



Spirit  
of  
St. Louis



# The Spirit flies on

Remembering the flight that changed  
the course of history

BY BARRY SCHIFF

**T**he *Spirit of St. Louis* is perhaps the most famous and recognizable aircraft of all time. I approached it with awe and reverence, even though it was a replica. The silver monoplane with the burnished cowling and spinner sat alone on a ramp at Oshkosh, its nose pointed skyward as if poised for flight.

The replica is the second built by the Experimental Aircraft Association (EAA). The first was built to re-create and celebrate the fiftieth anniversary of Charles Lindbergh's Guggenheim Fund Tour of the United States (July 20 to October 23, 1927). After being flown once by Lindbergh's wife, Anne Morrow Lindbergh, it was put on display in EAA's AirVenture Museum.

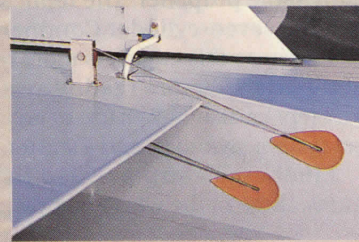
The original *Spirit* was named by Harold Gatty, a private pilot, St. Louis banker, and one of Lindbergh's sponsors. The City of St. Louis was named for France's Louis IX, an appropriate personage after whom to name Lindbergh's aircraft. "Louis had been a crusader, a pious traveler renowned for his self-assuredness. Maintaining his faith and vision, he withstood intense physical discomfort to reach his holy destination." (From the Pulitzer Prize-winning biography *Lindbergh* by A. Scott Berg.)

The original *Spirit* was built by Ryan Airlines in an old fish cannery in San Diego, the smell of which did not impress the visiting Lindbergh. A young worker at the factory, Douglas "Wrong Way" Corrigan, obtained transatlantic fame of his own in 1938, when he flew a dilapidated Curtiss Robin from New York to Dublin, Ireland.

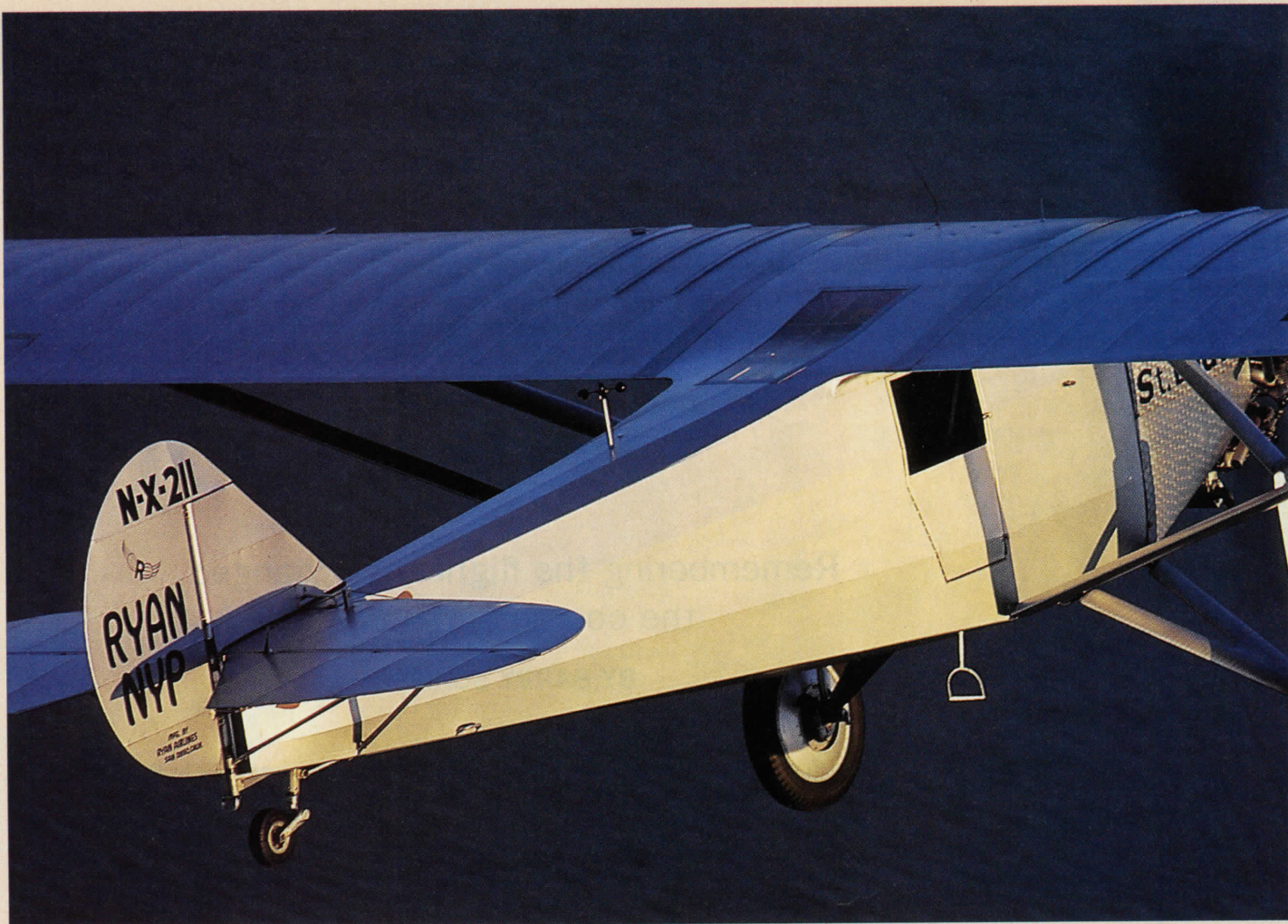
The *Spirit* was a descendant of Ryan's M-2 mail plane and was designed by Donald Hall with substantial input from Lindbergh, who wanted a single-engine monoplane because it "offered less of an opportunity for engine failure" and was "more efficient than a biplane."

