

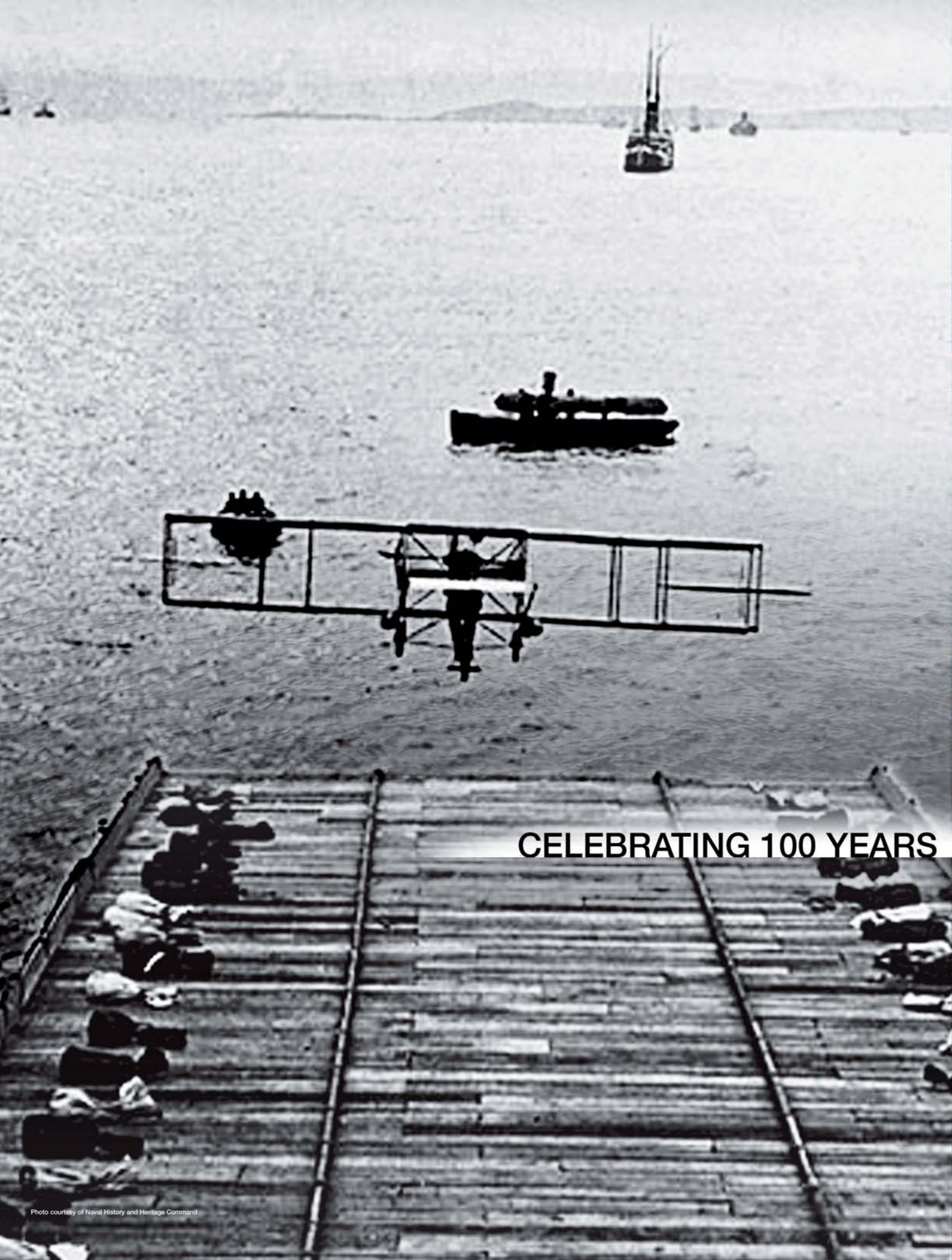
NAVY / MARINE CORPS / COAST GUARD / MERCHANT MARINE

SEAPOWER

*Celebrating 100 Years
of Naval Aviation*



SUPPLEMENT TO SEAPOWER MAGAZINE
MAY 2011



CELEBRATING 100 YEARS



OF NAVAL AVIATION.

From the early years of flight, Naval Aviation has played a critical and enduring role in protecting freedom around the world. And Boeing is honored that we've been part of this great legacy for more than nine decades. We proudly salute the generations of men and women whose commitment, expertise and service have made Naval Aviation all that it is today and will be tomorrow.



Paying Tribute

By AMY L. WITTMAN, Editor in Chief

On Feb. 17, 1911, inventor and aviation pioneer Glenn Curtiss — the “father of naval aviation” — taxied his “Hydroaeroplane,” or seaplane, to the battleship USS *Pennsylvania*, anchored in San Diego Bay. The plane was hoisted aboard the ship. It was later lowered back to the water and Curtiss returned to North Island.

The U.S. Navy and its sea service partners returned to that area in February to officially kick off a year-long celebration of the 100th anniversary of naval aviation at Naval Air Station North Island, San Diego, regarded as the “birthplace of naval aviation.”

Many other centennial-related events are slated to take place throughout the year, and synchronizing those events is the Centennial of Naval Aviation Task Force, estab-

lished by Vice Adm. Allen G. Myers, commander, Naval Air Forces. Working with him are Lt. Gen. Terry G. Robling, deputy commandant for Marine Corps Aviation; Rear Adm. Patrick McGrath, deputy commander, Centennial, Naval Air Forces; and Capt. Mike Emerson, Coast Guard chief of Aviation. The task force’s goal is to raise public awareness of Navy, Marine Corps, Coast Guard and NASA aviation operations.

In this special supplement, spearheaded by Managing Editor Richard R. Burgess, *Seapower* also aims to raise awareness, as well as pay tribute to those pioneers whose can-do spirit, courage and tenacity inspired today’s Navy, Marine Corps and Coast Guard aviators, some of whom contributed their personal perspectives for this publication. ■

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A composite image showing a variety of US Navy aircraft in flight. In the foreground, a large F-35 fighter jet is prominently displayed, flying towards the viewer. Behind it, several other aircraft are visible, including a P-8 Poseidon maritime patrol aircraft, a C-2 Greyhound amphibious transport aircraft, and several smaller fighter jets. The aircraft are flying over a blue ocean, and the USS Nimitz aircraft carrier is visible in the background, sailing on the water. The sky is blue with scattered white clouds.

A Century of Courage

Honoring US Naval Aviators
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security around the world

From a daring launch in Norfolk more than a century ago to the deck of the USS Nimitz and Naval Air Stations around the globe today, Navy and Marine Corps Aviators fly in defense of our shared values: liberty and democracy. At Rolls-Royce, we

are proud of our history supporting Naval Aviation. We strive to provide products and services equal to the courage and commitment Navy and Marine Corps Aviators exhibit everyday.

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Rolls-Royce

The First 100 Years

By VICE ADM. ROBERT F. DUNN, USN (RET.)

This year's Centennial of Naval Aviation is being marked with a multitude of celebratory events. From shaky beginnings in aircraft even the aviators of those days called "crates" to where naval aviation arguably is the centerpiece of all the Navy is today is no small story. It is one of setting records, success in preventing war and success in war itself. It is a kaleidoscope of leadership, people, money, legislation, materiel, machines and tactics.

From the beginning, in 1911, the names remembered best are Ely, Ellyson, Towers, Curtiss and Chambers. Of all, it is Capt. Washington Irving Chambers who should be most remembered and most honored. True, Eugene Ely was the first to launch from and land on a ship; Theodore Ellyson was Naval Aviator No. 1; John Towers was Naval Aviator No. 3

and the longest serving. Glenn Curtiss built most of the first Navy airplanes and showed how an aircraft could be landed on the water next to a ship, then be hoisted aboard and lowered again to the water for another mission. But it was Chambers, a battleship Sailor, who arranged to procure the first U.S. Navy aircraft.

It was Chambers who introduced a scientific approach for the improvement of airplanes, assigned the first engineers to help in the solution of early aeronautical problems and personally influenced the development of the shipboard catapult.

From the beginning, capable catapults were seen as the key to making aviation useful to the fleet.



COURTESY OF ROBERT F. DUNN

With the use of a catapult, increasing numbers of catapult-capable floatplanes took their place in the fleet. Their missions included scouting and light logistics, and they made up the Base Force of the 1920s and '30s. It was not until the helicopter came along after World War

II that the floatplanes were replaced.

Early successes notwithstanding, the American aviation industry soon lagged. When World War I broke out, U.S. forces had to be equipped with planes of foreign manufacture. Then, to fill the sudden need for more pilots, the first Naval Reservists were recruited, some paying for training themselves. Flying from bases in England, France and Italy, they played

Waypoints in History

NOVEMBER 14, 1910

Eugene Ely, seated in a Curtiss Pusher, conducts first flight launched from a ship, *Birmingham*, anchored at Hampton Roads, Va.

JANUARY 18, 1911

Ely, for first time, lands and then takes off from ramp built on *Pennsylvania*, anchored in San Francisco Bay.

FEBRUARY 17, 1911

Glenn Curtiss' "Hydroaeroplane" flies out to and is hoisted aboard USS *Pennsylvania*, anchored in San Diego Bay. The seaplane is later returned to the water and Curtiss flies back to North Island, today considered the birthplace of naval aviation.

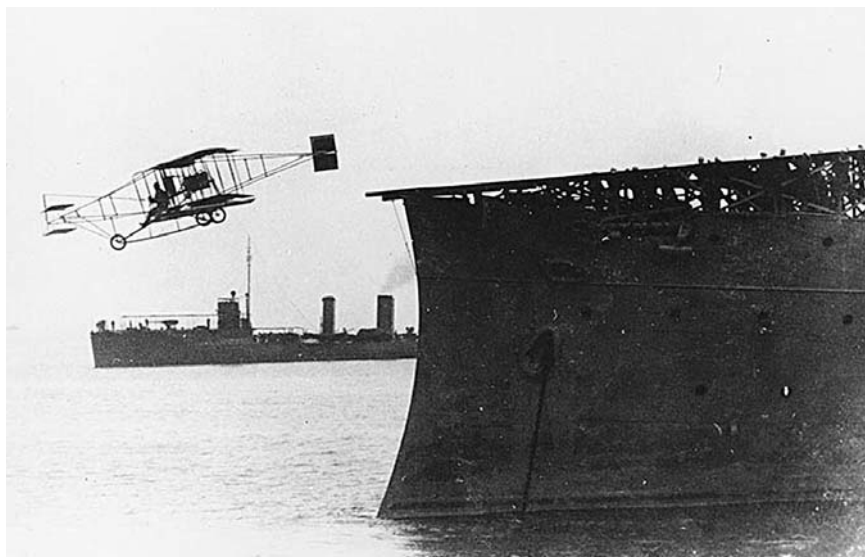
a major role in minimizing the U-boat threat. At the same time, other naval aviators, including Towers and Kenneth Whiting, were detailed to Europe to observe our allies.

The English were foremost in recognizing the value of naval aviation well beyond anti-submarine efforts. It was the Royal Navy that flew fighters from improvised cruiser and battleship decks to repel German Zeppelin raids, and developed the world's first aircraft carrier from a merchant hull, HMS *Argus*. Reports from Towers and Whiting convinced American political and naval officials to authorize the procurement of more aircraft for the fleet, and to convert the collier *Jupiter* into the first American carrier, USS *Langley*.

First, Some Unfinished Business ...

Plans originally made in 1914 to fly across the Atlantic had to be put on hold. Then, in 1919, with Towers in charge, three aircraft started out from Rockaway, N.Y., crossed Halifax, Newfoundland, the Azores and Lisbon, before ending the flight in England. Because of mishaps, only one aircraft — the NC-4 — completed the crossing.

Not long after the NC-4 flight, Marine naval aviators developed their concept of close air support, resupply of embattled troops and medical evacuation. Since then close air support has been part of



NAVY HISTORY AND HERITAGE COMMAND

Eugene Ely conducts the first flight from a ship, launching his Curtiss Pusher aircraft from USS *Birmingham* in Hampton Roads, Va., Nov. 14, 1910.

every Navy fighter and attack aviator's training. It was a very important tactic in Korea and South Vietnam and, despite "smart weapons," is often called for by troops on the ground in Afghanistan. Likewise, supply and medical evacuation continue as key missions for all naval service helicopters and transports alike.

Even as the Marines were developing tactics for troop support, it was another battleship captain, William Adger Moffett, who consolidated aviation development into one Bureau of Aeronautics. For 11 years, he was a most able advocate and leader of naval aviation in all its forms before he was killed when the dirigible USS *Akron*

crashed off New Jersey in 1933.

When Moffett was chief of the Bureau of Aeronautics, no one could see ahead to divine what would be the most important aviation systems in the years ahead. To his credit, all available systems were explored and, within the dollars available, tested. His mantra was, "naval aviation must go to sea on the back of the fleet ... the fleet and naval aviation are one and inseparable, no matter what its form."

Moffett was convinced that a major role of support for the fleet would be fulfilled by aircraft carriers. Consequently, at the Washington Naval Conference, Nov. 12, 1921-Feb. 6, 1922, he was instrumental in getting treaty authorization for the

MAY 8, 1911

Capt. Washington Chambers prepares requisitions for two Curtiss biplanes. Date later is marked as birth date for naval aviation.

JULY 1, 1911

A Navy-purchased Curtiss A-1 Triad makes first flight from Lake Keuka, Hammondsport, N.Y.

