. Because submissions are evaluated anonymously, the author’s name should appear only on the title page. Authors should provide on a separate page brief biographical details, to include institutional or professional affiliation and recent publications, for inclusion in the printed article. Pages, including those containing illustrations, diagrams or tables, should be numbered consecutively. Any figures and tables must be clearly produced ready for photographic reproduction. The source should be given below the table. Endnotes should be numbered consecutively through the article with a raised numeral corresponding to the list of notes placed at the end.

If an article is typed on a computer, the disk should be in IBM-PC compatible format and should accompany the manuscript. Preferred disk size is a 3 1/2-inch floppy, but any disk size can be utilized. Disks should be labelled with the name of the author, title of the article, and the software used. Most Word processors can be accommodated including WordPerfect and Microsoft Word. As a last resort, an ASCII text file can be used.

There is no standard length for articles, but 4,500-5,500 words is a general guide. Manuscripts and editorial correspondence should be sent to Jacob Neufeld, Editor, c/o Air Power History, 11908 Gainsborough Rd., Potomac, MD 20854, e-mail: editor@afhistoricalfoundation.org.
Books Received


Dear Members:

Each of you has played a part in the history and legacy of air power across the decades, and with your magnificent support your Foundation will continue its duty of educating Defense leadership and the public via a neutral, outside look at the effectiveness of air power. Your generosity to date resulted in more than $18,000 in contributions from our winter 2012-13 appeal, for which I say a hearty “Thank you!” These funds will support publication of two issues of Air Power History.

In 2013, the Foundation continues with our main goal of achieving financial stability for the future. We are working on several initiatives toward that end and look forward to having your continuing help.

Let me share with you some of our ambitions plans and major projects for this year:

- Publish three issues of Air Power History;
- Select and honor the winners of the Spaatz and Holley awards;
- Select and honor the winners of the Best Air Power History Article and Best Book Review awards;
- Conduct the biennial symposium;
- Select and present the Doolittle Award in a ceremonial event.

As you can see, our plate is full. We are fully confident that these deliverables are achievable with volunteer help and financial support, even during these turbulent times for our military budget and national economy. Your Foundation is looking to become an increasingly more vital and dynamic resource in order to advance our essential mission: to preserve and promote the history, heritage, and legacy of our U.S. Air Force, its predecessors, and other military air services.

We seek innovative ways to make our organization more useful and to attract a wider audience and broader participation. Your feedback is of the utmost importance to our success. By all means, let us know of any suggestions to make our Foundation grow.

Dale W Meyerrose, Maj Gen, USAF (Ret)
President and Chairman of the Board
Clark-Yudkin Research Fellowships at the Air Force Academy

Applications are being accepted for 2013 Clark-Yudkin Research Fellowships at the U.S. Air Force Academy. These fellowships were established by The Friends of the Air Force Academy Library to promote awareness and use of the scholarly holdings available in the library’s Clark Special Collections Branch. Grants range from $1,000 to $15,000 and are intended to assist visiting researchers with travel and living expenses while in residence at the Academy. Applications are invited from senior and early career scholars, recent PhDs, and advanced graduate students. Recipients are expected to complete their research within one year from the date of the award.

For detailed descriptions of the holdings in the Clark Special Collections branch, go to the Air Force Academy Library home page: www.usafa.edu/df/dflib and then open the link to “Special Collections.”

Additional information and an application are available at The Friends’ home page: www.friends.usafalibrary.com and then open the link to “Research Fellowship.” Applications and related materials are due no later than March 1, 2013. Applicants will be notified of The Friends’ decision in early April.

Questions concerning Clark-Yudkin fellowships may be submitted via email to friends@usafalibrary.com

The Friends of the Air Force Academy Library are pleased to announce the names of the 2012 Clark-Yudkin research fellows:

- Dr. Samuel Zebulon Baker
  Georgia Southern University
  Project title: “Forward Progress: Desegregating College Football, 1945-1975”

- Ms. Amelia Underwood
  James Madison University

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Douhet, Trenchard, Mitchell:
Airpower Prophets
or
Snake Oil Salesmen?
Read:
The Effectiveness of Airpower in the 20th Century
a trilogy
by
Capt. John F. O’Connell, USN (Ret.)
Part Two (1939-1945) (Test of war), ISBN 0-595-45724-3
Parts One and Two were reviewed in Air Power History magazine, Fall 2008
Part Three was reviewed in Air Power History magazine, Fall 2007
All available at Amazon.com
Expanding Outreach

As part of our ongoing effort to develop our service to members, the American Historical Association (AHA) is expanding our outreach for the Member News section of Perspectives on History and the AHA Today blog. As an affiliate member of the AHA, we encourage Foundation members to submit news and announcements about AHA members through the Perspectives on History web submission page www.historians.org/perspectives/upload or to the e-mail address perspectives@historians.org. Member news may include announcement of awards, prizes or other distinctions, new publications, mentions in the press or broadcast media appearances, as well as other topics. Please let me know if you have any questions. We look forward to hearing from you.

