

# AIR POWER

# *History*

WINTER 2013 - Volume 60, Number 4  
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# AIR POWER

## History

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# The Air Force Historical Foundation



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In this issue of *Air Power History* Darrell Dvorak provides a missing chapter to the story of Project Trinity, the world's first atomic bomb test. It is an account of the nearly two dozen men who witnessed the test, while flying aboard B-29s. He tells us why they were there, how they were selected, and how they trained. Based on recently available records and overlooked sources, this article extends the unfinished history of the 216th Army Air Forces Base Unit (Special) and its role in developing the atomic bombs that decisively ended World War II.

In 1966, prior to the advent of the U.S. Navy's Top Gun and the Air Force's Red Flag, the Air Defense Command (ADC) ran Operation College Prom, which examined the F-106's potential for fighter versus fighter combat tactics. In 1968, in Operation College Dart, ADC expanded the dissimilar combat tactics of the F-106s to go against F-102s and F-104s. During the 1970s, the program expanded again to include Tactical Air Command (TAC). Michael Weaver seeks to strip away some of the mythology surrounding this subject.

In "The Battles of al-Fallujah," William Head examines these two important battles involving air power and urban warfare. Although there are deep differences of opinion concerning whether Fallujah was a victory or a defeat, Head makes a case for the value of air power.

This issue also presents some new and some older book reviews, upcoming symposia, reunions, obituaries, the Foundation's annual awards ceremony, and winners, and the History Mystery.

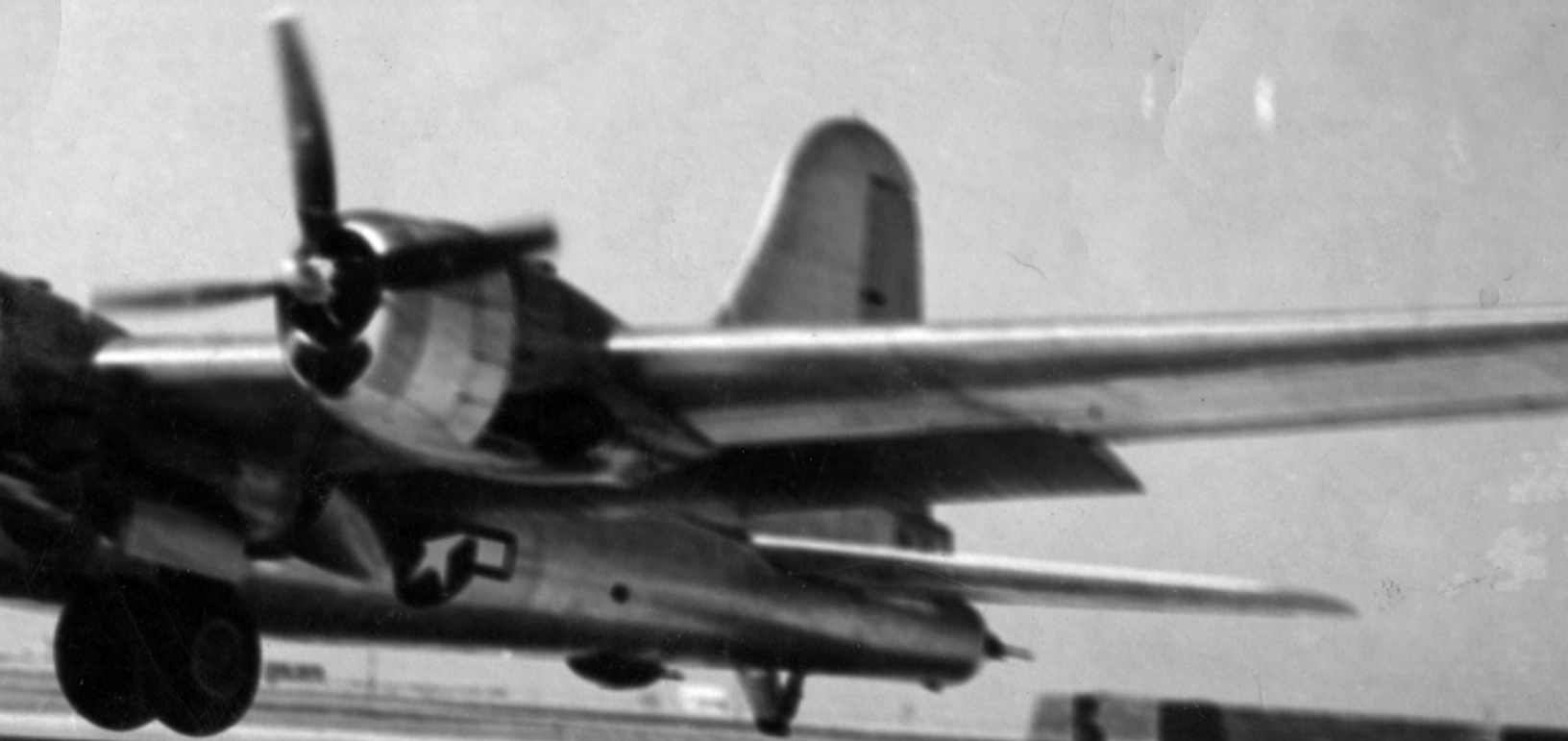
Be sure not to miss coverage of the Air Force Historical Foundation's Awards Ceremony and Dinner. Complete information on awardees and presenters, plus photos, appears on pages 62 and 63.

A stylized, handwritten signature in black ink, reading "J. Headfield". The signature is fluid and cursive, with a large loop at the beginning and a long, sweeping tail.

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# **THE FIRST ATOMIC BOMB MISSION: TRINITY B-29 OPERATIONS THREE WEEKS BEFORE HIROSHIMA**





Darrell F. Dvorak

(Overleaf) The Silverplate first drop-test B-29 aircraft, at Muroc Army Air Field, February 1944. (Photo courtesy of Keith Shields.)

## THIS PAPER ...IDENTIFIES THE AIRMEN WHO CREWED THOSE TRINITY FLIGHTS, WHY THEY WERE SELECTED, AND HOW THEY PRE- PARED FOR THEIR MISSION

**O**n July 16, 1945, the world changed forever, but the moment was witnessed by little more than 400 observers. Before dawn at a remote desert test site in New Mexico, history's first atomic bomb was exploded, culminating a top secret project codenamed Trinity. It was 50 percent more powerful than the bomb that soon would be dropped on Hiroshima and almost equal to the one dropped on Nagasaki a few days later. As events unfolded, Trinity's success meant an end to World War II without an Allied invasion of Japan, saving untold numbers of lives. But even though this epic event has been the subject of many scholarly works for more than sixty years, one important chapter of the Trinity story is still incomplete. It is the account of the fewer than two dozen men who witnessed the blast aloft in two B-29 bombers, exposed to uncertain and potentially deadly risks.

This paper identifies those intrepid flyers, why they were aboard, and what they saw. Most importantly, for the first time it identifies the airmen who crewed those Trinity flights, why they were selected, and how they prepared for their mission. Based on newly available personal military records, overlooked primary sources, and prior scholarship, this paper extends the important, but still unfinished, story of the U.S. 216th Army Air Forces Base Unit (Special) and its leading role in creating the atomic bombs that decisively ended World War II.<sup>1</sup> This is particularly significant because *no* 216th records for the critical year 1945 have yet been found by this author in any of the principal national archives. Most distressing, the Air Force Historical Research Agency, primary repository of Air Force historical documents, has no records of the 216th's finest hours. In 2013, the Agency wrote to an independent researcher, "*For some reason, the histories for the 216thAAF BU goes [sic] to September 1944 then does [sic] not pick up again until January 1946.*"<sup>2</sup> One result is that official AAF manifests for the Trinity flights are missing and the author has had to reconstruct them.

### The Manhattan Project

Many talented people helped create the first atomic bombs, but arguably the two most important were U.S. Army General Leslie R. Groves, head of the atomic bomb project (codenamed Manhattan Engineer District), and J. Robert Oppenheimer, scientific director of Los Alamos Laboratory (LAL), where breakthrough science and engineering transformed atomic theory into reality.<sup>3</sup> Oppenheimer's role began in mid-1942, a few months before Groves chose him to lead LAL. Six months later, the site for the laboratory had been chosen, construction was underway, and LAL personnel began to move in:

**Jun 42** Oppenheimer appointed Scientific Director of the Development of Substitute Materials Project, forerunner of Manhattan.

**Sep 42** Groves assumes command of Manhattan.

**Oct 42** Groves decides to centralize atomic bomb research at a single location and selects Oppenheimer to lead it.

**Nov 42** LAL site chosen in New Mexico.

**Apr 43** Initial research staffs move to LAL.

Manhattan's goal was to produce several atomic bombs in order to credibly threaten the Axis powers with repeated atomic attacks as necessary to force their surrender. Later events validated that goal, but achieving it depended on solving the most profound unknowns of nuclear science.

### Manhattan's Scientific Challenge

At the risk of oversimplifying, the immense power of an atomic bomb is the result of massive amounts of energy released when a particular material achieves *critical mass*, which triggers the nucleus of an atom to split apart—*fission*—releasing energy that creates an instantaneous, self-sustaining *chain reaction* of splitting nuclei within all the other atoms in the material, thereby releasing even more energy and creating an unprecedented blast. Researchers had determined that the most promising materials to produce that result were the elements Uranium-235 (U-235) and Plutonium-239 (Pu-239), but as potential weapons, the two elements had almost mirror-image advantages and disadvantages.

U-235 was difficult to produce in pure enough quantities, but could be readily incorporated into a simple "gun" bomb design wherein one sub-critical mass was "shot" into another sub-critical mass to achieve critical mass. But U-235's production difficulties meant there would only be enough for a single bomb (codenamed Little Boy). In contrast, Pu-239 was easier and cheaper to produce in purer quantities, thus requiring lesser amounts for a weapon. But in a dramatic mid-1944 development, LAL researchers confirmed that, if Pu-239 were used in the simple gun design (codenamed Thin Man), it would spontaneously begin fissioning and expire in a fizzle.

Thus, to produce several atomic bombs, LAL researchers had only one path forward: use Pu-239, but pursue development of a theoretical explosive concept known as "implosion." Implosion required uniformly compressing a plutonium sphere into a critical mass by surrounding it with explosives triggered by a complicated ignition system. Not only had this never been done before, but there were no small-scale, experimental methods that could prove that such a bomb design would work or, if so, how

*Darrell Dvorak is a retired business executive and a son-in-law of the late Colonel Clifford J. Heflin, Commanding Officer of the 216th Army Air Forces Base Unit (Special) during its 1945 service in the Manhattan Project that developed the first atomic bombs. This is the second paper that Dvorak has written about the 216th; the first was published in the Winter 2012 issue of Air Power History. Dvorak has a BS from Georgetown University and an MBA from the University of Chicago.*



The crew of the Silverplate first drop test B-29 aircraft, at Muroc Army Air Field, February 1944. Top row: Shields, Wilkinson, Dike, Storemen, Roark, Semple. Middle row: Bender, Coles, Merrill, unknown. Front: Rochlitz. (Photo courtesy of Keith Shields.)

THERE IS NO ONE MORE RESPONSIBLE FOR GETTING THIS BOMB OUT OF THE LABORATORY AND INTO SOME FORM USEFUL FOR COMBAT OPERATIONS THAN CAPTAIN PARSONS

powerful it might be. It was evident to LAL researchers that eventually they would have to undertake a live field test of any new plutonium bomb implosion design.

### Manhattan's Ordnance Challenge

While creation of the first atomic bombs was a triumph of outstanding science it was equally a triumph of outstanding engineering, especially the project's *ordnance* engineering, the conversion of theoretical science into practical and effective weapons. Research determined that the sizes, shapes, weights, and technologies of the uranium and plutonium bombs would be radically different from each other and unlike any other aerial bombs ever made. LAL's historian later observed, "A new field of engineering was being explored," one in which success would come from the work of "...physicists, chemists, and electrical and mechanical engineers...all of which contribute to the field and none of which dominate it."<sup>4</sup> But the historian failed to also credit the central role of the U.S. Army Air Forces (AAF): two events in June 1943 were the start of what became a twenty-seven-month period of ordnance research, development and testing shared between LAL and the AAF to *weaponize* LAL's work.

One event was Groves's selection of Navy Captain William S. "Deak" Parsons to lead LAL's ordnance program. Considered to be one of the military's best ordnance engineers, Parsons not only organized and led LAL's Ordnance Division, but in August 1944 he became Oppenheimer's Associate Director of LAL, and in March 1945 he was appointed Officer-in-Charge of Project Alberta to prepare for combat use of the bombs from a new air base on Tinian island in the South Pacific. Upon Parsons's death less than ten years later, his former LAL deputy eulogized, "There is no one more responsible for getting this bomb out of the laboratory and into some form useful for combat opera-

tions than Captain Parsons, by his plain genius in the ordnance business."<sup>5</sup>

The other June event was the AAF's selection of the B-29 Superfortress bomber to support the ordnance tests and fly the later atomic bombing missions. Aside from LAL's internal development and testing of certain bomb components, principal ordnance work centered on dropping evolving inert bomb designs from B-29s at the very high altitudes (30,000-plus feet) expected for the bombing attacks. As the bomb designs evolved, so too did the B-29 configuration, ultimately requiring a twenty-month period of plane modifications, codenamed Silverplate, to marry the planes to the final bombs. By the end of the war, sixty-five Silverplate B-29s had been delivered to the AAF, eighteen of which were used in the ordnance testing program.<sup>6</sup>

These two events initiated the first phase of the ordnance program, which had decidedly mixed results over its first fifteen months:

**Jun 43** LAL Ordnance & Engineering Division organized under Parsons; AAF selects the B-29 to carry the atomic bombs.

**Aug 43** Using a Grumman TBF Avenger, first drop tests of prototype scale model bomb at Dahlgren Naval Proving Ground, California; results are dismal.

**Nov 43** Silverplate prototype delivered to AAF's flight test center at Wright Field (now Wright-Patterson Air Force Base), Ohio; dedicated test crew assigned.

**Feb 44** First drop tests of full-scale bomb models begin at Muroc Army Air Field (now Edwards AFB), California.

**Mar 44** LAL begins planning plutonium bomb field test, codenamed Trinity; Silverplate prototype damaged; drop tests suspended pending repairs.

**Jun 44** Second drop test series conducted at Muroc.

**Jul 44** LAL cancels Thin Man work; assigns top priority to implosion bomb, codenamed Fat Man.

**Aug 44** LAL reorganizes to support Fat Man priority. Decisions made to expand drop test program and base it at Wendover Army Air Field, Utah, operated by the 216th AAF Base Unit (Special).

The B-29 test crew assigned in November 1943 included Major Clyde S. "Stan" Shields as plane commander and Lieutenant David Semple as bombardier. They would lead the ordnance test program through to its end in early August 1945. Considering Manhattan's supreme importance, their election undoubtedly was a testament to their aerial skills, but their value to the project over the next twenty months would go well beyond flying the B-29s.

Oppenheimer in March 1944, began planning a field test of the plutonium "Fat Man" bomb, recognizing that: "The many questions about a practical [implosion] bomb ... could only be answered by an



Fat Man sphere atop Trinity tower July, 1945. (Photo courtesy of the author.)

## PARSONS'S BROADER ROLE WAS RECOGNITION BY OPPEN- HEIMER AND GROVES THAT HE WAS INDIS- PENSIBLE TO MANHAT- TAN'S SUCCESS

actual experiment with full instrumentation.”<sup>7</sup> Sixteen months later, those many questions would receive unexpectedly spectacular answers.

### Reorganizing Ordnance Work

Beginning late 1944, reorganizations of LAL and the 216th spurred progress in preparing for the Trinity test and improving results of the ordnance test program:

- Aug 44** Parsons role expanded to include “...all aspects of the work having to do with ordnance, assembly, delivery, and engineering.”<sup>8</sup>
- Sep 44** Trinity test site chosen at Alamogordo Bombing Range in New Mexico. 509th Composite Group begins organizing at Wendover.<sup>9</sup>
- Oct 44** Three new Silverplate models assigned to 216th. Col. Clifford J. Heflin chosen to become 216th commanding officer. Oppenheimer approves initial plans for Trinity test.
- Nov 44** Shields assigned to 216th. Four new Silverplate models assigned to 216th.
- Dec 44** Navy Capt. Frederick L. Ashworth assigned to lead LAL ordnance work with the 216th. Trinity site base camp housing completed.
- Jan 45** Decision to organize 216th Special Ordnance Detachment. Heflin assumes command of the 216th.
- Feb 45** LAL finalizes Fat Man design. 216th Flight Test Section organized under Shields’s command. Drop tests resume. Five new Silverplate B-29s assigned to FTS. Shields begins daily diary of FTS work.
- Mar 45** LAL organizes Project Trinity under Kenneth T. Bainbridge. LAL Cowpuncher Committee formed to “ride herd” on all implosion work.

Parsons’s broader role was recognition by Oppenheimer and Groves that he was indispensable

to Manhattan’s success. But his additional duties necessitated bringing aboard Ashworth, another ordnance expert, to handle the increasing pace of drop tests with the 216th. Reflecting Groves’s sharp attention to Manhattan’s details, especially choosing the right people, he likely chose both Ashworth and Heflin.<sup>10</sup>

The 216th underwent a major reorganization in order to handle its ordnance responsibilities, which were far beyond the typical airfield operations duties of an AAF base unit. Two entirely new units were organized: a Flight Test Section (FTS) commanded by Shields that was responsible for the drop tests, support of LAL ordnance field tests, and advising on Silverplate modifications; and a Special Ordnance Detachment (SOD), soon to be commanded by Captain Henry Roerkohl, that was responsible for building the evolving drop test bomb models with LAL and creating new Silverplate bomb loading/unloading equipment.<sup>11</sup> The 216th’s reorganization was timely because LAL researchers in February 1945 completed the complex design of implosion technology, which helped determine the overall size (11 ft. long, 5 ft. wide), shape (“pineapple”) and weight (10,200 lbs.) of the drop test models and final bombs. Fat Man models quickly came to dominate the 216th’s ordnance work.

Also in February, Shields began keeping a classified “Daily Diary” that recorded FTS activities for the next six months, ending only a few days before the August 6, 1945 Hiroshima bombing mission. Shields’s diary appears to have only been shared with very top LAL officials and Wendover officers and, although declassified in 1973, it only became fully public in January, 2013. It is now an essential reference to understand how the first atomic bombs were created.<sup>12</sup>

### Ordnance Testing

The ordnance testing programs for Little Boy and Fat Man had several goals: produce designs whose ballistics properties ensured that they would follow predictable paths when dropped from 30,000-plus feet<sup>13</sup>; perfect the bombs’ internal technologies (e.g., firing circuits, proximity fuzes) to ensure that they would properly detonate at predetermined heights; utilize the bombs’ improving ballistics coefficients to prepare bombing tables for the bombing missions<sup>14</sup>; marry the bombs to the Silverplate B-29s to ensure failure-proof loading, unloading, carrying, monitoring, releasing and dropping both bomb designs; and assess the bombs’ air speed and time of fall to help determine how the mission aircraft would escape the blasts.<sup>15</sup>

Ashworth later commented, “The engineers to conduct the test work and I would fly from Kirtland [Army Air] Field in Albuquerque to Wendover each week for the next five months... Late Friday, after that week’s work was finished, we would fly back to Kirtland to prepare for the next set of test work the following week.”<sup>16</sup> Shields’s diary suggests the variety of issues that engaged LAL visitors at Wendover:

**Feb 20-25** Francis Birch (Leader, Gun) observes Little Boy drop tests, including as B-29 passenger.

**Mar 1** Shields and Donald Mastick (Ashworth assistant) discuss expansion of FTS, Los Alamos matters and drop test schedule.

**Mar 6** Shields checks "modification of the [B-29] front pressure door to take [Edward] Doll's (Deputy Leader, Fuze Development) radar installation."

**Mar 7** Shields receives Mastick memo recommending improvements in drop-test procedures; discuss next drop-test phase

**Mar 18** Shields, Mastick and Robert Brode (Leader, Fuze Development) witness mishandled loading of Little Boy unit; also discuss ordnance training for 216th.

**Mar 21** Shields expresses "consternation" about visit from Roger Warner (Deputy Leader, High Explosives).

**Mar 22** Semple and Mastick spend most of the day investigating premature release of Little Boy due to improperly connected B-29 electric circuit.

**Mar 25** Sheldon Dike (B-29 modifications) arrives from Omaha B-29 modification center with photos and blueprints of new fuel injection engines and synchronized propellers that will enable bombing from 35,000 feet.

**Mar 27** Ashworth, George Kistiakowski (Leader, Explosives Division) and Cmdr. Norris Bradbury (Leader, Implosion) observe high explosive (HE) bomb drop.

**Mar 30** Aboard B-29, Kistiakowsky observes poor Fat Man HE drop.

**Apr 22** Shields conversation with Ashworth and Dike regarding transfer of personnel to FTS armament section.

**Apr 24** Meeting of Heflin, Shields, Semple, Tibbets, Parsons, Ashworth, Norman Ramsey (Leader, Delivery) and Mastick regarding several matters.<sup>17</sup>

**Apr 25** Parsons and Ramsey observe test drop from 32,000 feet and "seemed very pleased" with the results. Semple promoted to Captain.

**Apr 26-30** Flying a C-47, FTS conducts three fuze tests for Brode using maneuver nicknamed "Dipsy Doodle."

As drop testing progressed, another ordnance assignment loomed for FTS, this one unprecedented: "Because only a limited number of measurements could be taken at Trinity, the ones to be selected became a critical topic of discussion [at Los Alamos]...Data were needed on both the performance and the effects of the weapon. Especially important were shocks, both the air blast, which would determine the height of their combat burst, and ground shock... *The most important Trinity measurements were concerned with the bomb's destructive power. Since the principal goal was to achieve the maximum blast wave energy from the least [nuclear] material, the laboratory placed the greatest emphasis on measuring the energy in the blast wave [emphasis added].*"<sup>18</sup>

But no technology existed for such measurements on the scale expected from the atomic blasts. So

*[Oppenheimer] asked [LAL physicist Luis] Alvarez to devise a way to measure the energy output of the bombs, when they went off over Japan. Alvarez asked if he could have his own B-29 bomber, as part of the bombing mission, to make those measurements, and Oppie said he could probably arrange that.... In talking to [LAL] theorists, they told [Alvarez] that the energy of [the bombs' blast] could be figured from the shape and duration of the shock wave, even if the wave were recorded at 30,000 feet above the [bomb's detonation altitude].*<sup>19</sup>

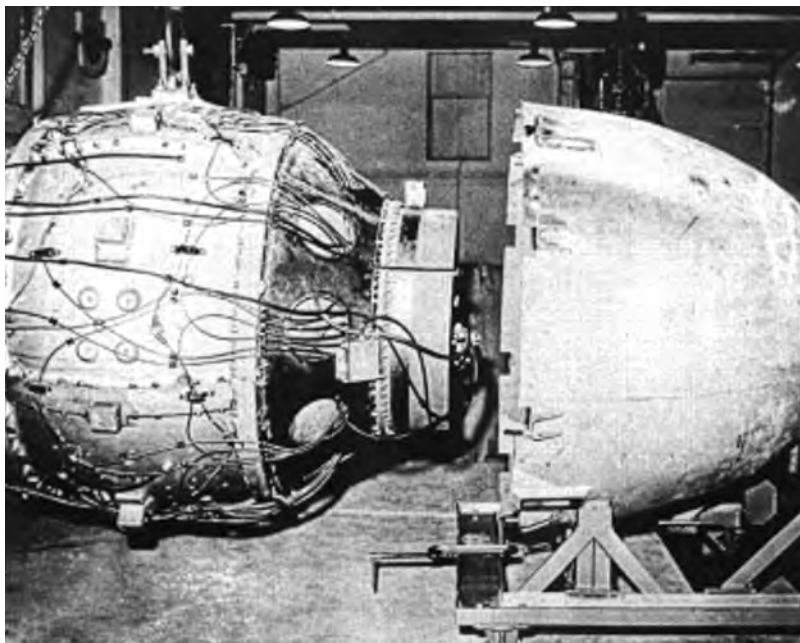
Alvarez later explained, "I would need a microphone calibrated so that its signal would increase as the blast wave hit it and decrease... as the wave passed by."<sup>20</sup> He assembled a small team of LAL scientists and technicians, who soon discovered that a related technology had been developed by a young university researcher who was signed on as a consultant to their project. Their final system utilized a microphone equipped with an FM transmitter and antenna packaged inside a three-foot long aluminum cylinder attached to a parachute. The cylinder would be dropped from a Silverplate B-29 over the blast to gather pressure wave data, and immediately telemeter that data to an FM receiver in the plane, that would record the wave on film. As a redundancy precaution, three cylinders would be dropped simultaneously.

In addition to measuring the blast's energy, the Fat Man test afforded Alvarez and his team the opportunity to conduct several other measurements. The blast would produce a growing radioactive "cloud" that they would measure for its size, shape, course, and gamma radiation intensity, the latter "by direct reading at a distance" and "by dropping film through cloud at intervals."<sup>21</sup> They would also film the event using a high speed camera that produced a slow motion recording. Another intended measurement was of "airborne products" that were to be trapped in special filters on the Silverplates.<sup>22</sup> And the AAF "wanted to know what the blast effects would be like on a plane 30,000 feet up and some miles away, simulating a bomb drop and scramble from the target area" but it is not clear if there were instruments to measure this.<sup>23</sup>

Meanwhile, Trinity project leader Bainbridge decided that it was essential to trial-run the Fat Man test with an all-hands-on-deck exercise nicknamed the "100-ton" test that took place May 7, 1945 at the Trinity site. Alvarez intended to test his blast measurement system during this trial run, but that depended on Oppenheimer getting him a B-29.

### Trinity's 100-Ton Test

"The breadth and intensity of the preparations...necessary for the [Fat Man] test cannot be overemphasized. The task was one of establishing under extreme secrecy and great pressure a complex scientific laboratory on a barren desert."<sup>24</sup> Thus did



Fat Man sphere being assembled into nose ellipse of Nagasaki bomb. (Photo courtesy of the author.)

**ALVAREZ AND ... PARSONS, ... PLOTTED ITS INTRICATE OPERATION: HOW THE PLANE WOULD APPROACH THE TOWER SECONDS BEFORE DETONATION, DROP ITS INSTRUMENTS TO MEASURE THE SPEED AND PRESSURE OF THE BLAST, THEN SWERVE AWAY IN TIME TO AVOID THE SPIRALING FIREBALL**

LAL's historian also frame the stakes for the 100-ton test: it was the only comprehensive field test of all those "preparations" for the Fat Man test coming two months later, including administrative procedures, equipment, instruments, etc. Despite its name, the trial run used 108 tons of high explosives, an amount that introduced uncertain risks because "very little experimental work had ever been done on blast effects above a few tons..." The explosives were set atop a twenty-foot tower at the Trinity site, because "appropriate scale factors" indicated that height would calibrate to the "100 foot height expected for the 4000 to 5000 tons [of TNT yield] expected..." in the coming Fat Man test.<sup>25</sup> The explosives were seeded with small amounts of radioactive product to simulate fallout that could be expected in the later Fat Man test. Shields piloted the B-29 for Alvarez that Oppenheimer had promised.

According to Shields's diary, on May 5 he and Semple flew a B-29 to Kirtland "...to conduct tests for Bernie Waldman [Co-Leader with Alvarez of Airborne Observations]. Four (4) flights were made. Two (2) during daylight hours on the 5th of May and 6th of May. Two blast tubes on chutes were dropped on the 6th. Meeting was held with people concerned and details for runs, timing, signals, etc. were worked out. Take-off was made at 0300, 6 May 1945 for practice mission. Results were satisfactory. Live run was made on 7 May. Drop was made and unit fired about 0445. Results were very satisfactory and everyone seemed pleased. Shock wave on aircraft was barely noticeable at 15,000 feet above terrain. At firing, aircraft was 26 seconds beyond target, or about 2¾ miles away from directly overhead. The glow was beautiful... returned to Wendover Field on 7 May at 1400."<sup>26</sup>

LAL's historian reported, "The [100-ton] test was successful as a trial run, and was used chiefly for suggesting methods for improving procedures for the final test... The high percentage of successful measurements in [the later Fat Man test] may

be attributed in large measure to the experience gained from [the 100-ton test]."<sup>27</sup> Trinity project leader Bainbridge wrote: "Three condenser gauges for measuring blast pressure were dropped over the target from a height 15000 ft above ground by the observation plane. One radio receiver in the plane was known to be out of order because of a fire, and one recording instrument failed. The other gave an excellent pressure-time record. The three parachutes had to be dropped in salvo instead of successively, as planned, because of failure in the bomb-release mechanism... The test appears to have been successful as a trial run. In the [Fat Man] test, it is to be hoped that a larger proportion of the measurements will be successful, but even if this were not the case sufficient data would be provided to answer a considerable proportion of the necessary questions."<sup>28</sup> Despite the success of the trial run, Bainbridge decided that two more weeks were needed "...to engage in the final tune-up and rehearsals, including a few with B-29 planes..."<sup>29</sup>

Shields had had a busy May. In addition to the 100-ton test and the ongoing drop tests, on May 14 he assumed command of the men and cargo planes of a section of a transport squadron that did not deploy to Tinian.<sup>30</sup> Yet June and July would be even busier for the 216th's airmen.

### **FTS Preparations for Trinity's Fat Man Test**

Shields's Diary reveals that one month after the 100-ton test he and Semple began the first of several days planning and rehearsing for the Fat Man test:

**Jun 7-8** Shields and Semple attend "various conferences" at LAL regarding "phases of coming [Fat Man] test work."

**Jun 18** Shields and Semple depart for three days of rehearsals at LAL; flew blast gauge test but "chute failed."

**Jun 27** Shields pilots rehearsal flight: "... four (4) blast gauges were dropped... all releases functioned normally. All chutes fell well and radar data on the rate of descent was gained."

One later account described the rehearsals in more detail: "The B-29 flew over Trinity daily, buzzing the shot tower in preparation for the test. Led by Luis Alvarez and Deac [sic] Parsons, the bomber group plotted its intricate operation: how the plane would approach the tower seconds before detonation, drop its instruments to measure the speed and pressure of the blast, then swerve away in time to avoid the spiraling fireball."<sup>31</sup> The "swerve" maneuver presumably was the vitally important "155 degree right turn" designed by Alvarez.<sup>32</sup>

Despite all its preparations for the Fat Man test, in June FTS nevertheless set a new record with five Little Boy and seventeen Fat Man drop tests.

Meanwhile, a date had to be set for the Fat Man test. It would be determined by the Trinity team's progress and by the weather conditions expected to prevail during the test. Summer is "monsoon" sea-



Flight test crew of Major Clyde "Stan" Shields, Sept. 20, 1945. (Photo courtesy of Keith Shields.)

**TRUMAN WANTED THE LATEST INFORMATION ON MANHATTAN'S PROGRESS, SO GROVES AND OPPENHEIMER CHOSE JULY 16 FOR THE FAT MAN TEST**

son in New Mexico, and rain and lightning would pose several problems: rain would drive radioactive residue to the ground in dangerous concentrations around the Trinity site rather than dissipating over broader areas; rain might obscure observations of the test; lightning would threaten the electric circuits of the bomb and test instruments; and severe downdrafts, turbulence and lightning would threaten the aircraft. At the end of June, Jack M. Hubbard, LAL's weather forecast expert, told Groves and Oppenheimer that over the next few weeks the fairest periods for the test would be July 12-14 and July 18-21.

But the new U.S. President Harry Truman was scheduled to begin a conference in Potsdam, Germany, on July 17, with British Prime Minister Winston Churchill and Soviet Communist Party General Secretary Joseph Stalin, to discuss wartime and post-war issues. In preparation, Truman wanted the latest information on Manhattan's progress, so Groves and Oppenheimer chose July 16 for the Fat Man test. Set between Hubbard's forecast of the best weather periods, their choice would cause problems.

On July 10, Shields, FTS Captain William Hartshorn, and their crews departed in two Silverplates for several days of "detached service" at Kirtland, beginning with four more days of Fat Man rehearsals. But ominously, as reported by Bainbridge, "The [July 11] afternoon rehearsals had to be changed to morning rehearsals because the daily afternoon thunderstorms interfered with the flight of the B-29 planes cooperating in the test and also produced electrical interference and pickup on lines. The second rehearsal was held the late morning of July 12, and the third the late morning of July 13, with the final rehearsal held at 11:59 the evening of the 14th."<sup>33</sup>

As the Fat Man field test approached, the great uncertainty as to how powerful it would be prompted some LAL scientists to wager on predictions ranging from zero to 45,000 tons of TNT. And LAL final calculations before the test predicted that

the yield "...would lie between 5,000 and 13,000 tons of TNT."<sup>34</sup> All the predictions and calculations were wrong.

