PHOTOGRAPHY BY **TYSON RININGER**

POETRY AND POWER

TWO STORIED AIR SHOW PLANES, ONE COMMON CONNECTION

BY BETH E. STANTON

What do a from-the-ground-up restoration of a celebrated air show duo's airplane and a jet-powered Waco built from scratch have in common? Pilot, aircraft technician, and builder Dell Coller. Since grade school, Dell's goal has been to build airplanes. "I would get ahold of the *Sport Aviation* magazine and immediately flip to the pages showing members' newly completed aircraft." His grandfather was a World War II Spitfire pilot and his father a pilot and air traffic controller. When Dell was 16, he bought a Cessna 150 with some friends and learned to fly. He joined the Air National Guard, was crew chief on a C-130 Hercules, and went on to become a successful business jet pilot. While working full time, he built and restored several aircraft. He discovered that his passion lay in building and flying aerobatic airplanes. He built a One Design aerobatic airplane and found himself doing more of this type of work. Dell decided to forge a new career and focus his energy and skills on aircraft improvements and custom builds, so he founded Dell Aero Speed specialty aircraft service.

THE FRENCH CONNECTION CAP 10B

For a plane to fly well, it must be beautiful.
—Marcel Dassault

The Mudry CAP 10 is one of the most successful two-seat training aerobatic aircraft in the world. Avions Mudry, located in Bernay, France, began manufacturing the airplane in 1970, and it's been flown by two generations of aerobatic champions. Daniel Héligoin and Montaine Mallet met while working for Avions Mudry. Daniel, a former French air force fighter pilot and French national aerobatic champion, and Montaine, an aeronautical engineer, were friends at first but eventually became partners in career and marriage. In 1973, they came to

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the United States to promote and sell the CAP 10. They operated aerobatic flight schools in New York and Florida, instructing and demonstrating in the CAP 10. Daniel flew air shows while Montaine taught aerobatics and flew in IAC competitions. Daniel's passion was formation aerobatics. He trained Montaine as lead pilot, and in 1973 the duo flew their first of countless air shows spanning almost 30 years.

The acclaimed husband and wife team became known as the French Connection. Their signature air show routine was flown in astonishingly tight formation, canopy to canopy. As their aerial ballet evolved, they added musical choreography, poetry narration, wingtip smoke, and specialty maneuvers like the Double Heart, Formation Snap Roll, and the Mirror Image. The couple performed all over the world and received the Bill Barber Award for Showmanship, the Rolly Cole Memorial Award, and the Art Scholl Showmanship Award.

YES, IT'S ONE OF THEIR AIRPLANES

The world knew Daniel Héligoin and Montaine Mallet as the French Connection. When they died, the world lost two of its more interesting characters and most outstanding pilots.—Budd Davisson

The aviation community was devastated when Daniel and Montaine perished in a training accident in May 2000. Tom Poberezny described their contributions to aviation. "They touched so many people through the years with their warmth and their willingness to share the world of flight. They were professionals and entertainers of the highest degree, who had marked their 25th year of performing at EAA AirVenture in 1999. They were extremely proud of that fact, and we are proud to have been associated with them for these many years."

Tom Joyce and his girlfriend, Kelly Root, are based at KILG, New Castle Airport in Delaware, where they are building a Pitts Model 12. Since they had never flown a tailwheel or aerobatic airplane, they decided to find a airplane to prepare them for flying a Pitts. They looked at several different options and came across a 1978 CAP 10B and purchased it. Olivier Langeard, a hangar neighbor originally from France, recognized Tom and Kelly's airplane in the book *Flight Fantastic: The Illustrated History of Aerobatics*. The French Connection used multiple airplanes over the span of their career. They sometimes kept airplanes on both U.S. coasts to minimize cross-country ferrying during the air show season. Olivier saw an airplane in the book with the French Connection lettering and tail number N780S, the same as Tom and Kelly's airplane. When Tom discovered the history of the airplane he decided to investigate further. He learned Gene Soucy also previously owned the airplane. The couple had a slick paint job picked out, but they scratched that plan and decided that it absolutely had to stay in the French Connection configuration. Dell explained that people get confused sometimes. "They say, 'Both those airplanes were lost; this can't be one of the actual ones,' but it is in fact one of the several CAP 10 airplanes they flew for a period of time," he said. "You can see in a number of videos, N780S, serial No. 87, flying in the air shows."

