



# Sikorsky Archives News

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## During the Decade of the 1990s Sikorsky Aircraft was Producing the H-60 Hawks and the S-76 Aircraft While Developing the Boeing Sikorsky RAH-66 Comanche and the S-92 Commercial Helicopters

During the early 1990s the U.S. Army developed a Light Helicopter Experimental Program to replace their older vintage helicopters. As a result of Army requirements, a number of helicopter companies joined partnerships to compete for the contract. The “*Boeing Sikorsky First Team*” and the “*Bell McDonnell Super Team*” were formed.

In 1991 the Boeing Sikorsky First Team was selected as the winner of the design competition to produce two prototype aircraft, and develop them for Army evaluation. Army funding issues and requirements growth resulted in schedule slippages, and eventually resulted in termination of the program. However, the Comanche program developed advanced state-of-the-art features and technologies that have benefitted current model aircraft and will continue to benefit helicopter models into the future.



S-70 (H-60)



RAH-66



S-92



S-76

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### The RAH-66 Army Helicopter Program

The 1990s was a period of intense activity with the Comanche. Sikorsky had teamed with Boeing to develop the first new helicopter since the Black Hawk and Apache were created twenty years earlier. The RAH-66 was an armed reconnaissance aircraft using new technologies of:

- Low radar and heat signatures
- Low IR exhaust system
- Fly-by-wire flight controls
- Composite fuselage
- Bearingless main rotor
- Fantail anti-torque system
- Mission systems used the latest technology to detect and prosecute targets at night and in adverse weather
- High-speed computers to process target information for attack or transmittal to ground commanders.
- Helmet Mounted Display, providing dynamic flight symbology, navigation information, target tracking, and weapons information.



RAH-66



All Composite Fuselage In-Build Fixture

“For the first time a helicopter could detect an enemy on the battlefield at a distance where the enemy could not see it.”

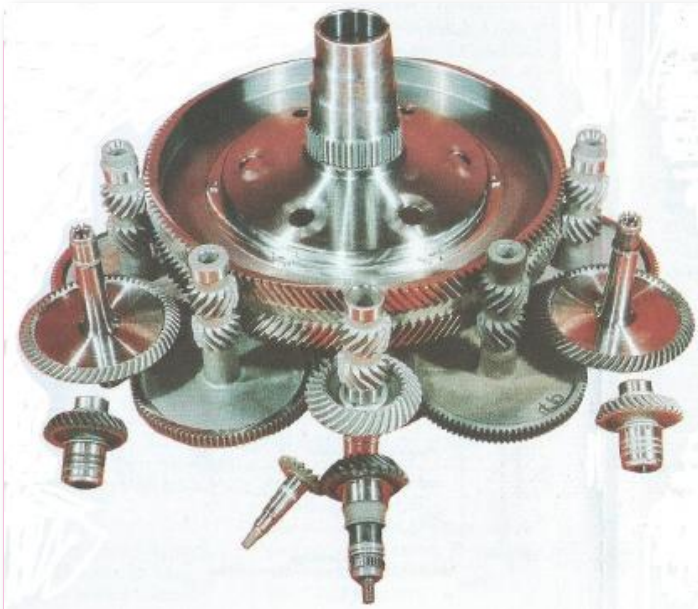
Sikorsky was determined to win the RAH-66 contract and created two S-76 experimental aircraft shown below by modifying one with an extended nose single pilot cockpit, and the other with a shrouded fan in place of the tail rotor. Sikorsky’s intent was to show the Army that we had done our homework to justify the company’s design approach for the Comanche helicopter.



The two pilot Comanche cockpit was fitted with multiple electronic display systems (glass cockpits) and side arm controllers for single pilot operation as required.

