

# AIR POWER

## History

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COVER: B-36s in flight. (Photo courtesy of Edward W. Van Orman.)



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Every year it seems marks an historic milestone. All this is to the good because it affords us an opportunity not only to commemorate some momentous event, but also to reflect on the past. The year 2007 provides a bonus, with several anniversaries. Most airmen know the obvious Sixtieth Anniversary of the establishment of the United States Air Force on September 18, 1947. But many may not realize that 2007 also marks the centennial of military aviation in the United States. Indeed, one hundred years ago, on August 1, 1907, the U.S. Army Signal Corps created an Aviation Section, the lineal antecedent of the USAF. Ironically, even as we honor such famous airmen as Billy Mitchell, Eddie Rickenbacker, “Hap” Arnold, “Tooney” Spaatz, and Ira Eaker, we tend to overlook the fact that they all served *before* Air Force independence. Craig Waff’s article, “Go to the Moon instead of just going into orbit,” reminds us that 2007 also happens to mark the Fiftieth Anniversary of the Space Age, which dawned on October 4, 1957, with the launch and orbiting of the world’s first artificial satellite—Sputnik.

In a thoroughly researched and rigorously reasoned article, Craig Waff traces the origins of the lunar probe attempts beginning only months in the wake of Sputnik. He tackles several key questions related to why the United States chose to embark on the ambitious goal of a lunar landing, rather than settling for an orbital flight. He delves into the identities and motivations of the agencies and people involved in the venture.

In 1952, Bill Van Orman nagged his mother until she agreed to let him join the Air Force. Only seventeen years old at the time, Bill went on to serve as an aerial gunner in the Strategic Air Command. He loved flying, the Air Force, and the people. In our lead article, Van Orman tells it “like it was.” He admired SAC and General Lemay, but left the service after four years.

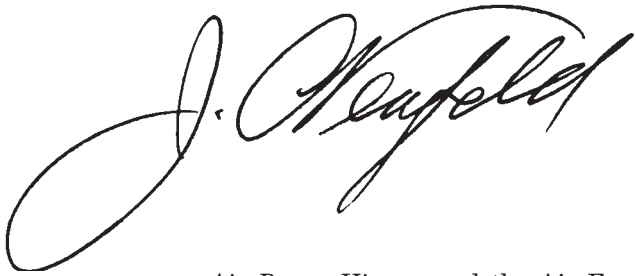
The second article presents “one day in the life of an F-15 driver” on Operation Northern Watch over Iraq in November 2000. Readers will occupy a ringside seat alongside pilot “Toes” Bartos as he maneuvers his plane to dodge enemy attacks, especially by surface-to-air missiles. I suggest you sit back and enjoy the ride.

We are privileged to publish, posthumously, Brian Gunderson’s brief memoir of his temporary duty as a B-29 navigator stationed in England during the Berlin Crisis of 1948. Written shortly before his death in 2004, General Gunderson confirms that the American bombers were not modified to deliver atomic weapons. Perhaps the most significant outcome of the deployment was the post-World War II start of a very long-term arrangement to station U.S. aircraft in England.

Although our cupboard is brimming with new books and book reviews, Scott Willey continues to solicit actively for potential reviewers. See page 56.

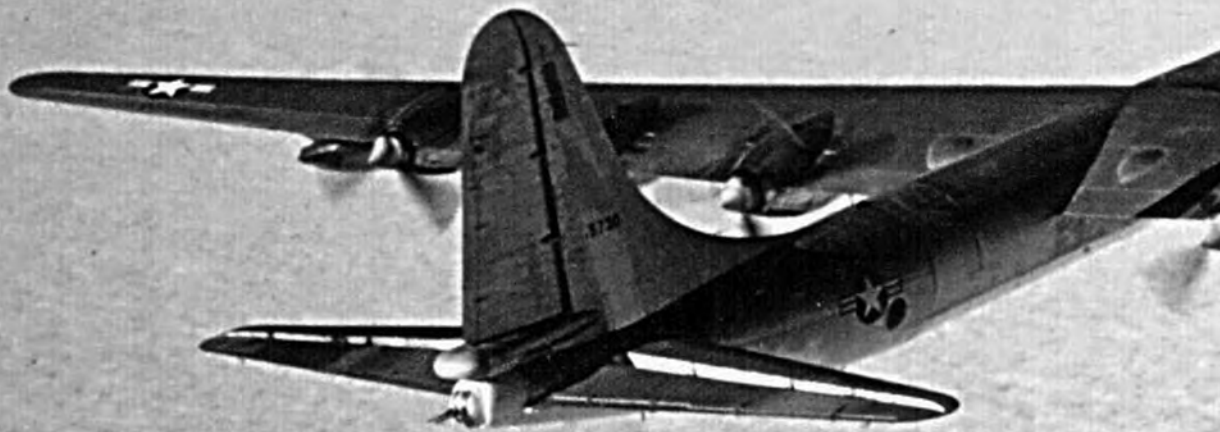
During the past year, the Foundation has been tremendously active. To keep up with the spate of recent developments, members must read: “The President’s Remarks “ (page 58), “Call for Papers” (page 60), and “Awards” (page 62). I also wish to thank our expert reviewers who help ensure the high quality of the articles published. (See page 65.)

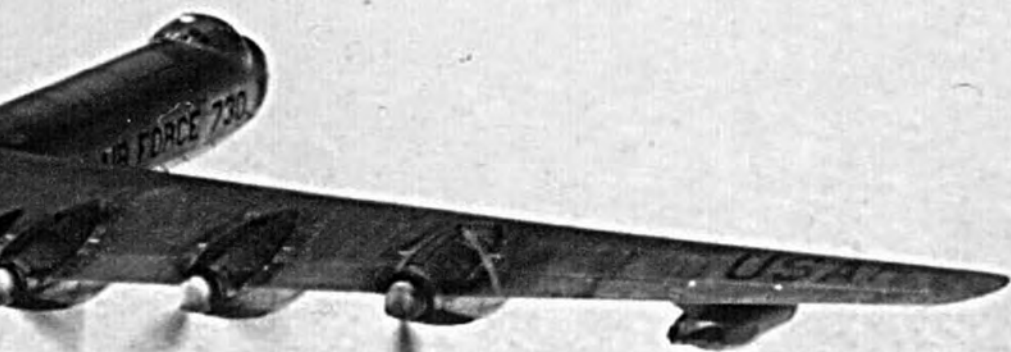
We note sadly the passing of three courageous airmen, historians, and friends including General Jacob Smart (page 66), Tom Y’Blood (page 64), and Sam Dickens (page 65). They all made history and helped to record it.



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# *A Very High Road: A B-36 Gunner's Story*





# Edward William Van Orman

(Overleaf) On the way home from a North African deployment. In two and a half years the author was on five overseas deployments, three short ones of one to two weeks, and two longer ones of up to three months. Destinations included: Thule, Greenland; Incirlik, Turkey; Dhahran, Saudi Arabia; and Nousseaur, Morocco.

(Right) Crew member 1st Lt John Merwick. His mother had her mantel blessed by a parish priest and she lit candles for us when we flew. (All photos courtesy of the author.)

**GOD, IT WAS BIG! NO, THAT'S WRONG. IT WAS ENORMOUS!**

**I LOOKED ABOUT AT ACRES AND ACRES OF CONCRETE COVERED WITH B-36s.**

God, it was big! No, that's wrong. It was enormous! I stood beneath what I thought was the nose entrance hatch. It was the hatch to the radio compartment. What did I know? I looked back toward the tail and all I could see was a wing. It could have been measured in acres or time zones. Where to begin?

It was late April 1954. I had spent a year and a half in the Air Training Command, trying to get to where I now stood. In those eighteen months I had jumped through every hoop the Air Force had set before me. Unknowingly, it had jumped through a few of mine. On this warm spring day, we had reached an accord. The Strategic Air Command (SAC) had cut orders sending me to the 436th Bomb Squadron, 7th Bomb Wing, 19th Air Division, Eighth Air Force at Carswell AFB, Ft. Worth, Texas. I was happy to oblige. I had achieved Nirvana.

In August 1952, two months shy of my eighteenth birthday, I had finally broken my mother's will and obtained the needed parental consent to join the Air Force. I was enraptured by flight. I cannot remember a time when I did not look up at any passing airplane. Now in my seventies, I still do it.

Slowly, the first sergeant and I walked toward the aft end of the colossus. I had only a "visitors" ramp pass. He was doing me a kindness in escorting me out onto the flightline so I could see up close the object that would fulfill my boyhood hopes and dreams. The number 5707, painted in four-foot-high numerals proclaimed her identity. We passed under that great wing and I gazed up at a vertical stabilizer measured in stories rather than feet. She had only recently had her more expansive heraldry removed. But the shiny, un-weathered portion of the tail still showed a giant triangle with a block "J" in the center. A patina of time would erase this declaration of belonging. I could not enter the aft compartment, which was invitingly open. "No ramp pass — no touch." I could wait.

"We better get back." The first sleeve broke my reverie.

"Yes sir," I answered, instinctively.

We turned and retraced our steps to the gate. All the while, I looked about at acres and acres of concrete covered with B-36s.

My Air Force Specialty Code (AFSC) was that of an aerial gunner. I no longer recall the numbers, but mine ended with the letter "B." That made me rather unique at that time, in that fraternity. Not only did I not hold a gun, no one did that anymore, but neither did I manipulate a remote control sight. I operated a gun laying radar set. In the early fifties, we were a new breed, and soon to be the only one of the species left. Just as the ring sight had been replaced by a circular reticule, it in turn had given way to a blip on a cathode ray tube (CRT) screen.



I had come to that job by a route the Air Force was determined I would not take. Had the service had its way, I would have become a bombing and navigation radar technician. But, "no good loophole goes unexploited." I found one, and to borrow from Robert Frost: "Took the road less traveled."

### Lowry

As I stood before the clerk's desk to pick up my orders at the end of basic training, he ran his finger down the page until he came to my name. He stopped and began to underscore those lines that pertained to me. He paused and looked at me. "Lowry, you lucky bastard. Best duty in the Training Command." He shook his head.

I spent fifteen months at Lowry AFB, Colorado, attending three schools. Much, but not all, of that time was wasted, learning things I would never use. That is not just my opinion. When SAC began training B-52 tail gunners, they cut the Air Training Command completely out of the loop. I did learn to speak "electronicese" and to identify all of the component parts and sub-assemblies of the two radar sets I would be using. But, I was not going to do what I had trained for. I left Lowry never having turned on, much less operated, either an APG-32 or APG-41 radar, or firing a 20mm cannon. Everything that I really needed to know would come as an unbidden gift from a man I would come to know and admire greatly, but not at Lowry.

*Edward William Van Orman is a retired optician living in Eugene, Oregon. He served in the United States Air Force from 1952 until 1956, and flew as a tail gunner on a Select B-36 crew. He has published more than a dozen stories in Wings/Air Power, Air Combat, Warbirds, World War II History, and Sea Classics. He is a founding member and past president of the Oregon Air and Space Museum.*

One commander the author truly respected, Lt Col Brockwell, newly promoted. This photo was taken about a year after the author left.



**WHEN NOT ASSIGNED TO A CLASS YOU WERE A "CASUAL," A BENIGN TERM FOR "INDENTURED SERVANT."**

The buck sergeant at Parks AFB, who effused over my assignment, had been right in one respect. He had just used the wrong proper noun. Lowry wasn't great, Denver was. Today, most seventeen and eighteen year olds have traveled. For all practical purposes, I had not. In the truest sense, I was a small town rube. To me Denver was a metropolis and many of my barracks mates were worldly.

I spent all of 1953 in the nether reaches of Lowry, being thoroughly disillusioned by the base and the two schools I attended. The entire year was spent on Lowry II. The main base, called Lowry I, was a permanent facility. During World War II an annex was built on the Eastern side of the North-South runway and was designated Lowry II. The atmosphere was from a John Steinbeck novel. We were not on the wrong side of the tracks, but that runway was pure metaphor. Even worse than the schools and the ambiance was the time between schools. When not assigned to a class you were a "casual," a benign term for "indentured servant." For three dreary, seemingly endless months, I pulled casual duty: KP, laundry detail; KP, furnace guard; KP, and every other crummy job that came up. All together, I was a casual for more than five months. Of course, this did not go un-avenged. In the first course I took, "Basic Electronics," I managed to outfox the system, using its own rules.

The course was twenty weeks long, with a test on the last hour each Friday. If you passed, you went on to the next week. If you failed you "phased back," that is, repeated the past week's syllabus. Fail in the same week twice and you were gone. The tests had twenty questions; worth five points each. Four of them were "key" questions. If you missed a key question, you also phased back. So, you could score 95 on the test, and still have to repeat the pre-

vious week. Your grade point score stayed high, but you did not advance. This becomes important. By about the seventh week the key questions started to jump out at me.

The Basic Electronics course led to about a dozen secondary schools. The largest of these was the one on bombing and navigation radar systems. On average, seven out of every ten graduates went there. (All of those B-47s coming on line.) Of these secondary schools, only one led to a possible flying billet: B-36 tail radar and possibly B-36 gunnery. Long odds, but there was nothing to lose.

In the seventeenth week, we were apprised of the school choices open to our class. Twenty-one students, of an original twenty-four, remained in my class. I stood third academically. Our choice sheet showed no B-36 tail turret slots. There was only one thing to do—miss a key question—no problem. I phased back. That class also had no B-36 tail slots. I aced the test and moved on. I repeated this performance the following week. I had learned that the class behind me had two B-36 tail openings. I was still third in class rank and one of the men ahead of me also wanted to be a gunner. Fortunately, the other one didn't. Now all I had to do was graduate high in the B-36 tail radar course. There were ten in that class and the top three got to go to gunnery school. I graduated second.

I had been released from purgatory in more ways than one. Gunnery school was held on Lowry I. I was out of the "low rent district." I had a set of orders that said I was "Rated," a term which meant that you had, or were working toward, an AFSC that held "flight" status. This meant that I could bum rides on the base hacks that had room for passengers wanting to log "observer" time. On weekends, I would go to Base Operations, show my orders and wait for two pilots who had non-flying jobs, and needed to get in their monthly four hours of multi-engine time. Lowry had a B-25 and a B-26 for that purpose. The guy at the Ops desk would nod to me, and I would ask the pilots if I could log observer time with them. I was never turned down. We also began to earn flight pay.

The gunnery school I had striven so hard to attend turned out to be fun, but empty of content. There wasn't even a tail radar in the classroom or on the firing range. I spent the month stripping and assembling a 20mm cannon, shooting skeet, and taking two flights in a B-29. But on April 8, 1954, I was put on flight status and authorized to wear gunners' wings. Without a backward glance, I left Lowry. Next stop was the "wild blue."

#### **SAC, 1954**

If asked to describe the Cold War, most people conjure up images of ICBMs fired from silos or missiles launched from submarines. But, for the first fifteen years of that forty-year Cold War stand off, these weapons did not yet exist. When I reported to Carswell AFB, Texas, in April 1954, the security of the free world rested in the hands of about ten wings of B- and RB-36s and about twenty wings of

The SAC Bombing Competition crew picture, taken in July of 1956. Then-Major Brockwell (at left) truly inspired the respect and admiration of his entire crew.



B- and RB-47s. There was still a smattering of B-50s and the B-52 was just over the horizon. That force was predicated on the assumption that it could overwhelm any defense system by the sheer weight of numbers and that the resulting attack would obliterate any enemy. This was no idle boast. SAC could project power on a scale that beggars both imagination and description. And, all protestations to the contrary by other services notwithstanding, SAC alone wielded that kind of power. We were it. There was one disquieting bit of “collateral damage.” It could mean the end of civilization as we knew it. I was blissfully ignorant of all these weighty global ramifications. All I wanted to do was fly.

**NOT ONLY  
COULD WE  
FLY AT OVER  
45,000 FEET,  
WE COULD  
MANEUVER—  
NOT DEFTLY,  
BUT WE  
COULD DO IT**

### The Old Baker Three- Dozen

It may be too much to ask any reader of this story to imagine an era not all that distant in years, but eons ago in technology. In its day the B-36 was unique; to date no airplane that matches its wingspan has been built in quantity. There had been big airplanes, but the B-36 was the first true giant. She was invariably the star at air show static displays. Nothing drew amazement quite like an airplane that big. Yet, even more unusual than the size, however, was the arena in which she operated. It is not all that common, even today. Nine miles up is a long way. We rarely stayed up there for more than a few hours at a time, because it was hard on

the engines. But we could and did, when called upon to do so. In the mid-1950s that was not just rare, it was singular. Not only could we fly at over 45,000 feet, we could maneuver—not deftly, but we could do it. The few fighters capable of flying that high could only do so for a few minutes and then only straight and level.

I was stunned the first time we feathered an engine. It was only my second flight and I was unaware that it was a common occurrence. Blown rocker box gaskets on a 4360 engine were a way of life. I had trained in B-29s and knew that when a -29 lost an engine you began to think of someplace to put it down. In a B-36, it wasn't even a topic for discussion. The left scanner briefly looked up from the novel he was reading, informed the engineer that the propeller had stopped wind milling, and went back to his book. I was on at least a dozen flights when an engine hopped, with never a thought of an RON (remain overnight).

I was never comfortable landing. The main gear strut flexed backward at touchdown, and it always unnerved me. After my first landing I went out to look up into the main gear well. It looked like the engineering equivalent of a camel. There were braces going off in all directions, but it worked every time. Still, I was never at ease when we turned final.

An airplane that routinely stays aloft for a day at a crack can be a bit much. Most of a twenty-hour plus mission was flown at a base altitude of 25,000



The sheer immensity of the B-36 is demonstrated by this photo of an RB-36 at an open house, and the dwarfed people near it.



**THE DOWN  
SIDE TO LIFE  
IN THE BACK  
END OF A  
“BIG-UN,”  
WAS, FIRST,  
THE ENGINE  
NOISE...SEC-  
OND ... THE  
VIBRATION  
...THIRD...  
THE  
DESICCATED  
AIR**

to 33,000 feet. While it could get uncomfortable, a B-36 was a pretty good ride. Only my first three months in SAC were in heavyweights, as the fully armed B-36s were called. The ensuing two years were in featherweights: As strange a choice of terms as I ever heard. Early on it created a roomy crew compartment in the aft end. With only three of us back there, most of the time, movement was virtually unrestricted. At 25,000 ft. explosive decompressions were almost nonexistent. By the time I got out, much of that space and the upper aft turret bay had been filled with ECM equipment.

The down side to life in the back end of a “big-un,” was, first, the engine noise. To some extent it became subliminal, but over time it was unpleasant. The simple fact is that you can’t have six 4360 engines pounding away at your ears for twenty plus hours at a time, and not pay some sort of physiological price. Aside from losing my hearing later in life, I could never sleep in flight. Sometimes I would try, but it was an exercise in futility. Once crewed, I just had the 580 (the NCOIC of the aft compartment) decide which side of the plane he and the other scanner wanted to man and I took the other side for whatever time I had no other duties.

The second annoyance was the vibration. The rear end of a B-36 was much more supple and reactive to the cadenced, harmonic throbbing of the engines than was the nose. This, too, became covert over time, but like the noise it could get on your nerves.

The third problem was the desiccated air. Electronic equipment works best in an arid environment, so they kept it bone dry. This made your skin itch and you were always thirsty. There was a collective, cumulative effect from all of these. How great was it? I don’t know. Being young helped.

I flew in the front end of a B-36 only once. I couldn’t believe how quiet and smooth it was up there, but it was crowded. There were ten men up there and not a lot of room. All things considered, I preferred my noisy, shaky, roomy back end. I could gaze out of my magnificent thirty-inch blister. In my two and a half years and just over 1,000 hours in the Baker Three-Dozen, I can honestly say that I never tired of the majesty of flight and watching the world slip beneath me. To me the sunrise or sunset above the clouds was Biblical. The stars at night were crystal clear and bright and seemed so near. It was as though all of the celestial bodies were mine alone. I loved to fly over a great city and see it all in one glance, to view an island as a verdant gem surrounded by a multi-hued sea, to look down on a mountain passing below and see it from God’s perspective.

Back then we were a rare breed. We had the high heavens almost to ourselves. There were only a few thousand airliners world wide. They flew far below us and almost exclusively in daytime. Fighter planes spent mere minutes at our altitude; if they could get up there at all.

We didn’t file a flight plan, except with SAC.

B-36 number 1382, a late H model, from the summer of 1955. The model differences are obvious to those who were there. She has the new wing emblem and white underbelly, but lacks the later SAC blue banner.



I STOOD  
ALONG THE  
BACK WALL  
AND  
WATCHED AS  
THE  
“BARONS,  
EARLS, AND  
KNIGHTS”  
ENTERED...  
I DON'T  
THINK I HAVE  
EVER FELT  
QUITE SO  
INSIGNIFI-  
CANT IN MY  
LIFE

Where we went and what we did was no one else's business. That is license. At 45,000 feet and above, there was us, some test pilots, and just aborning, the U-2. That was all. We were in that singular realm where you just begin to see the curvature of the Earth. Just above us the sky was a much darker blue than that seen from the ground. And the view below was vast beyond comprehension. From nine miles up you can see, well, a lot! At that time and at that altitude, we were almost invulnerable. It didn't last long, but while it did, it was one heck of a trump card.

She has passed into history and aviation lore as an unloved and unwanted hybrid stepchild. Those of us who crewed the -36 do not view her in such a light. She cast a giant shadow, and that visage held sway when and where none other could. She was not unloved by those who knew her best.

### A Bomb Squadron

An operational bomb squadron is not a miniature wing. Each unit is unique to its role. A wing has an administrative corporate structure. A squadron is a society of doers, the very tip of the pointy end of the spear. The 436th was divided vertically: Operations on one side of a line, Maintenance on the other. The twain met at the top, in the form of the commander, and interfaced when a plane was being prepared for takeoff. Other than that, they were two separate worlds. On the opera-

tions side we were bisected by a generational line, at that time: World War II veterans and those of us who had enlisted for Korea. Other than flying, we had little in common. But flight was a strong bond. For the most part, we got on well.

I spent my first three days checking into the base and the squadron. Finally, on Friday, I had a ramp pass and could go to the "Operations Section," which was next to our hangar. At 0700 roll call that morning, I saw what I would come to know as my squadron in its' entirety, for the first time. As a supernumerary, I did not rate a seat. With a handful of kindred souls I stood along the back wall and watched as the "barons, earls, and knights" entered and took their assigned chairs. I don't think I have ever felt quite so insignificant in my life. With only a few exceptions, I had not been within thirty yards of more than a captain in my whole eighteen months. The only master sergeants I had been near were my squadron first sergeants. That day I was in a room with five lieutenant colonels, ten majors, and more master sergeants than I knew existed. To say that I was in awe grossly understates the situation.

The spring and summer of 1954 were times of change in the gunnery departments of the 19th Air Division. All of our aircraft were being feather-weighted. This reduced the number of gunners from eight to one, and each crew from fifteen to thirteen. Two of the gunners stayed on as scanners. The other two went elsewhere. Most became boom

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operators on KC-97s. The fly in the ointment was that a lot of those guys had gotten spot promotions, which they lost. For those who had served together on the same crew for four or five years, it was a wrenching experience.

There were ten crews in a B-36 squadron. In the case of the 19th Air Division, many of them were select crews. SAC had a combat rating system that went from Non-ready to Ready, to Lead, to Select. If you were career regular Air Force and on a select crew, you were eligible for spot promotions. As long as the crew retained the rating and you stayed on it, you kept your spot or spots. (I never heard of an officer being double spotted, but there were a lot of enlisted double spots.) Six crews in the 436<sup>th</sup> were Select, three were Lead, and only one was Ready.

Virtually all of this trouble passed me by. I spent that spring and summer attending various indoctrination courses, and on deployment to North Africa. That fall I attended SAC Survival School, at Stead AFB, near Reno, Nevada. It was broken into three phases: Parachute training, POW indoctrination, and Escape and Evasion. The latter was known as the "Trek." At the end of parachute training, you had the option of making a live jump; no one did. In POW indoctrination, you were a prisoner for three days and two nights. The course was run by former *Dulaglufters*, men who had been POWs in Germany, during World War II. It was not fun. They tried and—as far as I was concerned—succeeded to make it as realistic as safety would allow. Those guys were sadists. Most of the men on our crew swore we'd kill them if we ever caught one of them off base. The Trek was an ordeal in mountain survival. In late November, we were trucked into the Sierras and dropped off, with essentially the stuff we'd have on landing. We were given a topographical map with a spot circled on it, and told: "We will pick you up here, in a week—be there." Then they drove off. We did make it to the pick up point. Had it been two weeks, we would probably have been a redux of the Donner party and started eating each other. At the time of the drop off I weighed 185 pounds at just over 6 feet 1 inch. I lost eighteen pounds in that week, and I was no stranger to camping. It was tough stuff.

In May I flew twice. The first one was on what turned out to be the last gunnery mission the squadron flew in a heavyweight. It was with (S-03) Cameron's crew. No one was happy on that flight. Later I would understand why. At the time, I just knew that I was an unwanted nuisance, and just tried to stay out of everyone's way. I never flew with that crew again, by choice. In June I was assigned to Maj. Fred Bachmann's crew as their designated spare gunner. This was the single most fortuitous event in my Air Force career.

### S-21-F

For just over a year I flew on Bachmann's S-21-F crew (Select, 19th Air Division crew number 21, Featherweight. In SAC speak; Sierra Two One Foxtrot.) It held a special status in the division

because they flew a disproportionate number of classified missions. Most of these had to do with special weapons (A-bomb testing) or very high altitude sorties. I was excluded for some of these; for others, I was not. I never learned why the difference. I flew the only mission that is not on my Form 5, as one of these. We were told at the debriefing that what we had just done had never happened.

Bachmann's bird, 1086 (Call sign "Hornet 04") was the first featherweight B-36. That fact, its timing, and the crew to whom it was assigned, were central to my becoming a *good* tail gunner. Over a year and a half before any other B-36s were feather-weighted, it was done to 1086 and its crew, so that she could be used as a sampling and observation platform for the H-bomb tests at Eniwetok Atoll, in "Operation Castle." Coincidentally, SAC wanted to know how much it would gain in performance if you took everything out of a -36. Did you have a survivable, viable weapon, or just a really big, defenseless target? Bachmann's crew set about answering these questions. The most profound aspect of the featherweight program was the removal of all the turrets, except the tail. When you totaled up all of the weight: ammo, sights, computer systems, and support structure, it came to well over six tons. Put another way, close to the weight of a Mark VI unit. This gained a little airspeed, which was almost meaningless. It also gained over a mile in operational altitude; which was *not* meaningless. Back then what speed was to a fighter, altitude was to a bomber.

The turmoil that was rife within the gunnery cadres in the squadrons that summer had already occurred on S-21 two years before. They were the calm eye of the storm. This was the already feather-weighted, non-confrontational, environment in which I began to learn my craft. All three men in the aft compartment were spot master sergeants. I became their Gunga Din and loved it! Being assigned to a select crew, even as a spare, was a perk; if only in my mind. At roll call I got to sit with the peerage, rather than stand with the serfs. But one gift was very real. Assignment to S-21 had placed me with the best tail gunner in the 7<sup>th</sup> Bomb Wing.

### Bill Weiter

Bill Weiter was in many ways reflective of his heritage. He was a marginally educated high school graduate, who had enlisted for World War II. He was, without using the phrase in a demeaning way, an unsophisticated small town rube—as was I—who had found a home in the service. But unlike so many others in his position, he was innately curious. He wanted to know all there was to know about the gun-laying radar sets we used, and more importantly, why the turret system was so problem plagued. Over time, he had figured out not only all of the design flaws of the turret, feed mechanisms, and radar interface, but how to work around them. At the operational level, there was nothing about the APG-32 or APG-41 radars that he did not know.

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OF EVERY  
ROUND AS IT  
WENT IN THE  
BOX**

The same was true of the turret that was slaved to them. That was the nuts and bolts. The gift part of the equation was that Weiter liked to teach and he was good at it. On more occasions than I can recall he would hunt me down, have me go get my Dash-1 (Operational Procedures Manual). We would go out to an airplane that had power on from a B-10 external power unit and he would take me through one or more trouble or malfunction scenarios. He would then go into what, in his opinion, had created the problem in the first place, and how to avoid it. He almost never dwelt on trying to cure a failed situation, because at 45,000 ft. that was almost always impossible. Bill believed that since it was such a touchy system to begin with, the only real solution was to baby it to death—never approach operating it at any of its limits. To a great extent, that was actually possible.

