



Sikorsky Archives News

Published by the Igor I. Sikorsky Historical Archives, Inc. M/S S578A, 6900 Main St., Stratford CT 06615

UTTAS Win Sparked **BLACK HAWK** Series



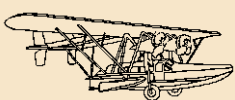
Based on the U.S. Army tradition, the UH-60 helicopter was named in honor of Chief Black Hawk, leader of the Sauk Indians who made the Mississippi Valley their homeland. During the war of 1812, he fought for the British under the leadership of

the famous Tecumseh. In 1832 he precipitated the Black Hawk war when the U.S. Government expanded its control of the west. Chief Black Hawk became a celebrity in 1833 when he was brought east by President Andrew Jackson. ☺



Chief Black Hawk

IGOR I. SIKORSKY HISTORICAL ARCHIVES, INC.



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January, 2008

Happy New Year

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President's Message

Volunteering



Dan Libertino

Dear Members,

As I start my fourth year of Presidency at the Archives, I would like on behalf of myself and our officers to thank all the members for their personal support by just being a member, and those few that in addition to their membership, volunteer their services on a regular basis. Volunteering is what keeps the Archives going and as always we can use more help! Try to visit

us, see what we do and decide what areas you would like to help with. This small dedicated group continues to work to resolve our many challenges. Over this period we have greatly improved our communications capabilities, we've continued to develop our cataloging and retrieval system, continued preservation of Igor's historical drawings at the rate of 15-20 per year, our quarterly newsletter has greatly improved and remains our main line of communications with our members.

Our public recognition and image continues to grow through community and Sikorsky employee presentations, which accounts for our steady moderate growth in memberships, our steady increase in email inquiries and measured by our daily web site activity (currently averaging 400 visitors

and 310 unique visitors per day over the last 15 months.) We are very proud to have collaborated with Sergei Sikorsky in the publication of "The Sikorsky Legacy." This book was nationally released by Arcadia Publications in April 2007 and represents a major effort in continuing our mission to preserve and make available Igor Sikorsky's Lifetime Achievements in Aviation.

As you can see we are covering a wide range of very interesting activities. The interest in Igor Sikorsky's Legacy is virtually worldwide as attested by the queries we receive. We need your continued support and a growing volunteer base. So, please give volunteering your serious consideration. ☺

Thank you,
Dan Libertino
President

Volunteers @ Work



EVOLUTION OF A WINNER

HOW SIKORSKY'S HAWK HELICOPTER FAMILY SPRANG FROM THE UTTAS REQUIREMENT



December 23, 1976 was a day forever etched in the memories of the 6000 Sikorsky employees who set the stage for the greatest turnaround in the company's history. It was the day when Sikorsky was selected by the US Army to be the sole source producer of Black Hawk helicopters. Sikorsky Aircraft was able to regain its leadership in the helicopter industry by developing the UH-60A into a world-class utility helicopter that would serve all US military organizations as well as over 25 countries around the world.

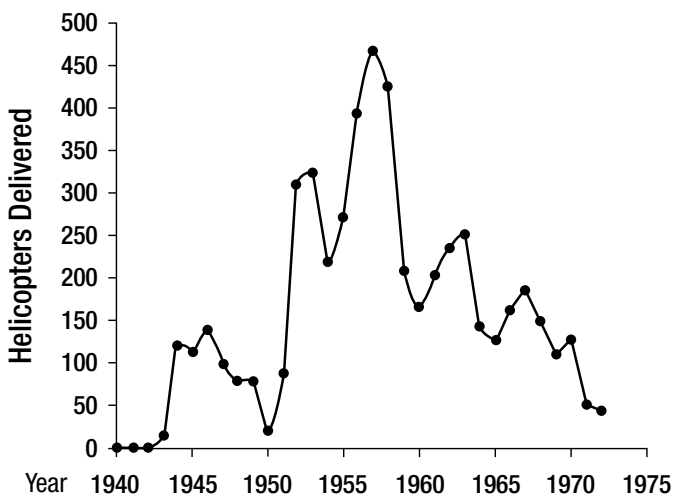
A less remembered date critical to Sikorsky was August 30, 1972 when it was selected along with Boeing Vertol to design and build prototypes for the Army's

Utility Tactical Transport System known as UTTAS. The prototype helicopters would be evaluated against each other through a grueling competitive evaluation whose outcome would be the ultimate winner for production.