Regards,
Jennifer Reut
Associate Editor, Perspectives on History

“Other” Red Tails

I want to thank you for publishing the article The “Other” Red Tails. So little is written about the Twelfth and Fifteenth Air Forces, it’s great to see stories about them. And as usual, a very good story with lots of information. If you can, please publish more articles about the air war over and around the Mediterranean.

My uncle was a 19-year-old fighter pilot with the 325th Fighter Group flying out of N. Africa. The Checkertail Association, the veterans group for the 325th, recently released a British made film, “Checkertails, Part 2.” This film, along with Part 1, is available FREE from the association web page www.checkertails.org. Filmmaker Neil Pugh worked with a worldwide contributing technical staff, and has directed free viewing or download of his Checkertails documentary. Please feel free to share information about these films and our association.

Thank you,
John B. Mier

Japanese Reprint

I appreciated the opportunity to publish “Shootout at Rabaul,” in Air Power History [Vol. 59, No.3, pp 14-27]. I thought you might be interested to find out that one of my articles has been translated into Japanese and published as a small book.

Richard L. Dunn

In Memoriam


Beneficial Bombing

MARK CLODFELTER

The Progressive Era, marked by a desire for economic, political, and social reform, ended for most Americans with the ugly reality and devastation of World War I. Yet for Army Air Service officers, the carnage and waste witnessed on the western front only served to spark a new progressive movement—to reform war by relying on destructive technology as the instrument of change. In Beneficial Bombing Mark Clodfelter describes how American airmen, horrified by World War I’s trench warfare, turned to the progressive ideas of efficiency and economy in an effort to reform war itself, with the heavy bomber as their solution to limiting the bloodshed.

$40.00 hardcover
STUDIES IN WAR, SOCIETY, AND THE MILITARY SERIES

For more information about this book and to read an excerpt, visit us online!
Frederick Shaw, Ph.D., a long-time resident of Montgomery, passed away December 23, 2012, after a short illness. He was 71 at the time of his death. After receiving his doctorate from the University of Florida in Gainesville, Dr. Shaw went to work as an official historian at Headquarters Strategic Air Command. He later transferred to the Historical Research Agency at Maxwell AFB, where he retired as the director of the Research Division. He is survived by his wife, Lynn Shaw; as well as his son and daughter, and several grandchildren.

Ed Rasimus, pilot and author, passed away on January 30, 2013. Born September 29, 1942, Ed was a command pilot, a retired major and a much-admired author who wrote from experience. He flew the F–105 Thunderchief and F–4 Phantom II in combat in Southeast Asia and wrote three great books about his experiences, one titled When Thunder Rolled. Commented an Air Force member. “I read both When Thunder Rolled and Palace Cobra. Great books!”

Col. Ralph S. Parr, USAF (Ret.), a double ace who flew 641 missions in World War II, Korea, and Vietnam, died on December 7, 2012, at New Braunfels, Texas. The eighty-eight year old former pilot suffered from lung cancer. His father was a Navy squadron commander. He instilled a love of flying in his son, when he took the five-year-old on a plane ride for his birthday. He flew the P–38 in World War II and the F–86 in Korea. After graduating from high school in 1942, he entered the military. After Korea he became an F–4 flight instructor and commander. He served two combat tours in Vietnam. In all, he flew more than 6,000 hours in fighter aircraft and earned more than sixty decorations, including the Silver Star, Bronze Star, ten Distinguished Flying Crosses, and forty-one Air Medals. Survivors include his wife of forty-three years, Margaret Bernstein. Colonel Parr was buried at Ft. Sam Houston in San Antonio, Texas.

Kari Poe, wife of Gen. Bryce Poe II, who held, among other positions, the Presidency of the Air Force Historical Foundation, died on January 2, 2013, less than a month after her eighty-second birthday. Mrs. Poe hailed from Oslo Norway.

Maj. Gen. Frederick C. “Boots” Blesse, USAF (Ret.) died on October 31, 2012, in Melbourne, Florida. He was a graduate of the U.S. Military Academy at West Point, New York (Class of 1945). General Blesse served in the USAF for thirty years. He served two combat tours in Korea. During his second tour, he was credited with downing nine MiG–15s and one La–9. Upon returning home in October 1952, he was the U.S.’s leading jet ace. He retired in 1975 as the Deputy Inspector General of the USAF.