SEPTEMBER 1911

Naval aviation training facility established at Annapolis, Md.

MAY 22, 1912

Lt. Alfred A. Cunningham is first Marine to report for pilot training.



Rear Adm. William A. Moffett consolidated naval aviation development into one Bureau of Aeronautics and was an early advocate of the support role aircraft carriers could play for the fleet. He is shown here in 1928 before a Douglas DT-2 aircraft.

conversion of the uncompleted heavy cruisers *Lexington* and *Saratoga* into aircraft carriers.

Moffett also was the point man for the Navy and naval aviation against the onslaught of Gen. Billy Mitchell and his allies, who campaigned for dependence on strategic bombing by a separate air force. Had it not been for Moffett, naval aviation might have disappeared much as did Britain's Fleet Air Arm, overwhelmed by the Royal Air Force.

Moffett held the view that naval aviation and the fleet it supported

would only be successful if the airplane was fully integrated into operations at sea. Resisting the efforts of some of his battleship brethren and, indeed, some aviators, he also insisted that naval aviators be naval officers first, and aviators second. There would be no separate corps, as in the Army. After all, he argued, the very reason for naval aviation was to support the fleet. That meant that flying naval personnel had to be part of it.

Not so much an engineer as he was a judge of good men, Moffett

surrounded himself with experts and doers. As a result, during his 11-year tenure naval aviation appropriations were protected and a stream of new and improved aircraft entered the fleet. He oversaw the advent of air-cooled radial engines, streamlined cowlings, closed cockpits, aircraft communications, instrument systems and a plethora of other improvements both in aircraft and shipboard aviation facilities.

Even while Moffett was holding sway in Washington, yet another battleship admiral was doing good work in San Diego. In 1925, Joseph Mason Reeves hoisted his flag on USS *Langley* as commander, Aircraft Squadrons, Battle Fleet. Reeves arrived admittedly not knowing a lot about aviation, but it was clear to him from the beginning that what he had inherited was not going to be of much service to the fleet.

There were more landing accidents than successes and *Langley* carried only 12 aircraft at any one time. Against the advice of several of his staff and the aviators in the two squadrons assigned, he insisted that more aircraft could be embarked and operated, perhaps as many as 42. He also felt that even at only 16 knots, *Langley* could serve as an ideal stand-in for *Lexington* and *Saratoga*, soon to be joining the fleet. Almost solely due to his insistence to the fleet commander, *Langley* joined the 1926

Waypoints in History

NOVEMBER 12, 1912

Naval aviator No. 1, Lt. Theodore G. Ellyson, successfully catapulted from barge anchored in Anacostia River, near Washington Navy Yard.

MARCH 6, 1913

First use of naval aviation in fleet maneuvers.

JANUARY 20, 1914

Pensacola, Fla., established as first aeronautic station.

APRIL 24, 1914

First combat flight made in AB-3 Flying Boat in support of Veracruz, Mexico, operations.

Fleet Battle Problem, an exercise, and then conducted a successful surprise aircraft “assault” on Pearl Harbor, an ominous foreshadowing of what was to come.

This was the first of a string of Fleet Battle Problems in the 1920s and 1930s that demonstrated time and again the importance of naval aviation, in all its dimensions. Long-range seaplanes, battleship- and cruiser-based floatplanes as well as carrier aircraft played important roles, but it was the metamorphosis of the aircraft carrier from fleet auxiliary to centerpiece of the fleet that was most significant. It was Reeves, ably assisted by those carrier commanding officers who later became the task force commanders of World War II, who made naval aviation that centerpiece.

Between the wars also was a time of aerial tactical development. That’s when dive bombing appeared on the scene. In one of the first dive attacks against ships, Lt. Cmdr. Frank Wagner of Fighting Squadron Two, led a flight of Curtiss F6C Hawks in almost vertical dives against the battle fleet during a sortie from San Pedro in October 1926. The battle line had no defense.

From then on, dive bombing became a preferred method of attack against a ship. The next year, the Marines in Nicaragua employed dive bombing against guerilla troops. Naval aviation now had a near-surefire way for attacking ships

and for close air support in a hostile environment. Aircraft designed specifically for dive bombing were not long in coming and they proved their worth at Midway.

There was a hiccup on the road to success, however — the Depression. Like every department of the government, the Navy in the early 1930s was forced to take a considerable budget hit, and at \$30 million, funding for naval aviation in 1934 was less than the nearly \$86 million budgeted in 1920.

Fortunately, a naval-minded president, Franklin D. Roosevelt, and Congressman Carl Vinson, chairman of the House Naval Affairs Committee, helped. One result was the Vinson-Trammell Act of 1934, which authorized an increased naval air force, followed by the Naval Expansion Act of 1938 and the Two Ocean Bill of 1940.

This expansion caused its own problems, however. One was recruiting the pilots and air crewmen needed to meet the expansion. Traditional sources would not be enough, so in 1935 the V-5 Program was established by the Aviation Cadet Act of 1935. Qualified young men would attend two years of college at government expense, then go through flight training and eventually become ensigns in the Naval Reserve. Without this program, naval aviation would have entered World War II woefully shorthanded. This program became the model for

similar programs, including V-12, which sustained the Navy in the prewar build-up and on through the war itself.

When war did come on Dec. 7, 1941, the nation was surprised but, by and large, naval aviation was ready. The carriers and other aircraft on hand were prepared and vast numbers of others were in the pipeline. Pilots and maintainers were either on hand or in training. That it was so can be attributed to people like Moffett, Reeves, Vinson and others.

Naval aviation successes in battle during World War II were built largely on the lessons of the interwar years, such as improved and higher performing aircraft, better tactics for ships and aircraft, and battle-winning techniques like close air support and dive bombing. [See “Imagining World War II,” page 12]

Naval Aviation Adapts, Evolves

At the end of World War II, the tremendous fleet built up to win the war shrank seemingly instantaneously. Ships and aircraft were decommissioned. The result was a fleet dramatically different from that which went before. Patterns of deployment and advances in capabilities were dynamic. Unlike the prewar Navy, which seldom made extended cruises, the postwar Navy was required by the Cold War and subsequent events to maintain a continual deployment

NOVEMBER 5, 1915

Lt. Cmdr. H.C. Mustin is the first to catapult from ship underway — *North Carolina* — in Pensacola Bay, Fla.

APRIL 10, 1917

Elmer F. Stone becomes first Coast Guard officer to receive Wings of Gold.

APRIL 20, 1917

First flight of nonrigid airship, DN-1, begins Navy airship operations.

NOVEMBER 18, 1917

U.S. Navy aerial patrols in European waters begin from La Croisic, France.

pattern punctuated by crises and hot wars. In all of these, naval aviation forces formed a core of ever-increasing capabilities, pacing and often leading the threat.

Since World War II, fixed-wing aircraft have gone from prop to jet. Ship-based floatplanes were replaced by jet-powered helicopters. Long-range patrol went from prop-driven seaplanes to land-based turboprops, soon to be replaced by a jet-powered commercial aircraft derivative. Airborne electronic warfare and surveillance became integral to fleet operations and today top the list of support requested by operational commanders.

Air-to-ground weapons were improved to the point that the measure of effectiveness became targets destroyed per sortie instead of the older measure of weapons per target needed for destruction. Air-to-air weapons would go miles instead of feet and their kill ratio rose to almost one-to-one.

Marines teamed with the Navy flying fixed-wing jets from carriers and vertical-lift Harriers, Ospreys and helicopters from amphibious ships and from ashore, but remain today the world's experts in close air support of troops on the ground.

The Coast Guard today sets the standards for air-sea rescue and law enforcement. At the same time, the training, morale and retention of both officer and enlisted personnel in naval aviation has never been better, and includes increasing

numbers of women. Almost unnoticed, they came on the scene in the mid-1970s and eventually took their place in every application. It didn't take them long to prove their worth and today there are women at every level of naval aviation, including air wing command.

Aircraft readiness has never been higher and the mishap, or accident, rate is the lowest it has ever been. Sixty-six years after World War II, naval aviation is at the top of its game and has never been more ready to answer the nation's call for presence, for combat or any mission in between.

The community has come a very long way since 1945, when the Navy and Marine Corps faced the biggest challenge yet to their very existence. The atomic bomb and the advocates of air power had convinced many politicians and American voters that navies were passé — "There were no enemies." If any should arise, the solution would be found in an independent air force that could carry a nuclear weapon to any spot on Earth. This made navies, and to some extent armies, and certainly a Marine Corps, obsolete.

The ensuing controversy led to the firing of a chief of naval operations, Adm. Louis E. Denfeld, the cancellation of a new aircraft carrier and no promotions for a number of Navy captains and flag officers.

The Navy, however, rallied, first demonstrating that it could indeed

operate and survive in a nuclear age, that it was capable of delivering nuclear weapons from the sea and at the same time be ready to carry out conventional roles. Aircraft that could takeoff from a carrier and deliver the 10,000-pound nuclear weapon of the day were developed.

Meanwhile, naval aviation began transitioning from props to jets. Aircraft carriers were equipped with angled decks, steam catapults and optical landing systems to accommodate those higher-performance aircraft. Battleships and cruisers traded their catapults and ship-based seaplanes for helicopters. Newer and longer-range land-based patrol aircraft began entering the fleet. Their capability was dramatically demonstrated when in 1946 the P2V Neptune, *Truculent Turtle*, flew nonstop from Australia to Columbus, Ohio. Night and all-weather flying became routine.

In those same years, Marines developed the concept of vertical assault with helicopters. At-sea replenishment was augmented with other helicopters. Not all of this happened at once, of course, but it continued even through the Korean War.

Just a matter of days after the North Korean troops surged into South Korea, the South Korean Army and the few American occupation troops were forced into a small perimeter around the southeastern Korean city of Pusan. They sorely

Waypoints in History

MARCH 19, 1918

Ensign Stephen Potter scores first "kill" by naval aviator, shooting down German seaplane over the North Sea.

MARCH 25, 1918

First naval air attack on German submarine off England conducted by Ensign John McNamara.

JULY 30, 1918

Personnel of 1st Marine Aviation Force arrive in Brest, France, and fly with British bombing squadrons.

AUGUST 15, 1918

Naval aviators bomb German submarine pens at Ostend, Belgium.

Seaborne Dominance

CARRIER-BASED STRIKE AND ISR UAS



Launched from a carrier anywhere in the world, the Sea Avenger Unmanned Aircraft System (UAS) offers transformational yet proven Intelligence, Surveillance, and Reconnaissance (ISR) and precision-strike capabilities for the U.S. Navy's Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS) System. This low-risk and affordable system leverages 18 years of unrivalled Predator-series UAS development and one million flight hours to provide naval commanders with enhanced situational awareness and immediate, time-sensitive strike. Sea Avenger's speed, long endurance, sophisticated sensors, and significant strike capabilities expand naval power projection.

Sea Avenger: A formidable, affordable carrier-based unmanned strike and ISR aircraft – deployable soon.



needed air support, but the Air Force had only very short-legged fighters based in Japan, which meant very little time on station over Korea and very little ordnance.

USS *Valley Forge*, one of the few carriers left in commission by 1950, was in the Pacific. Ordered north from where it had been in the South China Sea, *Valley Forge* was quickly on station and was soon joined by the smaller British carrier *HMS Triumph*, delivering sorely needed close air support to the beleaguered allied troops. This lesson in responsiveness was not lost on the politicians in Washington.

Frequently, during various crises in the years thereafter, the call was often heard, “Where are the carriers?” As early as 1958, when it appeared that Sixth Fleet forces might have to intervene in Lebanon and the question was asked, Adm. Arleigh Burke famously responded with, “We’re here now. What do you want us to do?” That set a tone and an expectation from that day to this.

Surveillance and Space

For many years, before satellite surveillance was in place, Navy-operated modified Super Constellations — Warning Stars — flew barrier patrols over the Pacific and Atlantic, ready to detect any Soviet incursion toward the United States. Navy reconnaissance aircraft flew the perimeter of the Iron Curtain in Europe and in the Pacific, losing not a few crews and aircraft to gangster-type attacks.

The near-hot-war manifestation of those attacks peaked when Fidel Castro and the Soviets installed ballistic missiles in Cuba. It was a Navy photo aircraft that brought back the proof of those installations and it was Navy patrol aircraft that formed the backbone of the quarantine and inspection that forced the Soviets to back down and remove their missiles.

At about the same time, naval aviation entered space in a big way. Alan Shepherd and John Glenn led the way, followed quickly by John Young, Dick Truly, Neil Armstrong and Jim Lovell. Unmanned spacecraft also began to play a larger role with navigation data in the form of the Global Positioning System satellite network, communications and more, all increasingly important to naval aviation operations.

New and dramatically more capable carriers entered the fleet as well: first the Forrestal class beginning in 1955; *Enterprise*, the first nuclear carrier, in 1961; and *Nimitz*, the first of a new class, in 1975. Also in the 1970s, former anti-submarine carriers, mostly World War II Essex-class ships, were decommissioned and the erstwhile attack carriers began outfitting with anti-submarine warfare (ASW) aircraft and helicopters. Newer and more capable amphibious ships with squadrons of Marine helicopters and Harriers also began to enter the fleet.

As the Cold War intensified, particularly in the Mediterranean and

North Atlantic, carrier-based fighters intercepted Soviet surveillance aircraft, P-3 Orions helped track Soviet ballistic-missile subs and, in the Mediterranean where American and Soviet fleets operated in close proximity, attack aircraft remained on high alert and shadowed Soviet missile cruisers wherever they went. Attack aircraft also stood alerts as part of the Single Integrated Operations Plan, should a nuclear exchange begin.

