

Col. John Boyd Is Dead at 70; Advanced Air Combat Tactics

By ROBERT McG. THOMAS Jr.

Col. John R. Boyd, a legendary Air Force fighter pilot whose discovery that quicker is better than faster became the basis of a far-reaching theory that helped revolutionize American military strategy, died on March 9 at a hospital in West Palm Beach, Fla. He was 70 and had lived in Delray Beach.

The cause was cancer, his family said.

To combat pilots of the late 1950's, it was always high noon in the skies above the Nevada desert. A pilot, a crack instructor at Nellis Air Force Base, perhaps, or a hotshot Navy flier passing through would get on the radio to call him out and within minutes Colonel Boyd would have another notch in his belt.

They did not call him 40-second Boyd for nothing. From 1954 to 1960 virtually every combat pilot in the country knew that Colonel Boyd, a former Korean War pilot who helped establish the Fighter Weapons School at Nellis, had a standing offer: take a position on his tail, and 40 twisting, turning seconds later he would have the challenger in his own gun-sights or pay \$40. Colonel Boyd never lost the bet.

A high school swimming champion who won an athletic scholarship to the University of Iowa, Colonel Boyd, a native of Erie, Pa., had superior reflexes and hand-eye coordination, but what made him invincible in mock combat was something else.

At Nellis he taught himself calculus so he could work out the complex formulas that produced his awesome repertoire of aerial maneuvers and led to his 1960 report, "Aerial Attack Study," the bible of air-to-air combat.

His own combat experience had been limited to a few missions in Korea, but that had been enough to produce a breakthrough insight. Wondering why the comparatively slow and ponderous American F-86's achieved near total domination of the superior MIG-15's, he realized that the F-86 had two crucial advantages: better visibility and a faster roll rate.

This, in turn, led Colonel Boyd to develop what he called the OODA Loop, to denote the repeated cycle of observation, orientation, decision and action that characterized every encounter. The key to victory, he theorized, was not a plane that could climb faster or higher but one that could begin climbing or change course quicker — to get inside an adversary's "time/cycle loop," as he put it.

The fast-cycle combat theory, expanded by Colonel Boyd into a lec-

ture he later delivered hundreds of times, has since been widely applied to fields as diverse as weapons procurement, battlefield strategy and business competition.

One implication of the theory was that the best fighter plane was not necessarily the one with the most speed, firepower or range. Colonel Boyd, who enrolled at Georgia Tech after his Nellis tour, was helping a fellow student with his homework over hamburgers and beer one night when he had an insight that led to a way to quantify his ideas. The resulting Energy Maneuverability Theory, which allows precise comparisons of maneuverability, has become a standard measure of aerial performance.

Assigned to the Pentagon in 1964, Colonel Boyd became an important figure in a movement that started in response to \$400 hammers and other headline excesses of Defense Department spending and soon expanded to question the need for many hugely expensive weapons systems.

Although he had allies in the Pentagon, Congress and business, Colonel Boyd's ideas often went against the grain of an entrenched military-industrial bureaucracy devoted to the procurement of the most advanced, most expensive and (not coincidentally, he felt) most profitable planes.

Although his design ideas helped give the F-15 a big, high-visibility canopy, his major triumph was the F-16, a plane lacking many of the F-15's high-tech, expensive features, but which is far more agile and costs less than half as much, allowing for the purchase of many more of them for a given expenditure.

Top Air Force officers were so opposed to the concept of producing a plane that did not expand on the F-15's cutting edge technology that Colonel Boyd and some civilian allies developed it in secret.

The plane was hailed for its performance in the Persian Gulf war, a war whose very strategy of quick, flexible response was based largely on ideas Colonel Boyd had been promoting for years.

Colonel Boyd, who maintained that the lure of big-money defense contracts invariably perverted weapons assessment, was so personally fastidious that during his years in the Pentagon he became known as the ghetto colonel because he lived in a basement apartment.

He carried his notion of propriety to such an extreme that when he retired in 1975 and began some of his most productive work, as a Pentagon consultant, he insisted that his fam-



Col. John R. Boyd

ily live on his retirement pay. Initially offering to work full time without pay, he was persuaded to accept one day's pay every two-week pay period, because he had to be on the Pentagon payroll to have access to the building, before retiring in 1988.

He is survived by his wife, Mary; three sons, Stephen, of Springfield, Va., Scott, of Burke, Va., and Jeff, of Delray Beach, Fla.; two daughters, Kathryn, of Delray Beach and Mary Ellen Holton of Centerville, Va.; a brother, H.G. Boyd of Pompano Beach, Fla.; a sister, Marion Boyd of Erie, and two grandchildren.

Percy Gran

By MEL GUSSOW

Percy Granger, a playwright focused his sharp-edged wit on dementia, television, advertising and other vulnerable subjects, died Monday at his home in Manhattan. He was 51.

He suffered a cardiac arrest while his wife, MariElena. He had been unable to work since a previous cardiac arrest in 1992.

Mr. Granger was the author of "Eminent Domain," "The Works of Studs Edsel" and other one-act plays. His short, pithy comedies consistently brightened the Ensemble Studio Theater's spring marathon. "Scheherazade" in 1992, was a lunatic satire of soap opera and soap operas that mirrored life.

He was also a screenwriter, actor and taught playwriting at the 52d Street Project, a theater program in Manhattan for disadvantaged youngsters.

Percival Harkness Granger was born in Ithaca, N.Y. He graduated from Harvard magna cum laude in 1967 and began his career as an actor, but soon moved into playwriting. The partly autobiographical "Studs Edsel," about an American law student, "an idealist with faith" who avoids the draft by moving to Canada, was staged at the New York City Playhouse in Manhattan. Later it was done at the Theater Group in Washington, D.C. and the Ensemble Studio.

In common with his other work, "Eminent Domain" went through an extensive creative process.

Carld Jonaissant, 35, a Dancer

By JENNIFER DUNNING

Carld Jonaissant, a dancer with Dance Theater of Harlem and American Ballet Theater, a choreographer and a designer, died on Feb. 28 at St. Luke's-Roosevelt Hospital in Manhattan. He was 35 and lived in Manhattan.

The cause was AIDS, said his brother, Jude Jonaissant.

Writing of Mr. Jonaissant in 1987, the year he joined Ballet Theater, the critic John Gruen described him as a dancer who "moves easily and often breathtakingly from style to style, lending his mercurial presence to a wide variety of roles." Primarily a classicist, Mr. Jonaissant was equally at home in contemporary and 19th-century ballets and brought a sophisticated intelligence to bear on ballet styles.

Mr. Jonaissant was born in Port-de-Paix, Haiti, and moved with his

family to Canada, where he studied jazz and modern dance. He came to New York City in 1980 after the Harlem company on tour. There he was given a scholarship to study ballet and was made a full-fledged member of the company, forming principal roles in "Dance Theater of Harlem" and "Four Temperaments." John Taras's production "Firebird," Arthur Mitchell's "Festations" and in a role he created in John McFall's "Toccata and Canzoni."

Mr. Jonaissant danced with the Theater through 1993, performing principal roles in "La Bataille de Merce Cunningham's 'Duo' Ulysses Dove's 'Serious Pleasure' and as a soloist in 'The Nutcracker' George Balanchine's 'The Variations,' and Jiri Kylián's

Deaths	Deaths	Deaths	Deaths	Deaths
ACCONCI—Themistocles F. March 11, 1997. Professor Emeritus Manhattan College, Riverdale. Beloved husband of Jesse. Devoted father.	BRACHFELD—Phyllis. Beloved husband of the late Gertrude. Loving father of Raymond, Francine and Theodore. Adored grandfather.	CHANIN—Marcy. Dear friend, how does one say goodbye after so many years of fun, happiness and	ACCONCI, Themistocles F. March 11, 1997. Professor Emeritus Manhattan College, Riverdale. Beloved husband of Jesse. Devoted father.	Defflese, Pauline Deller, Roslyn McShane, Vincent Meltzer, Ruby

LUCAS—Elizabeth Z. Norton, C.T., on M. Norton, C.T., on M.

Genghis John

By Franklin C. Spinney

John Boyd—who fought the establishment for more than 50 years and prevailed—set a standard for integrity seldom equaled in this era of flexible ethics. He's going to be a tough act to follow.



AFWIDE WORLD PHOTOS

One hardly expects the Commandant of the Marine Corps to agree with a dovish former Rhodes Scholar, or an up-from-the-ranks, brass-bashing retired Army colonel, or a pig farmer from Iowa who wants to cut the defense budget. Yet, within days of each other in mid-March 1997, all four men wrote amazingly similar testimonials to the intellect and moral character of John Boyd, a retired Air Force colonel, who died of cancer on 9 March at the age of 70.

General Charles Krulak, our nation's top Marine, called Boyd an architect of victory in the Persian Gulf War. General Krulak was "awed" by Boyd's intellect, character, integrity, and his selfless devotion to our nation's welfare. James Fallows, Editor of *U.S. News and World Report*, claimed that Boyd's "ideas about weapons, leadership, and the very purpose of national security changed the modern military." Retired Army Colonel David Hackworth, one of our nation's most decorated combat soldiers, wrote that Boyd's "legacy will be that integrity—doing the hard right over the easy wrong—is more important than all the stars, all the plush executive suites and all the bucks." And in a 20 March speech, Senator Charles Grassley (R-IA) declared that John Boyd, "the leader of the Military Reform Movement," was a man who "always set the example of excellence—both morally and professionally."

What kind of man could unite the emotions of such disparate men?

I met Colonel John Boyd in 1973, when I went to work for him in the Pentagon as a 27-year-old captain in the Air Force. He already was a legend, yet his most important work lay before him. Over the next 23 years, my life became intertwined with this maddening mix of eccentricity, intellect, creativity, and moral courage—a mix that did not fit into neat compartments. Over a career that spanned 50 years, he evolved from "40-Second Boyd," to the "Mad Major," to the "Ghetto Colonel," to "Genghis John."

Boyd opened his military career as a 19-year old draftee in the U.S. Army occupying Japan during the cold, wet winter of 1945-46. Morale was terrible. The soldiers froze in damp tents, often eating uncooked K-rations, while their officers indulged themselves with hot food in warm quarters. Boyd led the inevitable revolt—the mud soldiers chopped down a wooden hangar and burned it to keep warm. The Army, being the Army, court-martialed Boyd for destroying government property, but Boyd, being Boyd, converted the trial into a referendum on leadership and responsibility. The officers lost, the troops got hot chow, and the military got its first look at John Boyd.

40-Second Boyd

He left the Army and went to college on the G.I. Bill, where he met his wife, Mary, a woman best described as a saint. He graduated with a degree in economics, was commissioned in the Air Force, and became a fighter pilot. He flew about 20 combat missions in F-86s at the tail end of the Korean War—enough to warrant his selection as one of the first instructors at the fledgling Fighter Weapons School at Nellis Air Force Base in Nevada. He designed the dogfight tactics curriculum and earned the nickname "40-Second Boyd" as a result of a standing bet that he could maneuver from a position of disadvantage (challenger on his tail) to advantage (positions reversed) in 40 seconds—or pay the challenger 40 dollars. One of Boyd's lifelong friends, Ron Catton, a retired fighter pilot, and one of the few ever to graduate from the Fighter Weapons School with a perfect score, told me that Boyd usually needed only 20 seconds to win, but liked a little insurance in case something went wrong.

dragon" into the future must not ignore this. To do so risks being eaten.

