



# Sikorsky Archives News

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## Sikorsky Takes the UTTAS Prize



*The Sikorsky YUH-60A UTTAS prototype first flew on October 17, 1974.  
(All images property of Igor I. Sikorsky Historical Archives.)*

Sikorsky Aircraft flew its first S-70-series helicopter, the prototype YUH-60A Utility Tactical Transport Aircraft System (UTTAS), on October 17, 1974. It won the UTTAS competition on December 23, 1976 and delivered the 5,000th S-70, the latest UH-60M Black Hawk, in January 2023. US Army plans now continue UH-60M production through 2032 and hint at even more capable Black Hawks to come. The rapid-fire UTTAS competition that gave Sikorsky its longest production program revitalized the company and restored its leadership among American helicopter makers. Around the 100th anniversary of Sikorsky Aircraft, retired company president Bill Paul observed, "For all of us, it was a must-win, but for Sikorsky it was a make-or-break situation because we were slowly going out of business."

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Despite successful Army S-55, S-56, and S-58 (CH-19, CH-37, and CH-34) programs through the 1950s and orders for S-64 (CH-54) Sky-cranes in the early 1960s, Sikorsky had lost competitions for Army utility, heavy lift, and attack helicopters. By the 1970s, Paul noted, “The [Marine Corps] CH-53D production was gone, the [Navy] S-61s were gone. We had no commercial aircraft at the time. On the horizon we had [Marine] CH-53 Echoes coming down the line, but that was too small a program to sustain Sikorsky as we knew it.”

In 1965, the Department of Defense (DoD) formulated a Qualitative Material Development Objective to replace the Army’s UH-1 utility helicopter then fighting in Vietnam. The Army Aviation and Infantry Centers and the Aviation Systems Command considered coaxial compound helicopters, tilt rotors, and other radical rotorcraft, but the service and the DoD ultimately defined a 145 kt twin-engine helicopter able to hover out of ground effect at high density altitudes carrying 11 infantrymen, two pilots, a crew chief, and a gunner. The Army’s new, crashworthy, ballistically-tolerant squad carrier needed exceptional agility to evade air defenses. It also had to fold to fit Air Force airlifters and keep flying with austere operational-level maintenance.

Bill Paul headed Sikorsky Aircraft Design and Development in 1972 and recollected, “We were thought of as a Navy supplier and a long-shot to win UTTAS.” Within the company, Advanced Concepts Group lead Ray Leoni and Preliminary Design lead Lou Knapp headed competing teams to address Army requirements. Leoni’s team was chosen to answer the upcoming Request for Proposals (RFP) and filled unfinished space under the Stratford plant with about 100 Sikorsky engineering, logistics and manufacturing specialists. As a young engineer, John Bulakowski joined the UTTAS ground support equipment and trainer group. “The Basement was a large underground area with a single aisle

flanked by two large open areas. The importance of our efforts was emphasized with routine visits from Sikorsky and United Technologies [UTC] management, including Harry Gray, CEO and chairman of UTC.”

In the January 1972 edition of *Sikorsky News*, company President Wes Kuhrt declared “total dedication” to winning the UTTAS industry competition and announced executive vice president John McKenna would head a team including program manager Ken Horsey, technical manager Ray Leoni, and proposal manager Sam White. Sikorsky craftsmen built a wood mockup of the UTTAS helicopter with the wide-open troop cabin, canted tail rotor, big horizontal tail, and integrated maintenance workstands that distinguish Black Hawks today.

Wes Kuhrt told *Sikorsky News*, “Our philosophy in developing our proposed UTTAS is to exploit proven technological advances of the 1970s to achieve the lowest-cost, lowest-risk aircraft that meets the Army requirements. We have proven these advances either in the laboratory or in flight.” UTTAS innovations included titanium-spar/fiberglass-skin rotor blades, swept main rotor tips, fluidic stability augmentation, elastomeric rotor heads, and grease-lubricated intermediate and tail gearboxes. Titanium spars flew on the S-69 (Army XH-59) Advancing Blade Concept and elastomeric bearings on the S-65 (Marine



*The UTTAS wood mockup showed the integrated workstands and other features of the YUH-60A.*



*Sikorsky engineers tested the S-70 configuration in the United Technologies wind tunnel.*

CH-53D). Sikorsky engineers “flew” their UTTAS design in early flight simulators at the United Aircraft Research Laboratories in East Hartford.

