



Sikorsky Archives News

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Sikorsky's Sub Hunters

Today's multi-mission, multi-sensor MH-60R gives the U.S. Navy the world's most advanced Anti-Submarine Warfare (ASW) helicopter. However, the potential of the helicopter in ASW was recognized even before the Navy and Coast Guard flew their first Sikorsky R-4s in World War II. In February 1943, the Chief of Naval Operations directed the Bureau of Aeronautics to develop the helicopter for shipboard anti-submarine patrol. Pioneer Coast Guard pilot Lt. Frank Erickson soon after proposed helicopters with radar and dunking or dipping sonar as the eyes and ears of maritime convoy escorts. Post-war experiments with a Sikorsky XR-6A (the Navy XHOS) showed helicopter sonar was indeed effective locating undersea targets. The very first newspaper edition of The Sikorsky News on October 12, 1948 pictured Rear Admiral James Fife, Commander of the Atlantic Fleet Submarine Force, visiting the Bridgeport plant ". . . to look into possibilities of [the] helicopter's utility in the spotting of submarines."

In April 1950, the Navy ordered utility S-55s (HO4S-1s with folding three-bladed main rotors and 550 hp Pratt & Whitney engines). When the tandem-rotor Bell Model 61 struggled with technical problems, the Navy chose the Sikorsky S-55 as its substitute sub hunter. Navy HO4S-3s had 700 hp Wright piston engines and could operate in ASW teams, the submarine "hunter" with dipping sonar and "killer" with a torpedo.



The S-55 (HO4S-3) gave the U.S. Navy its first operational ASW helicopter deployed on aircraft carriers. (Sikorsky Archives)

The U.S. Navy commissioned its first antisubmarine warfare helicopter squadron, HS-1, at Naval Air Station Key West, Florida on October 3, 1951, and other navies followed. The UK Royal Navy formed 706 Squadron for ASW with Sikorsky-built S-55s in 1953, and Westland Helicopters began license production of the Whirlwind in the UK soon after. Canada formed Helicopter Anti-Submarine Squadron Fifty with S-55s in 1955.



The S-55 (HO4S-3) could carry either dipping sonar or a torpedo and had to work in hunter-killer teams. (Sikorsky Archives)

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Seabats

The 7,900 lb S-55 was short of range and payload for ASW. The April 21, 1954 Sikorsky News showed tie-down tests of the new S-58 (Navy XHSS-1), and the photo caption stated simply, "Specifications are classified." However, with a 1,525 hp engine and four-bladed rotor, the 14,000 lb S-58 (Navy HSS-1 or SH-34G) Seabat promised to be a more effective hunter or killer, one even compatible with a nuclear depth charge. In September 1955, Sikorsky News reported on the successful HSS-1 test effort. Navy Squadron HS-3 was the first to receive the HSS-1 in 1955.



*The S-58 (HSS-1) was designed for ASW. Here, a Seabat from HS-4 hovers with dipping sonar near the destroyer USS Richard B. Anderson in 1958.
(U.S. Navy)*

In 1956, Squadron HS-9 was commissioned at Quonset Point, Rhode Island. Sikorsky News reported "The new squadron is to operate from aircraft carriers of the Leyte class based at Quonset, working with other fleet units such as destroyers, submarines, patrol bombers and blimps." However, without visual hover references at night, early Seabat crews could use dipping sonar only in daylight. The Sikorsky News in May 1958 told of developments in night hover capability. The new HSS-1N (SH-34J) combined Automatic Stabilization Equipment with an im-

proved flight instrument and cockpit arrangement, automatic engine RPM controls, and an automatic hover-coupler. The story explained, "With the coupler, which uses the radar to determine ground motion, it is possible for the pilot to place the helicopter on automatic control at 200 feet altitude and 80 knots airspeed and automatically to come to a zero ground speed hover at a 50-foot altitude over a pre-selected spot."

Navy Squadron HS-5 at Quonset Point, Rhode Island received HSS-1Ns in 1960 and, after dangerous testing, the Nightdippers made autohover routine. The Sikorsky News reported delivery of the 1,000th S-58 in November 1958, an ASW helicopter made in Bridgeport for the U.S. Navy. More S-58 sub-hunters were produced under license by Westland in the UK, Fiat in Italy, and Sud Aviation in France. The March 1958 Sikorsky News reported, "Two S-58 helicopters have been purchased by the Japanese Navy for anti-submarine warfare use. . . [The S-58] has a payload capacity more than double the S-55 currently in use by the Japanese."



The HSS-1F testbed flew with twin GE T58 turboshafts in 1957. (Sikorsky Archives)

Sea Kings

Despite its size, the Seabat was still limited by its single, heavy reciprocating engine. An engine failure would drop a sonar-dipping helicopter in the ocean, and though the S-58 could carry sonar and a torpedo at the same time, the weapon came at the expense of fuel and dramatically reduced endurance, especially in hot climates.