## The Sikorsky RAH-66 Dynamic Components

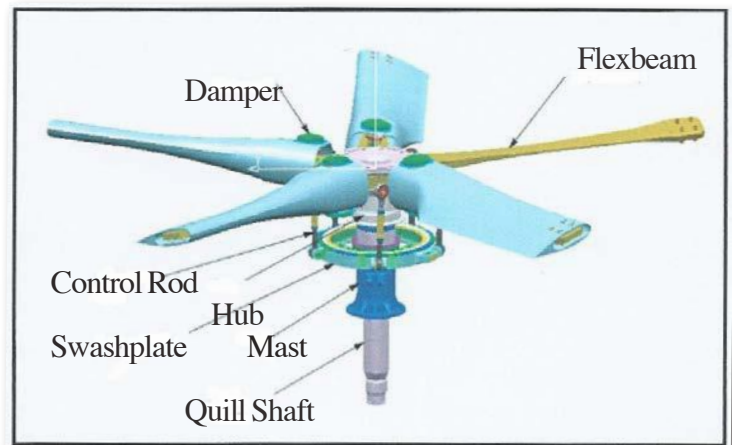
The Comanche five bladed Pentaflex Main Rotor System was based on the excellent experience gained with the Black Hawk tail rotor flexible beam configuration. The bearingless main rotor assembly is driven by the split torque main gear box shown below. The main gearbox and main rotor assembly resulted in a lighter weight and low height compact unit for the limited space in the Comanche fuselage.



Split Torque Main Gearbox

The Split Torque concept was developed at Sikorsky under a Research and Development contract. The concept utilizes two separate load paths per engine to deliver the engine power to the rotor head. The technology results in a compact main gear box that has fewer parts and less weight than previous versions. The main gearbox and main rotor assembly resulted in a light weight and low height compact unit for the limited space in the Comanche fuselage.

The split torque gear configuration allows for utilizing the power gears to drive generators, hydraulic pumps, fans and other components without the need for providing a separate set of gears or gear box for the accessories. Due to the compact configuration and vertical positioning of the prime drive gear center lines, accessory drives are readily available for maintenance purposes.



Pentaflex Main Rotor



Fantail Anti-Torque System

As a result of an Army requirement to eliminate the conventional tail rotor for ground safety reasons, Sikorsky designed, built and tested a Fantail Anti-Torque System on an S-76 aircraft shown on the previous page. The test aircraft was modified by replacing the tail rotor and drive system with a Fan Tail driven from the main gearbox tail take off and a new anti-torque drive system. Flight controls were modified to be compatible with the aircraft requirements.

Subsequent flight tests of the Fantail system on the S-76 test aircraft demonstrated that the maneuverability and rapid response requirements established for the Comanche helicopter were achievable with the proposed anti-torque system. This was another example of how Sikorsky proved to the Army that their technology was proven prior to the actual award of the Comanche program.



## Within Half a Century, the Sikorsky Commercial Helicopter Technology Advanced from The S-51 to the S-92 Helibus



S-51

S-92

The S-92 was designed and qualified to the most stringent Federal Aviation Regulation (FAA) standards which includes the requirement for Flaw Tolerant Design. This criteria requires that all flight safety critical single load path components must be designed and tested to show that any potential manufacturing or operational defect will not cause the critical part to fail in service for the demonstrated life of the component.

Prior to FAA certification, an analysis must be performed to identify the single load path parts, such as rotor and propulsion system drive components, main

and tail rotor components, and single point flight control elements, etc. The identified parts must be modified to include a potential defect and fatigue tested with the defect to qualify the part to the FAA Flaw tolerant Design requirement.

The S-92 was qualified to the Flaw Tolerant Design requirement by the FAA, and can rightfully be claimed as being **“The Safest Helicopter In The World.”** As of the date of this newsletter, *no* other helicopter can make this claim.

### S-92 Design Safety Features

- 1-High Visibility Cockpit
- 2-High Intensity Radiation Field Protection
- 3-Health and Usage Management System
- 4-Ground Proximity Warning System Protection
- 5-Crashworthy seats for all occupants
- 6-Fuel sponson design separates fuel from passengers
- 7-Suction fuel system prevents hazardous fuel spray
- 8-Energy absorbing landing gear
- 9-Built in corrosion resistance
- 10-Latest FAA bird strike protection
- 11-Lightning strike protection
- 12-High energy turbine burst protection
- 13-Flaw tolerant design
- 14-Optional certified Rotor Ice Protection System
- 15-Traffic Collision Avoidance System