## 216th B-29 Crews For Trinity's Fat Man Test

Shields's papers include a handwritten, undated note recalling some of those aboard the planes for the Fat Man test. Most significant, the note reveals nine 216th airmen were aboard the two planes and, because Shields presumably knew his FTS airmen quite well, his list arguably is complete and accurate.<sup>35</sup>

### Plane 1

A/C	Maj. Clyde S. Shields
Pilot	Capt. Richard R. Mann
Bombardier	Capt. David Semple
Unknown	Cpl. Ervin R. Rochlitz
Unknown	T/Sgt. Robert L. Blinn

### Plane 2

A/C	Capt. Wm. F. Hartshorn
Pilot	1st Lt. David W. O'Harra
Bombardier	Capt. Robert C. Von Graffen
Observer	Col. Clifford J. Heflin <sup>36</sup>

Of all FTS crews, the aircraft commanders and bombardiers shown above were the most experienced. They had flown the most drop tests, and the flight procedures for the later drop tests, the 100-ton test, the Fat Man test (and the Hiroshima and Nagasaki missions) were similar. FTS final records show that Shields flew 110 drop tests, Hartshorn 64, Semple 116, and Von Graffen 52.<sup>37</sup>

## LAL Observers Aboard the Trinity B-29s

It is surprising that, despite all that has been written about Trinity, relatively few accounts mention the LAL observers aboard the planes. Evidence assembled by the author indicates that at least nine LAL observers were aboard the two planes:

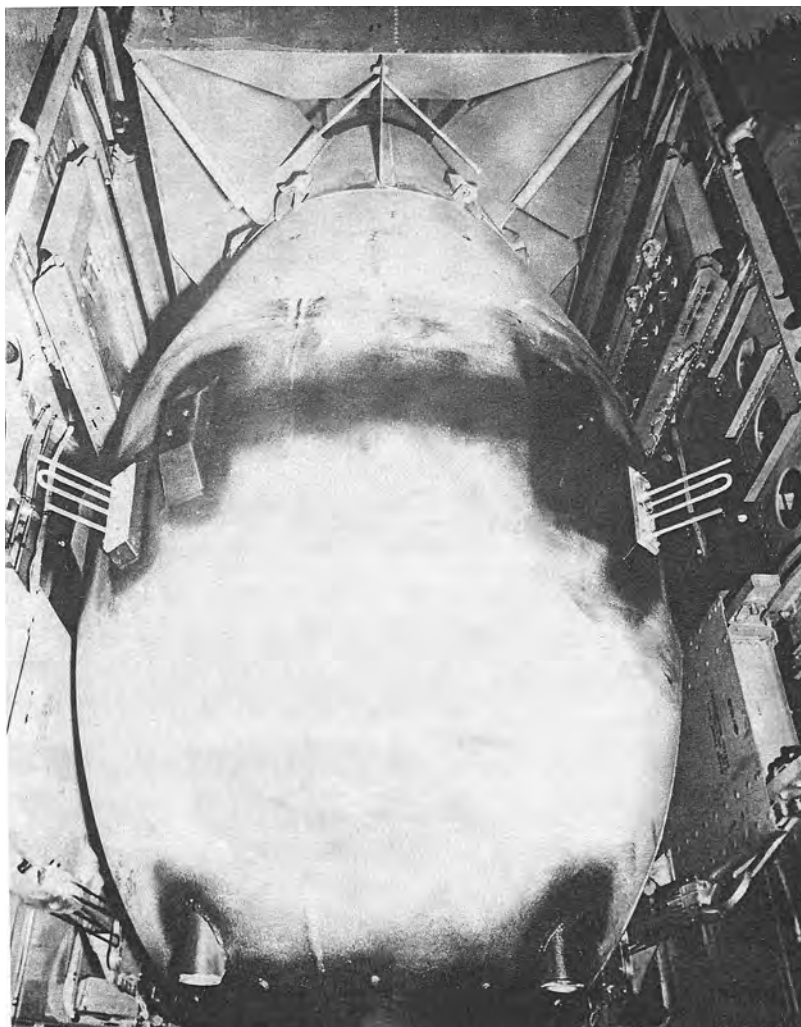
### Plane 1

Capt. Wm. S. Parsons	LAL Associate Director;
Leader, Ordnance Division	
Luis W. Alvarez	Co-Leader, Airborne
Observations	
Bernard Waldman	Co-Leader, Airborne
Observations	
Lawrence H. Johnston	Alvarez assistant, Energy
Yield Measurement	
Wolfgang K.H. Panofsky	Consultant, Energy Yield
Measurement	
Two technicians <sup>38</sup>	Unknown responsibilities

### Plane 2

Glenn A. Fowler	Aircraft Positioning
Wm. G. Penney	Consultant, Blast & Shock

One credible source for those aboard Plane 1 is a 2006 lecture that Johnston gave at Los Alamos in which he listed all seven men shown above.<sup>39</sup>



Fat Man test unit loaded in a 216th Silverplate B-29. (Photo courtesy of the author.)

**HUBBARD ASSURED GROVES THAT THE WEATHER WOULD BEGIN TO CLEAR... GROVES REPLIED, YOU'D BETTER BE RIGHT OR I WILL HANG YOU**

Similarly, in his 1987 autobiography, Alvarez listed the same men (except for the technicians), but mistakenly also included Harold M. Agnew,<sup>40</sup> who in a 1992 interview said that at the time of the Fat Man test he was already at Tinian.<sup>41</sup> Parsons, Alvarez, Waldman and Johnston would all later be aboard one of the three Hiroshima mission planes. Johnston was also aboard a Nagasaki mission plane, thereby earning the distinction of being the only person who witnessed history's first three atomic bomb explosions.

Regarding the identities of the technicians aboard Plane 1, most likely they were two of the four technicians who were part of Alvarez's team: T/5 Russell L. Ahlbrand, T/5 Walter Goodman, T/3 Emil C. Karas, and T/2 J. Wieboldt.<sup>42</sup> Goodman later joined Johnston aboard one of the Nagasaki planes, so he would have been likely to aboard Trinity Plane 1. If so, was among the very few men who observed two of the first three atomic bomb explosions.

Regarding LAL observers aboard Plane 2, the author has not located any sources as definitive and reinforcing as those of Johnston and Alvarez for Plane 1. Nevertheless, Glenn Fowler, a young radar specialist on Ramsey's team, was definitely aboard one of the planes with the task of positioning the two B-29s during their three-hour mission using "Identification Friend or Foe" (IFF) radar.<sup>43</sup>

In contrast to Fowler, the evidence that William George Penney was aboard Plane 2 is somewhat ambiguous, yet convincing to this author. First, Penney was serving as a consultant on the damage effects of the bombs, so he had a direct interest in the Fat Man blast measurement. Also, Penney was head of a group of nineteen British scientists working at LAL, and in a 1992 book about those scientists, Penney is said to have been "scheduled to be aboard" one of the planes. But author Szasz wrote that Penney didn't make the flight because, when the Trinity blast occurred, the planes were still grounded by the weather, and Penney was waiting in the officers' mess at Kirtland.<sup>44</sup> In a vague end-note, Szasz seems to attribute this account to a statement Penney may have made in 1988. Since there is no doubt that, although temporarily grounded by bad weather, the planes did indeed take off well before the blast, Szasz either misunderstood Penney or Penney, alone among at least nine LAL observers, was left behind.

There are other reasons to believe that Penney was aboard. Most persuasive to this author is that Shields's note lists one civilian aboard Plane 2, a "Pennington G. Britian," which the author believes is a mistaken recollection of Penney's name and an abbreviated and misspelled reference to Great Britain. Shields doesn't mention Penney in his Diary, which may indicate that they did not know each other at all or very well, which would explain why Shields did not accurately remember Penney's name and made the Great Britain notation to better identify him. Also suggestive is that Penney, as with four of Plane 1's LAL observers, later was important enough to earn a seat aboard a Nagasaki mission plane. Nevertheless, although Penney is mentioned in other sources as an "observer" at Trinity, the author has not yet found a source that definitively documents whether he was observing from the ground or from a B-29.

Silverplate models could carry up to twelve or thirteen men, (respectively, the totals aboard the Hiroshima and Nagasaki strike planes). Because Plane 2 presumably had room for up to five more passengers, one suspects that there could have been more LAL observers, but the author has only located vague references about a few others who may have been aboard.<sup>45</sup>

### Trinity's Fat Man Test

The July 16 test was scheduled to be triggered at 4 a.m., but "at 2:30 a.m. the whole test site was being racked by thirty-mile-an-hour winds and severe thunderstorms."<sup>46</sup> Hubbard assured Groves that the weather would begin to clear between 5-6 a.m., to which the always blunt-speaking Groves replied, "You'd better be right or I will hang you."<sup>47</sup> By 4:45 a.m. the storm began to moderate so the decision was made to trigger the bomb at 5:30 a.m.

The extra 90 minute wait could not have been comfortable for the 400 observers scattered at five desert locations, most with little shelter from the storms. Probably the most uncomfortable was a young

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HEIMER SUD-  
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LEAST 20  
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SEVERAL  
ACCOUNTS  
OF THIS  
EPISODE  
ATTRIBUTE  
THE FAILURE  
OF THE  
PLANES TO  
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DIRECTLY  
OVER THE  
BOMB TO  
EITHER THE  
WEATHER OR  
OPPEN-  
HEIMER

scientist huddled inside a flimsy, corrugated tin shack atop the 100-foot tower, who had been babysitting the Fat Man sphere most of the night.<sup>48</sup> In contrast, 95 miles away at Kirtland, the airmen and their LAL passengers were waiting in the officers' mess for the final decision. The commander of Kirtland objected to them taking off in the still stormy weather, but he was overridden. Those aboard likely hoped that they soon would receive a fair payback for all their work, but they were about to be shortchanged.

Although the storm was moderating, it didn't clear enough to allow the pilots to make their planned runs over the bomb. In a report to Secretary of War Henry L. Stimson, Groves wrote, "Because of bad weather, our two B-29 observation airplanes were unable to take off as scheduled from Kirtland...and when they finally did get off, they found it impossible to get over the target because of the heavy clouds and the thunder storms."<sup>49</sup> But also, Oppenheimer suddenly had doubts:

*... Oppenheimer called Alvarez at the last minute. He had cold feet about how big the explosion might be... He ordered us to be at least 20 miles away from the bomb when it exploded. Alvarez was very angry about this because it would make our measurements much weaker than would be expected. But we had no choice especially when we cooled down and realized that Oppie might know something we did not.*<sup>50</sup>

Other accounts say that Alvarez briefly argued his case, but in any event, the scientists had suddenly become little more than spectators. Several accounts of this episode attribute the failure of the planes to fly directly over the bomb to either the weather or Oppenheimer, but the two explanations are not mutually exclusive, so actually both were factors.

Six days later, Shields submitted to Ramsey a "Report of 'T' Test Aircraft Operations," which may have been the only report from any of the airmen in the two planes.<sup>51</sup> As a military report, it was likely to be relatively thorough and dispassionate, and it has been cited in at least one other account of the test. The author has not yet located a copy, but a sense of what occurred in the air can be gleaned from other reports and records.

In 2005, crediting several sources including Shields's report, one historian wrote,

*Five miles above the desert, two B-29 observation planes flew in widening circles, the men on board straining to catch a glimpse of the searchlight at Ground Zero far below. At the height they were flying, there was still an overcast, and it was almost impossible to see anything... A strange blue fire [St. Elmo's fire] appeared to burn around the two planes, streaming over the wings and past the windows, leaving a luminous wake in the sky.*<sup>52</sup>

In his 1987 autobiography, Alvarez recalled, "We tuned in the Trinity control room on our radios, circled in the stormy night twenty-five miles from the tower, and followed the progress of the countdown. As it came to its final moments, the pilot

banked and headed toward the tower." Alvarez also quoted from a report he filed shortly after the test: "I was kneeling between the pilot [Shields] and co-pilot [Mann] in B-29 No. 384 and observed the explosion through the pilot's window on the left side of the plane. We were about 20 to 25 miles from the site and the cloud cover between us and the ground was approximately [70%]. About 30 seconds before the object was detonated the clouds obscured our vision of the point so that we did not see the initial stages of the ball of fire...In about 8 minutes the top of the cloud was at approximately 40,000 feet as close as I could estimate from our altitude of 24,000 feet and this seemed to be the maximum altitude attained by the cloud. I did not feel the shock wave hit the plane but the pilot felt the reaction on the rudder through the rudder pedals. Some of the other passengers in the plane noted a rather small shock at the time but it was not apparent to me."<sup>53</sup>

In 2005, Johnston related: "We took off before dawn on July 16 and flew around listening to the countdown coming from the main bunker at Alamogordo. I started the recording system. We opened the bomb bay doors and at count zero dropped our parachute gauges. There was a flash as the bomb went off and we prepared for the shock wave to reach our microphones... The flash was pretty bright, even at twenty miles. The white light lit the ceiling of our plane, faded to orange and disappeared... We circled around the rising mushroom cloud awed by the magnitude of the effects that we were seeing that we had caused."<sup>54</sup> In his 2006 Los Alamos lecture, Johnston said, "Getting back to us guys in the B-29, I have been asked many times in interviews, what were my immediate thoughts when we saw the bomb go off? No problem remembering. I burst out 'Praise the Lord, my detonators worked!'... If the bomb had fizzled, we each would have had dark thoughts that maybe it was his fault."<sup>55</sup>

In a short newspaper article published on the fifth anniversary of the test, Hartshorn is quoted as saying, "We didn't know exactly what to expect, but we didn't have to be told that huge mushroom cloud boiling up was what we had been waiting for... We had been told about the expected size of the explosion and a little about the radioactive cloud that was expected, but you can understand the suspense."<sup>56</sup>

Shields's and Heflin's flight records are now available and, although they were in separate planes, their logs for the Fat Man test are almost identical. Shields recorded 3:10 of total flight time and Heflin recorded 3:00. Since a regular B-29 had a top speed of 358 mph, the 190 mile round trip between Kirtland and the Trinity site could take as little as thirty-two minutes, and a Silverplate stripped of 7,200 lbs. of turrets and armor plate presumably could do it faster.<sup>57</sup> This suggests that the planes could have been around the Trinity site and following the cloud for as long as 2 ½ hours. Also, of their total flight time, Shields recorded 2:10 at night and Heflin recorded 2:00. This further suggests that, of their total observation time, as much as 1:45



Major Clyde "Stan" Shields wearing his Legion of Merit Award. (Photo courtesy of Keith Shields.)

**ALTHOUGH THE PLANES WERE TOO FAR AWAY TO GET ACCURATE READINGS OF THE BLAST, ITS YIELD CLEARLY WAS IMMENSE AND FAR BEYOND WHAT HAD BEEN EXPECTED**

was at night when visibility would have been limited except for the light generated by the explosion.

In sum, although the planes were too far away to get accurate readings of the blast, its yield clearly was immense and far beyond what had been expected, undoubtedly reassuring everyone involved, including the AAF. A 1985 Los Alamos study estimated that the Fat Man test yielded almost 21,000 tons of TNT compared to Hiroshima's 14,000 tons and Nagasaki's 21,000 tons.<sup>58</sup>

#### **Manhattan's Sprint to the Finish**

Two days later, Shields sent a memo to Ramsey complaining that the test was "a good example" of LAL personnel's "inability to understand aircraft operations and their apparent disinterest."<sup>59</sup> His Diary doesn't further describe the matter, but the comment is perhaps evidence of the cumulative pressures he faced that July:

FTS conducted a peak 32 drop tests, 12 of Little Boy and 20 of Fat Man, essentially completing the program except for a couple of Fat Man tests in early August.

On July 27, in three B-29s, Hartshorn's crew and two from the 509th began a critical mission to carry Fat Man bomb assemblies from Kirtland to Tinian.

In late July, another FTS crew began a mission to carry "Bernie Waldman's stuff," consisting of all the equipment needed to record the Hiroshima and Nagasaki bombings.

The transport unit that Shields took over in May, "...carried 127,000 lbs. of freight and 356 pas-

sengers in a 30-day period," most of which probably occurred in June-July.

On July 23 Shields summarized his frustrations in very personal terms:

*The demands of the Project... as far as aircraft and test crews are concerned, has (sic) grown to amazing proportions. It is impossible for us to send a crew overseas [to Tinian], have two (2) crews at [Inyokern, California drop test range], furnish crews to [Kirtland] for Waldmans [sic] stuff and still continue to perform efficiently here [at Wendover] without crews to fly them or maintain them. Aircraft present something of a problem also. They are not like a car—you just can't step on the starter and go charging off into the "wild blue yonder" without taking into consideration a few other small items such as weather, availability of units, [work load] compliance, tech inspections, 50 and 100 hr. routine inspections, plus normal fatality rate on complicated flying machines. However, we shall endeavor to meet the requirements of the Project to the best of our ability, but please reserve us a padded cell or two—we can use them... On the 23rd of July Major Shields is going fishing for four (4) days and confidentially he doesn't care if the joint burns down while he's gone... Also, four (4) of the 1st pilots in the organization are expecting sons or daughters in the near future (including Major Shields) which also is not conducive to peace of mind.<sup>60</sup>*

At the end of August, Shields sent a memo to Oppenheimer that was a brief account of FTS's accomplishments and its "boundless" admiration for LAL's accomplishments. But surprisingly, he also said,

*Probably the thing that stands out more in our minds than anything else was the disappointment of being rejected as a team to drop the first Atomic Bomb. Capt. Parsons had given his word, when the tests were first started and we had proven the practicability of the weapon, that if it worked we would drop it.<sup>61</sup>*

Presumably, Shields was referring to February 1944, well before Groves and AAF Commanding General Henry H. "Hap" Arnold worked out plans for creating the 509th Composite Group. But Shields's frustrations and disappointments would have multiplied if had known that *all* of the 216th's accomplishments in 1945 would be long buried, and by an official order no less.

Groves anticipated the unprecedented public clamor for more information after Japan was bombed, so he had commissioned physicist Henry DeWolf Smyth to prepare an official, unclassified report, "Atomic Energy for Military Purposes." Released three days after Nagasaki, it would long serve as a guide to what could and could not be publicly revealed. Unfortunately for the 216th, the report said nothing about Manhattan's ordnance program. As related by his biographer, Parsons opposed releasing ordnance information because of

THEIRS IS A  
STORY OF A  
DIFFICULT  
AND DAN-  
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IN THE  
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its direct military usefulness, but Oppenheimer “found Smyth’s treatment of Parsons’s Ordnance Division ‘critically misleading’ and, in his review of a draft of the [Smyth] report, pointed out that, ‘[The Ordnance Division] had, and still has, the all-important and difficult job of making a weapon of this thing, of fuzing and designing it in such a way that it can be used in combat and can be effective. I take it that you won’t be saying much about this aspect of the work but you should certainly know that it is a very large set of problems and will increasingly be so.’ To overcome Oppenheimer’s objections, Smyth took the easy way out: he deleted everything dealing with the weaponization of the bomb—‘for reasons of security.’”<sup>62</sup> Perhaps this decision also swept away the 216th’s records into a top secret vault where they may remain, unexamined, to this day.

### Aftermath

The two months following the end of the war saw many changes at LAL and Wendover, including the exodus of key personnel (e.g., Oppenheimer) returning to their pre-war occupations. Because of overcrowding, LAL moved field testing to Oxnard Field (later Sandia Base), near Albuquerque, and because of the inconvenient distance between LAL and Wendover, AAF ordnance testing moved to Kirtland.

On September 21, 1945, new LAL Director Norris Bradbury convened a small conference at Wright Field to discuss future AAF aircraft that might be able to carry future atomic bombs: medium bombers B-45, B-46, B-47, B-48 and heavy bomber B-36. Heflin and Semple represented the 216th and, along with three Los Alamos personnel, opined that none of the aircraft in development would be suitable for carrying atom bombs because of limited speed, range, and/or load-carrying capacity. Among Bradbury’s later recommendations to Groves was to form a “semi-permanent committee” composed of two representatives each from Wright, Manhattan, and the AAF to “channel development problems that arise and to make recommendations thereon.”<sup>63</sup> Heflin was proposed as one of the AAF reps, but the AAF had other plans for him.

On September 28, 1945, Shields wrote a memo to “Whom It May Concern” that documented an impressive list of major accomplishments in the ordnance testing program 1943-1945. In addition to the drop tests, he listed bomb design modifications, Silverplate modifications, flight operations procedures, pioneering high altitude bombing, and training the 509th’s bombing crews.<sup>64</sup> (Curiously, an important improvement in Fat Man’s tail design is a matter of some confusion because of mysterious changes in original sources.<sup>65</sup>)

Information about the post-war military careers of the 216th airmen aboard the Trinity flights is available for only three of them: Shields, Semple and Heflin:

Shields returned to civilian life in October, and in November he received the Legion of Merit, the AAF’s fourth-highest award. He rejoined the AAF in

February 1946 and was assigned to Kirtland to pilot atomic bomb tests in Operation Crossroads until April 1947, when he became chief of flight testing at Victorville Field, California, 1947-1948. Shields died in 1977 at age 59.

When ordnance testing moved to Kirtland, Semple went with it. On March 7, 1946, filling in for another bombardier, “after dropping a Fat Man practice bomb, [Semple’s B-29] disintegrated for unknown reasons and spun into the ground from about 32,000 feet. All ten men on board died... [Semple] was scheduled to be the bombardier on one of the crews being considered for the honor of dropping the atomic bomb on Test Able of Operation Crossroads.”<sup>66</sup> He was 43 years old and had served more than 20 years, having first joined as an enlisted airman. The crew later assigned to Crossroads re-named their B-29 “Dave’s Dream” in Semple’s honor. Among his awards were the Silver Star, Legion of Merit, Distinguished Flying Cross, Air Medal, and Presidential Unit Citation. His military records were recently donated to the WWII Museum in New Orleans.

Heflin was relieved as Wendover Commanding Officer on October 22 and eleven days later became CO of Roswell Army Air Field, New Mexico, to which the 509th returned from Tinian and where its bombing unit was soon incorporated into the new Strategic Air Command. Heflin retired in 1968, after more than 30 years of exemplary service and was awarded the Distinguished Service Medal, in part for his role in Manhattan. His highly-decorated military career is summarized in a 2012 paper (see endnote 1) that first partially lifted the curtain concealing the 216th’s leading role in developing the atomic bombs. He died in 1980 at age sixty-four.

In sharp contrast to the unknown 216th airmen, post-war biographical information about the seven LAL men aboard the Trinity flights is widely available. But worth mentioning here, Alvarez returned to teaching and research at the University of California at Berkeley, was awarded the 1968 Nobel Prize in Physics, and in his 1987 autobiography wrote: “My last weeks at Los Alamos were not happy. Many of my friends felt responsible for killing Japanese civilians, and it upset them terribly. I could muster very little sympathy for their point of view...I have difficulty seeing why so many people see nuclear weapons as mankind’s greatest threat. Not one of them has been used since World War II, and without question they have prevented World War III...”<sup>67</sup>

In his Trinity scrapbook, Shields penned his thoughts about the project that dominated his life for three years:

*Toward this end we worked. This scrap book is about a small group of Army Air Forces personnel who ate, slept, and dreamed of the day when this would happen. Theirs is a story of a difficult and dangerous job performed in the cloudless vastness above 30,000'. Nowhere will you find mention of these pilots, bombardiers or enlisted men that made its use possible, but they know and are satisfied with a job “well done.”* ■

1. Darrell F. Dvorak, "The Other Atomic Bomb Commander: Col. Cliff Heflin and His 'Special' 216th AAF Base Unit." *Air Power History*, Winter 2012 Vol. 59 No. 4, pp. 14-27.
2. Scott W. Muselin from Cathy Cox, AFHRA Archivist, Aug. 14, 2012, Air Force Historical Research Agency, Maxwell AFB, Alabama. Copy in author's possession courtesy of Muselin.
3. For the period from its founding through the end of WWII, Los Alamos was officially known as Los Alamos Laboratory but code-named "Project Y" and often referred to as simply "Y" or "Project". After the war, it was renamed Los Alamos Scientific Laboratory and still later, Los Alamos National Laboratory, as it is known today.
4. David Hawkins, "Manhattan District History: Project Y: The Los Alamos Project: Vol 1. Inception Until August 1945." Los Alamos Scientific Laboratory, Los Alamos. (1946, 1947) p. 22.
5. Adm. Frederick L. Ashworth, quoted by Roger Meade, "Backward Glance," *Nuclear Weapons Journal*, Issue 1, 2010, Los Alamos National Laboratory, Los Alamos, 2010, p. 35.
6. Richard H. Campbell, *The Silverplate Bombers: A History and Registry of the Enola Gay and Other B-29s Configured to Carry Atomic Bombs*. (Jefferson, N.C.: McFarland & Company, 2005). pp. 159-60.
7. Hawkins, p. 266
8. *Ibid.*, p. 174
9. The 509th, commanded by Col. Paul W. Tibbets, flew the atomic bombing missions.
10. Regarding Ashworth, see Admiral Frederick L. Ashworth, *Frederick L. Ashworth: United States Navy: An Autobiography*. (Walla Walla, Wash.: Northwest Library Bindery, 2001.) pp. 157, 171: "[Groves] always insisted on having a spare for everything... I became the spare for Parsons." Regarding Heflin, see Dvorak, pp. 17-19.
11. Dvorak, pp. 19-21.
12. Major Clyde S. Shields, "Daily Diary For Flight Test Section." 216th Army Air Forces Base Unit, Headquarters Wendover Field, Wendover, Utah. February 2, 1945 – August 2, 1945. The diary is organized chronologically, not by page numbers. For an account of SOD's daily work, see James Les Rowe, *Project W-47*. (Livermore, Calif.: JA A RO Publishing, 1978).
13. "The number and complexities that must be taken into account [to accurately drop an unguided bomb] are daunting. The aircraft's speed over the ground, its horizontal distance to the aiming point at the instant of release, and its vertical distance from the target or altitude must be determined with small margins of error. The instant-to-instant yawing, pitching and rolling motions inherent in the flight of an airplane... impart their own accelerations to the bomb at the instant of release from the airplane and contribute to errors that are magnified many times during the bomb's fall to the target. The wind speeds and directions beneath the bomb bay and all the way to the ground also significantly affect the bomb's trajectory... A bomb's fall is retarded by air resistance, which depends on the air density, a function of its temperature, humidity of the air, atmospheric pressure, and speed of the falling bomb. Finally, there are the ballistics characteristics specific to the bomb itself: size, weight, shape, fin type, even the surface roughness of the casing." Stewart Halsey Ross, *Strategic Bombing in World War II: The Myths and the Facts*. (Jefferson, NC: McFarland & Company, 2003) pp. 123-124.
14. The bombing tables were matrices of factors for operating the mechanical computer of the B-29's Norden bombsight.
15. The maneuver to ensure the planes escaped from the atomic bombs' blasts has been memorialized as the "155 degree turn to the right," and the FTS deserves some credit for being among the first to practice it. According to one historian, the maneuver "... was designed by Luis Alvarez to place the Enola Gay as far away as possible from the burst during the bomb's drop to its detonation altitude of 1,750 feet above [Hiroshima]..." Lillian Hoddeson, et al, *Critical Assembly: A Technical History of Los Alamos During the Oppenheimer Years, 1943-1945*. (Cambridge: University Press, 2004.) p. 392. In addition to being a physicist, Alvarez was a rated pilot, so he certainly would have been capable of designing the maneuver. Tibbets sometimes has been credited for it, but in his autobiography he wrote: "The scientists had told me that the minimum distance at which we could expect to survive would be 8 miles... Calculations convinced me that the most effective maneuver would be a sharp turn of 155 degrees..." Paul W. Tibbets, Clair Stebbins and Harry Franken, *Mission: Hiroshima*. (Briarcliff Manor, N.Y.: Stein and Day, 1985.) p. 170.
16. Robert and Emilia Krauss, eds., *The 509th Remembered: A History of the 509th Composite Group as Told by the Veterans Themselves, 509th Anniversary Reunion, Wichita, Kansas, October 7-10, 2004* (Buchanan, MI: 509th Press, 2005.) p. 16. At a distance of about 50 miles, Kirtland was the closest Army Air Field to Los Alamos.
17. As suggested by these excerpts, Donald Mastick was a frequent visitor. Years later, he recalled, "I'll always remember one round-trip [drop test] when the plane threw a collector ring on one port engine. Stan [Shields] killed the engine and feathered out, grumbling. Then about 100 miles out of Wendover, another port engine went out. With a characteristic remark, Shields killed all remaining engines and settled down to dead-stick that heavy plane to a landing at Wendover... I was in the bombardier seat and during the last mile it seemed we were cutting off sagebrush. That was my most memorable experience at Wendover." Krauss, p.133
18. Hoddeson, pp. 351, 358-59.
19. Lawrence Johnston, "Adventures at Wartime Los Alamos." Lecture at Los Alamos National Laboratory, Los Alamos. (August 9, 2006) pp. 25-26.
20. Luis W. Alvarez, *Alvarez: Adventures of a Physicist*. (New York: Basic Books, 1987.) pp. 138-40.
21. Kenneth T. Bainbridge, ed. "Trinity." Los Alamos Scientific Laboratory, Los Alamos. (May 1976) p. 35.
22. Hawkins, p. 280.
23. Kenneth T. Bainbridge, "All In Our Time: A Foul and Awesome Display." *Bulletin of the Atomic Scientists*, Educational Foundation for Nuclear Science, Chicago. (May 1975 Vol. XXXI No. 5) pp. 45-46.
24. "Men who worked in well-equipped laboratories became familiar with field work." Hawkins, p. 271.
25. Hawkins, p. 270.

26. Shields Diary, May 8.
27. Hawkins, p. 271.
28. Bainbridge "Trinity," pp. 11-12.
29. Bainbridge "All In Our Time," pp. 41-42.
30. Dvorak, pp. 21-22 describes this added responsibility in more detail.
31. Lansing Lamont, *Day of Trinity: The Dramatic Story of the Los Alamos Atomic Explosion, and the Men Who, in July 1945, Opened the Nuclear Age*. (Kingsport Tenn.: Kingsport Press, 1965.) p. 157.
32. See endnote 16. Alvarez was a rated pilot, but may have been modest about his pilot skills: "Once, the pilot of a B-29 gave me the controls, and I put the plane into a well-coordinated 360-degree turn banked at 70 degrees, maintaining altitude to within forty feet. The pilot complimented me on my performance and asked casually if I knew the wings came off at eighty degrees." Alvarez, p. 268
33. Bainbridge "Trinity," p. 28.
34. Hawkins, p. 202.
35. Aside from Shields's papers, the author has located only one source published before 2012 that identified any of the 216th airmen aboard, and it only named Shields: Stephen Walker, *Shockwave: Countdown to Hiroshima*. (New York: HarperCollins, 2005.) p. 325. Walker credits a report by Shields, "Report of T Test Aircraft Operations" dated July 22, 1945.
36. Dvorak, p. 22, erroneously credits Heflin as pilot of Plane 2 based on his flight record for July 16, 1945. At the time, rated pilots on flying status who were on the flight order for a flight could log time in a heavy bomber as "First Pilot."
37. Clyde S. Shields, Memo: Test Section Personnel and Missions Flown, Headquarters Wendover Field, Flight Test Section, Wendover, Utah, Sept. 19, 1945. p. 1. Copy in author's possession, courtesy of Keith Shields.
38. According to Johnston, p. 28, these men were members of LAL's Special Engineering Detachment (nicknamed "SEDs"), an Army unit composed of enlisted, technically-skilled personnel that at its peak numbered 1,800 men.
39. Johnston, p. 28.
40. Alvarez, p.141: "Larry [Johnston], Harold [Agnew], and Bernie [Waldman] were aboard, and Pief [Panofsky] was our guest." Agnew at the time was a relatively junior scientist, but became Director of Los Alamos, 1970-1979.
41. Harold M. Agnew, Transcript, Voices of the Manhattan Project, The Los Alamos Historical Society, Los Alamos, November 20, 1992. <http://manhattan-projectvoices.org/oral-histories/harold-agnews-interview>
42. Bainbridge "Trinity," p. 23.
43. Interview, Glenn A. Fowler, May 17, 1983, SNL Archives; reprinted in *Sandia Lab News*, Sandia National Laboratories, Albuquerque, Jun. 12, 1983, p. 5.
44. Ferenc Morton Szasz, *British Scientists and the Manhattan Project: The Los Alamos Years*. (St. Martin's Press, New York, 1992.) p. 63.
45. One possibility is mentioned in a July 10, 1945 report by Louis H. Hempelmann, Jr., Director of LAL's Medical unit, concerning plans to track radiation from the Trinity blast: "It seems certain that two airplanes will follow the cloud. One airplane crew has instructions to follow the cloud for as much as 8 hours (Waldman's crew). The meteorologists expect to fly near the cloud but not for a time long enough to be useful to the [radiation monitoring equipment]." L.H. Hempelmann, "Preparation and Operational Plan of Medical Group (TR7) For Nuclear Explosion 16 July 1945." Los Alamos Scientific Laboratory, Los Alamos, June 13, 1947. Copy in author's possession. This seems to suggest that Plane 2 had meteorologists aboard, but it may simply be awkward phrasing. Also, Lamont, p. 187, writes, "Another medic would ride the B-29 observing the [Fat Man] test..." but offers no further details.
46. Kai Bird and Martin J. Sherwin, *American Prometheus: The Triumph and Tragedy of J. Robert Oppenheimer*. (New York: Alfred A. Knopf, 2005.) p. 307.
47. Richard Rhodes, *The Making of the Atomic Bomb*. (New York: Simon & Shuster, 1988.) p.665.
48. The young man was Donald F. Hornig, who later had a storied career in academia and advising President Lyndon Johnson. Douglas Martin, "Donald Hornig, Last to See First A-Bomb, Dies at 92." The New York Times, New York. (January 26, 2013)
49. General Leslie R. Groves, "Gen Groves' Memorandum Describing First Nuclear Test in New Mexico." *Public Broadcasting Service: American Experience: Truman: July 18, 1945*. [www.pbs.org/wgbh/amex/truman/psources/ps\\_memorandum.html](http://www.pbs.org/wgbh/amex/truman/psources/ps_memorandum.html)
50. Krauss, p. 110.
51. Shields Diary, July 22.
52. Walker, p. 61.
53. Alvarez, p. 141.
54. Krauss, p. 110.
55. Johnston, p. 30.
56. Associated Press, San Antonio Express, "Five Years Ago: First Atom Bomb Blast Recalled on Anniversary," July 16, 1950. Copy in author's possession courtesy of Keith Shields.
57. Campbell, p.1.
58. John Malik, "The Yields of the Hiroshima and Nagasaki Nuclear Explosions." Los Alamos National Laboratory, Los Alamos, September 1985, pp. 1, 17.
59. Shields Diary, July 18.
60. In a notable series of coincidences, Shields had been stationed at Bellows Field, Hawaii, when Pearl Harbor was bombed December 7, 1941; his daughter was born on August 14, 1945, the day Japan agreed to surrender; and his great-grandson was born on Pearl Harbor Day, December 7, 2007.
61. Robert S. Norris Papers, Hoover Institution Archives, Stanford, CA. Shields memo to Oppenheimer: "Subject: Final Diary - Flight Test Section, "Kingman" dated August 30, 1944.
62. Al Christman, *Target Hiroshima: Deak Parsons and the Creation of the Atomic Bomb*. (Annapolis, Md.: Naval Institute Press, 1998.) pp. 205-6. Ironically, Parsons's crucial role in Manhattan was mostly unknown until Christman's biography was published. Similarly, Hawkins's official history of LAL was written in 1946-47 but not declassified until 1961.
63. Norris E. Bradbury, Memo to General Leslie R. Groves, September 28, 1945. Archives, Los Alamos National Laboratory, Los Alamos. [www.lanl.gov/history/postwar/postwarworld.shtml](http://www.lanl.gov/history/postwar/postwarworld.shtml)
64. Major Clyde S. Shields, "Memo: To Whom It May Concern: Test Section Record," September 28, 1945. Copy in author's possession courtesy of Keith Shields.
65. There are factual conflicts between, as well as unexplained changes to, original sources regarding whether Ramsey or Semple should be credited with fundamental modification of the tail of the Fat Man drop test model, which dramatically improved the ballistics of Fat Man.
66. Campbell, pp. 187-188.
67. Alvarez, pp. 147, 152.