Let me illustrate how and why Bill Weiter had a fire out percentage in the 80s, while the Division average was in the 40s. Most gunners would open ammo cans on the ramp and snap together the contents of two of them, drape them over their shoulders, climb into the airplane, crawl back to the tail turret, snap them to what had already been loaded and repeat this process until both boxes were full. Weiter was the only tail gunner with whom I ever loaded ammo who took a link aligner out to the plane, up into the tail cone, and checked the alignment of every round as it went in the box. A round only had to be an eighth of an inch out of alignment to create a jam in either a chute or the link stripper. Most men just would not go to the trouble. They assumed the belts were “good to go.”

Another example of his self taught knowledge was the hand control used to move the turret. It was spring loaded to the upper limit. If you depressed the actuating switch when the turret was in “stow” position, the turret motors in both azimuth and elevation immediately tried to slew the turret as rapidly as possible, to align with where the hand control told it to go. The gear teeth on those motors were quite small when you considered how much weight they were required to heave around, while being hammered by the recoil of two 20mm cannons. You compounded the problem by employing the system at temperatures in the minus 40 to 50 degree range. Steel got brittle at those temperatures and the gears would strip. The way to overcome the problem was to avoid slewing the turret. Memorize where the handle needed to be, so that when you depressed the control button the turret did not have to hunt for it. Whenever possible, you wanted to move the turret from where it was, to where you wanted it, by hand. This took practice, lots of practice. There was nothing you could do to lessen the recoil of the guns, but you could mitigate many of the other factors. That was Bill Weiter’s mantra.

Before I was assigned as a primary tail gunner in August 1955, I flew many times with other crews than Bachmann’s. Not once did the tail gunners on any of those flights ever fire up their radars and just practice the mechanics of using the turret.

Weiter did it quite often. Whenever the mission plan allowed, he would ask the AC for permission to train; it was invariably granted. Then he would “exercise the system.” He then had me do the same, hovering behind me and critiquing my performance.

In the year that I was a primary crewmember, I had only one gunnery mission. It came about two months into the crew assignment. I followed every step that Weiter had taught me as holy writ. This drove “Mac,” my new 580, right up the wall. Like many of his peers, Mac saw no sense in being so picky. But he wasn’t the one being scored; I was. When I insisted on re-testing the firing circuit just prior to arming the guns at stations time, we ended up going to the AC. Much to my 580’s chagrin, I got my way. The line was clear. We armed the guns and flew the mission.

For the approximately five years that Maj. Leslie W. Brockwell had a crew, and what ever number of gunnery missions it had flown, they had never had a “fireout”—a turret that had fired all of the loaded ammo, without a stoppage. I had a fire-out, on both guns. I kept the turret in hand control, fired short bursts, and frequently, slowly ran it in small circles, to relieve any cramping in the chutes. Finally, I called the AC on interphone and told him the guns were “safe” and I was finished with the range.

“How’d we do?” he asked. He knew I had taken a long time.

“Both rounds counters are at the bottom, sir. Five on one and four on the other.” You could never fire the last few rounds once they had cleared the feeders.

“Hell of a job Van,” I could hear the smile in his voice. “Thank you, sir,” I grinned back.

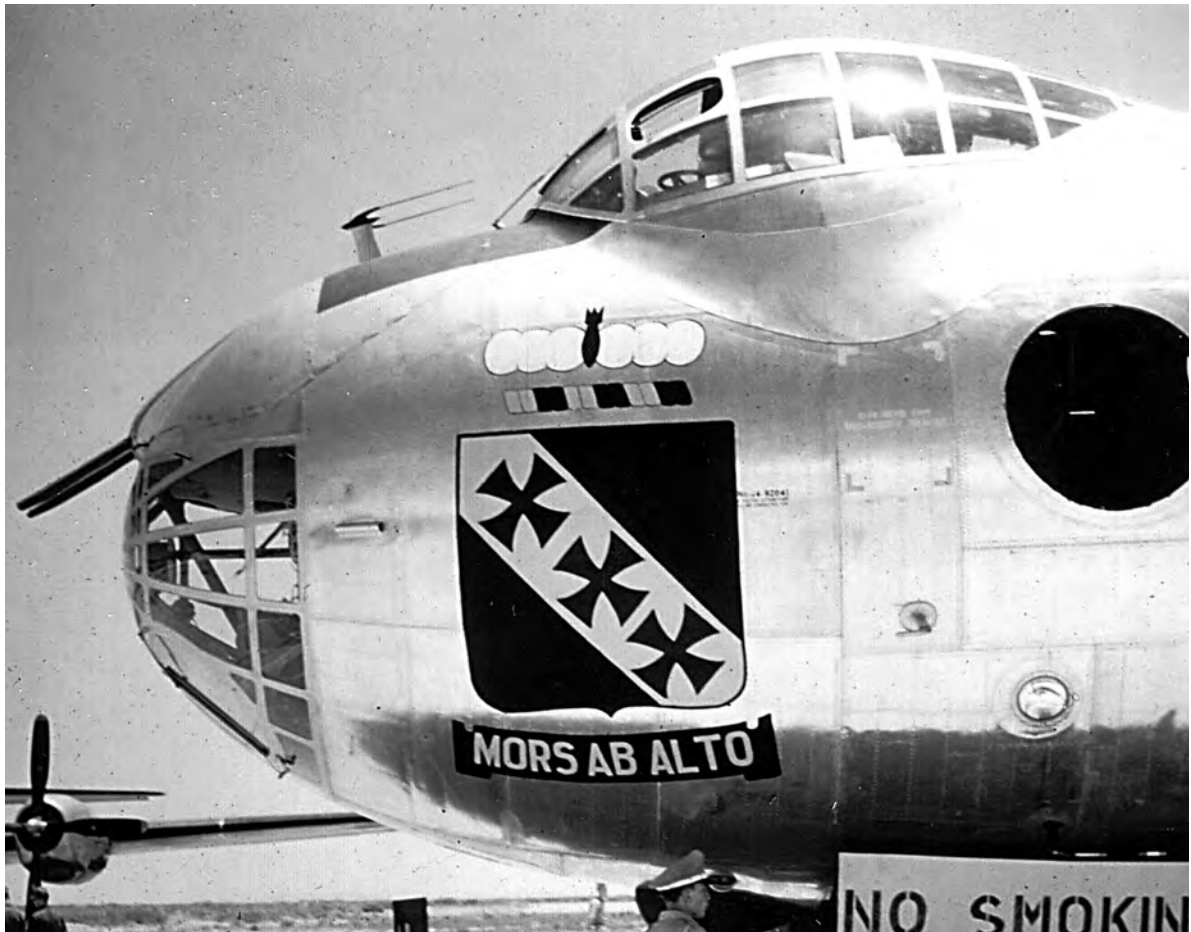
Brockwell did not ask how *I* had done. He asked how *we* had done. It was, after all, his crew. On an on going basis I basked in the reflected glory of being a member of it. For this one brief moment, I got to return the favor. My 580 went on at length about my beginners luck. I knew better. I’d had Bill Weiter sitting on my shoulder, whispering in my ear. And yes, more than a little luck.

### **Boring Holes**

Once we became a fully featherweighted squadron, most of what we in the aft compartment did was scan. This meant engine scanning when the airplane was above pattern altitude. Neither of my compartment mates knew anything about operating my radar. Nor did they show any desire to learn. They had both been remote sight gunners.

During my time in SAC, the training year was divided into quarters. Each crew had so many mission tasks to accomplish in each of these training periods. There were so many radar bomb runs, visual bomb runs, celestial navigation legs, and ECM runs. A constant was cruise control or fuel management. In theory, gunnery was a part of all this. But that almost never happened, due to the known poor results. I have no idea how squadrons

The emblem of the 7th Bomb Wing. The 7th is what is known as a "heritage" unit. The three Maltese crosses are for the campaigns the group participated in during World War I. The latin motto translates to: "Death from Above."



I KNEW HE WAS LOSING HIS TAIL GUNNER, BUT HADN'T A CLUE THAT HE WAS GOING TO OFFER ME THE JOB

and wings got around this predicament, but a firing mission was a rarity. The conundrum had a simple solution: replace the 20mm cannons with .50 cal. machine guns. (Which is exactly what was done in the B-52.) Every gunner knew that mounting 20mms in a flexible turret was a mistake; the recoil just beat the mechanisms to death—too much weight slamming against too little support. But somebody high up was infatuated with 20mms, so they stayed.

Our mission tasks were assigned in such a way that they could be accomplished in two months. This left the third month of each training period as a free training month. This time was used to try to improve scores in areas deemed below standard. This was not idle posturing. Crew status depended on those scores and was directly reflected by rank in the form of spot promotions.

My contribution came when we flew fighter intercepts, usually on ADIZ (Air Defense Identification Zone) penetrations. We would fly out to sea off the Pacific or Atlantic coast or North to the polar region and then turn back and try to defeat NORAD/ADC (North American Air Defense: A joint U.S. and Canadian effort, and Air Defense Command.) These two entities were charged with the defense of the continent. As a rule, we were altitude restricted to 35,000 feet. We were told that at that altitude the F-89s, F-94s and F-86Ds could make realistic runs on us. When they made passes on us, I made defensive lock-ons on them, and

called "guns" when I thought I had a kill. Only rarely—three times when I was in—were we allowed to choose our own time, place, and altitude of reentry. On those occasions we were not intercepted. One of them was a return flight from a deployment to North Africa. We came in over North Carolina, around and over a storm front. We remained undetected until we called Ft. Worth Center for let down instructions.

### Crewed

At roll call one day in August 1955, after all regular business had been covered, Major Green, the Operations Officer, was reading announcements. He called my name and told me to remain seated upon dismissal. I wondered what I had done wrong. Major Brockwell wanted to talk to me. I knew he was losing his tail gunner, but hadn't a clue that he was going to offer me the job. When he did, I was elated. There were dream billets in the 436th and S-12 was one of them. I don't know how or why Brockwell chose me as his new tail gunner. He may have spoken to Colonel Bachmann, Bill Weiter, or Major Green. Whatever the process, I had been picked, but I was in for a rude awakening.

I had only flown with Brockwell's crew once, and had not expected that my presence would meet with hostility. In the beginning, it wasn't personal. Mac, the 580, just wanted three career men in the rear end—soulmates, if you will. He told me, to my

This was the only B-36 that crash-landed and flew again. Then Major Brockwell put 2664 down at Kirtland AFB in 1952. The main landing gear would not go down. It took superb airmanship to land the aircraft without damage.



**IT WAS THE LONGEST TAKE OFF ROLL I EVER MADE. WE USED UP 7,000 FEET OF A 10,000 FOOT RUNWAY; IT WAS THE LONGEST IN HOURS I EVER FLEW—MORE THAN THIRTY-ONE**

face that I was not the man he wanted. Then he set about proving it. I took this very personally and let it show, but it only exacerbated the situation.

In the preceding sixteen months, I had flown with all but two of the squadron crews. I loved flying with Lt. Col. “Pappy” Rice’s crew (S-24), Captain Morris’s (L-39), and Major White’s (S-11). Captain Morris and Colonel Rice came as close to being friends, as that word may be used to describe a relationship between an officer and an enlisted man. I liked and admired both of them and they liked me. I continued to fly with them, even after being crewed on S-12. This was rare, and I took a certain amount of pride in being requested, by name, to replace their gunners when they were away.

Mac was the only member of the crew with whom I did not get on. Except for the navigator, who was a bit haughty, I liked all of my crewmates. I idolized Major Brockwell. He was a fine officer, great pilot, and born leader. Our co-observer; 1st Lt. John Merwick was the finest junior officer I ever met. But, the aft end of the plane had none of the camaraderie to which I had become accustomed.

### **1956 and Bomb Comp**

In early 1956, during the “Lebanon Crisis,” SAC was tasked to be part of the U.S. response. The 7th Bomb Wing deployed several crews to Nousseur Air Depot just East of Casablanca, in what was then, French Morocco. SAC’s bomber “staging” and “compromise” bases, literally surrounded the Soviet Union. Several times a year portions of the 19th Air Division would deploy to Nousseur for periods ranging from days to months. However, this was no routine deployment.

It was in response to a perceived threat. We loaded our “fly-away” kit at Carswell, landed at Loring AFB, in Maine, to load a “shape” (an inert practice A-bomb). We then took off for Morocco. Once on the ground, the fly-away kit was off-loaded and for one of only two times in my SAC career we loaded my turret with combat ammo: AP (armor piercing), HEI (High Explosive Incendiary), Tracer and Ball. The airplane was serviced, fueled, and pre-flighted. The crew was given twelve hours of crew rest—a joke We were then briefed to fly a “timed profile,” a flight that matched your “emergency war order” mission in all respects, with the exception of penetrating hostile airspace.

I no longer remember many specifics of that sortie, but do recall that it was the longest take off roll I ever made. We used up 7,000 feet of a 10,000 foot runway; it was the longest in hours I ever flew—more than thirty-one. And we spent more time over 35,000 feet than any other I was on. Our course was to a point North of Scotland, then south over Western Europe, down the Adriatic. At some point over the Mediterranean we released the “shape,” then on to a scored RBS run on Beirut. We then turned North until we neared the Turkish-Soviet border somewhere between the Black and Caspian Seas. Prior to the climb to high altitude for the run on Beirut, I had turned on my radar and tested my armament system. My guns had been armed prior to take off. From the time we left the target area until we were well clear of the border area, I manned my set. We did get a reaction, but by that time we were so light, that at our altitude of just over 50,000 feet, they could not reach us. We recovered at Dhahran, Saudi Arabia.

I can only assume that this exercise was a

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LEMAY WANTED MEN CUT FROM A PARTICULAR BOLT OF CLOTH. SAC WAS FILLED WITH SUCH MEN

“real-politik” version of “flipping the bird.” The effect for our crew was dramatic. Major Gibbs, our bombardier, scored a “shack” on his bomb run. We must have done very well on both navigation and cruise control because when we returned to Nousseaur, we were selected as one of the two crews to represent the 7th Bomb Wing at Bombing and Navigation Competition that summer. In SAC, that was a “biggie.”

When we returned to the ZI (the United States), our crew was put on a “Bomb Comp” training regimen. In April we spent a week at Loring AFB, which was to host the B-36 portion of the contest, replicating what would happen in August. Much of this was guess work based on the little information SAC would release to all of the competing crews. We were ordered to trade airplanes with Captain Van Reenans’ crew. Neither of the bombing teams was happy about this. Our plane had been 5742, an H model, with a radar set that Major Gibbs liked. Van Reenans’ ship was 2222, a J model that supposedly had the best radar in the squadron. All grousing was stopped in its tracks when the CO mandated, “Best crew with best bird. End of discussion.”

I spent the month of May at the NCO Preparatory Academy, graduating fourth in a class of sixty-two. I had agreed to attend because the Ops Officer (who by then was Lt. Col. Bachmann) had promised me staff stripes when I graduated. I had two years in grade, with an exemplary record, but I had one hurdle that could not be overcome—my 580 would not recommend me for the stripe. When the promotion roster came out in June, and I was not on it, I had the temerity to ask for a meeting with Col. Bachmann. Such confrontations are extremely rare and must be handled with delicacy—never my long suit. Colonel Bachmann had thought he could talk “Brock” out of this, but Mac stood his ground. Brockwell would not override his compartment commanders on matters of promotion. Bachmann had done all that he could, the matter was settled.

About a week later, Bachmann had to test hop a ship that had just come out of a 500-hour turn around dock. He sought me out and asked if I would command the rear end of a pickup crew, for the four-hour flight. It was his way of saying, “I know what you can do. I know you were screwed, and I’m sorry.” I was happy to fly with him again. In our conversation, Colonel Bachmann, told me that if I reenlisted, I was going to be detached from my crew and sent to Castle AFB for B-52 transition training. That ended any thought of me re-upping. Four years of being at the whim of the Macs of the world, no matter how well I did my job, was enough.

Almost thirty years later at a wing reunion, I had a chance to talk to then retired Colonel Brockwell. I asked him about that situation and to my surprise, he had remembered it. He said that sometimes good policy produces unfortunate results, as big a concession as he would grant, a sort of “no harm, no foul.” I did not just admire Major Brockwell, I idolized him. He was and remains one

of the finest men I have ever known.

In late July we flew back to Loring and spent a week at “Bomb Comp.” In one of those “Best laid plans of mice and men” scenarios, 2222 chose that week to have her radar go “gunny bags.” Whatever was wrong with it could not be repaired, under the rules of the competition.

### Final Flight

The week before I was due to start processing out I flew my last mission in a B-36 with my crew. It was and remains a vivid and bittersweet memory. On that flight, the final requirements included some RBS runs on Denver—how fitting. We arrived over the Colorado capitol a few hours before sunset. You could catch the western sun glinting off the golden dome of the capitol building. I looked down on the scene of some of my happiest times as a GI. Denver was a great city.

We flew figure eight RBS runs over the city as the day passed into night. Late in the evening, we headed back to Ft. Worth. I was in the left blister and saw Wichita Falls come up on the horizon. I knew that when we got over Sheppard AFB the power would come off and we would begin our let-down. Right on time, the resonant roar eased off to a grumble, and you could feel us start to drop.

I reached over my shoulder and switched the radio selector to the command set. The co-pilot was talking to Ft. Worth Center for a clearance. When I saw the moon glisten off of Eagle Mountain Lake I switched back to interphone. We had gotten a straight in approach clearance—no down wind, no base, just right on in. At pattern altitude the power came back up and the landing ritual began: flaps, gear, etc. The landing was almost anti-climatic. I remember thinking, “I will never do this again.” I hated that feeling. I had loved flying.

We parked at the refueling station on the taxiway, a good quarter of a mile from the hangar. There was a bus waiting for us, but I decided to walk. I needed to be away from the experience. With my gear and a spare chute piled on my back, I set off at a leisurely pace toward the 9<sup>th</sup> Squadron hangar to check in my equipment; for the last time. The night was warm. There was not a cloud in the sky. Not one engine was running on the whole ramp. Carswell was asleep. When I walked into our own hangar after dropping off my load, most of the crew was already gone. The few who were there gave no hint to the fact that I had flown my last flight as a member of their crew.

I was released from active duty August 29, 1956. I was 21 years old. In the truest sense of the phrase, I had grown up in the Air Force. For the next three decades I rarely gave my time of service a thought. As I have grown older, I do not so much reflect on my own time as on those with whom I served. General Curtis LeMay wanted men cut from a particular bolt of cloth. SAC was filled with such men. I was not one of them. I served my hitch and left. But I take unbounded pride in having walked among them. ■







*A Day on  
Northern Watch:  
November 2, 2000*

Peter P. Bartos

(Overleaf) Iraqi air defense systems included 122 mm rocket launchers like these, but were modified with air-bursting munitions. (All photos, except where otherwise credited are courtesy of the author.)

*Northern Watch* was a combined U.S., UK, and Turkish operation to enforce a no-fly zone in Iraq above the 36th parallel. Begun on January 1, 1997, it involved forty-five coalition aircraft and was expected to last for about six months. However, repeated extensions saw the operation continue for more than six years, until the final combat air patrol on March 17, 2003. No coalition aircraft were lost to enemy fire. Operation *Northern Watch* had succeeded Operation *Provide Comfort*, which had started in April 1991.

The previous day's mission had been a tremendous success. "Fangs," the 71st Expeditionary Fighter Squadron (EFS) weapons officer, had been the mission commander on a strike that had released much of our frustrations accumulated over the past months.

For over three years, U.S.-led coalition forces had been playing a game of cat and mouse with the Iraqi air defenses. We would fly into the UN-sanctioned No-Fly Zones in northern and southern Iraq to patrol the skies and to keep out the Iraqi air force. The Iraqis would comply by keeping their aircraft well clear or by grounding their aircraft entirely during our four to five hour missions. They would also routinely take pot shots at us with their anti-aircraft artillery (AAA), and on occasion with their surface-to-air missiles (SAMs). The last few weeks had the Iraqis had become particularly zealous in the Northern Zone, with AAA being fired daily, and the usually rare SAMs streaking into the air with alarming regularity.

The AAA was mostly medium caliber with only sporadic large caliber fire being seen. I was told that if you saw the muzzle flashes every second or so, it was medium caliber weaponry that couldn't hit us at the high altitudes where the F-15s loitered. The large caliber weapons (100mm and up) flashed only every eight seconds or so, but could reach up and touch you. The U.S. and the UK had been enforcing the No-Fly Zone seemingly forever, flying thousands of sorties without any aircraft ever receiving even a scratch from hostile fire. No one wanted to be the guy shot down by the "golden B-B."

I never saw the AAA being fired, although it was reported on every one of my missions over Iraq. I preferred to spend my time scanning the horizon looking for the one thing I thought might actually hit an aircraft—a SAM. It also conveniently allowed me to sightsee during my missions, taking in the beauty of the rugged Kurdish mountains and the cities and towns below. On the occasional foray



southwest of Mosul, I even spotted the outlines of ancient fortresses long since having been swallowed up by the desert.

By 2000, the Iraqis had earned a healthy respect for our High-speed Anti Radiation Missiles (HARMs) that would arrive shortly after they turned on their radars. So much respect, in fact, that they launched all of their SAMs without radar guidance, even if radar guidance was required for the SAM to hit us. I had several theories on why they did this: 1) they cleverly planned to get the SAMs close to an aircraft, then turn on their radars for the final guidance if it was close enough for a possible hit, or 2) they were just shooting their SAMs as acts of defiance, or 3) Saddam Hussein had ordered them to shoot or be shot themselves. In the latter two scenarios, the Iraqi SAM operators could "run like hell" after they gave away their location by firing a SAM. It would also allow them to assert they had followed orders, but that the devious Americans had somehow defeated their missiles (again). My guess is that it was the second or third option. This belief was reinforced by the fact that in the last few years, the Iraqis had almost always fired their SAMs singly, then moved and hid as quickly as possible afterwards.

In the previous two weeks four Iraqi SAMs were fired at the jets from Air Expeditionary Force #10 (AEF 10), to which the 71st EFS was assigned.

**BY 2000, THE IRAQIS HAD EARNED A HEALTHY RESPECT FOR OUR HIGH-SPEED ANTI RADIATION MISSILES... THEY LAUNCHED ALL OF THEIR SAMs WITHOUT RADAR GUIDANCE**

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The author after an Operation Northern Watch combat mission at the 71 EFS maintenance area, Incirlik AB, Turkey, November 2000.

**THE POSSIBILITY OF ADVERSE POLITICAL FALLOUT FROM CIVILIAN CASUALTIES OUTWEIGHED THE BENEFITS OF TERMINATING THE NUISANCE**

Three of the SAMs were short range French-made Rolands fired from a mobile launcher that ducked into a nearby town after firing, using the population to shield it from reprisal. The good news was that the Roland missile was easy to spot, didn't have a long range, and was typically not terminally guided—all factors that minimized the threat. Since we were not in an all-out war, the possibility of adverse political fallout from civilian casualties outweighed the benefits of terminating the nuisance. So far these guys had gotten off unscathed every time they shot. The previous week we had almost nailed them. An F-16 rolled in to attack immediately after the Roland fired, but a cloud got in the way at the last moment, making a laser-guided bomb (LGB) a dicey proposition. During the post-mission video tape review, the entire strike force groaned in unison as a cloud obscured the target in the pilot's targeting pod just two seconds from the LGB release point.

We also had a couple SA-3 medium range SAMs lobbed at us from near Mosul, but those two were launched from such a distance that I couldn't see the actual launches. The SAMs were called out by strike aircraft closer to the launch point. I watched the first one in fascination as a thin wispy trail emerged from the haze on the horizon and arced high into the sky. It accelerated in a hurry as it streaked to a point which I estimated to be well in front of my nose and well north of my position. Since this was the first SAM I had ever seen, I turned my flight hard in the opposite direction, although the SAM was probably about 20,000 feet above and crossing my path miles away. My heart started pounding as I realized that despite training to the contrary, my eyes had remained locked on the errant missile's path and I hadn't looked back towards the source of the SAM in 20 seconds. This

was just the first of several "shoot and run" SAMs that I would experience during AEF 10. This particular SAM apparently had its fins locked in place to give it substantially longer range. It traveled all the way up to near the Turkish border, but no one witnessed a detonation.

I did not fly in the previous day's mission. Instead I watched the events unfold from the Combined Air Operations Center (CAOC) at Incirlik Air Base, Turkey. The Operations room had a picture of the Coalition jets' positions displayed on a huge screen for all to see. The radio chatter indicated that they had spotted a SAM battery hiding in an orchard northeast of Mosul that was in the process of setting up for a shot. You could hear Fangs' voice crackle on the radio as he called for permission to attack, and again as he subsequently orchestrated the strike.

The debrief room was filled to capacity after the mission. Everyone watched with great anticipation as the video tape rolled from the first F-16's targeting pod. Two SA-3 missiles were clearly visible sitting on a launcher in the middle of an orchard, with the targeting cross-hairs centered on them. Then the fireball as the laser-guided bomb (LGB) slammed into the SAMs causing one to ignite. Ignited by the fireball, a huge missile flew crazily through the orchard, ricocheted through the trees and flopped around, with its rocket motor burning at full tilt.

The wingman put in his tape next. The cross-hairs were centered on a missile transport vehicle loaded with four SAMs. Beside the vehicle was a group of men. In unison, the men snapped their heads skyward toward the camera and managed to run two steps or so before a tremendous explosion sent them and their equipment flying into the air. The briefing room erupted with loud cheers from the pilots, navigators, and electronic warfare officers alike as the people who had been firing at them for months with impunity disappeared in a flash. We were promptly scolded for our insensitivity by the general in charge of Operation Northern Watch, who happened to be escorting a general officer from a middle east country into the debrief room at that moment. We all dutifully pretended to be remorseful for the remainder of the debriefing. That evening was filled with celebration and much singing, led by the British Jaguar pilots, who in the proudest traditions of the RAF knew three songs to every one of ours.

I was the air-to-air flight lead on the next day's mission. I planned the standard F-15 sweep of the airspace ahead of the strike and support aircraft. Because of the previous day's success, I expected no SA-3 launches. I took my two-ship element of F-15s down the eastern part of the northern No-Fly Zone towards Irbil, with my number three and four sweeping the west. The adrenalin rush hit as I approached "Peanut Hill," just outside of the Kurdish controlled territory and the site of many previous SAM launches. Sure enough, a smoky trail suddenly reached into the sky below and to my right. This one seemed to slow down as it gained

An SA-3 surface-to-air missile sits on its launcher. (Photo by Amn William Cassada, 547th Intelligence Squadron, Nellis AFB, Nev.)



**A FAINT,  
ALMOST  
INVISIBLE  
TRAIL  
APPEARED  
SLIGHTLY  
ABOVE THE  
HAZE ON THE  
HORIZON TO  
THE SOUTH. I  
ALMOST DIS-  
MISSED IT AS  
INSIGNIFI-  
CANT**

altitude and had a thick white smoke trail emanating from a bright guidance flare burning on its tail. The Roland was badly out of range and fell back down towards earth, exploding harmlessly well below my patrolling altitude.

“Whew,” I thought to myself, “glad to have the daily SAM shot out of the way already.” Chatter filled the radio as the F-16s rushed in to try to hit the mobile launcher before it sped into the nearby town with its human shields.

As I continued south on the sweep, someone called out that we were “marking,” or leaving contrails. I glanced over my left shoulder at my wingman, “Rudy,” who was stacked high to the east. I had positioned him away from the SAM threat areas so he could easily keep me in sight while helping to scan for SAMs. Unfortunately, this made it harder for me to keep an eye on him, and he was indeed leaving white intermittent contrails in the cloudless sky. Rudy corrected down without being told, and asked if I saw the explosions that just went off above my aircraft.

“No,” I responded incredulously, “what explosions?”

Rudy reported that seven to ten black bursts had gone off in rapid sequence and covered an area the size of a couple football fields directly above me. Apparently, the Iraqis had modified some of their 122 mm rocket launchers to fire air-bursting munitions and had been itching for the opportunity to try it out; my two-ship had provided such an opportunity. I began to reconsider my kinder, gentler strategy of putting myself between the threat and my contrail-producing wingman. As we continued

our southbound sweep, we focused our eyes westward towards Mosul, commonly the site of SA-3 launches, with only an occasional scan to the south and east. The radar display was empty, indicating no Iraqi aircraft were airborne.

A minute later another friendly voice on the radio advised us that we were “marking.” Sure enough, my wingman was flying a few hundred feet higher than I and was again making contrails. I checked my altimeter and it showed us to be at our planned altitude, almost 2,000 feet below the contrail level that we had confirmed before crossing into Iraq. We weren’t expecting any issues at this altitude, but had actually been nicking the bottom of the contrails layer. Rudy immediately corrected down, but I noticed a series of very short contrails stretching for many miles behind him. In fact, it looked like a trail of puffy white breadcrumbs in the deep blue sky pointing the way to.....us! We descended another thousand feet into the F-16 altitude block, but it was too late.