Lindbergh insisted on eliminating excess weight and drag the way a surgeon uses a scalpel to remove cancer. He even trimmed unneeded edges from his charts. Every six pounds saved meant another gallon of fuel he could carry. He declined fuel gauges, preferring to keep track of consumption with his watch. And he carried neither sextant nor radio. He even removed the carburetor heater to save weight but reinstalled it after an icing encounter between San Diego and New York.

The wheels were widely separated not only to better support his overloaded craft, but also to







reduce drag by placing them outside the propeller slipstream.

Construction of the *Spirit* took 60 days and cost \$10,580. It made its maiden flight in San Diego on April 28, 1927, only 22 days before Lindbergh's historic departure from New York's Roosevelt Field. Before leaving for Paris, Lindbergh had made 32 flights in the *Spirit* totaling 27.4 hours that included a transcontinental speed record of 21 hours and 21 minutes.

George Daubner, chief pilot for EAA's Volunteer Flying Program, checked me out in the replica. He explained that there are some differences between it and the original. Lindbergh's *Spirit* was powered by a 223-horsepower, nine-cylinder Wright Whirlwind J-5C radial engine turning a Hamilton, ground-adjustable propeller. The replica has a 220-hp, seven-cylinder Continental R-670 because this engine is more reliable and parts are more readily available. The replica also makes use of an electrical system, avionics, and a starter.

Lindbergh's airplane had five fuel tanks, three in the wings and two in the

cabin ahead of the cockpit and aft of the 80-quart oil tank. He developed this arrangement and willingly sacrificed forward visibility because he did not relish the thought of being sandwiched between the engine and a rear fuselage tank during a crash landing. He also wanted the fuselage tank on the *Spirit's* center of gravity so that trim changes and the resultant drag increases would be held to a minimum. Two independent fuel systems fed the engine. During his flight, he switched tanks hourly. The replica has two fuel tanks with a capacity of 106 gallons and two sight gauges.