This is not to say that the development of Sea Dragon battalions and units of that ilk is wrong. Such units are highly dependent on technology, however, and when it comes to money and high-tech equipment, the Army has always had an edge over the Marine Corps. Mirror image units would not help stem the debate over interservice duplication of capabilities. The Corps must provide a unique service to the nation to ensure its continued existence.

To this end, the Marine Corps must look to the strategic level, where warfare has not been so drastically affected. Technological limitations mean that the logistical tail will remain a reality for U.S. forces through at least the first half of the 21st century. Prosecution of war will require a port to support sealift, and the port will be a center of gravity that a prepared enemy will not provide freely. Hence, a forcible entry/amphibious assault capability will continue as a strategic must for the United States.

The Marine Corps is uniquely qualified to fulfill the strategic need for amphibious assault into the 21st century. The close Navy-Marine Corps relationship—which is essential to the seizure of advance base facilities for the introduction of logistics support and follow-on forces—is the dragon that must be ridden. All efforts must be made to continue to build on the corporate knowledge in forcible entry maintained only by the Marine Corps. To forget what has been the foundation of the Corps for the last 75 years is to dismiss the historical and contemporary evidence and do something the Corps and the nation can ill afford: get it wrong.

¹The *Mons Meg*, a bombard cast in the 1440s, weighed more than eight tons and required 100 men and special teams of oxen to move it. A Napoleonic 12-pounder weighed only one and a half tons, including the ammunition chest with more than 60 rounds, and required just 12 horses and a crew of 7-15. Geoffrey Parker, *The Military Revolution: Military Innovation and the Rise of the West, 1500-1800* (Cambridge: Cambridge University Press, 1988), p. 9; and Gunther E. Rothenberg, *The Art of Warfare in the Age of Napoleon* (Bloomington: Indiana University Press, 1980), pp. 74-80.

²All figures for ammunition expenditure were taken from Marine Corps Order 8030.1, *Class V Supply Rates for Fleet Marine Force Combat Operations*.

³Based on a CH-53E lifting a 16,000-pound load for every sortie.

⁴Based on a battery with 16 five-ton trucks and 12 HMMVs.

⁵The range of the M198 is 30,000+ meters, but only a small portion of the propellant supply for each gun will deliver a round that far. For operational planning, depending on the M198 beyond 20,000 meters is a poor idea. In contrast, the M107 175-mm gun had a range of 32,700 meters when first deployed in 1962.

⁶All performance information for this family of mortars obtained from Mr Earl Rubright, scientific advisor to U.S. Central Command, Tampa, Florida.

⁷Charles E. Myers, "Time to Fold 'em," U.S. Naval Institute *Proceedings*, July 1991, pp. 37-41.

⁸Results of discussions at Strategic Concept Wargame, Naval War College, Newport, RI, 23-27 October 1995.

⁹Both vehicles can be lifted by the CH-53E, but the MV-22 will not lift an LAV. The vehicles must be externally suspended beneath the air platform for transportation, a complicated and time-consuming process that severely limits the capabilities of the aircraft in flight and the safety of a tactical insertion.

¹⁰The "target engagement" designation is the author's.

¹¹Department of Defense, *Conduct of the Persian Gulf War, Final Report to Congress* (Washington, D.C.: Department of Defense, 1992).

¹²Merrill L. Bartlett, ed., *Assault from the Sea: Essays on the History of Amphibious Warfare* (Annapolis, MD: Naval Institute Press, 1983) p. 337.

¹³J. B. LaPlante, "It's Time for Gators," U.S. Naval Institute *Proceedings*, May 1993, p. 52.

¹⁴Headquarters, United States Marine Corps, *Operational Maneuver from the Sea (OMFTS) Concept* (Washington: U.S. Marine Corps, 1 December 1995), p. 7.

¹⁵Plans Division, PP&O, Headquarters United States Marine Corps, V-22, *Multi-Mission/Multi-Service Aircraft*, Undated Informational Handout.

Major Fuquea, a 1981 graduate of the U.S. Naval Academy, is executive officer of Battalion Landing Team 1/2 and is deployed as part of the 22d Marine Expeditionary Unit.

The U.S. Naval Institute Announces the 36th Annual Naval & Maritime PHOTO CONTEST

The U.S. Naval Institute is proud to announce the 36th Annual Naval & Maritime Photo Contest.

The contest is open to both amateur and professional photographers. The winning photographs will be published in a 1998 issue of *Proceedings*, the monthly magazine of the Naval Institute. Cash prizes will be awarded as follows:

1st Prize	\$500
2nd Prize	\$350
3rd Prize	\$250
Honorable Mention (15)	\$100 each

Entry Rules:

1. Each photograph must pertain to a naval or maritime subject. (The photo is not limited to the calendar year of the contest.)
2. Limit: 5 entries per person.

3. Entries must be either black-and-white prints, color prints, or color transparencies.

4. Minimum print size is 5" x 7".

5. Minimum transparency size is 35mm. (No glass-mounted transparencies, please.)

6. Full captions and the photographer's name, address, and social security number must be printed or typed on a separate sheet of paper and attached to the back of each print or printed on the transparency mount. (Do not write directly on the back of a print. No staples, please.)

7. Entries may not have been previously published, and winners may not be published prior to publication in *Proceedings*. Prior publication could result in the relinquishment of the prize awarded.

8. Entries must be postmarked by 31 December 1997. Only photographs accom-



panied by a self-addressed, stamped envelope will be returned. Photographs not awarded prizes may possibly be purchased by the Naval Institute.

Deadline: 31 December 1997



Write for details or mail entries to:

Naval & Maritime Photo Contest-U.S. Naval Institute-118 Maryland Ave.- Annapolis, MD 21402-5035-(410) 268-6110

Boyd never lost. By the late 1950s, he was widely regarded as the finest fighter pilot in the Air Force.

He personified the romantic image of a fighter jock—tall, lanky, wildly gesticulating, loud, and irrepressible, an in-your-face type of guy, who smoked long thin stogies and blew smoke in your face, while he shouted and sprayed saliva at you in a head-on attack, from two inches, nose to nose. But 40-Second Boyd's flamboyant exterior hid an incisive mind, and he was about to blossom into a warrior-scientist—the "Mad Major."

The Mad Major

In the late 1950s, he began this improbable mutation by teaching himself enough calculus to work out the formulas describing his view of the maneuver-countermaneuver aerial duel. He published his results in a book-length technical report, the *Aerial Attack Study*, a secret document that eventually spread throughout the Free World and became the international bible of air combat.

His next stop was Georgia Tech in Atlanta. The Air Force sent him there to learn industrial engineering, a standardized curriculum that forced him to take a survey course in thermodynamics—the science of heat and energy. On the way to class one day, he had a flash of insight: the laws of thermodynamics, particularly those governing the conservation and dissipation of energy, were like the tactical give-and-take of an air-to-air duel. It was the kind of insight that characterized his genius for using analogies to combine seemingly unrelated pieces of information, gleaned serendipitously from very different disciplines, into a new world view.

As any logician will tell you, reasoning by analogy is a very dangerous game for most mortals. False similarities can capture our imagination, restrict our vision, and seduce us into seeing things that do not exist. To the orderly, Cartesian thinkers of the self-styled defense intelligentsia, Boyd had a very spooky way of thinking. To make matters worse, he had an IQ of only 90, which he claimed was an advantage because it forced him to be more efficient.

Nevertheless, Boyd always seemed to end up with the winning answer when the bureaucracy begrudgingly permitted the free market of ideas to work its painful magic. Most people attributed his success to luck, but he had a secret weapon: his uninhibited imagination was tightly coupled to a maniacal discipline to follow the truth wherever it might lead—even if it meant trashing his own creations. Boyd subjected each new synthetic analogy to rigorous analysis and testing, rolling it over and over in his mind, checking it obsessively for internal consistency as well as its matchup to reality, tearing it to pieces on paper, or during interminable phone

calls at two in the morning, or, in the case of the analogy between thermodynamics and tactics—inside a computer.

Boyd hypothesized that a fighter's performance at any combination of altitude and airspeed could be expressed as the sum of its potential and kinetic energies and its ability to change these energy states by maneuvering. With this idea as a point of departure, he thought he could describe how well a fighter could perform at any point in its flight envelope. If the hypothesis were true, the next step would be to compare the performance of different fighters and determine which one was superior to the other at each point in the envelope. Establishing such a global standard of comparison promised two enormous payoffs:

► First, he could compare the flying characteristics of an existing fighter to those of another, say an American F-4 to a Soviet MiG-17, and thereby identify what tactical regions of the flight envelope were most advantageous or dangerous to the friendly pilot.

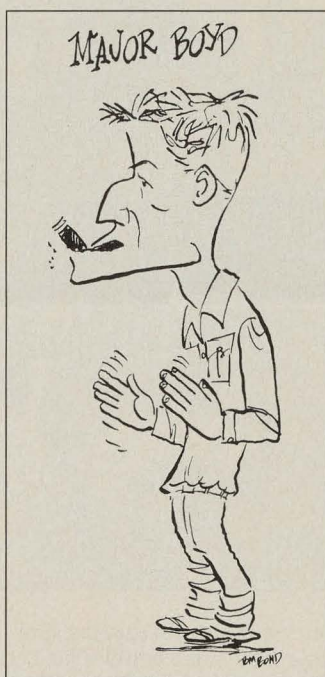
► Second, he could evolve a design for a truly superior fighter by developing a comprehensive tradeoff process that systematically compared the performance of successive, marginally different designs.

While elegant in its simplicity, and computationally straightforward, Boyd's energy-maneuverability theory was a gargantuan number-cruncher that required millions of calculations. The only way to do these calculations was with a computer, but in the early 1960s computer calculations were slow, computer time was expensive—and Boyd had no budget. Furthermore, the aeronautical engineers were not interested in the inspiration of a dumb fighter pilot with a yukky industrial engineering degree. To make matters even worse, Boyd had no right to design airplanes—he worked at Eglin Air Force Base, Florida, where rednecks tested bombs designed by others, whereas the airplane designers worked at Wright-Patterson Air Force Base in Dayton Ohio, the home of the Wright brothers and the mecca for aeronautical engineering. For a man like Boyd, there was only one thing to do. He concocted a daring plan to steal thousands of hours of computer time by making it appear that the computer was being used for something else.

Much to the dismay of the autocrats at Wright-Pat, the Mad Major's theory of energy-maneuverability (E-M) turned out

to be a stunning success. It provided a universal language for translating tactics into engineering specifications and vice versa and revolutionized the way we look at tactics and design fighter airplanes.

Boyd used it to explain why the modern F-4 Phantom performed so poorly when fighting obsolete MiG-17s in Vietnam and went on to devise new tactics for the Phantom—whereupon Air Force pilots began to shoot down more MiGs.



TOM BOND / COURTESY OF J. BURTON

The "Mad Major" got in everybody's face when he had something to say. Once, he burned a hole in a general's tie—and this was a general who agreed with him.

He used it to re-design the F-15, changing it from an 80,000-pound, swing-wing, sluggish behemoth, to a 40,000-pound fixed-wing, high-performance, maneuvering fighter. His crowning glory was his use of the theory to evolve the lightweight fighters that eventually became the YF-16 and YF-17 prototypes—and then to insist that the winner be chosen in the competitive market of a free-play flyoff.