BRINGING IT BACK

I have always had an admiration for French aviation, their aircraft designs in particular. This style is quite evident in the CAP 10. To have the opportunity to restore one of the actual French Connection airplanes made the project even more special.—Dell Coller

The CAP 10 came to Dell's shop in Boise, Idaho, in November of 2014 to undergo a complete restoration. Since the airplane had been sitting for a number of years, it was unknown what it was going to look like once it was opened up. It turned out that everything was in pretty good shape. The scope of the work included complete inspection, fabric, paint, new wiring, and updated instrument panel. Dell said, "There wasn't a part of the airplane that we didn't touch. We anticipated the engine would be fine since it was not high time. In the course of inspecting it we found some internal corrosion, so we decided to inspect and replace as necessary. We removed the engine and sent it to a shop. It wasn't a full overhaul, but they replaced a number of parts on the engine due to corrosion."

Some minor repairs were made to the wood structure. The canopy and windscreen did not need to be replaced, but Dell said, "We spent a lot of time sanding and buffing to get 30 years of scratches out!" The original

Upper left: Hartzell spinner and R-985 of the Jet Waco. Upper right: CAP 10B spinner and hand-lettered serial number. Bottom: CAP 10B wingtip light.

PHOTOGRAPHY BY **CRAIG VANDER KOLK** AND **DENNIS BIELA**

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JET WACO

DIMENSIONS

Length	26 feet 6 inches
Wingspan	30 feet 3 inches
Wing area	227 feet

WEIGHTS AND LOADING

Gross weight (normal flight)	4,000 pounds
Gross weight (aerobatic flight)	4,000 pounds
Empty weight	2,959 pounds
Useful load (normal flight)	1,041 pounds
Useful load (aerobatic flight)	1,041 pounds
Wing loading	17.62 pounds

PERFORMANCE

Maximum speed	250 mph
Rate of climb	10,000 fpm (approx. 100 mph vertical trajectory)
Stall speed (clean)	75 mph

ENGINE

R-985	
Fuel consumption aerobatic flight	40 gph
CJ610	
Fuel consumption aerobatic flight	280 gph

fixed-pitch propeller and fuel tanks were solid. The CAP 10 was outfitted with all new avionics including ADS-B compliance, GPS navigation, and Electronics International CGR-30 engine monitor.

Dell's favorite part of the restoration was the day the hand lettering went on the airplane. "After the French Connection were no longer flying this airplane, their logos were removed. Some of the sponsor stickers were retained, but 'French Connection Airshow' was removed," he said. "Tom and Kelly wanted it to look exactly the way it had originally, and we had a number of pictures from its air show days." Dell found a talented hand-lettering artist who was able to beautifully reproduce the lettering, placards, and French Connection script on the airplane.

The airplane was flying in June 2015, one month before AirVenture. Dell took it for some local test flights to get everything dialed in before flying cross-country to Oshkosh. The restored CAP 10 was on proud display at AirVenture 2015. Dell is pleased with the results. "We are excited to have brought this aircraft back to its original condition with the exact paint scheme and markings as when it was flying air shows." Tom and Kelly enjoy people's reaction to their French Connection CAP 10. Tom said, "We've had the airplane at different air shows, and everybody who sees the airplane says, 'Oh yes, I remember them!' People like Patty Wagstaff are so grateful to have a reminder of the team out there. I'm so glad we were able to restore it."