A faint, almost invisible trail appeared slightly above the haze on the horizon to the south. I almost dismissed it as insignificant but then I noticed it getting a little higher on the horizon. For a few seconds I was confused. This trail wasn’t in the No-Fly Zone, and wasn’t where the threat was supposed to be, or ever had been. “Could it possibly be a SAM?” My consternation ended as it accelerated in its climb with no left or right motion – just seemingly straight up as it rose rapidly above 50,000 feet. This lack of relative lateral motion could mean only one thing—it was headed straight at me.

“Iron, Break Left!” I commanded, “SAM in the



(Above) 1st Fighter Wing F-15C on No-Fly Zone patrol, Northern Iraq. (DoD photo by Staff Sgt. Vince Parker, U.S. Air Force.)

(Right) An SA-3 reaches for altitude, and a target. A contrail traces the path of a missile.



air south of Irbil.” More a slice turn than a break ensued due to our fuel-conserving speed and heavy aircraft configurations—with eight missiles and three 600-gallon external fuel tanks. In full afterburner and spewing chaff as a radar decoy, we began our attempt to outrun the SAM.

“SAM six o’clock high for five miles!” I yelled, as it began to bear down rapidly on us. While I was excited, I hadn’t panicked, yet. I still had “tally” on the SAM while spun around almost backwards in my seat, and I instinctively knew I had plenty of airspeed as I heard the wind rush increase over the canopy and felt the F-15’s controls increase their responsiveness. I dared not look forward to see my airspeed, altitude or my exact attitude or I’d lose sight of the quickly approaching SAM. The panic finally set in when the SAM’s smoke trail suddenly ceased and I lost sight of it. The “dead man timer” counting down in my head was telling me it was about time to jettison my external tanks and abandon the attempt at running away in favor of another break turn when I saw the flash of the

SAM’s detonation a few miles behind and above us, at our previous altitude.

“Airburst, six o’clock, three miles, over Irbil,” I breathed, as I turned forward to see where I’d been going for the last thirty seconds. After checking to ensure my seat cushion was still operable, I descended to a lower altitude for the next three hours of the mission.

“Wow, that was definitely an exciting mission,” Rudy grinned afterwards.

“Especially when your flight lead gets in the way of things shot at you!” I thought to myself.

Later, we learned that a popular Iraqi officer had been killed on the previous day’s mission. His buddies at the nearby bases had vented their anger on the first two jets into Iraq the following day. Four years later, I had the opportunity to speak with an Iraqi Air Force general who confirmed my hypothesis on the frequent Iraqi AAA and SAM shots in the No Fly-Zones. The orders from Hussein were to shoot or be shot.

But I never got a satisfactory answer to the question of how the Iraqis were able to replenish their stock of French and Russian SAMs during the UN arms embargo. ■

71 EFS officers at Incirlik AB, AEF 10, Fall 2000 (L-R: “Sniper”, “Slam”, “Booger”, “Nomad”, “Fangs”, “Roach” Bledsoe [71st Commander], “Toes”, “Jekyll”, “Bingo”, “Chet” (maintenance officer). Not pictured: “Rudy” (augmenting pilot).





“Go to the Moon  
instead of just  
going into orbit”



Craig B. Waff

(Overleaf) Ground crew of a Microlock receiver station. (Photo courtesy of the author.)

**BUCHHEIM  
VIEWED  
SPACE  
FLIGHTS AS  
THE GUIDED-  
MISSILE  
EQUIVALENT  
OF AROUND-  
THE-WORLD  
B-52  
BOMBER  
FLIGHTS**

The U.S. government's first publicly stated commitment to launch spacecraft that would escape from the Earth's gravity and scientifically explore interplanetary space and the other bodies in the solar system was made on March 27, 1958, nearly six months after the Soviet Union had launched *Sputnik 1*, the world's first Earth-orbiting satellite. On that day, Secretary of Defense Neil McElroy announced that his department's newly formed Advanced Research Project Agency (ARPA) would proceed with several programs for launching a number of small unmanned spacecraft. The programs that he authorized, with the prior approval of President Dwight D. Eisenhower, included not only scientific Earth-orbiting satellites, but also "efforts to determine our capability of exploring space in the vicinity of the moon, to obtain useful data concerning the moon, and provide a close look at the moon."<sup>1</sup> These authorized lunar-probe attempts, which would shortly receive the *Pioneer* name designation and be mostly launched (1958-1959) under the auspices of the new civilian space agency, the National Aeronautics and Space Administration (NASA), established later in 1958, initiated a long series of space-probe missions that NASA has conducted in the subsequent nearly half century.

McElroy's announcement strongly suggested that the primary purpose of the Pioneer probes was scientific. The authorization of the probes under military, rather than civilian, auspices, however, leads one to speculate whether the Eisenhower Administration had other unstated reasons for giving the go-ahead to rather challenging space missions at a time when American rockets and missiles were still suffering numerous launch failures. Somewhat surprisingly, the motivations for the Pioneer lunar-probe authorizations have hitherto not been historically investigated. One reason why historians may have failed to investigate in detail the origins of the program was its distinct lack of success in scientific investigation of the Moon—only one of the probe attempts successfully escaped the Earth's gravity, and it passed nowhere near the moon. A more probable reason was the unavailability of numerous relevant documents concerning the program for many years because of Cold War security classification policies. Many relevant documents, however, had been declassified by the late 1980s, when I began researching the origins of NASA's Deep Space Network (DSN) communication system, which in turn required a study of the space program that was responsible for the construction and installation of the DSN's first ground-based antenna.

## Pre-Sputnik Space-Probe Proposals

The political benefit that could be gained from the first successful deep-space probe was perceived over a year prior to the launch of *Sputnik 1* by engineers and analysts of the RAND Corporation, a consultant organization based in Santa Monica, California. Since 1946 it had carried out broad-based studies relating to national security and missile technology, primarily for the United States Air Force. In the spring and summer of 1956 a RAND team led by Robert W. Buchheim issued a series of reports that proposed combining an Atlas intercontinental ballistic missile (ICBM) with a Vanguard second stage, or alternatively a Titan ICBM with an Aerobee rocket, to provide a means for depositing on the lunar surface a package of scientific and radio equipment capable of transmitting data to an Earth station.<sup>2</sup> The team also advocated interplanetary flights to the vicinity of Venus and Mars, the two planets nearest the Earth.

Although a shortage of funds in the spring of 1957 forced the Air Force to suspend RAND's continued consideration of the interplanetary missions, Buchheim on May 2 presented to the service a proposed lunar-probe program that he argued would not only advance scientific knowledge but also serve as a technological show of force in the face of evidence of a Soviet high-level space-flight program. With regard to the latter purpose, Buchheim viewed space flights as the guided-missile equivalent of around-the-world B-52 bomber flights or atomic-submarine cruises under the polar ice cap.<sup>3</sup>

Because the Atlas and the Titan were still undergoing development and testing in 1957, neither missile would be capable of launching probes to the Moon and the planets for several years at least. This situation, however, did not discourage the manufacturers of these missiles, perhaps in response to RAND's suggested program, from submitting proposals for deep-space missions to the Air Force. The Martin Company claimed that its Titan could be combined with upper stages to achieve reconnaissance flights around the Moon. Similarly, the Convair Astronautics Division of General Dynamics proposed that its Atlas ICBM, together with upper stages, be used to (1) put payloads well in excess of 1,000 lb in orbit around the Moon, the planet Venus, and the planet Mars; (2) land a payload of less than 1,000 lb on the Moon; and (3) put a still smaller payload between the planet Mercury and the Sun.<sup>4</sup>

The RAND, Martin, and Convair proposals did not receive any endorsement from senior Air Force officials. Quite the contrary, the service on July 29,

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THE UNITED STATES SHOULD HAVE OTHER SPACE PROGRAMS UNDER DEVELOPMENT, THE STAFF ARGUED, IN CASE VANGUARD FAILED

1957, issued a directive discouraging public mention of the terms *space*, *space technology*, and *space vehicles*, because some news stories describing Air Force research and development as efforts in “space flight” had caused unhappiness at Air Force headquarters, within the top echelons of the Department of the Defense, and in Congress. This directive, which reflected the general pre-Sputnik political mood, went on to order that “No statements can be made which might in any way cause the national media to describe valid Air Force projects as efforts to fly to the moon.” This directive may have been largely prompted by a speech that General Bernard A. Schriever, head of the Air Force’s ballistic-missile program, gave in San Diego in February 1957 in which he predicted not only that “about 90 percent of the developments in the ballistic-missile program can be applied to advancing in space, satellites and other vehicles,” but also that “In the long haul our safety as a nation may depend upon our achieving ‘space superiority.’ Several decades from now the important battles may not be sea battles or air battles, but space battles, and we should be spending a certain fraction of our national resources to insure that we do not lag in obtaining space superiority.” On the day after the speech, he received a wire from the Secretary of Defense’s office instructing him to “not use the word ‘space’ in any of your speeches in the future.” At this time the Eisenhower Administration was seeking to establish, via the orbiting of a civilian, scientific Vanguard satellite, a “Freedom of Space” principle that would allow it later to orbit reconnaissance satellites that would fly over the territory of a foreign country, such as the Soviet Union. It was thus alarmed at Schriever’s public advocacy of space as a potential future battleground<sup>5</sup>

The political mood changed after the successful Soviet orbiting of the *Sputnik 1* satellite on October 4, 1957. Although the Eisenhower Administration tried in its public statements to downplay the significance of this event, many commentators, inside and outside of the government viewed it as shattering a public perception of United States technological superiority and requiring an appropriate American response.<sup>6</sup> Most of these commentators considered the launch of American Earth-orbiting satellites to be the top priority, and aerospace companies and individuals in fact submitted hundreds of satellite proposals to the Defense Department in the months immediately following the *Sputnik* launch. Several organizations, however, argued for a response that would clearly go beyond what the Soviet Union had accomplished—sending a probe to the Moon.

### **The Jet Propulsion Laboratory and Project Red Socks**

One of the first institutions to advocate a lunar mission in the period immediately after the orbiting of *Sputnik 1* was the Jet Propulsion Laboratory (JPL), in Pasadena, California, managed by the California Institute of Technology (Caltech). JPL began as an off-campus facility used by several Caltech graduate students in the late 1930s to con-

duct early rocket propulsion experiments. As an Army Ordnance facility in the 1940s and 1950s, it developed a jet-assisted takeoff (JATO) engine for airplanes during World War II and the Corporal and Sergeant surface-to-surface tactical nuclear missiles during the early Cold War years. In 1955, JPL, in conjunction with Wernher von Braun’s Guided Missile Development Division at the Army’s Redstone Arsenal in Huntsville, Alabama, had vied unsuccessfully for the assignment of launching the first United States satellite during the International Geophysical Year (IGY) (July 1957-December 1958).<sup>7</sup>

In the introduction to a proposal entitled “Project Red Socks,” formally printed on October 21, 1957, JPL staff members observed that the *Sputnik 1* launch had had “a tremendous impact on people everywhere” and had a “significance ... both technical and political.”<sup>8</sup> They argued that United States must regain stature “in the eyes of the world” and could best do so by undertaking a program that was “significantly different, different in kind and preferably technologically more advanced” than the Soviet satellite.<sup>9</sup> One possibility was to launch into orbit a satellite significantly heavier than *Sputnik 1*. As the staff members were well aware, however, current United States rocket capability was insufficiently powerful for such a task.

On the other hand, they pointed out, available rockets could send a relatively small probe to the Moon, and JPL had “some fairly sophisticated instrumentation and communication” capability that could facilitate a successful lunar mission. Believing that the launching of the *Sputnik 1* satellite implied that the Soviet Union already had the rocket capability to conduct flights to the Moon carrying scientific instruments, the JPL staff argued that the United States must demonstrate as soon as possible a similar capability.<sup>10</sup> In the words of JPL director William H. Pickering, they advocated that the country “go to the moon instead of just going into orbit.”<sup>11</sup> Adding to the JPL staff’s desire to undertake a lunar mission was its perception that the United States program for placing a 20-pound Vanguard satellite in orbit during the IGY period had a low probability of succeeding. The United States should have other space programs under development, the staff argued, in case Vanguard failed.

The “only means available” by which the United States could achieve a “Moon rocket” before the Soviet Union, according to the JPL staff, was the use of a lengthened Jupiter intermediate range ballistic missile (IRBM) as the booster, or first stage, plus a configuration of upper stages that employed solid-propellant rocket motors that the laboratory had developed for the Army’s Sergeant rocket. The second, third, and fourth stages would use, respectively, eleven, three, and one of these motors. JPL and Redstone Arsenal had proposed such a configuration in late 1955 for the purpose of orbiting six 15- or 20-pound satellites during the IGY.

Although this “Project Orbiter” proposal lost out to the Navy’s Vanguard for the assignment of



Eberhardt Rechlin, chief of JPL's Electronics Research Section. (Photo courtesy of the author.)

**A SUCCESSFUL PHOTOGRAPH OF THE FAR SIDE OF THE MOON WOULD BE PERCEIVED BY THE GENERAL PUBLIC AS A DRAMATIC DEMONSTRATION OF AMERICAN SPACE CAPABILITY**

launching the first United States satellite, a variant configuration (lacking the fourth stage) was subsequently used (September 20, 1956, and May 15 and August 8, 1957) in conjunction with the Jupiter C (actually a lengthened Redstone missile with an uprated engine) for the re-entry testing of missile nose cones. The Red Socks proposal noted that two of the three tests in this series had been "completely successful," and that "the soundness of the re-entry test vehicle (RTV) program is no longer speculative; it is a matter of history."

Because the Arsenal (subsequently renamed the Army Ballistic Missile Agency, or ABMA) and JPL had already purchased hardware for several more launch vehicles, JPL officials asked for authority "to conduct a program immediately for the purpose of making nine flights to the moon." The program would begin by using the Jupiter/RTV-upperstage-cluster combination (subsequently called Juno II) to send a 15-lb payload around the Moon in June 1958, a flight that "would provide valuable guidance and instrumentation information, as well as define an early capability." In the second phase of the program, which would start in January 1959, the Jupiter would be mated with a scaled-up RTV configuration that would enable a 120-lb payload to be sent to the Moon. This new configuration (subsequently called Juno III) would make use of the Grand Central Rocket Company "Meteor" engine that had been developed for the third stage of the Vanguard rocket.<sup>12</sup>

The remaining portion of the "Red Socks" proposal, drafted by Eberhardt Rechlin (chief of JPL's Electronics Research Section since 1954), was devoted to the electronics capability of the proposed lunar probes and to the specific payload that might be delivered. He ruled out the use of extremely sophisticated electronics on the first few flights because of limitations on weight (between 20 and 100 lb) and type of electrical power source (conventional batteries) and "considerations of time schedule, missile environment, and reliability." Rechlin instead recommended the inclusion of one or more photocells and a radio beacon. He calculated that 30 lb of mercury batteries would permit the transmission of around 1 million bits of information from the vicinity of the Moon. This figure was "equivalent to four times the detail of one frame of a standard television picture," according to a footnote in the proposal.

As for the specific experiments that should be conducted on the proposed flights to the Moon, Rechlin suggested that the first 15-pound-payload mission carry a single photocell with a fairly wide field of view and a modified Microlock transmitter radiating 2 watts of power and operating continuously in the vicinity of the Moon. (Microlock was the communication system that JPL had developed for Project Orbiter and would subsequently use in the early Explorer satellites.) Such a radio beacon could telemeter information on temperature, pressure, and light intensity measured by the photocell as it observed the Moon through a port in the side of the spacecraft. As the spacecraft rotated, the Moon could be coarsely scanned, enabling a measurement of the distance of nearest approach to the Moon.

For the later flights carrying the 120-lb payload, Rechlin suggested a logical extension of this experiment utilizing six photocells, each with a 1-milliradian-by-1-milliradian field of view. He calculated that if the spacecraft rotated at 3 revolutions per minute and flew by the Moon at a distance between 2,000 and 10,000 mi, this apparatus could obtain in one hour a two- or three-tone black-and-white picture of the far side of the Moon with a resolution of between 2 and 10 mi. The optical data for such a picture would be stored on magnetic tape and then played back at 1/30th of the original speed and relayed to Earth by a 3-watt Microlock transmitter during a period when the receiving station could see the spacecraft. Rechlin characterized his proposed experiments as meeting "the necessary qualifications of being simple, rugged, and valuable."<sup>13</sup>

Left unsaid, but certainly in the minds of JPL officials, was the expectation that a successful photograph of the far side of the Moon would be perceived by the general public as a dramatic demonstration of American space capability. Perhaps in order to give government officials an exaggerated idea of just how dramatic a close-up picture of the Moon might be, the JPL staff included in its proposal an artist's drawing of a spacecraft passing over a lunar surface area featuring large, distinctive craters, with the Earth looming behind the Moon. In other words, the spacecraft was viewing



Secretary of Defense Neil McElroy.

**INTENSE INTER-SERVICE RIVALRY BETWEEN THE ARMY AND AIR FORCE... APPARENTLY PLAYED A MAJOR ROLE IN DELAYING ANY IMMEDIATE ACTION ON JPL'S PROPOSAL**

the hitherto unseen far side of this body, an achievement that would likely regain stature for the United States.

In his typewritten draft of the electronics section of the Red Socks proposal, Rehtin initially recommended a 50-ft-diameter paraboloid dish antenna on the ground for communicating with the probes while they were in the vicinity of the Moon.<sup>14</sup> He crossed out this recommendation, however, and instead in the margins (and in the printed version of the proposal) advocated 4 x 4 arrays of the single Microlock helical antennas that JPL used to track the September 1956 firing of the Jupiter/RTV rocket. Rehtin most likely made this alteration upon more careful consideration of the urgency of the program that JPL was recommending. JPL engineers would need considerable time to set up a large paraboloid antenna, and in any case only a long-term flight program could justify its higher cost.

In late October 1958 Pickering and Caltech President Lee A. DuBridge took the Red Socks proposal to Lt. Gen. James Gavin, chief of Army Research and Development, who enthusiastically supported it. At a meeting shortly thereafter with Defense Secretary Neil McElroy, however, the reception to the proposal was more cautious. Intense interservice rivalry between the Army and Air Force at this time, particularly regarding the development and deployment of IRBMs, apparently played a major role in delaying any immedi-

ate action on JPL's proposal. Pickering later recalled that McElroy asked Deputy Defense Secretary Donald A. Quarles, to stay in the office to hear JPL's presentation. Afterwards, Quarles, a former Secretary of the Air Force, commented that while the proposal was "interesting," he felt that "the Air Force ought to be allowed to study it and make a comparable counterproposal rather than just accepting this out of the blue as an Army proposal." When McElroy agreed with Quarles, Pickering, well aware of "the feelings between the Air Force and Army at that time," assessed that the Pentagon would take no immediate action on the Red Socks proposal.<sup>15</sup>

Pickering was apparently suspicious, however, that the Air Force, with Quarles' encouragement, would also make a lunar-probe proposal, using a missile of its own as the launch vehicle. He, therefore, assigned several JPL engineers to continue to study the Moon flight concept over the next few months.<sup>16</sup> This study was undertaken while much of JPL's staff was heavily involved in the preparation of an Earth-orbiting satellite authorized by President Eisenhower in early November as a backup to the Vanguard program.

Pickering's suspicions were not groundless. Several individuals in the Air Force and working for its principal contractors were prepared to dispute the JPL assertion that the Jupiter/RTV-upper-stages combination was the only launch vehicle capable of propelling a payload to the vicinity of the Moon. And like Pickering and his JPL colleagues, they perceived political urgency in undertaking a lunar-probe program.

### **Space Technology Laboratories and Project Baker**

In order to get a new assessment of the relative military air-power strengths of the United States and the Soviet Union, President Eisenhower ordered a series of top secret meetings of high-level scientific, industry, and United States Air Force technical personnel that were held in Baltimore in late October 1957. At these meetings, presided over by nuclear physicist Edward Teller, the Air Force invited the country's leading aircraft and missile manufacturing companies to submit unmanned lunar-probe proposals. The invitation may have been prompted by knowledge of JPL's Red Socks proposal and by speculation that Soviet Union might announce a lunar probe on November 7, 1957, the 40th anniversary of the Bolshevik revolution.<sup>17</sup>

The invitation was not ignored. Over the next few months the companies submitted as many as 300 proposals for lunar probes and other space projects with "some based on a crash program for meeting urgent requirements and others looking far into the future."<sup>18</sup> Among those making immediate lunar-probe launch-vehicle suggestions were Douglas Aircraft Company (Thor plus Vanguard second and third stages), North American Aviation (XSM-64 [Navaho] plus upper stages), and Lockheed (Atlas plus upper stages). On October 30,



Deputy Secretary of Defense Donald A. Quarles.

**STL OFFICIALS ANTICIPATED BOTH SCIENTIFIC AND POLITICAL BENEFITS FROM AN EARLY LUNAR FLIGHT**

a “Short Term Space Flight Program” subcommittee of the Teller group recommended the Douglas-made Thor—the Air Force’s rival to the Army’s Jupiter for deployment as an IRBM in Europe—as the booster during the immediate future for satellites and lunar probes.<sup>19</sup>

Perhaps based on this recommendation, the Air Force began focusing its attention in mid-November 1957 on a Thor-Vanguard combination for launching lunar probes. On November 20, in a briefing to officials of the Los Angeles-based Air Force Ballistic Missile Division (BMD) (a part of the Air Research and Development Command) and the Ramo-Wooldridge Corporation (which served during the 1950s as technical adviser and systems engineer to BMD regarding ballistic missile development), Douglas recommended for lunar missions use of a Thor IRBM as a booster, a cluster of third-stage Vanguard engines as a second stage, and a single third-stage Vanguard engine as a third stage.<sup>20</sup>

On December 12, Ramo-Wooldridge engineer

Paul Dergarabedian, in an internal company memo, described the combination of a Thor with Vanguard second and third stages as “a promising lunar impact configuration.”<sup>21</sup> Such a configuration was seen as a logical development from a re-entry test vehicle—Thor booster and Vanguard second stage—that Major General Bernard A. Schriever, commander of the BMD, had authorized two weeks earlier. The development of this re-entry test vehicle, known as Project Able (later, Able 0), would be undertaken by the division and Ramo-Wooldridge, with launches scheduled in April, May, and June 1958.

Dergarabedian’s proposed three-stage configuration became the basis for a formal proposal, entitled “Project Baker,” that Space Technology Laboratories (STL), a newly formed Los Angeles-based subsidiary of Ramo-Wooldridge, sent to BMD on January 27, 1958.<sup>22</sup> STL staff members asserted, as JPL staff had for the Jupiter, that the Thor was the “only large high performance booster that could be made available for a lunar flight experiment during the next one to two years.”<sup>23</sup> In a cover letter, Louis G. Dunn, STL’s executive vice president and general manager and Pickering’s predecessor as director of JPL, reported his company’s estimation that a hard impact on the Moon could be achieved by October-November 1958 if STL was authorized to proceed immediately with a program of three lunar probe attempts.<sup>24</sup>

Like their counterparts at JPL, STL officials anticipated both scientific and political benefits from an early lunar flight. By “carrying a moderate payload of scientific instruments with telemetering means for transmission of signals of conditions to be found on the moon,” an early lunar probe could provide the information needed to develop rocket vehicles carrying several thousand pounds of payload that the STL staff was certain would be in operation within a few years. The staff suggested, however, that “the prestige of sending the first rocket to the moon, with clear proof that it reached its objective,” might be of “even greater national importance” than any scientific or technical benefits.<sup>25</sup>

STL engineers calculated that a minimum payload of 60 lb was possible if a Thor booster with a standard thrust of 150,000 lb and a Vanguard third stage with a standard propellant were used. They suggested, however, that it might be feasible to improve the Thor’s thrust to 175,000 lb and to substitute an improved propellant in the third stage; if so, a maximum payload of 100 lb would be possible. The relatively small weight, in either case, made the selection of a suitable payload, the STL staff observed, “a difficult problem.” Among the fundamental requirements, they argued, were a tracking beacon (for determining whether the rocket was performing as expected and telemetering certain basic data) and a magnetometer (for measuring the moon’s magnetic field), weighing respectively an estimated 20 lb. and 3 lb. In addition, if an accelerometer cut-off system in the third stage was not required, the 10 lb designated for it could be used instead to make measurements of meteorite impacts

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and lunar-atmosphere characteristics and spectra.

The STL staff suggested that the remaining payload capability—27 lb in the minimum payload and 67 lb in the maximum payload—could be allocated to fulfill the other, nonscientific objective of the mission, i.e., provide some means of clearly indicating, especially to the general public, that the probe had impacted on the Moon. One way of providing evidence of this result would be to trigger a high-intensity flash system at the time of impact. The staff, recalling that the American rocket pioneer Robert H. Goddard had estimated that “as little as 10 lbs. of flash powder would produce sufficient light on the dark part of the moon to be visible from the earth,” thus allocated the remaining 27 lb in the minimum payload to a flash system.

A heavier but more dramatic means of indicating that the probe was approaching the Moon, they suggested, would be the use of a television camera taking a series of pictures of both the Earth and the Moon as the probe followed a trajectory from the former to the latter. Beyond its public-relations value, the television camera could provide some scientific benefits. The STL staff pointed out that “pictures of the earth from space which could show cloud patterns over half the globe should give extremely valuable data to meteorologists,” while pictures of the Moon taken during the last few hours before impact would probably be significant, depending on their quality and lighting conditions, in sharpening the images of various lunar features. STL engineers estimated that a television system with a 10-watt transmitter power would probably weigh about 50 lb, making it feasible only if the maximum payload capability was obtainable, and if the flash system was reduced by 10 lb in weight.<sup>26</sup>

To receive the television picture and other data on the ground, STL engineers suggested using a 60-ft-diameter antenna. They cautioned, however, that an antenna of this size could obtain only a moderate-quality picture unless transmission was slowed down from one picture per second to one picture per ten seconds. Alternatively, increasing the diameter of the antenna to 200 ft would result in “greatly improved picture quality.” Clearly aware that the Project Baker lunar proposal could not alone justify the cost of a new antenna of this size, the STL engineers suggested that its construction, or use of an existing large antenna, “might be undertaken in cooperation with radio astronomy and long range communication projects.”<sup>27</sup>

BMD greeted the “Project Baker” proposal with immediate enthusiasm. Only two days after STL’s submission, Col. Charles H. Terhune, Jr., deputy commander of weapons systems (and later a deputy director at JPL under Pickering), proposed to his superiors that after the first three Thor boosters available in 1958 for “extra curricular work” were used in the Project Able re-entry tests, the next three, due to be delivered in August, September, and October of 1958, be employed in a “Hit the Moon” program.<sup>28</sup>

Terhune’s desire to schedule the lunar-probe attempts as soon as possible may have been

prompted in part by a suspicion that his division’s rivals in the Army were busy making similar plans. The very next day (January 30, 1958), in fact, JPL and ABMA engineers discussed the subject at a meeting held in the JPL office at the Air Force Missile Test Center at Cape Canaveral, Florida, where they were waiting out a weather-caused delay in the Army’s first attempt to launch a satellite. (A Jupiter C/RTV combination, known as Juno 1, would the following night successfully launch *Explorer 1*, the nation’s first Earth-orbiting satellite.) During the meeting the engineers allocated the second Juno II launch in November 1958 and the first Juno III launch in February 1959 for JPL lunar probes.<sup>29</sup>

JPL was certainly aware that it was not the only organization shooting for the Moon. On February 4, Jack Froehlich, the Explorer project manager at JPL, sent a telex to Ernst Stuhlinger, head of the Space Sciences Laboratory at ABMA, informing him of the possibility that the first lunar probe could be ready in time for the first Juno II launch slated for October 1958. In addition to citing several technical reasons for advancing the launch date of the first lunar probe, Froehlich observed that the “Competition seems to be aiming for the very same goal.”<sup>30</sup> Both engineers had read an *Aviation Week* article published two weeks earlier that had reported on BMD plans to send a payload to the Moon “probably within the next few months” using a Thor/Vanguard launch vehicle.<sup>31</sup>

Thus at the end of January 1958 both JPL and STL were actively competing for an assignment to launch probes to the vicinity of the Moon. The two organizations saw merit in having the probes obtain scientific data, but both perceived that the proposed missions could also serve as political responses to the Soviet Union’s launching of *Sputnik 1* in October and a much heavier *Sputnik 2* on November 3. Both had also considered potential communication systems for receiving dramatic pictures of the lunar surface that would fulfill this nonscientific goal. The assemblage of the launch vehicles, the construction of the probes, and the setting up of the communication systems could not be undertaken, of course, until approval was received from the highest levels of the United States government.