# Missed Opportunities before Top Gun and Red Flag





Michael E. Weaver

## AIR DEFENSE COMMAND HAD ... DIS- SIMILAR AIR COMBAT TACTICS TRAINING STARTING IN 1966

Important as they have been to the development of national defense, much history remains to be written about the advent of Red Flag and Top Gun.<sup>1</sup> Archival sources documenting the origins of Red Flag in the 1970s, for example, remain underutilized. Several books have laid out the story of the how naval aviators took the initiative to confront the problems the North Vietnamese Air Force was causing the United States' effort to achieve air superiority over North Vietnam, and how the U.S. Air Force responded in its own way during and after the war to the difficulties its jets had had with MiGs. The standard story is that aviators took the initiative to create the Top Gun school on March 3, 1969, where they relied on the air combat maneuvering experience of F-8 Crusader pilots in particular to develop their training syllabus. Top Gun instructors emphasized dissimilar air combat training—simulated combat between different kinds of aircraft—and “loose deuce” tactics, which utilized a formation of two jets as opposed to the Air Force’s “finger four” of four fighters. As a consequence of this training, the Navy’s F-4 aviators were better prepared to tackle North Vietnamese MiGs in 1972, when combat operations over the heart of North Vietnam recommenced. Navy ace Lt. Randy Cunningham, for one, repeated to whoever would listen “I owe my victories to Top Gun.”<sup>2</sup> Tactical Air Command (TAC) did not begin to make similar institutional changes until October 1972, when it established its first aggressor squadron, the 64th Fighter Weapons Squadron at Nellis Air Force Base, Nevada.<sup>3</sup> This article adds some new discoveries to this story, particularly the successes that Air Defense Command (ADC) had with dissimilar air combat tactics (DACT) training starting in 1966.

The problems the Air Force had in accomplishing air superiority during the Vietnam War have been well documented.<sup>4</sup> The institution knew before the initiation of Operation Rolling Thunder in 1965, that trouble was in the offing. An Air Force colonel at a Pacific Air Forces meeting, for example, complained, “One item that concerns me as much as anything is air combat tactics . . . I don’t think we have any F-105 or F-100 pilots in Southeast Asia who could fight their way out of a paper bag if they were really contested by MiGs today. There has been no real training on air-to-air tactics for a good five [years].”<sup>5</sup> The reason for this deficiency lay in assumptions the Air Force made after the Korean War: there would be no more medium-sized conventional wars due to the advent of nuclear weapons, therefore, the tactical fighter community concentrated on short-range nuclear bombing and neglected aerial combat. Col. Abner M. Aust, Jr., commented three months later that because of the

emphasis on nuclear attack with tactical fighters, “our tactics/techniques lessons learned during Korea and World War II were pretty much discarded.”<sup>6</sup> Less than a year into the Vietnam War, tactics specialists agreed that the Air Force’s preparedness for aerial combat was not what it should be: “Although a lot of ACT talk about the newer fighters has drifted across the bar in recent years, when the chips were down we really didn’t know in any thorough and documented fashion what to do.” Basic tactics were still taught, but their appropriateness to individual fighters at differing energy states had not been mapped out before the war.<sup>7</sup>

There had been some attempts to maintain those capabilities. Four years after Korea, Fighter Weapons Newsletter published a series of articles on air-to-air combat for the F-100 Super Sabre—the Tactical Air Force’s primary fighter at the time—most of which focused on individual aircraft maneuvers, and one aptly named “Flight Tactics.”<sup>8</sup> The Fighter Weapons School recommended seven one-hour sorties for its fighter weapons instructor course; its 1959 syllabus for the basic F-100 course contained three and a half flight hours for the employment of the new Sidewinder infrared-guided missile, three for intercepts, three more for air-to-air gunnery against a slow target towed behind another aircraft, but no air combat maneuvering training.<sup>9</sup> F-100s later struggled, however, during their first encounter with North Vietnamese MiG-17s on April 4, 1965, and the Air Force immediately pulled them from escort missions in favor of the new F-4C.<sup>10</sup> A couple of months later the Fighter Weapons School published an article on aerial gunnery,<sup>11</sup> and immediately thereafter the Air Force conducted Project Feather Duster, which tested the air combat capabilities of its F-100, F-104, F-105, and F-4C against the F-86H, which simulated the Mig-17—something that could have been accomplished prior to the escalation of American involvement in the Vietnam War.<sup>12</sup>

Within Air Defense Command (ADC), only the two remaining F-104A squadrons practiced air combat maneuvering (ACM) on a regular basis; other interceptors were normally prohibited from doing so.<sup>13</sup> Since ADC assets trained to shoot down bombers and had no reason to expect to encounter enemy fighters, their shortcomings in ACM jived with their primary mission. Based at Webb AFB, Texas, and Homestead AFB, Florida, the F-104A squadrons directed their attention toward Cuba and its MiGs. To that end in 1964, members of the 319th FIS learned tactics for use against other fighters from the 436th TFS, an F-104C unit located at George AFB, California. Once they returned to Homestead AFB, Florida, the squadron

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altered its training patterns to include ACM along with intercept profiles,<sup>14</sup> an understandable change given that the Cuban Air Force fielded fighter aircraft, not heavy bombers.

Within the Southeast Asia theater during the Vietnam War, USAF F-4 Phantoms were responsible for defending strike aircraft on missions over North Vietnam against MiGs, but had to struggle for opportunities to practice ACM. At the outset of the war, F-4 aircrews devoted only four sorties per year to ACM.<sup>15</sup> In 1966, one pilot noted after a MiG encounter that fighting the MiG was the first time he had ever engaged in ACM; he had never received any ACM training as an Air Force pilot.<sup>16</sup> During the first couple of years of the war, F-4 crews with some excess fuel on their return leg from a Rolling Thunder strike might practice a few ACM maneuvers on their way back to base,<sup>17</sup> but not until 1967 would the Air Force admit that its pilots needed this kind of training prior to entering a combat environment.<sup>18</sup> Worse, F-4 crews did not receive enough training in the employment of their missiles, and consequently often fired them outside of the missile's parameters. Ironically they also needed this ACM training in order to place their missiles within a proper firing envelope.<sup>19</sup>

ADC developed its own program for training in DACT in order to be ready for a new supplementary mission of providing air defense overseas. In 1966, ADC assets began to be seen as fighters to be sent to hot spots outside of the continental U.S., as had been done with PACAF F-102s to Vietnam in 1964.<sup>20</sup> Four years later true to form ADC F-106s from the 48th FIS participated in Operation Fresh Storm, which comprised of air operations in support of South Korea during the Pueblo Crisis.<sup>21</sup> That meant that they might have to engage enemy fighters—not strategic bombers—in combat, something for which they had not trained. ADC/ADOTT Project 66-1, “College Prom,” investigated solutions to this new challenge. The project took place at Minot AFB, North Dakota, from August 22 to September 17, 1966, and involved F-106s from the 5th FIS, with F-102s and F-104s functioning as adversary aircraft.<sup>22</sup> College Prom sought to discover how best to train F-106 pilots for combat against fighter aircraft. Specific test areas included formation flying, basic fighter maneuvers, visual identification of enemy MiGs, discovering which tactics were most appropriate against fighters, which were the least effective for the -106, the effects of air combat maneuvering on the jet itself, and to figure out the modifications necessary to the F-106's fire control system for engaging MiGs.<sup>23</sup> Altogether 127 F-106 sorties, forty F-104 sorties, and forty F-102 sorties were planned.<sup>24</sup>

College Prom utilized seven pilots to investigate and develop the best tactics for the “Six.” In terms of F-106 flying experience they ranged from 1490 hours to just seventy-one, with most possessing around 500 hours. Interestingly, the -106s used did not have G-suit attachments, so the pilots were going to have to be careful past five Gs. There was no need for high-G maneuvers against Soviet

bombers, so the absence of that feature was not peculiar. During the College Prom training sorties, however, F-106s frequently exceeded six G's during the exercise (the jet's limit was seven). Even without G-suits these pilots “did not exhibit a reduced capability to maneuver because of ‘G’ loads except when five or more sustained ‘G’s’ were experienced for 360 degrees of turn or comparable periods.”<sup>25</sup>

The syllabus began slowly and grew in complexity. Pilots during the first four flights practiced two-jet formation flying, elementary air combat maneuvers, recognizing when maneuvers were about to exceed a pilot's abilities—and recognizing when to back off. The first week also centered on instructions on how to avoid mishandling their aircraft and how to get out of dangerous situations, like spins. The pilots also flew four missions to investigate the aircraft's flight characteristics at high angles of attack, high G, “extreme pitch angles, and the use of the rudder “at low airspeeds and to assist in reversals and last ditch maneuvers,” and they explored “the F-106 flight envelope to determine if any undesirable characteristics existed which would affect the pilot's ability to perform aerial combat maneuvers.”<sup>26</sup> The dicta “Safety will be paramount during this test,” reflected a long time Air Force concern—concern over mid-air collisions—that functioned as a barrier to pilots' learning how to fight other aircraft.<sup>27</sup> Safety requirements included a minimum speed of 150 knots indicated airspeed, a minimum altitude of 10,000 feet above ground level, “5 miles visibility and 2,000' vertically from clouds,” a common radio channel, and the requirement that the wingman maintain sight of his leader during maneuvers.<sup>28</sup>

During the second phase of College Prom, the syllabus brought in the F-102 and F-104 as adversary aircraft. The Deuces gave the -106 aircrew the chance to practice against a jet that—although slower—could out-turn a -106. Clearly, this was in case they encountered MiG-15s or MiG-17s, so one wonders why the project did not utilize F-86Hs from the Air National Guard, as the Air Force had done in Project Feather Duster. Coordinating with another command may have been deemed too difficult.<sup>29</sup> The F-104 was the obvious stand-in for a MiG-21. The command utilized F-102s and F-104s as such “until they were deleted from the ADC inventory,” in 1971 and 1969, respectively.<sup>30</sup>

The F-106 pilots practiced air combat as a two-jet formation, learned more about the difficulties of “detecting, identifying, and attacking hostile fighters,” and began flying in four-jet formations. Starfighters presented challenges far different from the Deuce. It was basically as fast as the -106, but not surprisingly possessed “different flight characteristics.” F-102 missions occurred below 20,000 feet, those with the F-104 took place above that altitude. The Sixes utilized the finger-four formation for patrolling, then for attack split into two elements lead-trail with anywhere from three to fifteen miles of separation between the elements. A step away from the finger-four formation TAC utilized, -106s in this phase examined “the feasibility of both air-

**THE ADVERSARY AIRCRAFT WERE NOT PASSIVE TARGETS, EITHER. THEY MANEUVERED IN WAYS TO DEFEAT THE ATTACKING F-106s**

craft in the F-106 element launching missiles at different targets in the formation.” Pilots found that the requirement for the wingman to “stay with the leader for mutual protection” worked against this goal of maximizing the firepower of two jets, for “as the launch range for the missiles was approached, the azimuth angle to the wingman’s target became so great [that] his radar broke lock due to antenna azimuth limit. This occurred when targets were 6,000 to 9,000 apart, line-abreast. The element could separate enough to solve this problem on front attacks and rejoin after launch but on stern attacks separation to accomplish the missile launch allowed the targets to engage them individually before they could rejoin and support each other.” Another factor that worked against the goal of maximizing the formation’s firepower lay in tactical philosophy: “The primary duty of the wingman is providing visual coverage for the leader.” The project found, however, that the wingman could attack a separate aircraft from the one the leader had targeted if they were flying a high aspect attack profile greater than 135 degrees TCA. If less than 135 degrees, the wingman would target the same jet his leader was attacking, closing “to a loose fighting wing position after lock-on, being careful that lead was clear of the flight path of wingman’s missiles. The wingman was prepared to shoot on command if lead could not shoot.”<sup>31</sup>

The College Prom sorties not only trained the aircrews, they revealed the complexity of air combat in a learning process. In order to grapple with their fighter adversaries, F-106s during College Prom first received GCI vectors toward the adversary aircraft, which received warning on some missions of the F-106s’ presence from a GCI weapons director.<sup>32</sup> The adversary aircraft were not passive targets, either. They maneuvered in ways to defeat the attacking F-106s both during the intercept run-in and after the attackers closed, and they tried to position themselves behind the -106s for their own simulated IR missile or gun kills. These practice combats demonstrated the difficulties a wingman had in staying in position relative to his leader. For instance, when a wingman saw his leader light his afterburner, he was already a few seconds late in doing the same and was thus falling behind. “Staying and fighting” was not always the best decision, either, and the -106s learned to accelerate away from a fight at maximum power, then to get a vector back from GCI when ten miles away. They found that if an F-104 got within firing range dead astern, an F-106 did not have time to escape if the pilot saw it at the last second. “When starting on equal footing, the F-104 proved to be a formidable adversary only if visual contact could not be maintained.” The F-106 accelerated faster from a low initial speed than from a higher speed. The participants also found that it best to keep the -106’s airspeed up in turning fights in order to maintain a greater turn rate. Sometimes pilots entered “post-stall gyrations” as a result of violent maneuvers while trying to get into a simulated guns-kill position (they practiced that in anticipation of possibly adding a gun to the jet at a later date), but

found that recovery of normal flight was pretty routine by releasing backpressure on the control stick. With practice, the pilots found that they could maintain position behind an adversary in a maneuvering fight and complete the switch actions necessary to fire their weapons.

Among other findings were that the best search altitude was 5,000 feet below the target’s suspected altitude because the -106’s radar would point to the sky and not receive any ground returns, and because from that aspect the target’s radar cross-section was larger. Somewhat surprisingly the gloss grey finish of the ADC aircraft was harder to see “against a dark ground background” than the dark-camouflaged F-102s. Lighting the -106’s afterburner inside thirty miles from the target, however, resulted in a “white cloud of fuel vapor [that] gave away the F-106 position.” F-106’s flying stern intercept profiles were seen at five or six miles away, before they had completed their turn to the target’s tail, prompting the targeted aircraft to maneuver offensively. Intercepting pilots preferred to track the adversary on radar by eight miles, and as an aid they looked for tell tail signs like “contrails or smoke trails at ranges greater than ten miles.” If they did not see those clues they started looking for the target jet itself. The trailer needed to be within ten miles of his leader, lest the just-ID’d targets have too much time to react to the trailing jet. The trailer would “fly a position 30 degrees left or right of the ID element’s flight path” in order to make it harder for the alerted hostile aircraft to “engage the trailing element.”<sup>33</sup> The requirement to have the element leader fly past the suspected targets to visually confirm that they were hostile undercut the effectiveness of the F-106. The target aircraft would see the identifying Six as it flew past them, so they would know they were under attack—violating a basic rule of air combat: the best way to shoot down another aircraft is to make sure its pilot is unaware of your presence, or at least of your attack. This ID/shooter tactic could ensure positive identification of the target as hostile, but it also ensured that the target would be maneuvering defensively by the time the trailing interceptor shot its missiles, thus complicating firing sequence or even defeating the AIM-4F in flight by out-turning it. The targeted aircraft might even be able to target the shooter before it fired its missiles, or go after the identifying -106. Altogether this rule of engagement (ROE) forced the F-106 to avoid using its weapons to its best advantage.<sup>34</sup> Another lesson was that if the IDing -106 stayed and fought after accomplishing an ID, the shooter could not risk firing his missiles because he might hit his element leader. It was better for the lead aircraft to blow through straight ahead so the shooter would have only hostile aircraft in front of it (the leader would be out of the trailer’s missiles’ range), or climb up to a spot out of the way of the trailing shooter, then re-attack. Stern shooter/ID profiles were problematic, because “an attempt to climb to a position of advantage [by the lead F-106] resulted in the targets achieving a missile launch position on the ID element before it could use its

Advanced Aerial Combat Tactics Training "College Dart" for 5th Fighter Interceptor Squadron, Minot AFB, North Dakota. (Left to right) Lt. Col. James R. Mathews (IWS), Lt. Col. Byrum (Minot AFB), Maj. Ward (Marines), Lt. Cdr. Lewis (Navy), Lt. Col. Rutherford (Minot AFB), 1st Lt. Nicosia (Navy), Capt. Terry R. Luke (IWS). (Photo courtesy of AFHRA via the author.)



## THE F-106 CAN PERFORM ALL OF THE CLASSIC OFFENSIVE AND DEFENSIVE MANEUVERS IN A CLOSE-IN FIGHT

speed to separate to a safe range the since initial closure and separation rate was low.”<sup>35</sup>

Ideally, both F-106s in a two-jet element would fire their AIM-4Fs at two different aircraft, in a near head-on aspect at a range at which the enemy could not even see them. That way the enemy would not be maneuvering and would be easier for the missiles to track and hit. Striking without warning was a reasonable expectation for this era of fighter aircraft, because fighters seldom carried radar warning receivers (bombers did, but a subsonic bomber, such as a Bear, Badger, or Bison had little chance of evading an F-106 once the interceptor found it). This method would also keep the friendly fighters out of harm's way. Such head-on tactics resembled a joust, whereby the contestant with the longer lance would be able to hit first, but chivalry has no place in aerial combat. Hitting first against an opponent who does not know you are there is a necessary virtue in war.<sup>36</sup>

Although designed to shoot down bombers and not fighters, Operation College Prom, in 1966, discovered that the F-106 possessed a number of characteristics favorable for fighter vs. fighter combat. For instance, “The F-106 is extremely responsive to the rudder for directional control,” and “The rudder roll over the top very nearly duplicated the hose high reversals necessary to gain an advantage over an opponent during a scissors.” The Six proved to be very stable at high pitch angles, and even when flying as slow as 95 KIAS when pulling over the top of a loop, and it did not go out of control when stalled. Indeed, “All F-106 pilots expressed enthusiasm for

the confidence maneuvers and basic ACM because of superb aircraft response throughout the flight envelope.” This project's findings were pretty positive: “The F-106 exhibited excellent performance response to all aerial combat maneuvers with no undesirable flight characteristics,” and “The F-106 can perform all of the classic offensive and defensive maneuvers in a close-in fight.” The WSEM's [weapons system evaluation missile] and the MA-1 fire control system performed pretty well considering that they were designed for finding, tracking, and shooting non-maneuvering bombers. Of fifty missile attacks during the project, thirty-four succeeded, nine failed due to a malfunctioning radar, and seven because of “pilot error.” The MA-1 was able to compute firing solutions against hard maneuvering targets, something for which it was not originally designed. College Prom confirmed the need for electronic identification of enemy aircraft, because nearly every time an F-106 closed for visual identification, the adversary saw him first and took evasive action. The large white fuel vapor cloud that occurred when lighting the afterburner that others could see thirty miles away, however, concerned the writer of the final report. Although the current F-106 training program did not prepare F-106 pilots for the fighter vs. fighter environment, the project's officers concluded that a pilot would be reasonably capable of defending “himself if exposed to hostile fighters” after about twenty training sorties designed around ACM.<sup>37</sup>

The project flew forty-seven identification (ID) missions, and all nine of those flown by two-jet ele-

**WHILE COLLEGE PROM SHOWS THE BENEFITS OF ALLOWING DIFFERENT COMMANDS TO INNOVATE—ADC CONDUCTED IT IN 1966, THREE YEARS BEFORE THE NAVY ESTABLISHED TOP GUN—ONE WONDERS WHAT CAPABILITIES A MORE JOINT PROCESS MIGHT HAVE YIELDED**

ments “were successful.” Twenty-eight of the remaining thirty-eight were successful. The participating pilots discovered benefits of fighting as if the F-106 had a gun, for the aircrews realized that they could use a gun at ranges too close for the AIM-4F/G, and that a gun was necessary for killing an enemy aircraft that was on the tail of a wingman because a Falcon missile could not tell the difference between a friendly or an enemy aircraft. A Falcon fired at a MiG that was shooting at another American fighter might guide on the friendly jet and contribute another incident to the fratricide book. The F-106 had real potential as a close-in guns-range fighter: “Of 12 attempted [gun attacks] on F-104s all were successful due to the capability of the F-106 to turn tighter and fly slower than the F-104 in a close-in fight.” Against more maneuverable jets (a MiG-17 at slower speeds), the officers who studied College Prom suggested that the F-106 keep up its speed, use the vertical plane, and not get into a turning fight. Visibility from the cockpit, however, was limited for this kind of flying.<sup>38</sup>

All of the aircrews, both blue and red force, debriefed and instructed each other in person. To do so the participants made use of several sources of information in order to reconstruct what happened during each mission in order to debrief each other more intelligently and maximize their learning. Data from the GCI radar scopes provided a big picture, while “F-106 scope film” provided precise information as to the parameters when WSEMs were “launched.” F-104s provided their gun camera results, and the radar and infrared WSEM “Tapes were analyzed to determine if failure of the WSEM to acquire or track was because of target maneuvers at launch or after launch.” Every pilot wrote his version of what happened during the sortie after he had heard from everyone else during the debriefing. Another aid to learning was the two-seat F-106B, and the pilots found that they learned much faster when an instructor first demonstrated the correct way to complete a maneuver instead of relying on the “unsupervised trial and error method.”<sup>39</sup>

Not only are these interesting findings regarding the history of ADC in the mid-1960s, College Prom also illustrates a path that other American air forces could have pursued in preparing their pilots for war at an earlier date. While College Prom shows the benefits of allowing different commands to innovate—ADC conducted it in 1966, three years before the Navy established Top Gun—one wonders what capabilities a more joint process might have yielded. TAC had its own program for DACT, but College Prom also pointed out the need for sharing information, which apparently was a rarity between ADC and TAC until the early 1970s—an unfortunate reality considering that TAC-trained pilots were having difficulties with North Vietnamese fighters.<sup>40</sup> ADC aircrews began some DACT with TAC assets at Nellis AFB in 1967, but TAC brought that to an end in January 1969, because of the demands of training pilots for operations in Vietnam.<sup>41</sup> This stove piping may suggest that TAC was obstinate—“bomber interceptor pilots have

nothing to teach us.” Indeed, F-106 Capt. Don Carson later called TAC on this front in a letter to Fighter Weapons Review in 1973, noting that “ADC has been extremely active in the dissimilar ACT program for the past several years and has had an excellent exchange program with the Navy and Marine fighter Squadrons . . . please remember, ‘We fly fighters, too!’”<sup>42</sup>

Anyway, as a result of the new tasking for overseas deployments, the Air Force revised AFM 3-16 “Intercept Tactics for Air-to-Air Operations” by adding a chapter: “Air Superiority-Air Combat Tactics providing procedures for employment of air defense interceptors in the air superiority role.”<sup>43</sup> Furthermore, the Air Force made ACT training a priority for the interceptor pilots, requiring twelve sorties in order to be qualified.<sup>44</sup> The 71st FIS became the first F-106 unit to receive this new training, beginning in May 1967; ADC relieved it of its air defense duties while its pilots completed the syllabus that Interceptor Weapons School instructors along with “instructors from [the] ADC Tactics branch” provided.<sup>45</sup> When the 318th FIS began ACT training in July 1967, its historian noted that, “This is a completely new type of training for the aircrews [who] have been in ADC all their careers. This program requires twelve missions to be flown utilizing the F-106 as an Air-to-Air Day Fighter. For most of us in the squadron, Tactical Formation and Element Engagements were both challenging and very exciting. This program has been very beneficial to the aircrews both in morale and operation of the F-106 in its optimum capability.”<sup>46</sup> The 5th FIS gave this task “primary scheduling” for its pilots,<sup>47</sup> and the 94th FIS had fewer interceptors on alert when it began ACM training at the end of June 1968. The training was new, but not intense, as the initial ground school lasted only three days.<sup>48</sup> Full implementation of this requirement, however, proceeded slowly. The 49th FIS, for example, did not begin its ACT training in June 1969.<sup>49</sup> When the 319th FIS (F-104As) fought against F-106s during its March 1969 evaluation, the squadron’s historian referred to this as “a new twist.” “The results of this engagement were eye-catching as the Starfighter proved superior in the ‘eyeball-to-eyeball’ contest by scoring four . . . MAs [mission accomplished] against the enemy force.”<sup>50</sup>

Following the promising results of College Prom, the Interceptor Weapons School initiated “College Dart” at Tyndall AFB, Florida in 1968.<sup>51</sup> This was a training program also designed “to prepare unit pilots for deployment to an area where they might encounter a hostile fighter threat.” The 318th and 460th FIS were the first squadrons to be a part of this program,<sup>52</sup> and ADC once again utilized F-104As from Homestead as adversary aircraft, flying them, for example, against jets from the 94th FIS during March 1969.<sup>53</sup> The Air Force made ACT training a priority for the interceptor pilots, and continued the twelve sortie requirement in order to be qualified.<sup>54</sup> While this program prepared interceptors for going up against MiGs, when the 71st FIS deployed to Osan AB, South Korea in 1969,

**THE TOP GUN SCHOOL ASKED AGAIN FOR F-106S TO JOIN IN DACT IN AUGUST [1971], AND ADC READILY APPROVED BECAUSE, "ALL PARTICIPANTS HAVE BENEFITED IN THE AREAS OF TACTICAL DEVELOPMENT AND REALISTIC TRAINING AGAINST THREAT TYPE FIGHTERS"**

its most noted missions were two intercepts of Tu-95 Bear bombers during a winter snowstorm over the Sea of Japan.<sup>55</sup>

ADC<sup>56</sup> held a conference in October 1969 to provide some standardization to the tactics its interceptors would use against other fighters. Among the topics were "revisions to ADCM 51-106, Vol. III, qualification training, continuation training, use of B model during ACT [air combat tactics] training, reduced G limitation during ACT training, college dart, six pac tactics, fluid four formation procedures, fighting wing versus double attack, [and] escort tactics."<sup>57</sup> The interceptor pilots were learning a lot while these decisions were being made, finding as a result of fighting F-104s that the similarly-sized MiG-21 would be hard to see, and that F-106 radars would not detect them at great distances. Pilots of the 94th FIS found that four F-106s "line-a-breast" was best for visual lookout, but that the finger-four formation neither lent the protection for the lead element it was supposed to provide, nor did it place the formation "in a position to offensively command." Furthermore, the fighting invariably broke down into combat by two-jet elements, not four-jet fighting wings. It was best to keep the F-106 fast because of its superior maneuverability at high speed, and if one searched just below Mach 1, F-106s could go supersonic "almost instantaneously through afterburner use." Finally, the infrared "boresight mode of the Fire Control System [was] highly effective in acquiring the target for a kill in the maneuvering 'dog-fight.'" This was all good to know, because these pilots were flying patrols out of South Korea a month later in June 1969 to ensure that another EC-121 was not shot down by North Korean MiGs.<sup>58</sup>

By the winter of 1969-1970, ADC confirmed that aerial combat tactics would be a part of the training regimen for "all F-106 units." Once a pilot qualified during initial training, his continuation training consisted of "two ACT sorties per month." The command stipulated that "An ACT sortie consists of approximately 30-45 minutes devoted to ACT maneuvering of which only five to ten minutes maximum would be at other than normal flight loads."<sup>59</sup> But even with this added emphasis on ACT, the command reminded its units that, "The prime mission of FIS units is air defense and all units must be capable of accomplishing that mission at any given time."<sup>60</sup> Given this priority, the 5th FIS, for example, obtained a waiver from the ACT requirement in order to have more time to keep its MA-1 systems operable.<sup>61</sup>

ADC continued to provide its fighters with DACT as the new decade commenced. In summer 1970, F-102s from Perrin AFB, Texas, served as adversaries for the 49th FIS F-106s in their College Dart program.<sup>62</sup> The training consisted of eight F-106s on each training mission, two missions a day, for four weeks.<sup>63</sup> The command was about to gain a new opportunity for this kind of training, however, because in March 1970, the Navy, specifically VF-121, the F-4 squadron at Naval Air Station Miramar, sought out F-106s for DACT. This

squadron was significant as the home of the Navy's Fighter Weapons School, which the Navy had established in March of the previous year. Within a week ADC agreed to the request and added that, "This type of training would be mutually beneficial to both commands as a method of developing and updating tactics while gaining experience in realistic air-to-air engagements." The deputy chief of staff for operations, Maj. Gen. Joseph L. Dickman, followed up by proposing that the Air Force host the Navy for joint DACT training "at selected F-106 bases;"<sup>64</sup> this began in June 1970.<sup>65</sup> Their cross-pollination took off; aircrews from the 94th FIS, for example, were flying DACT missions against Navy aircraft at Miramar by February 1971.<sup>66</sup>

Beginning in June 1971, entire squadrons flew to Tyndall AFB to conduct the sorties. Eleven classroom hours and nine sorties spread across three to four weeks, "depending on the number of pilots to be trained," comprised the syllabus. Following three DACT flights "preferably" against [Navy] F-4 Phantoms, a class flew three more "against strike forces." The last three taught escort tactics for both fast and slow aircraft, such as the EC-121.<sup>67</sup> The following month, Navy F-4s flew to Tyndall for the first time to participate in the DACT training of College Dart.<sup>68</sup> The Top Gun school asked again for F-106s to join in DACT in August [1971], and ADC readily approved because, "All participants have benefited in the areas of tactical development and realistic training against threat type fighters. For ADC units, these programs have proved to be the most valuable ACT continuation training available."<sup>69</sup> The 2d and 49th FIS's joined in from August 30 to September 10, and the participants subsequently provided suggestions and observations on tactics that were effective to higher headquarters.<sup>70</sup> The leadership of the 49th FIS wrote that, "The College Dart deployment was a tremendous success. All pilots involved received invaluable training and increased their fighter versus fighter proficiency."<sup>71</sup> The pitch of DACT between the Air Force and Navy increased when F-4s from Oceana Naval Air Station flew to Tyndall to fly against Interceptor Weapons School class 72-3 at the end of November 1971.<sup>72</sup> Ideally each ADC squadron would participate in College Dart biannually, but there was not enough money to pay for that so as of November 1971, only the 5th, 87th, and 318th FIS's were slated to participate.<sup>73</sup> It continued to be ADC's desire that year that every F-106 pilot "be ACT qualified."<sup>74</sup>