THE *SCREAMIN' SASQUATCH*, JACK LINK'S JET WACO

Attaching a Learjet engine to the bottom of a 1930s biplane is something you normally only do with Legos when you are a 10-year-old kid. I got to do the real thing!—Dell Coller

When John Klatt, president of John Klatt Airshows Inc., needed someone to lead his Jet Waco project, that someone was Dell Coller. When Dell first realized he was going to be involved in this project, he could hardly believe his ears. Jimmy Franklin first introduced the Jet Waco to the air show circuit in 1999. Dell remembers watching Jimmy fly his machine at the Sussex Airshow. "It was one of the coolest things I had ever seen," he said. John and Eddie Sauerman of Sauerman Aircraft Works traveled to Texas to check out the Jet Waco Taperwing project. The fuselage, truss, landing gear, 450-hp Pratt engine, engine mount, tail feathers, wings, ailerons, and control system of the classic 1929 Taperwing Waco were mostly intact. Bill Scheunemann, a previous owner, provided Eddie with 2-D CAD drawings from the initial build of the Taperwing components. From these, Eddie created a 3-D model of the airplane, and the real engineering task began. "John and I had many discussions on the expectations of the final product: appearance, performance, handling, structural requirements, and systems. John wanted the flavor of the Waco Taperwing but with modern pizazz." During the three-view development, a preliminary weight and balance study was needed. The basic aerodynamic data of the Jet Waco needed to be defined: things like aerodynamic centers of the wing cell, horizontal tail, and vertical tail, jet thrust vector. "A lot of balls thrown up in the air at one time, and all those balls had to land in the right places," Eddie said.

When it was determined that the project could be successful, John made the purchase and the serious analysis and design work began. Eddie and Dell worked closely together on the project. Eddie's role was the structural design, while Dell led the systems aspect of the project. In 2013, the aircraft began to come together in Buffalo, Minnesota. The 3-D model was used to refine locations of mass items such as 100LL tanks, Jet A tanks, smoke tanks, oil tanks, batteries, plumbing, instrumentation, electronics, pilot, the jet engine, and tail pipe combination so that weight and balance requirements were met. The placement of the CJ610 turbine jet engine was configured so that it could be removed without adversely affecting weight and balance. Fuel and smoke oil burn-off also had to be taken in consideration as most of the fuel and all of the smoke oil would be consumed in a single flight with a significant reduction of weight. The shift in CG had to be minimal so that the handling of the aircraft during the flight did not change appreciably.

The original aircraft gross weight for the Waco CTO Taperwing was 2,600 pounds, and with all the added components the final gross weight of the Jet Waco was approximately 4,000 pounds. Since this was a significant increase in weight, the 3-D model was again used to create a finite element model (FEM) of the primary structural elements. The fuselage truss required substantial modifications to carry the new loads. Numerous tubes and fittings were cut out and replaced with larger ones as defined by the finite element analysis results. Because of the need to relocate the pilot's location due to weight and balance

PHOTOGRAPHY BY **CRAIG VANDER KOLK**

requirements, the cockpit was moved aft approximately 36 inches. The vertical and horizontal tails are a completely new design. They were sized to provide positive control throughout a wide airspeed spectrum. The cockpit is thoroughly modern, incorporating an MGL Avionics iEFIS Challenger touchscreen system, integrating the engine monitoring of both powerplants and the aircraft's avionics systems.

One of the challenges of the project was finding an appropriate way to provide positive fuel to the jet engine. Dell said, "At the time, I was unable to locate an electric fuel pump that would meet our requirements. It had to have a small physical footprint, reasonable amperage draw, jet fuel compatible, and capable of flowing 300 gallons per hour. Initially I pulled from my knowledge of two very different aircraft systems. The Falcon 50 corporate jet uses pressurized air to put head pressure in the fuel tanks. Fuel will feed to the engine without an electric fuel pump running. The Yak-55 stores high-pressure air and uses this to operate pneumatic systems. I ended up using pressurized air regulated down to just a few psi to push the fuel to the jet."