S-92 Petroleum Helicopter offshore oil rig operation

The S-92 Helibus Program was Introduced to the World by Sikorsky Aircraft President Gene Buckley During a Press Conference at the Paris Air Show on June 12, 1995

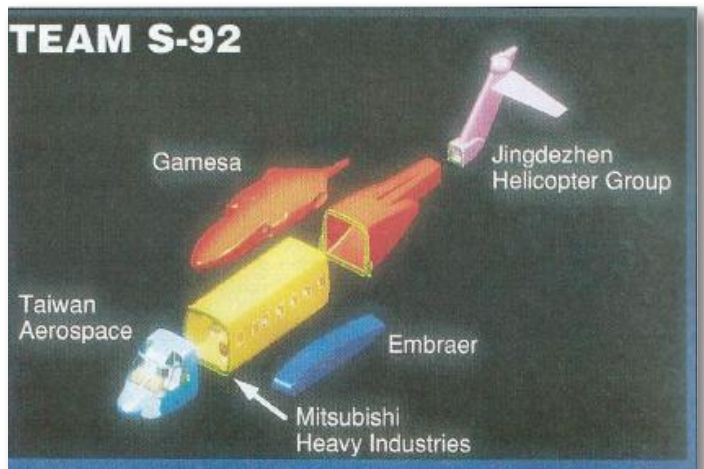
Gene Buckley stated, “Today begins a new era for Sikorsky Aircraft” as he formally announced the launch of full scale development of the S-92 Helibus during the conference. Mr Buckley stated, “The S-92 is a modern, comfortable utility helicopter that is easily adapted to individual customer needs. With its superb quality, low price and superior features, the S-92 will dominate the civil and government markets for new medium lift aircraft”.

The S-92 was built by an international team of leading aircraft design and manufacturing companies from four continents with Sikorsky leading the team. The initial international partners were *Embraer* in Brazil, *Mitsubishi Heavy Industries* in Japan, *Jingdezhen Helicopter Group* in the People’s Republic of China, *Gamesa* in Spain and *Taiwan Aerospace* in Taiwan.

As team leader Sikorsky designed and manufactured the aircraft’s dynamic systems, and carried out final assembly, flight test and certification. There are 242 S-92 helicopters in service to-date covering a variety of commercial and government missions.



S-92 Mockup at Paris Air Show



S-92 Her Majesty’s Coast Guard



S-92 Presidential Transport



S-92 (CH-148) Cyclone  
Canadian Air Force

The S-92 was selected for the next United States Presidential Transport, and by the Canadian Air Force for their required missions. Both aircraft are currently under development.



## Sikorsky Helicopters Were Called To Duty During “Operation Restore Hope” In 1993

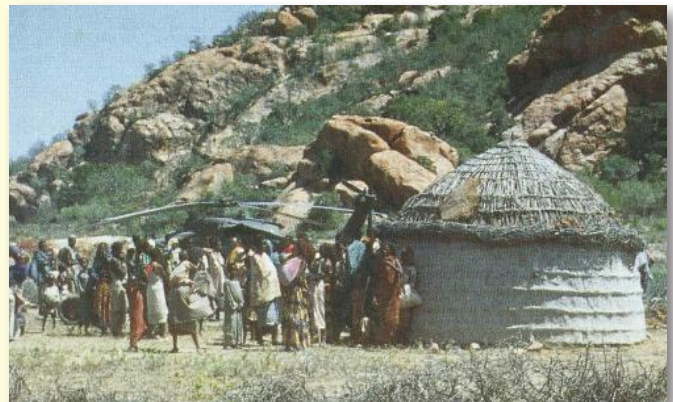
The country of Somalia in East Africa was plunged into a tragic conflict in January 1991 when the country’s leader was overthrown. The main source of power in the country was the control of food supplies, which was rapidly dwindling resulting in clan warfare leading to starvation for many of Somalia’s civilians. Food was routinely exchanged with other countries for weapons. Between 1991 and 1992 it was estimated that over 300,000 Somalis died of starvation.

The United Nations asked member nations for assistance, and in December 1992, President George Bush proposed to the United Nations that United States combat troops lead the intervention force to prevent the food supplies from being stolen or destroyed. The United Nations accepted his offer and 25,000 U.S. troops were deployed to Somalia for Operation Restore Hope.