SIKORSKY WINS UTTAS COMPETITION

When the Army RFP was released to industry in January 1972, the odds of Sikorsky winning one of the two Army contracts for UTTAS were thought to be very low by most industry experts. Sikorsky had not been an Army helicopter supplier for many years after ending its production of S-55, S-56 and S-58 models by the early 1960s. Since its peak output of 470 helicopters in 1958, Sikorsky's output declined for over 15 years and reached a precipitous level when the UTTAS program began in 1972.

The production status hit bottom in 1977 when no Sikorsky helicopters were delivered to the US Government during the whole year. Winning a place in the UTTAS program was a matter of survival and spurred major changes in management, technology and company culture. ☺



During the lean production years, major rotor systems technology improvements were being developed. Sikorsky Aircraft positioned itself at the forefront of rotorcraft technology by demonstrating to the Army that the improved technology was ready for the UTTAS competition. These technologies included the following:

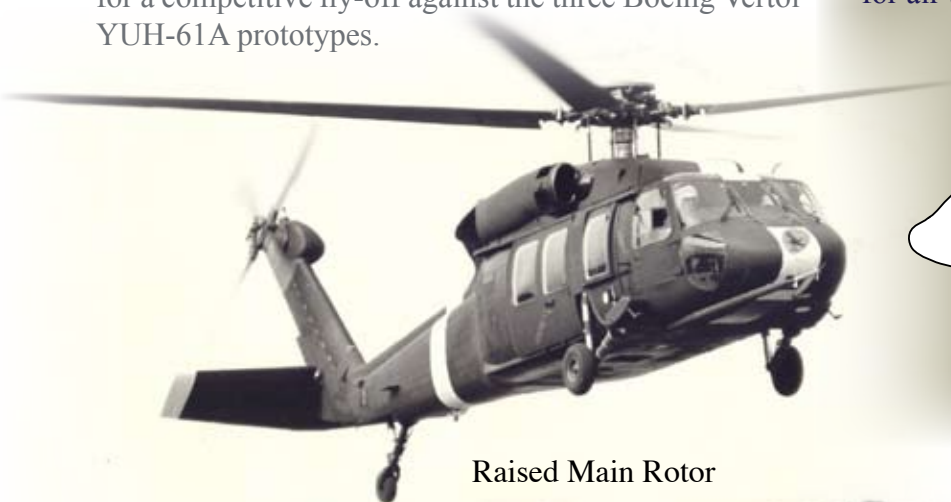


First Flight-Low Main Rotor

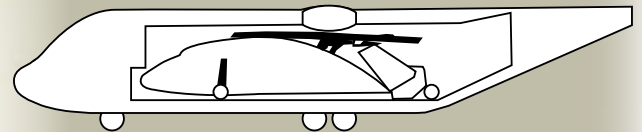
- A CH-53D advanced rotor blade with titanium spar, cambered high lift airfoil and high twist.
- Swept main rotor blade tips on the S-67 to improve performance and reduce noise
- Elastomeric bearings on the CH-53D main rotor head to eliminate the need for lubrication.
- Development of a bearingless cross beam tail rotor head on the S-61.
- CH-53D demonstration of the aerodynamic benefits of a canted tail rotor to improve lift.

First flight of the Sikorsky YUH-60A, piloted by Dick Wright and John Dixon, took place on October 17, 1974, 26 months after contract award. But within a month after first flight, major problems in vibration, performance and handling qualities surfaced to the dismay of the Sikorsky team. One-by-one the causes of these daunting problems became understood and solutions were developed, some were found by trial and error, some by good engineering and some by good luck. But in the end the company was able to deliver three well-developed YUH-60A prototypes to the Army for a competitive fly-off against the three Boeing Vertol YUH-61A prototypes.

The most important design change made to the initial YUH-60A was to raise the main rotor 15 inches in order to move it away from the strong upflow from the fuselage nose that was found to be a major cause of the vibration problem. The rotor initially was placed very close to the fuselage in order to meet the Army's air transport requirements of stuffing a UTTAS into a C-130 transport aircraft without any disassembly. After the vibration problem surfaced, clever design work produced a two position rotor that was high for flight and low for air transport. ☺



Raised Main Rotor



C-130 Cargo Space

A major effort was undertaken to develop new helicopter technologies. The most successful were the titanium rotor blades and the elastomeric rotor that promised significant performance, durability and maintenance improvements. The new cross beam tail rotor and the canted tail rotor configuration were also developed in time for the UTTAS program and were critical to its success. They helped make Sikorsky's design nearly 100% responsive to all Army requirements thereby earning a share of the prototype program and later winning the sole source production contract.