Col. Kenneth L. Moll, USAF (Ret.) died on February 21, 2013. A long-time, ardent supporter of the Air Force Historical Foundation, Col. Moll was eighty-five. Born in Oakdale, California, he graduated from West Point in 1950, joined the U.S. Air Force, completed flight training, and became a fighter pilot. After flying in many combat missions, he was assigned to the Pentagon, and the JCS as chief of planning for the Worldwide Military Command and Control System. He received a Bronze Star, and two Legion of Merit awards. He was predeceased by his son Ken Jr. in 1975, and his twin brother Kendall in 2005. He is survived by his wife of sixty-two years, Marilyn, his son Kevin and daughter Nancy, and numerous grandchildren.

Gen. H. Norman Schwarzkopf, USA (Ret.), passed away on December 27, 2012, and was interred at the U.S. Military Academy at West Point, New York on February 28, 2013. A 1956 graduate of the Academy, Gen. Schwarzkopf was most noted for commanding the U.S. and Coalition forces in Operation Desert Storm in 1991.

Maj. Thomas C. Griffin, a B–25 bomber-navigator in the audacious Doolittle raid on Japan in April 1942 died. He was ninety-six.
Reunions

388th Fighter-Bomber Wg. May 30, - June 2, 2013. Fairborn, OH. Contact: Don Rahn
5902 Lynnnawny Drive
Dayton, OH 45415
(937) 278-4390

Fairborn, OH. Contact:
338th Bomb Wing Assn.
Fairborn, OH. Contact:
Don Rahn
5902 Lynnnawny Drive
Dayton, OH 45415
(937) 278-4390

Fairborn, OH. Contact:
Sharon Lemanek
338th Bomb Wing Assn.
8th Tactical Fighter Sq. (1972 Takhli).
September 5-8, 2013. Fairborn, OH. Contact:
Ron Hunt
1328 Meadow Moor Drive
Beavercreek, OH 45434.
(937) 426-0867
ron.hunt.oh@gmail.com

PTC-48B. September 10-12, 2013. Dayton/Fairborn, OH. Contact:
Bill Bell
2322 Shadow Hill Drive
Riverside CA 92506-3462
(951) 781-6629
bgaden58@sbcglobal.net

PTC-48B. September 10-12, 2013. Dayton/Fairborn, OH. Contact:
William Bell
2322 Shadow Hill Drive
Riverside CA 92506-3462
(951) 781-6629
bgaden58@sbcglobal.net

57th Bomb Wing Assn. Sept. 26-29, 2013. Fairborn, OH. Contact:
Woodie Hall
5305 Forest Breeze Court
St Cloud FL 34777-7743
(407) 301-5133
alumni57th@gmail.com

MacDill Flyers. October 4-6, 2013.
Fairborn, OH. Contact:
Gene Stevens
3380 Greenburn Road
Beavercreek, OH 45434
(937) 429-1552
genestevens@sbcglobal.net

Ranch Hands Vietnam Assn. October
10-13, 2013. Fairborn, OH. Contact:
Jack Spey
4245 South Rome Way
Hurricane, UT 84737
(435) 877-1166
maresfwb@aol.com

List provided by:
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National Museum of the U.S. Air Force
Public Affairs Division
1100 Spaatz Street
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(937) 255-1386

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We seek quality articles—based on sound scholarship, perceptive analysis, and/or firsthand experience—which are well-written and attractively illustrated. The primary criterion is that the manuscript contributes to knowledge. Articles submitted to Air Power History must be original contributions and not be under consideration by any other publication at the same time. If a manuscript is under consideration by another publication, the author should clearly indicate this at the time of submission. Each submission must include an abstract—a statement of the article’s theme, its historical context, major subsidiary issues, and research sources. Abstracts should not be longer than one page.

Manuscripts should be submitted in triplicate, double-spaced throughout, and prepared according to the Chicago Manual of Style (University of Chicago Press). Use civilian dates and endnotes. Because submissions are evaluated anonymously, the author’s name should appear only on the title page. Authors should provide on a separate page brief biographical details, to include institutional or professional affiliation and recent publications, for inclusion in the printed article. Pages, including those containing illustrations, diagrams or tables, should be numbered consecutively. Any figures and tables must be clearly produced ready for photographic reproduction. The source should be given below the table. Endnotes should be numbered consecutively through the article with a raised numeral corresponding to the list of notes placed at the end.

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There is no standard length for articles, but 4,500-5,500 words is a general guide.

