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100 years ago, in 1918, during the First World War, the Thomas-Morse factory in Ithaca, New York produced hundreds of single-seat advanced trainers for the U.S. Army. They were sent to training fields all over the country and came to be known as the “Tommy” by the cadets who flew them. In 2010, one of those Tommies came back to Ithaca, and this fall, on September 29 (weather date is the 30th), it will fly again for the first time in 80 years in a historic event that will be open to the public.

The Thomas-Morse S-4 Scout was a wood-framed, fabric-covered biplane powered by a rotary engine of 80 to 100 hp that swung an eight-foot wooden propeller at about 1,200 rpm. Designed in 1916 and first flown as a prototype in 1917, it was similar to airplanes that were fighting over the Western Front in Europe at the time. Cadets in the U.S. Army Signal Corps learned to fly in the two-seat Curtiss Jenny, but the Tommy gave them experience in a much more fighter-like airplane before they shipped off to France. It also taught them to fly behind a rotary engine, a common type in Europe. Rotaries had their own operating quirks, and because the entire engine spun with the propeller, it imparted gyroscopic forces to the airplane that had to be mastered.

The story of our Tommy restoration began 16 years ago at a meeting at the Tompkins County Airport, where someone said, “If there’s one Tommy Scout left in the world, shouldn’t it be here in Ithaca where it was made?” That question soon led to the creation of the Ithaca Aviation Heritage Foundation (IAHF).

Because so few original aircraft still existed, our prospects of getting one seemed poor, so we started building new wings ourselves. Then, in 2010, Dr. William N. Thibault of Newport Beach, California generously donated his original Thomas-Morse Scout to our Foundation. We were tremendously excited to have a real Tommy and it quickly led us to a series of projects. First, we had to finish building the wings. We were determined to restore the airplane to flying condition, and the original wings wouldn’t do. Second, we had to strip the covering off the fuselage and figure out what lay ahead of us. Finally, we wanted to know the history of our new machine. There was no manufacturer’s plate, and it had been re-covered, so the number painted on the fabric was suspect. We also discovered that the airplane wasn’t quite what it appeared to be.

There were two models of the Thomas-Morse S-4 Scout, beginning with the S-4B in 1917. The Army ordered 100 examples of the machine, which became the first big contract for the Thomas-Morse Corporation. Following Army requests, the design was modified to the S-4C, of which about 500 were produced. Soon after acquiring our example we realized that what we thought was an S-4C was actually an S-4B model that had “C” wings and elevators grafted on. It was an exciting discovery, because it meant that our Tommy was part of the very first order received from the Army. However, it also meant converting everything to S-4B construction. This was problematic, as drawings only exist for the S-4C. Fortunately, the Old Rhinebeck Aerodrome has the only complete S-4B in the world, and they kindly let us examine and measure it. The story of how we converted our Tommy to its original configuration, the history we learned about our airplane, and what we discovered about differences between the B and C models, are told in back issues of WWI Aero (Nos. 214, 215, and 226).

The following series of photos details work performed on the machine to date.
Examples of the Thomas-Morse S-4B (above) and S-4C. There were a number of differences between the two types, perhaps the most obvious of which is the distinctively different shapes of the aileron and elevator surfaces. On the S-4B, the trailing edges are endowed with large curves, while those on the S-4C were straight, resulting in a significantly reduced total area. The S-4B also employed the 100 hp Gnome rotary engine, while the C type was powered mainly with the 80 hp Le Rhône. In addition, the S-4B utilized cables to actuate the ailerons rather than the torque tubes seen on the S-4C and also lacked a gun mount, which became standard on the later model.
Above Left: The Morse Chain Corporation merged with the Thomas Aircraft Company in early 1917, and we learned that the original buildings were still standing, including the house where the designer, B.D. Thomas, lived at the time. Emerson Power Transmission initially allowed us to use the Morse Chain factory for our project, and Don Funke and Bill Klein are seen here in the old woodworking shop, beginning wing construction where the Scouts originally came together using machine tools on inventory 100 years ago. Above Right: Our Tommy photographed at the Hangar Theater in Ithaca with a newly made lower wing. Research concluded that the aircraft was the 91st S-4B manufactured for the first order of 100 examples purchased by the U.S. Army Signal Corps. The fuselage bears Signal Corps number A-4358, although production numbers found in two locations on the machine identify it as 4366.