Swept Tip Titanium Spar Main Rotor Blades

Other key design changes included the stabilator to replace the fixed horizontal tail and a reshaped main rotor pylon to reduce aircraft drag and tail shake. A propeller shaped main rotor head with internal elastomeric bearings and no lubrication needed. The titanium hub provides ballistic and environmental protection.

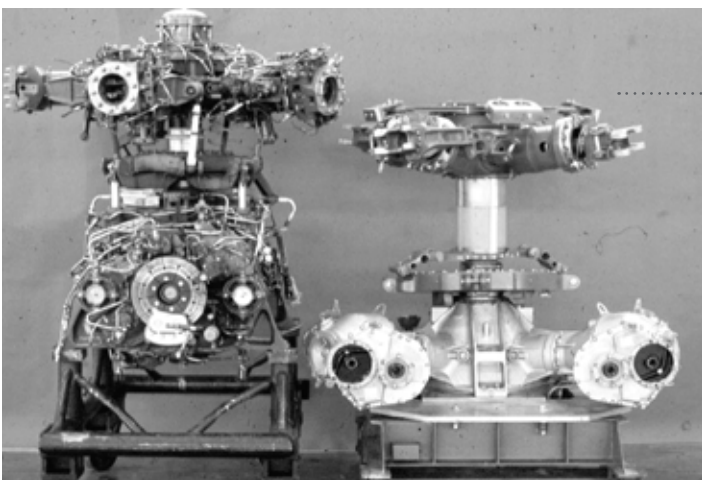


Canted Cross Beam Tail Rotor, and Stabilator

Main Rotor Elastomeric Bearings

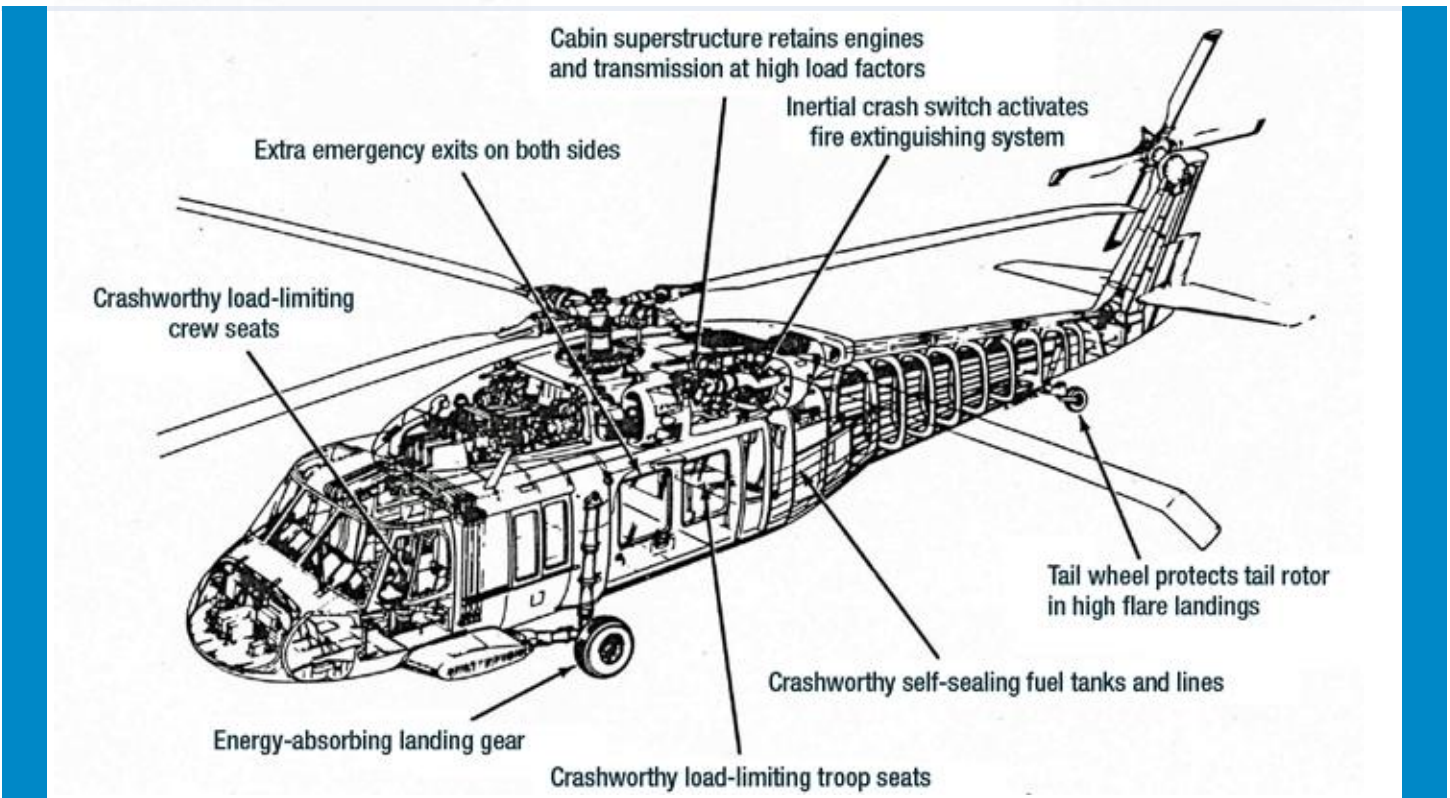


Propeller Shaped Main Rotor Head



The photo on left is a side-by-side comparison of the S-61 rotor and main gearbox to the UH-60 rotor and main gearbox assemblies. The Black Hawk main gearbox with internally cored oil passages eliminates all exposed lines. Its main gearbox provides a reduction ratio similar to the S-61 but with only three gearing stages rather than four. ☺

Safety and crashworthiness was a major focus early in the design process. The Black Hawk helicopter's most significant design features for enhancing safety in all operating environments is shown in the following illustration:



