America’s History

In 1914 Rodman Wannamaker (of the department store fame) contracted Glenn Curtiss to build an aircraft that was capable of flying across the Atlantic Ocean. Not even a decade had passed since Glenn Curtiss and the Aerial Experiment Association (AEA) had flown the June Bug near Hammondsport, New York. Aviation had made amazing strides in the six years since the flight of the June Bug, but Wannamaker’s proposed flight seemed more “Jules Verne” than practical. Still, the promise of aviation led most to believe that the flight would take place; it was simply a matter of when the technology would be up to the task.

To celebrate 100 years of peace between the United States and England, in 1913 The London Daily Mail newspaper offered a prize of $50,000 for the first aerial crossing of the Atlantic between the two countries. To further commemorate the strong bonds between England and the United States, there was to be both a British and an American pilot.

It only took 90 days to turn out the Curtiss model H America, the world’s first multi-engine flying boat. With its 72-foot upper wing span and gross weight of more than 5,000 pounds, this was, up to that point, the largest aircraft Curtiss had built. It also incorporated many design features that stayed in use throughout flying-boat production in the coming years. The innovations included the stepped hull, step vents, wing floats, sponsons, provisions for in-flight maintenance, an enclosed cockpit, and even provisions for an in-cabin mattress that would allow a crew-member to rest.

The aircraft was powered by two 90-hp V-8 OX-5 engines and was designed to cruise at 55 to 60 mph. The instrument panel consisted of a board that ran across the aircraft in front of the cockpit, just below the windscreen. Installed on the board were an airspeed indicator, a special
compass that was built just for the occasion, and an altimeter. Also, just above the instrument board, mounted just below the front windshield, was a curved glass tube with a bubble that acted as a wings-level indicator. Navigation was done by compass and was to be assisted by a picket line of British and American naval destroyers stationed every 100 miles along their route of flight. The ships could also render rescue assistance if needed. The plan was to fly America from Trepassey Bay, Newfoundland, southeast to Funchal, in the Portuguese Madeira islands, and then north to Plymouth, England.

Despite the remarkable speed with which America was built (it was first test flown on June 28, 1914), testing continued throughout the next two months during the summer of 1914, as the big biplane needed considerable tweaking to gain the performance needed to make the flight. By the time testing was concluded, fate would intervene. The June 28 assassination of Austro-Hungarian Archduke Franz Ferdinand set in motion a series of war declarations that culminated in early August, heralding the beginning of what would be a four-year global conflict. World War I broke out two weeks before the transatlantic flight was to be attempted. Since both countries had to recall their ships, the flight was postponed and eventually cancelled. Instead of achieving the fame and fortune of the first aircraft to fly across the Atlantic Ocean, America would serve aviation development in another way. It would be the very first of a long line of great multi-engine flying boats built by many manufacturers over the next two decades.

America and its backup aircraft, another H-4, were shipped to England (on the Mauritania) and used for flight training and surveillance of the North Sea. Over the next two years, 60 more were built. These were bigger with more powerful engines. From this early flying-boat design came others. They got big-
ger, faster, and more complex, but still used all the basic innovations that Glenn Curtiss designed in 1914.

The Replica

As part of their continuing work to honor and commemorate the accomplishments of one of aviation’s pioneers, the volunteers of the Glenn H. Curtiss Museum in Hammondsport built a reproduction of *America*. The project took a bit longer to build, covering a period of three years.

*After construction in the restoration shop of the Glenn H. Curtiss Museum in Hammondsport, New York, the wings are installed on the grounds of the Mercury Aircraft Corporation.*
The planking of the inverted hull of the H-4 closely followed high-speed boat construction.

Another view of the original America during the construction.

The instrument “panel” consisted of little more than a board across the cockpit, and an adapted marine compass.

A pair of special propellers was tested on the H-4 as the designers and test pilots tried to coax more thrust out of the V-8 Curtiss engines.

Watching the work being done on the huge aircraft became quite an attraction for visitors to the museum.
Only a few blueprints were available. The available drawings documented certain wing sections, the flight controls, stabilizers, struts, and some fittings. To aid in filling in the missing knowledge, there were numerous construction photographs and even patent drawings. The photographs were enlarged, which allowed very accurate dimensions to be determined. Studying the old photographs of the aircraft under construction in the Curtiss plant became a daily ritual for the volunteers. Thanks to the excellent resolution of the slow film emulsions of that time, amazing details were discovered in this manner.

Each time a photograph was studied, some new detail was noticed. Even a large electric drill hanging on a post in one photograph that was viewed dozens of times wasn’t noticed for more than a year.

Construction of the replica was done using most of the same materials and techniques that Curtiss used, such as copper rivets and slot-head brass screws (the Phillips head screw wouldn’t be invented for at least 15 years). There were a few liberties taken with history in the interest of safety: covering with a fire-resistant material rather than varnished red silk, two-part epoxy glue instead of animal glue, and adding trim tabs to unload the large flight controls (trim tabs and balanced flight controls hadn’t been invented yet either). A big improvement from earlier Curtiss airplanes was the turnbuckle (a Curtiss invention), to adjust the tension on the flying and landing wires. On previous airplanes, bicycle spokes were part of the bracing wires, which meant rigging the airplane with a bicycle spoke wrench.