Because the replica does not have fuel tanks in front of the "Lindbergh seat," there is room for a second pilot to sit in front and see through small windows that are revealed when the burnished aluminum panels are removed. This is where Daubner sat during my checkout. I sat in the rear seat and noted with dismay that I could not see through the front windows because Daubner was in the way. This made flying from the rear seat a realistic simulation of what it must have been like for Lindbergh.

Taxiing was easier than it was in the original. The replica has brakes and a fully castoring tailwheel while the original *Spirit* had a tail skid and no brakes. The airports in Lindbergh's day were usually large fields that allowed landing in any direction, thus eliminating the need for crosswind operations. Taxiing the replica required S-turning and the neck of a giraffe to see where I was going.

Lindbergh's takeoff from the muddy, rain-soaked runway at Roosevelt Field was extremely hazardous and was all the more challenging because he had increased the pitch angle of the ground-adjustable Hamilton propeller to improve cruise performance, which prolonged the takeoff roll.

Lightly loaded as we were during my checkout, the tail came up early in the roll, and I was relieved that taking off in the *Spirit* using only peripheral vision was not difficult.

Although optimum climb and glide speeds were never determined for either the original or the replica, Daubner advised that 70 to 75 mph "seems to work pretty well."



## 75th Anniversary

ing 32 flights in the *Spirit*). Revealing the young man's attitude as he set off on his quest, Will Rogers noted, "A slim, tall, bashful, smiling American boy is somewhere over the middle of the Atlantic Ocean, where no lone human being has ever before ventured," while Lindbergh himself reflected, "A certain amount of danger is essential to the quality of life."

Although the front seat of the replica is equipped with standard instrumentation, Lindbergh flew instruments using only a turn indicator, a bubble-type inclinometer, an airspeed indicator, and an altimeter mounted on a plywood panel. He also had an earth-inductor compass, indicated by small anemometer-like cups spinning about a mast atop the rear fuselage.

The *Spirit* was given a huge wing, 66 feet of span and 7 of chord, to lift the 450-gallon fuel load. This was 10 feet longer than the M-2's wing and increased roll damping dramatically. Lindbergh noted,

"The wing drops slowly. The ailerons on the *Spirit* aren't as [effective] as those on the standard Ryan. Hall made them short to avoid overstressing the wing under full-load conditions. It's good enough for a long-range airplane."

I found the ailerons heavy, relatively unresponsive, and they created considerable adverse yaw. It helped to have a well-developed forearm and responsive feet.

The control stick was as long as a baseball bat—too tall, I thought, and I tended to grip it low. As my first flight wore on, however, I noticed that my right hand kept inching higher on the stick to gain the leverage needed to combat large control forces.

Considering the larger wing, Hall was dissatisfied with the stability that the small tail surfaces of the M-2 would provide. Larger surfaces would improve stability but increase drag and production time. Lindbergh opted to retain the smaller tail surfaces: "It's clear that sta-

The only way to see ahead in flight was to S-turn while peering out a side window or to boot a rudder pedal. The wing has no dihedral and is so flat that the airplane skids easily toward one side or the other. Lindbergh did not have to worry much about a midair collision in 1927, especially over the Atlantic. Frank Tallman flew a replica for the movie *The Spirit of St. Louis* and said that the airplane "is as blind as a nuclear sub under a polar icepack."

The original *Spirit* was equipped with a periscope that extended from the left side of the fuselage through which Lindbergh could see ahead during flight but he probably could not have used it effectively during takeoff or landing.

There is an aura about this airplane. You cannot fly it without drifting into thoughts of yesteryear and trying to imagine what it was like to occupy that seat over the Atlantic in 1927. It is like flying through the pages of history.

When Lindbergh began tracking along the 3,610-sm, great-circle route to Paris, he was only 25 years old and had logged fewer than 1,800 hours (includ-



The replica is the second one built by EAA. There are differences between this aircraft and the original, but the aura of the early days of flight remains the same.