Sikorsky began investigating turbine power in the 1940s, and the S-59 (Army XH-39) set speed and altitude records in 1954 with a Turbomeca turboshaft. General Electric meanwhile proposed a small gas turbine specifically for helicopters. Twin GE T58s first flew in February 1957 in the first of two HSS-1F test aircraft. The March 1957 Sikorsky News reported "The new powerplant, developed for the Navy Bureau of Aeronautics, will replace the Wright R-1820."

When the Navy formulated a requirement for an ASW helicopter to carry sonar and weapons, it saw turbine power as an Engineering Change Proposal for the HSS-1. Sikorsky made its own proposal on January 31, 1957 for a new five-bladed, twin-turbine helicopter with a boat hull for overwater safety. The Sikorsky News revealed the 18,000 lb sub-hunter taking shape in Stratford and said, "The design

also promises greater range, larger payload and better visibility than its predecessor, the HSS-1. First flight of the advanced helicopter is scheduled for 1959. Company designation of the new ship is S-61." A Navy contract was awarded on December 24, 1957, and what should have been the HS2S in service became the HSS-2 (later SH-3A) Sea King.



The second S-61 variant in the US Navy (SH-3D) was the pattern for export Sea Kings. (Sikorsky Archives)

The first of seven YHSS-2 prototypes flew on March 11, 1959 with company test pilots Robert Decker and Francis 'Yip' Yirell. The new sub hunter soon broke records. On 17 May, 1961 a Sea King clocked 192.7 mph over a 3 km course, and on 1 December, another set three world helicopter speed records: 182.8 mph over a 100 km course, 179.5 mph over 500 km, and 175.3 mph over 1,000 km. An SH-3A reached 210.65 mph on a 20 km course in February 1962, and another, The Dawdling Dromedary, set a non-stop helicopter distance record flying 2,105.49 miles from the USS Hornet off San Diego to the USS Franklin D. Roosevelt off Jacksonville on March 6, 1965.



The S-61 mockup constructed at Bridgeport showed the distinctive Sea King boat hull. (Sikorsky Archives)

First Sea King deliveries began to squadron HS-1 in June 1961. The January 1963 Sikorsky News reported on Seventh Fleet operations: "U.S. Pacific Fleet Navy men are definitely excited about the new HSS-2 (SH-3A) helicopter. They believe this revolutionary turbocopter has opened a new chapter in the Navy's book on antisubmarine warfare." The story continued, "As the first Navy helo to combine both hunter and killer capabilities, the SH-3A can detect, identify, track and destroy aggressor submarines. It can accomplish this day or night, under all weather conditions."

Canada became the first international Sea King customer. The first four CHSS-2s (later CH-124s) left Stratford in May 1963. Subsequent helicopters were assembled from Sikorsky kits by United Aircraft of Canada Ltd (now Pratt & Whitney Canada) at Longueuil, Quebec.

The U.S. Navy SH-3A (S-61) evolved into the SH-3D in 1965 with more powerful engines, an updated main gearbox, and a redesigned tail rotor. The SH-3D was first exported to Spain in June 1966 and provided the pattern for Sea Kings license-built by Westland in the UK, Agusta in Italy, and Mitsubishi in Japan. Westland ASW Sea Kings joined the UK Royal Navy in 1970 and were later sold to Australia and Germany.

The SH-3D introduced better dipping sonar, but the U.S. Navy Sea Control Ship concept in the early 1970s drove development of the multi-sensor SH-3H with sonar, Magnetic Anomaly Detector, sonobuoys, and search radar. The U.S. Navy converted 151 Sea Kings to SH-3Hs from 1972 to 1982, then recycled SH-3Hs through a Service Life Extension Program (SLEP) at Stratford beginning in 1986. Sea Kings remained in U.S. Navy service until 2009.



The SH-3H hunted with sonar, MAD, radar, and Electronic Support Measures. (Sikorsky Archives)



Canada was the first international Sea King customer and went on to operate its CH-124s from frigate decks for 50 years. (Sikorsky Archives)

Seahawks

The US Navy put Kaman Seasprite helicopters on first-generation Light Airborne Multi-Purpose System (LAMPS I) ships in 1970. The helicopters datalinked sonobuoy returns to their ships for processing and used MAD to target submarines and radar to track surface targets.

The Navy wanted better sensors and more processing power on LAMPS II. Sikorsky News in April 1972 saluted the British WG-13 Lynx helicopter and reported, "Sikorsky is proposing the WG-13 as the Navy's LAMPS (light airborne multi-purpose system) vehicle and would produce the aircraft in this country under license from Westland."

LAMPS II was bypassed, and IBM Systems Integration Division (today Sikorsky Owego) won a Navy contract in 1978 to integrate LAMPS III systems on ships and helicopters. In the competition for the air vehicle, a maritized Sikorsky S-70/UH-60 BLACK HAWK again beat the Boeing YUH-61 designed for the Army Utility Tactical Transport Aircraft System. The new Seahawk was built in the then-new Development Manufacturing Center in Stratford. Sikorsky News reported pilots John Dixon and Richard Mills began testing the first of five S-70B-1 (Navy SH-60B) prototypes on December 12, 1979 at the Development Flight Center near West Palm Beach, Florida.