Tactical Air Command was watching, noticing in spring 1971, the way in which the Navy integrated DACT into its training, designating an aircraft as an adversary "based on the similarity to the anticipated threat rather than on the basis of availability." ADC already considered that kind of training "mission essential."<sup>75</sup> As a result of the tactical fighter symposium at Nellis AFB in June of that year, TAC set out on a more ambitious, systematic program to refine combat tactics and train its pilots that would culminate four years later with the first Red Flag exercise (another story!).<sup>76</sup>

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In the opinion of the commander of ADC, Gen. Thomas K. McGehee, DACT against Navy aircraft had produced “an unexcelled capability to perform the air-to-air mission against both bomber and fighter attacks.” In selling ADC’s capability to Air Force Chief of Staff Gen. John D. Ryan, he asserted that “we should not lose sight of the fact that the demonstrated world-wide capability of our F-106s and EC-121s represents the only mobile air defense capability available to the Joint Chiefs,” an odd statement that would seem to overlook the capabilities of TAC, USN, and USMC F-4 squadrons. In fact, McGehee was trying to hold on to a mission for his command. There was discussion of removing the world-wide air defense deployment tasking from ADC’s set of missions, and he did not want ADC to be “the only operational Air Force command not so charged.” General Ryan maintained ADC’s deployment mission, but given the diminutive size of the command, he did not think it wise to “advertise” “the deployment capability of scarce air defense resources.”<sup>77</sup> The fact that ADC interceptors were available for such exercises also suggests that the Soviet ICBM threat had achieved so much overkill that the Americans saw the Soviet bomber threat as superfluous. ACT and DACT were inherently risky, as in a September 1971 situation in which a pilot lost control of his jet “due to improper pilot techniques during low speed ACT maneuvering.” The need to fly the F-106 to the limits of its capabilities clashed with the great desire of the generals to avoid aircraft and aircrew losses to accidents resulting from pilots losing control of their jets. The leadership decided that pilots were going to have to terminate dogfights whenever “airspeed or altitude are deteriorating towards an unsafe condition irrespective of whether established minimums have been reached. The spirit of competition must not be permitted to affect the requirement for absolutely safe ACT operations. Unit Commanders will assure that there is no stigma attached to disengagements called for safety reasons.”<sup>78</sup> At least one pilot did not change his priorities and nearly crashed as a result in January 1972. He was “over-aggressive” in his “attempt to engage at high altitude and low air-speed.” General McGehee warned that these were training flights and as such, not crashing aircraft and not dying were the first priorities. “Engagements must be broken off before an unsafe condition develops. In no way will there be any implication of a contest or ‘score’ kept on who shot who. This command cannot stand another accident during ACT training and I will not condone a recurrence of an incident of this nature.”<sup>79</sup> The pilots had to remember that training was the goal, not trying “to prove one pilot or unit’s ability over another.”<sup>80</sup>

The deputy commander for operations and training at the IWS also recognized that College Dart pilots had to avoid crashing airplanes into each other or the whole program would be at risk, or worse. In 1972 ADC was the only portion of the Air Force conducting DACT, and there was “considerable interest at all levels of Air Force Command, up to and including the Air Staff, as well as from the

other participating services. If this vital program is to survive, absolute safe conduct is essential.” Col. William C. Sullivan repeated warnings that pilots had to avoid becoming too aggressive, and simply had to terminate ACM that was approaching an unsafe situation “immediately.” They needed to remember its true purpose. “Score keeping,” he added, “or other attempts to imply superiority by any group will not be tolerated. This program is in no way a contest. It is a controlled learning environment. . . . Learning outcomes must be determined by each individual aircrew participant and not related to any so called ‘box score.’” Because these were learning exercises, Sullivan reminded them that they were to utilize every kind of input during the debriefs in order to reconstruct what happened as best they could. Finally, “Safety will be the prime consideration to the extend of sacrificing any or all other mission objectives.”<sup>81</sup>

Related to the safety issue was the over-stressing of aircraft airframes. Pilots rarely over-G’d their -106s, but it did happen.<sup>82</sup> Pilots were also “over-G-ing” their Sixes during these missions, which risked reducing the life of the airframes, or worse, breaking them mid-flight. The limit for the F-106A was eight Gs, with seven for the B model. Early data revealed an over-G of an A model took place on average 1.4 times every 4,000 flight hours, and seventeen times every 4,000 hours in the B.<sup>83</sup>

The College Dart program was innovative in more ways than one. Students at the IWS, for instance, raised the level of detail in the preparation for and analysis of each mission. Class 71-C produced a research report that “was so comprehensive and far-reaching that IWS feels all ADC units should be aware of their efforts.” It mapped out procedures and briefings for both pilots and weapons directors to a degree of detail not seen before.<sup>84</sup> Aerospace Defense Command then revised College Dart in 1972; the program was never just for pilots; weapons directors, both in EC-121s and in mobile ground-based control units benefited from the exercises. The training expanded to include deployments with Alaskan Air Command assets, to TAC bases, and vice versa.<sup>85</sup> In the spring, the IWS hosted an aerial combat tactics symposium for all of the services.<sup>86</sup> Over in New Mexico, two ADC officers spoke at the Air-to-Air Analysis Symposium at Kirtland AFB “on ‘The Problems in Multiple Aircraft Engagements.’” Their presentation was also an appeal to industrial representatives of “the need to develop real-time accurate monitoring and playback of air combat engagements in three dimensions,”<sup>87</sup>—a prelude to Air Combat Maneuvering Instrumentation. The efforts also produced a tactics manual, ADCM 3-1, “entitled F-106 Fighter versus Fighter Tactics.”<sup>88</sup>

College Dart merged the ADC/Naval DACT program in 1972, and the program at Tyndall “became known as Air Superiority Tactics training to distinguish it from College Dart conducted elsewhere”<sup>89</sup> For example, the topics covered during the August 21-25, 1972, ASTT included energy maneuverability, two-jet DACT, “strike escort (4 vs 4),” and “slow

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escort (4 versus 4).” ADC’s “Air Superiority Indocination Course” a.k.a. “Mini Dart,” consisted of three DACT, four strike intercept, and two escort missions, seventy-two sorties in all, over a period of five days. Each side—F-106s and F-4s—received its own GCI controller for the DACT sorties, for example, and for the strike intercept missions, four F-4s escorted three F-101Bs. Four F-106s tried to shoot down the F-101B strike force.<sup>90</sup> At the same time, an officer evaluated the F-106 against the F-4E with slatted wings (which improved maneuverability) at Nellis, and a pair of IWS instructors examined the classroom side of the Navy’s Top Gun school.<sup>91</sup>

Before and during the outbreak of the invasion of South Vietnam by mechanized forces of the North Vietnamese Army in the spring of 1972, Navy and Marine F-4 units came to Tyndall on a regular basis in 1972 for DACT against F-106s. In January, for example, F-4s of VF-154 and VMFA-251 went up against F-106s from the 318th FIS. All three squadrons praised the quality of GCI the IWS controllers provided, “one of the outstanding learning outcomes derived from this course.” The Marines sent their own controllers to the IWS in March to learn GCI methods from the IWS controllers.<sup>92</sup> In February, the 87th FIS flew against Marine F-4s at El Toro MCAS in “Project Have Partnership,” joint AF/USMC aerial combat training.<sup>93</sup> The IWS held another “ACM instructor pilots’ symposium” on May 25-27, with officers from the “USAF, USN, and USMC fighter weapons schools as well as from several tactical units of all services” in attendance.<sup>94</sup> Before the year was out, ADC analysts concluded after “maneuvers with the Navy at Point Mugu NAS, [F-106] superiority over the F-4 and F-8 was well documented (3:1).” That is a difficult assertion to accept, because an F-106 pilot could not fire his missiles if pulling more than three Gs because that would over-stress the weapons bay doors. It also took too long to open them and extend the missile launching racks: three seconds.<sup>95</sup> College Dart was producing successes for combat pilots. According to a letter to the DCS of Plans and Operations, Navy Lt. Randy Cunningham “during his debriefings” credited the sorties he flew in College Dart as “one of the primary reasons for his success in downing five MiGs.”<sup>96</sup>

Interceptor pilots relished the College Dart deployments. For three weeks starting November 16, 1972, the 5th FIS practiced against TAC, Navy, and Marine aircrews: “The pilots were very impressed and enthusiastic toward this type of training and returned to Minot with a new knowledge of tactics for dissimilar aircraft and passed this information on to the rest of the squadron.”<sup>97</sup> In January 1973, eight pilots of the 87th FIS flew out to Miramar to train against F-4s, F-8s, and A-4 Skyhawks, completing forty-six DACT sorties over the course of six days. The members of the “Red Bulls” considered the TDY “an outstanding success” as did their Navy comrades. Everyone gained “invaluable experience in unlike air combat tactics against a formidable and well trained foe.”<sup>98</sup>

All this gained high-level attention from big Air

Force. The commander of the Air Defense Weapons Center, Brig. Gen. Lawrence J. Fleming, briefed General Ryan on College Dart on July 14, 1972, who then suggested that TAC send a couple of flights to Tyndall to evaluate the program. TAC sent F-4Es for College Dart missions in August and November and left with a favorable impression, but with “reservations because of shortcomings in ‘tactics’ training potential of the program.” Compliments from the Air Staff, however, were plentiful.<sup>99</sup> The bulk of the TAC pilots who did were instructors from the Fighter Weapons School at Nellis AFB, and this was the first time TAC assets participated in College Dart/ASTT. This DACT training highlighted the importance of GCI to the air superiority mission: “As usual, IWS GCI control was particularly admired by the visiting forces, noting the high degree of skill and assistance provided by controllers knowledgeable in the art of ACT.”<sup>100</sup>

In fall 1972 this training continued to become more broadly joint, and indeed, it had nothing to do with training on shooting down strategic bombers. F-8J Crusaders participated for the first time, and they “surprised many participants with its added power for ‘zoom’ capability,” a result of uprated engines. During the final College Dart of the year, USAF F-4Es and Navy and Marine F-4Js functioned as adversary aircraft for interceptors from the 5th FIS. The IWS also served as host for the Royal Air Force’s Central Tactics and Trials Organization; officers from both exchanged ideas on “weapons systems and tactics employment.”<sup>101</sup> At the end of the year an ADC captain, Robert L. Blair, “was a member on the Dissimilar Air Combat Maneuvering Panel” at the “1972 Tactical Fighter Symposium” held at Nellis AFB, demonstrating that the interceptor community was not only taking a joint service approach to training, it was providing leadership, as well.<sup>102</sup>

The end of the Vietnam War saw no letup in the pace of DACT training. The F-106 detachment at Homestead AFB, for example, managed to engage Navy F-4Js from Key West in a couple of DACT missions during the second quarter of 1973.<sup>103</sup> The 5th FIS deployed several jets and personnel to Miramar Naval Air Station in California in October 1973 for DACT against VF-154, a Navy F-4 squadron. They found that they gained a more objective understanding of their abilities and shortcomings when they emphasized “complete, accurate, objective flight debriefings, devoid of partisan emotionalism . . .”<sup>104</sup> McCord’s 318th FIS carried out a College Dart deployment to El Toro in February-March 1974 to fly against Marine F-4s.<sup>105</sup>

College Dart lost no momentum in the mid-1970s. From July through December 1975, for example, the 5th, 48th, 49th, 84th, 87th, and 318th FISs—all of the F-106 active squadrons—flew against a variety of opponents, including Marine F-4Bs of VMF-321, Navy F-4Js of VF-21, F-14s of VF-142 and 143, F-8s from VMF-351, and a package of TAC F-4s, F-105s, F-111s.<sup>106</sup> In 1976, all of the FISs got to complete multiple College Dart deployments, adding F-15As and A-4Fs to their list

of adversaries, and Navy and Marine squadrons readily functioned as adversaries for ASTT courses.<sup>107</sup> From April 1977 to September 1978, crews from the 5th, 48th, 84th, 87th, and 318th FIS's hassled against Navy, Marine, and TAC fighters.<sup>108</sup> College Dart, however, was not the optimal program for preparing aircrews for fighting enemy aircraft because they studied and prepared against the tactics of *American* jets. The 49th FIS, for example went to "Tyndall AFB in July [1974] for dissimilar ACT with Marine F-8s and Air Force F-4s. A concentrated ground school is planned to discuss tactics and flight characteristics of the F-8s and F-4s,"<sup>109</sup> with particular concentration on the tactics F-8 Crusaders flew.<sup>110</sup>

The focus for air combat training in the Air Force was, however, shifting to Nellis AFB and the Fighter Weapons School by this time. Development of fighter training was becoming less stovepiped; representatives from ADC and the IWS attended a fighter symposium at the Top Gun school in April 1975, and the IWS was interested in "a closer interface between IWS and Top Gun (NFWS). The two schools could mutually benefit from an exchange of ideas on tactics."<sup>111</sup> Later that summer the IWS participated in the 1975 revision of Tri-Command Manual 3-1 at Nellis; the services were standardizing the tactics that tactical, naval, and air defense fighters used.<sup>112</sup>

TAC was somewhat of a late-comer. After the Vietnam War, TAC studied DACT and two-jet formations and tactic more closely. On October 15, 1972, it activated the Aggressor Squadron, the 64th Fighter Weapons Squadron in order to provide DACT to TAC fighters; the unit was operational in June 1973. It also recognized the value the Navy had received by training against F-106s.<sup>113</sup> The format of the Aggressor squadron's syllabus and approach to instruction was quite similar to what ADC and the IWS had been providing: detailed briefings and debriefings, short courses at a fighter wing's base as well as courses at their home station (Nellis AFB), and integrated use of GCI and weapons directors. The Aggressors, however, flew *Soviet* tactics—not Navy F-8 Crusader tactics, nor Air Force F-4 Phantom tactics. In this way Aggressor training would improve the air combat

capability of the United States' air forces even more than had Operation College Dart.<sup>114</sup> By the late 1970s, Red Flag and the revamped Fighter Weapons School had essentially absorbed the air combat training mission, and ADCOM became a subset of TAC in 1979: ADTAC. Red Flag exercises utilized Air Force, Navy, and Marine assets. Pilots from different commands and services shared knowledge, methods, and efforts toward a common goal. College Dart was phased out in May 1983 as the the Air Defense Weapons Center was retired.<sup>115</sup>

ADC had initiated a training program that contained every element TAC's advanced train utilized a decade later, with the exception of ACMI and the E-3 AWACS, neither of which existed in 1966. That is nice, and interceptor veterans can point to their tactical fighter counterparts in the Navy and TAC and argue that "we were first," but all of them should have been on the same page, together.

I have found no evidence that it occurred to ADC leaders to share their practices in 1966, with TAC or PACAF, nor have I found any evidence that leaders from PACAF or TAC asked or cared. ADC initiated formal DACT training for its F-106 aircrews in 1966. A less stove-piped military would have begun to expand operation College Prom to TAC, PACAF, and Navy F-4 units training for war before that year came to an end. With the natural consequences of interservice training, air superiority squadrons could have entered the final year of Operation Rolling Thunder and then Operation Linebacker with months and then years of advanced training under their belts, and fought more effectively against the North Vietnamese Air Force.

Once ADC began flying DACT against Navy jets in 1970, its leaders concluded that, "Realistic training and tactics validation in aerial combat maneuvering can only be effectively accomplished through unlike fighter engagements," and in 1971 recommended to the office of the chief of staff that "Continued high level emphasis should be placed on providing this type of training for all tactical fighter types."<sup>116</sup> The Air Force's interceptor community during the Cold War never shot down a Soviet bomber; but it did contribute leadership to the improved training and readiness of fighter squadrons from all of the services. ■

## NOTES

1. All documentary file numbers are from the Air Force Historical Research Agency, Maxwell Air Force Base, Alabama. Where necessary, excerpts have been declassified IAW EO13526 or by the Southeast Asia Declassification and Review Team. Thanks are in order to Archie Difante for reviewing hundreds of pages of documents for this article. The views expressed in this article are my own and do not reflect the views of the U.S. Air Force, Air University, the Department of Defense, nor the U.S. government.

2. Robert K. Wilcox, *Scream of Eagles: The Creation of Top Gun, and the U.S. Air Victory in Vietnam* (New York: John Wiley & Sons, Inc., 1990), 113-291, quote on 288. John B. Nichols and Barrett Tillman, *On Yankee*

*Station: The Naval Air War over Vietnam* (Annapolis, Md.: Naval Institute Press, 1987), 79-86. "The Rise and Fall of the Aggressors," *Air International* 49:1 (July 1995): 23-28. Hearings before the Committee on Armed Services, *United States Senate*, 93rd Cong., 1st sess., (March 1973), 4077.

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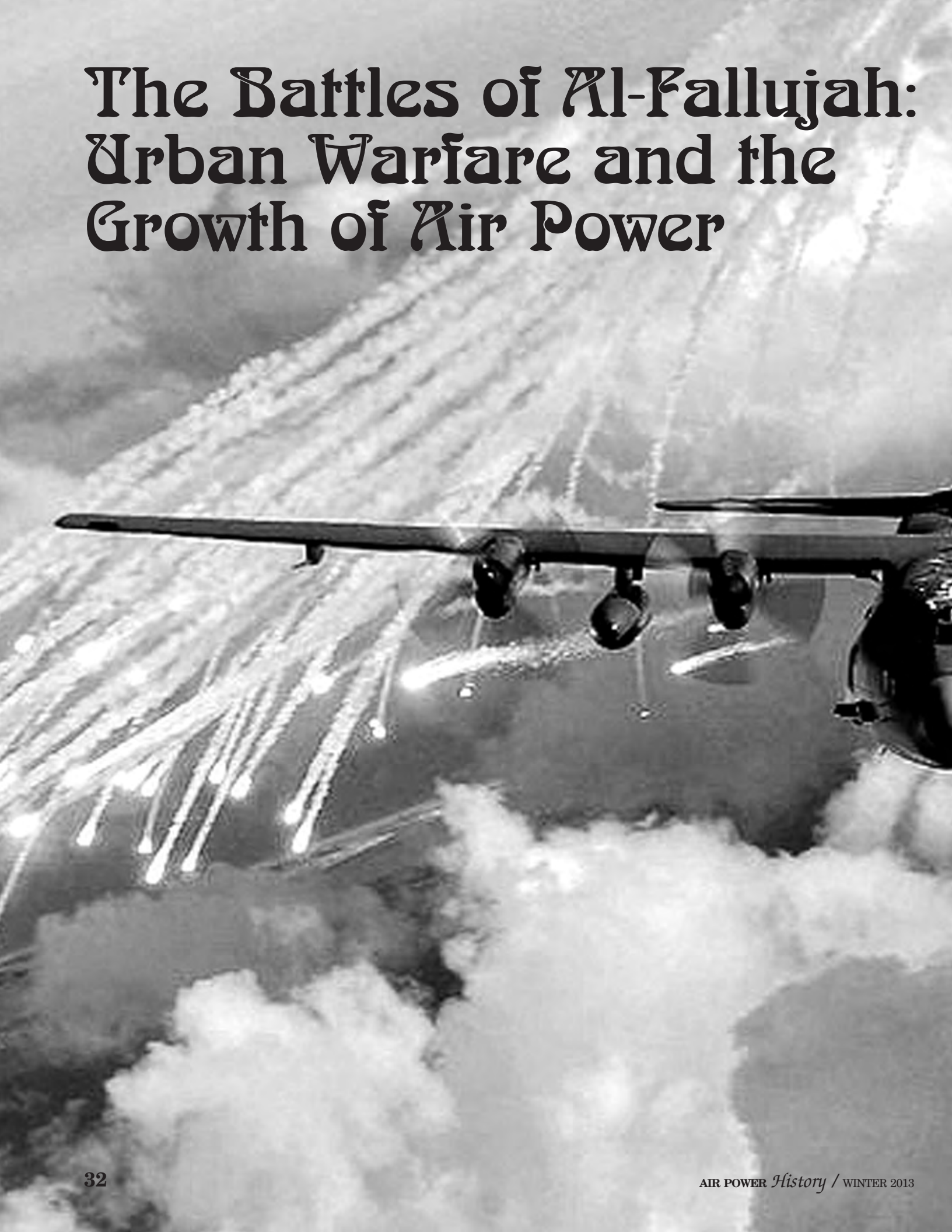
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  24. *Ibid.*, Maj. Peter D. O'Neill, Final Report, "College Prom," ADC Project 66-15, 1 October 1966. K410.01-17 July - December 1966, vol. 4. K-SQ-FI-5-HI, September 1966.
  25. O'Neill, Final Report, "College Prom."
  26. *Ibid.*
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  32. *Ibid.*
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  34. *Ibid.*
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  45. Historical Record of the 71st Fighter Interceptor Squadron for the period ending 30 June 1967. K-SQ-FI-71-HI, 1967. Office of Information, 28th Air Division, ADC, News Release 120-69. K-SQ-FI-71-HI, October-December 1969.
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  47. Historical Record of the 5th Fighter Interceptor Squadron, December 1969. K-SQ-FI-5-HI, 1969.
  48. Historical Record of the 94th Fighter Interceptor Squadron for the Period Ending 30 June 1968. K-SQ-FI-94-HI, January-June 1968.
  49. Historical Record of the 49th Fighter Interceptor Squadron for the Period Ending 30 June 1969. K-SQ-FI-49-HI, January-June 1969.
  50. "Historical Record of the 319th Fighter Interceptor Squadron, 1 January 1969 - 31 March 1969. K-SQ-FI-319-HI, January-June 1969. Additional squadrons commenced this training in 1969, such as the 87th FIS. Historical Record of the 87th Fighter Interceptor Squadron for the period ending 30 June 1969. K-SQ-FI-87-HI, January-June 1969.
  51. History of ADCOM, 1 July – 31 December 1975, 43. K410.011 75/07/01 -75/12/31, vol. 1. Steve Davies makes brief mention of College Dart in *Red Eagles: America's Secret Migs* (Midland House, UK: Osprey Publishing, 2008), 29-30. Another author refers to College Dart as a "spin-off" of Top Gun. Anthony Thornborough, *Modern Fighter Aircraft: Technology and Tactics. Into Combat with Today's Fighter Pilots* (Sparkford, UK: Patrick Stephens Ltd., 1995), 12. Lt Col C. Horner [probably Charles Horner] mentioned College Dart during his March 16, 1973 testimony to the Senate Armed Services Committee. Hearings before the Committee on Armed Services, *United States Senate*, 93rd Cong., 1st sess., (March 1973), 4400.
  52. Wing Commander Patrick J. Cabourne, RAF, Message from ADC, "College Dart Training," 31 December 1969. K410.01-21, FY 1970, vol. 4. Cabourne was an exchange officer from the Royal Air Force.
  53. K-SQ-FI-319-HI, Jan-Jun 1969. Historical Record of the 94th Fighter Interceptor Squadron for the Period Ending 30 June 1969. K-SQ-FI-94-HI, April-June 1969.
  54. K-SQ-FI-5-HI, 1969.
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  56. The Air Force changed the name of ADC to the "Aerospace Defense Command" on January 15, 1968. K410.01-19, January – June 1968, vol. 1.
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  60. Col. John M. Winkler, Message from ADC to 20AIRDIV, "ACT Training Program, 48 FIS," 23 March 1970. K410.01-21, FY 1970, vol. 6.
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  62. Col. Arthur W. Owen, Jr. Message from ADC, "Advanced Aerial Combat Tactics, College Dart," 16 April 1970. K410.01-21, FY 1970, vol. 4.
  63. Maj Gen Joseph L. Dickman, Message from ADC, "College Dart Training," June 1970 (no day given). K410.01-21, FY 1970, vol. 4.
  64. Maj Gen Joseph L. Dickman, Message from ADC to CNO, "Dissimilar ACT Training," 27 March 1970. K410.01-21, FY 1970, vol. 6.
  65. Maj. Haight, Message from ADC to CSAF/XOOS, Final Report, 1971 Tactical Fighter Symposium, 17 September 1971. K410.01-21, FY1972 vol. 5.
  66. Historical Record of the USAF Interceptor Weapons School, period ending 31 March 1971. K410-012 January-March 1971.
  67. History of the Aerospace Defense Command, Fiscal Year 1972, 236-37. K410.01-21, FY1972, vol. 1.
  68. Historical Record of the Interceptor Weapons School, for the period ending 30 June 1971. K410.012, April-June 1971. The Navy squadrons were VF-92 and VF-96; the 84th FIS was the F-106 squadron. *Ibid.*
  69. (Name illegible) Message from ADC to AIG 7142/DOT, "Navy/ADC ACT Training at Miramar," 19 July 1971. K410.01-21, FY 1972, vol. 5.
  70. Col. Lauren B. Hollenbeck, Message from ADC to 21 AirDiv, "Navy/ADC Training at Miramar," 16 August 1971. K410.01-21, FY 1972, vol. 5.
  71. Historical Record of the 49th Fighter Interceptor Squadron for the Period Ending 31 March 1971. K-SQ-FI-49-HI, January - December 1971.
  72. Col. Ranald T. Adams, Jr. Message from ADC to CNO/OP-591, "ACT Training," October 1971. K410.01-21, FY 1972, vol. 5. This message was CC'd to the office of the chief of staff of the Air Force, CSAF/XOOSN.
  73. History of the Aerospace Defense Command, Fiscal Year 1972, 236-37.
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  79. Lt Gen Thomas K. McGehee, Message from ADC to AIG 7142/CC, "F-106 Control Losses," Jan. 26, 1972. K410.01-21, FY 1972, vol. 5.
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83. (Name unreadable), Message from ADC to AIG 7142/DO, "Exceeding F-106 Load Factor Limits," 15 February 1972. K410.01-21, FY 1972, vol. 5.
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86. Historical Record of the USAF Interceptor Weapons School for the period ending 31 March 1972. K410.012 January-March 1972.
87. Historical Record of the USAF Interceptor Weapons School for the Period Ending 31 March 1972. K410.012, January - March 1972.
88. Letter to Lt. Gen. George J. Eade, 6 June 1972.
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91. Historical Record of the 4757 Air Defense Squadron (IWS) for the period ending 30 September 1972. K410.012 July - September 1972.
92. Historical Record of the USAF Interceptor Weapons School for the Period Ending 31 March 1972. Message from ADC to 23rd Air Division, 13 January 1972. K410.01-21, FY 1972, vol. 6. Message from ADC to CNO/OP-591, "ACT Training," October 1971. This message was CC'd to the office of the chief of staff of the Air Force, CSAF/XOOSN.
93. Historical Record of the USAF Interceptor Weapons School for the Period Ending 31 March 1972.
94. Historical Record of the USAF Interceptor Weapons School for the period ending 30 June 1972. K410.012 April - June 1972.
95. Lt Col William G. Dolan, Jr. "Final Report, Phase I, ADC/ADWC Project 70-37 F-106 Externally Mounted Missiles," 27 October 1971. K410.012 October - December 1971.
96. Letter to Lt Gen George J. Eade, 6 June 1972.
97. Historical Record of the 5th Fighter Interceptor Squadron, December 1972. K-SQ-FI-5-HI, 1972.
98. Historical Record of the 87th Fighter Interceptor Squadron for the Period Ending 31 March 1973. K-SQ-FI-87-HI, January-December 1973.
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100. Historical Record of the 4757 Air Defense Squadron (IWS) for the period ending 30 September 1972. K410.012 July - September 1972.
101. Historical Record of the 4757 Air Defense Squadron (IWS) for the period ending 31 December 1972. K410.012 October-December, 1972. The adversaries were from the 31st and 33rd TFW, VF-14, VF-32, VMFA-251, and two F-8 Crusader reserve squadrons: VF-201 and VF-202. The Air Force-Navy training program may not have been widely known. In a March 13, 1973 testimony before the Senate Armed Services Committee, a Navy representative, Lt Cmdr McKeown, replied "no, sir," when Senator Barry Goldwater asked him if the Navy had "any mutual training with the Air Force" in terms of air-to-air combat training. Hearings before the Committee on Armed Services, *United States Senate*, 93rd Cong., 1st sess., (March 1973), 4081.
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104. Historical Record of the 5th Fighter Interceptor Squadron, (ADC), December 1973. K-SQ-FI-5-HI, 1973.
105. Historical Record of the 318th Fighter Interceptor Squadron for the period ending 31 March 1974. F-SQ-FI-318-HI January-March 1974.
106. History of ADCOM, 1 July - 31 December 1975, 44. K410.011 75/07/01 -75/12/31, vol. 1. Historical Record of the 49th Fighter Interceptor Squadron for the period 30 September 1975. K-SQ-FI-49-HI January-December 1975. Historical Record of the 319th Fighter Interceptor Training Squadron for the Period Ending 30 September 1975. K410.012 75/07/01 - 75/09/30, vol. 5.
107. History of ADCOM, 1 July - 31 December 1975, 161-62. Historical Record of the 319th Fighter Interceptor Training Squadron for the Period Ending 30 June 1976. K410.012 76/04/01 - 76/06/30.
108. History of ADCOM, Jan. 1, 1977 - Dec. 31, 1978, 169. K410.011, 01/01/77 - 12/31/78, vol. 1.
109. Historical Record of the 49th Fighter Interceptor Squadron for the period ending 30 June 1974. K-SQ-FI-49-HI, 74/04/01 - 74/06/30.
110. Maj. Gen Richard H. Schoeneman, Recommendation for ADC "A" Award, 49th Fighter Interceptor Squadron, draft, no date. K-SQ-FI-49-HI, July-September 1975.
111. Maj. Thomas A. Cardwell, Maj Robert J. Casey, TDY Trip Report, Navy Top Gun Fighter Symposium as ADWC/IWS Representatives, 14 April 1975. K410.012 75/04/01 - 75/06/30, vol. 3.
112. Maj. Robert J. Casey, TDY Trip Report, Tri-Command Manual Conference, 10-16 August 1975. K410.012 75/07/01 - 75/09/30, vol. 5.
113. Col. M.F. Ewing, Dept. of the Air Force, "Special Order GA-234," 10 October 1972. K417.0735, FY1973, vol. 2. Captain Mike Press, "Meet the Aggressors," *Fighter Weapons Review* (Fall 1973), 30-33. Ronald L. Rusing, "Prepare the Fighter Force - Red Flag/Composite Force," (Thesis, Command and General Staff College, 1980), 11-12.
114. Capt. Mike Press, "Meet the Aggressors," *Fighter Weapons Review* (Fall 1973), 30-33.
115. History of ADCOM/ADC, 1 January--31 December 1979, 143. K410.011 Jan-Dec 1979, Vol. 1. USAFIWS Farewell & Reunion, "Operation Snowman" 1954-1983. K410.012, Jul-Sep 1983, Vol. 3.
116. Maj. Haight, Message from ADC to CSAF/XOOS, Final Report, 1971 Tactical Fighter Symposium, 17 September 1971. K410.01-21, FY1972 vol. 5.

# The Battles of Al-Fallujah: Urban Warfare and the Growth of Air Power





William Head

(Overleaf) An AC-130 firing chaff to confuse enemy radar. (All photos courtesy of the author, unless otherwise credited.)

**WAS FALLUJAH A BATTLE WE LOST IN APRIL 2004, WITH RUINOUS RESULTS? OR WAS IT A BATTLE WE WON IN NOVEMBER ?**

## The First Battle for Al-Fallujah: Background

Before the United States and her allies invaded Iraq in the spring of 2003, Al-Fallujah was known only as a small city, forty-two miles west of Baghdad. Favored by the Iraqi strongman, Saddam Hussein, it was a Ba'athist stronghold populated by loyal Sunni supporters of the regime in the Iraqi capital. Soon after the incursion began, it made worldwide headlines when a Royal Air Force (RAF) jet aiming at a key bridge, unintentionally dropped two laser guided bombs (LGBs) on a crowded market in the heart of the city killing dozens of civilians.

