



The 1928 BOEING 40C

“Sail on, silver girl . . . all your dreams are on their way”

BY SPARKY BARNES SARGENT

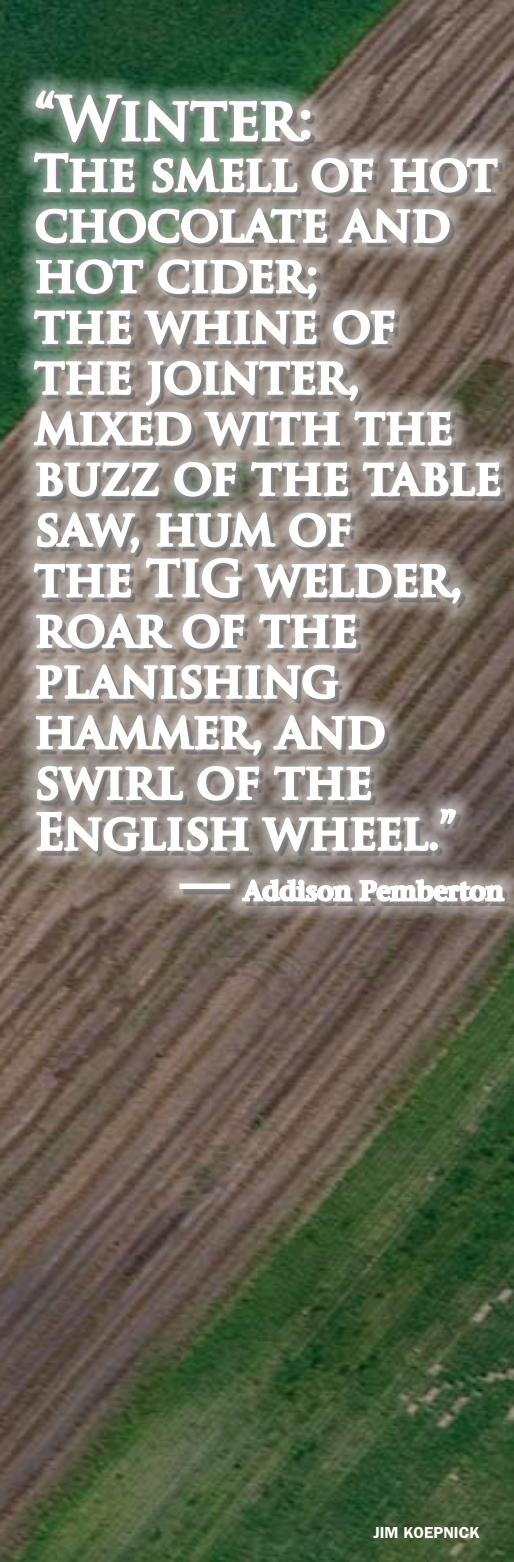
This silver Pacific Air Transport mailplane shines and sparkles, rivaling the diamonds she carried that fateful October day in 1928, when the mountainside claimed her in Canyonville, Oregon. Thanks to Addison Pemberton's persistent dream of owning and flying

a Boeing 40C, N5339 exists today as the only 40C and the oldest air-worthy Boeing.

Finding and restoring the Boeing was partially a tribute to his father's childhood memories of watching the mailplanes flying the contract air-mail (CAM) route over Iowa, and also Pemberton's way of bring-

ing history to full-fledged life. After bartering for the biplane's remains with the Oregon Aviation Historical Society, he eventually brought a veritable village together to accomplish the memorable and monumental task of restoration.

It is quite an experience to personally behold this fabulous flying



**“WINTER:
THE SMELL OF HOT
CHOCOLATE AND
HOT CIDER;
THE WHINE OF
THE JOINTER,
MIXED WITH THE
BUZZ OF THE TABLE
SAW, HUM OF
THE TIG WELDER,
ROAR OF THE
PLANISHING
HAMMER, AND
SWIRL OF THE
ENGLISH WHEEL.”**

— Addison Pemberton

JIM KOEPNICK

machine and listen as its inertia starter whines into a crescendo, watch the propeller slowly turn while the engine sputters to life, and hear the 16-foot exhaust stacks pipe their ancient melodious tune. This past summer and fall, numerous people had that opportunity. After flying from Felts Field in Spo-

kane, Washington, to Oshkosh, Wisconsin, for the week of EAA AirVenture Oshkosh 2008, Pemberton flew the 40C to Blakesburg, Iowa. There, in the fields of summer corn and soybeans, N5339 was one of nine original-type air-mail planes to actively participate in the Antique Airplane Association and Air Power Museum’s 90th anniversary celebration of the first scheduled air mail in the United States. Along with others, Pemberton was sworn in as an air-mail pilot, signed a contract, and flew the official U.S. postal mail from Antique Airfield to Ottumwa, Iowa, and return.

Soon afterward, Pemberton and the Boeing, accompanied by Larry Tobin in his 1927 Stearman C3B, and Ben Scott in his 1930 Stearman 4E, flew to New York to begin their carefully planned re-enactment of the transcontinental air-mail route. The “Transcon” commenced September 10 and was successfully completed September 18, after 29 hours’ flying time. They carried official U.S. mail across the country and stopped at each of the 15 original air-mail stops, where an educational program was shared with the public. Afterward, Pemberton described the flight as “a trip into a time warp,” and himself as being “a very humble pilot to have lived history up close and personal, with an increased respect for the air-mail pioneers.”