As the airplane came together, it was moved out of the restoration shop onto the main floor. Watching the work being done on the huge aircraft became quite an attraction for visitors to the museum. The final gross weight came out to 4,100 pounds. This gave the aircraft a wing-area-to-weight ratio similar to a Piper J-3 Cub.

In late summer of 2007 it became clear that our engines, which were sent out for overhaul, would not be ready for the planned christening and first flight in September. With only weeks to go, two normally turning 90-hp Curtiss OX-5 engines and mismatched props were fitted.

It is worthy to note here that the original America had counter-rotating propellers that were specially carved for the airplane by Dr. Charles Olmstead of Buffalo. These rotated just the opposite from modern counter-rotating twin-engine aircraft. America’s props had the down blade sweeping outboard, and the blades coming up were inboard. This not only eliminated P-factor, but gave the horizontal stabilizer, which was a positive airfoil, an up draft, or free lift as the designers saw it.

The aircraft was disassembled and moved out of the museum to the water’s edge of Keuka Lake, where it was reassembled and readied for sea trials. The OX-5 engines were not strong enough to get the aircraft on the step, but would do for taxi tests and demonstrations. America was officially christened and taxi demonstrations were held, but flight tests would have to wait until the freshly overhauled engines and props were completed.

The year 2008 was a different story. With two newly overhauled counter-rotating, 100-hp V-8 Curtiss OXX-6 engines and matching propellers, now mounted in the center section, America was again disassembled and transported to the waters of Keuka Lake.

On September 7, 2008, the first sea trials of the season began. The engines were started and warmed up. The aircraft then was turned into the wind and the throttles advanced for the first-step taxi tests. Would the engines be powerful enough to get the aircraft on the step? The question was quickly answered. Eleven seconds later, America lifted sprightly from the surface of Keuka Lake. With no pitch change, the aircraft transited from displacement directly to flight. Unlike most seaplanes, which need time to accelerate to flying speed once they climb on the step, America, with its low stall speed (38 mph) and 46-foot lower wing riding in ground effect, is ready to fly as soon as it reaches the step. Being out of trim, it took all of our strength holding forward pressure on the control yoke just to get the aircraft safely back on the water. We then taxied back to base, and America was given a detailed inspection.

After that first unintentional flight, we knew America would fly, but would it be stable and controllable? After making adjustments to
the horizontal elevator trim, the next day we made the first flight tests, flying America four times. Aside from both of us getting some landings, we found out a lot about the handling characteristics.

At first the ailerons were very stiff and barely responsive, so turns were avoided. Since they are each 17 feet long, we expected some resistance, but not quite this much! Later, we repaired a jammed pulley, which fixed that problem.

The rudder was extremely heavy. It took all of our strength just to move the ball out of the center just a fraction. Differential thrust and rudder trim had much more effect. The elevators were somewhat heavy, but were very manageable with the trim. When we leveled off on the first flight without reducing power, we soon found ourselves indicating 80 mph, which we both agreed was too fast. We found that it took very little power in cruise to maintain 60 to 65 mph, which we used for our cruising speed on all later flights. Approaches were made at 50 to 55 mph, during which the engines were throttled back to just above idle. At about 5 feet off the surface, the throttles were reduced to idle and the aircraft slowed to about 45 mph, where it would softly settle onto the water. It is the smoothest-landing seaplane either one of us has ever flown. Over all, America performed very well.

The preliminary flight tests showed it to be a large, very stable aircraft that takes some strength to maneuver. We now felt ready for the big show in six days.

On September 13, 2008, during the Annual Seaplane Homecoming in Hammondsport, America was started and taxied out. After warming up the engines, the power was applied. The crowd cheered as America lifted off the waters of Keuka Lake. These were the same waters that Glenn Curtiss had lifted the original America from 94 years earlier. We leveled off at about 200 feet (we had a nonsensitive altimeter) and flew up the east side of the lake. After about 2 miles, we lowered the left wing and turned America for the first time. We made a large sweeping turn and headed back to the crowd, where we repeated the maneuver around the end of the lake. We turned a third time back toward Hammondsport and started our landing approach. It was a long, shallow approach at 55 mph. Just above the surface the throttles were retarded, and America slipped gracefully onto the water.

That day the people of Hammondsport watched and listened as a twin OX-powered biplane flew overhead, repeating an event that happened nearly a century ago. For us it was a true honor and the thrill of a lifetime to fly the same type of aircraft that Glenn Curtiss flew in the same place he flew it. The Curtiss-Wanamaker H-4 America was the aircraft that set the initial benchmark for the coming decades of seaplane development. Come see it at the Glenn H. Curtiss Museum.

Glenn H. Curtiss Museum
8419 State Route 54
Hammondsport, NY 14840
607-569-2160
www.GlennHCurtissMuseum.org

Success! The replica Curtiss H-4 America flew beautifully the first time on September 7, 2008, and again for the assembled crowds on September 13.