### PSAC and the Desire for Something that the Public Can Admire

Authority to launch lunar probes would come only slowly and reluctantly from the Eisenhower Administration. Early on, the Administration publicly took the stance that it would not rush to approve projects of little intrinsic merit that it perceived as hysterical responses to the Sputnik satellites, and proposals to hit the Moon were among such projects. Although Deputy Secretary of Defense Quarles had privately encouraged competing lunar-probe proposals from the Army and the Air Force, he testified on November 27, 1957, before the Preparedness Investigating Subcommittee of



Herbert F. York, director of the Livermore Laboratory. (Photo courtesy of the author.)

the Senate Armed Services Committee, that <sup>32</sup>

*I find in the existence of the first satellites no cause for national alarm. In this respect I am disagreeing with many people who have been saying "Let's beat them [the Soviet Union]"; "Let's put up a bigger satellite"; "Let's hit the moon with a rocket" .... We must not be talked into "hitting the moon with a rocket" just to be first, unless by so doing we stand to gain something of real scientific or military significance.*

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Eisenhower himself in early February 1958 told Republican Party legislative leaders that he "would rather have a good Redstone [IRBM] than be able to hit the moon, for we don't have any enemies on the moon!" He declared that he would not be drawn into a "pathetic race" with the Soviet Union, and he characterized a lunar probe as "useless."<sup>33</sup>

Despite this public negative attitude of Eisenhower and his Administration concerning lunar-probes, proposals for them came under renewed study by high government advisors and officials as a result of actions that the President took shortly after the launching of *Sputnik 2*. On November 7, four days after this event, President Eisenhower went on nationwide television to announce that he was appointing James R. Killian, Jr., then president of the Massachusetts Institute of Technology, as head of the newly created Office of the Special Assistant to the President for Science and Technology.

Two weeks later, in accordance with a recommendation by Killian, Eisenhower transformed the Office of Defense Mobilization's Scientific Advisory Committee, set up in 1951 by President Harry S. Truman, into the President's Scientific Advisory Committee (PSAC) and expanded its membership to make it more representative of the entire scientific community. Its chairman, Columbia University physics professor and Nobel Prize winner I.I. Rabi, stepped aside to allow Killian to succeed him.

After the first attempt to launch a Vanguard satellite ended in spectacular failure on December 6 (the explosion of the first stage of its launch vehicle within seconds of liftoff was recorded on live national television), PSAC members, among other activities, soon began debating "the components and the organization which a well-conceived American space program must possess."<sup>34</sup> On February 4, 1958, President Eisenhower formally ordered a special study to recommend the outlines of a space program and an organization to manage it. Killian assigned the study to a Space Studies Panel comprised of Harvard University physicist and Nobel Prize winner Edward M. Purcell (chairman), Herbert F. York (director of the Livermore Laboratory), Lt. Gen. James H. Doolittle, USAF (Ret.) (vice president of Shell Oil Company and chairman of the National Advisory Committee for Aeronautics), and Edwin H. Land (president of the Polaroid Corporation), all PSAC members.<sup>35</sup>

Earlier, on the same day in late October 1957 that Pickering and DuBridge had presented JPL's Red Socks proposal to McElroy and Quarles, they had also briefed the old Science Advisory Committee but received only a lukewarm reception. Pickering recalled the committee members as being "not sure that this was more of a stunt, as it were, and ... not really that enthusiastic about it from a scientific point of view, and even though Sputnik had happened already I don't think they really had quite the appreciation from a political point of view of the value of doing something like this."<sup>36</sup>

PSAC's Space Studies Panel had a more expansive view of the value of space technology. In a document entitled *Introduction to Outer Space* that President Eisenhower issued publicly on March 26, 1958, Purcell and York identified four factors that "give importance, urgency, and inevitability to the advancement of space technology." In addition to scientific observation and experiment, there was also the human urge to explore, defense needs, and national prestige. Regarding the last factor, they argued that "To be strong and bold in technology will enhance the prestige of the United States among the peoples of the world and create added confidence in our technological, industrial, and military strength."<sup>37</sup>

York, in particular, actively encouraged the lunar probes proposed by JPL and STL and visualized them, if successful, as both producing scientific data and enhancing national prestige. York had a long-standing strong interest in space travel (as presented in science fiction) and in the astronomy of the

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solar system, and he thus approached the work of the Space Studies Panel with “special enthusiasm” and a delight that he was now “being asked to plan the real thing.” He perceived lunar probes as among those projects that could “both be useful in themselves [obtaining scientific data] and outclass the Russians in their public relations impact.”<sup>38</sup>

This potential dual value of lunar probes prompted the Space Studies Panel to summon representatives of JPL, STL, the Army Signal Corps’ Research and Development Laboratory (Fort Monmouth, N.J.), and the Naval Ordnance Test Station (NOTS) (Inyokern, Calif.) to a meeting at the Executive Office Building next to the White House on February 17. In addition to Purcell and York, PSAC members Hugh L. Dryden (director of the National Advisory Committee for Aeronautics), Alan T. Waterman (director of the National Science Foundation), and Emanuel R. Piore (chief scientist of the International Business Machines (IBM) Corporation), along with S. Paul Johnson (director of the Institute for Aeronautical Sciences) of the PSAC staff, attended the meeting.

At the beginning of the meeting York, subbing for a late arriving Purcell, made it clear that the goal of restoring national prestige was the major factor driving PSAC’s interest in gaining approval for an immediate program of lunar probes. He informed the visitors that PSAC had decided that the United States should “attempt a lunar mission with the objectives of: a. Making contact of some type with the moon as soon as possible, but with the limitation, b. That the contact be of a type that has significance such that the public can admire it.” York further stated that the panel had concluded, given the second objective, that “some kind of visual reconnaissance” was the most significant experiment that a lunar vehicle could carry. York and Dryden, and to a lesser extent Waterman and Purcell, all emphasized “the very great significance of bringing back some pictorial information, particularly of the other side of the moon.”<sup>39</sup> What was probably in the minds of the panel members may have been revealed in the *Introduction to Outer Space* document: “Photographs of the back or hidden side of the moon may prove quite unexciting, or they may reveal some spectacular new feature now unguessed.”<sup>40</sup>

With the goal of potentially dramatic photographs in mind, PSAC invited camera developers from the Signal Corps and NOTS (William Stroud<sup>41</sup> and Howard Wilcox, respectively) to present at the February 17 meeting a state of progress of their devices to representatives of JPL and STL, the leading proponents of lunar probes and launch vehicles. York expressed his hope that the conference would “induce some interactions that would result in an earlier accomplishment of lunar experiments of significance.”<sup>42</sup>

The “interactions” were in fact quite animated. Clarence (Johnny) Gates (manager of JPL’s Guidance Systems Analysis section), recalled that the meeting was “quite competitive” and had a “somewhat charged atmosphere”: “We said we could do this and the guys from STL disagreed. And the

guys from STL said they could do something, and we disagreed. There was a challenge present in the meeting as to ‘Were we speaking the truth, were we credible?’”<sup>43</sup> Another participant, A.F. Donovan (head of STL’s Astrovehicles Laboratory), reported to Dunn examples of this competitiveness:<sup>44</sup>

*Mr. Stroud started to complain to the Committee that they expected to have equipment available for reconnaissance, but there were no vehicles. I countered that we could have vehicles needing equipment within three months. When I asked him what he could deliver in three months, he had no equipment. This degenerated to his opinion that our vehicles would not work, and my opinion that our vehicles had more chance of working than his equipment. When we got into this phase it became somewhat clearer that Mr. Stroud had been brainwashed by the Army. Dr. Wilcox of NOTS kept arguing that either he could produce equipment, or that Mr. Stroud’s equipment could be adapted for our use within the three months period, given suitable priority and authorization. Dr. Gates of JPL expressed extreme skepticism of our ability to establish a satellite orbit [i.e., an orbit around the Moon].*

Donovan also reported to Dunn that he was “personally ... very skeptical that the JPL system can come anywhere near the Moon.”<sup>45</sup>

Gates and his colleague Walter K. Victor, an electrical engineer working under Rechlin, informed the panel that JPL was already developing two types of reconnaissance systems for its Juno III-launched lunar probe. They, therefore, gained little from the meeting other than detailed information about STL’s plans.

On the other hand, during the interval between submission of the “Project Baker” proposal and this meeting, the STL staff had changed the goal of its proposed lunar mission from a surface impact to orbiting a 30-lb satellite around the Moon. Such a spacecraft, because of its repeated passes over the lunar surface, would be particularly well suited for obtaining a picture of the far side of the Moon. At the meeting, therefore, Donovan expressed interest in the television scanning systems presented by Stroud and Wilcox, which he assessed were “considerably further along than I had believed any systems were for possible application to the Baker mission.”<sup>46</sup>

Despite his interest in the Signal Corps and NOTS camera systems, Donovan informed the panel of STL’s plans to include in its first few flights only a simple telemetering transmitter to communicate “minimum data, perhaps measurements of the moon’s magnetic field” and its hope “to obtain other significant data by observing the trajectory of the satellite.” He emphasized that company engineers in the initial missions were “making every attempt to keep it [the payload] as simple as possible to maximize the probability of success, and were reluctant to introduce television scanning systems or equivalent devices of a low probability of success.”<sup>47</sup>

The Purcell committee members, however,

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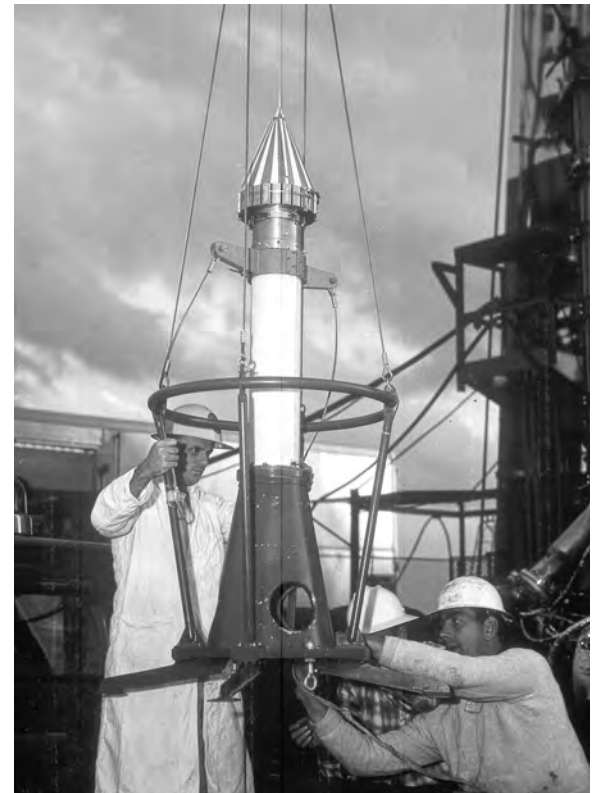
were adamant about attempting to get visual data, and hinted rather broadly that they felt lunar missions that did not attempt to fulfill this objective would have great difficulty receiving PSAC's endorsement. The point was emphasized by Killian, who came into the middle of the meeting for about 10 or 15 minutes. Gates recalled vividly many years later Killian's declaration that PSAC wanted "something flashy, showy, and cheap." The PSAC chairman made it clear that he perceived the lunar-probe project as "all froth, no substance, a stunt" and "just fluff," and that he wanted "something that they could flash in front of the public, something that would have no future, no substantial continuity, no real value."<sup>48</sup>

Based on these strong views expressed by the subcommittee members and Killian, Donovan recommended to Dunn that STL should immediately expand its "studies of significant measurements that can be made by simple telemetering in order to try to define significant experiments that can be done without television to minimize opposition to an early launching." He cautioned, however, that "It is imperative that we carefully review the possibilities of the Signal Corps and NOTS television units for application to Project Baker. To fail to do so on a positive and constructive basis would result in an enormous amount of ill will and potential opposition from the Killian Committee." Donovan warned that "We can expect a continuing and increasing pressure from the Killian Committee to get significant data and, if possible, visual data from our lunar experiments. They will insist that we use all possible resources for this purpose."<sup>49</sup>

The Space Studies Panel considered alternatives to a camera. Purcell reported on studies that he had done indicating that a minimum of 200 lb was necessary to place a permanent marker on the Moon, apparently too heavy a payload for the initial lunar-probe attempts. In addition, Donovan reported that the panel expressed "little enthusiasm for a momentary flash at impact." Furthermore, opposition recently expressed by biologists to contamination of the Moon by radioactive or germ-carrying material excluded the possibility of "landing an atomic bomb on the moon."<sup>50</sup> (In 1956 William W. Kellogg in one of the RAND reports had suggested exploding an atomic bomb on the Moon in order to create a visible flash and seismic motion.<sup>51</sup>)

One day after the meeting with the STL and JPL representatives and the television scanning system designers, York sent to Killian the Space Studies Panel's tentative recommendations concerning "the first phase" (1958-1959) of the United States space program. Among the recommendations were approval and implementation of lunar-probe attempts by both the ABMA/JPL and BMD/STL teams. The panel members recommended that the attempts be given the highest priority because they believed that "the USSR can make a lunar shot at any time now, and will probably do so before the US can, and that the US must do all it can to mitigate the Sputnik-like reaction which would follow the USSR achievement."<sup>52</sup> York

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would soon have an opportunity to implement this recommendation.

#### **ARPA and the Desire to Beat the Russians**

Already, on February 12, President Eisenhower had signed a Congressional act authorizing the creation, within the Department of Defense, of an Advanced Research Projects Agency (ARPA) that would manage new weapon programs during the early stages of research and exploratory development. This act was passed in response to a desire by Eisenhower and McElroy to have "any new missile or related program hereafter originated ..., whenever practicable, be put under a single manager and administered without regard to the separate services." In addition, the new agency was authorized, for no longer than a year after the act took effect, "to engage in such advanced space projects as may be designated by the President."<sup>53</sup> ARPA would eventually transfer these projects to any new space agency proposed by Eisenhower and authorized by Congress.

Anticipating the legislative approval of the new agency, Secretary of Defense McElroy on February 7 named Roy E. Johnson, an executive at General Electric, as the first director of ARPA. Johnson in turn selected Rear Admiral John E. Clark, the director of the Navy's Guided Missiles Research Division, as his Deputy Director on March 5. Thirteen days later Johnson announced the appointment of York as chief scientist of the new agency. In his autobiographical account, however, York noted that he had already been effectively at work at ARPA for several weeks, and thus he was already on board when ARPA officials pri-



(Left) In this photograph, the lunar and planetary exploration satellite, Pioneer III, is being prepared for installation to Juno II (AM-11) launch vehicle.

(Right) Director of the U.S. Army Ballistic Missile Agency's (ABMA) Development Operations Division, Dr. Wernher von Braun, and Director of Missile Firing Division, Dr. Kurt Debus, are shown with unidentified individuals, discussing two components that would make up the Pioneer IV Lunar Probe. The mercury batteries (left) and the conical shroud. (NASA photos.)



## ARPA'S DECISION TO ENDORSE AN IMMEDIATE PROGRAM OF LUNAR PROBES WAS BASED ON A DESIRE TO "BEAT THE RUSSIANS."

vately informed BMD (and presumably ABMA as well) on March 16 that the agency had approved the proposed lunar-probe attempts.<sup>54</sup> One of the first things York did as chief scientist, a history of ARPA notes, was to "hang a large picture of the moon on his wall next to an empty picture frame which, he felt, was 'soon' to receive the first picture of the backside of the moon."<sup>55</sup> Both Clark and York would later recall that ARPA's decision to endorse an immediate program of lunar probes was based on a desire to "beat the Russians." Johnson in particular, according to York, was "eager to surpass the Soviet Union in any way possible."<sup>56</sup>

President Eisenhower's March 24 decision to approve the JPL and STL proposals for early lunar-probe attempts was apparently reluctantly made for the same reason. As late as March 18, during a meeting with Republican leaders, he argued against the United States getting involved in a race to the Moon with the Soviet Union and explained that a successful lunar probe could be achieved only after "a long series of painstaking steps." Nevertheless, he ultimately approved the probes, "fearful of another blow to national prestige," according to historian Robert A. Devine.<sup>57</sup>

The presidential approval led to McElroy's issuance on March 27 of ARPA's first three orders, all concerning lunar probes. Specifically, he gave ABMA authority to undertake one, and possibly two, 15-lb lunar probe attempts with Juno II vehicles in or about November and December 1958, and BMD authority to make three 30-lb lunar-probe attempts with Thor-Vanguard vehicles "as soon as possible." In addition, NOTS was ordered to develop a camera system for the Air Force probes.<sup>58</sup> Not surprisingly, the Army and Air Force organizations called upon

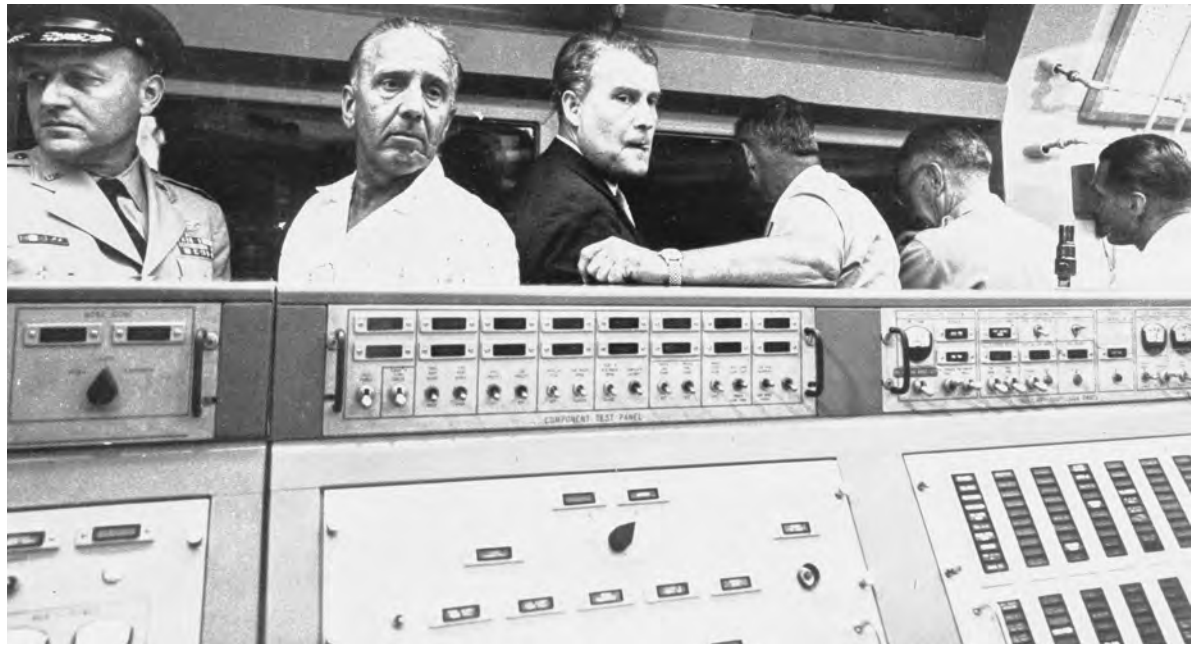
JPL and STL to perform major tasks in their respective lunar-probe programs.

### Mission Operations

The activities that JPL and STL undertook in connection with the approved Pioneer lunar-probe attempts are beyond the scope of this article, but a brief summary of these missions follows. The Air Force made its first attempt on August 17, 1958. The probe's Thor-Able launch vehicle lifted off successfully from the launch pad at Cape Canaveral, but at 73.6 sec into the flight a turbopump bearing failed and the liquid-oxygen (LOX) pump stopped in the Thor booster. A violent vehicle motion ensued, causing a rupture of either the main LOX tank or the main LOX duct and a subsequent explosion that destroyed the vehicle. The malfunction occurred when the vehicle had reached an altitude of 56,000 ft and a downrange distance of 27,000 ft. The probe it carried is sometimes called *Pioneer 0*.<sup>59</sup>

The Pioneer lunar-probe program was transferred to the newly formed National Aeronautics and Space Administration on October 1, 1958. The subsequent launches in the program were thus made under the auspices of NASA, although Air Force and Army personnel continued to participate in the launch activities at the Cape. The second probe, christened *Pioneer 1* and launched on October 10, went much further but traveled nowhere near the Moon. The first two rocket stages performed excellently, but when the third stage burned out, the payload had an inertial velocity about 500 ft/sec lower than the desired 35,206 ft/sec. Although all the vernier rockets were fired in an attempt to provide the needed additional velocity increment, the

This photograph shows Dr. von Braun, third from the left, in the blockhouse at the Florida launch facilities on March 3, 1959. He and others gathered for the launch of the Pioneer IV satellite. Behind Dr. von Braun is Kurt Debus, who managed the Florida launch facilities. To the right of Dr. von Braun is Army General John B. Medaris. Next to him is General John Barclay. At this time, Dr. von Braun and his associates were members of the Army Ballistic Missile Agency in Huntsville, Alabama. (NASA photo.)



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TO REACH  
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VELOCITY**

impulse was insufficient. The payload thus failed to achieve escape velocity, reaching a maximum altitude of 71,700 mi.<sup>60</sup> The third probe, *Pioneer 2*, was launched on November 8, 1958. The first two stages again performed well, but the third stage failed to ignite, resulting in a maximum altitude of 963 mi for the upper stages and payload.<sup>61</sup>

The later launches of the two Army lunar-probe attempts enabled them to be used to explore further a phenomenon whose discovery, by the *Explorer 1* and *3* Earth-orbiting satellites, was the most important scientific achievement of the early Space Age—radiation trapped in a belt surrounding the Earth at certain altitudes. The first attempt (*Pioneer 3*) was made on December 6. Because of a premature cutoff of the booster and angular dispersion in the upper stages, the probe met a fate similar to that of *Pioneer 1*, reaching a maximum altitude of 63,500 mi. Ground-based antenna stations set up by JPL at Cape Canaveral, Mayagüez (Puerto Rico), and Goldstone (in California's Mojave Desert) all performed well, and the unplanned reentry of the payload enabled transmission of scientific data from two traverses of the desired altitudes for the cosmic-ray experiment.<sup>62</sup>

The second Army lunar probe, *Pioneer 4*, was the only one of the five ARPA-authorized attempts to reach escape velocity. After earlier attempts to launch on February 28 and March 1, 1959, were canceled due to weather and technical problems, the Juno II vehicle lifted off on March 3. During its ascent, the probe, like its predecessor, transmitted data on the Earth's radiation belts to the Mayagüez and Goldstone stations. The probe passed too far away (37,000 mi) from the Moon, however, to activate the camera system; thus no photograph was obtained. The probe transmitted signals for about 82 hours until its batteries became exhausted. When Goldstone received the last probe signal (on March 6 during the station's fourth period of successful signal acquisition and tracking), the probe

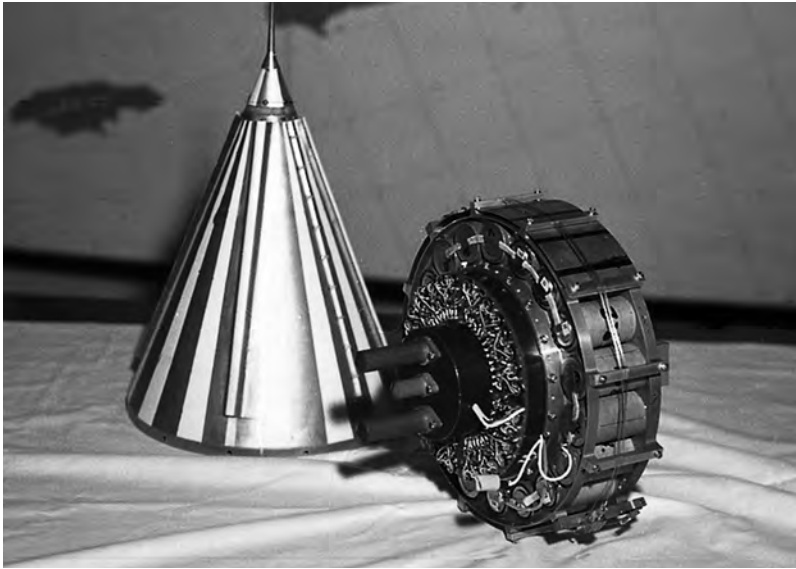
was at a distance of 407,000 mi, setting a communications-distance record for the time.<sup>63</sup>

*Pioneer 4*'s success in escaping the Earth's gravity, however, came too late in the more general space competition between the United States and the Soviet Union. The latter had already, on January 2, 1959, successfully launched *Luna 1*, which passed by the moon at the much closer distance of 5,985 km two days later.

**Conclusion**

As this study has shown, the potential scientific and political benefits that might be reaped from successful lunar probes had already been seriously discussed in the United States for nearly two years prior to the Soviet Union's orbiting of *Sputnik 1*. The shock of that event, and the desire to conduct a space mission that would be perceived as outdoing the Soviet accomplishment, was certainly a major motivation for two military-related engineering organizations, the Army's Jet Propulsion Laboratory and the Air Force contractor Space Technology Laboratories, to propose immediately the launching of probes launched toward the Moon. The same considerations also led two newly-formed government organizations, the President's Science Advisory Committee and the Department of Defense's Advanced Research Projects Agency, to recommend authorization of the probe attempts to President Eisenhower. Eisenhower, despite desiring to avoid getting the United States involved in a "space race" with the Soviet Union, appears to have eventually reluctantly approved the lunar-probe attempts in an effort to avoid a potential second "space shock" that might occur if the Soviets accomplished a successful lunar mission first.

Despite the Cold War motivations underlying the proposal, endorsement, and authorization of the Pioneer lunar-probe attempts and the failure of any of them to come anywhere near the Moon



Assemblies of Pioneer III, lunar and planetary exploration satellite and the payload for AM-11 (Juno II). Pioneer III was launched on December 6, 1959. (NASA photo.)

before a Soviet probe did so, one can nonetheless argue that they laid several foundations for the solar-system exploration program that NASA would carry out in succeeding years. Space Technology Laboratories (later renamed TRW) would subsequently construct several solar, interplanetary, and Jupiter probes (all under the Pioneer name), and the Jet Propulsion Laboratory would become NASA's principal field center for managing, and in some cases constructing, lunar and planetary probes. Also, the ground-based antenna that JPL personnel erected at Goldstone (in California's Mojave Desert) would become the cornerstone for the Deep Space Network, the worldwide system of antennas (at Goldstone, as well as in Australia, Spain, and formerly in South Africa) that have tracked, communicated with, and commanded NASA's solar-system space probes since the early 1960s. ■

## NOTES

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37. The entire document is reprinted in Killian, *Sputnik, Scientists, and Eisenhower* (ref. 35), pp. 288-99. The quotation is from p. 289.
38. Herbert F. York, *Making Weapons, Talking Peace: A Physicist's Odyssey from Hiroshima to Geneva* (New York: Basic Books, 1987), pp. 112 and 146.
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42. Donovan, "Meeting with Killian Subcommittee" (ref. 39), p. 3.

43. Gates oral history interview by author, Pasadena, Calif., Dec. 12, 1990.
44. Donovan, "Meeting with Killian Subcommittee" (ref. 39) p. 7.
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56. Cargill Hall interviews with Clark and York on Nov. 1 and Dec. 17, 1971, partial transcripts in History Collection (Documents 2-2233 and 2-2235), JPL Archives.
57. Eisenhower to McElroy, Mar. 24, 1958, History Collection (Doc. 2-2363), JPL Archives; Robert A. Devine, *The Sputnik Challenge: Eisenhower's Response to the Soviet Satellite* (New York and Oxford: Oxford University Press, 1993), pp. 108-10. Within the White House, Special Assistant for International Affairs Frederick Dearborn was an advocate of lunar probes in late 1957 and early 1958. He perceived them as one of several demonstrations of technological progress that could regain the psychological initiative for the United States in the cold war against the Soviet Union. Dearborn died in February 1958, however, and it is thus unclear what role he may have played in Eisenhower's ultimate approval of lunar-probe attempts. See Rip Bulkeley, *The Sputniks Crisis and Early United States Space Policy: A Critique of the Historiography of Space* (Bloomington and Indianapolis: Indiana University Press, 1991), pp. 174-75.
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# Strategic Air Command's B-29s during the Berlin Airlift





Brian S. Gunderson



(Overleaf and above) SAC B-29s of the 28th Bombardment Group(H) from Ellsworth AFB, South Dakota, on TDY deployment to RAF Scampton during the Berlin Airlift in the summer and fall of 1948, as they fly over the British countryside. (All photos courtesy of the author.)

When the Berlin Blockade began in late June 1948, one B-29 squadron of Strategic Air Command's (SAC's) 301st Bombardment Group, based at Salina Air Force Base, Kansas, was on rotational training at Furstenfeldbruck, the German air base near Munich. As the friction intensified between the United States and Soviet Union, Lt. Gen. Curtis E. LeMay, Commander, U.S. Air Forces in Europe (USAFE) felt that the presence of more B-29s on the European continent—even though they weren't configured to carry atomic bombs—might cause the Soviets to think twice before taking any further precipitous action.