Beginning in the early 1960s, Navy photo reconnaissance aircraft were called upon to provide evidence of the Communist buildup in Laos. Flying extended-range missions from afloat and ashore, they gathered the needed intelligence. It wasn’t long after that that Communists in North Vietnam infiltrated democratic South Vietnam. The United States came to the aid of that small nation and the Vietnam War began.

At first, there were retaliatory strikes carried out entirely by Navy carrier aircraft. Only later did the Air Force position aircraft in South Vietnam and Thailand. Soon a major effort was being carried out by the Navy with as many as four carriers at a time operating in the Gulf of Tonkin, providing close air support to Soldiers and Marines in the south and, despite intense anti-aircraft and missile opposition, striking military targets in the North.

Marine aircraft based ashore at Chu-lai and other “in-country” bases also provided close air sup-

Waypoints in History

SEPTEMBER 24, 1918

Lt. j.g. David S. Ingalls shoots down fifth enemy aircraft to become Navy’s first and only World War I ace.

MAY 8, 1919

Four NC flying boats lift off from Rockaway, N.Y., for trans-Atlantic flight. One, NC-4 commanded by Lt. Cmdr. Albert “Putty” Reid and piloted by Coast Guard Lt. Elmer F. Stone, would land at Lisbon 19 days later.

MARCH 20, 1922

Langley placed into commission as Navy’s first aircraft carrier.

port and struck targets in the North. Meanwhile, Navy helicopters and OV-10s supported riverine operations in the South and patrol squadrons flew countless reconnaissance missions offshore. Other ship-based helicopters made numerous daring rescues of downed pilots, often in the face of intense enemy fire. The Vietnam War was an “all-hands” evolution.

After the Vietnam War, ships and aircraft were worn out. These were difficult days for the Navy and naval aviation, yet the Cold War dragged on and new threats developed in the Middle East. New aircraft and ships entered the inventory and the Navy and Marine Corps never missed a commitment. As early as 1981, Sixth Fleet aircraft were called upon to deal with Libyan MiGs. In 1991, another task for carrier aircraft emerged — Operation Desert Storm in Iraq — employing no less than six aircraft carriers.

Desert Storm was followed in quick succession by Southern Watch to enforce the no-fly zone over Iraq. In 1999, aircraft from USS *Theodore Roosevelt* flew more than 3,100 close air support missions in support of NATO operations in Kosovo. Next came Enduring Freedom, flying from carriers in the Indian Ocean over Afghanistan in response to the Sept. 11, 2001, attacks on the United States, and then the initial “shock and awe” strikes from carrier



NATIONAL ARCHIVES/THE TAILHOOK ASSOCIATION

Loaded with bombs, VA-115 Douglas AD-4 Skyraiders from USS *Philippine Sea* fly a Korean War strike mission in February 1951.

er aircraft in the first battles of Iraqi Freedom.

While the carriers were busy and Marines were based afloat and in country, patrol squadrons, ostensibly trained for ASW were flying missions over Iraq and Afghanistan helping to locate improvised explosive devices and performing all sorts of missions for which they were not originally designed, demonstrating the flexibility of naval aviation.

Naval aviation forces have been in continual combat since 1990, more than 21 years. Throughout, they have shown every day the spirit, the flexibility and capability of which Ellyson, Curtiss and Chambers could have only dreamed.

Throughout these 100 years, the strength of naval aviation has been the people who make up this force, a force integral to the basic composition of the Navy, the Marines and the Coast Guard. It started that way with Ely, Towers, Chambers and their colleagues. It was sustained and improved by Moffett and Reeves and it will continue that way if only we keep in our sights the Moffett's mantra: “Naval aviation must go to sea on the back of the fleet ... the fleet and naval aviation are one and inseparable.” ■

Retired Vice Adm. Robert F. Dunn is president of the Naval Historical Foundation in Washington and the former president of the Association of Naval Aviation.

OCTOBER 26, 1922

Lt. Cmdr. Godfrey Chevalier records first Navy landing on aircraft carrier.

SEPTEMBER 4, 1923

Shenandoah makes maiden voyage from NAS Lakehurst, N.J. Airship would crash nearly two years later.

NOVEMBER 25, 1924

German-built airship *Los Angeles* is commissioned at NAS Anacostia, Washington.

APRIL 1, 1925

First night carrier landing conducted by Lt. Cmdr. John C. Price on *Langley*.

Imagining World War II

By BARRETT TILLMAN

Imagine the Second World War, fought across the globe on an industrial scale that will never be possible again. Imagine a navy with 4.2 million personnel and 6,700 combatant vessels, from PT boats to battleships. Imagine a scale of conflict so great that it cost nearly 300 of those combatants (more ships than the U.S. Navy currently possesses) including 11 aircraft carriers, 52 submarines and 62,000 men — and still defeated two of the world's greatest navies within four months of each other. Imagine an inventory so immense that it could lose 150 aircraft in a day — and make good the deficit.

Imagine an industrial base that built most of a two-ocean navy in five years, producing 70,000 naval aircraft, including 52,000 carrier types, 6,000 patrol planes and 9,000 trainers. Factories were so incredibly efficient that they rolled out a four-

engine bomber every hour and launched an escort carrier (CVE) each week from mid-1943 to January 1945.

Imagine a training establishment that turned out 60,000 aviators in four years — a program so effective that it routinely sent 220-hour pilots to axial-deck carriers, then on to combat units, without simulators, except primitive Link trainers. The hacheries were everywhere, from Pensacola, Fla., and Corpus Christi, Texas, to Reserve bases from Long Beach, Calif., to New York.

That same training scheme yielded many more thousands of aircrew, mechanics, ordnancemen and electronics technicians. The learning curve was extraordinarily steep, especially since fleet radar



COURTESY OF BARRETT TILLMAN

hardly existed before 1941.

Imagine a navy conducting two major amphibious operations on opposite sides of the globe within days of each other — in northern Europe and the Central Pacific.

All of that happened within living memory, accomplished with less than half of today's population. Veterans of World War II still recall what it looked like: the world's most powerful navy with nearly 100 carriers, 23 battleships, 70 cruisers and 230 submarines. But that enormous fleet took time to plan, build and deploy.

In December 1941, the U.S. Navy possessed 790 active warships, including 17 battleships and eight carriers (one of which was a prototype

Waypoints in History

MAY 9, 1926

Lt. Cmdr. Richard E. Byrd and Chief Aviation Pilot Floyd E. Bennett fly Fokker Tri-motor aircraft over North Pole.

OCTOBER 22, 1926

Dive bombing demonstrated as viable tactic.

JULY 16, 1927

Marine aircraft strafe Sandinista positions in Nicaragua. Considered first dive-bombing attack in combat.

NOVEMBER 16–

DECEMBER 14, 1927

Laid down as battle cruisers, *Saratoga* and then *Lexington* are commissioned as aircraft carriers.

CVE). Only months previously, carrier air groups had flown biplanes, and some new monoplanes such as F4F Wildcats and SBD Dauntlesses were still being debugged.

Meanwhile, other designs were nearing completion. The Navy already had a world-beating concept in Vought's radical F4U Corsair, America's first 400-mph single-engine production aircraft. But the F4U was more than a year from combat, and then only land-based. Grumman's promising F6F Hellcat would not even fly until mid-1942. The "Iron Works" TBF Avenger torpedo plane promised a generational improvement over the Douglas TBD. The SBD's replacement, Curtiss' big SB2C Helldiver, was plagued with troubles that kept it out of combat until the end of 1943.

With new aircraft came a new generation of ships. Foremost was the Essex-class carrier, produced in exceptional numbers. Big, capable carriers displacing 27,000 tons and embarking 90 or more aircraft, they represented the cutting edge of the Central Pacific offensive that began in late 1943. Seventeen were commissioned during the war, with seven more coming afterward. Exceptionally long-lived and versatile, they became "the DC-3 of aircraft carriers."

Operating alongside the Essexes were nine Independence-class light carriers (CVLs), converted from light cruisers, also entering combat



An SBD-5 Dauntless dive bomber gets the launch signal before taking off to join other aircraft in strikes against Japanese targets in the Central Pacific on March 7, 1944.

in 1943. At 30 knots, they could keep up with the larger flattops while operating fewer aircraft.

Then there were the escort carriers.

"Baby flattops" or "jeep carriers" were another wartime innovation. With heavy attrition in the year after Pearl Harbor, replacement flight decks were urgently needed. A pre-war experiment, USS *Long Island*, proved the concept, and in 1942 conversions began on merchant hulls, producing the Bogue and Sangamon classes. Subsequent designs were purpose-built CVEs of the Casablanca and Commencement Bay classes. American shipyards produced so many that 30 went to Britain.

The jeeps seldom received much press but they performed vital missions, especially anti-submarine warfare (ASW). Deployed in hunter-killer groups, their Avengers and Wildcats helped plug the dreadful mid-Atlantic gap beyond range of land-based aircraft, and crippled the U-boat threat 12 months before D-Day.

Their importance was noted by no less than Winston Churchill, who conceded that the only thing that truly worried him throughout the war was the submarine threat to Britain. In the six-year Battle of the Atlantic, British and American escort carriers made a strategic contribution to victory.

JANUARY 23-27, 1929

Lexington and *Saratoga* participate in Fleet Exercise. *Saratoga* launches successful mock attack against Panama Canal.

NOVEMBER 29, 1929

Cmdr. Richard Byrd makes first flight over South Pole.

JANUARY 22, 1931

Navy orders first rotary-wing aircraft, the XOP-1 autogyro.

OCTOBER 27, 1931

Airship *Akron* is placed in commission. It would crash off New Jersey on April 4, 1933.



NAVY HISTORY AND HERITAGE COMMAND/THE TAILHOOK ASSOCIATION

A Navy Consolidated PB4Y-1 Liberator flies an anti-submarine patrol over the Bay of Biscay near the English coast in July-August 1943.

In the Pacific, CVEs continued ASW work but also earned their keep providing close air support to American infantrymen and delivering immediate replacement aircraft to the fast carriers.

Flattops conducted a variety of unusual missions, starting with *Hornet's* (CV 8) launching the Doolittle Raiders in April 1942 to make the first U.S. air strikes against the Japanese home islands. Subsequently, other ships appeared in climes as varied as the Moroccan coast (Operation Torch, November 1942), Norway (*Ranger's* Operation Leader, October 1943) and the Riviera (Operation Anvil-Dragoon, August 1944).

But the fast carriers carried most of the load in a form of warfare

unique to the Pacific Theater of Operations. Between 1942 and 1944, U.S. and Japanese flattops engaged in five battles conducted wholly by carrier aircraft, with all the action "beyond the horizon." First in the Coral Sea in May 1942, then a month later off Midway, the new art of naval air combat played itself out on a gigantic chessboard defined by degrees of latitude and longitude.

Flattops represented both the kings and queens with exceptional reach and mobility, but even naval royalty was vulnerable. During the four 1942 battles, including two at Guadalcanal, Japan lost five carriers and America three, with another sunk by submarine. Then, in June 1944, supporting the Saipan land-

ings, two dozen Fifth Fleet carriers clashed with nine Imperial Navy flattops in a battle so lopsided that it was called The Marianas Turkey Shoot.

Only four months later came the greatest naval battle of the 20th century, the sprawling three-day slugfest at Leyte Gulf. While CVEs fought for their lives against a Japanese armada off Samar, Task Force 38 was lured north to sink the emperor's last four deployable carriers. It was the effective end of the Imperial Navy, marking the onset of what has become the post-naval era, with no significant engagements in nearly 70 years.

Time and again, the fast carriers disproved the conventional wisdom that naval aviation was inherently inferior to land-based air. Going head to head against major Japanese airpower on Formosa, the Philippines and, ultimately, Japan, Task Forces 38 and 58 brought 1,000 or more fighters and bombers to the fight. The inevitable result was air superiority, leading to outright supremacy over the home islands in summer 1945.

Along the route to Tokyo, the Hellcat established an unrivaled record as master of Pacific skies. Claiming more than 5,200 aerial kills, the F6F was credited with nearly as many enemy planes as all Army fighters in the Pacific and China-Burma theaters combined.

Frequently overlooked was the other segment of shipboard aviation: scout-observation aircraft aboard battleships and cruisers. The obser-

Waypoints in History

NOVEMBER 2, 1931

First Marine air squadrons report onboard *Lexington* and *Saratoga*.

JUNE 23, 1933

Airship *Macon* placed into commission. Would be lost off California on Feb. 12, 1935.

JANUARY 10-11, 1934

Six P2Y-1 flying boats establish time and distance records in flight from San Francisco to Hawaii.

JUNE 4, 1934

Ranger commissioned as first U.S. carrier designed and built from keel up.

vation scout floatplane community was among the smallest in naval aviation but it was found everywhere — in the Atlantic, Mediterranean and Pacific. Apart from their primary mission of spotting naval gunfire, SOC and OS2U floatplanes performed invaluable work in search and rescue. Undoubtedly, the record was earned by a USS *North Carolina* OS2U pilot who delivered 10 fliers to the lifeguard submarine off Truk Atoll in 1944.