The UTTAS RFP arrived on January 3, 1972 with a Prime Item Development Specification (PIDS). “The remarkable thing was the requirements the Army had in producing the RFP,” noted Bulaowski. “The PIDS was 300 to 400 pages with every system and subsystem and what it should do.” Sikorsky delivered its nine-volume response with PIDS on March 30, 1972, and Kuhrt wrote in his cover letter to the Army, “Never before in our history have we entered a competition better prepared.”

In August 1972, the Army Aviation Systems Command awarded Sikorsky and the Boeing Vertol Company UTTAS Basic Engineering Development contracts, each company to build one static test article, one ground test vehicle, and six flying prototypes. In his book, *Black Hawk, the Story of a World Class Helicopter*, Ray Leoni wrote, “If there was a single reason why Sikorsky was awarded one of the two UTTAS development contracts, it would have to be because of the company’s near-total responsiveness to the Army’s specifications.”

General Electric received a separate contract in March 1972 to develop the T700 engines that

would power the competing Sikorsky YUH-60A and Boeing YUH-61A. Despite Army appeals, the House Appropriations Committee in September 1972 cut the number of UTTAS flying prototypes to three per contender. Sikorsky leadership nevertheless understood the potential of the S-70 and funded a fourth identical prototype for marketing -- the US Navy expressed early interest in the Army UTTAS as a Light Airborne Multi-Purpose System (LAMPS III) platform.



*The folded mockup demonstrated YUH-60A air transportability features.*

A mockup review conference in September 1973 introduced the S-70 to Army and civilian defense leaders. The Army wanted a compact helicopter that could be made ready to roll into a C-130 transport in less than an hour. In response, the squat UTTAS mockup had a low main rotor hub that would pose performance and vibration challenges in flight testing.

At Stratford, the UTTAS static test article was subjected to wide rotor frequency excitations to measure airframe response. Dick Wright, John Dixon, and four other company test pilots began running the YUH-60A ground test vehicle (GTV) in June 1974. Dixon recalled, “When everything got routine, we let ground test engineers do it.” The GTV proved the reliability of helicopter systems and uncovered early drivetrain problems. A GTV gearbox failure before the UTTAS fly-off restored traditional oil lubrication on the YUH-60A.

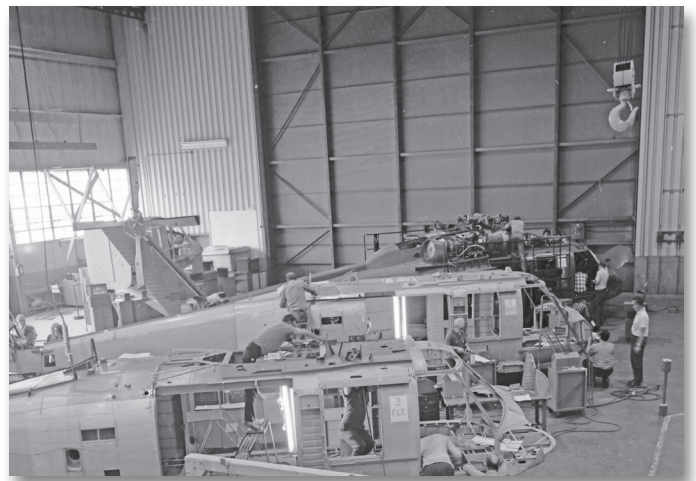
New Sikorsky President Gerald Tobias presented the first flying YUH-60A prototype at an official roll-out in Stratford on June 28, 1974. The crowd included Army Aviation Materiel Command project manager Brigadier General Leo Turner, United Aircraft chairman and president Harry Gray, two US senators, and Sikorsky employees reminded of their importance by a huge banner: "UTTAS begins with U!" Sikorsky implemented a monthly UTTAS Recognition Award in May 1975 to sustain the spirit.