RAF station headquarters, Scampton Airfield, 1948.



In April 1948, the Soviets had stopped all trains from departing Berlin for western Germany. In response, U.S. Army Gen. Lucius D. Clay, U.S. Military Governor for Germany, informed the Soviets that Allied military aircraft would fly in and out of the city. General LeMay, desiring a greater show of strength, requested the Pentagon permit him to position B-29s either on continental Europe or in Britain. The response was positive and quick. The two squadrons of the 301st that remained at Salinas AFB were immediately put on alert and then deployed to western Germany in early July. At the same time, the 28th Bomb Group, based at Rapid City, South Dakota, and the 307th Bomb Group, based at MacDill AFB, Tampa, Florida, went on alert and ordered to deploy within 12 and 3 hours, respectively after receiving notice. The rest of SAC went on 24-hour alert. Later in the month the 28th and 307th each consisting of 30 B-29 aircraft and crews deployed to England. The 28th Group deployed to Royal Air Force Station Scampton, Lincolnshire, while the 307th Group deployed one squadron of ten planes to RAF Station Waddington, Lincolnshire, and two squadrons to RAF Station Marham, Norfolkshire. (The 307th flew to England via Kindley Airfield, Bermuda.)

The planned flight of the 28th Bomb Group from Rapid City to Scampton was 18 hours (12 daylight, 6 night). Each B-29 carried 20 airmen, including 10 crew and 10 maintenance and support personnel. Additional support personnel followed the group in C-54 transport aircraft. The 28th Group flew via Royal Canadian Air Force Airfield at Goose Bay, Labrador, where they encountered some problems in refueling. Then, once airborne, some of the B-29s encountered strong headwinds and communications problems, which resulted in several aircraft being directed to RAF Airfield, Prestwick, Scotland, delaying their arrival in Scampton by a day before flying on to their destination. The first B-29 landed at 0827 on July 17, with Col. John B. Henry, Commanding Officer on board. He was greeted by Air Vice Marshal C. E. N. Guest, Air Officer Commanding (AOC), No. 1 RAF Group. The major London newspapers gave front page coverage to the arrival of the B-29s. The *Sunday Express* headed their story: "The Forts Stream in All Day." Others said: "The Yanks are Back" and "Superfort Fleet Will Be Here Today." The RAF made certain that the deployed B-29s would not want for anything.

The three airfields selected for use by the Super Fortresses were a lot different from those used by most B-17 Fortresses and B-24 Liberators of World War II. The latter had been carved out of commandeered farmlands, with living quarters, messes, clubs, and support service buildings

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A B-29 crew from the 77th Bombardment Squadron, 28th Bombardment Group(H) during its 3-month TDY to England and RAF Scampton during the Berlin Airlift. The author is in the back row, third from right.



USAF B-29 ground crew personnel performing 100-hour inspection at RAF Scampton, 1948.

quickly constructed, mostly Nissen huts or larger variants of the same. All three RAF airfields to be used by SAC's B-29s were fully operational, constructed before World War II. (Later, 8,000-foot by 200-foot runways had been built at the host bases, permitting them to accommodate the B-29s.) Most of the buildings were built of brick, with living quarters made up of separate rooms, instead of crowded quarters, and featured heated, indoor bathrooms. The Scampton Officers and Enlisted Clubs had comfortable leather furniture in "clubby" lounges, where one could comfortably read and write letters. A large bar offered cards, darts, and

"shove-ha-penny" games to test one's skills. All in all, the atmosphere throughout the airfield was such that it fostered many new friendships between the American and British personnel.

For the first couple of weeks after the B-29s had landed in England, all three airfields—Scampton, Marham, and Waddington—were kept busy responding to a continuous stream of visiting VIPs, mostly U.S. and British. From Washington, a group headed by Senator John C. Gurney (R-S. Dak.) reflected the keen interest of the U.S. Congress in the Berlin blockade and the deployment of the B-29s in particular. On the British side, the Honorable Arthur Henderson, the United Kingdom's Air Minister, and Lord Arthur Tedder, RAF Chief, were among the first of many senior RAF officers to visit the airfields. Several USAF generals also arrived, including Lauris Norstad, Curtis LeMay, and Leon Johnson, Commander 3d Air Division (later redesignated Third Air Force and situated in the London suburbs.)

Gen. Hoyt S. Vandenberg, the USAF Chief of Staff, commended the RAF for its support, saying, "They have done a splendid job in making the USAF visitors feel right at home." General LeMay emphasized to Colonel Henry and his 28th Bomb Group that he wanted the B-29s to be flying as frequently as possible over the United Kingdom and continental Europe. He wanted the Soviets to be particularly aware of their presence nearby. On weekends during summertime and early fall, the B-29s were scheduled to perform formation flying at low altitude over major cities and beach resorts in England, Scotland, Wales, and Northern Ireland. In addition, sorties were also scheduled to fly over densely populated areas in continental Europe.

The deployment allowed the men of the 28th Bombardment Group(H) to see some of the sights in England.  
(Right) Lincoln Cathedral.  
(Below) Lincoln Castle.



Furthermore, practice bombing and gunnery training flights were scheduled for the bombing ranges in the Wash area off the coast of England. This area was also used by the RAF for practice bombing training. With such an active flying and maintenance schedule maintained week in and week out, it was not possible to give crews and support personnel three-day passes to go to London or elsewhere in England during the early weeks after the arrival of the B-29s. For those stationed in Scampton, the beautiful cathedral city of Lincoln was nearby and many 28th Bomb Group personnel were able to visit the city in the evenings, taking

World War-II “Liberty Runs” on buses and trucks into the city. The pubs and dance halls were usually full and many new friendships were made.

Security of the B-29s while on the ground at Scampton added to the overall workload, especially in the evening and during the night. Many of the parking areas for the B-29s were on the fringes of the airfield, separated from heavily trafficked roads only by low hedges or barbed wire fence. This required a USAF armed guard to be assigned to each aircraft from sundown to sunrise. The guards came out of the 28th Group’s complement. To ensure that the guards’ attention was not interrupted by persons along the roads who tried to engage them in conversation, an Operations Officer of the Day in a jeep continuously circled the airfields to ensure that the guards were paying full attention to their assignments. The OOD provided guards with hot beverages to make doubly sure they didn’t fall asleep.

In August an unexpected tragedy occurred at the 28th Group’s home base at Rapid City, South Dakota. A B-29, flying with a makeshift crew from all three of the Group’s squadrons (the 77th, 717th, and 718th) crashed on takeoff after feathering an engine almost immediately after breaking ground. All aboard perished. Because everybody knew someone on board the aircraft that crashed, it was quite a shock for the 28th Group’s personnel in England.

One problem facing most USAF airmen was transport to and from aircraft, to and from the flight operations/maintenance buildings, and to and from living quarters areas. Fortunately, a garage proprietor near the airfield had a stock of World War II second-hand bicycles, which he

Distinguished visitors were common during the deployment. (Right) Lt. Gen. LeMay, commander of U.S. Air Forces in Europe, visits RAF Scampton in August 1948.



(Below) In September, the 28th Bombardment Group(H) commander, Col. John Henry is flanked by Senator Gurney (left) and Maj. Gen Leon W. Johnson, commander 3d Air Division.



quickly expanded by canvassing the area for miles around. As soon as he got one in hand, it was sold for ten dollars. Many owners of this new form of transportation became so enamored with their bikes that they loaded them on board their aircraft when the time came to return to the States.

The 28th Bomb Group's three-month tour at Scampton came to a close in October 1948. It was ordered to return home, replaced by the 301st Bomb Group from Salina AFB, Kansas. The 301st and other B-29 units in England that replaced the 307th Bomb Group at Marham and Waddington RAF airfields returned to their home bases in the

States in January 1949, by which time the situation with the Berlin Airlift had eased.

Flight planning for the 28th Group's return journey provided somewhat more complicated than had the trip to England. First, the prevailing west to east winds across the Atlantic were so strong that the 28th was unable to fly directly to Goose Bay, Labrador. The plan called for the first leg—a 6 hour daylight flight—to be flown on October 19 to Meeks Field, Iceland. The second leg to Goose Bay began immediately after refueling was a day-night affair averaging 2 hours, 45 minutes daylight and 6 hours of night flying. The last leg, on October 20, to Rapid City was 2-1/2 hours of daylight flying and 7-1/2 hours of nighttime flight. The return trip took 24 hours and 45 minutes versus 18 hours on the flight to England in July.

*The deployment of these two bombardment groups ultimately marked the establishment of a permanent U.S. Air Force presence in England. Since their arrival in July 1948, USAF aircraft and personnel have remained in England to this day. ■*

### Suggested Readings

*To Save a City: The Berlin Airlift, 1948-1949*, by Dr. Roger G. Miller, Air Force History and Museums Program, 1998.

Patrick E. Murray, "An Initial Response to the Cold War: The Buildup of the U.S. Air Force in the United Kingdom, 1948-1956," pp. 15-24 in Roger Miller, Ed. *Seeing Off the Bear: Anglo-American Cooperation during the Cold War*. Washington, D.C., 1995.

**The Secret Plan That Would Have Prevented the Attack on Pearl Harbor.** By Alan Armstrong. Guilford, Ct.: The Lyons Press, 2006. Notes. Appendices. Bibliography. Index. Pp. xvii, 237. \$22.95. ISBN: 1-59228-913-4

There are tricks in selecting the title and cover design of a book to attract popular interest. Certain names, images, and themes function almost as an aphrodisiac, so connections are sought—however far-fetched—with events currently holding center stage. Somehow, “Preemptive Strike” sounds more like recent headlines than what might have happened in 1941.

Alan Armstrong is an experienced lawyer specializing in aviation. He has used his forensic skills to prepare a brief, bolstered by selected evidence, to support his case. In my opinion, the verdict is “Not Proven.”

The Japanese incursions into China had started with the Mukden Incident in 1931, but it wasn't until the Marco Polo Bridge in 1937 that there was full-scale warfare and the start of proposals on how Americans might help China. Not only was there the matter of friendship and sympathy, but also the hard-boiled realization that it was in our national interest to preserve the sovereignty of the Middle Kingdom. Related to this was the hope that, if the forces of Japan could be tied down on the mainland of Asia, they were less likely to be used to our detriment and that of other friendly nations elsewhere in the region. As the world war spread to Europe in 1939, the U.S. had to make a tough decision on where to place its main effort. Asia became secondary with economy of forces intended to conduct holding operations. There was a growing belief in the capability of air power, and Plan Orange was modified to provide for the retention of the Philippines as our forward base. Any B-17s that could be spared from the buildup for Europe would go there. There were other possibilities of bombers for China, but none that could realistically have arrived before the attack on Pearl Harbor to make any preemptive strike. Considering the massive size of the later air campaigns required in both Europe and the Pacific, any effort at that time would have been a pinprick.

Throughout the book, Armstrong references a “guerrilla” air force. He may have copied this from another source but shouldn't have, for it shows a misunderstanding of the irregular, indigenous nature of such forces. Equally annoying (and also a sign of the novice) is the use of the “Congressional Medal of Honor.” This is on a par with saying “shrapnel” (a very specific projectile) to describe shell fragments.

The American Volunteer Group (Flying Tigers) became operational at a time when we needed heroes. We tended to romanticize these soldiers of fortune and their accomplishments beyond their merits. There were mercenaries—in it for the bucks—though perhaps mixed with an itch for excitement. A very few may have had an interest in acquiring experience in aerial warfare as part of professional growth. They are not to be compared to the Lafayette Escadrille or the Eagle Squadrons, where the pay of the Foreign Legion or the RAF wasn't much of an inducement.

The book has useful information that is not generally known about conditions in China and the development of an air force there before our formal entrance into the Pacific War. Despite the long connections of the Manila Galleons and the Clipper Ships, there were misconceptions then which still persist; the contradiction between a civilization which existed when Europeans were living in caves and technology that halted when gunpowder was discovered.

On balance, there is enough good material to warrant reading this work; but it shouldn't convince the reader that Pearl Harbor might have been averted.

*Brig. Gen. Curtis Hooper O'Sullivan, ANG (Ret.), Salida, California*



**Roaring Thunder: The Birth of the Jet Age [A Novel].** By Walter J. Boyne. New York: Forge (Tom Doherty Associates), 2006. Pp. 303. \$24.95. ISBN: 0-765-30843-6

Walter Boyne knows something about history, particularly aviation history. That comes as no surprise since he spent most of the 1980s as the Director of the Smithsonian's National Air and Space Museum. And he is a retired Air Force colonel with over 5,000 hours in various aircraft. Then, there's the 40-plus non-fiction and nine fiction books dealing with various aspects of aviation that he's either authored or edited. But, perhaps more important than his general knowledge of aviation history's facts and figures, is his grasp of history as an interesting, exciting story to be told in both factual and fictional forms.

In *Roaring Thunder*, Boyne turns to the latter. He returns to a method that has proven very successful for him over the years: the combination of real people and experiences in a fictionalized story to relate an accurate picture of some aspect of aviation history. In this case, it's the story of the birth of jet aviation and the

infancy of the American aerospace industry. Boyne draws on the real life adventures of people such as Sir Frank Whittle and Hans von Ohain, considered co-inventors of jet propulsion, although each worked separately (Whittle in England and von Ohain in Germany). In doing so, Boyne details trials and tribulations that accompany any new advancement in aviation. As counterparts to actual aviation pioneers such as test pilot “Tex” Johnston and engineer “Kelly” Johnson, Boyne created the Shannons—Vince and his twin sons, Harry and Tom—to give readers a view of what might actually have happened from the later part of World War II to the mid-1950s.

This fictional story follows Vince Shannon, a typical American test pilot and aviation engineer, through the birth of American jet aviation by showing its relationship to the British and German inventions. Through Harry and Tom, the reader sees the use of jets in combat for the first time and the difficulties faced in developing both aircraft and pilots capable of handling the powerful new engines. We see the advent of aviation giants such as Boeing, Learjet, McDonnell, Douglas, and others as they vie to get in on the ground floor of this new and exciting advance in aviation technology. Most importantly, the story is told through the personalities of the people, both real and imagined. Readers will empathize with the challenges, concerns and fears of the characters.

Boyne, however, leaves the reader wanting more at the end. He creates unanswered questions about aircraft and events referenced in the latter part of the book. Of course, this is intentional, as he plans *Roaring Thunder* as the first of a trilogy of stories on the history of the American aerospace industry. But there's one other significant aspect of *Roaring Thunder* that bears pointing out. While the story was clearly written with adult readers in mind (the Shannons face numerous challenges such as love, treachery, broken marriages, and the like), Boyne has kept it at a level both acceptable and interesting for young people, particularly teenagers who are at that point of making decisions about their future. It has intrigue, suspense, and adventure woven together in an exciting story of interest to aviation enthusiasts of all ages.

*CMSgt. Robert J. Davis, USAF (Ret), Owner of Bob Davis Editing, Live Oak, Texas.*



### **Chopper: Firsthand Accounts of Helicopter Warfare: World War II to Iraq.**

By Robert F. Dorr. New York: Berkley Books, 2005. Photographs. Index. Pp. vi, 328. \$24.95 ISBN: 0-425-20273-9

The latest volume from noted aviation writer Robert Dorr is the result of seventy-seven interviews the author conducted with veterans who flew helicopters in combat from World War II to the present. Consequently, the book is not a comprehensive analysis of the multitude of tasks performed by military helicopters in combat over the years, but rather the retelling of specific missions by the participants themselves in their own words. Because these interviews provide the bulk of the source material for the book, its scope is much narrower than one might expect with the bulk of the missions recounted being of the combat-rescue type.

The widespread use of helicopters in Southeast Asia is well known. Indeed, Vietnam has sometimes been called “the helicopter war” and many of those stories are told here, including the exploits of Medal of Honor recipient Michael J. Novosel, a former B-29 pilot turned Army warrant officer and UH-1 pilot. Less well known is the pioneering use of the “whirlybirds” in the same theater during World War II. Second Lieutenant Carter Harman’s account of that first-ever helicopter rescue mission is riveting, enabling the reader to know exactly what it was like to fly low and slow into a hostile combat zone with a revolutionary, yet underpowered and fragile, aircraft. More than any other type of aircraft, the helicopter has always been vulnerable to ground fire, including that from a lone rifleman. Throughout six decades of combat service, helicopter crews have time and again braved withering fire and in the face of seemingly impossible odds.

There is a big gap from 1972 (when one of the last rescue missions of the Vietnam War took place) to 1999 when we read about one of the only two search-and-rescue missions carried out over Kosovo, this one to pick up the pilot of the downed F-117 “Stealth” fighter. Readers looking for a more complete history of helicopter operations might be left wanting. Candidates to fill this void might have included firsthand accounts from crews involved in the unsuccessful Mayaguez or Iran hostage rescue operations, or the joint operation involving Air Force special ops MH-53s and Army Apaches (Task Force Normandy) to eliminate Iraqi air defense radars at the start of the 1991 Gulf War.

Interestingly, the jacket on the edition I reviewed was subtitled “A History of

American Military Helicopter Operations from WWII to the War on Terror,” which might make the book more marketable to a wider audience, but it does not describe the work as accurately as the actual title found inside the cover. Notably absent is a table of contents to help the reader navigate the twenty chapters. The book is lavishly illustrated, with nearly one hundred photographs, many from personal collections of the participants and never before published. The page layout is a bit unconventional, as the majority of the photos are roughly the size of a business card; and ninety percent of them are placed in the upper left hand corner of the page. Nevertheless, this book is a testimonial to the courage and dedication of helicopter crews past and present and is a valuable reference work for historians and general interest readers alike.

*Maj. Anthony E. Wessel, USAF, Commandant of Cadets, AFROTC Detachment 670.*



### **American Women and Flight since 1940.**

By Deborah G. Douglas with Amy E. Foster, Alan D. Meyer, and Lucy B. Young. Lexington: The University Press of Kentucky, 2004. Tables. Illustrations. Photographs. Notes. Appendix. Bibliography. Index. Pp. xi, 359. \$29.95 Paperback. ISBN: 0-8131-9073-8

This book is a second installment on the subject by Deborah Douglas, having written a monograph for the Smithsonian Institution in 1991 entitled *United States Women in Aviation, 1940-1985*. Douglas is currently the curator of science and technology at the MIT Museum. Prior to joining the museum, she was a Smithsonian Institution Predoctoral Fellow at the National Air and Space Museum, and served as the Visiting Historian for the NASA Langley Research Center in Hampton, Virginia, and as adjunct assistant professor of history at Old Dominion University in Norfolk.

In the book, Douglas takes the reader from World War II to May 2003, chronicling the contributions American women have made to aviation. These include not only women pilots and flight crews, but also flight attendants and women who worked in airplane factories and military aviation support roles during the war. In her introduction, she starts with recovery operations at the World Trade Center on September 15, 2001. A woman named Cindy Wilson is one of the helicopter pilots ferrying New York Port Authority rescue workers. These workers hardly

noticed their pilot was a woman, nor did they express any concern. Douglas uses this story to illustrate how far the American people have come in accepting women in aviation. But then she asks, while we have accepted women in aviation, why do we keep forgetting who these pioneering women were?

In chronological fashion, Douglas tells the story of our American grandmothers, mothers, aunts, cousins, sisters and daughters in aviation. By researching and documenting what has happened, she ensures that future generations will be able to read, understand, and remember some remarkable American women. These include Jackie Cochran and Nancy Love—two women who contributed to the World War II effort by advocating and forming a group of women pilots to help take over “less hazardous” flying duties, freeing men to fly combat missions. Olive Ann Beech and Betty Gillies were two women who were in white-collar occupations of management or engineering after the war. And, of course, there are the women who accomplished historical “firsts,” some of whom include Ann Shaw Carter, Marian Olmsted, Geraldine Cobb, Geraldine Mock, Jeanna Yeager, and Eileen Collins. This is only a short list of the women who contributed. There are also hundreds of nameless and faceless women who reported to jobs in the aviation industry as engineers, skilled labor, flight attendants, and air traffic controllers. Douglas rounds out her historical chronology with a chapter devoted to what the state of women in aviation is today.

This is the most complete book I’ve read about the history of American women in aviation. It does not cover any one event or any one person in depth—that would have made the book very long. But it is a great reference document if someone wishes to do more research on any of the events or women mentioned. The book is very well end-noted, and the bibliography is quite extensive. Finally, for those interested in statistics, there are some very nicely documented tables in the appendices.

*Lt. Col. Cynthia L. A. Norman, USAF (Ret.), Docent, Smithsonian Institution’s Udvar-Hazy Center, Dulles, Virginia.*



**Looking Backward, Looking Forward: Forty Years of U.S. Human Spaceflight Symposium.** Edited by Stephen J. Garber. Washington, D.C.: NASA History Office, 2002 [NASA History Series SP 2002-4107]. Illustra-

tions. Photographs. Notes. Pp. vi, 247. \$17.00 Paperback ISBN: 0-16-067595-2

In honor of the 40th anniversary of America's first space flight and the 20th anniversary of the Space Shuttle's first flight, the NASA History Office, headed by Stephen Garber, combined efforts with NASA's Office of Policy and Plans, and the George Washington University Space Policy Institute to present a one-day symposium on May 8, 2001 on the history, policy, and future of America's human space-flight program. This book contains the transcripts of the presentations made by NASA Administrator Dan Goldin; author Charles Murray; Apollo astronaut "Buzz" Aldrin; several Shuttle astronauts; historian and policy analyst, John Logsdon; astrophysicist Neil de Grasse Tyson; Mars mission advocate, Robert Zubrin; and others as they interpret the implications of space history, assess current efforts, and speculate on our future.

Administrator Dan Goldin leads off with reminiscences about Alan Shepard's 15-minute sub-orbital flight conducted in full view of the public with all of the attendant risk of a spectacular and deadly failure. Goldin's confidence that we would soon break out and return to further human exploration was put into motion less than three years later with President Bush's initiation of the Vision for Space Exploration in December 2004. Charles Murray, author of *Apollo: The Race to the Moon* (1989), characterizes the race to the moon as "not really a race against the Russians; it was a race to see if we could get to the Moon before NASA became a bureaucracy, and we won." His advice on how to get to Mars is to repeat the conditions for Apollo.

William Sims Bainbridge takes a longer perspective, viewing the space program in a social context. A few visionaries (Tsiolkovsky, Goddard, and Oberth) create the ideology followed by small volunteer groups fomenting a radical social movement—space exploration. The military development phase gained the support of governments and culminated in establishing government military and civilian space agencies. John Logsdon explores some fascinating alternate paths that would have required very little change and might have resulted in very different results. The Mercury Redstone 2 flight on January 31, 1961 overflew its target. This was blamed on a malfunctioning valve. The subsequent re-flight allowed Russia to launch Yuri Gagarin ahead of Alan Shepard. A working valve or less testing would have allowed Shepard to fly first, which might have eliminated President Kennedy's need to accelerate the space race.

Several authors offer insights into how they became astronauts. Dr. Buzz Aldrin promotes space commercialization including tourism, proposing to auction off spare seats on Shuttle flights to generate revenue that would be used to underwrite the cost of developing reusable launch vehicles. Bob Crippen, copilot on the first Shuttle launch, reflects on the evolution of the astronaut corps. Dr. Charles Walker designed electrophoresis experiments that led to his becoming the first industry astronaut when he flew Shuttle and Shuttle/Spacelab missions while employed at McDonnell Douglas. Dr. Mary Ellen Weber, a physical chemist, talks about work in space using bioreactors to aid in liver research as well as studying human adaptation to space.

To stir the pot among the gathered space fans, Neil deGrasse Tyson argues that we will not "leave low Earth orbit for the next several hundred years." He categorizes the greatest human endeavors as stemming from three motivations: economics (Columbus and Magellan), ego gratification (Pyramids, Taj Mahal), or national defense (Great Wall of China, Manhattan Project). His thesis is that "When one of these three drivers is in effect, cost doesn't matter." He applies this to our future in space concluding that economic and political cycles will prevent us from continuing our exploration unless it satisfies one of these three criteria.

Homer Hickam, author of *Rocket Boys: A Memoir*, provides the most inspiring call to arms by examining how deeply the space program affected him as a boy. Extending this to America, he invokes the spirit of manifest destiny to justify the need for continued exploration. He offers two reasons why we need to go out there: (1) sources of cheap, clean energy, and (2) "because we need a purpose for ourselves and our country."

Laurie Zoloff, Professor of Ethics, San Francisco State University, attempts to answer two fundamental questions: (1) Is it ethical to travel in space? And (2) if so, what ethical challenges will we face out there? The first question seems unnecessary when the answer is so obviously "Yes," while the answer to (2) is "What ethical challenges?" Yet this is the most thought provoking piece as it forces you to question what you may have taken for granted. For those interested in trying to understand and explain "Why go?" this essay alone is worth the book's cost.

Astronaut William Sheperd, commander of Expedition 1 on the International Space Station, wraps up the seminar by examining parallels between the ISS and a future Mars expedition. He concludes that this hypothetical project will:

(1) be international; (2) require sending big, heavy spacecraft requiring big launch vehicles; (3) need more speed and power; (4) need to be highly autonomous; (5) need more advanced, closed-loop environmental support systems; and (6) need much greater standardization of terminology, systems, and interfaces to reduce the cost and complexity of international missions.

This book spends far more time looking forward than looking backward, which has more to do with the participants and subject than any failing by historian Garber. For the historian, it offers occasional anecdotes about the careers of astronauts and glimpses into development of the Apollo and Shuttle programs but comes up short as a retrospective of 40 years of space development. For the futurian, the book is more satisfying and offers inspiration and insights into how, where, and when that will shape our exploration in the next several decades.

*Jim Schier, Docent, NASM's Udvar-Hazy Center, Dulles, Virginia.*



**P-47 Pilots: The Fighter-Bomber Boys.** By Tom Glenn. Osceola, Wisc.: MBI Publishing Company, 1998. Photographs. Index. Pp. 157. \$19.95 Paperback ISBN 0-7603-0548-X

An often downplayed aspect of the air war over Europe is the role played by the tactical air forces. Supporting the allied ground forces, the American Ninth Air Force and the British Second Tactical Air Force often proved to be the slim margin between victory and defeat. Nevertheless, their valuable contributions to victory have often been less heralded than those of their contemporaries in the heavy bombers.

Glenn's book provides a valuable and much needed account of the important role played by tactical air forces. He speaks with the indelible authority of one who has been in the middle of events he boldly describes. Vividly capturing for his reader the true essence of what it was like to have fought—often at tree-top level—over the battlefields of Europe during World War II, the importance of this work quickly comes into focus. It provides the historical record with a primary account of the combat conditions and experiences encountered by the tactical air forces during the allied operations in Europe in the waning days of the war.

Beginning his narrative with a brief introduction on aerial combat and the use of aircraft in modern warfare, Glenn is

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quick to point out the possible fate of those engaged in this deadly occupation: "The superb became aces; the fair to mediocre—statistics; the lucky ones survived..." For background necessary for a reader's understanding, Glenn pauses briefly to provide a glimpse into the rigorous training requirements for becoming a fighter-bomber pilot, and describes the remarkable aircraft he flew, the stalwart P-47 Thunderbolt. Completing this short digression is a look at the combat organization of tactical air forces units. Then it's off to a no-holds barred recounting of personal battlefield experiences filled with all the excitement, travails, and bitterly brutal disappointments which made up the daily life of fighter-bomber pilots. In sum, they existed merely to survive mortal combat and to help out their brothers-in-arms on the ground. The storyline reads at a break-neck pace that must have been much akin to that of the allied advance across the German-occupied continent.

Another equally important insight the book provides is that of the psychological make-up of the typical fighter-bomber pilot. Glenn eloquently points out why they often risked all against seemingly insuperable odds and flew on highly dangerous combat missions. On one particular mission, the briefing officer stated, "Gentlemen, those long range guns are raising hell with our troops. They can cut a company of infantry to pieces in short order, and that's just what they're doing; casualties have been heavy. I can't stress enough the importance of knocking them out. You've got a lot of guys down there depending on you." After that, Glenn said there was no uneasiness among the squadron pilots about going into combat. They all got up and simply went out and flew the mission.

But death was never far away, and the pilots came up with various ways of coping with the stress of combat flying. "You're not going to get me. I'm going to make it home." Glenn himself was shot down on his very first mission but managed to make it back to England. "This presented somewhat of a problem to us on our theory of invincibility. But because I survived, we altered our thinking slightly and agreed that they could, with a lucky shot, shoot us down but never kill us: we were still invincible." But losses did happen, and close comrades often failed to return from missions. Deep down, they knew they were not invincible.

