

# Sikorsky Archives News

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## EXPERIMENTAL



IGOR I. SIKORSKY HISTORICAL ARCHIVES INC.



Some of the development designs over the years



NASA Photo

**The Rotor Systems Research Aircraft** project, funded by NASA and the US Army, was to provide a way of testing various main rotor designs both as pure lifting for helicopters, and in combination with wings and auxiliary power units for compound aircraft. Two aircraft were built, the first as a pure helicopter, the second complete

with wings and GE TF 34 auxiliary jet propulsion. The main transmission was mounted on a specially designed balance, so the lift and torque of the test rotor could be measured directly. The main components were basically S-61. This was the only helicopter to have ejection seats, the main rotor blades being shed by explosive bolts prior to seat ejection. The first flight was on October 12 1976, with the first of two delivered to NASA on February 11, 1979. The first flight of the compound version was made at NASA Wallops Island during the Sikorsky phase of the program. The Sikorsky Flight Test team nicknamed the two aircraft Gertrude and Heathcliff, and in



**The RSRA Team**



this age of logos, an artistic member of the team came up with imaginative flight suit shoulder patches. Following initial testing at Wallops, both aircraft were transferred to NASA Ames at Moffet Field California. One aircraft was subsequently returned to Stratford to be used in the X-Wing program. NASA pilots flew this aircraft in fixed wing configuration (without the X-wing) in December 1997.

**The X-wing** itself was a four bladed main rotor which was designed to be able to act both as a helicopter rotor, and then be slowed and stopped in-flight in flat pitch to become an x-planform fixed wing. It used tip jet propulsion technology.



**The X-Wing Aircraft**



**The X-Wing Team**

**Innovation- A Sikorsky Hallmark.**

The S-67 was built to demonstrate the potential of a gunship based on well proven components from the S-61. First flight was on August 27, 1970. This machine took the helicopter world speed record on December 19 1970 at 220.8 mph.

Features included a cambered fin, stub wings, and speed brakes. These all contributed to outstanding stability and maneuverability, two potentially conflicting characteristics.

Later, the aircraft was used to test the Sikorsky “Fan in Fin” concept for possible use on the Army UH-60 Black Hawk and other future designs. While the UH-60 has a conventional tail rotor, the new US Army RAH-66 COMANCHE uses the “Fan in Fin”.



Company Logos for the S-67 BLACKHAWK and the UH-60A BLACK HAWK.



L-R Rear: Bob Rice, Ralph Jaswynski, Jim Nedin, Bill O'Connor, Al Makowski, Bobby Bartron, Bob Bowolick, Wes Bacon, Frank Kreutz. Front: Jack Brilla, Bob Monteleone, Dick McCutcheon.

**Below: S-67 with experimental “fan in fin”**





## S-54

The R-4 airframe was used for a number of test programs, the one shown here to try a solution for the small center of gravity range, similar to a VS-300 configuration. A seat for an observer was provided in the tail fuselage. The R-4 was also fitted with a canted tail rotor as another potential solution. The cant angle was ground adjustable. The canted tailrotor was not used again until the UH-60 BLACK HAWK. It is said that an observer in the rear seat once stood up while the rotor was still running down, but hastily sat down again after frantic signals from the ground crew.

## S-61F

The S-61F was built using parts from a damaged airframe, to investigate the compound helicopter, using auxiliary power to reach higher speeds. It first flew on May 21, 1965. The aircraft was fitted with a wing to offload the rotor, and two Pratt & Whitney J-60 jets. It had ailerons and a stabilizer with elevators, and a fin with a rudder. The airframe was extensively streamlined and bore little resemblance to an H-3. The rotor controls could be phased out with increasing speed as the aerodynamic controls were phased in.



## S-75 ACAP

The Advanced Composite Aircraft Program was initiated by the US Army to see if an all-composite helicopter airframe could be built and how much weight could be saved by doing this. Bell and Sikorsky both received contracts. The Sikorsky design used S-76 gearboxes, engines and rotors. The weight savings came out at about 20% compared with a conventional S-76. On completion of flight tests, the ACAP airframe was used for ballistics testing. This was one of the enabling technologies for LHX, now materialized as the US Army RAH-66 COMANCHE.

## S-69 ABC (XH-59A)

The first of two aircraft built under US Army contract flew on July 26, 1973. After studying all the existing high speed VTOL concepts, the company decided that the Advancing Blade Concept offered the simplest way to achieve high speed without undue complication. It was flown in both helicopter and compound modes, the two J-60 jets left over from the S-61F program being installed for the compound mode. A speed of 240 knots was achieved in level flight, and 263 knots in a very shallow dive.





Photos by Bob Brady

The News thanks the team of volunteers who contribute their time to the Archives. Pictured above, from top left L-R: Harry Hleva, Bruce Vander Mark, Sergei Sikorsky, Andy Whyte, Lou Havanich, Carl McDonald, Charlie Sharp, Emery Wach, Ron Schlegel, Dick Sykes, Danny Libertino, Ed Groves, Wally Wanamaker, Bob Brady, Fred Schubert, Jack Kochiss, Bill Smethurst, Harry Pember, and Pete Peterson.

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**Projector Conference**



**What's in this box?**



**Sorting documents**



**President and Trustee confer.**

### NEW MEMBERS

We are pleased to welcome these new members who will help provide the means for future generations to acknowledge Sikorsky Aviation history.

Armand LeClerc  
Fred Whittemore  
Gail Whittemore  
Ralph Conly  
Carl Dewey  
Daniel Libertino  
Samuel Johnson  
Paul Martin



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