## SPECSHEET

**Ryan NYP**  
**The Spirit of St. Louis**  
**Original cost (1927): \$10,580**

### New York-to-Paris Statistics

Distance .....3,610 sm  
 Local departure time .....  
 .....7:52 a.m., May 20, 1927  
 Local arrival time .....  
 .....10:22 p.m., May 21, 1927  
 Time en route.....33 hr 30 min  
 Average groundspeed .....107.8 mph  
 Fuel consumed .....365 gal  
 Fuel remaining .....85 gal  
 Average fuel consumption.....10.9 gph  
 Oil consumed.....22 qt  
 Oil remaining .....58 qt

### Specifications

Powerplant .....Wright Whirlwind J-5C  
 (Serial No. 7331)  
 Max. allowable power...237 hp @ 1,950 rpm  
 Rated power.....223 hp @ 1,800 rpm  
 Propeller .....Standard Steel Propeller Inc.  
 .....Ground adjustable only, 8 ft 9 in  
 Length.....27 ft 8 in  
 Height .....9 ft 10 in  
 Wingspan .....46 ft  
 Chord .....7 ft  
 Wing area .....319 sq ft  
 Wing loading .....16.5 lb/sq ft  
 Power loading (rated) .....23.6 lb/hp  
 Wing aspect ratio .....6.6  
 Wing incidence .....0 degrees  
 Wing dihedral .....0 degrees  
 Wing airfoil .....Clark Y  
 Seats (wicker) .....1  
 Cabin length .....3 ft 2 in  
 Cabin height (average).....3 ft 11 in  
 Cabin width (average) .....2 ft 8 in  
 Empty weight .....2,150 lb  
 Max. gross weight .....5,250 lb  
 Max. useful load .....3,100 lb  
 Max. payload w/full fuel.....210 lb  
 Fuel capacity .....450 gal  
 Oil capacity .....80 qt  
 Baggage capacity .....40 lb  
 (Note: The no-lead Amoco fuel and the oil weighed 6.11 and 7.0 lb/gal, respectively.)

### Performance

Takeoff distance, ground roll .....2,500 ft  
 Takeoff distance over 50-ft obstacle...Unknown  
 Rate of climb (sea level) .....Marginal  
 Max level speed (sea level) .....129 mph  
 Max range (begin/end cruise speed) .....  
 .....4,650 sm (95 mph/75 mph)  
 Fuel consumption (begin/end of flight) .....  
 .....13.6 gph/6.3 gph  
 Minimum airspeed (maximum/minimum fuel) .....  
 .....72 mph/48 mph  
 Service ceiling .....Unknown  
 Landing distance over 50-ft obstacle..Unknown  
 Landing distance, ground roll .....Unknown

All specifications and performance data are based on the calculations of designer Donald Hall and unless otherwise specified are based on the conditions that existed during Lindbergh's takeoff from New York on May 20, 1927. Some performance data and many of the limiting and recommended airspeeds normally found in this space either were never determined or cannot be located.



bility is not a strong point with the *Spirit*, but we didn't design the plane for stability. We decided to use the standard tail surfaces to...gain...range."

Lindbergh was a master of under-statement. The aircraft is dynamically and statically unstable. "It is one of the worst flying airplanes I've ever flown," said Robert "Hoot" Gibson, former space shuttle commander. "It's a challenge to keep the airplane going straight and make it do what you want."

"The *Spirit* is too unstable to fly well on instruments. It is high-strung, and balanced on a pinpoint. If I relax pressure on stick or rudder for an instant, the nose veers off course," commented Lindbergh.

You can say that again. After entering a normal turn and neutralizing the controls, I noticed that although the airplane remained banked, the nose suddenly stopped moving across the horizon, and I was in a perfect sideslip.

The rudder and elevator were easier to operate but required constant attention to keep the aircraft on an even keel. The nose hunted left and right, and porpoised like a whale. The *Spirit* is a high-workload airplane that never allows you to relax.