The YF-16, which won, is still the most maneuverable fighter ever designed. The production successors, the not-so-lightweight F-16 (Air Force) and the F/A-18 (the Navy-Marine Corps aircraft that evolved from the YF-17),

not come up with the evidence; in the end, investigators found only four hours of stolen time. When confronted, the Mad Major blew cigar smoke in the chief inspector's face and explained calmly how he had stolen the rest. He then showed the inspectors a thick file of letters, which documented how his requests for computer time had been refused repeatedly by the bean counters at Eglin and the autocrats at Wright Patterson. He suggested they call Headquarters, Tactical Air Command, and tell the Commanding General that Boyd was about to be hosed for uncovering better combat tactics.

The inspectors, being inspectors, sensed a debacle and retreated. The bureaucracy, being a bureaucracy, said it had always liked Energy-Maneuverability and awarded Boyd a scientific achievement award and the Legion of Merit.

The Ghetto Colonel

All this was the stuff of legend in 1973 when I met Boyd, who was living modestly with Mary the Saint and their five children in a run-down apartment complex in Northern Virginia. He was well into his third mutation: the Ghetto Colonel. Like Immanuel Kant, he was an austere man of intense rectitude, whose life had become devoted to the study of science, philosophy, and the humanities in a small room. Like Kant, Boyd was obsessed with understanding how the mind creates knowledge, or in modern parlance, how it creates theoretical models of the real world—how new observations make existing theories obsolete, and how the mind replaces old theories with new theories in a never-ending cycle of destruction and creation.

To this end, he devoured books on physics, mathematics, logic, information theory, evolutionary biology, genetics, cognitive psychology, cultural anthropology, sociology, political science, economics. Between

1973 and 1976, he poured his intellectual energy into producing a 16-page double-spaced, type-written paper describing his theory. Entitled "Destruction and Creation," this abstract treatise describes how a dialectical interplay of analysis and synthesis destroys and creates our mental images of the external world. It describes what pressures drive this mental process, and how internal phenomena naturally regulate it in a never-ending dialectic cycle, which takes on the outward manifestations of disorder turning into order, and order turning into disorder.

At the heart of Boyd's theory of knowledge was a natural regulation mechanism that he discovered by unifying for the first time certain aspects of the Incompleteness Theorem of Mathematics and Logic discovered by Kurt Godel, an Austrian mathematician; physicist Werner



COURTESY OF J. BURTON

John Boyd and Pierre Sprey (seated) mugged for the camera in this gag shot taken in the Air Force Secretary's office with their baby—the lightweight F-16—in the background.

together with the F-15, dominate the skies today. Naturally, Boyd believed they could have been much better war machines if the bureaucrats had not corrupted their thoroughbred design with so many bells and whistles. Nevertheless, more than any other single person, the Mad Major is responsible for our nation's unsurpassed air superiority, which began in the mid-1970s and continues to this day.

Boyd received the accolades, if not the acceptance, of the aeronautical engineering aristocracy for his pioneering work, and the thanks of the combat pilots who now understood how to fight an F-4 against the more maneuverable MiGs.

The Air Force, being the Air Force, tried to court-martial Boyd for stealing the computer time but it could

Heisenberg's Uncertainty Principle; and the Second Law of Thermodynamics. Typically, he did not even try to publish his paper, although he did vet it through many distinguished scientists and mathematicians—none of whom was able to poke any holes in it.

"Destruction and Creation" became the intellectual foundation of his monumental study of competition and conflict—although at the time, he had no idea where his philosophical musings might take him.

Looking back at those four years between 1973 and 1976, I now understand that they were a period of intellectual refueling for the next campaign in Boyd's war against a bureaucratic establishment that had lost sight of its goal. For unlike Immanuel Kant, Boyd worked in the Pentagon, a moral sewer dedicated to using other people's money to feed the predators in the Hobbsean jungle known as the military-industrial-congressional complex.

Viewed from this perspective, the Ghetto Colonel's lifestyle was much more than an aesthetic philosopher's quirk. It was a deliberate choice reflecting that bureaucratic warfare in the Hobbsean jungle had replaced the aerial dogfight as his first love.

Boyd loved a good skunk fight and he played for keeps—instinctively applying Napoleon's dictum of preparing a circumspect defense before unleashing an audacious attack. He built up his defenses by eschewing careerism and materialism, which left the generals and bureaucrats nothing to work on, no opportunity to gain leverage on him, no bait to tempt him into corruption. The Ghetto Colonel became an impenetrable fortress, a bastion of moral power in a way that Mohandas Gandhi would have easily understood. From the perspective of the bureaucracy's authoritarian mentality, however, the man was certifiably insane; even worse, he was completely out of control.

I once asked him why he lived this way. He got in my face, the ever-present cigarillo clenched between his teeth, its hot tip popping up and down a quarter of an inch from my nose, and amidst a gush of suffocating smoke, he explained: "The most important thing in life is to be free to do things. There are only two ways to insure that freedom—you can be rich or you can you reduce your needs to zero. I will never be rich, so I have chosen to crank down my desires. The bureaucracy cannot take anything from me, because there is nothing to take."

This statement went to the core of a puritanical ethos. For the Ghetto Colonel, life revolved around a simple choice: To be or to do? He could *be* somebody, with all the shallow accoutrements of power and small achievements—high rank, a big office in the Pentagon's E-ring, and a big post-retirement job with a defense contractor—or he could *do* important things and make a real contribution to society. The Ghetto Colonel was more interested in doing things than in being somebody, so he cranked down his needs. His choice really was very simple and logical, if somewhat bizarre and indecipherable to the inhabitants of Sodom on the Potomac.

I resigned from the Air Force in 1975. Boyd retired a few months later. He stopped smoking cigars, but not before accidentally burning a hole in a general's tie while using one as a pointer. By 1975, his work on Energy-Ma-

neuverability, the F-15, and the Lightweight Fighters had made him the pre-eminent designer on new fighter concepts in America, if not the world. Most people with his kind of resume would have sold out to industry for a high six-figure income. The airplane contractors, in particular, wanted his talents desperately. One even offered me a fat job if I could convince Boyd to come with me. But the Ghetto Colonel had other things on his mind. His refueling operation was over, and he was ready for action. He was about to mutate into "Genghis John," the creator, chief strategist, and spiritual leader of the Military Reform Movement.

Genghis John

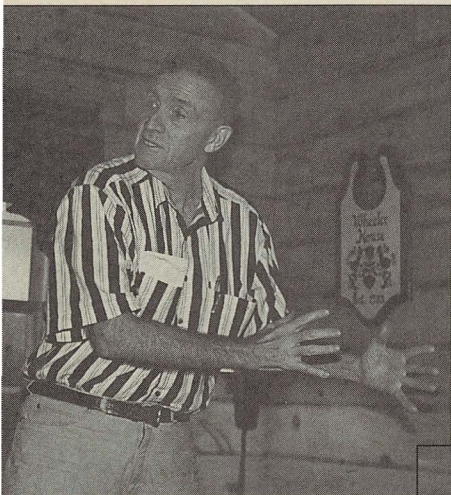
The transformation began quite modestly. After he retired, his old friend and partner in crime from the E-M days at Eglin, Thomas Christie, now a senior civilian in the Pentagon, arranged to hire Boyd as a consultant to the Program Analysis and Evaluation Directorate in the Office of the Secretary of Defense. Housed in a small cubicle of room 2C281, the infamous TacAir shop, Boyd worked 50-hour weeks, although he would accept payment for only one day per two-week pay period. He wanted to work for free, and the Ghetto-Colonel lifestyle enabled him to live on his retirement salary, but a minimal stipend was necessary to keep his security clearance current, and more important, to give him unfettered access to telephones and Xerox machines, which in the primitive days before e-mail were the weapons of choice among the small fraternity of reform guerrillas.

Operating out of this tiny cubicle, a man who held no official position used the force of his intellect and character to become, in the words of the Commandant of the Marine Corps, an architect of victory in the War with Iraq. The transformation of the Ghetto Colonel into Genghis John, however, had its origins in an unrelated anomaly.

The paradoxical results of the flyoff between the YF-16 and YF-17 continued to bother Boyd after he retired. The energy-maneuverability calculations predicted a much closer outcome, with the YF-17 theoretically superior in some portions of the flight envelope. But the pilots were unanimous—the F-16 won hands down. To a man of Boyd's mental discipline, test results in the real world had to be the final authority. So something was missing from his theory, but he did not know what.

He questioned the pilots closely, and with their help, he gradually determined that the decisive advantage of the YF-16 rested in flying characteristics like its "buttonhook" turn. When a YF-16 pilot pulled into an increasingly tight turn, the aircraft lost energy faster than did the YF-17. Normally, this would have been a disadvantage. Since the dawn of fighter aviation in 1914, power limitations made this kind of energy-dumping maneuver a desperation tactic. Once the energy was lost, it was difficult, if not impossible, to regain energy quickly enough to continue the dogfight if one was facing a competent adversary. But the high thrust-to-weight ratios of the new fighters changed the tactical nature of energy dumping in a very fundamental way.

The high-powered YF-16 could regain energy very quickly, and although the E-M calculations had led to the



PHOTOS COURTESY OF J. STEVENSON

Author Jim Stevenson captured Genghis John at his animated best speaking to a group of military reformers in West Virginia. The cigar was gone—but the body language was vintage Boyd.

ity theory could not predict the tactical advantages accruing from such fast-transient maneuvers, and it is a tribute to Boyd's iron discipline and integrity that he uncovered the limitations of the very theory that made him a world-renowned designer.

The discovery of the importance of fast-transient maneuvers, together with his research and writing of "Destruction and Creation" triggered the transformation of the Ghetto Colonel into Genghis John. Strangely, the evolution began with a return to his roots and a new look at F-86 performance in the Korean War.

American fighter pilots achieved roughly a 10:1 kill ratio over their North Korean and Chinese adversaries. Nevertheless, it had long been recognized that the enemy's principal fighter, the MiG-15, could out-turn and out-climb the F-86 in most parts of the flight envelope. Why had American pilots done so well?

The conventional wisdom was that our advantage lay in better-trained pilots, a significant and undeniable fact. Boyd was the first to agree that people always are far more important than hardware in war. He often said "Machines don't fight wars, people do—and they use their minds." Nevertheless, his new appreciation of the tactical benefits of fast-transient maneuvers enabled him to understand how two technical advantages of the F-86 gave the pilot a powerful tactical advantage in a mind-time-space frame of reference.