From that time until the last American troops withdrew from Iraq in December 2011, Al-Fallujah became the main center of anti-Coalition violence. Perhaps it is not surprising that this city and region turned into the heart of pro-Hussein resistance during Operation Iraqi Freedom (OIF) and was witness to the bloodiest battles of the entire Second Persian Gulf War. Indeed, in the three battles for control of the city between 2003 and 2005, Coalition forces lost roughly 150 killed and had 1,500 wounded. This in an area commonly called the Sunni Triangle and populated by Sunnis and Ba'athists who lost nearly everything when Saddam Hussein's regime fell.<sup>1</sup>

The determined resistance and the savagery that would characterize the upcoming battles for this small city on the periphery of the Iraqi state would surprise the Americans and bring into question the level of success they had in finally taking Al-Fallujah. The cost in lives also has left many questions as to how one should view these battles. In his poignant article, "Who Won the Battle of Fallujah?" Jonathan F. Keiler asks, "Was Fallujah a battle we lost in April 2004, with ruinous results? Or was it a battle we won in November?" He answers his own questions by saying, "The answer is yes. If that sounds awkward, it is because Fallujah was an awkward battle without an easy parallel in U.S. military history."<sup>2</sup>

In fact, many analysts have compared the destruction of buildings and the ferocity of the fighting to the U.S. struggle to retake Hue city during the Tet Offensive in 1968. In one regard, the comparison is apt since, as Keiler points out, "Enemy insurgents defending Fallujah were formidable because many of them were willing to fight to the death."<sup>3</sup> The same had been true of the Vietnamese insurgents during the earlier struggle. However, there were many differences in the two battles as

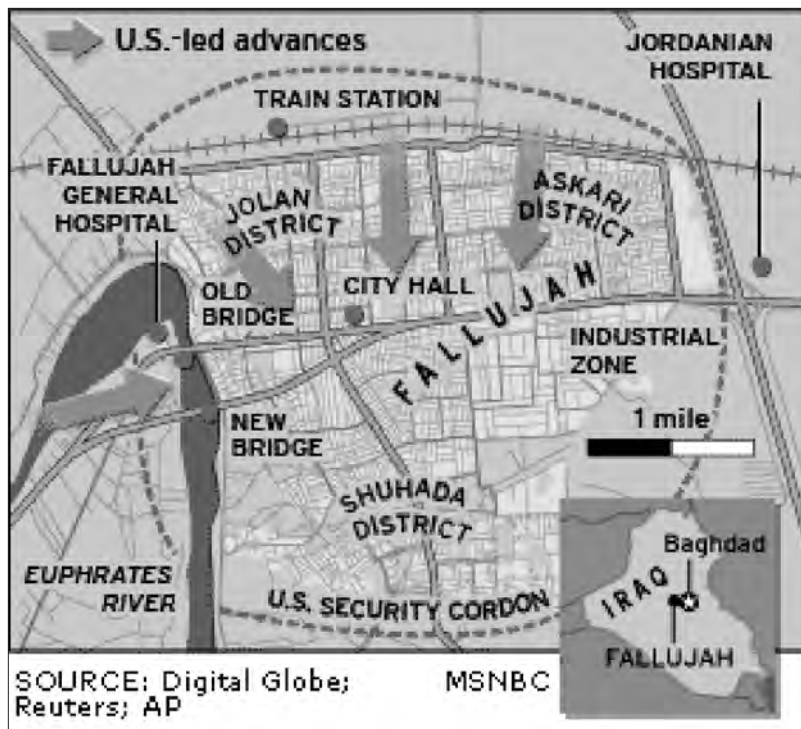
well, not the least of which was the skilled use of air forces at Al-Fallujah, especially during the second battle that lasted between November 7 and December 23, 2004. Of special note was the nearly obsessive effort to keep aerial attacks and artillery fire as precise as possible in Al-Fallujah.

First Marine Expeditionary Force (I MEF) operations officer, declared that weapon precision was unprecedented. He also described how surgical air strikes employing LGBs and/or other forms of precision-guided munitions (PGMs) could "topple a minaret hiding snipers, without causing damage to an adjacent mosque." When asked to compare Al-Fallujah to Hue, he posited, "Is this like Vietnam? Absolutely not, Hue City . . . was leveled, and there wasn't precision targeting, and they didn't secure it in the amount of time that we've secured Al-Fallujah."<sup>4</sup>

One other important lesson to come from this controversial battle was the steady increase in the use of air power in urban combat. As I will discuss in detail later, traditional U.S. Army and Marine doctrine (developed in the wars of the twentieth century) had never really included the use of air forces. The first battle unfolded in the customary manner of urban combat. During the second, the effective use of aerial assets increased to a point where it altered the very theory of how to execute urban battles in the future. In February 2005, Lt. Gen. Thomas F. Metz, upon departing Iraq, wrote his Air Force counterpart, Lt. Gen. Walter E. Buchanan III, complimenting his air personnel on their vital role in the battle saying that without, "the prompt and sustained air support our land forces received," we would not have won the battle. He focused on the fact that air power from all services covered the skies of Iraq from 60,000 feet to the deck with all manner of aircraft ranging from Air Force fighters, gunships, and remotely-piloted weapons systems to Army and Marine helicopter gunships.<sup>5</sup>

To be sure, traditional air power roles and missions during Persian Gulf Wars focused on strikes against what could best be described as strategic targets, such as, Command and Control (C<sup>2</sup>)bridges, communications nodes, and electric grids. While tactical roles such as close air support (CAS) and vehicular attacks increased over time even this was often more cheaply executed by helicopter gunships using "hell-fire" missiles, than fixed-wing aircraft using 500-pound bombs. However, this all changed with the advancements in precision-guided ordnance

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Map of Fallujah.

**WITH  
PRESIDENT  
GEORGE W.  
BUSH'S DEC-  
ARATION OF  
"MISSION  
ACCOM-  
PLISHED,"  
VIOLENCE IN  
AL-FALLUJAH  
WAS GROW-  
ING INTO  
WHAT  
WOULD  
PROVE TO BE  
THE TWO  
BLOODIEST  
BATTLES OF  
THE ENTIRE  
WAR**

and high tech targeting lasers and weapons. These advances included highly sophisticated Intelligence, Surveillance and Reconnaissance (ISR) platforms, such as, Unmanned Aerial Vehicles (UAVs) combined with extremely accurate CAS targeting equipment on aircraft, such as, the AC-130.

One Associated Press article reported that there were at least twenty kinds of aircraft supporting ground troops during the second battle for Al-Fallujah. As the correspondent described it, "The skies over Fallujah are so crowded with U.S. military aircraft that they are layered in stacks above the city, from low-flying helicopters and swooping attack jets to a jet-powered unmanned spy drone that flies above 60,000 feet." To quote Air Force Lt. Col. David Staven, who headed the ground targeting process, "we call it the wedding cake. It's layered all the way up."<sup>6</sup> It was from this major battle, that ended in tactical success but only limited strategic achievement that the primary maxims of how to conduct urban combat evolved from the death and destruction to focus on the effectiveness and potential decisiveness of air power in urban combat environments.

### The Buildup to a Blood Bath

During the regime of Saddam Hussein, Al-Fallujah had thrived economically because many citizens were employed as police, military officials, and intelligence officers by the dictator's administration. As he fell from power, there was little sympathy for him in much of the rest of Iraq since most Iraqis considered Saddam to be an oppressive tyrant. It should also be noted that the city was one of the most religious and culturally traditional areas in Iraq.<sup>7</sup>

When the U.S. began its invasion of Iraq in

March 2003, it appeared that those living in the city would be pro-American. Indeed, after the Ba'athist's regime's collapse, the locals elected a nominally pro-American town council headed by Taha Bidaywi Hamed, who quickly restored law and order to Al-Fallujah. Given these events, Coalition leadership determined it was unnecessary to commit large numbers of troops to the region.<sup>8</sup>

All this changed on April 23, 2003, when 700 soldiers from the U.S. 82d Airborne Division entered Al-Fallujah, and 150 members of Company C occupied the Al-Qa'ida primary school. The occupiers soon established an evening curfew that offended many of those living in Al-Fallujah. Having already been sensitized by Allied air strikes that had killed citizens and destroyed property in the surrounding area, by April 28, tensions had grown to a critical level. That morning a crowd of 200 people gathered outside the school after curfew and demanded that U.S. troops leave the building, so the school could begin operations again. The situation soon escalated and the protesters became increasingly agitated. To disperse the growing mob, the soldiers fired smoke canisters. Instead of breaking up the crowd it only angered them more. According to U.S. forces, at this point, one of the protesters fired on the Americans who returned fire on the mass of people. Soon members of the 1st Battalion, 325th Airborne Infantry Regiment, and 82d Airborne Division were firing randomly into the crowd. When it was over, a minute later, they had killed seventeen people and wounded seventy others. No U.S. or Coalition casualties were reported.<sup>9</sup>

As embers from the clash smoldered, the Iraqis regrouped and, forty-eight hours later, initiated another protest in front of the former Ba'ath party headquarters denouncing the carnage of the 28th. Again, depending on the sources one reads, either American forces were fired on or simply fired without provocation. This time, soldiers from the 3d Armored Cavalry Regiment fired into the crowd killing three more Iraqis. Over the next month, Iraqi protests grew larger and more belligerent. Fearing for their safety, on June 4, the 3d Armored Cavalry commander requested an additional 1,500 troops to help quell the growing resistance.<sup>10</sup>

In June, to put an end to drive-by attacks, U.S. forces began confiscating motorcycles and other vehicles from local residents. However, this did little to help matters. In fact, it only made them worse. Then, on June 30, a massive explosion ripped through an important local mosque killing the imam, Sheikh Laith Khalil, and eight other people. While later evidence suggested that anti-Coalition forces planted the bombs, many Iraqis accused the Americans of having fired a missile at the mosque. U.S. officials claimed the explosion had occurred accidentally when insurgents were constructing bombs.<sup>11</sup> The cruel irony was that two months after the war was supposed to have ended with President George W. Bush's declaration of "mission accomplished," violence in Al-Fallujah was growing into what would prove to be the two bloodiest battles of the entire war.

## From Bad to Worse

By the following year, with many Americans back home still expecting a final withdrawal of Coalition forces, the situation in Al-Fallujah was perched on the edge of all-out war. On February 12, 2004, insurgents ambushed a convoy carrying Gen. John Abizaid, commander of U.S. forces in the Middle East, and Maj. Gen. Charles Swannack, commander of the 82d Airborne. The insurgents fired Rocket Propelled Grenades (RPGs) at the vehicles from nearby rooftops. They were dressed as Iraqi Security Forces (ISF). No one really knew if they were ISF renegades or resistance fighters wearing stolen uniforms.<sup>12</sup>

Roughly two weeks later, rebels diverted Iraqi police to a false emergency near the outskirts of the city. With law enforcement personnel on a wild goose chase, insurgents attacked three police stations, the mayor's office and a civil defense base at the same time. In the end, seventeen police officers were killed, and eighty-seven detainees released. Any hope that peace and order might be established came to a disastrous end. To deal with the insurgents the 82d Airborne implemented a new procedure, within Al-Fallujah, which the media called "lightning raids." In these raids convoys, often led by Humvees or armed personnel carriers, sped through the streets of the city seeking out and destroying enemy-constructed road blocks which frequently concealed Improvised Explosive Devices (IEDs). The abrupt nature of the actions caught the insurgents by surprise and allowed the U.S. forces to search homes, schools and other buildings for enemy personnel or arms stashes. Unfortunately, the process often caused property damage and led to shoot-outs with local residents, many of whom claimed not to be sympathetic to the pro-Saddam forces.<sup>13</sup>

By early March 2004, Al-Fallujah began to fall under the increasing influence of paramilitary factions. During this time, General Swannack's Army forces withdrew and turned over control of the Al-Anbar Province to the 1st Marine Expeditionary Force under the command of Lt. Gen. James T. Conway. It proved to be both an awkward and untenable situation for the Marines. It was one that was also beginning to slip away from U.S. control. With the Coalition forces facing increasing violence, Conway decided to withdraw all his troops from the city in order to regroup and retake what was becoming a hornet's nest of insurgency. At first, they made occasional incursions into the city in an effort to gain a foothold and then reinforce it. Each time they attempted this maneuver, they failed. As a result, they were reduced to sending patrols around the outer limits of what became known as Forward Operation Base "Volturno," which had been the home of Qusay and Uday Hussein, the deceased sons of the Iraqi dictator.<sup>14</sup>

### The Blackwater Tragedy

The breaking point came on March 31, 2004, when insurgents ambushed a convoy with four

American private military contractors traveling with it. The four were working for Blackwater USA, Arlington, Virginia, and were delivering food for the U.S. food caterers. Scott Helvenston, Jerko Zovko, Wesley Batalona, and Michael Teague, were killed by machinegun fire and a grenade thrown through a window of their SUV. Subsequently, a mob descended on their vehicle dragged the bodies out and set them on fire. In turn, they pulled their corpses through the streets before hanging them over a bridge that crossed the Euphrates River. During the Blackwater event, someone took photos and released them to the international news media. Even as this ghastly scene was unfolding five Marines were killed elsewhere in the area by a roadside IED explosion that ripped their vehicle in small pieces of scrap metal.<sup>15</sup>

The next day, photos of the Blackwater episode were released by various news agencies across the world. The horrifying pictures caused indignation in the U. S. and led to a decision by senior American officials to "pacify" the city. No longer would the U.S. continue less aggressive raids, humanitarian aid or try to work with local leaders. Now they would execute a major military operation to expel the insurgents from Al-Fallujah once and for all!<sup>16</sup>

When President George W. Bush saw the photos, he ordered immediate retaliation. It was an action that many analysts and Marines, over the intervening years have wondered about. Some have written articles and books questioning the presence of non-military American security personnel not just in a combat zone, but anywhere in Iraq. Some believed it a waste of 150 American, British, and Iraqi lives to try and retake the Iraqi hotbed to avenge four contractors who had no business being there.

In fairness to the President, much of the criticism is often just second-guessing. To be sure, it is hard to imagine that given the horrific nature of the death and mutilation of four Americans, no matter who they were, any occupant of the White House in any era would have failed to take action both from an ethical and/or a political stand point. In short, how could any U.S. President not take decisive action? Whatever the moral truth, action quickly began to root out the "bad guys."<sup>17</sup>

### The First Battle of Al-Fallujah Begins

On April 1, Brig. Gen. Mark Kimmitt, deputy director of U.S. military operations in Iraq, declared that the U.S. intended an "overwhelming" response to the deaths assuring the press, "We will pacify that city." Two days later, the 1st Marine Expeditionary Force (I MEF) Command received a written order from the commander of the Joint Task Force ordering offensive operations against Al-Fallujah. The order was contradictory to the inclinations of the Marine commanders on the ground who wanted to conduct surgical strikes and raids against those suspected of being involved.<sup>18</sup>

One major reason for the Marines' concerns was that U.S. basic doctrine for ground warfare did

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Marines on patrol in Fallujah.

**URBAN COMBAT HAS BEEN A PART OF TACTICAL THEORY SINCE 500 BCE [ALTHOUGH] SUN TZU WARNED THAT "THE WORST POLICY IS TO ATTACK CITIES"**

not favor military operations on urbanized terrain (MOUT). While urban combat has been a part of tactical theory since 500 BCE, the great military thinker Sun Tzu warned that "the worst policy is to attack cities."<sup>19</sup> American ground forces armed with tanks and other tracked vehicles have always preferred to engage in combat on open plains, where their maneuverable weapons can dominate the battle field. It was not until 1944 that, out of sheer necessity, urban tactics began to appear in U.S. Army doctrine. During the Cold War most plans for conventional war in Europe involved sweeping movements on open plains to deal with a potential Soviet attack. As for the Marines, they are naval ground forces designed to forcefully assault and secure beach heads. In short, they are storm troops, not urban fighters. Yet, this was exactly the role they were asked to perform.

The Marines' concerns notwithstanding, on the night of April 4, 2004, U.S. forces launched a major assault in an effort to "re-establish security in Fallujah" by encircling it with more than 2,000 troops. By the next morning, American troops had blockaded the roads leading into the city and began making radio announcements and passing out leaflets telling residents to stay in their homes and identify the insurgents for their own safety. Soon, information filtered to the Marines that roughly twenty individual enclaves of enemy forces, armed with RPGs, mortars, heavy machineguns, and anti-aircraft weapons were well entrenched in the heart of the city. In addition, nearly a third of the city's population had fled leaving it in the hands of the insurgents. Considering this new information, the U.S. military began to have second thoughts about a direct assault.<sup>20</sup>

As a result, this first battle evolved into more of a siege that also touched off extensive fighting

throughout Central Iraq and along the Lower Euphrates River with several components of the enemy forces taking advantage of the situation to initiate attacks on various Allied units. One of the groups that emerged was the Mahdi Army of Shiite cleric Muqtada al-Sadr. To exacerbate the crisis, there was a simultaneous rebellion by the Sunnis in the city of Ramadi. Several foreigners were captured by rebel forces and either killed or held as hostages in an attempt to barter for political or military concessions. Even elements of the Iraqi police and Iraqi Civil Defense Corps turned on the Coalition forces or abandoned their posts.<sup>21</sup>

Gradually, the Americans tightened their hold on the city. They employed aerial night attacks by AC-130 fixed-wing gunships, scout snipers who killed more than 200 enemy fighters, and teams from Tactical Psychological Operations Detachment 910 who attempted to lure Iraqis out into the open for the Scout Snipers by reading scripts aimed at angering the insurgent fighters and by blasting heavy metal rock music over loud speakers. After three days of fighting, U.S. leaders estimated they had taken one-fourth of the city including several vital enemy defensive positions.<sup>22</sup>

Progress was complicated by the fact that, while Americans were decimating the enemy, they were often accidentally killing civilians as part of collateral damage or through misidentification. As a result, the Allies experienced growing criticism from within the Iraqi Governing Council. One representative, Adnan Pachachi, declared publicly that, "these operations by the Americans are unacceptable and illegal."<sup>23</sup>

Under growing pressure, at noon on April 2004 9, L. Paul Bremer, head of the U.S. Coalition Provisional Authority (CPA), announced that U.S. forces would initiate a unilateral ceasefire, stating that they wanted to facilitate negotiations between the representatives of the Iraqi Governing Council and insurgents in the city. This would allow humanitarian supplies to be delivered to residents. Among the vital relief materials, was one major convoy organized by private citizens, businessmen, and clerics from Baghdad as a joint Shi'a-Sunni effort. The truce also facilitated the reopening of the Al-Fallujah General Hospital and the Jordanian Hospital closed during the siege. Iraqi hospital officials in Al-Fallujah reported that 600 Iraqis had been killed in the fighting and more than 1,250 people had been injured. Some declared that more than half of the dead were women and children. Predictably, Coalition sources disputed these claims and countered with fewer than 10 percent of these numbers; and that the vast majority of the bodies found were enemy fighters. U.S. officials insisted they were doing everything they could to minimize civilian deaths. General Kimmitt said insurgents were using Iraqi civilians as human shields and were firing weapons at U.S. forces from inside schools, mosques, and hospitals. During the ceasefire in Al-Fallujah, civilians were allowed to leave. Coincidentally, soldiers on both sides also took the opportunity to improve their positions within the city.<sup>24</sup>



Fallujah before the 2003 invasion

**ABU MUSAB AL-ZARQAWI ...EMERGED AS THE MOST FAMOUS ANTI-COALITION COMMANDER**

**COALITION FORCES CREATED CHECKPOINTS AROUND THE CITY [AND] EMPLOYED RECONNAISSANCE AIRCRAFT TO TAKE AERIAL PHOTOS...TO MAKE MAPS OF THE CITY**

## The Battle Resumes

Throughout the ceasefire, skirmishes continued. Anti-coalition forces used local mosques and schools to store weapons and fighters, and they constructed roadblocks in the city in preparation for renewed fighting. The enemy seized private residences forcing the owners to either flee the city or stay in their barricaded homes. On April 19, 2004, U.S. officials announced they had reached an agreement with local community leaders to defuse tension in Al-Fallujah. The agreement included conducting joint patrols by Coalition and ISF troops. The arrangement failed to last more than twenty-four hours. The next day, Sunni militants launched an attack on Marines patrolling the city. Employing heavy weapons, they soon convinced American leaders that Al-Fallujah city fathers had no power to persuade fighters in the town to turn in their weapons. Thus, the Marines prepared to move in with force to pacify the city.<sup>25</sup>

On April 27, 2004, enemy forces attacked Coalition defensive positions in Al-Fallujah, and Allied troops called in CAS attacks. One aircraft bomb hit a flatbed truck and sedan, setting off secondary explosions that resulted in a massive twenty-minute display that lit up the sky for miles around. The insurgents fled to a nearby building, and when Coalition aircraft fired on it, another series of huge secondary explosions resulted.

On May 1, claiming that they had finally broken enemy resistance, U.S. forces withdrew from Al-Fallujah. Officially, General Conway announced he had unilaterally decided to turn over any remaining operations to the newly-formed Fallujah Brigade commanded by former Ba'athist Gen. Jasim Mohammed Saleh. Conway said this force would be armed with U.S. weapons and equipment under the

terms of an agreement that would allow the Iraqis to complete the retaking of the city. Several days later, it became clear that Saleh could not be trusted. Indeed, Coalition intelligence had discovered that he had been involved in military actions against Shi'ites during Saddam Hussein's rule and intended to use his shiny new American weapons in this task again. To stop this potential conflict, U.S. leaders announced that Muhammed Latif would assume control of the Brigade. The entire effort proved to be a debacle. By September, the group had dissolved and handed over all the American weapons to the insurgents. This fiasco eventually led to the Second Battle of Al-Fallujah in November.<sup>26</sup>

## Preparations for the Next Battle

While the U.S. technically departed, in fact, between May and October, American forces remained nearby at Camp Baharia only a few miles from Al-Fallujah. Back home in the U.S., perceptions about the on-going conflict, which was supposed to be over, began to change. This enemy was a group of insurgents not an organized resistance being carried out by troops loyal to Saddam Hussein. Coalition officials had discovered, too late, that the reliance on Allied-supported local militia such as the Fallujah Brigade was risky at best. One U.S. analyst observed after the first battle, "The handwriting is on the wall. The Battle of Al-Fallujah was not a defeat — but we cannot afford many more victories like it."<sup>27</sup>

One person the battle brought into the public eye was Abu Musab al-Zarqawi, who emerged as the most famous anti-Coalition commander in Iraq. He became a particular target of the Allied forces because his troops had killed twenty-seven American military personnel in and around Al-Fallujah during the battle. Hundreds of Iraqi civilians and insurgents had died — most were buried in Al-Fallujah's former soccer stadium, which became known as the Martyr's Cemetery. As time passed, the city became a fortress filled with a maze of killing zones and hideouts from which the enemy planned to ambush Allied ground forces if and when they decided to retake the city.<sup>28</sup>

To prevent the defenders from being resupplied or insurgents from escaping, Coalition forces created checkpoints around the city. They also employed reconnaissance aircraft to take aerial photos that experts used to make maps of the city for use by attackers. U.S. leaders also assigned Iraqi interpreters to U.S. units. Throughout the days leading up to the actual assault, the Americans executed surgical air strikes and periodically fired artillery barrages designed to deplete the enemy's numbers and morale. There were 13,500 American, Iraqi, and British shock troops in place to carry out the attack. Of these numbers 6,500 were U.S. Marines and 1,500 U.S. Army personnel. Approximately 2,500 Navy sailors played a support role. Officials organized U.S. force into two Regimental Combat Teams: Regimental Combat Team 1 included the



Fallujah during the second battle

**WITH THE PREVALENT LOW INTENSITY CONFLICT... MENTALITY INUNDATING THE CORPS, THERE HAS DEVELOPED A MINDSET THAT SMALL AND LIGHT IS GOOD, AND BIG AND HEAVY IS BAD. THE TRUTH BE TOLD, SMALL AND LIGHT EQUATES TO WEAK AND DEAD**

3rd Battalion/1st Marines, 3d Battalion/5th Marines, Naval Mobile Construction Battalion 4 and 23 (Seabees) as well as the U.S. Army's 2d Battalion/7th Cavalry. Regimental Combat Team 7 was comprised of the 1st Battalion/8th Marines, 1st Battalion/3d Marines, the U.S. Army's 2d Battalion/2d Infantry and 2d Battalion/12th Cavalry. Of the total, roughly 2,000 Iraqi troops were supposed to participate in the assault. Last, but not least, 850 members of the famed 1st Battalion of the British Black Watch battalion took part in the encirclement of, and assault on, Al-Fallujah. Ground forces were supported by CAS from Coalition aircraft and Marine and Army artillery battalions.<sup>29</sup>

Both the Army leaders and 1st Marine Division Commander Maj. Gen. Richard F. Natonski Marine realized as they planned for the second battle was that they needed tanks and, later, they also needed air cover; lots of it! Natonski's regimental Combat Team-1 (RCT-1) commander, Col. Michael Shupp, went further saying "we saw that we needed more combat power to thwart the enemy and their defenses. We didn't have enough heavy armor to go in there with us, . . ." Indeed, a decade earlier Marine Maj. Dennis W. Beal had declared, "With the prevalent Low Intensity Conflict (LIC) mentality inundating the Corps, there has developed a mindset that small and light is good, and big and heavy is bad. The truth be told, small and light equates to weak and dead."<sup>30</sup>

#### Enemy Forces

In April, Al-Fallujah had been defended by about 500 "hardcore" and 2,000 "part time" insurgents. In November, *Time Magazine* determined that the number of insurgents had grown to 3,000-

4,000. One reporter for the *New York Times* estimated roughly the same number were present but believed that many enemy fighters, especially their leaders, fled before the actual attack began. According to one ABC News correspondent, by September 24, 2004, he had been told by a senior U.S. official that they estimated the enemy strength to be nearly 5,000 mostly non-Iraqi insurgents. He also reported that this same official had declared their primary goal was to capture Abu Musab al Zarqawi who was supposed to be in Al-Fallujah.<sup>31</sup>

Ominously, for the Coalition, not only had the number of enemy present increased, but Iraqi insurgents and foreign Mujahideen fighters had built formidable fortified defenses throughout the city. They dug a labyrinth of tunnels and trenches, prepared spider holes and planted an extensive number and variety of IEDs. Within many of the abandoned homes in Al-Fallujah, the insurgents placed several large propane bottles, gasoline drums, and ordnance, wired to a remote trigger they could detonate when Coalition troops entered the buildings. They blocked streets with "Jersey" barriers behind which they could attack unsuspecting Allied forces entering a house or neighborhood. The enemy had a variety of advanced small arms much of which had been given to them in April by the U.S. who thought they were friends. These included M-14s, M-16s, body armor, uniforms, and helmets.<sup>32</sup>

To make matters worse for the Marines assault units, the enemy had placed cleverly disguised booby traps in various buildings and vehicles, including wiring doors and windows to grenades and other ordnance. Anticipating U.S. designs to take control of the roof tops of high buildings, they bricked up stairwells to the roofs of many buildings, creating paths into prepared fields of fire which they hoped the Americans would try to enter. Final intelligence reports predicted that Allied units might encounter Chechens, Libyans, Syrians, Iranians, Saudis, Filipino Muslims as well as Iraqis—mostly Sunnis. These reports anticipated that most of Al-Fallujah's civilian population had fled the city, thus, reducing the potential for non-combatant casualties. They believed that 75–90 percent of the population of 300,000 had departed.<sup>33</sup>

It was a battle that most, Coalition (especially U.S.) leaders and combat troops realized would be difficult and bloody. The troops themselves worried out loud that many might not make it out alive. With nearly six months to prepare, the rebel forces inside Al-Fallujah had had time to build formidable defenses. To quote one official report, "American forces entering the city would face a bewildering array of improvised explosive devices (IEDs), vehicle-borne improvised explosive devices (VBIEDs), mines, roadblocks, strong points, and well-constructed fighting positions." Worse, "Many of the insurgents were foreign Islamic extremists who were more than willing to die." Besides, they were convinced that since "they had stopped the Marines in April," they could attain "victory" again.<sup>34</sup>

Between early May and late October, representatives of the interim Iraqi government, headed by



Clearing buildings in Fallujah is a dangerous business.

**U.S. AIR POWER PLAYED A SIGNIFICANT ROLE. CLOSE AIR SUPPORT WEAPONS SYSTEMS PLAYED THE GREATEST ROLE, PARTICULARLY GUNSHIPS**

Prime Minister Iyad Allawi, continued negotiations with the rebels in a desperate effort to end the conflict peacefully. It proved to be a futile gesture. On October 30, 2004, U.S. officials initiated airstrikes against suspected militant pockets in Al-Fallujah even as they prepared for a major ground operation to root out insurgents in what had become an enemy stronghold. Airpower would play a major role in the second part of the struggle.

#### **If at First You Don't Succeed, "Try, Try Again!"**

In November 2004, one of the most significant battles of OIF took place in this city whose name would soon go down in U.S. military history alongside Khe Sanh, Guadalcanal, Antietam, and Bunker Hill. The fight to gain total control of the city of Al-Fallujah in early-November has been seen as infamous and heroic. The bitter resistance faced and the hard fought victories have made it a name to remember among historians and military personnel. Designated Operation *Phantom Fury*, it officially lasted from November 7 to December 23, 2004, and, as detailed above, was spearheaded by both U.S. Marine and Army elements and British troops of the famous "Black Watch" battalion.<sup>35</sup>

It was a fight in which Coalition, especially U.S., air power played a significant role. Close Air Support weapons systems played the greatest role, particularly gunships such as the AC-130s which participated almost totally at night for fear of being attacked by highly accurate surface-to-air missiles (SAMs). It was tactical standard operating procedure for the gunships and had been since the Vietnam War. The bitter and bloody fighting in and around the city caused some ground commanders to complain that keeping one of the most powerful ground-support weapons out of the fight in daylight

was forcing them to fight with "one hand tied behind their backs."<sup>36</sup> However, risking one of these scarce and important assets was something that the Air Force was loathe to do after losing one during the First Gulf War.

According to respected air power expert Rebecca Grant, even though "the public focus" was on the land war, "coalition air forces were deeply involved in urban 'stability' operations." In fact, the November 2004 sweep of the Iraqi town of Al-Fallujah became "the benchmark for airpower in urban joint force warfare."<sup>37</sup> Many analysts agreed that Al-Fallujah became a model of modern urban-warfare and its "resolution." It was combat in the most bitter and arduous definition of that term. Once President George W. Bush declared "mission accomplished" in OIF, the next phase focused on what military leaders called "stability operations." The doctrine underwriting this phase of operations evolved from Army experiences in Panama (Operation *Just Cause*) and Southeastern Europe (Operation *Allied Force*) in which they concluded after a regime change they would have to pacify and stabilize the invaded nation under a new indigenous and hopefully democratic regime. By the next century, most Army officials saw this as a key final step for future military missions.<sup>38</sup>

Specifically, "stability operations" combined defensive and offensive operations with support processes to form the key aspects of the new combined-arms doctrine. Army planners developed this new doctrine in four phases. The first two dealt with preparations and planning followed by Phase III, "Decisive Combat Operations" and Phase IV, "Stability Operations." In previous cases, Phase IV had been relatively easy to implement mainly because the local populations were generally supportive of the U.S. and glad to see the end of the dictatorial regime of the overthrown government. Iraq proved to be much more difficult. In fact, it was a bloody test that created formidable demands on Allied ground forces and vital air forces. To quote Dr. Grant, "Fallujah marked the unveiling of an urban-warfare model based on persistent air surveillance, precision air strikes, and swift airlift support. Together, these factors took urban operations to a new and higher level."<sup>39</sup>

#### **Operations *Phantom Fury* and *Al-Fajr***

Department of Defense officials originally designated the tactical operation to secure Al-Fallujah *Phantom Fury*. Later, the Minister of Defense in the new Iraqi government renamed it Operation *Al-Fajr*, an Arabic term for "dawn." Iraqi officials promised their American counterparts to expect about 2,000 ISF troops to fight with the Allies, but as the jump off date approached, Gen. George W. Casey Jr., the commander of Central Command (CENTCOM) and senior U.S. commander in Iraq, had to admit he did not really know how many Iraqis would participate. With or without their so-called allies, Coalition forces finally launched their assault late on November 7, 2004.



Firing on an enemy position.