Sikorsky received a Seahawk production contract in September 1981. As LAMPS III co-prime contractor, the helicopter maker integrated SH-60Bs built in Stratford with mission electronics from Owego, New York. The first Seahawk squadron, HSL-41, was commissioned at Naval Air Station North Island, California in 1983. Worldwide, the 181 LAMPS III helicopters integrated at Stratford and Owego became powerful battle management assets for the U.S. Navy.

The S-70C(M) Thunderhawk delivered to the Republic of China in 1991 evolved from the U.S. Navy S-70B-4/SH-60F CV Helo. (Sikorsky Archives)



The S-70B-1 or SH-60B was the airborne portion of the Light Airborne Multipurpose System Mk. III (LAMPS III) and fed sensor data to the ship for processing. (Sikorsky Archives)



The S-70B-2 Seahawk was the Roll Adaptive Weapons System developed for the Royal Australian Navy. (Sikorsky Archives)



In 1985 Sikorsky reported delivery of the first Seahawk for Japan. Mitsubishi Corporation integrated the S-70B-3 (SH-60J) with Japanese systems and later developed the SH-60J Kai in service today. A government-to-government sale delivered LAMPS III frigates and S-70B-1s to Spain in 1988. Unlike the highly integrated LAMPS III, the Royal Australian Navy specified a more autonomous Role Adaptive Weapons System. Sikorsky was prime contractor for the RAN S-70B-2 with Collins tactical avionics system delivered in 1989.

While the Outer Zone SH-60B used sonobuoys to find submarines, the noisy Inner Zone around the CV-class aircraft carrier demanded active dipping sonar for quick, autonomous attack. The Navy chose the S-70B-4 (Navy SH-60F) with dipping sonar, sonobuoy launcher, and more autonomous tactical data system. The “CV Helo” first flew at Stratford in March 1987 and entered service with HS-10 at North Island in June 1989. HS-2 on the Atlantic Coast made the first operational deployment in 1990. The Navy took delivery of the last of 82 SH-60F Seahawks on 1 December 1994. However, Sikorsky continues to develop international S-70Bs and has so far exported Naval Hawks to Brazil, Greece, the Republic of China, Thailand, and Turkey.

Naval Hawks and Cyclones

The SH-60B and F were designed for “Blue Water” ASW. However, Navy strike groups today face quiet submarines in the open ocean and cluttered, shallow littoral regions. The LAMPS III Block II Upgrade evolved into the more autonomous MH-60R with Advanced Low Frequency Sonar, Automatic Radar Periscope Detection and Discrimination, multi-spectral electro-optics, and better Electronic Support Measures (ESM). Engineering and Manufacturing Development started in 1993, and Romeo Seahawks flying

from carriers and small decks ultimately replaced the SH-60B, SH-60F, and fixed-wing ASW aircraft.



The MH-60R Sea Hawk is the U.S. Navy multi-mission helicopter with sonar, sonobuoys, search radar, electro-optics, and ESM. (U.S. Navy)

The first MH-60R – a remanufactured SH-60B -- made its maiden flight July 19, 2001 at Stratford with Sikorsky pilots Chris Geanacopoulos and Tage Erickson. After flight tests at Naval Air Station Patuxent River, Maryland, it flew to Owego for mission systems integration. The first operational MH-60R deployment was with Helicopter Maritime Strike squadron HSM-71 on the USS Stennis in 2009. Sikorsky Frontlines in 2010 reported the delivery of the 50th MH-60R. By 2018, the U.S. Navy had received 251 MH-60Rs. The Royal Australian Navy was the first international Romeo operator and took 24 aircraft. Romeo deliveries continue to Denmark and Saudi Arabia.



Australia was the first international customer for the MH-60R. (Australian DoD)

Separate from the Naval Hawk family tree, Sikorsky built 28 S-92/CH148 Cyclones for the Canadian Forces with a mission suite integrated in Canada. Test Pilots John Armbrust and Rick Becker made the first Cyclone test flight on November 14, 2008 at West Palm Beach. The militarized, marinized, fly-by-wire S-92s will be assigned to the 423 Maritime Helicopter Squadron at Shearwater, Nova Scotia. Canada will retire the Sikorsky Sea King late this year after more than a half-century of sub hunting service.



*The first CH-148 Cyclone Canadian Maritime Helicopter flew on November 14, 2008 at West Palm Beach.
(Sikorsky)*



*Canada now operates the CH-148 Cyclone, the marinized, militarized, fly-by-wire Sikorsky S-92.
(Canada DND)*

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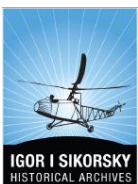
Sergei Sikorsky, Lt. Gen. USMC (Ret) Duane Thiessen (President, Naval Aviation Museum – Pensacola, Fl) and Dan Libertino at a March visit to the Museum

Prepared by Frank Colucci and John Bulakowski with graphic art and layout by Jodi Buckley.



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