During the war, the Navy used some 6,000 patrol planes, a generic title covering seaplanes, amphibians and land-based aircraft. The most familiar was Consolidated Aircraft Corp.'s fabled PBY Catalina, which entered service in 1936. A rare combination of awkwardness and grace, it was both long ranged and long lived, serving well after the war. It excelled at nearly everything, including reconnaissance, ASW and air-sea rescue.

But the Catalina also was a nocturnal creature, earning a solid reputation for night attack in several "Black Cat" squadrons. Other flying boats were Consolidated's bigger, more capable PB2Y Coronado and the Glenn L. Martin Co.'s PBM Mariner.

"Patrol" also included land-based bombers, notably the PB4Y variants of the Army's B-24. Possessing exceptional range and ordnance options, the Liberator and Privateer frequently flew 2,000-mile, 12-hour round-trip missions, harrying Japanese bases and sinking their ships.

Among the least-reported operations was Fleet Air Wing Four's dismal environment in the Aleutians. Mostly flying PBYs and the Lockheed series of PV Ventura and Harpoon attack bombers, the aircrews operated in arguably the worst weather on Earth, braving the North Pacific for 700-mile missions against the Kurile Islands. It was a grim, mostly thankless task that kept the pressure on Japan's northern flank.

While airplanes bombed and strafed, or at least flew at airspeeds exceeding 130 knots, there were far slower, unglaorous blimps. "Lighter than air" (LTA) had been part of naval aviation almost from the start, but after the glory days of the 1930s rigid airships, blimps (non-rigids) upheld the LTA mantle.

To this day, no one can say with authority where the word "blimp" came from, but it doesn't matter. Blimps provided convoy escort and ASW almost everywhere, including the remote South Atlantic, and once in a great while they even sighted a hostile submarine. Cruising at 55 knots, their silvery presence lent comfort to thousands of mariners in dangerous waters.

If history has neglected any aspect of World War II naval aviation more than transports, it's a well-kept secret. Naval Air Transport Service (NATS) did not even exist before December 1941, but it quickly became a growth industry. With nearly 900 Douglas and Curtiss aircraft procured during the war, NATS established a world-

wide reputation for efficiency and competence. In 1945, naval transports flew a global network of some 63,000 miles, delivering supplies and transporting personnel. One of the primary missions was medical airlift, and at Okinawa NATS evacuated nearly 10,000 casualties.

But naval aviation was more than the Navy. The Marine Corps and Coast Guard both grew tremendously during the war, with flying leathernecks eventually gaining their own escort carrier air groups. Next year marks the centennial of Marine Corps aviation.

In an endeavor so huge, on a scale so vast, very few individuals could exert an effect. At least 370 Navy fighter pilots became aces — more than 80 percent in Hellcats — and many of their names are well known even today. Fighters could achieve air superiority but they could not sink capital ships. Individual dive bomber pilots could. Probably no other "shooters" in the entire war were capable of directly influencing the course of battles or campaigns. Certainly that was true at Midway, where perhaps a dozen SBD pilots made the hits essential to victory.

The same applied to their airplane. Without the Dauntless, the Pacific Fleet could not have fought to a draw at Coral Sea, won at Midway, nor taken the offensive at Guadalcanal, where Navy and Marine Dauntlesses held the Imperial Navy at bay. Slanting into their 70-degree dives, tracking their targets

AUGUST 19, 1936

Naval aircraft demonstrate capability to sink submarines in exercise conducted off Virginia Capes.

SEPTEMBER 30, 1937

Yorktown commissioned. Would be lost in 1942 at Battle of Midway.

MAY 15, 1938

Enterprise commissioned. Would be most decorated ship of World War II.

MAY 17, 1938

Naval Expansion Act increases number of naval aircraft to 3,000 and results in laying down of carriers *Hornet* and *Essex*.



U.S. NAVY/THE TAILHOOK ASSOCIATION

VF-1 Grumman F6F-3 Hellcats with Air Group 1 aboard USS *Yorktown* warm up for takeoff for a mission in the Pacific in 1944.

in the 30 seconds available, then releasing at 1,500 feet and recovering barely off the wavetops, SBDs hammered their ordnance into carriers, cruisers and transports as no other aircraft possibly could.

Ever since Tom Brokaw's 1998 best seller, there has been perennial homage to those who won the Second World War as "the greatest generation" in American history. A more reasoned assessment would accord that honor to the nation's founders, who faced vastly greater odds than America did in World

War II — after all, the United States was allied with the British Empire, the Soviet Union and China against Germany and Japan.

But there's something to the notion that the World War II generation produced the greatest naval aviators: men — some too young to vote — who went to war in high-performance aircraft on straight-deck carriers, flying day and night in an esoteric martial art that remained immature as of early 1942. The variety of aircraft available to that generation is incon-

ceivable today, when some pilots were current in three or four types. The prevailing attitude was summed up by a squadron skipper, Lt. Cmdr. Roger Hedrick, who told his pilots transitioning from Hellcats to Corsairs, "They all have a stick and a throttle. Go fly 'em!"

But behind the dash and glamour were the inescapable realities. Ships were designed for combat rather than habitability. Of the 3,000 men aboard a fleet carrier, the huge majority were smokers, living in confined steel compartments in the tropics, without air conditioning. Three months at sea was not unknown. Meanwhile, squadrons based on many Pacific isles endured a miserable climate, inescapable disease, poor food and often crushing boredom.

Whatever their environment, those pilots, aircrew, maintenance personnel and ordnancemen experienced a war that can never be repeated. Their honor is not so much in winning as in how they achieved it — with perseverance, professionalism and the pride of having served when it mattered as never before. ■

Barrett Tillman is an author and public speaker best known for his books on naval aviation history. A former editor of The Hook magazine, he has received six writing awards including the Admiral Radford Award for Naval History and Literature. His next book is "Master of the Pacific," a history of USS Enterprise (CV-6) from Simon and Schuster in 2012.

Waypoints in History

JUNE 14, 1940

Naval Expansion Act of 1940 increases naval air strength to 4,500 planes. The next day, Congress increases this to 10,000 "useful airplanes."

DECEMBER 10, 1941

Three days after Pearl Harbor, SBD dive bombers from *Enterprise* sink submarine I-7, the first Japanese Navy ship sunk by the U.S. Navy.

FEBRUARY 20, 1942

Lt. Butch O'Hare, credited with shooting down five enemy bombers and damaging another over Southwest Pacific. He is later awarded the Medal of Honor.

MARCH 1, 1942

U-656 is sunk by Navy PBO patrol bomber south of Newfoundland, first U-boat sunk by U.S. Navy aircraft.



For 100 years, Naval Aviators have earned their wings by demonstrating the highest levels of ability, professionalism, leadership and patriotism. The men and women of Naval Aviation have always represented a standard in excellence recognized around the world. And the men and women of Lockheed Martin are proud to have played a role in their success. For the past 90 years – from the HS-2L to Mariner, Catalina and Neptune, to Orion and the longest-serving aircraft in U.S. Naval history, the KC-130 Hercules – Lockheed Martin is proud to have built such cutting edge aircraft for the U.S. Navy. And, we will be there tomorrow as the F-35 Lightning II sets the standard for Navy and Marine Corps aviation in the decades to come.

The Aviation Appeal

■ Avionics Technician 2nd Class Anthony Bennekin

AIRBORNE EARLY WARNING SQUADRON 120
NAVAL STATION NORFOLK, VA.
HOMETOWN: MONTEREY, CALIF.



U.S. NAVY

Before I joined the Navy, I was interested in computers. I was trying to get in the electronics field. When it came to choosing my rate, I'd seen electronics, but I didn't really see the aviation part of it, but now that I'm in it, I love it. I learn. It has me going.

I have been working on radars, radios and

navigation equipment on E-2Cs for five years now. I like working on electronics. I like to learn how things work. I like to take them apart and fix them. However, the most enjoyable part is the people I work with, people from all over.

The daily aviation challenge is to meet the demand of the operational side while we're doing the maintenance. There are always a few people who have been doing this for a while and understand how this stuff works, and you've got junior guys who don't know what they're doing, so you walk through steps so they'll understand and catch up fast enough. It's a challenge to do that every day, but I'm still doing it.

INSPIRATION: Working on the aircraft carriers. I just like being out on deployment and working on airplanes and the rest of things out there. There's something new every day.

■ Aviation Survival Technician 2nd Class Sara Rose Faulkner

HH-60J HELICOPTER RESCUE SWIMMER
COAST GUARD AIR STATION CLEARWATER, FLA.
HOMETOWN: LOS ANGELES

My involvement in the Naval Sea Cadet Corps [Betsy Ross Division, Sherman Oaks, Calif.] introduced me to various aspects of Navy and Coast Guard aviation. When I trained with Coast Guard rescue swimmers, I knew instantly that was what I wanted to become.

I enjoy the satisfaction that comes when all the hard work and training from the pilots, flight mechanics and rescue swimmers come together to

effectively complete a search-and-rescue mission.

The most challenging aspect of my job is to remain prepared physically and mentally for the unknown. Even a routine training flight could be diverted to a major search-and-rescue mission.

INSPIRATION: The response to Hurricane Katrina, with the coordination of multiservice aircraft coming from all over the country to save so many lives.



U.S. COAST GUARD

Waypoints in History

APRIL 18, 1942

During Halsey-Doolittle Raid, carrier *Hornet* launches Army Air Forces B-25 bombers in first strike on Japanese islands.

MAY 7-8, 1942

Battle of Coral Sea is first carrier-versus-carrier battle. *Lexington* and one Japanese carrier sunk.

JUNE 3-6, 1942

Navy SBD dive bombers score fatal hits of four Japanese carriers during Battle of Midway.

AUGUST 26, 1942

Capt. Marion Carl becomes first Marine Corps ace, shooting down a Zero over Guadalcanal.

■ Lt. Cmdr. Jonathan Fay

P-3C NAVAL FLIGHT OFFICER
WEAPONS AND TACTICS INSTRUCTOR,
COMMANDER, PATROL & RECONNAISSANCE WING 10
NAS WHIDBEY ISLAND, WASH.
HOMETOWN: FORT WORTH, TEXAS



U.S. NAVY

Naval aviation was very intriguing. It has a great heritage, a lot of tradition. Anyone who's ever been to an air show and seen the Blue Angels fly overhead certainly said that that was something they would like to be a part of. It was pretty cool. I liked the discipline of it, the professionalism.

Originally, I was an S-3 naval flight officer, but when the S-3 community was phased out, I transferred over to the P-3. In the P-3 community, we're constantly facing

evolving tactics, evolving aircraft modifications. Even with an aircraft as old as the P-3, you're still getting new systems and technologies added on, and with that comes new and advanced tactics and, on top of that, new operating procedures. Your box gets full pretty quickly. Even in terms of acoustics, we're always fielding newer and better acoustic processors. You almost have to pick your expertise in certain ways. You can't master them all, that's for sure. Fortunately, our air crews are really good at plowing through it. They'll make it happen.

INSPIRATION: My grandfathers served in World War II, one specifically in naval aviation. When you look at the impact that World War II [had], naval aviation's part in that was huge. The war started the whole expansion of naval aviation. Coming from an S-3 and then a P-3 background, there's a tremendous amount of heritage that goes back to World War II, where you're out on patrol and looking for subs and surface ships. It inspires me a lot to think of what the folks ahead of us did. I'm honored to be a part of that.

■ Maj. Will Grant

MV-22B OSPREY PILOT
MARINE MEDIUM TILTROTOR SQUADRON 261
MARINE CORPS AIR STATION NEW RIVER, N.C.
HOMETOWN: ALBANY, N.Y.

The first movie I ever remember going to was "The Right Stuff." I was 8 years old. In particular, the scene where the NASA scouts were on the carrier and Scott Glenn was the actor landing an A-4 on the carrier. I thought that was pretty cool. I've always had a fascination with flying. That just kind of sealed the deal.

Hornets at [Marine Corps Air Station] Miramar, Calif., was my first choice, but I flew EA-6Bs with an Operation Enduring Freedom deployment. I switched to V-22s for two reasons. One was the need for volunteers. The second part was my brother-in-law, a [CH-46] "Phrog" pilot, was transitioning to V-22s, so it

was a chance to bring a couple of families together. I was kind of fascinated with the technology as well. To me, it's more of an airplane than a helicopter. To your Phrog guy it might be more of a helicopter than an airplane. We duke it out in the ready room and come to a middle ground most of the time.

INSPIRATION: Vice Adm. James Stockdale really stands out in my mind — the [operations off] Yankee Station and his ordeal as a POW in the Vietnam War in particular, and the books he has written, "Thoughts of a Philosophical Fighter Pilot," and another he and his wife co-wrote, ["In Love and War"].



U.S. MARINE CORPS

JANUARY 3, 1944

Coast Guard Cmdr. Frank A. Erickson performs first helicopter lifesaving mission to Sandy Hook, N.J.

JUNE 19-20, 1944

During Battle of Philippine Sea, Navy fighters shoot down nearly 300 Japanese aircraft.

OCTOBER 25, 1944

Aircraft from escort carriers help turn back Japanese surface group, including battleship *Yamato*, at battle of Samar off Leyte Gulf.

NOVEMBER 14, 1944

Cmdr. David McCampbell, the Navy's highest scoring ace, claimed his 34th aerial victory over Japanese aircraft.

■ Sgt. Jacob Stinson

MV-22B OSPREY CREW CHIEF
MARINE MEDIUM TILTROTOR SQUADRON 261
MARINE CORPS AIR STATION NEW RIVER, N.C.
HOMETOWN: FORT WALTON BEACH, FLA.