The Scout’s fuselage seen after the fabric was stripped off in 2012. In the process, remnants of paint were discovered, suggesting that it was painted red at one time. Records show that the aircraft was re-covered in 1928, and it is believed that the color was added at that time by then owner Roy Larson.
Steve Umscheid, Roger Pellerin, and Jim Rundle seen with fuselage parts in 2012. We dismantled the airplane right down to sticks, metal fittings, turnbuckles and wires. We used all the original parts we could, consistent with flight safety. All metal fittings were stripped, soda-blasted, inspected, and re-finished. Many parts, some unique to the B model, were designed based on measurements from the Rhinebeck Scout and fabricated with generous help from volunteers and local businesses. All wood parts were sanded and re-varnished, or replaced if they showed signs of rot. All cables that braced the wings and operated control surfaces were replaced. Most of the turnbuckles were in good shape and were reused. Original cockpit instruments were also acquired and restored.

An S-4B type aileron constructed using measurements acquired from Old Rhinebeck’s Tommy. The Rhinebeck example also helped us determine the arrangement of the pulleys to actuate the surfaces, as no photos or drawings of the mechanism could be located at the time.
Don Funke trues up the cabane struts in 2015. The configuration of the struts differed depending on the type of engine used. As the Le Rhône is lighter than the Gnome, aircraft using the engine had their upper wing relocated three inches aft, requiring longer cabane struts and shorter interplane struts. The cabanes can also be seen tilting slightly rearward on Le Rhône-powered Tommies. Our S-4B and Old Rhinebeck’s example employ the modified struts, as are both powered with 80 hp Le Rhône rotaries.

Left: The original Le Rhône rotary engine was in good shape, but needed restoration. This engine (Tips & Smith #34544) replaced the original, but less reliable, 100 hp Gnome in our machine sometime before 1929. The fuselage is seen here during Ithaca Aviation Heritage Foundation’s open house in October 2015, as Don Funke and Matt Quinney prepare for one of the first engine tests in over 75 years.

Centerfold: The Scout’s completed framework photographed at Taughannock Aviation at Tompkins County Airport in 2016. The large “snorkel” protruding from the fuselage between the cabane struts is believed to be a remnant the fuel system for the original Gnome engine. As the Gnome required a pressurized tank, the hollow streamlined tube was apparently used to provide a chamber of pressurized air when the tank was full. Although the first 50 S-4C types were powered by Gnomes, this feature was absent due to a redesigned tank.
Above: The Tommy seen in the shop at the airport in 2017, newly covered and almost complete. Many of the sheet aluminum parts were replaced, including the firewall, and a new propeller crafted to original specifications by Sensenich was substituted for the original. Several departures were made from the original machine, including the use of modern West System epoxy for all gluing and varnishing, the addition of a safety harness for the pilot and a few safety modifications to the tailskid and elevator control systems. After an FAA inspector certified the structural work, modern synthetic fabric and paint generously donated by Poly-Fiber was applied. Our prospective pilot, Ken Cassens, also inspected our work several times along the way, and provided expert advice.

Our Tommy is now as close to factory-fresh, 1918 condition as we could make it while remaining consistent with 21st century safety standards. The sights and sounds of an original rotary engine powering a 100-year-old airplane will be a thrill for everyone who loves early aircraft and for the generous donors and volunteers who have made it possible. The fact that the Tommy was locally built also makes it a precious part of the rich aviation heritage of the Finger Lakes region of upstate New York. Afterward the airplane will be put on exhibit at the forthcoming Tompkins Center for History and Culture in downtown Ithaca.