Lindbergh was "thankful we didn't make the *Spirit* stable. The very instability which makes it difficult to fly blind or hold an accurate course at night now guards me against excessive errors." He credited the instability with keeping him awake and alive.

You can fly it with fingertips in smooth air, but the slightest zephyr causes the *Spirit* to take off on its own. Get a grip, because you'll need it. The

*Spirit* is a handful. Despite its idiosyncrasies and rude manners, I nevertheless discovered a growing affection and appreciation for the machine.

Lindbergh carried a driftmeter that could be placed into brackets on one window to determine wind drift at sunrise and mid-ocean. But he never used it because of instability and fatigue. "So simple. So impossible. Why did I ever think I could fly the *Spirit* straight while I lean out to look into the eyepiece of a drift indicator?" said Lindbergh.

Using windows that were stored behind him would have smoothed airflow along the fuselage, but he never used them either: "They'd interfere with the crystal clarity of communion with water, land, and sky [and] insulate me from a strength I'll need before my flight is done, and which, for some reason, cannot penetrate their thin transparency. Fumes drift through the fuselage, and drift away," said Lindbergh.

The wicker porch seat is hard and uncomfortable. Lindbergh used an air cushion: "It's been expanding as I climb to altitude. I open the valve for a few seconds, to lower my position and make sure the fabric won't burst."

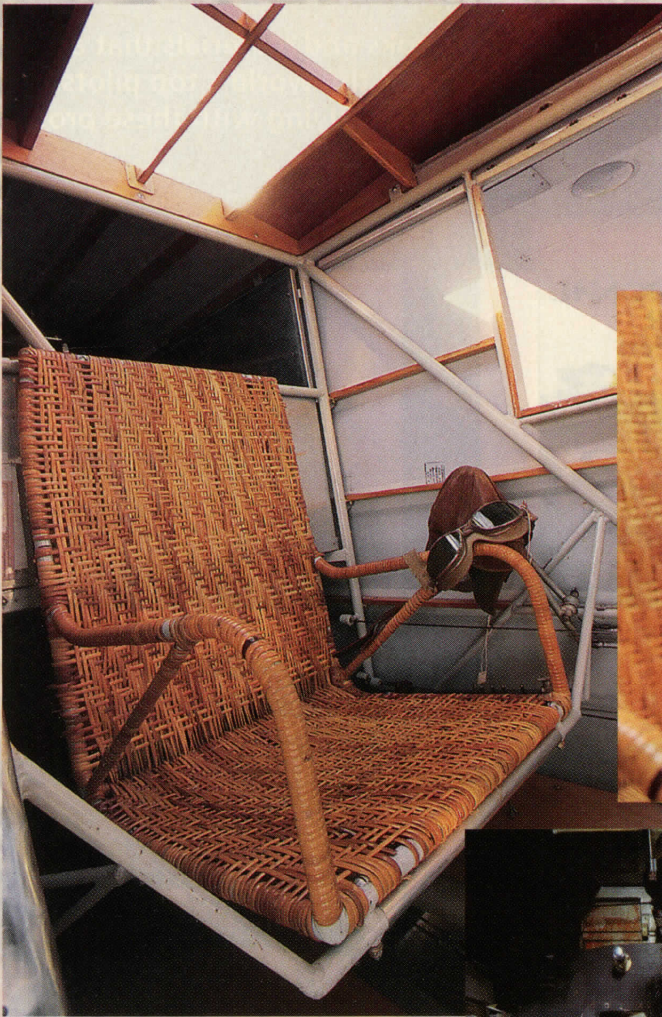
Back over the Wisconsin fields, I found the rudder pedals were too close and prevented me from stretching my legs. It must have been worse for Lindbergh, who was taller. In fact, it became increasingly difficult for me to comprehend how Lindbergh could take off after being awake for 24 hours and then fly this airplane into the unknown for 33 and a half hours.