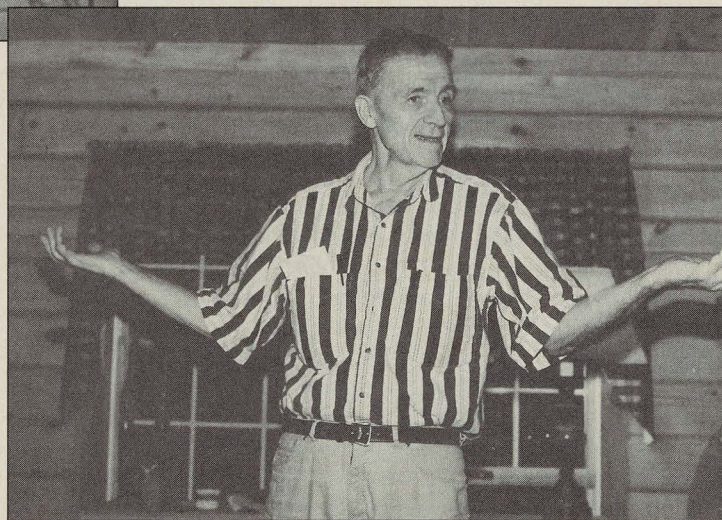
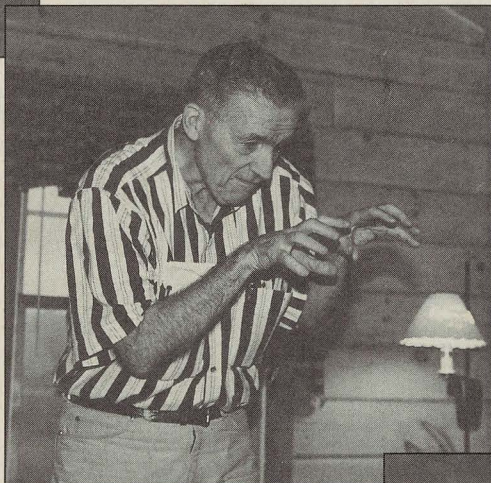
The first related to visibility. The MiG-15 and F-86 were roughly the same size (the MiG was slightly smaller) and therefore about equally visible at a given distance with perhaps a slight edge going to the MiG. The pilot of the F-86, however, had a high-visibility bubble canopy and

high thrust-to-weight designs of the lightweight fighters, the tactical effects of the added power were not fully appreciated during the design stage. During the flyoff, however, the pilots learned by trial and error to take advantage of this power by evolving quick energy-dumping as well as quick energy-pumping tactics. The energy-maneuverabil-

could see out of the F-86 much better than his counterpart in the MiG, whose head was confined by a more compact, aerodynamically streamlined canopy. So, in terms of one's ability to observe his adversary, the F-86 had a distinct advantage over the MiG.

In addition, the F-86 had a fully-powered hydraulic flight control system, whereas the MiG had a hydraulically-boosted mechanical system. An F-86 pilot could move the control stick with one finger, but the greater resistance of the control stick in the MiG meant that its pilot had to exert himself physically every time he turned. This difference in control power enabled the pilot of the F-86 to flip from maneuver to another more easily and quickly than his adversary. Moreover, this advantage grew more important as a dogfight continued, because the higher workload on the MiG pilot increased his mental and physical fatigue at an ever-increasing rate.

Putting these two advantages together, Boyd reasoned that a competent pilot in an F-86 could observe more effectively and decide and act more quickly than an equally competent pilot flying a MiG-15. Put simply, an F-86 that was losing the fight—with a MiG about 40 degrees of his tail—could start a turn in one direction, then, as the MiG followed, reverse the turn using the F-86's superior maneuverability. The maneuver might gain the F-86 pilot 10 degrees



almost immediately, putting the MiG 50 degrees off. Repeating this maneuver-counter maneuver sequence—often called a scissors—would put the MiG pilot farther and farther out of sequence: relatively quickly, the F-86 pilot would be able to work himself into an advantageous firing position. Add in the decision-making effects of better-trained pilots, and our cumulative advantage in the observation-decision-action cycle permitted the F-86 pilot to operate inside his adversary's mind-time-space frame of reference.

Grasping another of his analogies, Boyd reasoned that the Germans had used their *blitzkrieg* to penetrate the French mind-time-space frame of reference in 1940. Perhaps his insight applied to ground warfare as well as air

combat. Over the 15 years between 1977 and 1992, Boyd became obsessed with expanding his insight in to a general theory of competition and conflict. To this end, he absorbed the writings of great military theorists, like Sun Tzu, Clausewitz, and Jomini. He analyzed campaigns of the master practitioners, like Genghis Khan, Tamerlane, Belisarius, Frederick the Great, Napoleon, Grant, Manstein, T. E. Lawrence, Lettow-Vorbeck, Mao, and Giap. Beginning with the Peloponnesian War, he studied conventional battles and guerrilla warfare.

Boyd did not read books, he devoured them—marking them up, cross-correlating information in the front with information in the back, seeking out contradictions with every turn of the page, gleefully tearing each author's argument to pieces. After only six months, his copy of Clausewitz looked as if it were 100 years old. He never attempted to publish his work, but assembled all his research into a 13-hour briefing called a "Discourse on Winning and Losing." He gave the briefing to enlisted men and generals, congressmen, newspaper reporters, scientists, futurists, academics, anyone who would listen.

He thought that any conflict could be viewed as a duel wherein each adversary observes (O) his opponent's actions, orients (O) himself to the unfolding situation, decides (D) on the most appropriate response or countermove, then acts (A). The competitor who moves through this OODA-loop cycle the fastest gains an inestimable advantage by disrupting his enemy's ability to respond effectively. He showed in excruciating detail how these cycles create continuous and unpredictable change, and argued that our tactics, strategy, and supporting weapons' technologies should be based on the idea of shaping and adapting to this change—and doing so faster than one's adversary.

While the concept of disrupting an opponent's decision cycle is an old idea in military affairs, Boyd's theory of operating inside an adversary's decision cycle—or OODA loop—and its relationship to conflict is a bold new conception. His strategic aim was to isolate his adversary—physically, mentally, and morally—from his external environment by destroying his view of the world: his orientation. The key to appreciating the power of Boyd's idea is to understand why the orientation function is the door through which a competitor can penetrate his opponent's decision cycle.

Each of us bases our decisions and actions on observations of the outside world that are filtered through mental models that orient us to the opportunities and threats posed by these observations. As Konrad Lorenz and others have shown, these mental models, which the philosopher of science Thomas Kuhn called paradigms, shape and are shaped by the evolving relationship between the individual organism and its external environment.

In conflict, each participant, from the individual soldier trying to survive to the commander trying to shape strategy, must make decisions based on his orientation to reality—his appreciation of the external circumstances which he must act on. Boyd argued that one's orientation to the external world changes and evolves, because it is formed by a continuous interaction between his observations of unfolding external circumstances and his interior orien-

tation processes that make sense of these circumstances. These interior process take two forms activity: analysis (understanding the observations in the context of pre-existing patterns of knowledge) and synthesis (creating new patterns of knowledge when existing patterns do not permit the understanding needed to cope with novel circumstances).

The synthetic side of the dialectic is crucially important to one's orientation, because it is the process by which the individual (or group) evolves a new world view, if and when one is needed to cope with novel circumstances. But as Kuhn and others have shown, the synthetic process can be extremely painful, because its nature is to build a new paradigm by destroying the existing one. Boyd strove to use multiple, quick-changing destructive thrusts to isolate his adversary from reality by destroying his existing paradigm, and at the same time, deny his adversary the opportunity to synthesize a new paradigm. The combination of menacing pressure and an inability to cope with external circumstances cause the adversary to experience various combinations of uncertainty, doubt, confusion, self-deception, indecision, fear, panic, discouragement, and despair—which, in turn, overload his capacity to adapt or endure.

John Boyd is dead, but his ideas live on. They are cropping up in books, often without proper citation, in subjects ranging from warfare to economic competition to political strategy. Representative Newt Gingrich (R-GA) used them to plot the Republican takeover of Congress. Secretary of Defense Dick Cheney used Boyd's ideas when he overrode the Army's plan and insisted on the famous left hook into Kuwait. But the Marines have paid the retired Colonel the highest compliment. They will dedicate a section of their library at the Marine Corps University at Quantico, Virginia, to a collection of his unpublished papers and research materials.

His intellectual achievements pale beside the moral example he set. He asked for nothing other than the opportunity to contribute. I saw first hand how he passed up riches and status to make his contribution. He put service to truth and country ahead of everything else. He set an example of integrity and morality that is rare in a Washington where the Lincoln bedroom is for sale, the Speaker of the House flunks the ethics test, and the special interests of the defense contractors carry more weight than the needs of our soldiers and the rights of taxpayers—which is why men as different as General Charles Krulak, James Fallows, Colonel David Hackworth, and Senator Charles Grassley went out of their way to page homage to a great man's passing.

John Boyd always said the choice facing us all is "To Be or To Do." Paradoxically, Genghis John did things—and still ended up being somebody.

Colonel Boyd is survived by his wife, five children, two grandchildren, and—much to the chagrin of the card-carrying members of the military-industrial-congressional complex—a growing number of disciples who are carrying forward his good work.

Franklin Spinney, a former Air Force officer, has worked in the Office of the Secretary of Defense since 1977. He worked closely with Colonel Boyd for more than 23 years.

Fifth Fleet, Arriving

By Vice Admiral John Scott Redd, U.S. Navy

Through a policy of regional engagement, containment of Iran and Iraq—here, the *Russell* (DDG-59) launches a Tomahawk cruise missile against Iraq in September, 1996—and just “being there,” a reborn Fifth Fleet supports and protects U.S. interests in one of the world’s most potentially volatile regions.

On 1 July 1995, the Navy recommissioned the Fifth Fleet in the Arabian Gulf—the first stand up of a new Fleet in 50 years. Although the affair itself was low-key, the commissioning was significant. For almost half a century, U.S. interests in the Gulf had been represented by the Middle East Force, normally comprised of a few surface combatants and a flagship. Since the Gulf War, however, naval presence had increased significantly. Establishment of Fifth Fleet sent two signals:

- ▶ It codified the facts of life—our naval presence had grown to meet a new situation.
- ▶ It put substance to the words of then-Secretary of State Warren Christopher that our commitment to the region was enduring and “ironclad.”

In the last of my two years as Commander U.S. Naval Forces, Central Command, I had the privilege of serving concurrently as the fifth Commander of the U.S. Fifth Fleet. It is, to my mind, the best job in the Navy. First, it is the vice admiral farthest removed from the Pentagon. More substantively, the combination of component and fleet commander duties offers a wide range of responsibilities, from real-world fleet operations to politico-military matters at the highest levels. Finally, the theater itself is incredibly dynamic, rich in culture, intrigue, danger, and—most important—vital international interests.

The United States—indeed, the entire industrial world—has a vital stake in the region. Our government has defined our interests as threefold:

- ▶ Stability in the region
- ▶ Countering the proliferation of weapons of mass destruction
- ▶ Ensuring access to strategic natural resources (in a word, oil)

These interests are not new—nor are they transitory. Clearly, we will remain engaged indefinitely in a region containing more than 60% of the world’s known oil reserves. What has changed is the threat.

During much of the 1980s we kept a carrier battle group in the Indian Ocean/Northern Arabian Sea in response to Iranian threats—primarily maritime—to our interests. In

1990, when one Arab state invaded another, the ground threat to those interests became up close and personal for half a million U.S. service members. Both threats remain and appear likely to endure. With the recognition that we should operate large naval formations in the Gulf and with the inclusion of much of the northern Indian Ocean in Central Command’s area of responsibility, Central Command has undergone a steady evolution from a largely land focus to one with a significant maritime dimension as well.