President Clinton supported the United Nations request to maintain U.S. troops for a period of time to allow the United Nation forces to take full control of the peace keeping effort. The U.S. troops returned home on October 7, 1993.



(S-65) CH-53 helicopter arriving to support Operation Restore Hope

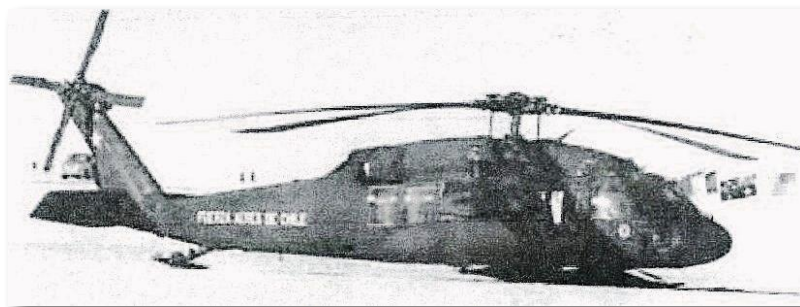


Somali villagers in front of Black Hawk

## Chilean Air Force Black Hawk Makes Record Flight to South Pole in January 1999

A new chapter was written in aviation history January 28, 1999 when an S-70 Black Hawk helicopter commanded by the Chief of the Chilean Air Force, General Fernando Rojas Vender, landed at Amundsen Scott Air Base at the South Pole.

The flight marked the first time a helicopter flew more than 2,833 miles to unite the city of Punta Arenas in southernmost Chile with the South Pole.



S-70 Chilean Air Force Black Hawk at South Pole

The historic journey, christened “Operation Aurora Austral” (Dawn of Southern Lights), was accomplished without incident. Configured with four 230 gallon auxiliary fuel tanks, the Black Hawk departed January 17 from Punta Arenas, Chile on the southern tip of South America, and landed at Presidente Eduardo Frei Montalva Air Base, marking its arrival on the frozen polar continent. The six hour trip covered a distance of 768 miles without refueling and established a record in uniting the South American continent with Antarctica by helicopter.



## Sikorsky Black Hawk Helicopters Participated In “Cobra Gold ‘93” Exercises in Thailand

The “Cobra Gold ‘93” military field exercises were performed for the purpose of training and assessing the military’s capabilities to perform their required missions. Three HH-60H Helicopters were flown to Thailand via a C-5A aircraft with a team of military personnel.

Shortly after arriving in Thailand, the Cobra Gold ‘93 exercises commenced. A typical day of Cobra Gold ‘93 included the sky full with aircraft for the U.S. and Royal Thai military forces. Big C-130 aircraft dropped SEAL teams on the beach as F-5, F-16 and F-18 fighter jets screamed overhead. Cobra attack helicopters provided cover for the landing troops as CH-47 helicopters lowered heavy artillery guns and amphibious assault vehicles lumbered ashore. HH-60H helicopters hovered high above the ground operations as its paratroopers disembarked and descended from the aircraft shown below.



S-70 (HH-60H) passing Thailand monument

Throughout the month long exercises, almost half of the flight hours were completed in darkness, validating night vision capabilities. The squadrons operational success during the complex exercises included 112 sorties accumulating more than 240 flight hours with a mission capable rate of 98.9 percent. The complex exercises were free of mishaps and injuries. The HH-60H aircraft were specifically designed for this mission.



In 1994, S-76 aircraft supported research expeditions and off shore oil operations in the frozen tundra of Antarctica. The outside operating temperatures averaged from -10 C at midday to -20 C at midnight. The S-76 is certified to operate down to -34.4 C.

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## The 1990s Was A Decade Of "High Tech Innovation"



Newsletter designed and edited by Lee Jacobson, Art Linden and archive members with graphic art assistance by Jodi Buckley.



Igor Sikorsky in first rescue hoist

“For me, the greatest source of comfort and satisfaction is the fact that our helicopters have saved up to this present time (1969) over 50,000 lives and still continue with their rescue missions.”

Igor Sikorsky

As of October 2015 the number of lives saved by Sikorsky helicopters is over two million.

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