**ON NOVEMBER 9, THE ALLIES BEGAN INTENSIVE AIR STRIKES WHICH DEVASTATED SEVERAL MAJOR BUILDINGS AND THE TRAIN STATION PRIOR TO U.S. TROOPS MOVING INTO SOUTH AL-FALLUJAH**

One key factor in making this attack was the need for the U.S. to regain control of the city from insurgents in preparation for national elections scheduled for January 2005. In one regard, this seemed to make sense in a Clausewitzian manner if “war is an extension of diplomacy and politics.” In Al-Fallujah this mattered little since of the population of 300,000 civilians, 75-90 percent had fled.<sup>40</sup>

Led by U.S. Marine assault units, the Allies quickly captured two strategic bridges and a hospital situated on a peninsula formed by the Euphrates River, which U.S. intelligence believed led to an enemy fall back zone if they were expelled from central Al-Fallujah. Later, evidence suggested that the insurgents were using the hospital as a propaganda center broadcasting false information on the number of civilian casualties. As the American and British advance proceeded, the Iraqi 36th Commando Battalion took charge of Al-Fallujah General Hospital in order to provide medical services to injured civilians. The use of this unit would have later consequences since it was mostly a “political” unit comprised of individuals from the five major Iraqi political parties. In fact, the only competent personnel were Kurds. Among some of the Kurds, the U.S. enthusiasm for their support led them to hope, indeed, believe that after the conflict, the Americans would support their efforts for an independent Kurdish state.<sup>41</sup>

One major problem the Allies faced from the very beginning was the aforementioned maze of tunnels under and through the city which the enemy used either to go from weapons cache to weapons cache or to escape hopeless situations. The most frustrating aspect of these tunnels was that many were under mosques and schools. The Coalition was reluctant to attack schools, and international law protected mosques from attack unless

it could be absolutely proved they were being used for military purposes.<sup>42</sup>

As the attack began, Iraqi Prime Minister Ayad Allawi declared a national state of emergency to stem violence which had erupted elsewhere just prior to the assault on Al-Fallujah. In the city itself, he imposed a twenty-four-hour curfew on all residents who were warned not to carry weapons. With American forces having cordoned off the city, no one was allowed access which was a discernible difference from the previous April when the enemy exploited the all too loose blockade to infiltrate personnel and supplies into the city.<sup>43</sup>

On November 9, the Allies began intensive air strikes which devastated several major buildings and the train station prior to U.S. troops moving into south Al-Fallujah. Throughout the campaign, ground forces received abundant support from a combination of highly accurate CAS and artillery fire as they began to enter the city’s maze of streets and alleys. Coalition forces frequently reported observing secondary explosions during air and artillery strikes which evidence suggested were explosions of weapons caches. By 1700 hours, the Marines had cut all the electrical power in the city and were making steady advances into the northeastern part of Al-Fallujah. As nightfall came, they had pushed into the center of the city about 800 to 1,000 yards, and set up defensive positions in preparation for resuming the offensive. On the western side of the city, Allied units ran into heavy fire which slowed their advance. Having to root out the enemy in house-to-house fighting also caused their advance to be more protracted. Reports from the battle areas indicated that the enemy still had ease of movement in some parts of the city. At the end of the day, American officials announced the capture of thirty-eight insurgents, four of whom were foreign fighters. Two Marines died in a bulldozer accident.<sup>44</sup>

That same day, leaders of the Iraqi Islamic Party, the major Sunni political faction, denounced the attack on Al-Fallujah and withdrew from the interim government. The Sunni clerics of the Muslim Scholars Association, which represented 3,000 mosques, called for a boycott of the January 2005 national elections. To make matters worse, that afternoon, one of Prime Minister Allawi’s cousins, the man’s wife and daughter-in-law were kidnapped in Baghdad and threatened with execution unless he ended the assault on Al-Fallujah.<sup>45</sup>

The following day, Marine leaders reported that they held 70 percent of the city, which included the mayor’s office, several mosques, a commercial center, and other major civic objectives. Employing PGMs, the Allies continued targeted airstrikes on buildings that held insurgent forces. American officials publically proclaimed that Coalition troops had taken the neighborhood of Jolan in northwestern Al-Fallujah with less resistance than expected. The paucity of opposition continued as U.S. forces seized and crossed Al-Fallujah’s main east-west highway. American units in the southwestern parts of the city, specifically in the neighborhoods of Resala and Nazal, reported heavy resistance.



Iraqi civilians flee Fallujah.

**BY THE 12TH, COALITION OFFICIALS COULD ANNOUNCE THEY HAD TAKEN 80 PERCENT OF THE CITY AND BELIEVED THEY WOULD HAVE TOTAL CONTROL OF AL-FALLUJAH WITHIN FORTY- EIGHT HOURS**

General Casey predicted that fighting would increase as the Coalition drove through the outer ring of defenses into the heart of the city where insurgents were expected to leave myriad IEDs. Many Allied soldiers reported receiving fire from schools and mosques, often by women and children.<sup>46</sup>

As the assault surged forward, new reports confirmed earlier speculation that the enemy was hiding arms under mosques in the city. Lt. Gen. Thomas Metz, the commander of foreign military operations in Iraq, announced that many of the mosques searched housed munitions and weapons. Specifically, the U.S. Marines' 7th Regimental Combat Team (RCT) along with the 5th Battalion, 3rd Brigade of the Iraqi Army seized Al Tawfiq Mosque. In turn, the Iraqi Police Service's Emergency Response Unit took the Hydra Mosque supported by the 2d Battalion, 1st Brigade of the Iraqi Intervention Force and U.S. Marines from the 7th RCT. American marines and soldiers, supported by Iraqi Security Forces, captured the Muhammadia Mosque in one of the biggest clashes of the Al-Fallujah campaign. Later, it was confirmed that the insurgents were using this mosque as a command and control center. A convention center across the street from the mosque was also captured in addition to two ancillary facilities in which weapons, munitions and IED-materials were hidden. Eight marines were killed in that operation as well as dozens of insurgents.<sup>47</sup>

On November 11, 2004, some of the more sobering events took place. First, Allied forces uncovered what Maj. Gen. Abdul Qader, the local Iraqi forces commander, called "slaughter houses," lined in black cloth, where terrorists made video footage showing hostages being berated and killed. Later, that same day, two Marine Super Cobra attack helicopters

were hit by ground fire and forced to land in separate incidents near Al-Fallujah. The crews were not injured and were eventually rescued. By the end of the day, American forces had totally secured the Jolan neighborhood and turned it over to Iraqi forces. This area had been the main headquarters of the insurgents.<sup>48</sup>

By the 12th, Coalition officials could announce they had taken 80 percent of the city and believed they would have total control of Al-Fallujah within forty-eight hours with full pacification being reached within a week. The imminent victory had already cost the lives of eighteen Americans and five Iraqis. All told, 164 U.S. and Iraqi troops had been wounded, with an estimated 600 insurgents killed. They also reported that the insurgents had been pushed into the southern part of town. In addition, 151 enemy troops were detained by coalition troops. An additional 300 individuals who had negotiated surrender from within a mosque that day were soon moved in with them. According to one report, Allied units continued to move in a southeasterly direction from Highway 10 into the Resala, Nazal and Jebail areas. One main concern was the existence of sleeper cells that might pop up once the initial Coalition assault ended.<sup>49</sup>

By November 13, American officials claimed they had achieved control of most of the city, and a house-to-house mop up sweep was about to commence. In turn, the Iraqi national security adviser reported that more than 1,000 insurgents had been killed in fighting in Al-Fallujah, with an additional 200 captured. As promised the mop up operation began two days later, on the 15th, with leadership estimating it would take four to six days. This process was made more difficult by the extensive subterranean tunnel labyrinth under the city that focused on a large bunker filled with munitions. Most of the tunnels were protected by numerous IEDs and booby-traps. To conserve American lives, troops normally entered the houses over the tunnels after tanks smashed through the walls or sappers used explosives to blast open the doors. In nearly every case, the Marines discovered large weapons caches. As this grisly process unfolded, Coalition aircraft continued to provide CAS and reconnaissance support for Marines attacking buildings throughout the city.<sup>50</sup>

In the meantime, the Iraqi Red Crescent continued to complain they were unable to deliver food, water and medical aid to civilians in the city. Instead, their trucks went to the surrounding villages where tens of thousands of displaced civilians camped in tents to escape the conflict. One cruel irony was that, in spite of the public criticism of the Americans for not letting supplies into Al-Fallujah, to have done so would have risked the lives of the relief personnel and prolonged the campaign. Indeed, most of the supplies were from the U.S. as were the vehicles. Worst of all, leadership announced on November 16, that the U.S. death toll had increased to thirty-eight and the Iraqi's to six. A total of 278 Americans had been wounded. Estimates placed the enemy death toll at 1,200.<sup>51</sup>

MANY DIED ON BOTH SIDES IN THE MAJOR BATTLE OF OIF, WHICH TOOK PLACE AFTER "VICTORY" HAD BEEN DECLARED. ONLY RECENTLY HAVE EXPERTS... BEGUN TO EXAMINE THE ROLE OF AIR POWER IN THIS BLOODY ENGAGEMENT

Throughout the remainder of the month, sporadic fighting continued at an ever decreasing level, with Allied forces eventually conducting a search-and-cordon operation in and around Al-Fallujah — mostly in the north. The action resulted in the detention of seventeen fighters who were transferred to Abu Ghuraib Prison for further questioning. The final skirmish occurred on December 23. It cost the lives of three U.S. Marines and twenty-four insurgents. By the end, Operation *Phantom Fury* had the ignominious distinction of being the bloodiest battle of the Iraq or Second Persian Gulf War.<sup>52</sup>

As one official history admitted even though the battle had been an Allied victory, it had been fraught with problems, including, “communications, equipment, breaching operations, intelligence, and perception issues.”<sup>53</sup> The same report concluded that, “The second battle of Al-Fallujah proved costly for U.S. forces. Although casualties were light compared to urban combat in the past, seventy Americans were killed and over 600 wounded.”<sup>54</sup> There are others who would argue that all of this was a needless exercise in futility considering that within less than a year they had to perform the entire thing over.

The White House announced that Al-Fallujah had been taken, which they translated as a great victory. But what kind of victory was it? Some suggested that with more victories like this one the U.S. could not afford to win the larger war. Jonathan F. Keiler, in the *Naval Institute Proceedings* of January 2005, simply asked, “Was the battle of Al-Fallujah a victory or a defeat? . . . That, “The Marine Corps’ military operations in urban terrain doctrine recognizes that tactical success does not necessarily translate to strategic victory.” He concluded with an ominous warning, “It is hard to say whether the drawn-out process of securing that medium-sized Iraqi city was a one-time event or the beginning of a trend. I hope it is the former.”<sup>55</sup>

Of course, this evaluation came very soon after the battle concluded and during a time when many American analysts, historians, politicians, military leaders, and citizens remained hopeful that the Iraqi adventure had been justified and might still come to a positive conclusion. Since then, both these notions have been thoroughly eroded. It is also important to realize that most of this initial scrutiny focused on the ground engagement since so many died on both sides in the major battle of OIF, which took place after “victory” had been declared. Only recently have experts like Dr. Grant and others begun to examine the role of air power in this bloody engagement both from the standpoint of how it performed and if it should have played a larger role? This next section examines these questions and others regarding how Allied air forces were or should have been employed at Al-Fallujah.

### The Role of Air Power

From the time that Allied forces first invaded Iraq in March 2003, until they departed on December 18, 2011, the main battles had involved

urban warfare. This should not be surprising since roughly 75 percent of Iraqis live in the sixteen largest cities in the country. While the first phase of OIF focused on ending Saddam’s regime and eventually capturing him, the fighting itself did not end on May 1, 2003 when President Bush declared “mission accomplished.” In the north, the Baathists and Sunni Muslims who had dominated the government and army under the toppled dictator continued to resist. As noted, by March 2004, this resistance had coalesced in Al-Fallujah. In the two battles that followed, combatants confronted all the classic features of urban warfare. Standard procedure for taking a town or city had always prescribed the use of ground forces, while aerial attacks had normally occurred after a ground assault had failed or ground to a halt such as in the case of the World War II Battle of Caen.<sup>56</sup>

As Dr. Grant said, “Commanders engaged in urban warfare long have regarded airpower as a blunt instrument. In battles from Stalingrad in the 1940s to Grozny in the mid-1990s, airpower’s primary purpose was to turn buildings into rubble — and fast.” Air Force leaders were caught in a conundrum over how to approach their role once the conflict in Al-Fallujah began. What they discovered but has largely been ignored was that, “Fallujah marked the unveiling of an urban-warfare model based on persistent air surveillance, precision air strikes and swift airlift support. Together, these factors took urban operations to a new and higher level.”<sup>57</sup>

The first battle for Al-Fallujah manifested itself when insurgents ambushed and killed four U.S. contractors on March 31, 2004 and, later that day, five soldiers with an IED a few miles north of the city. American leadership reasoned that these horrific killings demanded retaliation against those specifically responsible for them. As a result, on April 4, some 1,300 members of the 1st Marine Expeditionary Force, under General Conway initiated Operation *Vigilant Resolve* in an attempt to locate those responsible for the slayings and draw out other insurgents. Prominently featured in this manhunt were AC-130 gunships which targeted specific sites designated by Marines calling for precision air strikes against buildings sheltering terrorists or insurgents. This effort ended in utter frustration due to political pressures from the interim Iraqi government’s leaders. Indeed, “This abortive April foray . . . was no pitched battle of army on army. The key to the strategy lay in isolating insurgent leaders and strong points inside the city.” The key component had been airpower and not ground power.<sup>58</sup>

The impact of air power manifested itself since it not only covered the withdrawal of coalition ground forces but also continued to fly ISR, CAS and interdiction sorties during the period between the two battles. As the air war expanded, Gen. Richard B. Myers, the Chairman of the Joint Chiefs of Staff (JCS), remarked that the AC-130 gunships and fixed-wing aircraft attacks had produced devastating results. He concluded, “There were a lot of

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enemy [fighters] that died there." In spite of the clear signs of success by air power, many ground commanders remained convinced that only ground units could carry out urban assault missions. To this end, they normally never called for CAS from AC-130s unless nighttime conditions were perfect. They might call on fighter aircraft with PGMs in the daytime as a last resort.<sup>59</sup>

During the ensuing seven months prior to the Second Battle of Fallujah, the air component played an ever expanding role in the intensifying search for prime insurgency targets in Al-Fallujah and other cities. These efforts came more and more to rely on constant ISR efforts employing both air and space assets. During this phase of the conflict, air planners had assiduously analyzed and interpreted the data they had gathered while simultaneously applying their efforts to bolstering overall political goals of the campaign. As a result, they kept a steady and measured process of air attacks underway even though the ground assaults had stopped. Throughout, they targeted repeated attacks against sites believed to be the hideouts of enemy leaders such as al-Zarqawi. General Ryan admitted, "There was never any delusion that airpower was capable of stopping door-to-door thuggery." Still, he believed that hitting these kinds of targets was like cutting back the "leaves and branches" if not hitting at the roots.<sup>60</sup>

As combat unfolded in Al-Fallujah, "the air component proved it could do quite a lot to target those engaged in door-to-door thuggery" since the "combination of persistent ISR and on-call strike aircraft was nothing short of stunning." New aircraft, like the MQ-1 *Predator* UAV, was only beginning to demonstrate the total impact of its sensors and shooter technology. During the weeks prior to the second assault, this UAV and other aerial platforms not only located high value targets with uncanny accuracy, but their ability to "hunt for insurgents soon evolved into successful battle space shaping" All this climaxed in early fall when "a series of pre-planned strikes took out key insurgent targets—and did so with great precision." In one case, a *Predator* located and followed a vehicle carrying weapons and ordnance as it parked under a carport in one of the city's compounds. Once given permission to fire, it launched a Hellfire missile into the parked vehicle destroying it without damaging the nearby house.<sup>61</sup>

The main attack on Al-Fallujah began in the late night hours of November 7/8 and lasted, officially, for eight days. Throughout, aircraft hit pre-planned targets, such as barricaded insurgent sites, then shifted to on-call response. As intermittent fighting continued throughout the remainder of the year strike sorties across Iraq increased with weekly ISR sorties alone reaching 161 and peaking at 379. In the end, the major advantages that Allied airpower afforded were: total air dominance; layered twenty-four-hour support; joint integration, especially employing AC-130 CAS; strafing by gunships and fixed-wing fighter platforms such as the F-15; sustained and accurate ISR coverage; suc-

cessful first-strike capability; ability to make immediate follow-on attacks; state-of-the-art airlift and medevac capabilities; and the most up-to-date PGMs and other ordnance such as the GBU-38 Joint Direct Attack Munitions (JDAM). Based on the advantages provided only by air power, a new urban warfare model evolved out of this conflict. It was a paradigm that provided a margin of safety and superiority for forces on the ground while also taking the pursuit of major urban targets to a new level of proficiency through persistent use of such air power roles as ISR and on-call strike.<sup>62</sup>

### The Role of the Fixed-Wing Gunship: Critics and Supporters

During OIF, as had been the case during Operations *Desert Shield/Storm*, the most popular air asset for those on the ground proved to be the AC-130H, and later, AC-130U fixed-wing gunships. Most of the Army ground commanders around Al-Fallujah in 2004 argued that since ground forces were taking heavy casualties in close combat and the AC-130s were so effective the latter should take the risk to provide them CAS during daylight hours. These critics seemed to have forgotten the consequences of even minimal daylight on the "Spirit 03" during operations in *Desert Storm* on January 31, 1991. It was not that the Army did not like the AC-130s. One Army officer said, "The AC-130 — what a great platform. When it's flying, the insurgents are killed by the buckets. However, they will not fly during the day In Fallujah we had a better time during periods of darkness, and in the day [we] experienced difficulties because of the absence of the AC-130."<sup>63</sup>

As gunship crews explained to their brothers on the ground the AC-130s electro-optical and infrared sensors were best employed at night. Human targets on the ground stand out on screens inside the specially fitted cargo airframe, which the shadows and clutter of daytime eliminated. On the other hand, the gunship has a large profile, flies in predictable orbits and is slow to maneuver out of harm's way. While C-130 cargo aircraft flying tactical supply missions routinely fly daytime missions, they seek to avoid threat areas rather than linger right over them. CENTCOM Deputy Commander Lt. Gen. Lance L. Smith, USAF, noted, "If the situation absolutely required the AC-130 to operate during daylight hours, then it was used that way." He also assured *Inside Washington Publishers* that, "Both the commanders and crews will do whatever is necessary to best support the troops on the ground, given the total complex of systems available." Naturally, the AC-130 crews agreed with that assessment saying, "Obviously, we've surged aircraft in support of current operations. "There's...twice as many [in Iraq] as four months ago." This was correct since, by late 2004 there were at any one time, as many as twelve gunships in the Area of Responsibility (AOR) as opposed to the six that had originally been deployed. This was true even with demands for AC-130 services still



MQ-1 Predator.

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**LATER...  
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IN CACHES  
ALL OVER  
IRAQ**

urgently being sent to Washington by forces in Afghanistan.<sup>64</sup>

From 2003 to 2011, one of the biggest concerns for AC-130s was the threat of man-portable air defense systems or MANPADs. As these weapons proliferated, the risk to the AC-130s increased at a similar rate. As Smith noted, "To effectively employ its weapons ... the AC-130 has to fly within the envelope of a number of enemy [MANPADs and anti-aircraft artillery], which this enemy has in quantity." He concluded, "Even if it could survive — 'a big if' it would either constantly be moving out of its orbit to avoid threats, or [it would] incur combat damage resulting in the system being unavailable for long periods of time due to repairs." To the ground troops, the spectacular results of gunship's 105mm were much appreciated as was the rapid rate of fire of the AC-130's 40 mm cannon whose ordnance can pierce thin-skinned vehicles. The U model could engage two targets simultaneously and with its enhanced survivability, increased stand-off range, armor protection and electronic countermeasures, it executed nearly all the handful of daytime missions flown in dire emergencies. Most daylight CAS was flown by aircraft like the A-10 attack aircraft or F-16 fighters which employed internal guns and/or bombs/rockets to attack enemy positions. However, while they were more agile, their inability to loiter over the target limited how long they could support ground forces.<sup>65</sup>

Throughout this period of insurgency, unlike the other attack aircraft, the AC-130 was in very short supply, having only eight H models and 13 U models—although four more of the advanced Spooky versions were in production and expected by 2006. Of course, one of the main disadvantages was the fact ground forces wanted the gunships and not everyone could have them. Senior leadership was

not inclined to risk these high-demand/low-density (HD/LD) assets. Some ground commanders criticized such caution. One Army officer at Al-Fallujah complained that, "Instead of sticking it out and supporting the Marines [and] soldiers in the day with the best ISR [intelligence, surveillance and reconnaissance] and air strike platform, they leave the area." As a result, our troops fighting in very complex and difficult terrain are left to less efficient and less agile air platforms." The truth was that AC-130 pilots and crews were always willing to jump in the fight to protect their comrades on the ground. Some even argued that MANPAD threats were relatively low given the higher altitudes at which they fly. Still, official policy restricted such daytime missions. This caution should not be sneered at considering that the loss of one gunship would cost 14 young lives and one of only 21 gunships.<sup>66</sup>

Some critics like Army Col. David Hunt, a former Green Beret, declared that: "It's not the captains and the majors flying these missions. They're the bravest of the brave! The generals are making a statement, 'We'll tell you how best to use our airplanes.'" He went on to say, "The problem is AFSOC's [standard operating procedures], routine and legacy of not flying during the day." "They are frankly ignoring the intelligence and actual capabilities of the insurgent." Others went so far as to declare that most SAMS in Iraq "topped out in a range below the AC-130s normal operating altitude, but 'these insurgents [also] are operating with old, worn-out equipment.'" They concluded, "I've seen these MANPADs, and I have not found one that was in very good working order. All these factors make the risk well within the margins to fly during the day." Hunt declared that, "The Air Force is still trying to protect [the gunships] from the rocket-propelled grenades and the SA-7s, [and] the truth is the Air Force will care more about their flying platforms than the infantry and special forces and Marines on the ground. If a guy on the ground says they want the AC-130, they should get it — now."<sup>67</sup>

In response one senior Air Force leader replied that, "These are critical HD/LD assets that are not easily replaced!" However, he went on to say, "But given the other risks we are taking there with folks on the ground, if the AC-130s can provide a unique capability with persistence and precision, why wouldn't we use them?" Even with such bravado noted, the truth was that dozens and, later, hundreds of Soviet/Russian-made SA-7s, -9s, -14s and -16s were discovered in caches all over Iraq where the insurgents were strongest. In retrospect we now know that the enemy had many more where these came from and were just waiting to deploy them against the slow flying Spectres/Spookys. As one Air Force officer later pointed out, "You cannot exactly predict what threat will be present." Besides, from the beginning of OEF in 2001 to this very day, SOF aircrews have taken "huge risks" with the AC-130s in Iraq and Afghanistan almost "always" agreeing to come to the aid of their fellow Americans.<sup>68</sup>

As one might expect, this was not the first time

**SOME ARMY OFFICERS HAD CRITICIZED THE AIR FORCE FOR WITHDRAWING AN AC-130 FROM ROBERTS RIDGE DURING OPERATION ANACONDA IN AFGHANISTAN**

**WHEN [THE THREAT] CATCHES UP WITH YOU, IT CAN BE DISASTROUS**



this kind of debate had percolated to the surface. The daylight loss of 14 AC-130H crew members during action near Al-Khafji, Saudi Arabia, during the 1991 Persian Gulf War caused most Air Force special operators to be uneasy about committing their assets to daytime battles. Some ground personnel privately made it seem they are scared. However, this was a valid lesson, and there is a great deal of difference between being brave and fool-hardy. It is worth noting that in March 2002, some Army officers had criticized the Air Force for withdrawing an AC-130 from Roberts Ridge during Operation *Anaconda* in Afghanistan after an overnight battle in which friendly troops were under intense fire. The fact is the AC-130 was engaged for more than two hours and was running low on fuel. No backup gunship was sent due to daytime restrictions. As one former AFSOC commander said, "There are certainly times when they can fly in the daytime [however] it's just that when [the threat] catches up with you, it can be disastrous." Besides, as some ground commanders admit and most airmen already realize, it is up to senior commanders to appraise the big picture and utilize their assets prudently. After all, a threat always seems "most intense to the guys in the foxhole," and soldiers tend to get attached to a particular platform. To quote General Smith, "taking stock of the bigger picture, commanders can provide capability around the clock for a sustained period of time by taking advantage of all the strengths of all the weapon systems available and employing them accordingly."<sup>69</sup>

To quote Mike Klausutis, a highly experienced special operations expert, "The AC-130 is arguably the single best CAS platform to support troops in contact in night engagements. It can find and attack targets at night when other assets like the A-10

and F-16 are not nearly as effective." All these aircraft have their strengths, and balancing the platform to use under any given circumstance in order to provide around-the-clock coverage is the essential issue.<sup>70</sup>

### **The After Effects**

Officially, during the second battle for Al-Fallujah, the U.S. suffered ninety-five killed and 560 wounded, while insurgents had 1,350 killed and 1,500 captured. Civilian deaths were put at 800. Of a total population of 300,000, more than 200,000 civilians were displaced by the combat that totally destroyed nearly 40 percent of the city. In fact, the structural damage was lessened by the accuracy of air power assets such as the AC-130. So many of the casualties came in the earliest moments of the offensive when, in an effort to avoid collateral damage Marines attempted to wind their way through the narrow streets that became perfect spots for ambushes and ideal killing zones. To stop the loss of life, commanders moved their forces at night when the AC-130s could provide CAS. More importantly, they gave up on sparing homes and civilian lives since the enemy was using them to shield their forces. The Second Battle of Fallujah proved the great virtues of the AC-130s and made it clear that to keep this most effective weapon should continue to be employed, potentially in more modern versions, in future conflicts.<sup>71</sup>

One article on the battle summed up the role of the gunships saying, the AC-130U gunship demonstrated its great value to the boots on the ground. Its precision fire support from the sky both day and night suppressed fortified and moving insurgent targets. The sophisticated fire control system with massive amounts of ammunition on board gives

AL-FALLUJAH, OFTEN REFERRED TO AS THE "CITY OF MOSQUES," WAS OFFICIALLY HOME TO 133 MOSQUES PRIOR TO THE FIGHTING. AFTERWARD, SOME REPORTS DECLARED THAT 60 HAD BEEN DESTROYED

AC-130U the ability to provide a steady CAS without the need of FAC unlike other fixed-wing aircraft. Ground units only needed to provide both friendly and target positions, and the gunship took it from there. Different cannons on the AC-130U provided more choices of weaponry with smaller blast radii than bombs; hence they had lower risk of damage to friendly units and civilians.<sup>72</sup>

In simple terms, the battles for Al-Fallujah, especially the second one, proved to be the bloodiest involving American troops since the Vietnam War. Some experts went so far as to compare it to the Battle of Hue or Marine assaults in the Pacific during World War II. Specifically, the Allies had 107 killed and 613 wounded during Operation *Phantom Fury*. The United States forces had fifty-four killed and 422 wounded in the initial invasion in November and, as noted, by December 23, when the operation was officially declared to be over, the numbers had increased to ninety-five killed and 560 wounded. In turn, British forces had four killed and ten wounded in two separate attacks in the outskirts of Al-Fallujah. Iraqi allies suffered eight killed and forty-three wounded. While there were never official figures based on an actual count, most estimates placed the number of insurgents killed at 1,200 to 1,500, with some numbers as high as 2,000 killed. Coalition forces captured around 1,500 insurgents. The Red Crescent/Cross reported that 800 civilians had been killed during the fighting.<sup>73</sup>

To quote Jonathan Keiler, "despite the superb performance of Marines and soldiers in Fallujah there is reason for concern. The 476 U.S. casualties represent about 8 percent of the total assault force, a low but not insignificant loss for less than two weeks of combat. Of equal concern had to be the fact that roughly 45 percent of those wounded in the operation were returned to action." The Defense Department also reported that the initial OIF assault, between March 19 and April 30, 2003, led to 109 killed and 426 wounded. The casualty numbers during the Second Battle of Fallujah came close to that total.<sup>74</sup>

While the city itself suffered terrible damage to homes, mosques, city services, and businesses, it was not nearly as bad as previous urban battles such as Stalingrad or Hue, mainly due to the extensive use of precision airpower. Al-Fallujah, often referred to as the "City of Mosques," was officially home to 133 mosques prior to the fighting. Afterward, some reports declared that 60 had been destroyed. The destruction was certainly predictable since, according to American military sources, 66 were used by the insurgents as arms caches and weapon strongpoints. These same accounts also claimed that of the roughly 50,000 buildings in Al-Fallujah, between 7,000 and 10,000 were destroyed and about half of the buildings still standing showed significant damage.<sup>75</sup>

Displaced persons also proved to be a major issue. Prior to Operation *Vigilant Resolve* in March-April 2004, most estimates placed the population at around 300,000. By the end of Operation *Phantom Fury*, more than 200,000 civilians were labeled by

Iraqi authorities as "internally displaced persons" who either never returned or only came back reluctantly. At first, the Allies were loath to allow people back into the city. It was not until the end of December 2004, that residents, after undergoing a biometric identification process, were allowed to return if they wore their identification cards at all times. By the end of March 2005, with reconstruction moving along at snail's pace and mostly consisting of clearing away rubble, most estimates put the number of returning inhabitants at 30 percent.<sup>76</sup>

As for the battle itself, no one can call it any more than a limited success. By September 2006, U.S. Marine Corps official reports concluded that while Al-Fallujah itself remained generally pacified, Al-Anbar province, which included Al-Fallujah was under "total insurgent control." Worse, "insurgent attacks gradually increased in and around the city and although news reports were often few and far between, several reports of IED attacks on Iraqi troops were reported in the press." Of special note was a suicide car bomb attack carried out on June 23, 2005 against a convoy, which killed six Marines and wounded thirteen others. Less than eight months after the bloodiest battle of the Iraq war, insurgents were again able to operate with impunity and in large numbers. As result of mounting violence around Al-Fallujah and in nearby Ramadi, a third offensive began in late September 2006 and lasted until mid-January 2007. In what became known as the "Third Battle of Fallujah" the enemy fought the Americans to a stalemate during what Iraqis called "the Great Sunni Awakening." After four years of bitter fighting, the U.S. formally turned Al-Fallujah over to the Iraqi Provincial Authority and the Iraqi military forces. From every logical point of view, these battles had been a disappointment for Coalition forces.<sup>77</sup>

### Some Good Things Did Come from the Battles

In spite of these criticisms of the Allied efforts at Al-Fallujah, there were positive aspects and results, too. The January elections did take place as scheduled and were mostly successful in their execution and the subsequent transition of power to a relatively democratic sectarian government. General Casey later remarked that, "The military and civil side had to work together . . . and this one team, one mission had to include the Iraqi Government. We set out to help make . . . this Interim Iraqi Government successful." To him the Second Battle of Fallujah facilitated the January 2005 elections, and, he concluded, "I don't believe that the elections would have come off if there was still a safe haven in Fallujah. I'm absolutely convinced of that. . . . It was one of the things that caused them to step up and vote and make a choice, and on the 30th, they did!"<sup>78</sup>

Lt. Gen. Lance L. Smith, CENTCOM Deputy Commander, echoed Casey's words when he pointed out that, "Besides being a safe haven for leadership command and control, Al-Fallujah was a center for



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OPEN AND  
HIDDEN POSITIONS**

making IEDs that were being produced and used in other parts of the country to attack the Coalition.” I should add they were also being used to disrupt preparation for the January 2005 elections. Dr. Grant concluded in her article on Al-Fallujah that, “There was no doubt the second battle for Fallujah was a necessary one. Many of the estimated 2,000 insurgents in the city were killed and their sanctuary eliminated.”<sup>79</sup> That is to say, at least for the time being and long enough to hold elections.

#### **The Controversy over Using White Phosphorous**

One last controversial aspect of the struggle for Al-Fallujah was the U.S. use of white phosphorous artillery rounds. While an extremely volatile issue that requires a great deal of evaluation on its own merit, there is not enough room to discuss the usage in detail. Still, it cannot be ignored in any discussion of Al-Fallujah. White phosphorus is an effective smoke producing agent in combat, especially when used as an artillery round. It burns rapidly to create a smoke bank to hide the movement of one’s troops from the eyes of the enemy. Over the past century, the use of such agents in artillery shells and/or smoke grenades has become increasingly common. It can be used by infantry, mortars, tanks, artillery, and other armored vehicles. The negative side of its employment is that phosphorus is toxic in itself and white phosphorus can function as a particularly terrifying incendiary weapon since it burns quickly and at very high temperatures. It can easily set cloth, fuel and ammunition on fire and it is very difficult to extinguish because water is not very effective. While it is not illegal to use under the international Chemical Weapons Convention, its results, when used against humans, is so gruesome that it is used infrequently in cases where civilians are close to military targets.<sup>80</sup>

Throughout the second battle for Al-Fallujah in November 2004, while the U.S. employed white phosphorus they were reluctant to discuss it with

the media for obvious reasons. Even so, word of its usage filtered back to Western Europe and the U.S. At first, it was no big deal, then, on November 8, 2005, the one year anniversary of the start of the Second Battle of Al-Fallujah, Sigfrido Ranucci of Italy’s RaiNews24 released a gratuitous documentary entitled *Fallujah, The Hidden Massacre*. It was completely one-sided and designed to create public outrage and increase the number of viewers. It proved to be effective and very embarrassing to America. A week later, Defense Department spokesperson, Lt. Col. Barry Venable, publically confirmed the use of white phosphorus against well entrenched “enemy combatants.” However, he denied that civilians had been targeted. In spite of concerns expressed by the Iraqi government the situation soon began to cool off. On November 30, 2005, General Peter Pace not only admitted its use but called it a “legitimate tool of the military.” He explained that it was not a chemical weapon but an incendiary, and its use against enemy combatants was perfectly legal. The force of this statement seemed to defuse the matter at least in the U.S.<sup>81</sup>

#### **One Special Shining Light**

While the battles for Fallujah had been a bitter pill for the U.S. to swallow, there was one success story. In general, air power and specifically AC-130s had proven their worth both with their ability to search and destroy enemy assets in an urban environment as well as being able to devastate insurgent forces in open and hidden positions. Most U.S. ground forces, especially the Marines, found particular comfort from gunship support during the insurgency phase of OIF, during which U.S. Marines faced most of their fighting in urban settings. They favored the gunships because of their accurate and sustained firepower, time on station, and advanced optics.