The huge wing was designed to carry such a heavy load that it was difficult to



## 75th Anniversary

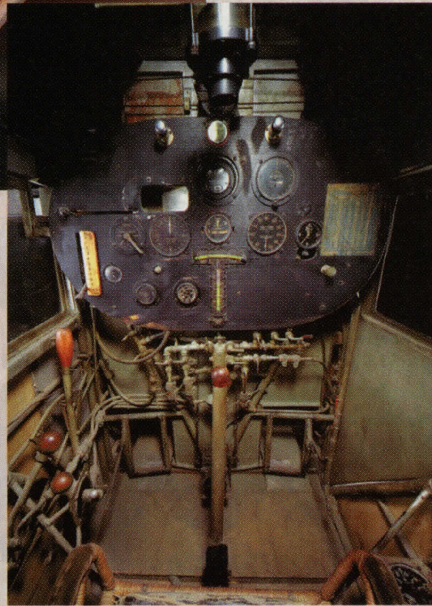
Lindbergh used an air cushion on the uncomfortable wicker seat (left). The simple control stick and rudimentary panel (below) did little to make flying easier.



stall in our lightly loaded configuration. When the nose dropped slowly at 35 mph, it took only the slightest release of back-pressure to recover.

The only way to keep the runway in sight during a landing approach was to make a slipping turn from base to final and hold the slip until just before touchdown. In the meantime, I craned my head to one side and into the relative wind blowing through the open side window. During the flare for either a three-point or wheel landing, there was only my limited peripheral vision upon which to rely, which Lindbergh also remarked upon: "I slip down on the final glide, nose high and left wing low—that gives me perfect forward vision. Then I straighten out just before my wheels touch."

Wheel landings seemed easier than full-stall landings, but I didn't always know what type of landing to expect until it happened. Daubner added that "you have to be willing to take what you get." The wheels and fuselage rumbled on rollout, and I prayed that nothing got in my way because there was no way that I was going to see and avoid it.



"He took off as an unknown boy from rural Minnesota and landed 33 and a half hours later [six and one-half hours less than Lindbergh had anticipated] as the most famous man on Earth and sent the world into an unprecedented frenzy," claimed *National Geographic* magazine.

Lindbergh's affection for the airplane lingers today. "The *Spirit of St. Louis* is a wonderful plane. It's like a living creature, gliding along smoothly, happily, as though a successful flight means as much to it as to me, as though we

shared our experiences together, each feeling beauty, life, and death as keenly, each dependent on the other's loyalty. We have made this flight across the ocean, not I or it," he said.

Although a single-place airplane, Lindbergh managed 21 passenger flights that included carrying Henry Ford and his mother, Evangeline Lindbergh. The *Spirit's* final and 174th flight was made on April 4, 1928, after accumulating 489 hours of flight time.

The *Spirit of St. Louis* was donated to the Smithsonian Institution in 1928 and has been on permanent display ever since. It is now in the Smithsonian's National Air and Space Museum.

In her book, *Slim*, Slim Keith—wife of motion

picture producer Leland Hayward—observed Lindbergh sitting in the cockpit of the *Spirit* in the Smithsonian prior to filming Hayward's movie, *The Spirit of St. Louis*. "Lindbergh had noticed that the primer was out of place, said to himself that 'it shouldn't be this way,' and pushed the knob in with a noticeably tender caress of a gesture."

Paraphrasing aviation writer Jack Cox, "It is difficult for us, 75 years and a cultural lifetime removed from the event, to fathom the impact of Lindbergh's flight. Nothing else in our lifetime, including the first trip to the moon, so profoundly impressed the world. Nothing so dramatically and so instantly changed the course of history."

Lunar astronauts also are in awe of what Lindbergh accomplished. Neil Armstrong said, "[He] flew through miserable weather and stretched the science and art of navigation to find Le Bourget. We could see our destination throughout our entire voyage."

Similar to questions posed to astronauts, England's King George asked in 1927, "Now tell me, Captain Lindbergh. There is one thing I long to know. How did you pee?"

ACPA

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