I wanted to do a job that was challenging to my intellect. This job was open and a lot of my family is involved in aviation via the Air Force — my father was an Air Force air traffic controller and my brother is an Air Force pilot — but I wanted to be a Marine, so Marine aviation made the fit for me.

Job satisfaction for me came mostly on deployment when I actually was doing my job: flying missions, moving passengers and cargo that was really needed and vitally important; when I was able to actually utilize all the training for the mission over in Afghanistan.

The long hours are the most taxing part — the pre-flight and post-flight inspections especially when

you're on a mission; cleaning your weapons preflight, post-flight. We have mechanics whose sole job is to perform maintenance, but crew chiefs, when we're not flying, are also expected to help perform maintenance.

INSPIRATION: Flying in Afghanistan, [being] a part of something that was so important. A successful outcome was so important to the overall mission of the day. It really let me know how important my job was, how important aviation was, and how much of an asset it is to the Marine Air-Ground Task Force.



U.S. MARINE CORPS

■ Lt. Cmdr. Brian Mello

F/A-18C PILOT
STRIKE FIGHTER SQUADRON 131
NAVAL AIR STATION OCEANA, VA.
HOMETOWN: NEWPORT, R.I.

When I was a kid, I went to my first air show at Quonset Point, R.I. I saw the Blue Angels perform, I saw a Tomcat do a demonstration. I was in awe watching the fighter

jets fly around. I always wanted to be part of that. My first tour was as a damage-control officer on a destroyer. I went to flight school after that.

When I come to work every day, I don't work a 9-to-5 job behind a desk doing spe-

cific tasks. There's always something new and exciting to do every day and it's that that keeps me excited. I've had three combat tours so far. Besides landing on the boat at night, the most challenging thing we face is managing the other aspects of our job when we are gone for eight or nine hours a day on a combat flight. In our community, we lean a lot on our chiefs and maintenance officers to run the squadron and handle all the day-to-day stuff while the pilots are airborne on a mission.

INSPIRATION: The guys who were aviators back in the late '50s and early '60s, when the Mercury space program was coming online, guys like Alan Shepard who were pioneers going into a field that had never been done before, doing things that nobody had ever thought possible. Also, my wife is actually related to Vice Adm. Bill Lawrence, who was a prisoner of war in North Vietnam. He, along with guys like Vice Adm. Jim Stockdale, were amazing leaders, not only in the air, but also on the ground.



MC2 MICAH BLECHNER/U.S. NAVY

Waypoints in History

APRIL 7, 1945

U.S. carrier aircraft sink *Yamato*, a light cruiser and four destroyers en route to Okinawa.

APRIL 24, 1946

Chief of Naval Operations Fleet Adm. Chester Nimitz issues directive for flight demonstration squadron that would become the Blue Angels.

JULY 21, 1946

First carrier landing of pure jet aircraft, onboard *Franklin D. Roosevelt*.

SEPTEMBER 29, 1946

P2V-1 Neptune *Truculent Turtle* flies 11,235.6 miles from Perth, Australia, to Columbus, Ohio.

■ Chief Naval Aircrewman Mark Klingelheber

MH-60S SAR CREWMAN

HELICOPTER SEA COMBAT SQUADRON 22

NAVAL STATION NORFOLK, VA.

HOMETOWN: CUYAHOGA FALLS, OHIO

I wanted to do something with aviation. The rating specialist told me about helicopter search and rescue (SAR). That was right down my alley. I've always been the type of person who wanted to have the opportunity to help others.

I've flown in the H-46, UH-3 and now the MH-60S. What I like best is the variation of the different missions we train for and fly, which are never routine. The next day is always different. We're always training for the next mission set.

Currently, I am the squadron's tactics and training chief petty officer. The most challenging part, because the MH-60S is so diversified with all its mission sets, is not only training the crews but keeping them profi-

cient so that when they deploy they can meet that mission set, whether it's logistics, SAR, force protection or special operations. The crews have to be ready to flex at a moment's notice.

INSPIRATION: Recently, we had [a replica of] the original Curtiss biplane in our hangar for a special event and we listened to the story of Eugene Ely, the first one to launch a Curtiss biplane from a ship. The weather he had to deal with, the basic instrumentation, just to do that and have that foresight and know-how and to say, "This is what we can do," inspires us to constantly push the envelope and expand the capabilities of naval aviation.



U.S. NAVY

■ Lt. Jason Pohl

EA-6B ELECTRONIC COUNTERMEASURES OFFICER

ELECTRONIC ATTACK SQUADRON 142

NAVAL AIR STATION WHIDBEY ISLAND, WASH.

HOMETOWN: BRAINERD, MINN.

I used to work in the film business. What I like about naval aviation is the diverse backgrounds of the aviators. It's funny how we

all get together and end up having that same shared experience as a single unit. We just like to fly. They let us take these planes out and work them. It's pretty awesome to be allowed to do that.



U.S. NAVY

Aside from landing on a carrier, which goes without saying, in the EA-6B the part I find interesting is that we sit more or less like you would in a car. There is the challenge of just coordinating with the front seats and the back seats. It can be difficult to actually coordinate all your efforts in combat, to be able to get everybody on the same page.

INSPIRATION: With my race, I'd pick Ensign Jesse L. Brown [the first black naval aviator, who died after he crash-landed his F4U behind enemy lines in North Korea]. He was posed with all sorts of new problems and issues — more than the standard folks back then. To top it off, the part I really like is that his wingman [Lt. j.g. Thomas J. Hudner Jr.] actually put his plane down to try to help him out [and was awarded the Medal of Honor]. They didn't take into account race; they just did what they were supposed to.

DECEMBER 1, 1947

First experimental Marine Corps helicopter squadron commissioned, leading to vertical envelopment concept.

APRIL 1, 1948

Navy establishes first operational helicopter squadron, HU-1.

JULY 3, 1950

Valley Forge launches Navy's first air strikes in Korean War.

AUGUST 3, 1950

Marine fighters off escort carrier *Sicily* conduct first Marine carrier-based strikes of Korean War.

■ Lt. Jessica S. Davila

MH-65C HELICOPTER COPILOT
COAST GUARD AIR STATION SAVANNAH, GA.
HOMETOWN: INVERNESS, FLA.

Flying helicopters was a dream of mine since I was in high school. I always told people I was going to be an FBI agent and fly helicopters for the agency. When I was in college, I had a friend in the Coast Guard who brought me to Aviation Training Center Mobile, Ala., to see the Coast Guard helicopters. When I left the hangar, I knew then that I wanted to be a Coast Guard aviator.

Search and rescue, when it ends on a positive note, gives me the most job satisfaction. It's a great feeling knowing I'm a part of an organization that saves lives.

We give people a chance to go home when they thought they would never be able to.

INSPIRATION: The cruise ship *Prinsendam* rescue that took place off Ketchikan, Alaska, on Oct. 4, 1980. The Coast Guard collaborated with other agencies to affect the rescue of all 520 passengers and crew members from the burning ship without loss of life. This case is particularly inspiring because of the sheer number of people rescued, the flawless coordination and international cooperation.



U.S. COAST GUARD

■ Capt. Neil H. Brubeck

F/A-18A++ PILOT
MARINE FIGHTER-ATTACK SQUADRON 115
MARINE CORPS AIR STATION BEAUFORT, S.C.
HOMETOWN: CORPUS CHRISTI, TEXAS.

My dad was a Navy A-7 pilot and my grandfather was an Army Air Corps pilot, so I wanted to continue in their footsteps and be a part of a good team and do something challenging. I went to the Naval Academy with the plan of being a Navy aviator, but through interaction with the Marines there I chose Marine aviation.

I enjoy the opportunity to work with other like-minded individuals who genuinely care about what

they do, about being a Marine first and about our specific mission of close air support for other Marines on the ground. The most satisfying thing is to hear the gratitude in their voices on the radio when you're in a position to help those guys out. That's what sets us apart. On almost every occasion, I either know the guys I'm talking to on the radio or I know somebody in their unit, so it's personal.

The most challenging thing is keeping up with the ever-evolving threats and staying ahead of the game in tactics. Being a good leader, staying engaged with all the young Marines in the squadron, keeping that good rapport. Definitely challenging, but rewarding as well.

INSPIRATION: Guys who I've flown with before: Lt. Cols. "Jerky" Johnson, "Howdy" Douds, "Sack" Rowell and "Beavis" Leibine. Those guys — my role models, my mentors — are the true, quiet professionals. They go out and they serve as they have done for the last 15-20 years. They've sacrificed a lot and they really inspire me to keep the legacy going.



U.S. MARINE CORPS

Waypoints in History

NOVEMBER 9, 1950

First jet-versus-jet combat between U.S. Navy and Chinese fighters. Lt. Cmdr. William T. Amen becomes first U.S. naval aviator to shoot down a jet.

DECEMBER 4, 1950

Ensign Jesse L. Brown, the first black naval aviator, dies after his F4U is shot down over North Korea.

NOVEMBER 18, 1952

Soviet MiGs engage Navy F9F Panthers off Vladivostok, resulting in loss of two Soviet aircraft.

MAY 27, 1954

Plans approved to install angled decks and hurricane bows on World War II-era Essex-class carriers.

■ Lt. Eric Bondurant

SH-60B PILOT

HELICOPTER ANTISUBMARINE SQUADRON LIGHT 43
NAVAL AIR STATION NORTH ISLAND, CALIF.
HOMETOWN: HACIENDA HEIGHTS, CALIF.

My Army dad wanted me to go into the military. I was around aviation and planes for quite a bit traveling as a kid. I always wanted to just do my duty to the United States. What a better opportunity than to support it in aviation? It was really between the Air Force and the Navy. I found more heritage in naval aviation dating back from World War II to the current day, so it was what was more interesting to me.

I really wanted to fly fixed-wing jets, as most kids do when they see “Top Gun,” but as I was going through flight school, I saw the type of flying that I would be doing in helicopters, flying by the seat of the pants, how naval aviation started with just stick-and-rudder skills. That was really appealing to me.

Every day there are personal rewards. Probably the

greatest benefits and feelings were on my first deployment when I supported humanitarian assistance and disaster relief off the coast of Sumatra, Indonesia, dropping off relief supplies, food and rice, seeing the smiles on the faces of the kids and their families, who had essentially nothing. Being able to share those pictures and those stories with our Sailors back on the boat was purely amazing.



U.S. NAVY

INSPIRATION: Igor Sikorsky, who did a lot of great things for naval aviation by designing and developing some of the first naval helicopters, like the HO3S-1 Dragonfly that helped set the footprint for naval aviation. Here we are today, with helicopters that have capability similar to a strike fighter, with the exception of [heavy] ordnance. Sikorsky really laid the foundation for us.

■ Lt. Wayne Sparrow

E-2C NAVAL FLIGHT OFFICER

CARRIER AIRBORNE EARLY WARNING SQUADRON 120
NAVAL STATION NORFOLK, VA.
HOMETOWN: ROANOKE, VA.

Traditionally, most people join naval aviation because of the coolness factor. That's pretty much why I joined. But then you realize that it's much more than that. I enjoy the flying aspect, but also, every day is different. The fact that you're not just stuck in an office all day and you get to do a lot of traveling, see a lot of places and just work with a great group of professionals.

The biggest challenge today: with the tightening of the budget, it's a challenge every day to do more with less money and aging equipment.

INSPIRATION: Operation El Dorado Canyon, [the April 1986] strike against Libya, with the Air Force and Navy combining to do the strike. It's one of those things with the flexibility — that you find in the job all the time — you just do whatever is necessary to help out the greater cause.



U.S. NAVY

JUNE 1, 1954

First steam catapult launch from an aircraft carrier occurs when *Hancock* launches an S2F Tracker.

OCTOBER 1, 1955

Forrestal commissioned as first super carrier.

JULY 20, 1956

Navy commissions *Thetis Bay* as first assault helicopter carrier.

OCTOBER 31, 1956

R4D Skytrain transport aircraft lands at South Pole.

Four Decades of Change

By VICE ADM. DAVID ARCHITZEL

Celebrating the 100-year anniversary of naval aviation this year provides an opportunity to reflect on where we've been and where we're headed, particularly in terms of technology advancements. In November 1910, Eugene Ely deck-launched from a wooden platform mounted on the foredeck of a cruiser. Since then, numerous advancements in aviation technology have impacted and improved the country's global presence and the security of the world's maritime domain.

My own part of this story began in 1973, when I graduated from the U.S. Naval Academy, and it continues to this day. In my time in the Navy, I've seen some dramatic changes in the technology associated with aircraft, launching and landing systems, and data sharing and sensors. A general theme has been the transformation from multiple single-mission plat-

forms to a fewer number of highly capable type/model/series aircraft operating with multimission systems.

Aircraft Systems

When I reported to my first fleet squadron in 1975 as an S-3 pilot, we embarked on USS *Forrestal* along with Carrier Air Wing (CVW) 17. At the time, *Forrestal* carried about 84 aircraft of various types, models and series, some of which augmented the air wing from places ashore: F-4J, A-7E, A-3D, C-1, A-6E, KA-6D, RA-5C, E-2B, SH-3D and S-3A. Back then, we needed many types of aircraft because each was designed to work autonomously to accomplish a specific mission or warfare area.

Today, it's a different story. USS *Enterprise* deployed in January 2011 with CVW-1 embarked. That air wing has four F/A-18 Hornet squadrons (three Navy and one Marine), an E-2C squadron, an EA-6B squad-

ron and an SH-60F/HH-60H squadron. That's less than half as many aircraft types as we had on *Forrestal*.