The Fifth Fleet commander, like his counterparts around the world, faces a challenging set of key issues every day. In the case of Fifth Fleet, my daily checklist had five items: Iran, Iraq, the ongoing maritime interception operations, the current “hot button,” and, finally, the normal forward engagement activities that navies always have done. Looking at each of these in turn, one can gain an understanding of the scope and diversity of challenges facing the Navy in the troubled waters of the Central Command and draw several conclusions about the nature of U.S. military operations in the region.

The Fifth Fleet

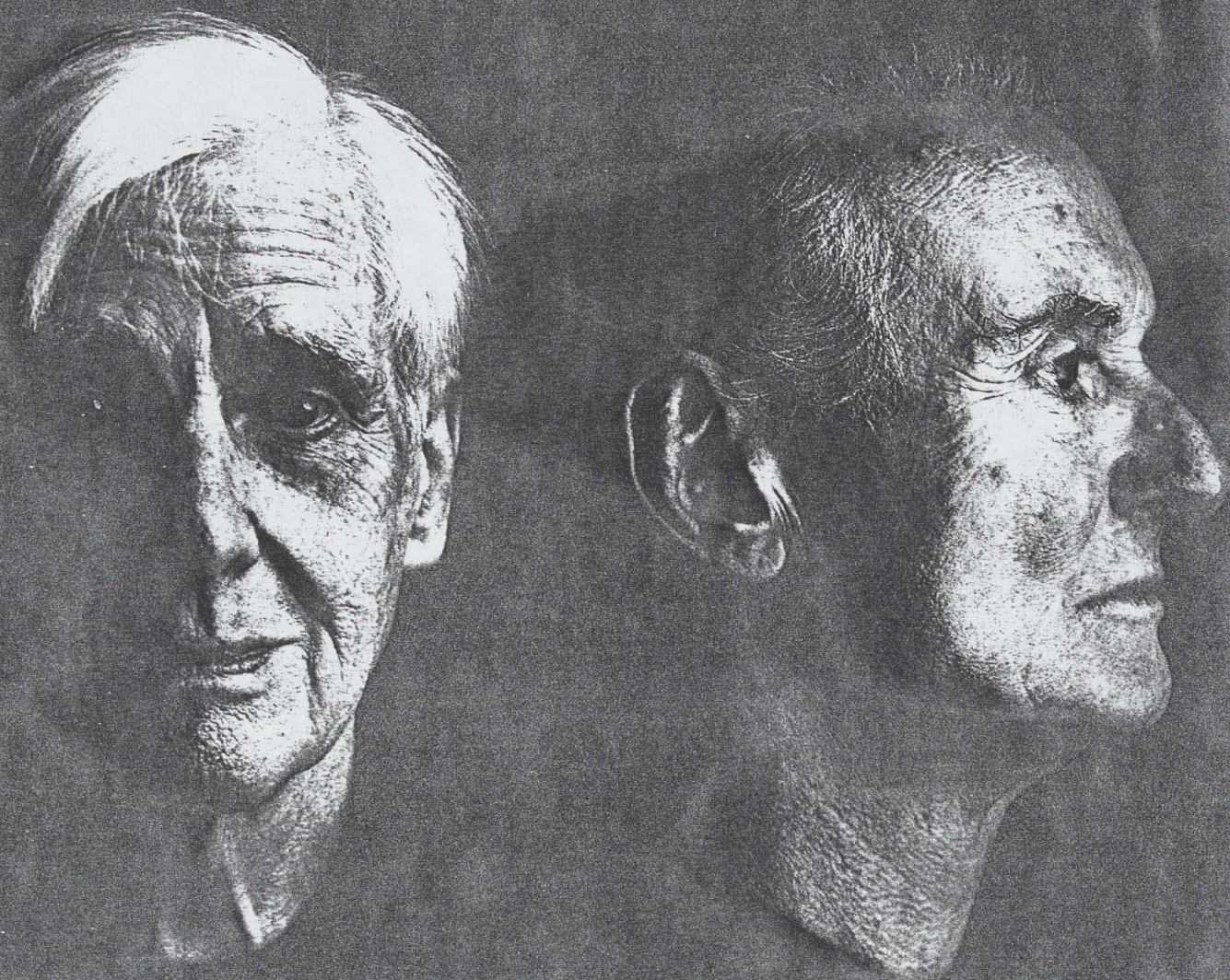
Organizationally, Fifth Fleet is part of U.S. Central Command, which is headquartered at MacDill Air Force Base in Tampa, Florida. Its commander is dual-hatted as Commander U.S. Naval Forces, Central Command, and is the only forward-deployed component commander of Central Command. He thus is charged with the conduct of maritime operations throughout a complex theater stretching from Egypt southward to Kenya and eastward to Pakistan, and including key bodies of water and three critical maritime choke points.

The Fifth Fleet may be the newest of the so-called fighting fleets, but it is the full equivalent of both Sixth and Seventh Fleets. This may come as a surprise to some, especially to those naval officers who still remember the old MidEastFor. Nothing could be further from reality. Today’s Fifth Fleet includes the most modern ships in our Navy: typically, a carrier battle group, an amphibious ready group, and the surface ships of Destroyer Squadron 50—the forward-deployed squadron whose commander now serves as Commander, MidEastFor. In addition, submarines, support ships, and afloat prepositioning ships operate routinely in the Arabian Gulf and Indian Ocean. On any given day, Commander Fifth Fleet has between 15 and 35 ships under his operational command. When the carrier battle group and amphibious ready group are present, this equates to about 14,000 Sailors and Marines.

Fifth Fleet operations are littoral warfare defined. Within in the close quarters of the Arabian Gulf, command and

The New York Times Magazine

JANUARY 4, 1998 SECTION 6



The Lives They Lived

...e people who made a difference. Michael Kimmelman on **Willem de Kooning and Roy Lichtenstein**
...tian Junger on **Donald Flickinger** Robert Lipsyte on **Curt Flood** Wendy Wasserstein on **Leo Rosten**
...ry Peck, Diane Keaton, Joanne Woodward and Tony Randall on **Sanford Meisner** Richard Holmes on **Leon Edel**
...Vonnegut Jr. on **Bernard Vonnegut** Frank Deford on **Joanie Weston** Brent Staples on **John Sengstacke**
...n Trillin on **Murray Kempton** Suzanne Farrell on **Alexandra Danilova**. And others. **An Annual Issue**

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Burma jumpers: Flickinger flanked by Cpl. William G. McKenzie and Sgt. Richard Passey.

Dr. Donald D. Flickinger

The Escape Artist

b. 1907 Flickinger first gained renown during World War II for parachuting into the jungles of Burma to save downed airmen. He went on to help develop life-support systems for high-altitude flight and space travel.

By SEBASTIAN JUNGER

August 1943: The German war machine was running down, the U.S. Navy was decimating the Japanese fleet in the Pacific, but a problem still lurked

Sebastian Junger is the author of "The Perfect Storm: A True Story of Men Against the Sea."

in the jungles of Burma. Japanese forces, determined to cut China off from the outside world, had severed the Burma Road, the last overland supply route for the beleaguered forces of Chiang Kai-shek. All Chiang had left were his air bases, and if those were overrun, his army would collapse. The Japanese would effectively control China, and from there, it was feared, they could wage war for years.

The Allies planned a big push into northern Burma in the winter of '43-'44 to drive the Japanese from their jungle bases, but in the meantime, they had to keep Chiang propped up. From air bases in India, American pilots started playing Russian roulette over "the Hump," a 500-mile stretch of mountains between them and Chiang's forces. The route took them over the Himalayas, where the weather was so severe it could flip a transport plane upside down, and across the jungles of Burma. More planes were lost flying supplies across the Hump than were lost in combat over China.

Over the course of these missions, a

young flight surgeon named Donald Flickinger started making a name for himself. Handsome, brave and hopelessly charming, over and over again he parachuted into the Burmese jungle — an area simply marked "unexplored territory" on the map and inhabited by Naga headhunters — to treat downed airmen and lead them to safety.

Flickinger's most famous rescue came early in August 1943, when a C-46 transport plane went down on the Chinese border. The plane radioed an SOS and then the 21 crew and passengers — including the newsman Eric Sevareid and several U.S. intelligence personnel — bailed out. Except for the co-pilot, they all survived the jump. Flickinger was quickly flown in with two other medics, and the three men parachuted straight into the clearing where the survivors were camped. Flickinger, who had thought to bring trade goods with him, quickly won the cooperation of the Naga, and a month later the entire party emerged from the jungle without having lost a single man.

"If someone made an error," recalls Richard Passey, who made the jump with Flickinger, "he explained the right way to do it and nothing more was ever said about it. He was one of the coolest people I ever ran into."

After the war, Flickinger worked on the problems of high-altitude flight for

Col. John R. Boyd

A Fighter on Many Fronts

b. 1927 Col. John Boyd's name has become synonymous with moral and physical bravery. He was an architect of the military reform movement in the Department of Defense in the 1970's and 80's.

By DAVID H. HACKWORTH

Col. John Boyd was the original "Top Gun," a fighter pilot who was also one of America's greatest military thinkers. He was also a national treasure of rectitude and moral bravery.

As a young captain in the 1950's, Boyd developed the dogfight tac-

David H. Hackworth, who has earned eight purple hearts, is a retired Army colonel.

tics and curriculum at the Air Force Fighter Weapons School. He emphasized improvisation and surprise rather than dogma and routine. He wrote a treatise on tactics that became the bible of air-to-air combat all over the world.

He was known as 40-Second Boyd because he defeated opponents in aerial combat training exercises in less than 40 seconds.

In 1960, after finishing his

treatise, Boyd was enrolled by the Air Force at Georgia Tech, where he received a master's in industrial engineering. He was later assigned to the Pentagon to oversee fighter aircraft development, taking the abstract aeronautic designs created by nonflying engineers and redesigning them in the light of his flying experience. The result was more agile, less expensive planes

the Army and later for the Air Force. His specialty was high-altitude survival and bailout, in which pilots are forced to parachute from as high as 30,000 feet. He helped develop oxygen systems, barometric releases for parachutes and the pressurized suits that help pilots withstand the huge G-forces generated by high-performance flight. He went on to work with the Lovelace Clinic in Albuquerque, N.M., where pilots were subjected to harrowing ordeals to prepare them for the hardships of the Mercury space shots. "Flickinger enabled men to survive in an increasingly hostile environment," says Robert Hotz, a lifelong friend from the war. "The Hump, when you come right down to it, is more hostile than outer space."

The Air National Guard pararescue jumpers — some of the most elite men in the military — can trace their origins to Flickinger's escapades in Burma. They are charged with flying cover for the space-shuttle launches, and one of the odd twists of Flickinger's career is that a Presidential commission determined that the crew of the Challenger might have survived had they had the kind of emergency equipment he helped devise. (NASA has since made such equipment mandatory on space shuttles.)

Flickinger started his career as a cavalry officer and went on to survive the attack on Pearl Harbor, operating for 72 hours straight on wounded servicemen. One can only imagine what he thought when he heard that the Challenger crew may well have lived right up until the moment they hit the Atlantic Ocean. ■



Lieutenant Boyd, ready to go in 1953.

that shaped the design of post-Vietnam War fighter aircraft.

For instance, the F-15 fighter plane was going to be an 80,000-pound, swing-wing behemoth.

John P. Snyder

The Earth Made Flat

b. 1926 A gifted amateur with a pocket calculator and a spare bedroom for a study, Snyder solved one of the most vexing map-making problems of the century.