FIRST FLIGHT

When there was nothing left to check, I strapped into the Jet Waco. John signaled to go ahead, as a knight would gesture to a fair maiden. I dropped the hammer on the 450 Pratt.—Eddie Sauerman, test pilot of the first Jet Waco flight

The team assembled in Coolidge, Arizona, for the test flights. Dell felt a combination of excitement and nerves. "With every first flight, there comes a moment of truth. It goes from just a collection of parts into an airplane. But it's not an airplane until it flies." The first test flights were made without the jet engine attached. Eddie kept the airplane high and close to the airport for several circuits around the pattern. A few minutes into the flight, there was a pronounced vibration, loud noise, jolt, then the vibration disappeared. Eddie knew from past experience that something had fallen off the airplane. John confirmed from the ground that the cowling had come

CAP 10B

DIMENSIONS	
Length	23 feet 5 inches
Wingspan	26 feet 5 inches
Wing area	116.8 square feet
WEIGHTS AND LOADING	
Gross weight (normal flight)	1,829 pounds
Gross weight (aerobatic flight)	1,675 pounds
Empty weight	1,200 pounds
Useful load (normal flight)	629 pounds
Useful load (aerobatic flight)	475 pounds
Wing loading	15.6 pounds per square foot
PERFORMANCE	
Maximum speed	170 mph
Cruise speed	156 mph
Range (with reserve)	600 miles
Rate of climb	1,200 fpm
Stall speed (clean)	58 mph
Stall speed (full flaps)	50 mph
ENGINE	
180-hp fuel-injected Lycoming IO-320-B2F	
Fuel consumption at 75 percent cruise	9 gph
Fuel consumption aerobatic flight	14 gph

Updated CAP 10B cockpit.

off. Eddie immediately throttled back to land. Typically, when a cowling comes off a radial engine, the propeller is damaged. As he slowed the airplane down to approach speed, it became apparent that the horizontal tail and elevator were having issues with airflow. Maintaining flare was impossible, and the airplane hopscotched down the runway for the first landing. To everyone's surprise and glee, the cowling had completely missed the propeller when it came off. Dell and Eddie made some on-the-spot modifications that improved handling for the second flight, but they still had a problem.

Test pilot Len Fox made the third and subsequent test flights. Tuft tests, vortex generators, and deflectors were experimented with in an attempt to tame the airflow issue. Ultimately, they discovered that the too-small original windscreen and the too-high turtledeck were the culprits of the airflow problem. Air hitting the top of the turtledeck created turbulent air over the tail. A larger windscreen was installed that brought the air up and over the turtledeck for smooth airflow over the tail. This fix cleaned everything up and allowed the airplane to fly properly. They next attached the CJ610 jet engine, and Len began exploring the entire flight envelope. By spring, they had a wild new air show machine raring to go for the 2014 season.

A BEAST OF AN AIRPLANE

U.S. National Unlimited aerobatic champion Jeff Boerboon was selected to pilot the Jet Waco. Jeff had been flying formation in the Air Guard Program for John Klatt Airshows for the past few years. "I was in the right place at the right time," Jeff said. "To say I'm a lucky guy doesn't even scratch the surface. It's a lifelong dream come true." The team gets a big kick out of watching the expressions on the faces of the crowd when the air show routine starts. People don't expect a screaming jet engine and 4,000 pounds of thrust on a big biplane. The sight and sound of the airplane creates a momentary disconnect. "We call it cartoon aerobatics," Jeff said with a laugh. "It's like Wile E. Coyote; it doesn't make sense. Here is a biplane going straight up, and it sounds like a jet. Eyes and ears and the thought processes don't match up." Jeff described his favorite maneuver, "The greatest thing we can do with this airplane is pull up to 1,200 feet on a vertical line, come to a complete stop, do a 360-degree torque roll, then add the rest of the power and accelerate to 80 mph going straight up from zero. It's very hard to describe how cool that is."

This one-of-a-kind airplane requires extreme focus and care to put on a safe and entertaining show. There is nothing easy about the airplane, and it requires a team effort to make it work. Jeff explained why this team is a "Win-win-win-win. What better sponsor than Jack Link's beef jerky? It's a 'beefed up' biplane, it's *Screamin' Sasquatch*, and it's feed your wild side. John Klatt Airshows is a leader in the industry. I add my bit as national champion aerobatic pilot, and then Dell of course created and maintains this thing. It's really fun to be a part of this." John Klatt said, "Dell literally lived with this airplane for over a year and oversaw its every last detail. The Jet Waco's tremendous success is in no small part the result of his passion, determination, and skill." EAA

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