Today's aircraft are much more complex and designed to be used in multiple missions and warfare areas. Because of that complexity, they must be capable of operating seamlessly with other complex surface and air platforms — including those from all the U.S. services and coalition forces. And tomorrow's fifth-generation fighter, the F-35 Lightning II Joint Strike Fighter (JSF), and the P-8A Poseidon must be even more integrated and interoperable.

The venerable Viking is now gone from the fleet, as are many of the aircraft I flew in the 1980s and 1990s. They have been replaced by more capable platforms. In the 1970s, the SH-3, a system intended for anti-submarine warfare and search-and-rescue missions, served in tandem with the SH-2 — a completely differ-

Waypoints in History

JULY 16, 1957

Marine Corps Maj. John Glenn Jr. breaks transcontinental speed record in 3 hours, 23 minutes, in F8U-1P Crusader.

JULY 15, 1958

Aircraft from *Essex* and *Saratoga* cover Marine landings into Lebanon.

JUNE 19, 1959

First ZPG-3W non-rigid airship delivered at NAS Lakehurst.

MAY 5, 1961

Lt. Cmdr. Alan B. Shepard Jr. is first American in space.

ent system intended solely for cruisers and frigates. Both aircraft went out on missions and operated largely autonomously. Today, the MH-60R/S fulfills the roles of both aircraft, and adds new capabilities such as anti-surface and mine warfare, and the ability to work in an integrated fashion with other units across the carrier strike group.

In the coming years, the JSF will join the fleet — the F-35C on our carriers and the F-35B on our large-deck amphibious assault ships. These aircraft will replace the AV-8B and legacy F/A-18 Hornets. JSF will fulfill the missions performed by four different aircraft in my first air wing on *Forrestal*, and bring fifth-generation stealth and fusion technology to the Navy/Marine Corps team for the first time. Unlike earlier air wings, or even those of today, tomorrow's air wings will be made up of a handful of airframes bringing a plethora of capabilities.

When I received my wings in November 1974 and headed to my first S-3 squadron, it never occurred to me that more than 30 years later a freshly winged pilot heading to his or her fleet readiness squadron might be sharing airspace with unmanned aircraft. Today, unmanned systems perform missions alongside manned aircraft, and new systems are adding even more capability to the fleet. The Navy's first high-altitude, long-endurance intelligence, surveillance and reconnaissance (ISR) capability has been demonstrated through the

Broad Area Maritime Surveillance Demonstrator, or BAMS-D. The operational system, MQ-4C, will enter the fleet in the near future.

On one of my early Mediterranean deployments, my crew and I launched off USS *Saratoga* south of Sicily and transited to the Atlantic Ocean where we gained contact on a Soviet Echo II-class submarine about 100 miles west of Rota, Spain. We were "on top" for several hours and required multiple in-flight refuelings during the 12-hour flight that ended when we returned to Sigonella. Before leaving station, we handed off contact to a P-3.

With both the P-8A Poseidon (which will replace the P-3) and BAMS, persistent netted surveillance scenarios like this will be more efficient and effective. The primary mission of the MQ-4C is persistent ISR on the order of 25 or more hours on station; it will cue both airborne and alert P-8 crews to contacts of interest in the maritime domain.

Perhaps no aircraft better illustrates the interaction between continuity and change in naval aviation in the past 40 years than the E-2 Hawkeye. Already an indispensable part of the fleet for more than a decade by the time I earned my wings, the E-2 still serves as the Navy's primary airborne early warning aircraft. Externally, all the various models of the E-2 largely resemble each other. Today's E-2D, however, is a completely different system from its predecessors.



Vice Adm. David Architzel, commander, Naval Air Systems Command, speaks with members of Air Test and Evaluation Squadron 30 at Naval Base Ventura County, Point Mugu, Calif., in summer 2010.

The D has an all-glass, all-digital cockpit. The new APY-9 radar provides longer range surveillance, a better overland capability and a superior ability to find small targets than the APS-145 of the E-2C. And the Cooperative Engagement Capability, introduced in the E-2C, provides automatic, real-time data sharing among surface and air platforms that integrates the E-2 and all strike group components.

Launching & Landing Systems

The current aircraft launch system for all the Navy's aircraft carriers — as it was when I first entered the Navy — is the steam catapult. However, over time, aircraft have been getting heavier, needing higher launch

NOVEMBER 25, 1961

Enterprise commissioned as world's first nuclear-powered aircraft carrier.

FEBRUARY 20, 1962

Lt. Col. Glenn completes U.S. space program's first orbital flight.

OCTOBER 15, 1962

Navy RF-8A Crusaders begin collecting vital photography validating the Soviet missile threat in Cuba.

AUGUST 5, 1964

Navy aircraft attack North Vietnamese bases after Tonkin Gulf incident.



An F/A-18F Super Hornet and a Korean War-vintage F4U Corsair fly in formation during the Navy Legacy Flight at the 2005 Air Power Over Hampton Roads air show held at Langley Air Force Base, Va.

speeds (or greater wind over deck), with the result that launch energy requirements have approached the limits of the steam catapult's capacity.

The Electromagnetic Aircraft Launch System (EMALS) is a new carrier-based launch system designed for the Gerald R. Ford class. EMALS is designed to achieve increased sortie rates and reliability, while reducing operational and support costs, providing better control of the launch forces, and minimizing wear and tear on carrier-based aircraft. The system will provide the capability for launching all current and future carrier air wing platforms. Its mission and function remains the same as the steam catapult. EMALS uses stored kinetic energy and solid-state electrical

power conversion. This technology permits a high degree of computer control, monitoring and automation.

EMALS is highly modular, especially in the power-conversion subsystems. Maintainability and supportability are enhanced by this modularity. A single EMALS catapult is actually supported by four independent power trains. Should any one power train fail, the remaining three will provide ample energy to safely complete the catapult launch cycle. This motor redundancy will increase EMALS' high launch critical reliability.

The program entered full system functional demonstration in September 2010 and launched its first aircraft, an F/A-18E Super Hornet,

on Dec. 18, 2010. Delivery of the first ship components to *Gerald R. Ford*, currently under construction, will begin in 2011.

The process of landing aircraft aboard ship also has undergone tremendous change. As a member of CVW-17 in the mid-1970s, I trusted the precision approach radars aboard *Forrestal* and the controllers in the Carrier Air Traffic Control Center to provide me with the information I needed to get aboard safely, especially at night.

The two-channel, SPN-42 (now SPN-46) "needles" Automatic Carrier Landing System was a radar-based system that could track two aircraft at a time, one per channel. The radar scanned an area aft of the ship based on known aircraft altitude. Once the aircraft flew into the radar's search window, it would be locked on by a controller who used azimuth and elevation reference marks to determine aircraft position relative to optimum glide slope. When conducting a nighttime Case III recovery with several aircraft lined up behind the ship at 2-mile intervals, only the closest two aircraft would be locked on by the SPN-42 and be able to receive precision approach information.

The Joint Precision Approach and Landing System (JPALS) removes the radar component of carrier landing systems and replaces it with four Global Positioning System (GPS) receivers mounted on the ship's mast. Each receiver con-

Waypoints in History

JUNE 17, 1965

First confirmed air-to-air kills of Vietnam War occur when two F-4B Phantoms from *Midway* down two MiG-17s.

MAY 11, 1966

Marine Corps uses a land-based catapult to launch A-4 Skyhawks into combat in Vietnam.

JUNE 16, 1966

Carrier aircraft begin sustained operations against North Vietnamese petroleum facilities.

AUGUST 30, 1966

Naval aviators begin flying UH-1B Huey helicopters to support riverine operations in Vietnam.

ducts survey mapping to determine its distance from the optimum touchdown point on the flight deck.

The two most accurate receivers, based on the quality of satellite reception, self-select to provide ship location data to aircraft on approach via an encrypted UHF data link. Aircraft location, determined by GPS receivers on the aircraft, is married up with the ship's location to calculate the optimum flight path to touchdown. Once fielded, JPALS will be able to conduct Mode I (fully automatic) approaches all the way to touchdown for those aircraft that are Mode I certified.

JPALS offers numerous advantages over radar-based approach systems. Radar lock-ons to specific aircraft on final approach are no longer required. All aircraft configured with JPALS on final approach will receive landing information simultaneously. Final controllers no longer have to perform the 27 separate actions necessary to acquire, lock-on and "drive" aircraft to touchdown. For them, JPALS is hands-free. Beam steering facilitates satellite acquisition and tracking, and a nulling feature discounts any information received from jammed satellites.

JPALS is being installed in two increments: 1A — ship (carriers and amphibious assault ships) — and 1B — aircraft. Ship installations will begin in 2012 aboard USS *George H.W. Bush* and aircraft installations will begin in 2016 with the MH-60 Seahawk helicopter.

The final part of the aircraft-recovery process is the Advanced Arresting Gear (AAG), a modular, integrated system consisting of cable shock absorbers, energy absorbers, power conditioning equipment, a thermal management system and digital controls. This is designed to replace existing Mk-7 arresting gear when landing fixed-wing tailhook-equipped aircraft at sea.

The Mk-7 system on Nimitz-class carriers, a linear hydraulic system that is very labor intensive for both operations and maintenance, will be replaced with the AAG system during planned upgrades. The AAG system will be installed first on *Gerald R. Ford*.

Data Management & Sensors

In the 1970s, aircraft and ships had limited ability to communicate with each other and share data. Today, multiple systems connect air and surface platforms in real time. The complexity of air operations aboard naval aircraft carriers requires accurate, continuous and timely information distribution to all work centers requiring vital data. Existing shipboard information-management systems do not seamlessly support weapon, maintenance, flight deck control, flight operations and shipboard planning operational requirements.

The Aviation Data Management and Control System (ADMACS) is a tactical, real-time internal data-management system that connects a car-

rier's air department, ship divisions and Sailors who manage aircraft launch-and-recovery operations. ADMACS communicates aviation and command-related data across the system's local area network and the integrated shipboard network system. The position and location of the aircraft on flight and hangar decks are then electronically displayed in the flight deck control room. ADMACS also displays the aircraft's status, status of launch-and-recovery equipment, fuel, weapon types and quantities, and other aviation and ship-related information.

The primary goal of the ADMACS program is to improve ship air operation effectiveness and reduce workload through process automation, optimization and integration of key



A Boeing P-8A Poseidon, the Navy's next generation long-range anti-submarine warfare and maritime patrol aircraft, conducts a test flight near Seattle June 5, 2009.

JULY 29, 1967

Forrestal Sailors overcome major fire to save ship, but lose 134 crew members and embarked air wing personnel.

APRIL 25, 1968

VA-176 retires Navy's last operational piston-engine attack aircraft — A-1 Skyraider.

JUNE 19, 1968

Daring helicopter rescue deep over North Vietnam earns Lt. j.g. Clyde E. Lassen Medal of Honor.

APRIL 14, 1969

North Korean aircraft shoot down a Navy EC-121 aircraft over the Sea of Japan, with loss of 31 crewmen.

operational systems. Installation of ADMACS is ongoing. By 2015, all active-duty carriers will be equipped with the ADMACS Block 2 system, and by 2017 the Block 3 system — which will provide an interface for data sharing between systems such as the EMALS, AAG, JPALS and the Moriah Wind System — will be in operation.

Today's F/A-18E/F Super Hornets are equipped with Advanced Targeting Forward Looking Infrared (ATFLIR), an electro-optical targeting pod incorporating an infrared, low-light television camera, laser range finder/target designator, and laser spot tracker. A video transmission system now makes it possible to down-link streaming ATFLIR video to troops on the ground, enabling real-time, coordinated target identification and acquisition. Joint Tactical Air Controllers use the Remotely Operated Video Enhanced Receiver, or ROVER, to talk Hornet pilots onto targets of opportunity in real time.

Super Hornets are also equipped with the Shared Reconnaissance Pod (SHARP) which replaced the F-14 Tactical Airborne Reconnaissance Pod System. SHARP's low-rate imagery transfer sends real-time electro-optic and infrared video to analysts at the Combined Air Operations Center, who determine the level of risk in high-threat areas.

When I started flying 36 years ago, the best we could do with our FLIR was record the footage on film and bring it back to the intel-



U.S. MARINE CORPS

Lt. Col. Fred Schenk pilots F-35B test aircraft BF-2 for its first vertical landing Jan. 6, 2011, at Naval Air Station Patuxent River, Md. The Marine Corps' short-takeoff, vertical-landing version of the F-35 is designed for large-deck amphibious assault ships. The Navy's carrier-capable variant is the F-35C.

ligence specialists in the Combat Visual Information Center for time-late analysis. With ATFLIR and SHARP, we have the ability to provide real-time targeting and surveillance information to those who need it most — when they need it.

Throughout the 100 years of naval aviation, change has been a constant. Technological advancements have allowed us to expand the ranges, capabilities and endurance of aircraft in ways the early pioneers of flight could only dimly imagine. Every aviator who's made climbing into aircraft his or her profession — no matter how long or short a career

— has witnessed extraordinary developments. As we enter the second century of naval aviation, that change will continue, as will the unswerving dedication of the men and women who design, test, operate and maintain the aircraft of the Navy and Marine Corps. ■

Vice Adm. David Architzel is commander, Naval Air Systems Command, and former commanding officer of Sea Control Squadron 30, USS Theodore Roosevelt and USS Guam. Over the course of his career as an aviator, he accumulated more than 5,000 flying hours in the S-3 Viking and 30 other aircraft types.

