

NAVAL AVIATION 100 YEARS FROM KITTY HAWK

Edited by Wendy Leland

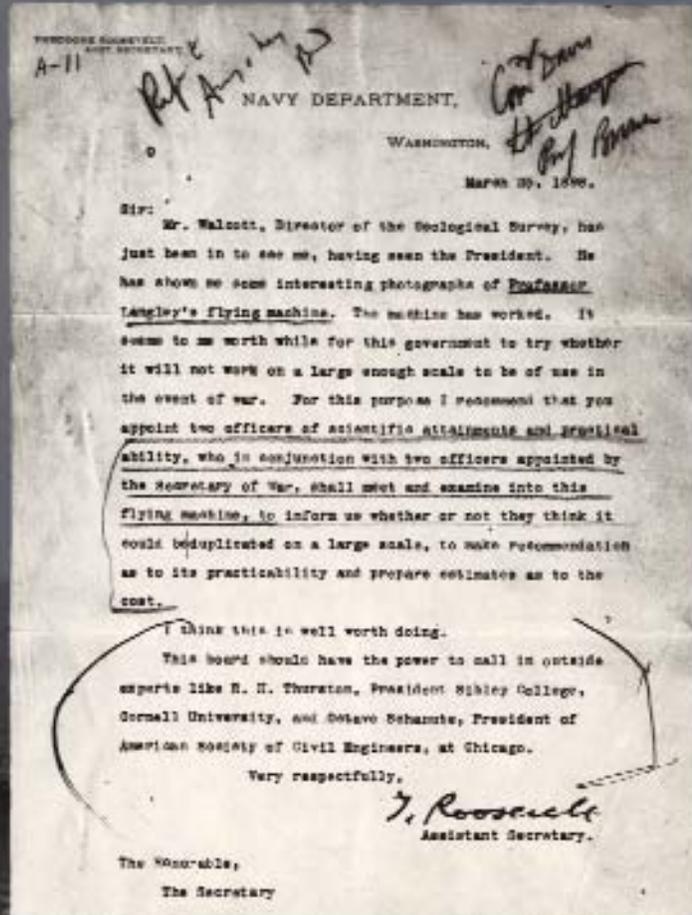
The late 19th and early 20th centuries saw a flurry of inventors striving to find a way to enable man to take to the skies. While some successfully flew gliders both in the U.S. and abroad, the inexorable draw was toward powered flight. The Wright Flyer built by Orville and Wilbur Wright was the first to achieve what had previously been only dreamed about or sketched on paper: a successful flight of a heavier-than-air craft powered by an internal combustion engine. The milestone flight on 17 December 1903 marked the inception of the modern aviation age and began a revolution in civilian and military transportation.

The Navy's interest in flight had already been piqued prior to the Wright brothers' historic achievement. In 1898, Navy officers were assigned to sit on an interservice board to investigate the military possibilities of Professor Samuel P.

Langley's flying machine.

Almost immediately after the 1903 flight, civilian inventors began to apply the lessons learned by the Wright brothers to their own designs, and in 1908 naval observers began attending flight demonstrations to observe

the progress of the new technology. In late 1910 the first naval officer was ordered to flight training, and the Navy purchased its first aircraft in 1911. Soon, Naval Aviation had developed into a formidable fighting force utilizing the



Above, an 1898 memo from Assistant Secretary of the Navy Theodore Roosevelt marked the beginning of the Navy's interest in aircraft. Prior to the Wright brothers' successful 1903 flight, many inventors were working on aircraft designs, such as Professor Samuel P. Langley's Aerodrome, left, shown in an attempted 1903 launching on the Potomac River.



technology that had been so new just a few short years before.

