

Igor Sikorsky—VS-300



The Sikorsky XR-4 was first flown on January 14, 1942. It was the test version of the popular R-4 used extensively in World War II.

In the 1930s, the French [Louis Bréguet](#) and German [Heinrich Focke](#) had made major advances in [helicopter](#) design in Europe. A Russian who had emigrated to the United States, Igor [Sikorsky](#), eventually made the most significant advances. Although Sikorsky is not generally credited with inventing any new solutions to the problems of controlling a helicopter in flight, he is widely regarded as the person who improved existing technology and made the helicopter practical and successful. [Sikorsky Aircraft](#) remains the oldest helicopter firm in the world.

By the 1930s, Sikorsky was building transport aircraft and flying boats for Pan American Airways. His company, the Sikorsky Aviation Corporation in Bridgeport, Connecticut, became a subsidiary of the giant United Aircraft and Transport Corporation. Sikorsky and his aides occasionally sneaked helicopter models into the company wind tunnel. In 1931, he applied for a patent for a novel helicopter design that used a [single main lifting rotor and a small vertical tail rotor](#) to counteract torque. He later visited Europe to witness the flights of both Focke's Fa-61 and Bréguet's experimental gyroplane.



With Igor Sikorsky at the controls, the VS-300 hovers during an early public demonstration flight. First flown in September 1939, the VS-300 brought the world record for helicopter endurance to the United States in 1941 when it stayed aloft for one hour thirty-two minutes. All Sikorsky production helicopters have been refined versions of this first successful single main rotor, torque-compensating tail rotor configuration.

In 1938, as United Aircraft was closing down Sikorsky's company to cut costs, Sikorsky received permission to expand his helicopter research and to begin work on an experimental vehicle. In spring 1939, he designed the VS-300, which was built that summer. The VS-300 was constructed of an open welded tubular steel frame with three-wheel main landing gear. A three-bladed rotor with a diameter of 28 feet (8.5 meters) was mounted at the top. A single two-bladed vertical rotor was mounted at the tail. Both rotors were powered by a four-cylinder 75-horsepower (56-kilowatt) Lycoming air-cooled engine connected to the rotors through a truck transmission and a series of pulleys and belts. The main rotor could increase the [pitch](#) of the three blades collectively to change [lift](#). Sikorsky also adopted cyclic control from [Cierva's autogyro](#).

Wearing a topcoat and fedora to protect himself from the cold, Sikorsky piloted the VS-300 himself during its first flight on September 14. The craft vibrated excessively, until Sikorsky was a blur at the controls of the skeletal craft. He lifted the helicopter off the ground and set it down several times. The VS-300 remained tethered to weights on the ground by wires during these early flights.

Sikorsky made constant modifications to the craft in an attempt to reduce vibration and increase control. His mechanics began calling it "Igor's nightmare." By November 1939, the craft was making hops lasting a minute or two, but it was heavily damaged in December when a gust of wind toppled the machine and the rotor blades smashed against the ground.

The machine made its first free flight on May 13, 1940. By this time, Sikorsky had added outriggers at the tail end and two additional tail rotors, and had switched to a more powerful 90-horsepower (67-kilowatt) Franklin engine. By mid-1940, the VS-300 was flying for 15 minutes at a time. In July, Captain Franklin Gregory, the project officer for the budding U.S. Army helicopter program, took the VS-300 for a test flight. He described the craft as having poor handling capabilities, saying that it flew like a bucking bronco. Gregory was an autogyro pilot, unaccustomed to the helicopter's unusual flight control system, which often required delicate hand movements. The U.S. Army Air Corps was very impressed, however, and awarded a contract to Sikorsky in December 1940 to build an experimental helicopter known as the XR-4, which was to be larger than the VS-300.



The Sikorsky R-4 was first used in combat in May 1944.

Over the next year, Sikorsky continued to refine his craft. It ultimately went through eighteen visibly different configurations. On May 6, 1941, the VS-300 broke the world helicopter endurance record held by the Focke-Achgelis Fa-61, remaining airborne for 1 hour, 32 minutes and 26.1 seconds.

Sikorsky soon decided to eliminate the horizontal outriggers holding the tail rotors and mount the vertical tail rotor on a pylon added to the tail boom. This dramatically improved performance and soon the craft was flying forward stably at 70 miles per hour (113 kilometers per hour).

On January 14, 1942, the XR-4 was wheeled out and performed several short hops. By May, the craft was ready for delivery to Wright Field in Ohio. Sikorsky's test pilot flew the unusual aircraft on a series of short hops over five days from Connecticut to Ohio, and Sikorsky himself finished the trip. His test pilot navigated by reading highway signs or asking

directions from surprised motorists.

The Army soon contracted for production to begin and also ordered a new, larger model. In April 1943, it requested another version. More than 400 Sikorsky helicopters were produced for the U.S. Army by the end of World War II. The R-4 saw service with the 1st Air Commando unit in the China-Burma-India Theater, where it performed some of the missions that would be later expanded during the Korean War and become common during the Vietnam War. Although they had no impact on the war, they clearly offered much promise.

Sikorsky's VS-300 was significant because it was the first working helicopter that did not require two counter-rotating rotors to cancel out torque, instead using a tail rotor that provided thrust in the opposite direction of the torque. This made the craft less complicated, lighter, and easier to control. But perhaps more importantly, the VS-300 served as the forerunner for the modern helicopter—it looked more like helicopters in use decades later than any of its predecessors. Unlike either Heinrich Focke or Louis Bréguet, Sikorsky continued building helicopters and ultimately became the most famous helicopter manufacturer in the world.

—Dwayne A. Day

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