## Speeds and Shakes

The first YUH-60A flew on October 17, 1974, six weeks ahead of contract schedule. Sikorsky chief pilot Dick Wright and program chief pilot John Dixson alternated pilot and co-pilot seats on all subsequent flights from October to December. The first largely-hovering flight was uneventful, but the second test at modest speed revealed serious problems in the UTTAS prototype. According to Dixson, "It was a mess. It was terrible from every point of view you could think about in a new helicopter, from vibrations to handling qualities." At design weight with 100% torque, pilots had to keep the cyclic stick far forward just to take off and climb out. "We started off and knew we had



*The Static Test Article was subjected to wide-spectrum vibration to measure YUH-60A airframe response.*



*The three Army YUH-60A prototypes were built in Stratford alongside a company-funded demonstrator.*

a problem there." In an attempt to improve handling, the UTTAS team in November 1974 flew the YUH-60A stripped of its big horizontal stabilizer.

Just before Christmas 1974, Tobias visited the pilots' office and cheerfully asked the status of the UTTAS. Wright answered with brutal candor. Dixson itemized the flight test failings that day in a memo. "Each one of those things was a big deal," he noted. Sikorsky's then-chief of Aircraft Design and Development Robert Zincone became UTTAS program engineering manager early in January 1975 and in a sober meeting ordered each engineering branch lead to provide three remedies to their respective problems. He told the group, "I can't bet everything on one solution."



*The Ground Test Article proved the reliability of the YUH-60A drivetrain.*

The UTTAS engineering team and experimental shop implemented rapid changes in the YUH-60A including a year-long series of vibration reduction modifications. “That aircraft was a vibration nightmare, and it wasn’t just single frequencies,” recalled Dixon. Initial vibrations were so bad that engineers in November 1974 cut four S-61 blades to the S-70 rotor diameter, tested them on the Stratford whirl stand, and flew them on the first UTTAS prototype. Pilots took the helicopter to 137 kt indicated airspeed with all vibration absorbers in play, then repeated the experiment with absorbers removed. Dixon recalled, .... at 20 kt the instrument panel disappeared in a blur.”



*Bill Paul, Bob Zincone, and production director Les Burroughs inspected one of the Black Hawk blade iterations.*



*The first YUH-60A rolled out at Stratford in June 1974 with a compelling message for Sikorsky workers.*

Performance was likewise disappointing and like the vibration problems seemed tied to the low-set main rotor. Sikorsky engineers calculated YUH-60A top speed at design gross weight around 176 kt, but the prototype failed to top 145 kt. The “UTTAS maneuver” formulated by the Army started at 145 kt true airspeed, but Dixon explained, “You’d pull up to 1.75 G, hold it for three seconds, lose not more than 30 kt, then push over to zero-G and hold zero-G for two seconds. We weren’t going to be able to do that with that low rotor.”

Test pilots warned that YUH-60A main rotor blades turning so close to the cabin roof would strike both cockpit and tail boom in the UTTAS push-over. Bill Paul and Bob Zincone ultimately

gained approval from UTC chairman Harry Gray to raise the main rotor if they could still meet the UTTAS requirement for air transportability. Rotor designer Don Ferris proposed a bolt-on rotor shaft extender removable for air transport. John Dixon noted, “From the meeting when it was decided to do this to my first flight with it was 39 calendar days. That included fatigue testing of parts and a full functional test in the head and shaft test facility out by the whirl-stand at Stratford.” Sikorsky built a mockup of a C-130/C-141 cabin cross-section in 1975 to show the S-70 still fit.

Depending on aircraft attitude, the fixed horizontal tail on the YUH-60A also added to drag. The UTTAS prototype tried different tail configurations including fore- and aft-swept surfaces, Z-tails, and other fixed layouts through late 1974 and early 1975 without success. A variable-incidence stabilator automated with fly-by-wire (FBW) controls promised to reduce drag and improve handling. Sikorsky had proposed FBW in its failed bid for an Army heavy lift helicopter, but the technology offered the S-70 the variable-pitch stabilator it needed. John Dixon, handling qualities branch chief Lou Cotton, and UTTAS handling qualities engineer Bob Poulin made the first flights with the moving tail in March 1975, just 30 days after the decision to proceed.



Four YUH-60A prototypes flew at Stratford, the Army Aircraft distinguished with one, two or three fuselage stripes.