From its earliest days, Naval Aviation has played a role in countless technological innovations. While many of these focused solely



Above, the Curtiss A-1 Triad was the Navy's first aircraft. Right, the January 1911 demonstration of an aircraft landing and takeoff aboard the armored cruiser *Pennsylvania* (ACR 4) foreshadowed the role aviation would assume in the U.S. Navy. Below, representing the Navy's newest operational fighter, an F/A-18F of Strike Fighter Squadron 41 returns to *Abraham Lincoln* (CVN 72) after a combat mission during Operation Iraqi Freedom. Background, *Enterprise* (CVN 65) steams in the Atlantic Ocean in September 2003 prior to deployment.



on improving aviation's warfighting capability, others had broader applications outside the military arena. The following photo essay highlights a few of Naval Aviation's advancements in science and exploration; radar, navigation and communications; aviation

technology; and lifesaving techniques and equipment that have benefited the civilian world during the first 100 years of modern flight.

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Background image by PH2 Douglas M. Pearlman

Science and Exploration



Record-Setting Flights

The Navy's achievement of the first transatlantic flight paved the way for future record-setting military and civilian flights. The NC-4, above, departed Newfoundland, Canada, on 16 May 1919 and arrived in Lisbon, Portugal, on 27 May 1919 after a layover in the Azores. Top right, the NC-4's crew comprised (left to right) Machinist's Mate Eugene S. Rhoads, Lieutenant James L. Breese, Lieutenant (jg) Walter K. Hinton, Lieutenant Elmer F. Stone, USCG, and Lieutenant Commander Albert C. Read. The NC-4 flight terminated at Plymouth, England, on 31 May.

Above right, on 16 July 1957 Major John H. Glenn, Jr., USMC, broke the transcontinental



speed record in an F8U-1P Crusader during a flight from Los Alamitos, Calif., to Floyd Bennett Field, N.Y., in 3 hours 22 minutes 50.05 seconds for an average speed of 723.517 mph. This was the first supersonic flight from the West Coast to the East Coast.

Left, the Pacific Fleet naval air commander and the CO of *Hornet* (CVS 12) greet the pilots of an SH-3A Sea King after a test flight from *Hornet* on 5 March 1965. The next day, copilot Lieutenant David Beil, left, and pilot Commander James Williford took off from *Hornet* at NAS North Island, Calif., and landed aboard *Franklin D. Roosevelt* (CVA 42) at Mayport, Fla., exceeding the existing distance record for helicopters by more than 700 miles.



Scientific Research

Right, Lieutenant Commander Malcolm D. Ross holds a model of the Stratolab balloon showing the 16" telescope mounted on the top. On 8 November 1956, Ross and Lieutenant Commander M. Lee Lewis piloted the Stratolab to a world altitude record of 76,000 feet on a flight to gather meteorological, cosmic ray and other scientific data necessary to improve safety at high altitudes.



From 1951 through 1994, the U.S.

Navy, under the Project Magnet program, collected aeromagnetic survey data to support a Defense

Mapping Agency world magnetic modeling and charting program. Above, a VXN-8 P-3 Orion flies a Project Magnet mission in 1987.