By MARK MONMONIER

John Snyder was a chemical engineer who studied maps as a hobby but ended up solving a key cartographic problem of the space age. In 1972, NASA launched the first of many Landsats, which circled the earth several times a day at an altitude of roughly 500 miles. With electronic scanners, these new mapping satellites captured massive amounts of new information about terrain, vegetation and land use. But their images lacked meridians and parallels, the standard reference grid that provides geographic orientation, and there was no way to translate the abundance of satellite data into the language of a standard map.

Snyder heard of the problem almost by chance. He had published a cartographic history of New Jersey, his home state, in 1973 and moved on to working out map projections — or formulas that convert the spherical globe to a flat map — on a pocket calculator in his home in Madison, N.J. In 1976, on a vacation conveniently coinci-

Mark Monmonier is a professor of geography at Syracuse University. His book "Cartographies of Danger: Mapping Hazards in America" is dedicated to John Snyder.

Boyd streamlined it into a lean 40,000-pound, fixed-wing flying machine that as recently as the gulf war proved that it has no equal.

These changes, however, did not come without a struggle from the top brass and the racketeers from the defense contractor industry. Luckily, Boyd was as adept as a bureaucratic infighter as he was as a fighter pilot. That is, he

had no peer. One example: A general known for terrorizing subordinates ordered Boyd to write and sign a paper championing the B-1 bomber. Boyd disagreed with the position. Boyd wrote the paper exactly as the general directed. He also wrote a memorandum explaining why he disagreed with his own paper. Boyd threatened to release both papers so that people would know where

he stood. The general's paper was never sent out. This, and other methods of bureaucratic subterfuge — like redesigning a plan in secret and presenting it as an accomplishment — have been copied by the many Young Turks who were drawn to the charismatic Boyd. These men are still in all the services and are carrying on Boyd's good work, striving to serve the public over self. ■

dent with a meeting of geodetic scientists at Ohio State University, he heard Alden Colvocoresses, a research scientist with the U.S. Geological Survey, outline the problem and appeal for a solution. Several months later, Snyder mailed in his, complete with 82 equations. Impressed with his ability and enthusiasm, the Geological Survey offered him a job.

The problem was unique. Snyder's predecessors could follow the conventional strategy of reducing the earth to a stationary globe, wrapping it in a cone or cylinder and transferring coastlines, boundaries and other features onto the flattenable surface. Satellite mapping vastly confounded the process by adding a moving vantage point.

In addressing the problem, Snyder cleverly adapted the famed Mercator map to a moving target. His solution, the Space Oblique Mercator projection, not only adds the necessary grid but provides a low-distortion view of the area along the spacecraft's ground track, the path directly below it. In map makers' jargon, the Space Oblique Mercator projection combines true scale along the ground track with an exact rendering of angles and small shapes and mini-

Snyder in 1978 at his home, where he developed techniques for mapping satellite pictures.

mal distortion of angles and distances. Quite an accomplishment for an amateur.

In 1978, at the age of 52, Snyder thus began his successful second career with the Geological Survey's professional staff. His various guides are illustrated with diagrams, programmed himself on a computer, as well as his desire for the field, "Flat Earth: Two Thousand Projections," are now primary reference works on the subject. Modest and fair, Snyder always credits Colvocoresses with the original projection that he tinkered made and to this day his name is known outside the field.

John P. Snyder died after a valiant struggle. Although no one writes his name, his diagrams and lucid essays on the use and history of map-making make him every bit as good as any map maker in his line, Gerard Mercator.



Congressional Record

Speech by Senator Grassley
memorializing John

Chuck

PROCEEDINGS AND DEBATES OF THE 105th CONGRESS, FIRST SESSION

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changed, cannot be over-emphasized. The wording in all MAU dictation is carefully thought out, discussed, peer reviewed often times, and results from correct interpretations of the data. Any dictation signed out by the MAU Unit Chief or his designee should not be changed in any manner without the proper notification and consent of the AE.

In my opinion, SSA *** chose to ignore this longstanding practice, a practice that everyone else adheres to.

It is clear that SSA *** does not understand the scientific issues involved with the interpretation and significance of explosives and explosives residue composition. He therefore should realize this deficiency and differentiate between his personal opinions and scientific fact. An expert's opinion should be based upon objective, scientific findings and be separated from personal predilections and biases.

In order to identify a given material, it is necessary for the examiner to acquire sufficient data using acceptable scientific techniques/protocols and instrumentation to specifically identify it. If that level of data is not acquired or does not exist, then complete identification is not possible and words such as "consistent with" or "similar to" are used. This is nothing new. It is taught in our colleges and universities. It is a standard set by MAU based on experience/background, education, discussions, research and peer review of the analytical procedures in place. By rewording AE dictation, SSA *** places an examiner in the position where he/she would be required to advise the court that the report overstates the findings and therefore is incorrect.

A FBI Laboratory report is evidence. Often times the report itself is entered into evidence during the trial proceedings. The fact that SSA *** did make unauthorized changes in these reports could have resulted in serious consequences during legal proceedings and embarrassment to the Laboratory as well as the entire FBI.

In conclusion, SSA *** committed errors which were clearly intentional. He acted irresponsibly; he should be held accountable; he should be disciplined accordingly. The problems regarding AE alterations by SSA *** are verified. All of the AE dictation furnished to SSA *** by SSA WHITEHURST has been reviewed. The causes, reasons and events which led to the occurrence of the errors has been discussed. The appropriate administrative action, in my opinion, should be that SSA *** be given a letter of censure.

DEPARTMENT OF JUSTICE,
FEDERAL BUREAU OF INVESTIGATION,
Washington, DC, November 8, 1995.

FBI Director Louis J. Freeh today released the following statement:

The FBI looks forward to working with the Blue Ribbon Panel named today. The FBI will assist the panel in every manner possible to ensure an objective review of our examinations and policies.

Over the past several years, Special Agent Frederic J. Whitehurst has raised a variety of concerns about forensic protocols and procedures employed in the FBI Laboratory. The FBI has vigorously investigated his concerns and is continuing to do so. The FBI alone has reviewed more than 250 cases involving work previously done by the Laboratory. To date, the FBI has found no evidence tampering, evidence fabrication or failure to report exculpatory evidence. Any finding of such misconduct will result in tough and swift action by the FBI.

The FBI Laboratory conducts over one million examinations per year and our experts testify hundreds of times annually in state and federal courts of law. At trials, FBI

Laboratory examinations are constantly subject to extraordinarily vigorous challenge through cross-examination and the presentation of expert testimony by defense witnesses.

The PRESIDING OFFICER (Mr. BROWNBACK). The Senator from Virginia.

Mr. ROBB. Thank you, Mr. President.

BALANCE THE BUDGET

Mr. ROBB. Mr. President, leadership often involves seizing the moment. And right now the moment is a real but rapidly fleeting chance to actually balance the Federal budget. For those of us who have long been dedicated to stopping the Federal Government from spending more than it takes in, the moment is now. While we're away from Washington during the recess, I hope that we will use this time to prepare ourselves for serious work on the budget when we return. We cannot let another opportunity to do what's right pass us by.

I recognize the fear on both sides. The President is understandably reluctant to embrace a necessary change in the Consumer Price Index because of its effect, however minimal, on benefits for a large and vocal segment of the population. The Republican Party is reluctant to scale back its calls for a massive tax cut because of a similar effect on an equally vocal segment of their supporters.

But simple math dictates that both must occur if we are truly interested in balancing the budget and keeping it in balance over the long term. And the reality is that entitlements have got to be curbed, and the resulting savings have got to go to reducing the deficit, not tax cuts.

The Speaker of the House has taken a bold step by expressing a willingness to surrender tax cuts until the budget is balanced. I hope the President will meet this bold step by expressing his willingness to reconsider an adjustment in the CPI, or some other means to accomplish the same goal.

As meetings take place over the course of the congressional recess, I would encourage both sides to use as a starting point the Centrist Coalition budget developed last year by a bipartisan group of Senators, including myself.

The Centrist plan, known also as the Chafee-Breaux plan, was the only budget in the Senate last year that received bipartisan support. In fact, the Centrist plan received 46 votes. And to me, that seems like a logical place to start.

Our plan used conservative economic assumptions, a rational reduction in the Consumer Price Index, and a modest tax cut. We did not have, within our coalition, universal agreement on all aspects of the plan. Personally, I have always wanted to postpone even modest tax cuts until we actually achieve balance. But, I believe it provides a reasonable roadmap now of how to get from here to a budget that bal-

ances, I hope that this plan will help guide congressional and White House negotiators during their upcoming budget talks.

With that, Mr. President, I hope all of our colleagues come back fully reenergized and ready to start producing some results.

I yield the floor.

The PRESIDING OFFICER. Who seeks time?

Mr. GRASSLEY addressed the Chair.

The PRESIDING OFFICER. The Senator from Iowa.

COL. JOHN BOYD

Mr. GRASSLEY. Mr. President, I am very sad to report that Air Force Col. John Boyd died in West Palm Beach, FL, on March 9, 1997.

He was 70 years old.

He passed away after a long and difficult fight with cancer.

His remains were laid to rest today in Arlington Memorial Cemetery.

John was a native of Erie, PA. But John came to Iowa to go to college.

Iowa is where his Air Force career began.

He won an athletic scholarship to the University of Iowa and enrolled in the Air Force ROTC program.

After graduating in 1951, he went to flight school. He earned his wings and began flying the F-86 Saber jet.

Then he went to Korea with one goal: shoot down a MiG.

Fortunately, for everyone concerned, that conflict came to an end before his wish came true.

But to John that was one of the biggest disappointments of his life.

Mr. President, I am proud that John Boyd was educated in Iowa.

He was a great American who dedicated his life to public service.

I would like to honor him by speaking briefly about some of his most important accomplishments.

First and foremost, John Boyd was a legendary Air Force fighter pilot.

But John was no ordinary jet jockey. He applied his vast intellect to understand the dynamics of air combat maneuvering at which he excelled.

To do that, though, he had to teach himself calculus so he could work the formulas to quantify the problem.

This was the problem he saw.

Why did the heavier and slower American F-86 achieve near total domination of the superior MiG-15 encountered in Korea?

John wanted an answer to the question.

After doing some truly original and pioneering work, he began advancing a theory.

His tactical "Aerial Attack Study" became the bible for air-to-air combat training.

It was instrumental in the creation of the Fighter Weapons School at Nellis Air Force Base, NV.

That's the Air Force equivalent of the Navy's "Top Gun" program.

John being John, he never slacked off. He kept right on working and developing his theory of aerial combat.

He wanted to take it to a higher plane.

And he did.

It culminated in the Energy Maneuverability Theory.

This was a very important piece of work.

John Boyd's Energy Maneuverability Theory was seminal in the development of two of our premier fighters: first the F-15 and then the F-16.

That theory helped to shape the design of those two very important airplanes.

So, Mr. President, John Boyd was truly a giant in the field of air warfare.

When I first met John in early 1983, he was applying his genius in an entirely different field.

He had retired from the Air Force and had set up shop over in the Pentagon.

He was given a small consulting contract and a cubbyhole-size office to go with it.

His Pentagon cubbyhole was the birthplace of some very important ideas.

That's when I met John Boyd. He was just beginning his reform crusade.