During night operational testing at Fort Campbell, one of the Sikorsky prototypes crashed with 14 Army crew and troops aboard. That event could have eliminated Sikorsky from the competition. At 11:15 on the night of August 9, 1976 a YUH-60A was reported to have crashed in a dense pine forest at Fort Campbell. A Sikorsky team was on site the next day relieved to learn that only one of the 14 Army occupants suffered

a minor injury and that the YUH-60A looked to be in good condition. The pilots felt a growing one-per-rev strong vibration and decided to make an emergency landing on the Fort Campbell reservation. Using their landing lights in poor visibility conditions, they mistook the tops of a dense forest of pine trees to be a cornfield suitable for an emergency landing.

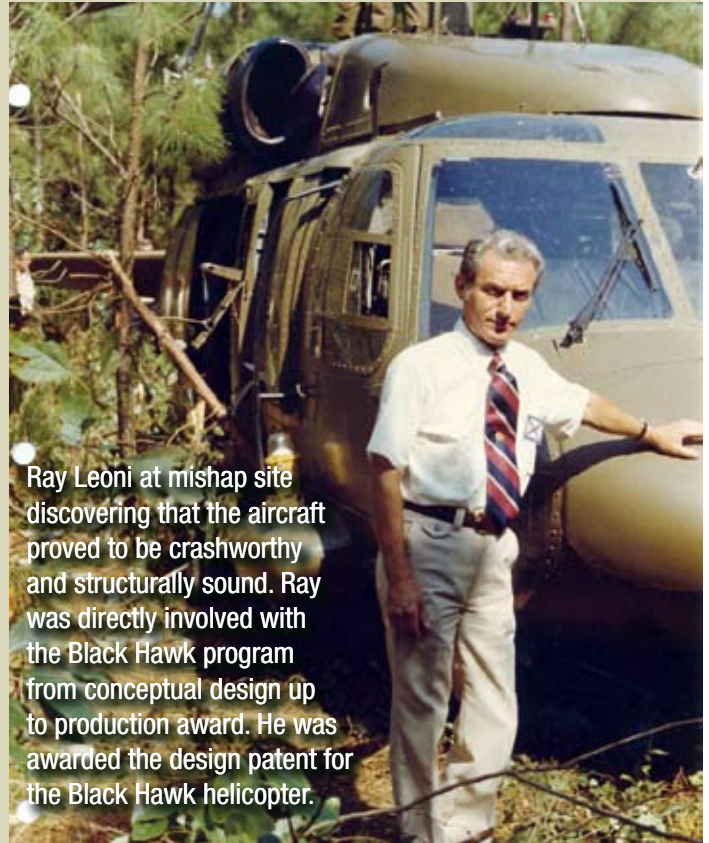


During the controlled descent, the YUH-60A chopped through 40 trees multiple times leaving a forest that appeared to have been cut down by a giant rotary lawn mower. The only damaged parts were the main and tail rotor blades. However, the blade spars sustained no damage. A main blade, the one shown pointing to the right, shed part of its fiberglass skin during flight which caused the strong vibration. ☺