Antarctic and Polar Exploration

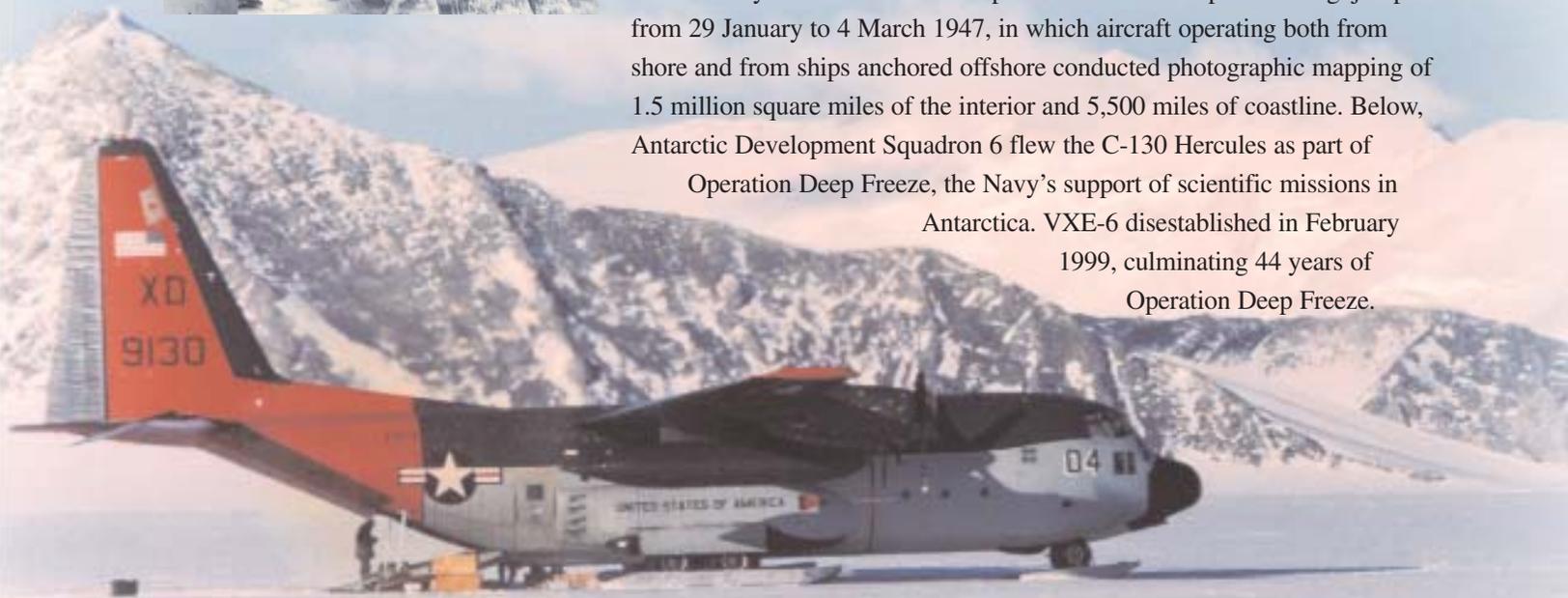
On 9 May 1926 Lieutenant Commander Richard E. Byrd, left, and

Naval Aviation Pilot Floyd Bennett made the first flight over the North Pole. Byrd was also the navigator on the first flight over the South Pole on 29 November 1929. Above, a Curtiss-Wright Condor fitted with skis and floats was used in early polar exploration.



The Navy's role in Antarctic exploration included Operation Highjump from 29 January to 4 March 1947, in which aircraft operating both from shore and from ships anchored offshore conducted photographic mapping of 1.5 million square miles of the interior and 5,500 miles of coastline. Below, Antarctic Development Squadron 6 flew the C-130 Hercules as part of

Operation Deep Freeze, the Navy's support of scientific missions in Antarctica. VXE-6 disestablished in February 1999, culminating 44 years of Operation Deep Freeze.





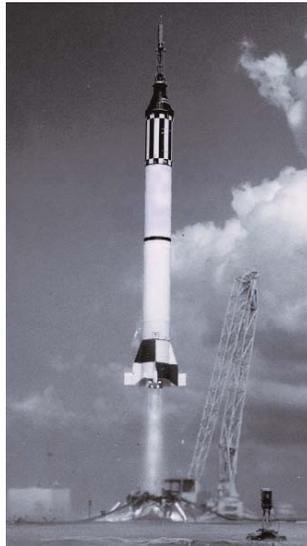
Weather Tracking

Before the advent of weather satellites, aircraft were the primary means of tracking weather events such as hurricanes. Light Photographic Reconnaissance Squadron 62 photographed Hurricane Gracie, left, in 1959. Below, Airborne Early Warning Squadron 4, known as the Hurricane Hunters, was the Navy's last squadron dedicated to hurricane reconnaissance.