He was the leader of the Military Reform Movement.

At that point in time, I was wrestling with the Reagan administration's plan to pump up the defense budget.

I was searching for an effective strategy to freeze the defense budget.

Cap Weinberger was the Secretary of Defense, and he kept asking for more and more money.

The DOD budget was at the \$210 billion level that year.

But Cap Weinberger had plans to push it first to \$300, then \$400, and finally to \$500 billion.

The money sacks were piled high on the steps of the Pentagon.

It seemed like there was no way to put a lid on defense spending—that is until John Boyd walked in my office.

To this day, I don't know how he got there. Ernie Fitzgerald may have introduced us. I don't quite remember.

But John had a secret weapon.

His secret weapon was Chuck Spinney.

Chuck was an analyst in the Pentagon's office of Program Analysis and Evaluation, or PA&E.

He had a briefing entitled "Plans/Reality Mismatch."

John's plan was to use Spinney's material to expose the flaws in Weinberger's plan to ramp up the defense budget.

So I asked DOD for Mr. Spinney's briefing but ran smack into a stone wall.

At first, the bureaucrats tried to pretend it didn't exist.

For example, Dr. Chu, Spinney's boss, characterized Spinney's briefing as nothing more than: "Scribbles and writings gathered up and stapled together."

Well, that didn't wash. It just added fat to the fire.

DOD could no longer suppress the truth.

The Wall Street Journal and Boston Globe had already published major reports on Spinney's briefing. A number of other newspapers had it and were ready to roll.

The press knew this was a substantial and credible piece of work.

John's behind-the-scenes maneuvering finally led to a dramatic hearing that was held in the Senate Caucus Room in February 1983.

It was an unprecedented event.

It was the only joint Armed Services/Budget Committee hearing ever held.

In a room filled with TV cameras and bright lights, Spinney treated the committee to a huge stack of his famous spaghetti charts.

This was Spinney's bottom line: The final bill of Weinberger's 1983-87 defense plan would be \$500 billion more than promised. It was devastating.

Mr. Spinney's outstanding performance won him a place on the cover of Time Magazine on March 7, 1983.

And it effectively put an end to Weinberger's plan to pump up the defense budget.

Two years later, my amendment to freeze the defense budget was adopted by the Senate.

If John Boyd hadn't come to my office and told me about Chuck Spinney, the hearing in the Senate Caucus Room might not have taken place.

And if that hearing hadn't happened like it did, I doubt we would have succeeded in putting the brakes on Weinberger's spending plans.

The Plans/Reality Mismatch hearing was just one episode in the history of the military reform movement, but it is the one that brought me and John together.

There were many others. John was always the driving force behind the scenes, giving advice, planning the next move, and always talking with the press.

John Boyd always set an example of excellence—both morally and professionally.

Mr. President, since John died, there have been several articles published about some of his exploits.

There was a truly beautiful obituary—if such a thing exists—in the March 13 issue of the New York Times. It describes John's vast contributions to air warfare.

Second, there is a more colorful piece, which will appear in the March 24 issue of U.S. News and World Report.

That one is written by Jim Fallows and is entitled "A Priceless Original."

Mr. Fallows describes some of John's important contributions against the backdrop of his unusual character traits.

Then, there is the letter from the Marine Corps Commandant, General Krulak.

General Krulak describes John as "an architect" of our military victory over Iraq in 1991.

That's an oblique reference to John's "Patterns of Conflict" briefing. This piece of work had a profound impact on U.S. military thought.

It helped our top military leadership understand the advantages of maneuver warfare. Those ideas were used to defeat Iraq.

And finally, Col. David Hackworth has devoted his weekly column to John Boyd. It is entitled: "A Great Airman's Final Flight."

I ask unanimous consent to have these reports printed in the RECORD.

Mr. President, we have lost a great American—a true patriot. I will miss him.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

(From the New York Times, Mar. 13, 1997)
COL. JOHN BOYD IS DEAD AT 70; ADVANCED AIR COMBAT TACTICS

(By Robert McG. Thomas, Jr.)

Col. John R. Boyd, a legendary Air Force fighter pilot whose discovery that quicker is better than faster became the basis of a far-reaching theory that helped revolutionize American military strategy, died on March 9 at a hospital in West Palm Beach, Fla. He was 70 and had lived in Delray Beach.

The cause was cancer, his family said. To combat pilots of the late 1950's, it was always high noon in the skies above the Nevada desert. A pilot, a crack instructor at Nellis Air Force Base, perhaps, or a hotshot Navy flier passing through would get on the radio to call him out and within minutes Colonel Boyd would have another notch in his belt.

They did not call him 40-second Boyd for nothing. From 1954 to 1960 virtually every combat pilot in the country knew that Colonel Boyd, a former Korean War pilot who helped establish the Fighter Weapons School at Nellis, had a standing offer: take a position on his tail, and 40 twisting, turning seconds later he would have the challenger in his own gun-sights or pay \$40. Colonel Boyd never lost the bet in more than 3,000 hours of flying time.

A high school swimming champion who won an athletic scholarship to the University of Iowa, Colonel Boyd, a native of Erie, Pa., had superior reflexes and hand-eye coordination, but what made him invincible in mock combat was something else.

At Nellis he taught himself calculus so he could work out the formulas that produced his repertory of aerial maneuvers and led to his 1960 report, "Aerial Attack Study," the bible of air-to-air combat.

His combat experience was limited to a few missions in Korea, but they were enough to produce a breakthrough insight. Wondering why the comparatively slow and ponderous American F-86's achieved near total domination of the superior MIG-15's, he realized that the F-86 had two crucial advantages: better visibility and a faster roll rate.

This, in turn, led Colonel Boyd to develop what he called the OODA Loop, to denote the repeated cycle of observation, orientation, decision and action that characterized every encounter. The key to victory, he theorized, was not a plane that could climb faster or higher but one that could begin climbing or change course quicker—to get inside an adversary's "time/cycle loop."

The fast-cycle combat theory, expanded by Colonel Boyd into a lecture he later delivered hundreds of times, has since been widely applied to fields as diverse as weapons procurement, battlefield strategy and business competition.

One implication of the theory was that the best fighter plane was not necessarily the one with the most speed, firepower or range. Colonel Boyd, who enrolled at Georgia Tech

after his Nellis tour, was helping a fellow student with his homework over hamburgers and beer one night when he had an insight that led to a way to quantify his ideas. The resulting Energy Maneuverability Theory, which allows precise comparisons of maneuverability, is now a standard measure of aerial performance.

Assigned to the Pentagon in 1964, Colonel Boyd became an important figure in a movement that started in response to \$400 hammers and other headline excesses of Defense Department spending and soon expanded to question the need for many hugely expensive weapons systems.

Although he had allies in the Pentagon, Congress and business, Colonel Boyd's ideas often went against the grain of a military-industrial bureaucracy devoted to the procurement of the most advanced, most expensive and (not coincidentally, he felt) most profitable planes.

Although his design ideas helped give the F-15 a big, high-visibility canopy, his major triumph was the F-16, a plane lacking many of the F-15's high-tech, expensive features, but which is far more agile and costs less than half as much, allowing for the purchase of many more of them for a given expenditure.

Top Air Force officers were so opposed to the concept of producing a plane that did not expand on the F-15's cutting edge technology that Colonel Boyd and some civilian allies developed it in secret.

The plane was hailed for its performance in the Persian Gulf war, a war whose very strategy of quick, flexible response was based largely on ideas Colonel Boyd had been promoting for years.

Colonel Boyd, who maintained that the lure of big-money defense contracts invariably perverted weapons assessment, was so personally fastidious that during his years in the Pentagon he became known as the Ghetto Colonel because he lived in a basement apartment.

He carried his notion of propriety to such an extreme that when he retired in 1975 and began some of his most productive work, as a Pentagon consultant, he insisted that his family live on his retirement pay. Initially offering to work full time without pay, he was persuaded to accept one day's pay every two-week pay period, because he had to be on the Pentagon payroll to have access to the building, before retiring in 1988.

He is survived by his wife, Mary; three sons, Stephen, of Springfield, Va., Scott, of Burke, Va., and Jeff, of Delray Beach, Fla.; two daughters, Kathryn, of Delray Beach and Mary Ellen Holton of Centerville, Va.; a brother, H.G. Boyd of Pompano Beach, Fla.; a sister, Marion Boyd of Erie, and two grandchildren.

[From Inside the Pentagon, Mar. 13, 1997]

LETTER TO THE EDITOR

TO THE EDITOR: I was deeply saddened to learn of the passing of Colonel John Boyd, USAF (Ret.). How does one begin to pay homage to a warrior like John Boyd? He was a towering intellect who made unsurpassed contributions to the American art of war. Indeed, he was one of the central architects in the reform of military thought which swept the services, and in particular the Marine Corps, in the 1980's. From John Boyd we learned about competitive decision making on the battlefield—compressing time, using time as an ally. Thousands of officers in all our services knew John Boyd by his work on what was to be known as the Boyd Cycle or OODA Loop. His writings and his lectures had a fundamental impact on the curriculum of virtually every professional military education program in the United States—and on

many abroad. In this way he touched so many lives, many of them destined to ascend to the very highest levels of military and civilian leadership.

Those of us who knew John Boyd the man knew him as a man of character and integrity. His life and values were shaped by a selfless dedication to Country and Service, by the crucible of war, and by an unrelenting love of study. he was the quintessential soldier-scholar—a man whose jovial, outgoing exterior belied the vastness of his knowledge and the power of his intellect. I was in awe of him, not just for the potential of his future contributions, but for what he stood for as an officer, a citizen, and as a man.

As I write this, my mind wanders back to that morning in February, 1991, when the military might of the United States sliced violently into the Iraqi positions in Kuwait. Bludgeoned from the air nearly round the clock for six weeks, paralyzed by the speed and ferocity of the attack, the Iraqi army collapsed morally and intellectually under the onslaught of American and Coalition forces. John Boyd was an architect of that victory as surely as if he'd commanded a fighter wing or a maneuver division in the desert. His thinking, his theories, his larger than life influence, were there with us in Desert Storm. He must have been proud at what his efforts wrought.

So, how does one pay homage to a man like John Boyd? Perhaps best by remembering that Colonel Boyd never sought the acclaim won him by his thinking. He only wanted to make a difference in the next war . . . and he did. That ancient book of wisdom—Proverbs—sums up John's contribution to his nation: "A wise man is strong, and a man of knowledge adds to his strength; for by wise guidance you will wage your war, and there is victory in a multitude of counsellors." I, and his Corps of Marines, will miss our counsellor terribly.—Proverbs 24:5-6

Sincerely,

C.C. KRULAK,

General, U.S. Marine Corps,
Commandant of the Marine Corps.

EDITOR'S NOTE: Col. John Boyd, who retired from the Air Force in 1975, died March 9 at age 70. A fighter pilot of legendary ability, Boyd was the author of several pivotal explorations of warfighting theory, including "Destruction and Creation" (1976), "Patterns of Conflict" (1981), and "Conceptual Spiral" (1991).

While still in the Air Force, Boyd was largely responsible for the early design of the F-15 and F-16 fighters, and contributed significantly to the design of the A-10 close air support aircraft. His "energy maneuverability theory" is still in use in designing aircraft for maximum performance and maneuverability.