According to one Marine Corps report, the Marines on the ground liked that, “the AC-130s car-

ried a lethal mix of firepower that varied slightly depending on whether it is an AC-130H Spectre, or AC-130U Spooky model.” The report noted that, “both models are equipped with a L60 40mm Bofors cannon capable of firing up to one hundred rounds per minute as well as a M102 105mm howitzer capable of shooting six to ten rounds per minute.” In addition, they reported that the Spooky models are equipped with 25mm GAU-12 “Equalizer” Gatling-type guns capable of firing four or six thousand rounds per minute. The report went on to reiterate that, “The primary missions for the AC-130 are close air support, air interdiction, and armed reconnaissance. Other missions include perimeter and point defense, escort, landing, drop and extraction zone support, forward air control, limited command and control, and combat search and rescue.” The report also focused on the fact there was a proposal on the table to retrofit all the existing H models with 25mm guns to allow them to fly at higher altitudes to avoid shoulder-fired SAMS which had begun to populate the battlefield during OIF and after. Not only did the author recount the virtues of the AC-130s but recommended that they be upgraded whenever possible to allow them to continue serving the Marines as they had in the past. This report is of interest because, in spite of the controversy, AC-130s had, as they had in every other previous war, won the respect of those fighting on the ground. It was not so much the Air Force, albeit they believed in the gunships, who wanted more and better gunships but those who served in the services for which the AC-130s worked so hard.<sup>82</sup>

The measure of any leader, especially a military leader, is his or her ability to embrace lessons obtained from past experiences, most often mistakes. This does not suggest they should be tied to past circumstances but, instead should posit how not to make the same mistake and how to anticipate what the future will bring. No fact is truer than military secrets being the most fleeting. This means that flexibility and constant concern for the men and women being asked to go in harm’s way is the greatest talent these leaders can possess. In the case of the AC-130s, operational tempo was so high during the years from OAF to the end of the Iraqi surge that learning lessons seemed to take a back seat to committing assets as quickly and effectively as possible. However, in the last few years, there have been efforts by some visionary Air Force leaders and some very innovative contractors and civil servants to not only upgrade the gunship’s lethality

but its survivability. During this time we witnessed the full flowering of the AC-130.<sup>83</sup>

### Some Final Observations

Ever since the last U.S. combat forces withdrew from Iraq in December 2011, Americans have been seeking some solace from this generally misguided adventure that was probably never necessary. Some even have suggested that OIF was concocted for political reasons mired in an arrogance of power. While that is an issue to be debated at another time and in another place, it must be noted that once the Coalition engaged the Iraqis in March 2003 to decapitate the government of the “Stalinist dictator” Saddam Hussein, the goals of OIF were supposed to be the discovery and dismantling of his so-called “Weapons of Mass Destruction” (WMDs). The ancillary goal was to topple Saddam Hussein and his government in order to allow the Iraqis to rebuild their government and nation. After President George W. Bush landed on the aircraft carrier *Abraham Lincoln* on May 1 and declared “mission accomplished,” the goals seemed to become obscured. It was during this “pacification” or nation-building phase that the unrest and turmoil in the western regions of Iraq were fomented. It was in Al-Fallujah that they bore their bitter fruit. It was during the apparently never ending struggle for control of this little city of questionable strategic and tactical significance that the bloodiest battle of OIF took place. This multi-faceted struggle cost hundreds of lives, displaced thousands of civilians and left many Americans as frustrated as they had been a generation before with Vietnam.<sup>84</sup>

At least in this case, some positive lesson should have been learned with regard to the ever expanding role of air power on and above the modern conventional battle field. Before Al-Fallujah few, if any, believed air assets played any role in urban warfare. The various roles these weapons systems performed in Al-Fallujah not only proved their worth but also caused many enlightened thinkers to wonder how many more roles they could have played. If this alone was the outcome of these conflicts, then it was a costly lesson indeed. However, if we can learn these lessons to the extent that we can limit the number of young men and women who we might have to send in harm’s way in future battles such as this one then, perhaps, those who paid such a precious price and their families and loved ones may be able to rest a little more peacefully. ■

### NOTES

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(Wheaton, Illinois: Tripping Light Press, 2007), [hereafter *Iraq War Journal*]. Bing West and his brother Owen have contributed accounts from his book, screen writing and advising on a new movie starring Harrison Ford as USMC General James “Mad Dog” Mattis entitled “No True Glory: The Battle for Fallujah.” West has also been an integral part of numerous documentary films by such groups as National Geographic.

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**The Bombing War: Europe 1939–1945.** By Richard Overy. London: Allen Lane, 2013. Pp. 880. £30 ISBN: 978-0713995619

With 642 pages of text, 30 pages of bibliography and 126 pages of notes, and utilizing archival research in seven different countries, *The Bombing War* looks impressive. Closer examination shows that, despite Professor Overy's claim that it is "the first full narrative history of the bombing war in Europe," it leaves out set-piece tactical bombing offensives and gives an inadequate and in many ways misleading account of strategic bombing in the period 1939-1945. The long chapter on "British Society and the Blitz," uses only one municipal archive (other than the disappointing Metropolitan Archive) out of the nine municipal archives covering the most bombed parts of London, and only three municipal archives outside the capital, though published work (not mentioned in the bibliography or notes) has shown the importance of local record material for any study of the subject. The even longer chapter on "German Society under the Bombs," uses no municipal records at all, though they are even more detailed and revealing in Germany than in Britain. The chapter on Italy makes no use of General Giuseppe Santoro's semi-official history of the *Regia Aeronautica*, or of General Giuseppe Valle's memoirs or the edition by Francesco Mattesini and Mario Cermelli of *Le Direttive Tecnico-Operative di Super-aereo*. Nor does it use Giorgio Bonacina's account of the bombing of Italian cities or the books by Aldo Stefanile and Michele Sforza on the bombing of Naples and Turin.

Patchy research underlies even patchier notions of what was actually going on. "Bombing, as the account here will show, was always only one part of a broader strategic picture, and a much smaller part than air force leaders liked to think," says Professor Overy. In practice the book makes no real attempt to relate strategic bombing to the broader picture, and the statement of Britain's Secretary of State for War in the House of Commons, three months before D-Day, that as many people were working to build heavy bombers as to equip the army, hardly suggests that, if there was indeed a broader picture, strategic bombing was only a small part of it. Professor Overy goes on to claim, "Bombing was never a war-winning strategy and the other services knew it." Yet even Churchill thought in 1940 that "the Bombers provide the means to Victory." Air Chief Marshal Sir Arthur Harris and General Carl Spaatz, who directed the strategic bombing offensive against

Germany, were of course convinced that they were carrying out a war-winning strategy: this was the reason why Harris rejected the requests of the Admiralty and Coastal Command for the allocation of more of the four-engined bombers that were needed to combat the greatest threat to Britain's ability to wage war, the hit-and-run U-boat attacks on Allied merchant shipping. Coastal Command is mentioned only twice in this book, once with reference to its cooperation with Bomber Command in hitting "targets that supported the German air-sea blockade," and once to make the mind-boggling claim that Coastal Command was responsible for most of the RAF's attacks on German airfields up until late 1941. The Hon. Ralph Cochrane, who schooled his No. 5 Group to achieve greater accuracy and Leonard Cheshire, the outstanding bomber pilot of the war and pioneer of the master-bomber technique, are not mentioned at all. Neither is Heinz-Wolfgang Schnauffer, the German night-fighter pilot who personally accounted for more RAF aircrew than died in the Battle of Britain. There is one mention of Canadian units in Bomber Command but no reference to the fact that No. 6 Group, comprising a fifth of Bomber Command, belonged to the RCAF with significantly different personnel arrangements from the rest of Harris's command. Sir Henry Tizard gets six mentions, but none deal with his most important criticisms of the strategic bombing campaign. In fact there is no real discussion of the thinking behind strategic bombing. The degree to which what thinking there was seems to have been at cross-purposes is not explored. Professor Overy mentions the German use of parachute mines in the Blitz but says, "housing as such was not a specific target and terror-bombing not its particular purpose," but it is difficult to think what else parachute mines could be used for since having parachutes they drifted randomly and, detonating on contact, had little ground penetration. The rationale given on page 617 for the RAF's bombing campaign is completely inadequate: analysis in published work not cited by Professor Overy suggests that Harris's own notion of *dislocating the functioning* of German cities was acceptable to others (including most of the bomber crews and most of the British civilian population) who were content to see German cities not so much dislocated as completely destroyed: nobody seems to have been much bothered by the fact that much of Germany's modern industries was on the peripheries of cities, or in smaller towns even more remote from the dislocation of city centers.

Perhaps the greatest weakness of this

book however is that it deals only with Europe. Professor Overy nowhere explains why he does not include the air offensive against Japan, and superficially the concentration on Europe may seem a sensible, business-like procedure: but as so often with seemingly sensible, business-like procedures, it makes nonsense of the whole exercise. The effectiveness of strategic bombing in Europe cannot be evaluated unless one takes into consideration the effectiveness of the bombing of Japan. In the case of Germany 1943-1945 it requires the most careful weighing of complex facts to come near to a meaningful balance sheet, and even then the calculations remain controversial, whereas in the case of Japan in 1945, it is terrifyingly clear that the bombing of Japanese cities had very substantially reduced any capacity Japan had ever had to sustain industrial-era warfare. But even before Japan's industries were wrecked by bombing they were becoming paralyzed by the cutting off of raw material supplies as a result of the elimination of Japan's merchant navy, a process in which direct attack by aircraft and the dropping of sea mines by long-ranged bombers played a major role. The war in the Far East shows that strategic bombing *can* work, though this result may be forestalled by more economical means of achieving the same effect. The war in Europe shows only a confused result: and one may well wonder if Professor Overy's achievement is not to have confused it a little bit more.

Dr. A. D. Harvey, historian.



**No Empty Chairs: The Short and Heroic Lives of the Young Aviators Who Fought and Died in the First World War.** By Ian Mackersey. London: Weidenfeld & Nicolson, 2012. Pp. 374. £20 ISBN: 978-0-2978-5994-9

Ian Mackersey's *The Wright Brothers* (2003) was a book of first-rate importance, a real eye-opener, even a rebuke to most of us who thought we already understood the milieu and issues of the early days of aviation. A book of the same caliber on aviation in the First World War has been long overdue: but this is not it. The author has trawled through family letters, the Liddle Collection at the Brotherton Library of the University of Leeds and the manuscript collections of the Imperial War Museum, consulted any number of printed works (though seemingly only four that are not available in the English language), spoken to relatives and psychiatrists, visited airfields, and apart from the nowadays oblig-

atory horror stories about combat fatigue and some not entirely credible gossip about Albert Ball's sex life has come up with very little more than what is already to be found in Alan Clark's *Aces High*, Denis Winter's *The First of the Few* and Richard Townshend Bickers's *The First Great Air War*. Rene Fonck is mentioned once, but only in a footnote; Franco Baracca and Godwin Brumowski, the leading Italian and Austrian aces, and Godfrey Banfield - Godfrey *Freiherr* von Banfield - the only aviator in two world wars to be ennobled for his exploits, are not mentioned at all. The National Archives at Kew appear in the listing the book gives of organizations that have helped with information, but no use has been made of the officers's personal files in classes WO 339 and WO 374, which include five files of men supposedly shot down by Manfred von Richthofen, with their own accounts of what happened, and the personal file of Duncan Grinnell-Milne, a pilot frequently quoted in this book, containing astonishing details of his career in the army prior to his transfer to the Royal Flying Corps. Nor has use been made of the 177 essays in which officers attending the RAF's staff college in the 1920s, recounted their war experiences. These are in AIR 1 and include R. M. Hill's reminiscences of Albert Ball, a 43-page essay on air fighting by Sholto Douglas, head of Fighter Command in the Second World War, and the recollections of Raymond Collishaw and Philip Fullard, who between them were credited with shooting down 113 German aircraft. Both Collishaw and Fullard survived to serve in the Second World War, so perhaps they do not qualify by the terms of the book's subtitle as having had *short* as well as *heroic* lives in the First World War. However, Mackersey devotes a whole chapter to showing that W.A. Bishop's First World War career was not altogether heroic, and he too survived to serve in the later conflict.

Ground-strafting—pretty much the principal role of Sopwith Camel pilots in 1918—is mentioned in a couple of places, but there is no reference to the success of German ground attack aircraft in the Cambrai counter-attack in November 1917, or of the American “Billy” Mitchell's organization of mass attacks on ground targets in 1918. This is not because Ian Mackersey has an overly restrictive conception of what constitutes air combat. For example he devotes a whole chapter to air raids carried out by German Gotha bombers, which he describes as “a revolutionary development of the flying machine,” exactly as if Russia, Italy and Britain had not all been employing multi-

engined bombers with greater bombloads long before the Gotha first appeared over southern England; he is also a month out in the date he gives for the first Gotha raid on London.

It may be of course that it is fighter pilots and dog-fighting in the clouds that people want to read about: but it is certainly a little curious that there seems to be a market for books about Bomber Command aircrew in the Second World War and the grueling routine and sudden terrors of their missions over Germany, and no apparent demand for books about the men who flew reconnaissance and artillery spotting aircraft in the First World War, for the latter had experiences at least equally stressful and dramatic. One suspects that it is aviation historians rather than ordinary readers who are responsible for such discrepancies in the way history is written.

Books such as *No Empty Chairs* serve to keep alive the memory of the exploits of some remarkable young men but also work to distract attention from the question of the real significance of aviation in the First World War. Despite popular interest in the subject it remains one of the least understood aspects of the war. This is a pity: the technology of almost a hundred years ago may seem fantastically rudimentary, but at least some of the military and organizational lessons are still very relevant

*Dr. A. D. Harvey, historian.*



**Destination Unknown: Adventures of a WWII American Red Cross Girl.** By LeOna and Kathleen Cox. CreateSpace Publishing, 2009. Photographs. Pp. 210. \$12.82 paperback ISBN: 978-1466412484

My first thought on flipping through these scrapbook-like pages was that this was going to be a “fluff” piece with lots of photos. Wrong! While bookshelves are loaded with personal accounts of the horrific realities of battle, this book gives poignant insight into the state of mind of the American soldier on his way to, or coming back from, war. It is a treasure trove collection of more than 200 letters written by a 27-year-old teacher, LeOna Kriesel, who left a secure college teaching post in 1943 to become a Red Cross girl in North Africa and Europe.

Recruited by the Red Cross, LeOna passed a thorough FBI background check and was ordered to pack a footlocker with everything she would need for two years. She viewed this as the most exciting thing to happen in her life; her parents dreaded

it. After several weeks of stateside training from how to play ping-pong and blackjack to properly donning a gas mask, LeOna sailed with 1,300 soldiers and 400 nurses and Red Cross workers to a foreign port known only to the ship's captain—*Destination Unknown*.

This book is loaded with photos and copies of LeOna's handwritten letters—most, thankfully, transcribed, and some juxtaposed with her handwritten letters on the opposite page. Interspersed throughout these typed letters are helpful explanations in bold font about who some of her subjects were, as well as current events to help the reader understand what was happening in the war and how her letters related to those events.

LeOna's letters bring the reader back to a bygone era of innocence. Few of us today would guess that the most popular form of entertainment overseas at Red Cross canteens was square dancing. And, yes, calling square dancing was another job a Red Cross girl had to know how to do. And those dances were packed!

For sixteen months LeOna's detailed letters regaled her parents with anecdotes of how she and her fellow Red Cross workers helped thousands of American soldiers. Often all they wanted was just to talk to an American girl—find out where she was from and if she knew anyone they knew. Red Cross girls felt compassionate listening was their greatest gift; from soothing the ones getting ready to go off to fight, to comforting those soldiers returning from the front who trembled so much they couldn't hold a coffee cup. We laugh when LeOna writes about getting a cavity filled while a sergeant pedaled a bicycle like mad to keep the dentist's drill going and we choke up when we read about a captain praying while holding a picture of his wife and baby as he prepared to go off to the front.

Over the months LeOna morphs from a naïve Minnesota girl to a seasoned and worldly young woman experienced enough, by the time she landed in Algeria, to barter her C-rations for coffee, bread, cheese, and sausages and, later on, talk a knife-wielding soldier out of killing another soldier.

Thanks to a daughter generous enough to share these compelling letters, we also get to peek into LeOna's personal world as she met a handsome young lieutenant who swept her off her feet and married her—much to the dismay of her parents. While most young American women had trouble finding wedding gowns even when there wasn't a war on, LeOna managed to have her wedding dress, underwear, and shoes designed by a famous fashion designer! To top it all off, another

famous designer did her hair and makeup. And she cut a deal with the Pope to arrange for electricity during her wedding ceremony. This gal knew how to get things done!

The English poet G.K. Chesterton once wrote that men fight not because they hate what is in front of them but because they love what is behind them. American Red Cross girls reminded these soldiers of what they were fighting for back home, often giving them the courage needed to keep fighting. LeOna did her part, dedicating those sixteen months to boosting the morale of American soldiers by giving them an interlude of peace and calm between living the horrors of war.

*Janet Tudal Baltas, Herndon, Virginia,  
docent, National Air and Space Museum*



### **Testing American Sea Power: U.S. Navy Strategic Exercises, 1923 – 1940.**

By Craig C. Felker. College Station: Texas A&M University Press, 2007. Index. Photographs. Appendices. Bibliography. Pp. 193. \$22.46 paperback ISBN: 978-1-60344-989-2

Felker's book is long overdue for people like me who have enjoyed reading about World War II in the Pacific. The Pacific War was basically a naval war, although large elements of the Army and Army Air Forces were heavily employed. It involved vast distances and corresponding logistic problems and was fought out during the 1920s and 1930s in two venues. The first was on the Game Floor of the Naval War College at Newport, Rhode Island. These war games were designed to educate and train naval officers in the grade of commander (lieutenant colonels in the other services) in thinking and planning for fleet engagements. They already knew a great deal about the mechanics of ship, submarine, and aircraft operations. The War College goal was to teach them to think bigger.

The second venue was much more significant. It involved fleet exercises at sea. That is what Felker describes. It was the place(s) where theories were tested under real conditions. Not only theories, but also fleet commanders and task force and task group commanders were tested. Although the UK and Germany were notional enemies at times (Red and Black respectively), the main enemy was Japan (Orange). The United States and Japan had been eyeing each other as potential enemies since the Japanese defeated the Russian fleet at the Battle of Tsushima Straits in 1905. The American naval scheme for dealing with

Japan was laid out in War Plan Orange, a plan that went through many changes and modifications during the period discussed. Three new technologies were introduced into naval warfare during that period: aerial warfare, amphibious warfare, and submarine warfare.

Army Brigadier General Billy Mitchell had published a provocative article, "Has the Airplane Made the Battleship Obsolete," in *The World's Work* magazine in April 1921. In the 1923 Fleet Problem One, a defense of the Panama Canal was carried out. Vice Admiral Eberle, the attacking force commander, launched an air attack at the Gatun Dam spillway in the predawn hours of February 21, 1923. The single Navy aircraft, representing a larger notional number of aircraft, was unopposed and dropped ten small simulated bombs were imaginary. Each carried fifteen imaginary bombers with a range of over 800 miles. *USS Langley*, the first U.S. Navy aircraft carrier, was just then undergoing initial underway testing. Although most admirals were still convinced of the effectiveness of the battleship with its large guns, the Navy saw its way to experimentation with the then relatively new area of aerial warfare. Fifteen of the twenty-one Fleet Problems tested aviation's role in naval warfare. Similarly, submarine warfare and amphibious warfare techniques were tested in Fleet Problems.

When World War II overtook the United States on December 7, 1941, the Navy had a very good idea of how it would go about the enormous task of crossing the Pacific, seizing Japanese-held islands, and establishing air and naval bases in order to reach further into the Japanese Empire. Aircraft carrier battle groups replaced the battleship as the main element of naval strength. The Navy had gained that knowledge and experience largely during the Fleet Problems of the inter-war years.

The Navy also experimented with horizontal bombing techniques. These were ultimately discarded, as they were relatively ineffective compared with torpedo bombing and dive bombing directed at ships underway. The famed Norden bombsight was developed for use in Navy patrol bombers and was later adopted by the Army Air Corps.

Air Force readers may find this book of interest as it outlines the process of testing of air power theories in the "Other Service."

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



**In the Shadow of the Moon; A Challenging Journey to Tranquility, 1965-1969.** By Francis French and Colin Burgess. Lincoln: Bison Books (Univ. of Nebraska), 2010. Photographs. Bibliography. Index. Pp. 480. \$22.95 paperback ISBN: 978-0-8032-2979-8

As a docent for the National Air and Space Museum, I have known for a very long time the average visitor is most interested in our space collections. Now imagine you are one of those visitors and you discover that your hometown meeting hall has organized a Space Symposium and invited all of the astronauts and cosmonauts who were part of NASA and the Soviet space programs between 1965 and 1969. The facilitators, Francis French and Colin Burgess, are award-winning authors of several space-history publications chronicling the human aspects of spaceflight. Not much technical or management details of the spacecraft or system will be included.

First they would give a brief description of the Gemini and Apollo spacecraft followed by a brief biography of the first crew. Next would be a description of mission accomplishments, with the crew then invited to give a first-hand account of the flight. After the remarks, the facilitators would wrap up the flight and continue with the next flight.

This is how this book is formatted: we are introduced to each crew of the nineteen missions flown during these five years (ten Gemini, five Apollo and four Soyuz). In later missions, as a rookie astronaut makes his first flight, his biography is detailed.

Little has been written about the Gemini flights in comparison with Apollo. Starting with Gemini III (Gemini I and II were unmanned) in March 1965, NASA launched ten manned missions over seventeen months. These proved that humans could perform spacewalks, rendezvous with an orbiting spacecraft, and survive at least eight days in space (minimum lunar voyage), among other things. With Gemini XII's successful completion in November 1967, the U.S. caught up with the Soviets in hours of space flight-time and then outdistanced them by a wide margin. Simply stated, the success of Apollo is due to the theories proven in Gemini.

The book's first half is the best; I thoroughly enjoyed learning about what it was like to crew a Gemini. The second half, covering Apollo, is already pretty familiar territory.

There are, however, several weak areas. During NASA's history, several astronauts were killed in plane crashes, automobile accidents, etc. These astro-

nauts are mentioned, their deaths explained, and nothing more. Yet there is a Roger Chaffee biography. It seems that if you were an astronaut and were killed in a spacecraft you are introduced; if you were killed another way you are only mentioned.

The book (the second volume of the *Outward Odyssey* book series) begins with a very weak introduction by Walt Cunningham. The series editor should have included a stronger introduction summarizing Mercury, which is not even brought up. Something along the lines of "... our first project, Mercury, flew six men into space, proving we could survive short-duration flights. It was during this period that JFK said we shall go to the Moon. . . ." in much greater detail.

The paperback version of the book has an index, but the electronic version does not. The latter has a bibliography listing books, periodicals, interviews conducted, and online resources. If you want the book as a reference source, buy the paperback; however, if you are reading for enjoyment, the eBook will do nicely. Either is a good place to start learning about the period called the Golden Age of Space Flight.

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



**How Wars Are Won and Lost: Vulnerability and Military Power.** By John A. Gentry. Santa Barbara, Calif.: Praeger Security International, 2012. Tables. Diagrams. Notes. Index. Pp. 314. \$63.00 ISBN: 978-0-313-39582-6

Books about war or other military operations frequently discuss battles or campaigns in great detail and explain how they contributed to the ultimate outcome of the war. John Gentry presents the view that the results of individual battles provide only a partial or indirect predictor of success and that ultimate victory (or defeat) in major military operations hinges upon high-level, strategic issues such as resource mobilization, force generation, and national will. Gentry has ample qualifications to discuss the question of military victory and defeat: he was an Army officer and an adjunct professor at the National Intelligence University and has authored a carefully researched history and analysis of the Central Intelligence Agency's Directorate of Intelligence.

In this scholarly work, much of which is based on his doctoral dissertation, Gentry discusses previously published theories on the causes of military success

and demonstrates—with specific examples—that all of them have shortcomings that leave them incapable of fully accounting for the outcome of all military conflicts.

Gentry then presents his own hypothesis, which he calls "dimensional analysis." The theory is based on six areas or "dimensions" of military power and on three independent variables that determine the impact of vulnerabilities on the effective exercise of that power.

In Gentry's construct, the six dimensions of military power are:

- National will—the desire or willingness to produce and use military capabilities
- Resource mobilization—the acquisition of physical resources for military purposes
- Resource conversion—the ability to convert raw resources into weapons and other useable political or military assets
- Force generation—the production of relevant forces by combining physical and "ideational" assets
- Leadership—the actions taken by civilian and military leaders to guide and inspire their subordinates, supported or enabled by effective staff activities and command and control
- Operational execution—the carrying out of military and political actions aimed at defeating the enemy

Gentry's variables that address vulnerabilities are the abilities to:

- Identify enemy vulnerabilities in the six dimensions.
- Exploit those vulnerabilities.
- Improve areas of one's own vulnerabilities.

Gentry develops the dimensional analysis theory by explaining what each of the dimensions and independent variables means, discussing how the dimensions should work together to contribute to victory, and showing how strengths in one dimension can be overwhelmed by weaknesses in others.

Following this exposition of his theory, Gentry moves to the book's real strength. These are six chapters, each of which provides a discussion of a major US or Allied military operation, shows how other theories fall short of accounting for the outcome, and explains how dimensional analysis can be applied to explain victory and defeat. His descriptions of the operations and his analytical approach in applying both his theory and competing theories are presented clearly and convincingly. Individuals who remember or have studied the Vietnam War will find Gentry's analysis of particular interest, not only for

the clarity and insights it brings to that conflict, but also as a suggestion of what might happen in future wars if the six dimensions are not effectively aligned.

*How Wars are Won and Lost* is not intended for those who are looking for a blow-by-blow account of battles and campaigns. But for readers who want a scholarly discussion of the important question raised by the book's title, Gentry's work would be a good addition to one's library.

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



**Mustang, The Inspiration: The Plane that turned the Tide of World War II.** By Phillip Kaplan, South Yorkshire, UK: Pen & Sword Aviation, 203. Photographs. Index. Pp. 192. \$29.95 ISBN 978-1-781-59046-1.

Certainly, most aviation historians would agree that the P-51 Mustang played a pivotal role in the Allied victory in the European Theater during World War II. Kaplan's title clearly sets the focus to tell the story of the North American Aviation P-51 Mustang.

A prolific military-history author, Kaplan begins his story of the P-51 by relating the story of Ed Schmued, the man credited with designing the Mustang. While the P-51 proved to be the linchpin of the U.S. quest to destroy the German *Luftwaffe*, it actually began as a British desire for an aircraft with better performance than the Spitfire and Hurricane. While testing the P-51, the Army Air Forces initially showed very little interest, choosing to focus on the P-38, P-40, and P-47. Originally equipped with an Allison V-1710 engine, the Mustang didn't initially prove itself to be the stalwart performer that would dominate the war-torn skies over Europe. It wasn't until April 1942 that Rolls-Royce test pilot Ronnie Harker, upon flying the Mustang, recommended it be re-engined with a Rolls-Royce Merlin. Once equipped with the Merlin, the P-51 transformed into a dominant force.

What follows after the initial discussion of the development and early fielding of the P-51 is a collection of there-I-was stories. The book appears to ramble on without any direction or purpose other than to relate individual stories of American Mustang pilots and ground crew. The stories appear to have no purpose or correlation to the author's implied theme that the P-51 turned the tide in World War II.

If the lack of focus on a central theme weren't alarming enough, the book's end-

ing is. The book abruptly ends in the middle of a less-than-memorable story: "But we went through the ditch and to a farmhouse where the colonel left me in charge of a farmer, his wife and their teenage daughter." There is no summary, conclusion, post-script, epilogue, or any form of text to reaffirm the author's point or even bother to tell the reader the story is done. The text ends on the last line of the page; the author simply ran out of space. Books are traditionally printed on large sheets of paper (flats) that fit a total of sixteen pages. As a result, publishers work to finish a book at the end of a flat. A quick page counts confirms that this is the case with *Mustang*. The publisher ran out pages to print the book on; therefore, the book is done! Editing the content would certainly have helped.

While the book does have a photo section, it does very little to enhance the story. A prime example is that the only cockpit photo is that of a Focke-Wulf Fw 190 rather than the focus of the book, the P-51. The remaining photos are a combination of hero shots and stock photos of the P-51 and other aircraft.

Sadly, this is not an inspirational work. After the initial discussion of the P-51's development, the book dissolves into a disjointed collection of stories garnered from other books. Forays into the F-82 Twin Mustang, the history of the Tuskegee airman (who did fly the P-51), the Korean War, and post-war warbird use fail to explain how the P-51 was "the plane that turned the tide of World War Two." In the end, the book fails to deliver. The discussion of the Mustang's development and British fielding are interesting but cannot overcome the poor organization and apparently non-edited text. Beyond readers who want to read a collection of firsthand combat experiences, this book has no appeal; it fails to take off.

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



**Birth of a Base: MacDill Field 1939-1941.** By TSgt Bruce Lipowski, USAF (Ret.). Bloomington, Ind.: AuthorHouse, 2013. Tables. Illustrations. Photographs. Notes. Appendices. Bibliography. Pp. xix, 162. \$25.95 paperback ISBN: 978-1-4817-2993-2

Sergeant Lipowski spent twenty years in the Air Force as a combat cameraman not overly interested in the history of the bases at which he served until later in his career. During his final tour of duty at MacDill AFB Fla., the base commander

decided he wanted pictures of all of the MacDill commanders for a display. Lipowski helped the local historian by going to the Air Force Historical Research Agency at Maxwell AFB, Alabama. There, he ran across a report written by 2Lt. John Jones, the base's first historical officer, on the establishment of MacDill Field. This book is essentially a reprint of that report plus a well-researched selection of documentation and photos of MacDill as the base was developed. In addition to the documents and photos, Lipowski also tracked down several relatives of the first commanders of the base, who provided more material for the book.

The establishment of MacDill is really a story that can serve as a primer for the vast expansion of the Army Air Forces preceding U.S. entry into World War II. It is a story repeated hundreds of times during the war as new bases were built all over the United States. It is part of the story of the tireless efforts of Hap Arnold and others to provide America with an Air Force before the country found itself in another shooting war—not to repeat the experience of 1917 when we entered a war with virtually no modern military force.

MacDill—or Southeastern Air Base, as it was originally known—was a result of the 1935 Wilcox National Defense Act that authorized seven new bases for the Air Corps (five flying bases and two depots). Unfortunately, no appropriations were attached, but the Air Corps completed site selection to be ready when funds became available: Fairbanks, Terr. of Alaska, (eventually Ladd), Northeast (Westover), Southeast (MacDill), Ogden, Utah depot (Hill), Mobile Alabama, depot (Brookley), Puerto Rico (Ramey), and Panama Canal Zone (Howard). Tampa got the Southeastern not because of its excellent weather and the fact that six of eight approaches to a field would be over water, thus increasing safety.

Construction started in September 1939; Lipowski/Jones describe an excellent example of cooperation between the Army Corps of Engineers, Air Corps, local Hillsborough County and Tampa officials and businessmen; the local citizens, and the Civilian Conservation Corps. Yes, there were many bumps in the road, but MacDill grew quickly. By mid-summer 1942, there were over 12,000 personnel on the base—a rapid period of growth from when the first 50 arrived from Barksdale Field Louisiana in March 1940. One of the early base commanders was Col. (later Maj. Gen.) Clarence Tinker, for whom Tinker AFB is named. Col. Malcolm Grow was the first surgeon. Anyone ever assigned to Andrews AFB is familiar with the Malcolm Grow Medical Center. The

book does not mention it, but the first bomb group of Eighth Bomber Command, the 97th, trained and departed for England from MacDill, along with its commander, Frank Armstrong, and one of its squadron commanders, Paul Tibbets.

This is an excellent book that provides a glimpse into the Air Force of seventy years ago and is well worth reading.

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



**Fifteenth Air Force Against the Axis: Combat Missions over Europe during World War II.** By Kevin A. Mahoney. Lanham, Md.: Scarecrow Press, 2013. Maps. Photographs. Notes. Appendices. Glossary. Bibliography. Index. Pp. xv, 485. \$95.00 ISBN: 978-0-8198-8494-6

For many years, students of the Allied bombing campaign against Europe in World War II have been waiting for a Fifteenth Air Force equivalent to Roger Freeman's seminal works on the Eighth, *The Mighty Eighth* and *Mighty Eighth War Diary*. Unfortunately, the wait is still on.

Kevin Mahoney obviously did a phenomenal amount of research to prepare for his writing. In addition to group histories and a long list of books, he examined a long list of records from the Library of Congress and the National Archives that indicate as thorough a study of the operations of the Fifteenth Air Force as has been taken. The problem with this book lies in the presentation of this vast amount of material. Everything is presented in narrative form—often quite dry narrative form. There is not a single table or organization chart in the over 400 pages of narrative. Mahoney evidently has little concept of the amount of material (aircraft numbers involved, losses, enemy claims, bomb tonnage, etc.) that can be presented in a table. Freeman's *Diary* is comprised primarily of tables supplemented by narrative descriptions to provide context and further detail.