If Glenn wrote *P-47 Pilots* merely to fill a void in the historical record, this work also serves as a fitting tribute to not only his squadron mates, but to all those American pilots who fought and died during World War II. Facing insurmountable

odds, they rose to the occasion and proved themselves worthy of the cause for which they fought. This is their story.

*LCDR Phil Webb, USN, USS San Antonio, Norfolk, Virginia.*



**Bomber Offensive.** By Arthur Harris. Barnsley, South Yorkshire, UK: Pen and Sword, 2005 [originally 1947]. Maps. Tables. Diagrams. Illustrations. Photographs. Index. Pp. 288. \$15.00 Paperback ISBN: 1-84415-210-3

This is the recently republished World War II memoir of Sir Arthur "Bomber" Harris, the controversial commander of the Royal Air Force's Bomber Command. The controversy over Bomber Command's area attacks against German cities continues to the present day. A great number of works have been written about the bomber offensive, all of which inevitably discuss Harris' leadership. But here the reader gets Harris' personal views and recollections. It is not an autobiography, and the author does not give many details of his life and career before 1939. Nor is it a retelling of the Allied or Combined Bombing Offensive. Sir Arthur writes about what he knows best: his own Bomber Command. The efforts of the USAAF Eighth Air Force are mentioned only in passing.

The RAF abandoned daylight bombing missions in favor of night attacks because of heavy losses in the face of effective German air defenses. Coupled with largely ineffective navigation and targeting aids, the result was widespread destruction and loss of life among the German civilian population—bombs frequently hit far from their intended military targets. In the immediate postwar years, several British newspapers leveled charges of deliberate mass murder against Harris. He states unequivocally throughout that the decision to target enemy cities and German morale was made by the Air Staff and Air Ministry prior to his taking the reins at Bomber Command. More recent histories, such as *The Bomber War* by Robin Neillands, tend to support the Harris's assertion. Harris also makes it clear that existing technology made it impossible to conduct true precision bombing strikes—by day or night—until the fall of 1944.

Even so, Harris believes the resources available to him in 1942 still could have been decisive. He points to the "Thousand Plane" raid that devastated Hamburg as proof of what could have

been accomplished if he had been given the planned 4,000-bomber force, though he again points out the 4,000 figure was arrived at by others who preceded him in command. Harris believes this great force could have been formed had resources not been diverted to other theaters and other missions, such as long-range U-boat patrols. He further asserts his command should have received priority, since it was the only one taking the fight to Germany. While allied bombing undoubtedly prevented vast numbers of German soldiers and heavy guns from reaching the front lines and eventually deprived the *Wehrmacht* of its air cover, it is unlikely Hitler would have succumbed to air attack alone as long as his army remained in the field.

Somewhat surprisingly, Harris admits the wisdom in using of the heavy bombers as part of the Transportation Plan in preparation for the Normandy invasion, and he considers the time spent under Eisenhower as Supreme Commander as some of his most productive. Unfortunately, he gives almost complete credit to his own command for the success of the air campaign, completing ignoring the contributions of the tactical air forces. In his book *Overlord*, Thomas Hughes argues that although the "heavies" destroyed all the marshalling yards, these were quickly repaired; whereas railroad bridges downed by allied fighters took much longer to rebuild. Coupled with strafing attacks, these had a far greater impact on mobility of German formations.

Much of the information Harris knew was still classified "secret" in 1947 and, thus, could not be used to support his case. Additionally, much of what we know now about German operations and equipment was similarly unavailable at the time of writing. At one point Sir Arthur refers to attacks on the undersides of his bombers by "vertically climbing" interceptors. We now know these attacks were actually carried out by *Luftwaffe* night fighters flying straight and level, but equipped with obliquely mounted cannon known as *schräge Musik*. Similarly, he describes the use of the *schnorkel* by German U-boats, but he does not mention it by its now well-known name.

The narrative flows smoothly and is even entertaining at times. Harris provides a number of anecdotes, most of which are aimed at the bureaucratic inefficiencies of the British Civil Service and various unnamed entrepreneurs. The lack of any illustrations whatsoever is unfortunate. Maps would have been especially useful. Even so, this work is a must-read for anyone studying Bomber Command's air campaign over Nazi Europe, as it pro-



vides useful insight into the mind of the man behind the missions.

*Maj. Anthony E. Wessel, USAF, Commandant of Cadets, AFROT Detachment 670*



### **Globemaster III: Acquiring the C-17.**

By Betty R. Kennedy. Scott AFB, Ill.: Air Mobility Command Office of History, 2004. Tables. Photographs. Notes. Appendices. Glossary. Index. Pp. xv, 298.

Betty Kennedy has done a superb job of capturing the tortuous history of the birth and fielding of what is possibly the greatest airlifter ever made. In doing so, she has produced a book that should be read by everyone involved in weapon-system acquisition, requirements generation, and resourcing—and this includes generals, officers, civilians, Hill staffers and members, testers, and industry.

My enthusiasm for the book may be biased by the fact that I was the KC-10 manager on the Air Staff during one of the roughest times for the C-17—during fiscal year 1983, when the KC-10, Boeing 747, C-5, C-130, and C-17 were all players in the morass of sorting out the nation's mobility requirements and how best to meet them. But this is only one brief period of the nearly two decades it took to bring the C-17 into service.

The story really starts in the early 1970s when the Army and Air Force were starting to look at better ways to get materiel—some of it really big—onto the battlefield. The Advanced Medium Short-Takeoff-and-Landing Transport (AMST) technology demonstrators (Boeing's YC-14 and McDonnell Douglas' YC-15) never made it to production, but they provided a lot of the technology that drove the later C-X program. Kennedy covers AMST in adequate detail and, most importantly, shows how the requirements process (especially where the Army and Air Force were involved) never could quite come up with a definitive need. This plagued the development of a new mobility asset throughout the C-17's design life. For those who have been in the business, this is not really news. But I don't think most people realize how difficult it is to settle on exactly what is needed to carry out the nation's defense. There are differences of opinion professionally inter- and intra-Service; there are the tugs and pulls of the political process as Congressional "sponsors" of whatever company's product resides in one's district or state push what is the "obvious" solution to the "needs" of the warfighter; and there are the realities of what technology is really going to let the system produce.

And that's just the requirements part. Add to that well-intentioned plans that don't work out or sometimes just plain stupidity and mismanagement by both the Government and industry. Then there are over-expectations and under-achievements, the fact that the defense budget is not a bottomless well (as many believe it to be), palace intrigue in and around the Pentagon and Congress, and the reality that other items may become much more important than your program at the most inopportune times, and you end up with a pretty wild ride that can last for decades.

That is story of the C-17, and Betty Kennedy has captured and presented it very well. She used a wide variety of original and secondary sources and documented all of this in her extensive notes. Her appendices are all germane since they cover funding, schedule, deliveries, and specifications. The all-color photo collection covers the AMST program and the C-17's production, testing, and operational phases. And the glossary takes care of the interminable acronyms involved in any acquisition program.

Even though most readers will be aware that we finally got the C-17 and that it does, and will continue to do, marvelous things; this story leaves you wondering if this airplane is really going to ever show up in the U.S. arsenal. Excellent history.

*Col. Scott A. Willey, USAF (Ret.), NASM Docent and Volunteer.*



### **Testing the Limits: Aviation Medicine and the Origins of Manned Space Flight.**

By Maura Phillips Mackowski. College Station: Texas A&M Press, 2006. Photographs. Notes. Bibliography. Index. Pp. xii, 289. \$49.95 ISBN: 1-58544-439-1

Airplanes and rockets developed from technologically lateral roots, somewhat entwined in recent history by the desire to go faster and higher. Aviation medicine, on the other hand, became space medicine's taproot. Maura Phillips Mackowski introduces *Testing the Limits* by tracing the evolutionary growth of space medicine from the recognition of aviation medicine as a professional specialty, through the establishment of dedicated organizations and research facilities, to the emergence of specific areas of study—physiological, psychological, and human factors (pilot-machine interface—that culminated in human spaceflight). After 1945, two well-springs of aviation medicine, one American and another German, combined to

foster and, subsequently, to nurture the discipline of space medicine.

In Part I, Mackowski explains how aviation medicine developed as a profession in the United States and Germany from the 1920s through World War II. She focuses on the careers and contributions of American Harry Armstrong, the Air Corps physician who first directed the Aeromedical Research Laboratory at Wright Field, and of German Hubertus Strughold, the *Luftwaffe* doctor who headed the newly formed LMFI, or Aviation Medicine Research Institute, in Berlin. Wartime marked a watershed in aviation medicine by compelling the technical and organizational transformation of research by the U.S. Army Air Forces that devoted substantial resources to understanding the effects of rapid acceleration or deceleration, oxygen deprivation, and extreme temperatures on pilots. Similarly, German physicians tested human performance, including bailouts, at altitudes above 35,000 feet and studied reactions to extreme cold, speeds over 500 mph, and forces up to 20 Gs. Mackowski offers a simultaneously enlightening and discomfiting analysis of how some Nazi aeromedical research—the Dachau concentration camp experiments—went beyond all ethical or scientific boundaries.

She begins Part II with the postwar transfer of Strughold and other former Nazi aeromedical specialists to the United States under Project Paperclip and concludes with the USAF relinquishing leadership in space medicine to NASA in the early 1960s. Culling information from an impressive variety of primary and secondary sources, Mackowski artfully weaves the details into a captivating narrative of how Armstrong, before leaving the School of Aviation Medicine at Randolph AFB in 1949, created the Department of Space Medicine under Strughold's leadership. From there, she recounts how John Paul Stapp, Don Flickinger, Otis Benson, Randy Lovelace, and others with USAF connections strove to acquire the knowledge needed to ensure military astronauts could survive spaceflight. As Margaret Weitekamp explained at greater length in *Right Stuff, Wrong Sex* (2004), however, neither the USAF nor NASA looked favorably on the possibility of women astronauts. Finally, retirement of the most vocal space-minded USAF doctors and assignment of human spaceflight to NASA sparked fragmentation of the USAF space medicine program.

Although *Testing the Limits* is a brilliant piece of scholarship, Mackowski probably would be the first to acknowledge that it fails to explore adequately the

history of Soviet space medicine. She also might confess that it gives scant attention to Naval Research Laboratory contributions to aviation and space medicine. Despite these exclusions, Mackowski's book belongs in every space historian's library next to such volumes as Mae Mills Link, *Space Medicine in Project Mercury* (1965); Loyd S. Swenson, Jr., James M. Grimwood, and Charles C. Alexander, *This New Ocean* (1966); and Craig Ryan, *The Pre-Astronauts* (1995). Seldom does one find in scholarly literature a book as easy and enjoyable to read as *Testing the Limits*.

Dr. Rick W. Sturdevant, Deputy Command Historian, HQ Air Force Space Command, Peterson AFB, Colorado.



**The Future of War: Organizations as Weapons.** By Mark D. Mandeles. Washington, D.C.: Potomac Books, 2005. Acronyms. Notes. Index. Pp. ix, 212. \$48.00. ISBN: 1-57488-630-4

Despite laudatory jacket comments, this book falls short in one major aspect: it fails to draw on—or consider—any resources dealing with military affairs in the twenty-first century. Mandeles, a former professor, national security expert, and current head of The J. de Bloch defense consulting firm, undoubtedly possesses the credibility and expertise to write a book about the future of warfare. Significantly, then, one can only speculate that this might be related to a problem with the publisher. Since the author used no sources published after 2000, I have to assume it took over four years to get the book off the press. Based on the idea that this book was written using the timeliest sources available to serve as advice for those in leadership positions, it has somewhat lower utility than if the author had had an opportunity to consider major post-9/11 military events. Without consideration of the impact of 9/11 or the Global War on Terror (GWOT), the analysis of the supposed Revolution in Military Affairs (RMA) proves somewhat hollow.

The so-called RMA plays centrally into the author's main theme of the influence of organization upon military operations. Criticizing Operation Allied Force and the Gulf War, Mandeles sees organizational problems in both conflicts. Maintaining that Command, Control, Communication, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) considerations will become a primary consideration for future conflicts, the author's assertion is that military organization(s)

will have to adapt in fundamental ways to seize the advantages offered by technological superiority. It is not so much the case that technology can provide military superiority (although it is certainly a major consideration): it is the optimum utilization of technology that can provide military superiority. Optimum utilization can occur only through optimum organization. The author draws on a variety of sources to demonstrate how important organization is to military operations.

Showing how an RMA usually cannot be identified until after the fact, the author turns this idea on its head by drawing on an early twentieth century French writer, Jean de Bloch. Although de Bloch never used the words "Revolution in Military Affairs," Mandeles maintains that this surely must have been what he meant through his various predictions about the future of military events (i.e., predictions of events that bore a striking resemblance to the pending World War One). Mandeles maintains that current events reflect an RMA. Without the sense to adapt organization to best seize the advantages through C4ISR, or how to apply these various advantages for different types of conflicts, the comparative advantage enjoyed by the U.S. at the turn of the twentieth century could decrease significantly.

Overall, this book proved to be an interesting read. Five years ago, it would have emerged at the perfect time given the sources the author used. Even without consideration of the very important last five years, the book still offers pertinent, useful advice for the directions that senior leadership should look at for different paradigms for future military organization.

David J. Schepp, Historian, 28th Bomb Wing, Ellsworth AFB, South Dakota



**Military Aircraft, Origins to 1918: An Illustrated History of their Impact.** By Justin D. Murphy. Santa Barbara, Calif.: ABC-CLIO, 2005. Maps. Tables. Diagrams. Illustrations. Photographs. Notes. Appendices. Glossary. Bibliography. Index. Pp. xiii, 319. \$85.00 ISBN: 1-85109-488-1

Dr. Justin D Murphy is professor of history at Howard Payne University in Brownwood, Texas, where he is also Director of the Douglas MacArthur Academy of Freedom Honors Program. He served as associate editor of *The European Powers in the First World War: An Encyclopedia*, and his articles and book reviews have been published in various scholarly journals and encyclopedias.

At first glance, one might expect this book to be an aircraft "catalog," with each aircraft type portrayed with a photo and a collection of facts and figures. Well, this is provided, but it makes up only the last third of the book. The first two-thirds is a concise yet readable history, not only of military aviation, but also of the origins of flight.

In Chapter One, Murphy unfolds the early history of balloons before setting the stage for powered, controlled flight. He reminds us that three major steps had to be completed before successful heavier-than-air flight: (1) an understanding of the aerodynamics and development of instruments, (2) efficient propulsion, and (3) an understanding of the basic mechanics of flight. In discussing key figures from the quest for flight, he points out that Hiram Maxim was most concerned with propulsion, while Otto Lilienthal and the brothers Wright focused first on the mechanics of flight. Murphy also reminds us that Octave Chanute was a correspondent of Orville and Wilbur Wright and encouraged their efforts.

Chapter Two gives an overview of military aviation during the 1914-1918 war, while the next chapters focus on different general types of aircraft: reconnaissance and auxiliary aircraft, fighter and attack aircraft, bomber aircraft, and naval aircraft.

The reader next gets one-page summaries of aircraft by country and aircraft by primary role, followed by the individual aircraft photos with descriptions.

This is a very useful book, both for understanding the early efforts at flight and also for gleaning information on specific early military aircraft. One unfortunate error is the repeated description of the 37 mm Hotchkiss cannon as .37 mm. This small glitch may have been introduced by a well-intended publisher—I'm sure Dr. Murphy knows better—but it's a shame it wasn't caught during the editing process.

Scott D. Murdock, Historian



**With the Possum and the Eagle: The Memoir of a Navigator's War over Germany and Japan.** By Ralph H. Nutter. Denton: University of North Texas Press, 2005. Map. Diagram. Photographs. Notes. Appendices. Glossary. Bibliography. Index. Pp. xiv, 327. \$29.95 Paperback ISBN: 1-57441-198-5

Although World War II ended more than sixty years ago, the debate over the efficacy and morality of the Anglo-

American strategic bombing campaign continues unabated. RAF's Bomber Command, flying at night and with limited accuracy, practiced "area bombing," targeting broad German urban areas rather than a specific industrial or military site. Heavy civilian casualties inevitably resulted. In contrast, the American Eighth Air Force arrived in England with a different theory of bombing. Flying by daylight and believing that they could hit specific targets with pin-point accuracy, the Americans argued that they could defeat Germany without the unsettling moral issue of heavy civilian casualties.

Nutter's book provides an absorbing personal memoir, while presenting a fascinating insider's picture of Army Air Forces(AAF) personalities, policies, and politics. A Harvard law student on December 7, 1941, Nutter enlisted in the AAF the next day, emerging from training as a navigator. In June 1942, he reported to the 305th Bomb Group at Muroc, California. Four months later he was in a B-17 flying to England. Harvard Law School was far behind.

Nutter's flight to England was not without excitement. His plane ran into bad weather and lost two engines. Jettisoning all extraneous weight, the crew arrived in Scotland long overdue. The flight was a hint of what awaited this 22-year-old navigator. When he left England in October 1943, he was one of two survivors of the original group of over four hundred crewmen who had arrived just one year before.

The 305th's commander was Colonel Curtis E. LeMay. The group was part of the 1st Bomb Wing, commanded by Brig. Gen. Haywood S. Hansell. Soon appointed as LeMay's lead navigator, Nutter found himself a close observer of two of the most controversial and important Air Force officers of World War II.

Hansell, known universally by his nickname "Possum," had been a co-author of the 1941 Air War Plan for the defeat of Germany. Earlier he had taught at the Air Tactical School at Maxwell Field where the doctrine of daylight precision bombing had been developed and preached. The younger LeMay had been one of his students.

The son of an army surgeon, Hansell displayed many of the qualities associated with the Old South. Gracious, warm, and soft-spoken, he was always a gentleman. In the AAF, he held the reputation as a planner and intellectual. Although liking Hansell on a personal level, Nutter found him, as a combat commander, to be ill at ease when dealing with nuts-and-bolts operational questions and incapable of giving direct answers to difficult questions. Most of all, Hansell was absolutely

inflexible in his determination that strategic bombing must be carried out in daylight with high accuracy: there were no conditions where bombing civilians was morally acceptable.

LeMay came from a hardscrabble youth and displayed none of the social graces of Hansell. Taciturn and direct, he earned the nickname "Eagle." He used words like bullets: they were to be fired directly at the target and not to be wasted. He was disciplined and efficient and demanded the same from his crews. As Nutter accurately observed, LeMay was "all substance and no form." The result was that LeMay's crews consistently suffered fewer losses while placing more bombs on the target. LeMay displayed the willingness of an engineer to face and fix problems. As strong German air defenses, bad European weather, and American bombing inaccuracy became the realities of 1943, LeMay considered various adjustments; but Hansell, ever the theorist, would not.

Ultimately, Hansell was sent to the Pacific to command the fledgling XXI Bomber Command and its new B-29s. Nutter joined him as his command navigator. As he had earlier in Europe, Hansell found that the theory of daylight bombing did not always fit reality. The wind and cloud conditions over Japan were even worse than over Germany, and the B-29 was haunted by engine and pressurization problems. Together, these realities made high-altitude bombing problematic and pin-point accuracy almost impossible. Yet, Hansell refused to consider other possibilities, such as bombing by radar or low-level night raids. Enemy civilians must not be bombed.

By January 1945, General "Hap" Arnold, AAF commander, believed that the B-29 strategic bombing effort hovered on the verge of collapse. In turn, its failure might spell the doom of an independent strategic bombing force and a future separate air force. Arnold fired Hansell and brought in LeMay. The student had now replaced the teacher.

LeMay quickly instituted changes. Well remembered are his low-level nighttime fire raids on Tokyo and other Japanese cities. Less well remembered but of great importance are his naval mine-laying missions to choke off Japanese shipping. And Hansell? The "Possum" was left with the consolation that he had stood firm in his refusal to carry out area bombing, even at the cost of his career.

Nutter's memoir is exceptionally readable. Although he necessarily recreates conversations and scenes—some

from memory, some from documents—his words ring true. He uses no footnotes, but he does provide a chapter-by-chapter list of sources. This former law student ended his career as a California state judge, and his judicious observations and insights shed indispensable light on these turbulent issues and distinctive personalities.

*Professor Calvin L. Christman, Cedar Valley College, Lancaster, Texas*



**The Politics of Air Power: From Confrontation to Cooperation in Army Aviation Civil-Military Relations.** By Rondall R. Rice. Lincoln: University of Nebraska Press, 2004. Notes. Bibliography. Index. Pp. xxii, 283. \$49.95 ISBN: 0-8032-3906-2

Dr. Rice, an assistant professor of history at the US Air Force Academy, has produced what may be the best of the many works dealing with the often agonizing birth of the United States Air Force. The heart of his book is 180 pages long. On top of that, however, are 78 pages of notes and over 11 pages of bibliography. To say that Rice thoroughly researched his topic would be a gross understatement.

There were many players involved with the evolution of the Air Force from its beginnings with that one Wright aircraft in 1909 to its formation as a separate service in 1947. Rice concentrates on the period from the end of the Great War in 1918 up to the start of World War II. But his focus is not on the development of aircraft and aerospace technologies. Rather, he concerns himself with the politics involved in forging what would become one of the greatest forces of war in history. In many ways, that is at least as fascinating as the weapons themselves.

Inevitably, Rice had to start with Billy Mitchell. I think most scholars today would agree that Mitchell's fire-brand style probably set back his dream of an independent air arm far more than it furthered his cause. Rice is right in there with them—and rightfully so. Mitchell's actions certainly got a lot of attention and caused great, albeit temporary, furor. But in the end, the damage he caused within the Army and the problems he created for both the executive and legislative branches of government took years to repair by a number of more patient and polished officers. Hap Arnold was a disciple of Mitchell's, but he learned from the bitter experiences of the

1920s and went on to become the true architect of the Air Force.

But this isn't Mitchell's story. It is the story of Mason Patrick and James Fetchet, two Air Corps chiefs who played the game within the bounds of established relationships with senior military and civilian leaders and the Congress, but also quietly drove the process toward its logical conclusion. Unfortunately, another firebrand, Benny Foulois, stepped into the Chief's position next and nearly undid what his predecessors had achieved. Then the convoluted relationship of Frank Andrews, Oscar Westover, and Hap Arnold takes over with Arnold finally emerging to take his place in history. The story covers not only the air generals, however, but also several of the traditional Army generals. Chief among these has to be George Marshall who, as Chief of Staff, forged an alliance with Hap Arnold that eventually created the separate service.

Civilian leadership played a big role as well, with probably no greater player than the first Assistant Secretary of War for Air Trubee Davison, the man who gave the airmen a legitimate seat at the political table and allowed calmer generals to work toward their goals. Equally big in the story are Presidents Coolidge, Hoover, and Roosevelt. Each of these men put his stamp on the Air Force's formation—Roosevelt more than all because of his preparation for and leadership during the Second World War. And, of course, there were numerous senators and representatives who forged the laws, passed the budgets, and either calmed or stirred the waters depending on each man's views.

Two things stood out as I read this book. First, I found myself doing a lot of introspection from my own days on the Air Staff in the early 1980s. How did some of the activities I was engaged in with the Congress, senior leadership (both military and civilian) in the Pentagon, and industry stack up regarding "propriety" of civil-military relations? It's an interesting question since there are no clearly defined black-white, yes-no boundaries in complex bureaucratic endeavors. Second, the only real problem I had with the book is that Rice seems to be one of the leading advocates of the "tell them what you're going to tell them; tell them; then tell them what you told them" school. After about the fortieth time he told me that Mitchell had stepped over the line of proper civil-military relations, I pretty well had the idea! I thought this style detracted from the front end; in fact it irked me so much that I put the book aside for a couple of months. Rice seemed to get away from that style a bit toward the end.

Despite my personal frustration with the style, I would recommend this book to anyone who wants to gain a better understanding of the complexities of the relationships in our form of government—inter and intra-service, military-civilian, Pentagon-Congress, White House-Congress, press-military, etc. It's not easy to create an Air Force, but Rice has done a superb job of laying out the story.

*Col. Scott A. Willey, USAF (Ret), NASM Docent and Volunteer*



**Flying into Hell: The Bomber Command Offensive in World War Two as Witnessed by the Crew Themselves.** By Mel Rolfe. London: Grubb St., 2004. Photographs. Glossary. Bibliography. Index. Pp. vi, 186. \$19.95 Paperback. ISBN: 1-904010-89-X.

In one respect, *Flying into Hell* delivers a most satisfactory read, but in others, it disappoints substantially. For the good news first. The author has pulled together the stories of twenty Bomber Command aircrews, and the telling makes for high drama. Rolfe highlights most phases of British strategic air operations, illustrating, for instance, the early operational problems for crews flying the cramped and unheated Handley Page Hampden, a plane that its airmen acerbically labeled "the Flying Suitcase." Navigation during the initial war years without radio aids was entirely by dead reckoning with a magnetic compass. In later chapters, Rolfe gives the readers a feeling for the marked improvements in both airframes and equipment over the campaign which lasted for more than five years.

While Rolfe pays deserved attention to the "gear," his strongest suit lies in the portrayal of the crews themselves. Basing much of his narrative on interviews with surviving flyers, he touches on their motivation for enlistment in the Royal Air Force, on morale issues, and on the challenges of night flying. To give but one example, a Wellington gunner recalls, "More than anything I was frightened of being in a thunderstorm when you had static electricity playing around the aircraft. When it struck my four Browning machine guns it streaked to the end of the flash eliminators and surged off like flames from a gas jet.

Especially effective is Rolfe's treatment of combat with the many British losses to flak, *Luftwaffe* night-fighters, and operational mishaps. He describes the experiences of downed airmen on the run in German-occupied territory and

those less fortunate who ended up in POW camps. An especially effective aspect of the book is the photographic section in which the pictures of the key individuals are clearly organized to dovetail with the separate chapters in the text.

So this book makes for good, sometimes even exhilarating, reading. On the debit side, Rolfe provides no citations, so the value of his work as serious scholarship is compromised. Apart from a skimpy bibliography and one paragraph in the acknowledgements section, he leaves the reader guessing as to the sources for his narrative. He treats dates, and sometimes even chronology, in a cavalier fashion. For example, the action in the first section advances from 1941 to 1943 and then jumps back abruptly to 1938. Also, much RAF wartime slang is naturally unfamiliar to modern readers, but the author defines terms and acronyms such as "sprog pilot; red TIs; Wanganui flares; OUT; and LMP" only in the glossary, not in the text itself.

More serious, the author gives very little context for the experiences of these twenty aircrews. The reader deserves to see the larger picture. An introductory essay of just several pages sketching the course of the air war over Germany, the vicissitudes of Bomber Command, and the overall costs of the British strategic bombing campaign would have knitted together these fine individual aircrew portraits. Notwithstanding, *Flying into Hell* encapsulates the heroism and the costs of those British and Commonwealth airmen who burned down so much of the Third Reich.

*Prof. Malcolm Muir, Jr., Virginia Military Institute, Lexington, Virginia*



**Project Apollo: The Tough Decisions.** By Robert C. Seamans, Jr. Washington D.C.: NASA History Division, 2005 [NASA SP 2005-4537]. Maps. Tables. Photographs. Notes. Appendices. Index. Pp. xi, 159. ISBN: 0-16-074954-9

Dr. Seamans earned his BS degree in engineering at Harvard University and his MS in aeronautics and PhD in instrumentation from MIT. From 1941 to 1955 he held teaching and projects positions at MIT and in 1955 joined RCA as manager and chief systems engineer of the Airborne Systems Lab. From 1948 to 1960, he served on many National Advisory Committees for Aeronautics technical committees. During the next eight years, he was Associate Administrator of NASA. Later, Seamans became Secretary

of the Air Force, President of the National Academy of Engineering, first administrator of the Energy Research and Development Administration, and Dean of the School of Engineering at MIT.

This book is part of NASA's Monographs in Aerospace History series. Seamans' monograph describes the history of the manned space flight program from 1960 to 1968 when he was the program's general manager. In Chapter One, he talks about NASA's problems with respect to international and national politics and finding resources to fund the program. From this brief overview, he launches into the history that leads to the Apollo Program itself.

Seamans was one of the top three management officials during this period (along with Hugh Dryden and James Webb), so much of his monograph is writ-

ten in the first person singular as he is addressing his own personal experiences. Working chronologically, Seamans talks about the "Eisenhower Legacy" and how his administration created NASA and what was happening in space history at that time. The Echo balloon and TIROS (Television Infrared Observation Satellite) were in orbit at that time. He also covers problems with labor unions and experiences with the Space Exploration Council and the Wiesner As Hoc Committee on Missiles and Space.

Moving on to the Kennedy years, he discusses the President's commitment to send men to the moon and back, James E. Webb being made Director of NASA, the Soviet Union's challenge to the U.S. space program, and the response of NASA management to the challenge. He well explains why NASA was reorganized, how

it chose the launch site, and the Mercury space program.