Waypoints in History

JULY 11, 1969

Korean War naval aviator Neil Armstrong first human to step on Moon.

JANUARY 6, 1971

Marine Corps receives first AV-8A Harrier jet capable of vertical launch and landing.

MAY 8, 1972

Navy and Marine Corps attack aircraft begin mining approaches to Haiphong Harbor in North Vietnam.

MAY 10, 1972

Eight North Vietnamese MiGs fall to Navy fighters. Lt. R.H. Cunningham and Lt. j.g. W.P. Driscoll become aces.

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A 30-Year Retrospective

By VICE ADM. JOHN P. CURRIER

Standing on the hangar deck at Air Station Cape Cod, Mass., in the spring of 1978, I had the privilege to observe my first awards ceremony as a newly commissioned Coast Guard aviator. As I stood proudly at attention in my freshly starched uniform, my butter bars gleaming, and sporting shiny and fresh wings, I tried to mask my anxiety, standing among more experienced and senior compatriots.

Adding to the intimidation factor, standing to my left was a Direct Commission aviator who had been an Army combat veteran during Vietnam, and to my right was a grizzled Coast Guard aviator who had survived multiple tours in the unforgiving Alaskan environment. Both wore the Distinguished Flying Cross (DFC) device, and one a Silver Star, on their dress canvas.

The ceremony continued with the award of a DFC to the pilot of

one of our own helicopters, who had flown through a Nor'easter to rescue the crew of a coastal tanker that was breaking up in high seas. The realization struck me that I was about to be initiated into the unique community of Coast Guard search-and-rescue (SAR) pilots.

Now, I am able to recall that day in retrospect through the lens of a 34-year career as an officer and aviator in one of the finest institutions of our government. From those days when SAR was the single, pre-eminent mission, I have watched Coast Guard aviation progress into a unique instrument in our nation's arsenal for ensuring maritime safety and security. Our capabilities, assets and, most importantly, people have progressed and developed rapidly into a multimission force able to respond to virtually any crisis our nation could face on or near its shores.

In the context of many years of experience, I have witnessed the effective total force response to threats as diverse as the Mariel Boatlift (1980), the *Exxon Valdez* environmental catastrophe (1989), the loss of the liner *Prinsendam* in the Gulf of Alaska (1980), the cataclysm of Hurricane Katrina (2005) and, most recently, the Deepwater Horizon oil well failure in the Gulf of Mexico last year. Concurrently, with these milestone events, we have developed unique capabilities to partner with federal law enforcement and the U.S. Navy to interdict illegal narcotics and counter mass migration incidents at sea.

One might ask what has enabled the Coast Guard and its aviation component to evolve into the agile and capable force that it is today. The answer to that question requires a walk in time with a view of

Waypoints in History

OCTOBER 5, 1973

Midway arrives at Yokosuka, Japan, as first overseas homeported Navy aircraft carrier.

FEBRUARY 22, 1974

Lt. j.g. Barbara Ann Allen becomes first woman to earn Wings of Gold.

MAY 3, 1975

Nimitz, lead ship of a class of 10 nuclear super carriers, is commissioned.

MAY 29, 1976

Helicopter assault ship *Tarawa* commissioned as first of new line of amphibious assault ships.

the events that spurred the development of this growth.

First, one must understand the culture of the Coast Guard. Formed through an amalgamation of several federal agencies from the mid-19th century through the days following World War II, the modern Coast Guard emerged with a strong first-response ethic. We are all oriented toward responding to crisis with a small, capable, well-organized and effective force package that is able to operate autonomously and adapt to handle any emergent situation. This attribute was certainly evident in the U.S. Lifesaving Service and the Revenue Cutter Service, two of the principal forbearers of today's Coast Guard.

A second element that has contributed to the aviation capability of today is the evolution of the airplane and helicopter. As naval aviation celebrates its centennial, Coast Guard aviation remains an integral component, along with that of our Navy and Marine Corps brethren. Our people, officers and enlisted, have been integral in the development of long-range search aircraft and short- to medium-range helicopters employed in SAR and law enforcement.

From the story of Coast Guard Lt. Elmer Stone and his role as pilot of the Navy's NC-4 under the command of Navy Lt. Cmdr. A.C. Read in their epic first crossing of the Atlantic, to the achievements of pioneers including Coast Guard

Cmdr. Frank Erickson and Lt. Steward Graham in the development of the helicopter for not only SAR, but anti-submarine warfare, medevac and firefighting, the Coast Guard has contributed materially to the evolution of modern flying machines. In our application, the helicopter was developed as an extension of the coastal surf/rescue boat combining air and surface capabilities to perform the most challenging rescues.

There are numerous examples of the Coast Guard's outstanding record of contribution in the development of aircraft and their specialized use. I have the privilege of calling Stewart Graham a friend. Now in his 94th year, he lives quietly on a lake in Maine. His personal contribution to rotary-wing flight in the development of our modern machines, as well as the tactics and techniques that are used in air/sea rescue today, cannot be overstated.

He was directly involved in the invention of the rescue hoist, the basket, litter, pop-out floats and most of the techniques used in hoisting operations to this day. He was among the first to land helicopters in the water and aboard ship, pioneering the use of the helicopter in the protection of convoys from U-boats in the dark days of World War II.

Stewart is able to recall virtually all of his flight activities in incredible detail, as if they were yester-

day. Listening to him recount his adventures is to witness living history. What I mention here is but a small number of his monumental achievements in the development of today's helicopter, not just Coast Guard but in all applications. As a project officer for the acquisition of our HH-60J during the late 1980s, I wasn't surprised to hear that Stewart Graham was still held in the highest esteem by the people at Sikorsky for his early pioneering efforts in partnership with icons Igor and his son, Sergei, who served as a petty officer second class in the Coast Guard.



U.S. COAST GUARD

Vice Adm. John P. Currier, Coast Guard chief of staff.

NOVEMBER 18, 1978

First F-18 prototype makes first flight.

APRIL 24, 1980

Eight RH-53 Sea Stallion helicopters off *Nimitz* participate in failed Iranian hostage-rescue attempt. One helicopter is lost in a collision with a U.S. Air Force C-130.

APRIL 12-14, 1981

First Space Shuttle *Columbia* flight conducted, with Capt. John W. Young and Capt. Robert L. Crippen onboard.

AUGUST 19, 1981

Two F-14s shoot down two Libyan Su-22 fighters after being fired on over the Gulf of Sidra.



U.S. COAST GUARD

A helicopter crew from the Helicopter Interdiction Tactical Squadron Jacksonville fires warning shots across the bow of a noncompliant boat during airborne use of force training off the coast of Jacksonville, Fla., Sept. 24, 2009.

Another significant enhancement of our aviation capabilities began 26 years ago, in response to a challenging rescue mission in very demanding weather that resulted in significant loss of life. In 1995, the Coast Guard designed and implemented a helicopter rescue swimmer program based on equipment and tactics used in the U.K. Royal Navy and Canadian Air Force. From very humble beginnings, the rescue swimmers of today are among the world's very best.

Deployed from HH-60 and HH-65 helicopters, they have routinely performed incredible feats in rescuing stranded mariners from near impossible conditions. Theirs is the stuff of

legend as told in the hit Hollywood movie *The Guardian*. I can state from experience that the movie's depiction of storm-tossed seas and the challenges of heavy weather search and rescue were quite true to life.

It was a privilege for me to participate in the 25th anniversary celebration of the Coast Guard rescue swimmer program last year at Elizabeth City, N.C. The plank owners in the establishment of this program, such as Coast Guard Master Chiefs Larry Farmer, Darryl Gelakoska and Scott Dyer, as well as retired Capt. Dana Goward, among others, were visionaries to be sure. Their collective efforts have saved thousands of lives over the past quarter century.

Coast Guard aviation has also contributed two pilots to the NASA astronaut program. We were all proud to see Bruce Melnick and Dan Burbank "break the bonds" in such a spectacular manner on several Shuttle missions. Of particular interest was Melnick's adaptation of standard helicopter hoist terminology to operate the robotic arm during a satellite-repair mission.

More recent achievements in rotary-wing development include the arming of helicopters to counter aggressive narcotics trafficking activities in the Caribbean and Eastern Pacific. While our ship/helicopter teams had evolved an effective detection and monitoring capability in countering small, fast, drug-carrying craft ("go-fasts"), interdiction of these vessels became problematic, particularly when the cutter was out of position. Many cases were documented where a helicopter and a fixed-wing patrol aircrew watched helplessly as their prey escaped.

The solution was the establishment of the Helicopter Interdiction Squadron (HITRON), formed to detect, engage and, if necessary, stop go-fasts using warning shots and precision fire. This program has been uniquely successful. HITRON's pilots and crew now flying the MH-65 have a near-perfect record of stopping or disabling highly suspect vessels. Their contribution has enhanced the effectiveness of the ship-helicopter

Waypoints in History

OCTOBER 25-27, 1983

Navy and Marine Corps aircraft play pivotal support roles during Operation Urgent Fury, the liberation of Grenada.

DECEMBER 4, 1983

Aircraft off *Independence* and *John F. Kennedy* attack Syrian positions in Lebanon, with loss of two aircraft.

OCTOBER 10, 1985

F-14s intercept and force down Egypt Air Boeing 737 flight carrying terrorists who hijacked cruise ship *Achille Lauro*.

MARCH 24-25, 1986

Naval aircraft destroy two Libyan vessels and attack shore sites in response to Libyan provocations.

team throughout the transit zones and kept literally tons of narcotics from our streets.

Our fixed-wing communities have progressed as well. In the 1980s, the Coast Guard developed a very sophisticated interceptor system for use against narco-trafficking via aircraft from the deep Caribbean. HU-25 Falcon jets were retrofitted with fighter/interceptor radar, the same found on the F-16 Fighting Falcon. For several years, the Falcon stood strip alert at Air Station Miami and at varied locations including Guantanamo Bay, Cuba, and Providenciales and Borinquen, Puerto Rico. In close cooperation with the U.S. Customs Service, Joint Inter-Agency Task Force South and other agencies, the HU-25 was very effective in thwarting the airborne threat axis. While commanding officer at Coast Guard Air Station Miami, I participated in the demanding night intercept mission.

During the 1990s, the HC-130H was fitted with a very capable synthetic aperture radar, forward-looking infrared and other sensors integrated into a system called CASPER. Deployed to the Eastern Pacific and Gulf of Mexico, CASPER-equipped HC-130s were uniquely effective in airborne detection and surveillance. With the addition of the HC-130J to the mix and installation of a modernized radar in the C-130H, our fleet will remain mission effective for years to come.

Building on the basic HH-60J and HH-65A airframes, our helicopters have been modernized into MH-60Ts and MH-65C/Ds and enhanced through a series of block upgrades conducted at the Aviation Logistics Center (ALC) at Elizabeth City. In my opinion, ALC is home to a dedicated band of

skilled engineers and craftsmen who border on magicians when it comes to aircraft modification and maintenance. They are the unsung heroes of Coast Guard aviation.

Additional rotary-wing capabilities have included an airborne-use-of-Force package that built upon the lessons learned from HITRON.



CENTENNIAL OF NAVAL AVIATION FORUM
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AIAA

APRIL 15, 1986

Aircraft from carriers *America* and *Saratoga* participate in Operation El Dorado Canyon strikes against Libya.

APRIL 18, 1988

A-6E attack aircraft from *Enterprise* help sink an Iranian frigate and severely damage another in Operation Praying Mantis.

MAY 23, 1988

First V-22 Osprey tiltrotor rolls out of production plant.

OCTOBER 6-10, 1990

Cmdr. Bruce E. Melnick is first Coast Guard aviator in space as crew member on Shuttle *Discovery* flight.

At several critical ports around the country, Coast Guard helicopters are able to offer gunship capability as an option to regional commanders. In response to a critical need to protect the National Capital Region from low/slow aviation threats, a very sophisticated set of tactics was developed and termed Rotary Wing Air Intercept. This package works closely in conjunction with the Department of Defense to protect critical national assets, both people and infrastructure. We routinely deploy this capability at the request of the Secret Service.

Recently, we began acceptance of the HC-144 Ocean Sentry. This replacement medium-range surveillance aircraft is the combination of a proven airframe, with modern avionics and sensors. Although slower than the HU-25 that it replaces, the HC-144 promises to be more suitable for longer-range missions, with on-scene loiter capability. The sensors are maturing into a most useful asset for both tactical mission accomplishment, as well as the provision of critical information to operational commanders. The Ocean Sentry performed admirably during the Deepwater Horizon oil spill response in the Gulf of Mexico.

My observations only touch on a few of the changes, enhancements and evolution of today's Coast Guard aviation component. While we have come a long way from pis-



U.S. COAST GUARD

A Coast Guard HC-144 Ocean Sentry flies over the drillship *Discoverer Enterprise* June 28, 2010, as part of the response to the Deepwater Horizon oil spill. Coast Guard aircraft flew continuously over the Gulf of Mexico to find locations of heavy oil on the ocean surface and communicated the coordinates to vessels so they could skim the oil during the worst spill in U.S. history.

ton aircraft and analog radios, the hazards associated with flight operations remain the great equalizer. Flying in poor weather, icing conditions, severe turbulence and high winds over the sea or at night demands the utmost from our aircrews. These risks can only be overcome by dedicated individuals who have the knowledge, skills and abilities to assess and overcome through teamwork. Our flight operations have always been, and will continue to be, high-risk operations conducted by talented and dedicated aviation professionals.