Manuscripts and editorial correspondence should be sent to Jacob Neufeld, Editor, c/o Air Power History, 11908 Gainsborough Rd., Potomac, MD 20854, e-mail: editor@afhistoricalfoundation.org.
ABOUT THE BOOK
From Hell Hawks! author Bob Dorr, Mission to Tokyo takes the reader on a World War II strategic bombing mission from an airfield on the western Pacific island of Tinian to Tokyo and back. Told in the veterans' words, Mission to Tokyo is a narrative of every aspect of long range bombing, including pilots and other aircrew, groundcrew, and escort fighters that accompanied the heavy bombers on their perilous mission.

Several thousand men on the small Mariana Islands of Guam, Saipan, and Tinian were trying to take the war to the Empire—Imperial Japan—in B-29 Superfortresses flying at 28,000 feet, but the high-altitude bombing wasn't very accurate. The decision was made to take the planes down to around 8,000 feet, even as low as 5,000 feet. Eliminating the long climb up would save fuel, and allow the aircraft to take heavier bomb loads. The lower altitude would also increase accuracy substantially. The trade-off was the increased danger of anti-aircraft fire. This was deemed worth the risk, and the devastation brought to the industry and population of the capital city was catastrophic. Unfortunately for all involved, the bombing did not bring on the quick surrender some had hoped for. That would take six more months of bombing, culminating in the atomic bombs dropped on Hiroshima and Nagasaki.

As with Mission to Berlin (Spring 2011), Mission to Tokyo focuses on a specific mission from spring 1945 and provides a history of the strategic air war against Japan in alternating chapters.

ABOUT THE AUTHOR

ABOUT ZENITH PRESS
Zenith Press (www.zenithpress.com), an imprint of Quayside Publishing Group, encompasses combat memoirs; battle and unit histories; books on civil and military aviation; biographies of prominent military figures; titles on espionage and national security issues; books on military weapons and equipment; and titles on policing, firefighting and rescue.
Our “mystery plane” in the last issue was the Douglas D-558 Skystreak (taken by John Gourley). Last issue’s photo was of Skystreak no. 1, Navy bureau number 37970 displayed on a wall at the National Museum of Naval Aviation in Pensacola, Florida. This issue’s photo shows D–558–1 #3. Even with partial cloud cover the white aircraft was easy to see.

The U.S. Navy and the National Advisory Committee for Aeronautics (NACA) jointly developed this research aircraft early in the jet age to explore problems associated with speeds approaching the speed of sound. The Skystreak was built around a 5,000-pound thrust Allison J35-A-11 turbojet engine. Initially painted a brilliant red, the first Skystreak completed its maiden flight at Muroc Army Air Field, California, on April 14, 1947. The Navy ordered six of the planes but soon cancelled the final three: Three aircraft (bureau numbers 37970/37972) conducted a range of tests marred by minor incidents.

The Skystreak established a succession of speed records, including one on August 25, 1947, when, piloted by Marine Corps Major Marion Carl, it reached 650.796 miles per hour (1,047.356 kilometers per hour). This was just two months before Air Force Capt. Charles E. “Chuck” Yeager flew the Bell XS–1 rocket plane on the first recorded supersonic flight on October 14.

Sadly, on May 3, 1948, the engine compressor on the number two Skystreak disintegrated in flight and the plane crashed, claiming the life of pilot Howard Lilly, the first NACA pilot to die on duty.

The tragedy delayed the program but the remaining two Skystreaks eventually flew until June 10, 1953, contributing enormously to aeronautical knowledge.

In addition to plane no. 1 at Pensacola, Skystreak no. 3 is on display at the Carolinas Aviation Museum in Charlotte, North Carolina, on loan from the National Museum of the Marine Corps in Quantico, Virginia.

Our “name the plane” contest continues to be popular. Twenty-three readers sent us their contributions. Only one didn’t have it right.

Our latest “History Mystery” winner is retired Lt. Col. Dan Hickox of Leander, Texas. Our thanks to all who entered the contest — and please remember to support the Air Force Historical Foundation with your deeds and donations.

See if you can identify our latest mystery aircraft. Our newest puzzler wears civilian attire in this photo by Stan Piet, but there’s also a military version. Remember, too that we’d like to know whether you think this long-running contest is too easy.

A reminder of the “History Mystery” rules:
1. Submit your entry via e-mail to robert.f.dorr@cox.net. Entries may also be sent via postal mail in any format to Robert F. Dorr, 3411 Valewood Drive, Oakton VA 22124.
2. Write a sentence about the aircraft shown here. Include your address and telephone number. Remember to include a phone number.
3. A winner will be randomly chosen from the correct entries and will receive an aviation book.

And let’s get serious about those historical treasures in your attic or basement. Some readers say they just don’t remember where their color slides are. That’s not a good way to assure the preservation of history. Dig out your slide or snapshot of a rare aircraft and lend it to Air Power History for this contest.
To: Air Force Historical Foundation  
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