Boyd is probably best known for developing the concept of the "OODA Loop," short for "observe, orient, decide, act"—effectively a guide to anticipating enemy moves in a fast-paced battle and heading them off at the pass. The term was widely used during the 1991 Persian Gulf war in reference to the U.S. force's ability to get "inside" Iraq's decision-making cycle.

Boyd is considered the father of the Air Force's original "fighter mafia" and, after his retirement, a key leader of the military reform movement in the 1980s.

[From U.S. News & World Report, March 24, 1997]

A PRICELESS ORIGINAL

(By James Fallows)

True originality can be disturbing, and John Boyd was maddeningly original. His ideas about weapons, leadership, and the very purpose of national security changed

the modern military. After Boyd died last week of cancer at age 70, the commandant of the Marine Corps called him "a towering intellect who made unsurpassed contributions to the American art of war." Yet until late in his life, the military establishment resisted Boyd and resented him besides.

Boyd was called up for military service during the Korean War and quickly demonstrated prowess as an Air Force fighter pilot. More important, he revealed his fascination with the roots of competitive failure and success. U.S. Planes and pilots, he realized, did better in air combat than they should have. In theory, the Soviet-built MiG they fought against was far superior to the F-86 that Boyd flew. The MiG had a higher top speed and could hold a tighter turn. The main advantage of the F-86 was that it could change from one maneuver to another more rapidly, dodging or diving out of the MiG's way. As the planes engaged, Boyd argued, the F-86 could build a steadily accumulating advantage in moving to a "kill position" on the MiG's tail.

Boyd extended his method—isolating the real elements of success—while maintaining his emphasis on adaptability. In the late 1950s, he developed influential doctrines of air combat and was a renowned fighter instructor. In the 1960s, he applied his logic to the design of planes, showing what a plane would lose in maneuverability for each extra bit of weight or size—and what the nation lost in usable force as the cost per plane went up. Within the Pentagon, he and members of a "Fighter Mafia" talked a reluctant Air Force into building the F-16 and A-10—small, relatively cheap, yet highly effective aircraft that were temporary departures from the trend toward more expensive and complex weapons.

Warrior virtues. After leaving the Air Force as a colonel in 1975, Boyd began the study of long historical trends in military success through which he made his greatest mark. He became a fanatical autodidact, reading and marking up accounts of battles, beginning with the Peloponnesian War. On his Air Force pension, he lived modestly, working from a small, book-crammed apartment. He presented his findings in briefings, which came in varying lengths, starting at four hours. Boyd refused to discuss his views with those who would not sit through a whole presentation; to him, they were dilettantes. To those who listened, he offered a worldview in which crucial military qualities—adaptability, innovation—grew from moral strengths and other "warrior" virtues. Yes-man careerism, by-the-book thought, and the military's budget-oriented "culture of procurement" were his great nemeses.

Since he left no written record other than the charts that outlined his briefings, Boyd was virtually unknown except to those who had listened to him personally—but that group grew steadily in size and influence. Politicians, who parcel out their lives in 10-minute intervals, began to sit through his briefings. The Marine Corps, as it recovered from Vietnam, sought his advice on morale, character, and strategy. By the time of the Gulf war, his emphasis on blitzkrieglike "maneuver warfare" had become prevailing doctrine in the U.S. military. As a congressman, Dick Cheney spent days at Boyd's briefings. As defense secretary, he rejected an early plan for the land war in Iraq as being too frontal and unimaginative—what Boyd would have mockingly called "Hey diddle diddle, straight up the middle"—and insisted on a surprise flanking move.

John Boyd laughed often, yet when he turned serious, his preferred speaking distance was 3 inches from your face. He brandished a cigar and once burned right through the necktie of a general he had buttonholed.

He would telephone at odd hours and resume a harangue from weeks before as if he'd never stopped. But as irritating as he was, he was more influential. He will be marked by a small headstone at Arlington Cemetery and an enormous impact on the profession of arms.

[From King Features Syndicate, Mar. 18, 1997]

DEFENDING AMERICA, A GREAT AIRMAN'S
FINAL FLIGHT

(By David H. Hackworth)

Col. John R. Boyd of the United States Air Force is dead.

Future generations will learn that John Boyd, a legendary fighter pilot, was America's greatest military thinker. He's remembered now by all those he touched over the last 52 years of service to our country as not only the original "Top Gun," but as one smart hombre who always had the guts to stand tall and to tell it like it is.

He didn't just drive Chinese fighter pilots nuts while flying his F-86 over the Yalu River during the Korean War, he spent decades causing the top brass to climb the walls and the cost-plus, defense-contractor racketeers to run for cover.

He was not only a fearless fighter pilot with a laser mind, but a man of rare moral courage, the mission of providing America with the best airplane came first, closely followed by his love for the troops and his concern for their welfare. Many of the current crop of Air Force generals could pull out of their moral nose dive by following his example.

After the Korean War, he became known as "40-Second" Boyd because he defeated opponents in aerial combat in less than 40 seconds. Many of his contemporaries from this period say he was the best fighter pilot in the U.S. Air Force.

Not only was he skilled and brave, but he was also a brain. The Air Force recognized this and sent him to Georgia Tech, not to be a "rambling wreck," but to become a top graduate engineer. It was there that he developed the fighter tactics which proved so effective during the Vietnam War, and the concepts that later revolutionized the design of fighter aircraft and the U.S.A.'s way of fighting wars, both in the air and on the ground.

He saved the F-15 from being an 80,000-pound, swing-wing air bus, streamlining it into a 40,000-pound, lean and mean fixed-wing fighter, which Desert Storm proved still has no equal.

Boyd was also a key player in the development of the F-16, probably the most agile and maneuverable fighter aircraft ever built, and costing half the price of the F-15. The top brass didn't want it. To them, more expensive was better. Boyd outfoxed them by developing it in secret.

Chuck Spinney, who as a Pentagon staffer sweated under Boyd's cantankerous, demanding tough love says, "The most important gift my father gave me was a deep belief in the importance of doing what you think is right—to act on what your conscience says you should act on and to accept the consequences. The most important gift Boyd gave me was the ability to do this and survive and grow at the same time."

Boyd never made general—truth-tellers seldom do in today's slick military because the Pentagon brass hate the truth, and try to destroy those who tell it. They did their best to do a number on John. But true to form, he always out-manuevered them.

Norman Schwarzkopf is widely heralded as the hero of Desert Storm, but in fact, Boyd's tactics and strategy were the real force behind the 100-Hour War. Stormin' Norman

simply copied Boyd's playbook, and the Marines were brilliant during their attack on Kuwait.

As USMC Col. Mike Wyly tells it, Boyd "applied his keen thinking to Marine tactics, and today we are a stronger, sharper Corps."

His example inspired many. He affected everyone with whom he came in contact. He trained a generation of disciples in all the services, and they are carrying on his good work, continuing to serve the truth over self. For those who know, the name Boyd has already become a synonym for "doing the right thing." His legacy will be that integrity—doing the hard right over the easy wrong—is more important than all the stars, all the plush executive suites and all the bucks.

God now has the finest pilot ever at his side. And He, in all His wisdom, will surely give Boyd the recognition he deserves by promoting him to air marshal of the universe.

For sure, we can all expect a few changes in the design of heaven as Boyd makes it a better place, just as he did planet earth.

The PRESIDING OFFICER. The Senator from Kentucky.

ANTITRUST IMPLICATIONS OF THE
COLLEGE BOWL ALLIANCE

Mr. MCCONNELL. Mr. President, Senator BENNETT of Utah, Senator THOMAS and Senator ENZI of Wyoming, and I have been working on a matter that we wish to discuss with our colleagues in the Senate for the next few moments. Senator THOMAS needs to leave so he is going to lead off.

I yield the floor.

The PRESIDING OFFICER. The Senator from Wyoming.

Mr. THOMAS. I thank the Chair.

• Mr. President, I rise today to speak about the college football Bowl Alliance. I am concerned that under the Bowl Alliance structure, athletic excellence is not being recognized in postseason I-A college football play.

Fresh in the minds of Wyoming football fans is the last game of regular season play when the nationally ranked Cowboys played against No. 5-ranked Brigham Young University for the Western Athletic Conference [WAC] championship title. Both teams went into the game believing the winner would be selected for major postseason bowl action. UW and BYU delivered a terrific conference championship game. BYU won 28-25 over Wyoming in overtime play. It was the first WAC title game won in overtime. Unfortunately, neither WAC team was invited to a major New Year's bowl.

The 1996 selections to the New Year's bowl games shed revealing light on the college football Bowl Alliance. Invitations to the most lucrative major bowls games—the Orange Bowl, the Sugar Bowl, and the Fiesta Bowl—were largely sent to high-profile, highly marketable teams instead of worthy teams. Many sports fans were disappointed at the postseason New Year's bowl matchups. I am concerned about the closed selection process that has developed and the impact the Bowl Alliance structure will have on I-A collegiate football.

The Bowl Alliance operates outside the purview of the National Collegiate Athletics Association [NCAA]. The Bowl Alliance was created in 1993 when the Atlantic Coast Conference, the Big East Conference, the Big 12 Conference, the Southeastern Conference and Notre Dame came together and took it upon themselves to provide and acquire teams to participate in the major bowl games. These Bowl Alliance conferences have contracts with the television networks and large corporate sponsors—Federal Express, Tostitos, and Onka. Champions from each alliance conference are automatically guaranteed a berth in one of the major bowl games. The nonalliance conferences remaining out in the cold are the Western Athletic Conference [WAC], the Big West Conference, Conference USA, the Mid American Conference and the 11 Independent teams.

The Bowl Alliance claims its purpose is to create optimal matchups and identify and national champion. Considering the 1996 selections for the bowl games, I question if quality matchups is the true goal. Last season, TV viewers saw No. 20 Texas lose to No. 7 Penn State 38-15 in the Fiesta Bowl. Texas' record was 8-4. The Orange Bowl showcased No. 9 Virginia Tech losing to No. 6 Nebraska 41-21.

Appearance in a Bowl Alliance game pays well. Each participating team takes approximately \$8,000,000 back to its school. In addition, the teams get the national visibility and prestige that leads to strong athletic recruitment. Conferences outside the alliance have a remote chance of participating in one of the Alliance Bowls. Over time it will hurt the quality of the nonalliance teams who will have difficulty in recruitment. The Alliance Bowl structure will make the alliance teams stronger and relegate the nonalliance teams to a second-tier status.

The alliance ensures its monopoly through the use of the at-large rule. Although the champions of the self-selected Alliance Bowl conferences automatically appear in one of the major bowl games there are two remaining at-large spots. It is questionable as to whether those two spots are truly at-large and open to any high-quality team that can play their way into one of the spots. A team from the WAC was deserving of one of those at-large spots last year, but the invitation never came.

I am concerned for the future of the athletes and schools in the nonalliance conferences. That is why I joined with Senators MITCH MCCONNELL, ROBERT BENNETT, and MIKE ENZI in writing to the Department of Justice [DOJ] and the Federal Trade Commission [FTC] to request an investigation of the Bowl Alliance. We suspect possible violations of the Sherman Antitrust Act. In 1996, the eight Alliance Bowl participants, including the Rose Bowl participants, went home with a total of \$68 million. The 28 teams that played in the minor bowl games shared a pot of