In retrospect, it is clear to me that high-quality people are the essential element in the success of this enterprise. As I look around our aviation community today, I see young people who are just as committed and dedicated as we were 30 years ago. For the Coast Guard, and the next 100 years of naval aviation, the sky is the limit and the future is bright.

Semper Paratus. ■

Vice Adm. John P. Currier is chief of staff, U.S. Coast Guard.

Waypoints in History

JANUARY 2-5, 1991

Marine helicopters evacuate U.S. citizens and foreign nationals from Somalia amid civil war.

JANUARY 17, 1991

Aircraft from four aircraft carriers launch attacks against Iraq during opening phases of Operation Desert Storm. Six carriers eventually would participate.

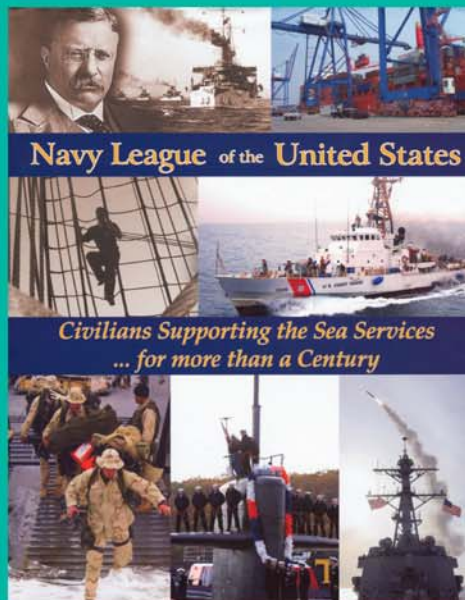
DECEMBER 8, 1991

Lexington, the last operational Essex-class carrier, is decommissioned.

JANUARY 13, 1993

Aircraft from *Kitty Hawk* make strikes against Iraq for violations of southern no-fly zone.

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Continuing a Proud Legacy

By VICE ADM. ALLEN G. MYERS

Naval aviation is a story of vision, courage, innovation and adventure. Throughout this centennial year, we celebrate our history, honor our heritage and look to the future.

Just 100 years ago, the battleship Navy dominated strategy and budget decisions. Flying was viewed as a minor capability that had limited potential for scouting purposes, and the General Board of the Navy declared in 1916 that, "Aeronautics does not offer a prospect of becoming the principal means of exercising compelling force against the enemy."

But as we know, naval aviation has proven its strategic worth by enhancing the Navy's ability to conduct its missions.

A navy exists to influence coalitions by building or disrupting them, and to influence the sea lanes of commerce by opening or

closing them. Over the last 100 years, naval aviation has steadily expanded the area that our naval ships can influence, from the line of sight in the crow's nest to hundreds of miles across the sea and inland, and we will continue to expand that area of influence.

Today, naval aviation is capable of supporting missions across the full spectrum of operations and delivering flexible, agile, immediately responsive and persistent combat power from the sea base around the world. From the pitching deck of an aircraft carrier in the North Arabian Sea, Navy and Marine Corps aircrews fly missions hundreds of miles inland to provide 24/7 close air support for coalition forces on the ground in close contact with the enemy in Afghanistan. At the same time, Air Ambulance Detachments, operating from dusty, remote forward operating bases,

evacuate hundreds of patients, while maritime patrol aircraft provide reliable reconnaissance, maritime security and counterpiracy operations support.

Our global presence, including the overseas-based USS *George Washington* Carrier Strike Group and forward deployed naval forces constantly on station in the Pacific, ensures that anytime, anywhere, we can respond to our nation's call, whether it be to deter aggression or to provide comfort and hope in the wake of disaster.

We are fiercely proud of our rich heritage, and as we celebrate 100 years of accomplishment, we look to the challenges of the future. The ready strength of a flexible, forward Navy remains vital to our national interests, and the capability resident within naval aviation will ensure our Navy continues to deliver effects in an expanding area of influence.

Waypoints in History

APRIL 12, 1993

NATO commences Operation Deny Flight over Bosnia-Herzegovina, incorporating a dozen F/A-18s from *Theodore Roosevelt*.

MAY 21, 1996

Marine helicopters and C-130s engage in month-long evacuation of Americans and foreign nationals from Central African Republic.

MARCH 13-26, 1997

Marine helicopters help with evacuations in Albania.

FEBRUARY 28, 1997

Fleet squadron VA-75 retires Navy's last A-6 Intruder attack aircraft.



U.S. NAVY

Vice Adm. Allen G. Myers, commander, Naval Air Forces, and Naval Air Force, U.S. Pacific Fleet.

Naval aviation is poised to start its next century executing long-planned-for modernization in every flying community, bringing increased capabilities, range and multimission performance to enhance the effects we deliver from the sea. The Maritime Patrol Community begins its transition later this year.

Replacing the P-3C Orion as a long-range anti-submarine warfare (ASW), anti-surface warfare (ASUW), intelligence, surveillance and reconnaissance aircraft, the P-8A

Poseidon will be capable of broad-area, maritime and littoral operations that will integrate this incredibly capable platform with the carrier strike group. This is the first Navy combat aircraft that has been built from the ground up on a commercial production line.

By leveraging Boeing's commercial 737 airframe and aircraft systems, the program will reduce time and overall cost for the Navy as we plan for a buy of 117 Poseidon aircraft. With the first fleet delivery scheduled this year, we look for-

ward to reaching initial operating capability (IOC) with the first squadron deploying in 2013.

In terms of personnel and airframes, rotary-wing aviation is the fastest growing community in naval aviation. By 2020, helicopter pilots will account for greater than 50 percent of all naval aviators. The range of mission sets provided by Navy helicopters in support of the Maritime Strategy has made them a vital asset to the fleet.

The rotary wing extends the actionable range of a ship and can serve as an ASW, ASUW and mine countermeasure (MCM) platform, and also conduct search-and-rescue (SAR) and logistics operations. The advances of the MH-60R/S greatly enhance the capabilities of the rotary-wing community, and with the continued implementation of the Helicopter Concept of Operations, the carrier air wing as well.

Further enhancing the capability of the strike group, the E-2D Advanced Hawkeye will provide enhanced, network-enabled long-range sensors for unmatched command and control. As the eyes and ears of the fleet, the Advanced Hawkeye brings game-changing capability. It provides maritime airborne early warning and command and control, and communication relays to long-range surveillance in the littoral waters, as well as to strike support over land. It also supports irregular missions,

MAY 29, 1997

Marine helicopters assist in evacuations in Sierra Leone.

DECEMBER 16-19, 1998

Air attacks initially launched from *Enterprise* attack targets in Iraq as part of Operation Desert Fox. Navy female aviators fly in combat for first time.

MARCH 24, 1999

Aircraft from *Theodore Roosevelt* play key roles in 78-day NATO air campaign against Serbia. P-3s launch Standoff Land-Attack Missiles against Serbian targets.

MAY 14, 1999

The Marine Corps takes delivery of first MV-22B Osprey.



U.S. NAVY

MH-60R Seahawk helicopters fly in tandem during section landings at Naval Air Station Jacksonville, Fla., June 10, 2009.

such as drug interdiction, with capabilities two generations beyond those provided in the venerable E-2C Hawkeye.

We marked fleet delivery in a grand ceremony in Norfolk, Va., last July. And as the pilots and aircrew at VAW-120 (the E-2/C-2 Fleet Replacement Squadron) train in the aircraft, we progress steadily closer to IOC in 2013 with VAW-121's fleet deployment.

Also ongoing is the transition from the EA-6B Prowler to the EA-18G Growler, which will serve as the nation's foremost platform for tactical airborne electronic attack, a Navy core competency. Employing the Super Hornet airframe, its state-of-the-art weapons systems also bring greater efficiency through 90 percent parts commonality and reduced operational crew size. While we have already noted the successes of the Growler in the expeditionary environment, we look forward to the first Fleet deployment later this year when VAQ-141 deploys as part of the CVW-8/USS *George H.W. Bush* team.

Equally important is the life-cycle management of our F/A-18E/F Super Hornets, which offer inherent flexibility as multimission aircraft. They enable carrier strike groups to execute the full range of core capabilities as well as interoperability of other tactical air (TACAIR) assets within the strike group and joint forces, and with our allies at sea and ashore. With their longer range, greater payload and ability to refuel other aircraft, they provide reassurance to allies, deter potential adversaries and project power in support of our coalition forces on the ground.

The Super Hornet is a reliable platform that does it all — air superiority, fighter escort, reconnaissance, air defense suppressions and day or night precision strike — and will make up half our

TACAIR strength as we begin to transition to the Navy variant of the F-35 Lightning II Joint Strike Fighter, the F-35C.

Naval aviation's legacy of innovation and technology advancements continues with the F-35C. We eagerly watch the progress of the ongoing test flights at Patuxent River, Md. The F-35C is a fifth-generation strike fighter, and its capabilities will truly change how a pilot flies and fights this aircraft through its sensor integration package, which synthesizes data input from multiple sources. The F-35C and its generational leaps in technology and capability are a key component to naval aviation's future ability to deliver effects from the sea base.

When the F-35C reaches the fleet, we also will be welcoming the next-generation aircraft carrier, the Ford-class carrier. As construction continues apace for the lead ship in the class, CVN 78, so do the advanced systems being developed for it, most notably the Electromagnetic Aircraft Launching System, which has already conducted test launches.

Equally important has been the news of the X-47B's first flight in early February. This is a key step in our effort to incorporate unmanned systems onto the flight deck by 2018. As we make progress in the development of UCLASS (Unmanned Carrier-Launched Airborne Surveillance

Waypoints in History

APRIL 1, 2001

A Chinese F-8 fighter collides with a Navy EP-3E Aries II surveillance plane in international airspace, forcing U.S. plane to land on Hainan Island.

OCTOBER 7, 2001

Enterprise and *Carl Vinson* launch strikes against Taliban in Afghanistan as part of Operation Enduring Freedom.

MARCH 21, 2003

Aircraft from *Abraham Lincoln*, *Constellation*, *Kitty Hawk*, *Harry S. Truman* and *Theodore Roosevelt* participate in Operation Iraqi Freedom "Shock and Awe" attacks.

APRIL 3, 2003

Marine AV-8B Harriers participate in major air strikes against Taliban targets in Afghanistan.



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NORTHROP GRUMMAN

An X-47B Unmanned Combat Air System demonstrator (UCAS-D) completes its first flight at Edwards Air Force Base Feb. 4, 2011. The UCAS-D will demonstrate the capability of an autonomous, low-observable unmanned aircraft to perform carrier launches and recoveries in preparation for development of the Unmanned Carrier-Launched Airborne Surveillance and Strike system.

and Strike systems), other unmanned combat air systems also are in development and operational testing. The Broad Area Maritime Surveillance system has been widely successful in its demonstration — proving constant value to the combatant commander as it delivered effect hundreds of miles inland.

Fire Scout is an unmanned rotary-wing asset that has already logged more than a thousand flight hours. Fire Scout also will operate from the Littoral Combat Ship, to

complement our manned rotary-wing assets and yield a more efficient use of our aviation platforms.

Unmanned systems will certainly play a complementary role in naval aviation's future and we are actively working on how this "family of systems" will become integrated into fleet operations. For many missions, such as those requiring extended time on station to conduct surveillance and reconnaissance, an unmanned platform offers an efficient and logical solution.

The challenge will be in determining how to integrate this family of unmanned systems with manned aircraft efficiently and effectively leverage the most out of both. While technology continues to evolve so that a UCLASS operates as part of the carrier air wing, there will remain a need for accountability for the employment of weapons. The excitement and the challenge will be determining where that decision maker is located — whether ashore, on the carrier or even as the "wingman" of the unmanned platform. I am confident that as this technology develops, naval aviation will find the right way to embrace these capabilities to extend the area in which the sea base can deliver effects.

The same passion that inspired Lt. T.G. Ellyson, Naval Aviator No. 1, and has inspired a century of innovation and success remains strong across the entire naval aviation team. Throughout this year, we recognize the brave pilots and air crew, as well as the legion of maintainers, ordnancemen, flight deck and other support personnel — military and civilian — who have ensured the aircraft were ready and safe to launch. Our shared passion for flight has fueled a century of accomplishment, and it will continue to inspire our proud legacy for the next 100 years. ■

Vice Adm. Allen G. Myers is commander, Naval Air Forces, and commander, Naval Air Force, U.S. Pacific Fleet.

Waypoints in History

APRIL 16, 2003

A P-3 Orion becomes first U.S. Navy aircraft to land at Baghdad International Airport.

FEBRUARY 8, 2006

An F-14 Tomcat makes last combat flight trap on *Theodore Roosevelt* after the fighter's more than 31 years of service.

JANUARY 10, 2009

George H.W. Bush is last Nimitz-class aircraft carrier placed in commission.

NOVEMBER 14, 2009

Keel of future *Gerald R. Ford*, first of new class of aircraft carrier, ceremoniously laid at Northrop Grumman Newport News Shipbuilding.

100 years of naval aviation began here.

It began with Eugene Ely landing a Curtiss biplane on the deck of USS *Pennsylvania* in 1911. Today, the U.S. Navy is the global leader in the application of airpower at sea and Curtiss-Wright continues to support that mission with an ever-expanding array of innovative technologies. We are proud of our heritage and commitment to help protect freedom.



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