Other drag reduction efforts, including raising the main rotor hub, still failed to improve speed. “That started a plan to increase rotor thrust,” said Dixon. Through 1975, the UTTAS main rotor blades went through successive changes including droop-snoop blade tips, trailing edge strips, trim tabs, and tip caps modified to increase main rotor diameter. With the changes, the YUH-60A met all hover and pull-up requirements in the UTTAS specification.

Though raising the main rotor by 12 in. failed to raise speed, the hurriedly-machined rotor shaft extension paid off in significantly reduced vibration. Dixon and other Sikorsky pilots kept testing vibration fixes. “One by one, those things were chipped away. After the raised rotor, with one bifilar [main rotor absorber] left and two fixed absorbers, the vibration levels got to be reasonable and competitive.” The YUH-60A Government Competitive Test (GCT) configuration was frozen in October 1975.

## Compete and Win

Sikorsky delivered three YUH-60A prototypes to the US Army at Fort Benning, Georgia in January 1976 for a UTTAS Government Competitive Test



Three Boeing YUH-61A took part in the UTTAS Government Competitive Test in 1976.

run in two parts from May to September that year. One instrumented YUH-60A went to the Aviation Engineering Flight Activity at Edwards Air Force Base in California to be evaluated by Army experimental test pilots. Two production-configured aircraft were evaluated at Fort Rucker, Alabama and Fort Campbell, Kentucky by operational Army pilots chosen for their varied experience. John Dixon compiled a 10-hour training syllabus for the Army aviators including the UTTAS maneuver. He was on hand to see the fly-off with



Bob Poulin, Lou Cotton and John Dixon (L to R) tested the moving stabilator on the YUH-60A.

the Boeing YUH-61A. “That was fun, and it told us we had the winning aircraft.”

California tests took both UTTAS competitors to high density altitudes, and early user tests lifted heavy external loads. The YUH-60A, 350 lb heavier than a planned production UTTAS, met just two of the 12 performance commitments in the PIDS, but Edwards test pilots concluded, “There was a high degree of pilot confidence in maneuvering the helicopter to the extremes of the flight envelope at mission gross weight.”

In the Fort Campbell fly-off, Dixon watched YUH-60A lift a 7,100 lb Gama Goat off-road vehicle with full helicopter fuel, both prescribed radios, and all troop seats. The YUH-61A could lift the amphibious vehicle with just 400 lb of fuel on board, one radio, and no troop seats. “We had at least a 2,000 lb hover advantage.” Informal talk at Fort Rucker indicated the YUH-61 was maintenance-intensive and had vibration levels painful to test pilots. The best YUH-60A endorsement came from experienced Army test pilot Joe Gibbons assigned to the YUH-61A but schooled on both helicopters. After an adventurous YUH-



*The YUH-60A with full fuel lifted the Gama Goat vehicle during Government Competitive Testing.*

60A flight with John Dixon, Gibbons told the Sikorsky pilot, “John, Igor would be proud of this.”

The Army announced on December 23, 1976 that Sikorsky Aircraft was the winner of the Utility Tactical Aircraft System competition. Gerald Tobias drove a golf cart around the plant to spread the word in person. In a February 1977 story on the impact of the UTTAS win on jobs and futures, TIME Magazine quoted riveter Maria Ferreira describing the atmosphere at Stratford: “It was like the war ended. Everyone went crazy, clapping, screaming, yelling.”

In the January 1977 Sikorsky News, Gerry Tobias told the company, “I believe the Army selected our UTTAS not only for its outstanding performance and maintenance qualities, but because you, the men and women of Sikorsky Aircraft, designed and built a truly production-ready helicopter.”



*Ray Leoni (front) and Gerald Tobias (rear) show the YUH-60A cockpit to Gen. John Gurthrie.*

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The second annual Sikorsky Archives charity golf tournament was held on August 26, 2024 at Sacred Heart University Great River Country Club. Thanks to all the Sikorsky volunteers that gave their time and efforts towards a very successful event. Pictured above (l to R) Meghan Dorash, Rebecca Benoit and Brianna Britton.

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



“It is the ability, experience and still to a certain extent, intuition, of the design engineers that enable them to make a good compromise between aerodynamic characteristics, structural weight, cost, and several other secondary requirements.”

Igor Sikorsky, *The Story of the Winged S*