In Chapter Four, Seamans moves on to the Johnson years and addresses technical and management issues surrounding the Gemini Program, development of the family of Saturn rocket boosters, the F-1 engine, Ed White's walk in space, the tragic Apollo fire that killed three astronauts, and Soviet space activities in the same period.

Chapter Five is devoted to NASA management and organization. How did management change the organizational structure (and create the Apollo Program structure) to best meet the needs of the entire U.S. space program? In the last two chapters, Seamans, describes the successes of Apollo and the demise of the Soviet Moon program.

This monograph is for people who are interested in the fine details of U.S. space history. Seamans includes verbatim transcripts of conversations with other NASA officials and politicians as well as letters on important issues regarding Apollo. The chapter on NASA reorganization may interest only readers who have a background in organizational development. Although a bit tedious due to the extreme detail in some areas, the book contains a wealth of information on the U.S. space program and would be an excellent addition to anyone's library who truly loves this subject.

*Bill Nardo, Docent Emeritus, National Air and Space Museum.*



**Locating Air Force Base Sites: History's Legacy.** Frederick J. Shaw, ed. Washington, D.C.: Air Force History and Museums Program, 2004. Photographs. Maps. Tables. Notes. Acronyms. Index. Pp. ix, 215. \$20.00. ISBN: 0-16-072415-5.

In *Locating Air Force Base Sites*, Frederick Shaw and his fellow historians at the Air Force's Historical Research Agency have provided researchers with a valuable tool to use when writing on the history of the United States Air Force. Shaw and his co-authors examine the Air Force during four distinct eras (1907-1947, 1947-1960, 1961-1987, and 1988-2003) and illustrate the growth of the new service and the importance placed on securing base sites that would prove adequate for military aviation. They consider many concerns involved with base selection. One such problem was converting an existing army installation into an air base in close proximity to a city.

Looking at the force expansion that



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occurred following the service's creation, the authors note the differing requirements that would eventually determine how a site was selected for a base, including following mandates that, at times, were more political than practical. Also examined were the requirements by Air Force leaders, such as General Curtis LeMay, that the nation's strategic forces be dispersed enough to ensure their survivability in the event of an attack by the Soviets.

The book's last chapter deals with the Air Force's reorganization following the collapse of the Soviet Union and the end of the Cold War. Focusing on the scale-down in personnel strength and the Base Realignment and Closure commissions of the time, the authors provide a sound look at the reasons some bases were closed and others were allowed to remain open, or why some were unaffected and other had either had a change in mission or lost assets in the form of aircraft or people.

Overall, this is a sound work that provides the reader with an excellent source for locating bases that have long been closed. Numerous maps illustrate the growing and then shrinking number of bases. Tables show the various commands to which the bases belonged as well as the timeframes of these command assignments. These tables also illustrate the weapons systems assigned to the bases and the overall force structure, including the Reserve and Guard.

*Locating Air Force Base Sites* is clearly a valuable addition to the literature of the history of the Air Force. While not always a fun book to read, the wealth of material makes it a necessity for the library of every Air Force historian. The authors have done an excellent job of assembling the material.

*MSgt. Dennis Berger, USAF, (Ret), History teacher, Lubbock, Texas.*



**G.I. Nightingales: The Army Nurse Corps in World War II.** By Barbara Brooks Tomblin. Lexington: University Press of Kentucky, 1996. Notes. Map. Bibliography. Index. Pp. viii, 254. \$26.95 Paperback ISBN: 0-8131-9071-1

The battle-scarred soldiers, seamen, and airmen of the "greatest generation" have been feted and honored and had their stories told large in recent years. This book tells the story of the nearly 60,000 nurses who comforted the wounded in their time of greatest need and fought valiantly to save their lives. The women of the Army Nurse Corps (ANC) were surrogate sisters, mothers, and con-

fessors to countless men; healers of broken bodies; and witnesses to indescribable horrors. During the war, sixteen nurses died as a direct result of enemy action. Barbara Brooks Tomblin describes the first, chaotic efforts to establish a trained cadre of nurses for the war; their deployment to all theaters of combat; and the rapid demobilization at war's end. By September 30, 1946, only 8,500 nurses remained on duty.

Tomblin used dozens of oral history interviews, personal papers, and firsthand accounts to explore in depth the nurses' experiences on the front lines and at home. A reader sees the war through the nurses' eyes and, ultimately, cannot help but get caught up in their narrative. Among the many tales, for example, Juanita Redmond recounted an incident at Corregidor, in the Philippines, in April 1942: "I wish I could forget those endless, harrowing hours. Hours of giving injections, anesthetizing, ripping off clothes, stitching gaping wounds, of amputations, sterilizing instruments, settling the treated patients in their beds, covering the wounded we could not save. I still had not grown accustomed to seeing people torn and bleeding and dying in numbers like these." Themes common to war—a loss of innocence, a small town girl seeing the world for the first time, love found and love lost—are all present and writ large in *G.I. Nightingales*.

Instead of just compiling a number of "feel good" stories, however, Tomblin goes on to discuss how the World War II experience changed long-held Nurse Corps traditions and points out the discrimination against African-Americans and males within the ANC. Tomblin also concedes that the wartime experience of the nurses did not lead to significant change, either within the military or in society at large. The ANC remained an all-volunteer institution composed almost exclusively of white women as it had been for nearly 200 years. And their service, while dedicated, professional, and, often heroic, did not bring equality between the sexes within the Army or change expectations about the place of women in the military.

Compared to the members of the Women Airforce Service Pilot (WASP) program, which allowed women to fly for the Army, the ANC program, perhaps, suffers from a lack of media celebrity. Certainly, in celebrations such as those surrounding the 50th and 60th anniversaries of the end of World War II and the dedications of the Women in Military Service for America and the World War II memorials, the women of ANC have received scant notice compared to the adoration of the WASPs. In the larger scheme, however,

female nurses remained an accepted, if small, part of the services; while it would be nearly thirty years following World War II before women would be accepted into the flying communities of our nation's armed forces.

*Dr. Bruce Ashcroft, Air Education and Training Command History Office*



**Fiasco: The American Military Adventure in Iraq.** By Thomas E. Ricks. New York: The Penguin Press, 2006. Maps. Photographs. Index. Pp. 496 ISBN: 1-59420-103-X and **Cobra II: The Inside Story of the Invasion and Occupation of Iraq.** By Michael R. Gordon and General Bernard E. Trainor. New York: Pantheon Books, 2006. Maps. Photographs. Notes. Pp. 603. \$27.95 ISBN: 0-375-42262-5

The recent Iraq Study Group report opens with, "The situation in Iraq is grave and deteriorating." These eight words succinctly highlight, at this critical juncture, the need for a more complete understanding of the how, why, and what of this bewildering and crisis-ridden conflict.

Fortunately, a number of informed authors have recently stepped up to the task of providing answers to the questions. They have produced well written, albeit highly critical, books on the decision to go to war, the consequences of that decision, the impact in Iraq, and the grim foreign policy ramifications that will burden the United States for the foreseeable future. Among these are Gordon and Trainor's *Cobra II*, Bob Woodward's *Plan of Attack* and *State of Denial*, George Packer's *The Assassins' Gate*, Peter Galbraith's *The End of Iraq*, Nir Rosen's *In the Belly of the Green Bird*, and Tom Ricks' *Fiasco*. I will look at two of them here.

Michael Gordon (chief military correspondent for the *New York Times*) and retired Marine Lt Gen Bernard Trainor address many questions in *Cobra II*: Why did the administration believe that war was the only viable option? Who in government was a proponent of war or had reservations, and for what reasons? What were the generals thinking, and did the planning fully reflect their requirements and concerns? What were the intelligence disconnects (e.g., Weapons of Mass Destruction, the estimate that Iraqi military units would capitulate and have utility during Phase IV, the post-combat phase, and the failure to anticipate that Iraqi *fedayeen* would fiercely engage invading forces)? What were the strategic

and operational concerns of Iraqi leadership, what was their assessment of opposing force objectives, and how did they intend to fight the war?

Gordon and Trainor comprehensively address these in the early and late chapters and focus in between on actual combat—not so much as combat history, but rather to illustrate the impact of misleading prewar intelligence on military planning and execution. They speak to the unfounded expectations of war hawks and contrast those with battlefield reality. *Cobra II* ends in Phase IV—the aftermath of the invasion—with Paul Bremer’s Coalition Provisional Authority (CPA) and the lost opportunities to salvage a post-war Iraq from the enveloping insurgency.

The authors dissect three separate but equally important issues: (1) the decision to go to war; (2) the strategy of war-fighting as envisioned by Rumsfeld and General Tommy Franks and encapsulated in the concept of Transformation; and (3) the nature of post-combat occupation. Transformation focused on light, lethal, and highly mobile units employing leading edge technology and emphasized taking minimum force to the fight. It was not that Rumsfeld was entirely off track. The Defense Secretary did not want to replicate the unwieldy deployment phase of Desert Shield/Storm that could have surrendered the initiative to the enemy. The success of Operation Enduring Freedom in Afghanistan appeared to validate the new thinking.

Iraq, however, was not Afghanistan. Iraq is a country possessing a highly urbanized population living in a number of fair sized cities. Once combat began, each city became a *fedayeen* stronghold that threatened the flanks of Army and Marine units and seriously interfered with lines of communication. The book states that, “the first Marine to be killed in action died at the hands of an Iraqi dressed in civilian clothes who fired from a pickup truck, not a tank.” Consequently, Rumsfeld’s emphasis on minimum force on the ground backfired. Rumsfeld tinkered with the plan’s Time-Phased Force Deployment List, eliminating forces and specialized units (e.g., military police) when they should have had boots on the ground at a critical phase of the battle. Victory on the battlefield did come relatively quickly (despite self-inflicted limitations), in most part because of the audacity of U.S. forces on the streets of Baghdad and the fatal restrictions that Saddam had placed on his Republican Guard forces. As events rapidly demonstrated, success on the conventional battlefield is irrelevant if the enemy is able to mount an effective insurgent challenge to numer-

ically inadequate occupying forces. For U.S. forces, mass, not speed, became the critical factor.

Ironically, it was the Administration’s aversion to prolonged occupation (a consequence of the Balkans experience) that actually precipitated many post-war problems. The Administration did not want to repeat the unending peacekeeping operations that have tied down U.S. forces in the Balkans. In the end, operations in the Balkans pale significantly in contrast to the occupation of Iraq.

One other question mark in this war could have been more adequately addressed. The authors mention that several general officers regretted not forcefully voicing their concerns about questionable intelligence and grossly inadequate planning. There must be very few officers not familiar with H. R. McMaster’s *Dereliction of Duty*. It indicted Vietnam-era senior government officials—especially general officers—who failed to take a firm position opposing a war that they knew was inconsistent with vital national interests, that squandered valuable resources, and likely could not be won. Where were the strong voices in the current generation of leadership when they needed to be heard? In their Foreword, the authors state, “the Iraq war was a war of choice, not necessity.” That puts everything in a proper perspective.

The exhaustive research and extensive interviews upon which this book is based, and the smoothly flowing prose laced with insightful detail ensure this work’s benchmark status.

Thomas Ricks is the *Washington Post*’s senior Pentagon correspondent. His work focuses less on the decision to go to war and initial combat and more on the war that begins after the fall of Baghdad. It does, however, share a common thesis with other books: “Bush’s decision to invade Iraq in 2003 may come to be seen as one of the most profligate actions in the history of American foreign policy. The U.S. led invasion was reckless with a flawed war plan, and a worse approach to occupation.”

Ricks is highly critical of military operations conducted during the occupation phase (the occupation having been naively anticipated as a largely benign peacekeeping operation requiring minimal forces) and of the Coalition Provisional Authority (CPA). He firmly believes that the missteps, in general, of the ground forces (especially under Lt. Gen. Sanchez’ Combined Joint Task Force-7 (CJTF-7)); the failure to establish unity of command for CJTF-7 and the CPA; the Abu Ghraib prison scandal (emblematic of widespread mishandling

of Iraqis throughout Iraq); and the gross inaptitude of the CPA under Paul Bremer have doomed the war effort to the point that the United States must now do everything to avoid catastrophe. Ricks is certain, however, that the litany of failures in Iraq begins prior to Sanchez and Bremer and can be found in the poorly structured plan of attack that General Franks used to go to war.

The author sees Iran as the chief beneficiary of the war: “the difference between Tommy Franks and Tehran was the Iranians had a good Phase IV [occupation] plan!” The occupation had actually shifted quickly into a counterinsurgency phase for which the U.S. military was ill prepared, having purposely forgotten (with the exception of Special Forces) the hard-learned lessons of the Vietnam War. Ricks emphasizes that it was a fundamental failure by senior leadership in CJTF-7 and the CPA to recognize that the insurgency was being fed by incompetent tactics that served to alienate Iraqis and turned them into insurgents. Ricks practically shouts from this book’s pages, “in counterinsurgency the Iraqi people are the prize, not the playing field.” He believes that current U.S. leadership in Iraq has belatedly figured this out, but is there enough time left, to effectively implement a winning change in strategy?

For those who have served in Iraq, this book may be a bit unsettling, because of its frequent and often harsh criticisms of operations. *Fiasco* does have its heroes including Army Lt. Gen. David Petraeus, Marine Generals Anthony Zinni (earlier commander of Central Command), and Greg Newbold (the Pentagon’s operations chief on the eve of hostilities), the Marines fighting the two battles of Fallujah, and the soldiers who are giving their all. Its villains include Paul Wolfowitz, Donald Rumsfeld, and *New York Times* reporter Judith Miller. More than a few other players, because it was their incompetence and not their good intentions that had a telling effect, fall in between.

Read these two books. In fact, read all of the books mentioned so as not to overlook valuable pieces of the puzzle.

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



# Books Received

Alling, Charles. *A Mighty Fortress: Lead Bomber over Europe*. Philadelphia: Casemate, 2002 and 2006. Maps. Illustrations. Photographs. Notes. Index. Pp. xiii, 183. \$19.95 Paperback ISBN: 1-932033-59-9

Black, Jeremy. *A Military History of Britain: From 1775 to the Present*. Westport, Ct. and London: Praeger Security International, 2006. Notes. Index. Pp. 191. \$49.95 ISBN: 0-275-99039-7

Coonts, Stephen. *Flight of the Intruder: A Novel* [Twentieth Anniversary Edition] Annapolis, Md.: Naval Institute Press, 1986. Pp. xii, 335. \$27.00 ISBN: 1-59114-127-3

Cull, Brian, with David Nicolle and Shlomo Aloni. *Wings over Suez*. London: Grubb Street, 1996. Maps. Tables. Photographs. Notes. Appendices. Bibliography. Index. Pp. xvi, 385. \$39.95 Paperback ISBN: 1-904943-55-1

Erisman, Fred. *Boys' Books, Boys' Dreams and the Mystique of Flight*. Ft. Worth: Texas Christian University Press, 2006. Photographs. Notes. Bibliography. Index. Pp. xx, 346. \$29.95 ISBN: 0-87565-330-8

Gillespie, Paul G. *Weapons of Choice: The Development of Precision Guided Munitions*. Tuscaloosa: The University of Alabama Press, 2006. Diagrams. Illustrations. Photographs. Notes. Bibliography. Index. Pp. xii, 218. \$35.00 ISBN: 0-8173-1532-2

Grotelueschen, Mark Ethan. *The AEF Way of War: The American Army and Combat in World War I*. New York: Cambridge University Press, 2007. Maps. Photographs. Notes. Bibliography. Index. Pp. x, 387. \$75.00 ISBN: 0-521-86434-8

McLucas, John L. with Alnwick, Kenneth J. and Lawrence R. Benson. *Reflections of a Technocrat: Managing Defense, Air, and Space Programs during*

*the Cold War*. Maxwell AFB, Ala.: Air University Press, 2006. Photographs. Notes. Appendices. Glossary. Bibliography. Index. Pp. xxvi, 367. Paperback

Mueller, Karl P., et al. *Striking First: Preemptive and Preventive Attack in U.S. National security Policy*. Santa Monica, Calif.: RAND Project Air Force, 2006. Maps. Photographs. Notes. Glossary. Bibliography. Index. Pp. xxxi, 311. \$30.00 Paperback ISBN: 0-8330-3881-8

Ringebach, Paul T. *Battling Tradition: Robert F. McDermott and Shaping the U.S. Air Force Academy*. Chicago, Ill.: Imprint Publications, 2006. Photographs. Notes. Bibliography. Index. Pp. xvii, 333. \$24.95 Paperback ISBN: 1-879176-42-4

Smith, Douglas V. *Carrier Battles: Command Decisions in Harm's Way*. Annapolis, Md.: Naval Institute Press, 2006. Maps. Tables. Diagrams. Illustrations. Photographs. Notes. Appendices. Glossary. Bibliography. Index. Pp. x, 346. \$32.95 ISBN: 1-59114-794-8

Schultz, Jake with Molt Taylor. *A Drive in the Clouds: The Story of the Aerocar*. New Brighton, Minn.: Flying Books International, 2006. Diagrams. Illustrations. Photographs. Pp. 122. \$21.95 Paperback ISBN: 0-9725249-2-4

Walpole, Nigel. *Best of Breed: The Hawker Hunter FR 10*. UK: Pen and Sword Aviation, 2006. Photographs. Notes. Appendices. Glossary. Bibliography. Index. Pp. xiii, 215. \$29.95 Paperback ISBN: 1-84415-412-2

Woods, Kevin M. et al. *The Iraqi Perspectives Report. Saddam's Senior Leadership on Operation Iraqi Freedom from the Official U.S. Joint Forces Command Report*. Annapolis, Md.: Naval Institute Press, 2006. Illustrations. Photographs. Notes. Appendices. Glossary. Bibliography. Index. Pp. xxi, 205. Paperback. \$15.95 Paperback ISBN: 1-59114-457-4

## PROSPECTIVE REVIEWERS

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

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

\* Already under review.



# Coming Up



Compiled by George Cully

## Mar 20

The **Military Classics Seminar** will meet at Ft. Myer, Va. Mark D. Mandeles, The J. de Bloch Group, will review Michael R. Gordon's and Bernard E. Trainor's book, *Cobra II: The Inside Story of the Invasion and Occupation of Iraq*. New York: Pantheon, 2006.

## Mar 20-21

The **American Astronautical Society** will hold its 45th annual meeting at the University of Maryland. Theme: "Sputnik to Orion" – Perspectives, Opportunities and Future Directions." For information, call: (703) 866-0020

## Mar 22

The **Air Force Historical Foundation** will hold its annual meeting in the Washington, D.C. area. For information, contact: Col. Tom Bradley, USAF (Ret.), Executive Director (301) 736-1959 or AFHF@earthlink.net

## Mar 29-Apr 1

The 100th meeting of the **Organization of American Historians** will be held in Minneapolis, Minnesota. In addition to commemorating its centenary, the OAH has dedicated the meeting to "American Values." See: <http://oah.org.meetings/2007>.

## Apr 12-17

The **National Council on Public History** will hold its annual meeting on "Many Histories. Many Places—Common Ground?" in Santa Fe, New Mexico. For additional information see: <http://www.lib.ncphborg>

## Apr 17

The **Military Classics Seminar** will meet at Ft. Myer, Va. Dina R. Khoury, George Washington University, will review two books: Wilkinson D. Bird's, *A Chapter of Misfortunes: The Battles of Ctesiphon and of Dujailah, and the British Campaign in Mesopotamia, 1915-1916*. London: F. Groom, 1923 (Reprint London: Helion, 2006) and Charles V. F. Townshend's *My Campaign in Mesopotamia*. London: Thornton Butterworth, 1920.

## Apr 19-22

The **Society for Military History** will host its 74th meeting at the Catocin Center for Regional Studies at Frederick (Maryland) Community College. The theme will be: "Crossroads of War" concerning the intersection between the military and civilian sectors of society. See: <http://catocincenter.frederick.edu>

## May 15

The **Military Classics Seminar** will meet at Ft. Myer, Va. Timothy K. Nenninger, National Archives, will review Edward M. Coffman's book, *The Regulars: The American Army, 1898-1941*. Cambridge, Mass.: Belknap Press, 2004.

## June 19

The **Military Classics Seminar** will meet at Ft. Myer, Va. Sanders Marble, Office of Medical History, U. S. Army, will review Laurence Stallings's book, *The Doughboys*. New York: Harper, 1963.

## Jun 20-24

The **Society for Historians of American Foreign Relations (SHAFR)** will hold its annual meeting in Reston, Virginia. For additional information see <http://www.shafr.org/>.

## Oct 16-17

The **Air Force Historical Foundation** will hold a seminar in the Washington, D.C. area on the theme "The Evolution of Air and Space Power: Know the Past, Prepare for the Future." See <http://afhistoricalfoundation.com>

## Oct 18-21

The **Society for the History of Technology** will hold its annual meeting in Washington, DC. See <http://www.historytechnology.org/annualmtg.html>

## Oct 24-28

The **Oral History Association** will hold its annual meeting at the Marriott Oakland City Center in Oakland, California. The theme is: "The Revolutionary Ideal: Transforming Community through Oral History." See [http://omega.dickinson.edu/organization/oha/org\\_am.html](http://omega.dickinson.edu/organization/oha/org_am.html)

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:

Air Power History  
P.O. Box 10328  
Rockville, MD 20849-0328  
E-mail: [JNeufeld@comcast.net](mailto:JNeufeld@comcast.net)



## THE PRESIDENT'S REMARKS

Last October we took a major step in revising the governance of the Air Force Historical Foundation by installing a new Board of Directors (see page 2) as called for in the bylaws approved by the membership in April 2006. I am pleased to call your attention to the fact that we have, in addition to a strong group of officers retired from the active duty force, a young major still serving (as far as I'm concerned, *anyone* still serving is *young*), retirees from both the Air Force Reserve and the Air National Guard, a retired Chief Master Sergeant (Executive Director of the Air Force Sergeants Association), and a retired civil servant (the editor of our magazine). It is a group with much to offer in experience and energy, and I am looking forward to a productive term with these partners.

The key concept featured in the new bylaws is an active Board with five standing committees: Finance, Development (fund-raising), Membership, Services, and Technology. The chairs of these committees serve on the Board, but the members of their committees do not need to be. If you are interested in helping the Foundation with some of your time and ideas, please contact Col. Tom Bradley, USAF (Ret.), our Executive Director at (301) 736-1959, or e-mail [tomb Bradley2@earthlink.net](mailto:tomb Bradley2@earthlink.net). He will provide additional information concerning the responsibilities of these committees and can put you in touch with the appropriate committee chair. Please note that you do not need to live in the Washington, D.C. area to participate, since much of our business is conducted by e-mail.





Looking ahead after a long and sometimes frustrating effort, we are on the brink of putting our website – [www.afhistoricalfoundation.org](http://www.afhistoricalfoundation.org) – to its intended use, meaning that it will provide members with the ability to join and renew, find out what is going on, register for events, buy books, and so on. (By the way, we have just published a great new coffee table book. It is a history of the United States Air Force, which all members will want to own. Its author is Lt. Col. Dik Daso, USAF (Ret.), curator at the Smithsonian’s National Air & Space Museum. If our website isn’t fully up, contact Tom Bradley.) Before too long, we will also offer articles from past issues of our magazine, *Air Power History*, as well as other useful features.

Another exciting event that we are planning is a major historical symposium entitled, “The Evolution of Air and Space Power: Know the Past, Prepare for the Future,” to be held on October 16th and 17th of this year in the Washington, D.C. area. In this endeavor, we join the U.S. Air Force in celebrating its Sixtieth Anniversary as an independent service. We expect to have several exciting presenters and distinguished speakers at two luncheons and a banquet. More details will be forthcoming soon, but in the meantime circle those dates on your calendar.

I want to acknowledge the recent receipt of a very generous contribution to the Foundation from the Lockheed Martin Corporation. These proceeds are earmarked already to carry out some of the ambitious goals we've set for ourselves. Also, thanks to all of our members who have contributed to the financial health of the Foundation, no matter the amount of their gift. Please remember, much more needs to be done and we can use everyone's help. If you have not contributed yet but would like to be a part of this adventure, kindly send your check to the aforementioned Tom Bradley at the address page 2. In advance, thanks.

**Lt. Gen. Michael A. Nelson, USAF (Ret.)**  
**President of the Air Force Historical Foundation**

# Air Force Historical Foundation

## Call for Papers

### *The Evolution of Air and Space Power: Know the Past—Shape the Future*

The Air Force Historical Foundation invites proposals for papers and presentations for its 2007 symposium to be held October 16-17, 2007 in Arlington, Virginia. The Program Committee of the AFHF welcomes proposals for presentations which may encompass leadership, technology, doctrine, planning, operations, and roles and missions within any of three general themes:

1. **War in the Shadows**, which would include special operations, rescue, CSAR, and other low-intensity operations or operations at the lower end of the spectrum of conflict.
2. **Conventional War**, which would include air superiority, counter-air operations, CAS, airlift, air-breathing ISR, etc.
3. **Space and Cyber War**, including all the military uses of space such as ISR, communications, navigation, etc.

**Proposal format:** Submit five copies of the proposal. Submit a one-page abstract and a one-page vita or résumé of the presenter. Each submission must be accompanied by a cover sheet, which can be copied from the adjoining page or printed from the AFHF Web site: <http://www.afhistoricalfoundation.org>

Proposals must be postmarked by May 1, 2007. They may be submitted by mail, fax, or email. E-mail submission must include the cover sheet in electronic form and must be one complete document in Microsoft Word format. If you do not receive e-mail confirmation by May 15, please contact the AFHF office.

Submit proposal directly to the AFHF office at the address below.

Air Force Historical Foundation  
1535 Command Drive, Suite A-122  
Andrews AFB MD 20762-7002

Phone (301) 736-1959  
Fax (301) 981-3574  
E-mail: [afhf@earthlink.net](mailto:afhf@earthlink.net)  
Website: <http://www.afhistoricalfoundation.org>

# Proposal Cover Sheet

2007 Air Force Historical Foundation Symposium  
Arlington, Virginia  
October 16-17, 2007

Proposals should include five copies of the cover sheet, individual proposal, and individual résumé. Please print clearly.

**Proposal packages should be sent to:**

2007 Symposium Program Committee  
Air Force Historical Foundation  
1535 Command Drive, Suite A-122  
Andrews AFB MD 20762-7002

Phone (301) 736-1959

Fax (301) 981-3574

E-mail: [afhf@earthlink.net](mailto:afhf@earthlink.net)

Web Site: <http://www.afhistoricalfoundation.org>

## Paper

**Title:** \_\_\_\_\_

**AV Needs:**

- Data Projector    DVD/CD Player    VHS Player    Audio Cassette Player  
 35mm Slide Projector    Overhead Slide Projector    Laptop Computer  
 Internet Connection

**Panel organizer or paper presenter's name and affiliation:**

\_\_\_\_\_

**E-mail:** \_\_\_\_\_

**Complete Mailing Address:**

\_\_\_\_\_

\_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP Code \_\_\_\_\_ Country: \_\_\_\_\_

Work Phone: \_\_\_\_\_ Home Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Cover sheet and proposals must be postmarked by May 1, 2007.

# Awards Program

The Foundation stimulates interest in America's air power history and heritage by sponsoring an annual awards program. The awards are presented to cadets in commissioning programs, to officers undergoing professional military education, and to authors who write for publication in periodicals or history books.