Space

Naval Aviators have played a key role in the U.S. space program since its inception. Right, Commander Alan B. Shepard, Jr., became the first American in space with the launch of Mercury capsule Freedom 7 by a Redstone rocket on 5 May 1961. Below, on 20 February 1962 Lieutenant Colonel John Glenn, USMC, was launched on the first orbital flights of the earth in the capsule Friendship 7. Far right, the takeoff of the space shuttle *Columbia* from Cape Canaveral, Fla., on 12

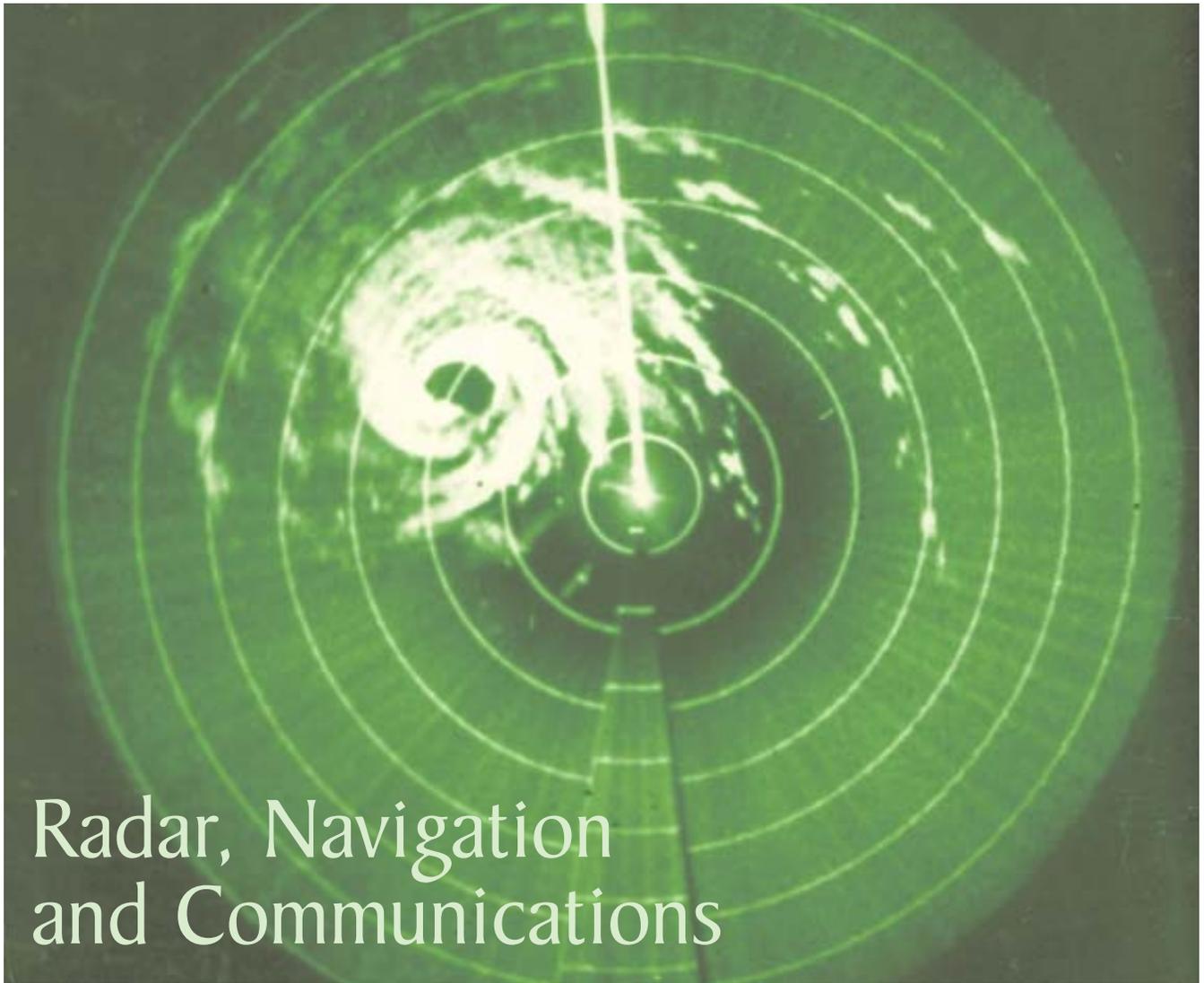


April 1981 was the first launch of the reusable space vehicle. The historic flight was manned by the all-Navy crew of Captain Robert Crippen and retired Captain John



Young. Twenty-two years later *Columbia* was destroyed while returning after a mission in February 2003. Pilot Commander William C. McCool, USN, was among those who perished.





Radar, Navigation and Communications



Radio Detection and Ranging (RADAR)

On 27 September 1922 the CO of NAS Anacostia, D.C., proposed that radio could be used to detect the passage of a ship at night or during heavy fog. The proposal resulted from an observation at the Aircraft Radio Laboratory, NAS Anacostia, when a passing river steamer interrupted experimental high-frequency radio transmissions between Anacostia and a receiver across the river. The observation and analysis of the phenomenon was a first step in the chain of events that led to the U.S. Navy's invention of radio detection and ranging.

The new technology rapidly evolved for military applications, as with this early radar antenna installed on the battleship *New York* (BB 34), left, in 1938. Soon, radar came to have many uses outside the military arena, from providing visual images of weather phenomema, above, to tracking both military and civilian air traffic, right. From its humble beginnings in the early 20th century, radar has become a part of our everyday lives.