In many ways, this book appears to be little more than a somewhat more detailed rehash of Carter and Mueller's *The Army Air Forces in World War II: Combat Chronology 1941-1945*. I compared a number of the daily entries in both books and found a lot more words in Mahoney with only a bit more detail than is found in Carter and Mueller. Even Mahoney's index of bombing targets is essentially the same as Carter and Mueller's with only Fifteenth's targets covered. But he does

list the targets under the countries in which they were located.

Three other problems exist. One is the lackluster collection of pictures: twenty-four of mediocre quality. The second is Mahoney's habit of spelling out numbers in the middle of sentences: "forty-two B-24s" or "thirty-seven Liberators." I don't think anyone has a problem reading "42 B-24s" or "37 Liberators," but I found this style distracting. Similarly, he had to spell out "Bomb Wing" or "Fighter Group" every time he used them. There's nothing wrong with "5BW" or "459BG," and a lot of ink and paper would certainly have been saved! The third problem was the lack of organization charts. Again, Mahoney chose narrative format to describe the changes in the unit's organization. One is better served to go to Davis's *Carl A. Spaatz and the Air War in Europe* to see how Fifteenth grew from its formation in the Fall of 1943.

So, is there anything really good about the book? Absolutely. Carter and Mueller essentially ran a diary from December 7, 1941 through September 15, 1945 without stop. Mahoney organized Fifteenth's operations into monthly chapters. At the beginning of each, he provides a well-thought-out summary and analysis of the unit's activities and impact for that month. The final chapter is appropriately titled "Summing Up" and is a fine analysis of the overall impact of Fifteenth on the war effort. The four appendices are also quite good and cover Command Structure, Intelligence, Photo Reconnaissance, and Weather; Bomber Operations; Fighter Operations; and Crews and Their Aircraft.

If you're really interested in details about Fifteenth Air Force in World War II, this is the best book out on the topic. It's expensive, but the monthly and overall summaries and the appendices probably make it worth the cost.

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



**The Schweinfurt-Regensburg Mission: The American Raids on 17 August 1943.** By Martin Middlebrook. South Yorkshire, UK: Pen & Sword Aviation, 2012. Maps. Photographs. Illustrations. Appendices. Bibliography. Index. Pp. 363. \$29.95 paperback ISBN: 978-1-84884-760-6

Recognizing the historical importance of the American daylight bombing raids on Schweinfurt and Regensburg Germany on August 17, 1943, Middlebrook did a sub-

urb job writing about that bloody day as a writer covering the human tragedies and triumphs, an historian capturing the information that makes the totality of the event clear, and as an analyst who shares what went right and wrong and why. His appendices post analytical data that readers can peruse to come to their own conclusions. This is a tale of an aviation event that changed the American air war over Europe and forced tactical changes that ultimately helped win the war.

The first chapter describes the American dream of self-defending bombers penetrating unescorted deep into Germany during daylight to precision bomb vital industrial targets. The RAF had long since given up on this idea and tried to get the Americans to join them in night bombing of major German cities, but American advocates of precision-bombing daylight missions won the day. Chapter two covers the targets and their importance. Chapter three deals with Eighth Air Force's chain of command. From there forward, the book follows the mission as the men who flew it would have experienced it. Each stage gets a separate chapter: briefings, plan revisions, going in, over the target, and so on. The Regensburg mission is covered first and the Schweinfurt mission second just as they occurred. This structure works well.

Middleton critically examines some of the Army Air Corps misperceptions and missteps. One fatal byproduct of the self-defending-bomber purists' views and theories was that the Air Corps did not see the need to rapidly produce and deploy a long-range fighter escort even though it had the ability to do so. The RAF experience should have warned the American chain of command that they either had to fly at night or field a long-range fighter that could escort the bombers all the way to target. Instead, the Army believed that tactics maximizing mutual fire support of the bombers would prove sufficient. It didn't.

The B-17 at that time had a fatal flaw that German intelligence knew well and German fighters used to great advantage—its guns could not fire forward against a head-on attack. The two machine guns in the nose of the aircraft fired at an angle not straight on and were manned by officers whose secondary mission was to operate the guns. The Germans considered these gunners far inferior to the well trained enlisted gunners who manned the other machine guns. By attacking the rear aircraft in the rear most combat box head-on they could escape the mutual fire support the B-17 relied so heavily on to survive fighter attack.

The chain of command and leadership

styles and decisions also played a large factor in the divergent performance of the Regensburg and Schweinfurt raids. Middleton admits that he has the luxury of looking at these mistakes in hindsight. Still no one can argue with his recognition of the core problem of the Schweinfurt tragedy—a commander who did not train his pilots hard enough to have total faith in their abilities.

The original plan called for both raids to occur simultaneously to stretch German defenses thin and reduce bomber losses. Colonel LeMay's 4th Bomb Wing (4th BW) would bomb the Messerschmitt factory at Regensburg and then fly on to airfields in North Africa. Eighth Air Force planners believed that the *Luftwaffe* would deploy its fighters to ambush the bombers on their way back to England. By flying to North Africa instead, LeMay's force would catch the German fighters out of position. Brig. Gen. Williams 1st Bomb Wing (1st BW) would bomb the ball bearing plant at Schweinfurt and fly a return course to England. Planners believed the simultaneous raids would dilute fighter attacks on the way to target but warned that this force would have to fight its way back home. That prophecy proved an understatement.

Weather played a key element in the tragedy. Fog and low clouds socked in the airfields of both wings as takeoff approached. Brig. Gen. Anderson, commanding Eighth Bomber Command, had a difficult decision to make: to delay or cancel the mission. He called LeMay and Williams to ascertain if they thought their pilots could take off under present conditions. LeMay, who made his pilots take off using instruments even in good weather in preparation for just such a day, said his could. Williams said his could not. The entire mission should have been either canceled then or ordered to proceed as planned. Instead, Anderson made a third choice: he ordered the 4th BW to fly as planned but ordered the 1st BW to delay until the weather cleared. This reduced the threat of aircraft accidents but led to many more combat deaths.

Short-range Spitfires and medium-range P-47s provided fighter escort. The *Luftwaffe* simply waited until the fighters turned back and then attacked the bombers. Deep penetration inside Germany exposed the bombers to fighter attack longer than customary and the 4th BW suffered accordingly. Despite losses, LeMay's wing carried off a flawless precision strike that even impressed the Germans.

Middleton well covers German actions during the fight using documentary evidence and interviews with

German participants and matching them with U.S. accounts to ascertain what actually happened. One fact that stands out is the over-inflated claims by B-17 gunners. They claimed 288 German fighters shot down (only 300 even participated), while German documents show that only twenty-one were lost. Eighth Air Force knew the claims were inaccurate but chose to publish them for morale purposes.

The 1st BW took off hours late for Schweinfurt. The *Luftwaffe*, believing the 4th BW would return to England, had had time to marshal fighters from all over Europe and planned to heavily engage the Regensburg bombers on their trip home. They were taken completely by surprise when the 4th BW flew on toward North Africa, but then the 1st BW flew into this fighter cauldron. The reinforced and incensed German fighters did not wait for the escort to turn for home this time and began attacking as soon as the 1st BW crossed the European coast. Combat was so intense that most US crews considered themselves already dead and simply focused on getting their bombs on target before getting shot down. Command decisions would again play havoc.

Colonel Gross, commander of the leading group, decided they could not safely fly through a cloud bank and ordered a descent. This unplanned descent led to a missed rendezvous with a fighter escort and caused the trailing groups to form gaps that made them vulnerable to fighters. This move also played a large role in the 1st BW's poor bombing results.

The closing chapters deal with the reckoning and aftermath of the raids. Out of the 361 B-17s that crossed the coast, sixty were shot down and 601 American pilots and crew killed, captured, or missing. The unsustainable aircraft loss rate was percent. From a statistical standpoint, it would appear a clear victory for the *Luftwaffe*, but other factors need to be considered. The Messerschmitt factory was out of operation for only several weeks; the buildings were destroyed, but the machinery was not. But the delay prevented about 1,000 fighters from being built. The ball bearing plant's damage also did not provide a critical blow to German industry; a ball bearing surplus existed for just such a contingency, and the machinery survived as well. But the Germans now had to disperse their manufacturing industry to protect it. The already hard-pressed *Luftwaffe* also faced the prospect of having to commit more fighters to defense of the homeland. Morale also took a hard hit. Many of the residents of Regensburg and Schweinfurt stated that they knew the gig was up when the Americans began bombing so far inside Germany.

Within the Air Corps, Eighth Air Force's leadership—Lt. Gen. Ira Eaker and Brig. Gen. Anderson—was reassigned and Maj. Gen. Jimmy Doolittle took command, bringing new leadership, strategy, and tactics. Gen Hap Arnold ordered maximum effort on P-51 long-range fighters with all production sent to England until Eighth Air Force had enough to escort bombers to targets and back. In December 1943, P-51s first flew as escorts. Indeed, the gig was up.

The appendix is one of the best I have seen. It includes every statistic a reader could want. Middleton even includes the location in each group of every lost aircraft and the status of each of its crew.

This is an excellent book that chronicles the heroism of the flight crews that flew the raids. It also provides a clear understanding of why the raids cost the Eighth Air Force so dearly. Readers of all stripes will enjoy it and find it useful.

David F. Crosby, Writer/Editor, Ninth Air Force History Office, Shaw AFB, South Carolina



### **Bombing Nazi Germany: The Graphic History of the Allied Air Campaign That Defeated Hitler in World War II.**

By Wayne Vansant. Minneapolis Minn.: Zenith, 2013. Maps. Illustrations. Appendix. Pp. 103. \$19.99 paperback ISBN: 978-0-7603-4530-6

This is one very nice little book that covers a huge subject. Wayne Vansant has encapsulated the greatest air campaign in history in a bit different format than most of us are used to. When I started reading the book, I was immediately reminded of what many of us will remember, the old *Classics Illustrated* comic books of the mid-20th century.

Vansant is both the writer and illustrator. He used a similar format when he illustrated Marvel's *The Nam* series and then went on to both write and illustrate *Normandy* and *Gettysburg* for Zenith. He drew almost 400 high-quality illustrations for this latest venture.

When I first started the book, I looked at it as a really good introduction for kids to the history of the Round-the-Clock Bombing Campaign against Nazi-held Europe by RAF Bomber Command and the US Eighth and Fifteenth Air Forces. After thinking about it awhile, I realized that it is actually a pretty good summary of this monumental effort for anyone—even some of us who have read dozens of books on the subject. This work certainly does not go into the detail of Davis's tome,

*Carl A. Spaatz and the Air War in Europe*, or a multitude of other scholarly works on the bombing campaign. But, for someone looking for an evening's reading as either a brush-up or as a broad introductory lesson on the subject, this is a fine book.

Vansant begins with just a few pages on the evolution of strategic bombing theory and practice. The 95 pages of illustrated text are then divided into major, chronologically arranged topic areas that cover the major events and aspects of the campaign. Along the way Vansant introduces all of the principal characters involved—Churchill, Arnold, Spaatz, Eaker, Doolittle, Galland, Harris, Goering, et al.—and most of the salient points that a good summary of the campaign should cover. While illustrations are the primary focus on each page, it is surprising how much narrative there is. The print and its text boxes may be small, but Vansant crams a lot of information into his writing. The single appendix illustrates and briefly describes the primary aircraft used by the UK, US, and Germany.

A note about the illustrations. I think these are of about the same quality as Hal Foster's original drawings in his long-running *Prince Valiant* comic strip. There's not a single illustration where I couldn't tell what kind of airplane or who Vansant was talking about in the accompanying narrative. They are cartoons, no question, but they are very good; and every one well supports the thread of the history presented.

For a quick and enjoyable summary of the technology, strategy, tactics, and personalities involved in this huge six-year military campaign, this book very adequately fills the bill.

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



**The Mons Pocket.** By Steve Bowman, Jack Neufeld, and Paul Gorman. City: The George C. Marshall Foundation, 2013. 78 pages. Photographs. Maps. Video. [www.marshallfoundation.org](http://www.marshallfoundation.org).

In late August and early September 1944, the Allies pressed the limits of their logistics in a race across France after striking victories in Normandy and Provence. With little notice, the U.S. First Army shifted the axis of its VII Corps' advance 90 degrees, enveloping enemy units in the vicinity of Mons, Belgium. By the time the dust settled, 30,000 Germans had been killed or captured. The heavy equipment of at least as many more had been demol-

# Books Received

Ballard, Jack S. and James J. Parks. *The 147th Aero Squadron in World War I: A Training and Combat History of those "Who Said Rats" Squadron*. Atglen, Pa.: Schiffer Military History, 2013. Maps. Notes. Photographs. Appendices. Bibliography. Index. Pp. 240. \$59.99 ISBN: 978-0-764333-4400-8

Greenly, Larry W. *Eugene Bullard World's First Black Fighter Pilot*. Montgomery, Ala.: NewSouth Books, 2013. Photographs. Index. Pp.147. \$19.94 ISBN: 978-1-58838-280-1

Lacey, Sharon T. *Pacific Blitzkrieg: World War II in the Central Pacific*. Denton: University of North Texas Press, 2013. Maps. Illustrations. Photographs. Notes. Bibliography. Index. Pp. xviii, 282. \$27.95 ISBN: 978-1-57441-525-4

Rothmund, Christophe. Ed. *History of Rocketry and Astronautics*. San Diego, Calif.: Univelt, 2013. [AAS History Series, Vol. 40, IAA History Symposia, Vol 28] Daejeon, Rep. of Korea, 2009. Illustrations. Photographs. Notes. Pp. xii, 331. Paperback. \$75.00 ISBN: 978—0-87703-600-5

Royal Air Force Historical Society. *Journal 56* [Prisoners of War], London: RAF Historical Society, 2013. Maps. Notes Illustrations, Pp. 180. ISSN: 1361 4231

Wildenberg, Thomas. *Billy Mitchell's War with the Navy: The Interwar Rivalry over Air Power*. Annapolis, Md.: U.S. Naval Institute Press, 2013. Maps. Photographs. Notes. Pp.288. \$34.95 ISBN: 978-0-87021-038-9

ished as the enemy struggled to escape the trap. *The Mons Pocket* tells this story with precise prose, ample eyewitness testimony and striking graphics. Beyond that, as an e-book, it provides a fascinating insight into the shape of things to come. The digital revolution opens up brave new worlds in the ways we teach history.

The late Col. Steve Bowman, long a pillar of the Army Historical Program and a former director of the Military History Institute, intensively researched the campaign in the archives and on the ground, including leading staff rides through the Mons battlefield. Jack Neufeld, editor of *Air Power History* and a former Air Force historian, brought the Ninth Air Force's important contributions to the battle into focus. Gen. Paul Gorman, former commander in chief of U.S. Southern Command and a consultant for the Institute for Defense Analyses and the Defense Science Board, brought the project to fruition in a manner that pushed the envelope with respect to current technologies. All three men were aided and inspired by the late Ambassador Fred L. Hadsel, former president of the George C. Marshall Foundation. As a lieutenant and an Army historian, Hadsel gathered invaluable interviews from participants

in 1945. The Marshall Foundation sponsored and published this book.

The basic text tells the story of the approach march and battle in seventy-eight tightly written pages. Separate chapters provide an epilogue, a prologue, and discussions of the campaign in Northern France and the resumption of the offensive by the First Army in late August. The text is not documented in the ordinary manner with footnotes or endnotes, but it does include an informative bibliographical essay. It also identifies sources via interactive dropdowns. The narrative is succinct but comprehensive. Discussions of air-ground coordination and the role and nature of the Resistance are particularly strong. I also felt a certain sense of *deja vu* while reading of the extraordinary measures taken to accommodate prisoners and of the grumpiness of after-the-fact analysts that too many had gotten away. As a veteran of Operation Desert Storm, I can identify with the frustration of achieving overwhelming victory in the face of daunting challenges, only to have pundits opine that it was not quite victory enough.

The Marshall Foundation, in its continuing efforts to support military education, has embraced e-books and the Internet as additional opportunities to

advance the ball. I encountered a few minor challenges getting started in the e-book, but fortuitously, my grandson was more than capable of talking me through them. The succinct text is multiplied by the ability to draw up maps and explanatory narratives, expand photographs into portfolios with captions, draw out individual anecdotes and biographies, play videos, and more. A map, for example, becomes an account in itself as one's cursor rolls over individual points or icons, drawing up discussions related to them. When one is ready for them, individual experiences can enrich the text.

I strongly recommend *The Mons Pocket* to all students of military history and those who would teach them. Its basic narrative is accessible to readers at all levels of experience, and its layers of detail will satisfy even the specialist in its subject matter. A book suitable for everyone has long proven the most elusive of goals. Now, harnessing the benefits of technology, we have come closer to achieving it.

*Brig. Gen. John S. Brown, USA (Ret.)  
Former Chief of Military History*

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## PROSPECTIVE REVIEWERS

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

Col. Scott A. Willey, USAF (Ret.)  
3704 Brices Ford Ct.  
Fairfax, VA 22033  
Tel. (703) 620-4139  
e-mail: [scottlin.willey@gmail.com](mailto:scottlin.willey@gmail.com)

# Coming Up



Compiled by  
George W. Cully

#### January 2-5, 2014

The **American Historical Association** will hold its 128th annual meeting in Washington, D.C. at the Marriott Wardman Park, the Omni Shoreham Hotel, and the Hilton Washington. More than 1,500 scholars will participate. For additional details, see the Association's website at [www.historians.org/annual/2014/index.cfm](http://www.historians.org/annual/2014/index.cfm).

#### January 14-15, 2014

The **Association of the United States Army** will host its annual Army Aviation Symposium & Exposition at the Crystal Gateway Marriott in Arlington, Virginia. For additional details, see the Association's website at [www.USA.org/meetings/2014/Pages/Aviation.aspx](http://www.USA.org/meetings/2014/Pages/Aviation.aspx).

#### February 11-13, 2014

The **U.S. Naval Institute** and **AFCEA** will jointly host West 2014, the largest event on the West Coast for communications, electronics, intelligence, information systems, imaging, military weapon systems, aviation, and shipbuilding. The forum and exhibition will be held at the San Diego Convention Center in San Diego, California. For more details see the website at [www.usni.org/events/2014-west-conference](http://www.usni.org/events/2014-west-conference).

#### February 20-21, 2014

The **Air Force Association** will host its annual Air Warfare Symposium at the Rosen Shingle Creek Conference Center in Orlando, Florida. For more information, see the Association's website at [www.afa.org](http://www.afa.org).

#### March 4-6, 2014

The **American Astronautical Society** will present its 52nd Robert H. Goddard Memorial Symposium in Greenbelt, Maryland. For details, see website at <http://astronautical.org/goddard>.

#### March 6-8, 2014

The **Army Medical Department Center of History and Heritage** and the Uniformed Services University of the Health Sciences will be co-sponsoring a conference on the medical history of WWII. The event will be held at the Army Medical Department Museum in San Antonio, Texas. For details, contact Dr Sanders Marble, US Army Office of Medical History at [william.s.marble.civ@mail.mil](mailto:william.s.marble.civ@mail.mil).

#### April 3-6, 2014

The **Society for Military History** will hold its 81st annual meeting in Kansas City, Missouri. The theme for this year's gathering will be "Transformational Conflicts: War and its Legacy Through History." For info regarding the event, see the Society's website at [www.smh-hq.org/2014/2014annualmeeting.html](http://www.smh-hq.org/2014/2014annualmeeting.html).

#### April 10-13, 2014

The **Organization of American Historians** will host its annual meeting at the Atlanta Hilton in Atlanta, Georgia. This year's meeting theme is "Crossing Borders." For more info, see website at [www.oah.org/news/20130709\\_2014OAH.html#sthash.QhJ8SrNs.dpuf](http://www.oah.org/news/20130709_2014OAH.html#sthash.QhJ8SrNs.dpuf).

#### April 11-14, 2014

The **University of Greenwich's Maritime Institute**, sited in London, England, will host a conference on "Naval and Maritime Powers During Two World Wars." Among other aspects, the program will include presentations on the airpower aspects of both conflicts. For details, see the University's website at [www2.gre.ac.uk/about/schools/gmi/about/news/gm/call-for-papers-naval-and-maritime-power-conference-2014](http://www2.gre.ac.uk/about/schools/gmi/about/news/gm/call-for-papers-naval-and-maritime-power-conference-2014), or e-mail the Institute at [maritimepower@greenwich.ac.uk](mailto:maritimepower@greenwich.ac.uk).

#### April 14-17, 2014

Global War Studies and the **Royal Military Academy Sandhurst** are pleased to announce "1944: Seventy Years On," an international conference on the Second World War with 1944 as its core theme. The conference will be held at the Academy. For more details, contact Robert von Maier via e-mail at [globalwarstudies@gmail.com](mailto:globalwarstudies@gmail.com).

#### April 28-May 4, 2014

The **American Society of Aviation Artists** will host its 2014 Forum at the San Diego Air and Space Museum in San Diego, California. The Forum will also mark the opening of an aviation art exhibition at the Museum which will run for three months. For additional information, see the Society's website at [www.asaa-avart.org/visitors/news.php](http://www.asaa-avart.org/visitors/news.php).

#### May 1-3, 2014

The **Association of Former Intel-**

**ligence Officers** and the **National Geospatial-Intelligence Agency** will co-host their 2014 Intelligence Symposium at the National Geospatial-Intelligence Agency located in Springfield, VA. Attendees must be U.S. citizens, and Friday's panels, speakers, and luncheon will be held at the Crowne Plaza Hotel in Vienna/Tysons Corner, Virginia. For more details, see the AFIO website at [http://www.afio.com/05\\_events\\_2014.htm](http://www.afio.com/05_events_2014.htm).

#### May 4-7, 2014

The **Army Aviation Association of America** will host its annual Professional Forum and Exposition in Nashville, Tennessee. For further information, see the Association's website at [www.quad-a.org/](http://www.quad-a.org/).

#### May 12-15, 2014

The **Association for Unmanned Vehicle Systems International** will host its annual Forum and Exhibition in Orlando, Florida. More details are posted on the Association's website at [www.auvsi.org/AUVSI/Events1/AUVSIEvents](http://www.auvsi.org/AUVSI/Events1/AUVSIEvents).

#### May 19-22, 2014

The **Space Society** will present its 30th annual symposium at the Broadmoor Hotel in Colorado Springs, Colorado. For further information, see the Society's website at [www.spacefoundation.org/node/43](http://www.spacefoundation.org/node/43).

#### May 20-22, 2014

The **American Helicopter Society** will hold its 70th Annual Forum & Technology Display at the Palais des congrès de Montréal in Montréal, Quebec, Canada. The theme of the conference is "Celebrating International Cooperation in Vertical Flight Technology." For more details, see the Society's website at <http://www.vtol.org/events/ahs-70th-annual-forum-and-technology-display>.

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

George W. Cully  
3300 Evergreen Hill  
Montgomery, AL 36106  
(334) 277-2165  
E-mail: [warty@knology.net](mailto:warty@knology.net)

# Reunions

**3389th Pilot Training Squadron** Apr 9-13, 2014, Dayton, OH Contact: Don Schmenk  
5049 South Agner St,  
Ottawa, OH 45875-9797  
419-306-3383  
dschmenk@bright.net

**Vietnam/Thailand Air Force "Sky Cops."** Apr 11-13, 2014, Fairborn, OH Contact: Pat Houseworth  
540 West Livingston St,  
Celina, OH 45822  
419-586-3076  
pathouseworth@gmail.com

**12th TFW (Vietnam), 12th FEW/SFW (Korea) 12th FTW (Randolph), 306th FTG (12 FTW) USAFA, 479th FTG (12 FTW) Pensacola.** Apr 23-26, 2014, Pensacola, FL. Contact: "E J" Sherwood  
480-396-4681  
EJ12TFW@cox.net

**306th FTG (12 FTW) USAFA** Apr 23-26, 2014, Pensacola, FL Contact: "E J" Sherwood  
480-396-4681  
EJ12TFW@cox.net

**479th FTG (12 FTW) Pensacola** Apr 23-26, 2014, Pensacola, FL Contact: "E J" Sherwood  
480-396-4681  
EJ12TFW@cox.net

**B-58 Hustler Assn** May 1-4, 2014, Ft Worth, TX Contact: Richard Bolcer  
817-249-5019  
rich92437@sbcglobal.net

**4950th Test Wing/Aria 328 Memorial.** May 6, 2014, Fairborn, OH. Contact: Bob Beach  
1616 Ridgeway Dr,  
Springfield, OH 45506-4023  
937-325-6697  
w81cz@woh.rr.com

**95th Bomb Grp Mem Foundation.** May 7, 2014, Dayton, OH. Contact: Meg Brackney  
216 Northwood Dr,  
Yellow Springs, OH 45387  
937-767-2682  
meggyjb@aol.com

**Blindbat C-130A Flarebirds** May 19-21, 2014, Las Vegas, NV Contact: Dennis Miller  
2014 Desert Quail Dr,  
Las Vegas, NV 89128  
702-363-4231  
dmillerrr@embarqmail.com

## List provided by:

Rob Bardua  
National Museum of the U.S. Air Force  
Public Affairs Division  
1100 Spaatz Street  
WPAFB, OH 45433-7102  
(937) 255-1386

**449th Bomb Group** Aug 6-9, 2014, Fairborn, OH Contact: Mary Crowley  
16292 Content Circle,  
Huntington Beach, CA 92649  
714-840-1805  
tcrow16@aol.com

**AC-119 Gunship Reunion** Sep 18-21, 2014, Albuquerque, NM Contact: Col Steve Mac Isaac, USAF (Ret)  
6449 Coventry Hills Dr, NE  
Rio Rancho, NM 87144  
505-867-3367 or 302-249-1499  
colmacmac@mac.com

**384th Bomb Group.** Oct 16-19, 2014, Fairborn, OH. Contact: Frank Alfter  
1306 Adams Way,  
Beavercreek, OH 45434  
937-306-2142  
fjalfter@gmail.com

**496th Tactical Fighter Squadron.** Oct 23-26, 2014, Fairborn, OH. Contact: J. Kevin Roll  
677 Todd Trail,  
Newport News, VA 23602  
918-815-2629  
rolljk@yahoo.com

**496th TFS/50th TFW - Hahn AB, Germany (1970-75)** Oct 23-26, 2014, Fairborn, OH Contact: Bill Flanagan  
9233 East Ave T-12,  
Littlerock, CA 93543  
661-944-3125  
flapsflanagan@roadrunner.com

## 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: jackneufeld@verizon.net.

## 2013 Foundation Awards



Major General Dale W. Meyerrose, USAF (Ret.), President and Chairman of the Board of the Air Historical Foundation (**left**) served as Master of Ceremonies at awards ceremonies on November 13, 2013. The Assistant Vice Chief of Staff and Director, Air Staff, Headquarters U.S. Air Force, Lt. Gen. Stephen L. Hoog (**below left**) was the Keynote Speaker and presenter of the awards.

The Doolittle Award recognized the best USAF unit, the 720th Special Tactics Group. The award ceremony (**below right**) was held on a brisk day at the Air Force Memorial in Arlington, Virginia, followed by remarks from the commander of the 24th Special Operations Wing (**bottom right**) and by Jonna Doolittle Hoppes, granddaughter of the legendary General Jimmy Doolittle (**bottom left**).

Later in the afternoon, the ceremonies relocated to the Army Navy Coun-



## In Memoriam

### Brig. Gen. Robinson Risner, USAF (Ret.) (1925-2013).

Brig. Gen Risner died from complications of a stroke, he was eighty-eight.

Robinson "Robbie" Risner was born on January 26, 1925, in Mammoth Spring, Arkansas, and grew up in Tulsa, Oklahoma. He joined the Army Air Forces in 1943 and was stationed in Panama. After the war he joined the Oklahoma National Guard.

During the Korean War he flew 108 missions in an F-86 and shot down eight Soviet built MiGs; becoming the twentieth U.S. air ace. He also won a Silver Star for executing a daring aerial maneuver by getting behind a fellow pilot and pushing his plane to safety.

Risner led the first flight of Operation Rolling Thunder during the Vietnam War. He completed fifty-five missions over North Vietnam until his "luck ran out" on September 16, 1965, when he was downed by enemy ground fire. Captured, he was held in Hoa Lo prison (the infamous Hanoi

Hilton) for seven years. In 1973, General Risner published his memoir, *The Passing of the Night: Seven Years a Prisoner of the North Vietnamese*.

General Risner won two Silver Stars, two Air Force Crosses, the Distinguished Service Medal, three Distinguished Flying Crosses, and two Bronze Stars.

His first marriage to Kathleen Shaw ended in divorce. General Risner is survived by his wife of thirty-six years, Dorothy Miller Williams, six children, a sister and fourteen grandchildren.

After his retirement he lived in Texas, where he ran an anti dug program. He was a close friend of H. Ross Perot, a onetime presidential candidate Perot commissioned a statue of Risner and had it installed at the U.S. Air Force Academy in 2001.

### Lt. Col. John J. Suggs, USAF (Ret.) 1915-2013

Lt. Col. John J. Suggs, of the Tus-

keegee Airmen died on October 10, 2013. He was ninety-eight.

Suggs was born in Slaughters, Kentucky, raised in Terre Haute, Indiana, and graduated from Indiana State University in 1939.

In World War II, he flew seventy combat missions. Colonel Suggs was also a veteran of the Korean and Vietnam wars. In World War II, he participated in operations over Anzio and Monte Cassino, Italy. During the Normandy invasion, he flew escorts over France. From 1952 to 1957, he worked in Howard University's R.O.T.C. program. His final active duty assignment was as chief of alert management for the 9th Bomb Wing (SAC) at Westover AFB, Mass.

Col. Suggs was a founder of the Tuskegee Airmen and first president of the East Coast and national chapters. His wife, Alice Stanton Suggs, died in 2007. Survivors include two sons, Lt. Col. John S. Suggs, USAF (Ret.), and Robert E. Suggs, three grandchildren and three great-grandchildren.

## Award Winners

try Club, where Lt. Gen. Burton M. Field, DCS/Operations at Headquarters U.S. Air Force (**below left, at left**), Maj. Gen. Meyerrose, and Lt. Gen. Hoog, recognize Colonel Darrell Whitcomb for writing the best article, published in *Air Power*

*History* (**below left**). Cargill Hall received the award for the best book, which he co-wrote with Richard K. Smith (**bottom left**), Jacob Neufeld was honored with the I.B. Holley Award, for lifetime achievements in writing air power history

(**below right**), and Gen. John Shaud was recognized with the "Tooey" Spaatz Award for his remarkable contributions to the U.S. Air Force (**bottom right**). The awards dinner was attended by more than 150 people.





The mystery aircraft in our last issue was Britain's Miles Master advanced trainer. The Royal Air Force, Fleet Air Arm and South African Air Force used hundreds of these aircraft, which were functional and useful, if not exactly pretty. Some 3,227 were built. Our photos depict the M.27 Master TMk-3 version.

As our "name the plane" contest arrives at the quarter-century mark, it's time to fess up. When we started this feature in 1989, we didn't keep a list. Once in a long time, we've goofed and used the same aircraft more than once. That appears to be the case with the Master.

The first production M.9 Master TMk-1 made its maiden flight on March 31, 1939. It was a derivative of an aircraft called the Kestrel and relied on an engine with the same name, the 715-horsepower (535 kW) Rolls-Royce Kestrel 30.

Subsequently versions included the M.9 Master II with a Bristol Mercury engine and the M.27 Master III with a Pratt & Whitney Wasp Junior. All were similar in appearance except for differences in the shape of the cowling. A single-seat fighter version with the rear seat removed and with six .303-cal. Browning machine guns in the wings was not

successful. Trainer versions had one forward-firing gun mounted in the port wing.

The Master was fast, strong and fully aerobatic. It was credited with a maximum speed of 260 miles per hour, a service ceiling of 28,000 feet and a range of 393 miles. In the two-seat tandem cockpit the instructor in the rear seat sat higher than the student and had an excellent view of the student's handling of the controls. According to the Royal Air Force Museum, some 15,000 British Commonwealth pilots completed flight training at the controls of the Master.

In a 1997 interview, author Bill Gunston, a former RAF pilot, said the Master "certainly wasn't any AT-6 Texan" — also used by the Commonwealth — but was, "a frugal and sensible aircraft to have, designed on fairly short notice and used widely."

Our "History Mystery" winner is Michael LeGendre of Chaparral, New Mexico, who takes the prize for the second time. Michael will receive a copy of "Mission to Berlin," a history of B-17 Flying Fortress bomber crews in World War II.

But what about you? Will you enter our next contest?

Several readers have asked if our puzzler-plane challenge could be made a little easier (this is the fun part of the magazine, remember). So let's see if you can identify our new History Mystery. Remember the 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. One contest entrant had to be disqualified this time around because she did not include a phone number.

3. A winner will be chosen at random from among correct entries and will receive an aviation book.

And by all means, weigh in. Would you like this feature to continue? If so, dig into those historical

treasures in your attic or basement. Dig out your slide or snapshot of a rare aircraft and lend it to *Air Power History* for this contest.



## This Issue's Mystery Plane



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