## **The Air Force ROTC Scholarship Award**

Cadet (now 2d Lt) Halei K. Wong, USAF

## **The United States Air Force Academy Award**

Cadet First Class (now 2d Lt) E. Aaron Brady, USAF

## **School of Advanced Air and Space Studies Thesis Award**

Lt Col Chris Moss, USAF

## **The General Bryce Poe II Award**

**(Air Force Institute of Technology thesis)**

Capt Joy D. Mikulcik, USAF

## **The Two Air Forces Award (USAF/RAF)**

Wing Commander S. D. Ellard, RAF

## ***Air Power History* Best Article Award**

Dr Don D. Chipman

## **Air Force Historical Foundation Book Award**

To be determined

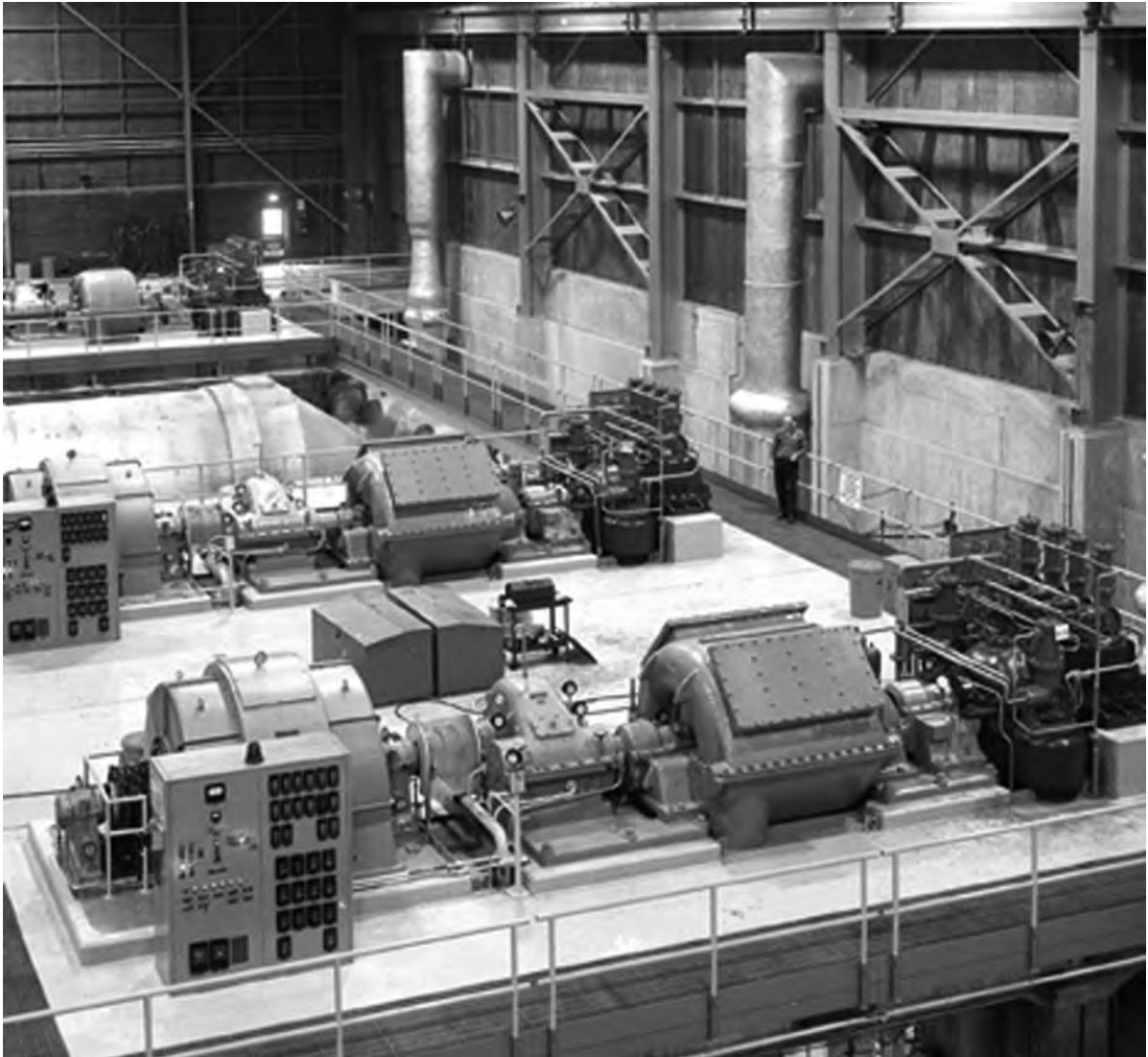
## **Notice of Annual Meeting**

The Annual Meeting of the Membership of the Foundation will occur at 11:00 am, Thursday, March 22, 2007, in the Board Room of the Air Force Association (AFA), in the AFA Building at 1501 Lee Highway, Arlington, VA. Please notify the Foundation staff if you intend to attend the meeting by calling (301) 736-1959 or emailing [afhf@earthlink.net](mailto:afhf@earthlink.net). The membership was informed of the meeting through letters mailed in January 2007.

## **Book Publication Announcement**

The Air Force Historical Foundation proudly presents a new book, *U. S. AIR FORCE: A Complete History*, by Lt Col Dik Alan Daso, USAF (Ret) (Westport, Connecticut: Hugh Lauter Levin Associates, Inc., 2006). Copyright (c) 2006 by The Air Force Historical Foundation. This is a new coffee-table book published in preparation for the 60th Anniversary of the United States Air Force celebration in 2007. It is a chronological history of the Air Force. Price (until 12/31/07): \$60.00 including shipping within the United States (including APO), \$80.00 including shipping to foreign addresses.

This photo from 1965 shows an elevated overview of the air compressors, motors and refrigeration equipment in Engine Test Facility's Basic-Plant (B-Plant) air-side facility. (AEDC photo.)



## 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, WordStar, Microsoft Word, and Ami Pro. 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*, P.O. Box 10328, Rockville, MD 20849-0328, e-mail: [jneufeld@comcast.net](mailto:jneufeld@comcast.net).

## Comment on RB-47H Article

Reference the very nicely written article by Forrest L. Marion in the Fall 2006 issue of *Air Power History*, "A Hot Day in a Cold War: An RB-47 vs. MiG-17s, April 28, 1965."

I very much enjoyed the article of a Cold War encounter that is rarely mentioned by writers, rather focusing on the subsequent loss of the Navy EC-121 and the USNS *Pueblo*. as stated by Dr. Marion, the attack on the RB-47H in 1965 should have led to a much more conservative effort in regard to reconnaissance operations adjacent to North Korea, but it didn't. Not for Colonel Mattison's RB-47H and his crew, nor for the EC-121 or the *Pueblo*, was any effort made to provide timely air-cover if the need should arise. Sadly, no lessons were learned from the North Korean attack on RB-47H 34-290 by either air force or navy senior leaders of the time.

There are a few very minor issues in the article I would like to address. The lead picture for the article is of an RB-47K rather than an RB-47H—it should have been an H-model. The 55th SRW at that time consisted of three operational squadrons—two squadrons of RB-47H electronic reconnaissance aircraft (38th and 343rd, I served in the latter), and one squadron of RB-47K photo reconnaissance aircraft. The K-model was mostly used for pilot proficiency flying, and not used for PARPRO missions. The H-model was always easily identifiable by its blunt black radome nose, versus the photo nose of the K-model.

Further, the RB-47H was not a Silverking aircraft as stated, rather that was a modification to the electronic reconnaissance suit of the H-model providing improved recording capability among other things. As for Colonel Mattison asking his crew if they wanted to eject "over the runway" that is doubtful. The three Ravens in back had downward ejection seats, and any ejection, if attempted, would have taken place over water. I've flown over 100 PARPRO missions while serving in the 55th SRW, including many out of Yokota Air Base, and none of my pilots would have asked us Ravens to punch out over a runway. Mattison was one of our very best—without doubt, an ejection, if attempted, would have taken place over water.

Finally, the aircraft had a severe center of gravity problem caused by the cannon shell that punctured one of the rear fuel tanks. Non-flyers may not appreciate the importance of knowing your center of gravity, but it is fundamental to aircraft control. All Mattison knew is that he was getting nose heavy. Mattison also knew if

he touched down nose-wheel first that he and his crew would most likely end up in an ever worsening porpoise leading to a fireball—the fate of many a B-47 crew. But at the very end Mattison did lose control, the aircraft got away from him, drove its nosewheel into the runway, and then began its deadly porpoise. How Mat and Hank kept that airplane under control is a mystery, but one of the great aerial achievements of that year which should have been honored with the Mackay Trophy or an equivalent. I am sure neither pilot ever forgot that landing, not to mention the three Ravens sitting in the aisle below the pilots.

Finally, to provide some perspective, I would like to note that in this secret war of reconnaissance, we the United States and the United Kingdom together only lost one aircraft over-flying the USSR, the U-2 of Gary Francis Powers on May 1, 1960. In contrast the peripheral PARPRO missions were far more deadly, and many US Navy and Air Force aircraft were lost over the years. Thank you for a fine article.

*Col. Wolfgang W. E. Samuel, USAF (Ret.),  
Fairfax Station, Virginia.*

## McD and Richtofen

What a great tribute to the late Brig. Gen. Robert McDermott in your recent Winter issue! I was privileged to know General "McD" over the past eight years, during the time that he worked with us to establish the American Fighter Aces Museum in San Antonio. Sadly, our efforts did not meet with success, but it sure wasn't for lack of General McDermott's support. He was the keynote speaker at the American Fighter Aces' 2006 convention in San Antonio on July 1st, when he was also inducted as an Honorary Member of the American Fighter Aces Association. He was a gentleman and patriot. We shall all miss him.

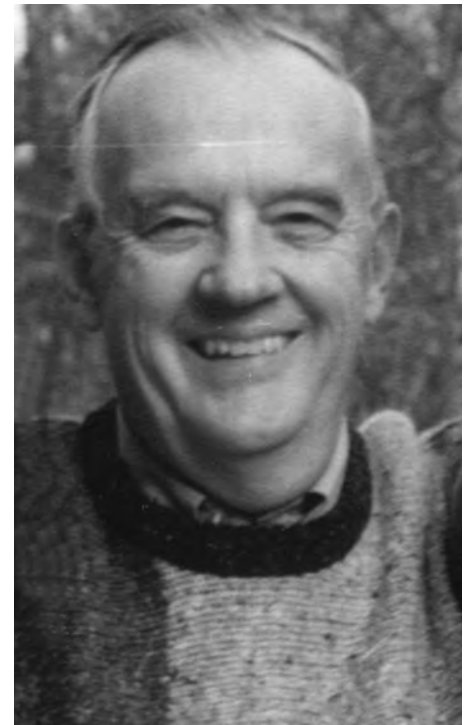
As a student of World War I military aviation history, I was also pleased to read the analysis of Baron Manfred von Richthofen's final, fatal flight, by Lt. Jonathan Young. However, it would appear that Lt. Young made two glaring inaccurate statements: On page 25 he states that, "The spirit of the hunter... made him the most successful aviation ace of all time", and on page 27 he writes, "To this day, no pilot of any nation matched the number of aerial victories achieved by the Red Baron".

Surely, Lt. Young's study of military aviation didn't end with World War I. He must know that the Luftwaffe's top ace of World War II (and, indeed, the top-scoring

ace of all time) was Maj. Erich Hartmann, with 352 aerial victories. Indeed, there were 106 other German fighter pilots with 100 or more victories. Granted, Baron von Richthofen was the top-scoring ace of World War I, and, arguably, the most renowned ace of all time (one whose fame is still being spread in the cartoon strip "Peanuts" and by the "Red Baron" frozen pizza chain), but he falls well down the list of "the most successful aviation aces of all time". Otherwise, Lt. Young's article was a scholarly and well-documented look at the Bloody Baron's last flight.

*Col. J. Ward Boyce, USAF (Ret), Austin,  
Texas*

# News



**Tom Y'Blood (1936-2006)**

Military historian Tom Y'Blood died after a heart attack on December 16, 2006. He was sixty-nine. Born in Forrester, Arkansas, in 1937, he graduated with a degree in music from the University of Oregon in 1959. As an Air Force pilot from 1960 to 1966, he flew B-, EB-, and RB-47's for the Strategic Air Command. After retiring from the Air Force, he was a commercial pilot, flying DC-9s and Boeing 727s for 18 years. While logging more than 11,000 flying hours he tried his hand at writing. Mr. Y'Blood wrote eight books, beginning with



*Red Sun Setting: The Battle of the Philippine Sea*, published in 1981, which won national acclaim. A true "renaissance man," his interests varied, from research and writing about aircraft carriers in World War II to air power in Korea and Desert Storm. He joined the Office of Air Force History in 1986 and for the past four years was the chief of reference at Bolling AFB, D.C. At the time of his death Tom was writing a history of the Air Commandos in World War II and histories of air combat in operations Iraqi Freedom and Enduring Freedom. Mr. Y'Blood is survived by his wife, Carolyn, their children, Kent and Laura, and granddaughters Jenna and Kiera.

## Samuel Dickens (1926-2006)

Col. Samuel Thomas Dickens, USAF (Ret.), an authority on national security policy, died of cancer on December 29, 2006. He was eighty years old. A West Point (1951) graduate, he became a pilot and flew reconnaissance missions during and after Korean War. In 2002, he organized a historical symposium about these flights. In the Vietnam War, Colonel Dickens commanded a tactical flying squadron and flew 225 combat missions. His decorations include the Legion of Merit, two Distinguished Flying Crosses, and a dozen Air Medals. Later, he was the commander at Torrejon AB, Spain, and served on the Air Staff as chief of plans and policy for the Western Hemisphere. After retiring in 1979, he was the director of inter-American affairs at the American Security Council Foundation, advised the Kissinger commission on Central America, appointed secretary and board member of the James Monroe Memorial Foundation. Survivors include his wife, Marcella Smith; three children, David T. Dickens; Samuel T. Dickens, Jr.; and daughter, Pamela Sellers; a sister; and eight grandchildren.

## B-Plant Closes: Paved the Way for Jet Engine Testing

Arnold Air Force Base, Tenn. — The U.S. Air Force's Arnold Engineering Development Center recently closed the Basic Plant (B-Plant) facility. It ends a remarkable and historic chapter after more than fifty years of aerospace ground testing. (See photo on page 63.)

"Almost every weapon system we're flying today has been supported by the B-Plant," said retired engineer and AEDC pioneer Glen Lazalier. "I'm not just talking about turbine engines either. After the Soviets launched a small satellite called Sputnik in 1957, we started testing rocket motors." "B-Plant airside was a pressure,

temperature and humidity conditioning facility. It controlled all three of those to supply air to turbine engines and to replicate the conditions they experienced in flight at desired Mach numbers and altitudes."

Commissioned in 1952, the B-Plant was the second operational facility at the center behind Peewee, a one-foot square wind tunnel. Expected to last about twenty years, AEDC's skilled engineers have kept B-Plant robust and even brought significant improvements to it over the years. "B-Plant has far exceeded its design life," Lazalier said. "It has performed admirably over that full length of time. It's been a marvelous set of equipment with some exceedingly esoteric engineering applied when they put it together."

The facility's history closely mirrors AEDC's origins when the United States sent a highly classified team to Germany at the end of World War II to retrieve wind tunnel hardware, blueprints, and scientists ahead of the Soviet Union. Much of that technology, knowledge and some of the material ended up at AEDC.

Part of this postwar treasure included German motors and compressors, which were used to form the heart of B-Plant. Aerospace Testing Alliance's Engine Test Facility system architect, Jim Rector, marvels at the engineering that went into the early 1940s-era motors, gear drives and compressors. "When you look at the intricate workmanship those German engineers put into that equipment, it's just amazing," Rector said. "They had a different engineering approach. You just wouldn't see anything like that these days. These motors and compressors may have helped the Germans to conduct ground testing on the first jet engine prototypes toward the end of the war. Our T-cells are copies of the German cells at Obervisenfeldt."

Lazalier and Rector are equally enthusiastic about what has replaced the B-Plant. The Aeropropulsion Systems Test Facility, located on a 57-acre site here, became operational in 1985. ASTF's C-Plant air supply compressors can provide up to 1,500 pounds of air per second (more than one-million standard cubic feet per minute) into a jet engine to simulate airspeeds up to 2,000 miles per hour.

After years of work and millions of dollars spent, ASTF now supplies conditioned air to all jet engine test cells here, and while this feat began a new chapter in jet engine testing at AEDC, it marked the end of the Basic Plant's. However, among the newer, larger multi-million dollar facilities that now do the work cheaper and easier, the B-Plant rests humbly, secure in its years of proven service to the nation.

**USS Tarawa, CV-40 and LHA-1**, will hold a reunion April 12-17, 2007, in Dayton, Ohio. Contact:

Frank Grosey  
976 Holly St.  
Bull Head City, AZ 86442  
(928) 763-8242  
e-mail: groseyjr@frontiernet.net

or

Walter Tothero  
1009 Lane Ave.  
Crawfordsville, IN 47933  
(765) 362-6937  
e-mail: walsue@wico.net

**USAF Pilot Training Class 55-I** will hold a reunion May 16-20, 2007, at Albuquerque, New Mexico. Contact:

Ken Gero  
(505) 897-7388  
e-mail: 55-llabq07@comcast.net

**RVAH-12** will hold a reunion June 8-10, 2007, at Key West, Florida. Open to all RVAH squadrons. Contact:

Alvis Didway  
1330 Our Farm Way  
Madison, NC 27025  
(336) 209-2905  
e-mail: Alvis.Didway@TIMCO.aero

The **C-7A Caribou Association** will hold a reunion September 6-9, 2007, in San Antonio, Texas. Contact:

Bill Buesking  
(210) 403-2635  
e-mail: wbuesking@satx.rr.com  
web: c-7caribou.com/reuniondex.htm

## Reviewers

C.R. Anderegg  
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Daniel Mortenson  
Patrick E. Murray  
Roger Launius  
Rob Owen  
Rick W. Sturdevant  
Wayne Thomson  
George M. Watson, Jr.  
Herm Wolke  
Tom Y'Blood

## **General Jacob Edward Smart 1909-2006**



General Jacob Edward Smart, 97, died on November 12, 2006, in Ridgeland, South Carolina, in the house in which he was born. A top strategist, tactician, planner, and air commander during World War II, General Smart worked closely with General Henry H. "Hap" Arnold, Commanding General, Army Air Forces (AAF) and Lt. Gen. Ira C. Eaker, Deputy Commander, AAF. During the Korean War, General Smart was Deputy for Operations at Headquarters, Far East Air Forces and in the 1960s commanded U.S. Forces in Japan; Pacific Air Forces; and then served as Deputy Commander-in-Chief of the U.S. European Command. He was awarded the Distinguished Service Cross, the Distinguished Service Medal, Legion of Merit, the Distinguished Flying Cross, and the Air Medal, four times.

General Smart was born on May 31, 1909 in Ridgeland, Jasper County, South Carolina. He attended the Marion Military Institute in Marion, Alabama, subsequently graduating in June 1931 from the United States Military Academy. After completing flying training at Randolph and Kelly Fields, Smart served in pursuit, observation and flying training units. During 1940-1942, Smart played a major role in developing the Air Corps' flying training program including primary flight training at civilian schools. He subsequently

became chief of flying training at Army Air Forces headquarters.

From mid-1942 to late 1943, Colonel Smart became the longest-serving member of Hap Arnold's Advisory Council, a coterie of bright officers that at one time or another also included Fred M. Dean, Emmett O'Donnell, Jr., Charles P. Cabell, and Lauris Norstad. Formed by Arnold in March 1942, these carefully chosen officers had no specified long-term assignments; they were Arnold's idea men. Smart, for example, dealt with strategy, organization, and a variety of planning tasks including even planning for postwar. Enjoying Arnold's trust and confidence, in 1943 he attended the high-level Casablanca and QUADRANT (Quebec) conferences as a key member of Arnold's planning staff. Arnold also sent Smart on special missions to the Middle East and the China-Burma-India Theater.

A perhaps apocryphal story has it that Arnold had told Smart to spend all of his time "thinking." Subsequently, Arnold and Smart met with Army Chief of Staff, General George C. Marshall to convince him of an idea that the Advisory Council had formulated. Marshall turned the suggestion down flat. Leaving Marshall's office, Arnold admonished Smart: "From now on, you spend thirty percent of your time thinking and seventy percent on how to sell an idea."

Also in 1943, Arnold directed Colonel Smart to conceive a plan to attack the heavily defended oil refineries at Ploesti, Romania, which were producing a major part of the oil fueling the Nazi war machine. This low level mission by 177 B-24 Liberator bombers ran into enormously heavy ground fire, fifty-four planes were lost and more than fifty were heavily damaged. Severe damage was inflicted on the refineries and five Medals of Honor were awarded, the most for any single American military action.

In early 1944, Smart became Commanding Officer of the 97th Bomb Group in Italy. While flying on a combat mission over Austria in May 1944, he was shot down, captured and became a prisoner of war in Italy and Germany until late April 1945. During his captivity, Smart was constantly interrogated but gave up nothing of value to the Germans.

General Smart was a true friend of the Air Force History Program. Over decades, he attended seminars and frequently helped historians recreate events in which he had participated and helped shape. In seminars con-

vened by the Office of Air Force History, he was a most welcome participant, always punctuating discussion with trenchant comments based on his long personal air experience in peacetime and war. Very few airmen possessed the kind of experience that General Smart brought to the table. In addition to his experience in World War II, during the Korean War, Major General Smart served as Deputy for Operations, at Headquarters, Far East Air Forces, where he planned air interdiction attacks against North Korean military concentrations and facilities as well as strikes on industrial targets. General Smart subsequently commanded Pacific Air Forces; U.S. Forces in Japan; and later, was Deputy Commander-in-Chief, U.S. European command where he dealt with heads of government including President Charles de Gaulle of France.

Lesser known were his contributions at Army Air Forces headquarters immediately after World War II. In 1945-1946, as Secretary of the Air Staff and Lt. Gen. Ira Eaker's executive, Colonel Smart worked closely with Arnold and Eaker. Smart emphasized that Arnold after the war had "focused intently" on the future—achieving an independent Air Force and establishing a small, policy-making Air Staff with decision-making delegated to lower command levels. Arnold wanted "to get the house in order," Smart stated, "to turn it over to his successor, General Spaatz. The fires that enabled him to build the world's greatest Air Force dwindled. He went into retirement with an admirable attitude. He was a superb statesman." Smart considered Eaker a fine man to work for and "at the poker table; he was a power to be reckoned with."

After the war, Smart had an opportunity to observe how General Dwight D. Eisenhower, Army Chief of Staff, supported the airmen's drive for independence. Eisenhower's wartime experience, Smart emphasized, convinced him that the air arm should be established as a separate service, coequal with the Army and Navy. Also, Eisenhower's close relationships with General Carl Spaatz, commander of the U.S. Strategic Air Forces in Europe, and with Air Marshal Arthur Tedder of the Royal Air Force, gave him a greater understanding and appreciation of air power.

As Eaker's executive officer, Smart was involved in the big issues of the immediate postwar years. These included unification, roles and missions, establishment of the 70-group Air Force, and overseas basing. He emphasized that the "most important and challenging" part of this was working with members of the House and Senate on unification matters. "I never dreamed," Smart recalled in 1992, "that the DOD would become the bureaucratic monstrosity that it is today." Dealing with civilian and military policy-makers at the highest levels, Smart also came into contact with Navy officials. He noted that his relationships with Navy personnel were always friendly. In 1961-1963 as commander of U.S. Forces in Japan, his vice commander was a rear admiral and he worked with a multi-service staff. "It is my view," Smart stated, "that one can get along well with the Navy except in the field of public relations and at appropriations time in Washington. The Navy is far more clever than the Army or the Air Force in those two closely related endeavors."

In the late 1940s, with the Cold War heating up, Smart recalled that he knew of no senior military officer who did not regard the Soviet Union as a potential enemy. Arnold considered the Soviets untrustworthy and thought it would be difficult to get along with them. Based on his own experience during and after the war, Smart thought conflict with the USSR was inevitable. He was also convinced that "we Americans posed a greater threat to our own well-being than the Soviets did. It's my view that we are still our own worst enemy."

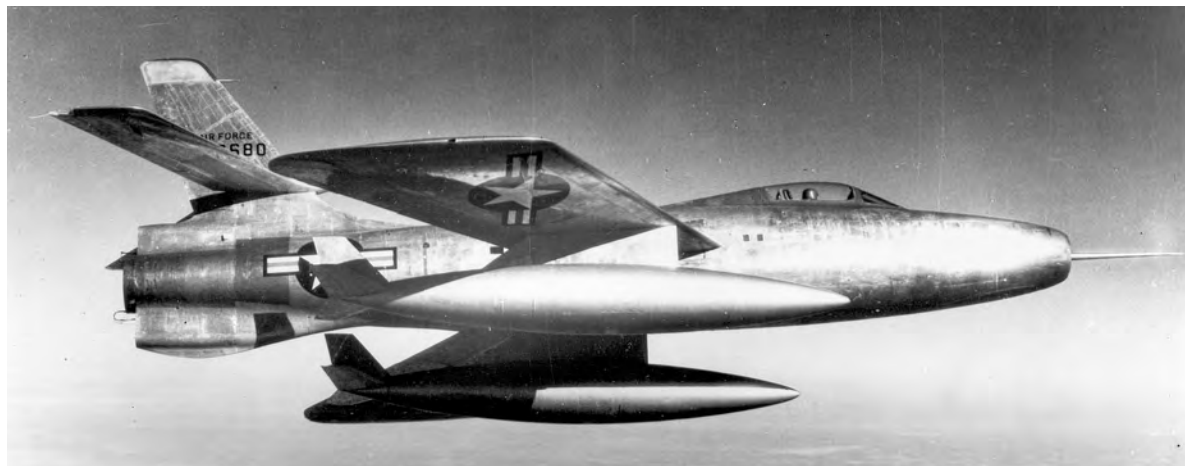
General Smart had a finely tuned sense of history and deep roots in the South Carolina Low-country where he was born and grew up. After his retirement from the Air Force, he served as an executive with the National Aeronautics and Space Administration. He then returned to Ridgeland where he served as a member of the South Carolina Prisoner of War Commission and became active in the Jasper County Historical Society. He served as President, and under his leadership, the Society built a museum celebrating and displaying the county's history. He also compiled and published a massive history of people from Jasper County and the Lowcountry who served in the nation's armed forces during World War II. He personally interviewed many of these veterans and gave the tapes to the Jasper County Historical Society.

General Jacob Smart enjoyed an extraordinarily varied and distinguished career. Combat flyer, teacher, strategist, air planner, and commander of air forces, he was a patriot, a superb officer and airman, and a true gentleman.

General Smart's marriage to Elizabeth Gohmert Smart ended in divorce. Two daughters died, Rosemary Burt in 2003 and Joan Pedersen in 2005. General Smart is survived by two children, William E. Smart of Whitehall, Montana, and Jacklyn S. Freeman of Ben Lomond, California; his companion, Setsuko Saito; ten grandchildren; and ten great-grandchildren.

*Herman S. Wolk Senior Historian, Retired Office of Air Force History*

*All quotations in this appreciation are from a letter, General Jacob E. Smart to Herman S. Wolk, September 29, 1992.*



*Air Power History's* discerning readers made short work of the XF-91, a rakish jet fighter of the 1950s with unusual features. Our photos of the XF-91 come from Republic Aviation Corp., which gave the Air Force the P-47 Thunderbolt and F-105 Thunderchief among other great warplanes. Some called the XF-91 the Thunderceptor, but the name may have been unofficial.

The XF-91 began as a 1946 proposal for a high-altitude interceptor capable of meeting Soviet bombers far from their targets in North America and initially called the XP-91. A Republic engineering team put together the company's first swept-wing aircraft, designed to use a combination of turbojet and rocket power to achieve supersonic flight on at least a temporary basis.

Similar in appearance to the F-84F Thunderstreak (which actually came later), the XF-91 was powered by a 5,200-pound thrust General Electric J47-GE-3 turbojet engine plus four 1,500-pound thrust Reaction Motors XLR11-RM9 rocket motors mounted two each above and below its jet exhaust. The rocket engines were by no means the only unusual feature of the XF-91: Its 35-degree swept wing could be adjusted to vary the incidence to the most effective angle for takeoff, landing, or cruise. And the

wing was of inverse taper—possibly the only time this concept was ever tried—with the thickest and widest portion of the wing at the tip instead of the root.

The XF-91's first flight was made May 9, 1949 by Republic test pilot Carl Bellingier. Republic built two XF-91s (serials 46-680/681) and they participated in a very active flight test program. The first ship was retrofitted with a nose radome housing APS-6 radar above the engine intake, giving it a resemblance to the F-86D Sabre. The second flew with a V-shaped butterfly tail like that found on the Beech Bonanza.

It appears the XF-91 may have been a little too costly and complex to win a production order. Republic pilots felt the aircraft performed well. The second XF-91 was eventually scrapped while the first is today part of the holdings of the National Museum of the Air Force in Dayton, Ohio.

An unprecedented 42 readers responded to our "name the plane" challenge and all identified the XF-91 correctly. Our "History Mystery" winner is Winston Hathaway of Concord, Calif. His prize is a copy of the book *Chopper: Firsthand Accounts of Helicopter Warfare, World War II to Iraq* by Robert F. Dorr, reviewed on page 45 elsewhere in this issue. Thanks to all who joined in our History Mystery exercise.

## This Issue's Mystery Plane

Once more, we present the challenge for our ever-astute readers. See if you can identify this month's "mystery" aircraft. But remember the rules, please:

1. Submit your entry on a postcard. Mail the postcard to Robert F. Dorr, 3411 Valewood Drive, Oakton VA 22124. Or send an e-mail message to robert.f.dorr@cox.net.

2. Correctly name the aircraft shown here. Also include your address and telephone number. If you use e-mail, include your electronic screen name.

3. A winner will be chosen at random from the postcards and e-mails with the correct answer. The

winner will receive an aviation book.

This feature needs your help. Do you have a photo of a rare or little-known aircraft? We'll return any photos provided for use here.