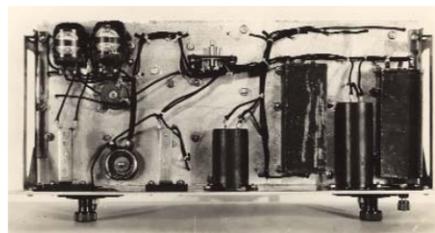
PHANI Brad Garner

Communications

The fledgling technology of the radio and telephone were put to use in the early years of Naval Aviation to allow communication between aircraft, as with the system being tested aboard a Curtiss pusher aircraft in 1912, right.

Soon thereafter the Navy went one step further and demonstrated the feasibility of using voice radio and telephone relay for air-to-ground communications. During a 12 March 1919 flight in an airborne flying boat, Lieutenant Harry Sadenwater carried on a conversation with the Secretary of the Navy, who was seated at his desk in the Navy Department some 65 miles away. This achievement set the stage for radio communication as we know it today.

Far right, a radio telephone set designed for a fighting plane illustrates the state of the art in 1928.



Navigation

On 21 March 1919, a gyrocompass developed for the Navy was tested in an aircraft, marking the first recorded instance of tests of a device that would become an invaluable navigational instrument for long-range flight.

Development of the Navy's tactical air navigation system (TACAN)—comprising a surface beacon and airborne receiver to determine the direction of the aircraft from the surface station—was initiated by a 1948 contract. On 30 August 1956 the Air Coordinating Committee approved a common military-civil short-range air navigation system called VORTAC, which combined TACAN with the Civil Aeronautic



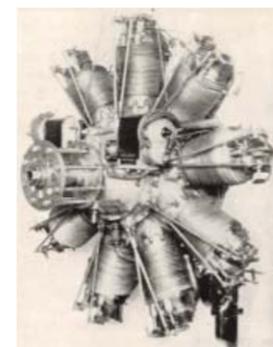
Authority's very high frequency omnirange direction finder.