Two days later, when an Army maintenance crew replaced all rotor blades and cleared the site of tree stumps, the Sikorsky YUH-60A took off and returned to its base at Fort Campbell. The minimal damage sustained by the aircraft earned great praise from the Army converting what could have been a tragic event into a victory for Sikorsky. ☺



YUH-60A returning to home base after rotary lawn mower incident.



Ray Leoni at mishap site discovering that the aircraft proved to be crashworthy and structurally sound. Ray was directly involved with the Black Hawk program from conceptual design up to production award. He was awarded the design patent for the Black Hawk helicopter.

When the competitive testing was finished in November 1976, the Army was thoroughly familiar with the strengths and weaknesses of the YUH-60A prototypes and was ready to make the decision for production. A month later, two days before Christmas, the army announced the decision to

award Sikorsky the sole source production contract, because it felt that the Sikorsky YUH-60A was more fully developed, offered less production risk and provided better value to the government. That historic award set the stage for what has become Sikorsky's most successful program. ☺

SIKORSKY TRIUMPHS AND A NEW HELICOPTER SERIES EVOLVES



Boeing YUH-61A
"The Loser"



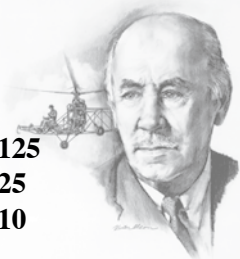
Sikorsky YUH-60A
"The Winner"

The development of the UH-60 Black Hawk and family of helicopters that followed will be covered in the January and April, 2008 issues of the newsletter. The data has been obtained from "The Black Hawk Story-Creating a World Class Helicopter" written by Ray D. Leoni, retired Senior Vice President, Engineering and Advanced Programs, and with data provided by Bill Tuttle, retired Manager of Public Relations. ☺

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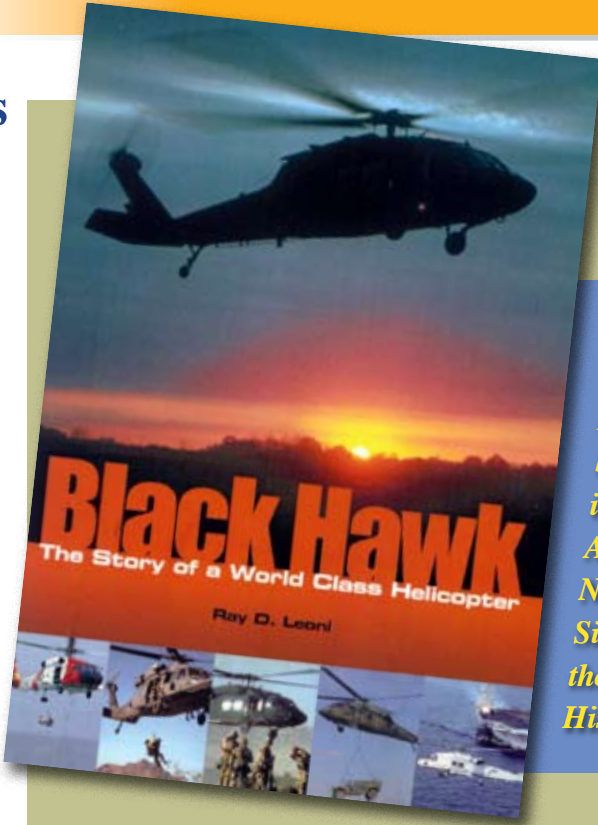
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The Story of the Black Hawk written by Ray D. Leoni is available via AIAA, Barnes & Noble, Amazon, the Sikorsky Store, and the Igor I. Sikorsky Historical Archives.

Newsletter designed and edited by Lee Jacobson, John Kowalonek and Edgar A. Guzmán with data provided by Ray Leoni and Bill Tuttle.



“We have progressed to the point of being permitted to cast off our shackles. As a pilot you will appreciate the fact that danger lies not in flying through the air but in striking the ground.”

Igor I. Sikorsky