On 1 January 1943, just nine days after the first successful experimental demonstration of Ground Controlled Approach (GCA) technology, the system was called into emergency use for the first time when a snowstorm closed down the field at NAS Quonset Point, R.I., shortly before a flight of PBV

Catalinas was due to arrive. The GCA crew located the incoming aircraft on their search radar and used the control tower as a relay station to "talk" one of them into position for a contact landing. Above, an air traffic controller at NAS Miramar, Calif., demonstrates the military application of GCA, circa 1961.

Aviation Technology

Engines and Propulsion



On 7 February 1922 the Navy's Aeronautical Engine Laboratory completed a 50-hour test run of the Lawrence J-1, a 200-hp radial aircooled engine, left. Radial engines would be the norm in naval aircraft for years to come.

The evolution of the turboprop engine in the 1940s was the next significant milestone in aircraft engine design. Left inset, McDonnell Aircraft's XFD-1, the first naval aircraft with turbojet engines, was the prototype for the F-4 Phantom jet fighter. Above right, Westinghouse jet aircraft engines designed and built for the Navy circa 1945 include a turbojet for the XFD-1, at left in photo.

McDonnell also designed the Navy's first twin-engine helicopter, the XHJD-1, right inset. Intended for experimental use in a flight development program and for tactical use in utility and



air-sea rescue operations, the helo made its first hovering flight on 25 March 1946.

Bottom photo, on 20 August 1947, Commander Turner F. Caldwell, right, achieved a world speed record in the D-558-1 Skystreak. His record was broken five days later by Major Marion Carl, USMC, left, in the same aircraft.



Landing Gear

By 27 October 1925, Oleo shock-absorbing landing gear developed by the Navy was reported in use on many military aircraft, such as the FB-1, below.



Within a few years designs for retractable landing gear were being considered. The Grumman FF-1, right, introduced retractable

landing gear to the operational Navy, and the technology soon became commonplace in military and civilian aircraft.

Aerodynamics and Avionics

The Bureau of Steam Engineering reported on 15 October 1918 that five Hart and Eustiss reversible pitch propellers were under construction for use on twin-engine dirigibles and two variable-pitch



propeller hubs for the F-5L were being ordered. Above left, a Smith controllable pitch propeller, circa 1932, is an example of one of many designs tested.

On 2 May 1986 the Navy initiated a contract for the V-22 joint-services tilt-rotor aircraft, above right.



appearance in Operation Iraqi Freedom. Operators use a laptop computer and a variety of cameras to control the aircraft. The roots of UAV technology can be traced to a 15 September 1924 flight of an N-9 equipped with radio control and without a human pilot aboard. The 40-

minute flight at the Naval Proving Grounds, Dahlgren, Va. demonstrated the practicability of radio control of aircraft.

The X-31 Vector enhanced fighter maneuverability aircraft, right, flew at Mach 1.2 on 17 March 1994 using thrust vectoring vanes instead of its tail surfaces for control, marking a significant aeronautical "first." The X-31 was developed jointly by the Navy, the Defense Advanced Research Projects Agency and the German Ministry of Defense.



The Silver Fox, bottom, a Navy unmanned aerial vehicle (UAV), made its first operational



Office of Naval Research

Lifesaving



On 11 August 1944 an electric-powered rescue hoist was installed on an HNS-1 helicopter at CGAS Floyd Bennett Field, N.Y. During a four-day test period in Jamaica Bay, the feasibility of rescuing people from the water was demonstrated, above. Six weeks later, a hydraulic hoist, which overcame the disadvantages of the

electric hoist, was installed and successfully tested, leading to its adoption for service use.

The first widespread use of the helicopter in a lifesaving role was during the Korean War. Below, an HO3S-1 from Marine Observation Squadron 6 evacuates a wounded man during combat on 3 October 1950.



Naval Aviation's peacetime and combat experience with the helicopter proved the versatility of rotary-wing aircraft. From military helos rescuing stranded flood victims and hikers, to community emergency services medical evacuation aircraft, the helicopter has become a fixture in both military and civilian lifesaving.