N5339 is not only recreating air-mail history; it’s making history of its own now—but just how was it transformed from those charred remnants of a fiery crash in 1928 into an airworthy beauty in 2008?

A VILLAGE OF VOLUNTEERS

A project of this magnitude wouldn’t be easily accomplished without help—and Pemberton was pleasantly astonished by how many volunteers showed up at his Felts Field hangar. “They’re not so much antique people; I had stockbrokers, doctors, all walks of life—and it was amazing to me the talents that some of these people had,” reflects

Pemberton, adding, “There are volunteers that you can give a giant task to, with minimum supervision; there are other ones that have to be shown how to hold a paint brush. So the key is to pair a challenged person with a helper.”

The entire restoration process was thoughtfully orchestrated to best utilize everyone’s time. “Believe it or not, this airplane was built on Wednesday nights over eight years,” shares Pemberton, explaining, “and it took me five nights to make a Wednesday night efficient. If people show up and they have direction, and they’ve got material and know what to do, they keep coming back. If they stand around, they go away. Of the 61 volunteers, there were 21 that did significant work, and there were 10 people who virtually didn’t miss a Wednesday night. My wife, Wendy, fed them dinner at 6 p.m. and we worked until 2 a.m.—she fed 14 to 16 people every Wednesday night for eight years. It was really a hoot; it was great!”

Numbering among the volunteers were Pemberton’s own family members. “Wendy married into this [aviation] disease, and she appreciates aviation not just for the airplanes, but for the people. They are usually the people you want to have as friends, because they’re interesting, motivated, and active—and a lot of times, successful. Our kids were raised in this environment, and to my wife’s credit, she cooks our dinner meal in the hangar every night. So our sons did their homework there, while their dad’s banging away on stuff. There’s a glider club in Spokane, and when my boys got to be 14, I towed for them in my Stearman, and they soloed at 14-1/2. They went right into power, and we built a Cub together. Ryan, my younger son, learned to become a very accomplished TIG welder through the Boeing restoration. Jay is a maintenance pilot—he’s a flight instructor, not a builder.”



PHOTOS COURTESY ADDISON PEMBERTON

The Boeing factory with at least 16 of the model 40 fuselages awaiting completion.



A shot dated 9-13-28 of 5339 when it was being used by Pacific Air Transport.

It was not a small feat. Describing it, he gave “thanks to my son Ryan for all the wonderful compound sheet metal work, and to Andy Bradford for many late hours on the milling machine and file work to make all the compound angles work out perfect on all the wing struts. These struts are *not* adjustable and are made to pin center with a .060-inch tolerance. The airplane has a total of 20 struts and 30 flying, landing, incidence, and tail wires. We were able to rig the airplane closer than I could have imagined, and that’s a tribute to Art Swenson and the squareness of the wings, and the perfection of the fuselage work that Matt Burroughs did seven years ago. The airplane is in rig within 1/4-inch in span (44-1/2-inch) and 3/8-inch from the outer wing struts to the tail post. The one surprising discovery is the firmness of the aileron control system and the heaviness of the elevator—which brings new meaning to a quote by Les Towers, the Boeing test pilot: “The controls are effective but feel as if they are cast in concrete.”

The wing trailing edges have a distinguished scalloped appearance, formed by stranded and soldered copper wire, which required careful attention during fabric installation. Wendy used a template to keep the scallops symmetrical while shrinking the Ceconite fabric, and rib-stitched with flat cord, taking care to ensure that the stitches weren’t twisted on top of the ribs. “Wendy did all the covering, taping, and brushing Randolph nitrates on the fabric,” shares Pemberton, “and that’s when I took it over, except she didn’t allow me to touch sandpaper to the fabric! She had 1,000 hours putting fabric on, and we put another 1,000 hours in the paint booth.”

The painting process was going strong during the late summer of 2007, and copious amounts of dope were applied on the massive wings with a high-volume, low-pressure (HVLP) system. Each of the 17 coats per wing required 47 trips up and down the paint booth. “One of my friends, Randy Ingraham, vol-

HIGHLIGHTS OF THE PROCESS

The cold Spokane winters were especially productive at Felts Field, and Pemberton poetically describes those long seasons when he states, “Winter: The smell of hot chocolate and hot cider; the whine of the jointer, mixed with the buzz of the table saw, hum of the TIG welder, roar of the planishing hammer, and swirl of the English wheel.”

The volunteers were armed with appropriate tools, materials, and 800 original Boeing drawings. Painstaking care was exercised to fabricate new parts, and old parts were used

where possible. “We consider the airplane a restoration,” emphasizes Pemberton, explaining, “The data plate in there is the original one, and there are 70 components that we moved over from the wreck, including the footsteps and handle, the throttle quadrant bracket and fuel selector assembly, the landing gear forgings, the top cap for the oleos, and one wing fitting.”

By late April 2007, the wood wings were installed on the fuselage for a check fit prior to covering, and Pemberton happily announced that N5339 could finally hold up her own wings, for the first time in 79 years.

unteered to help me in the paint booth,” chuckles Pemberton, “so he was going to be the grunt and mix the paint and hand me hoses. Then he wanted to try it, so he gets the

gun, and he’s like a robot! I asked him, ‘What are you not telling me?’ He told me he worked in a body shop for 12 years. So I said, ‘Okay—now I’m the grunt, and you’re the

shooter!’ So Randy did all the final finishes, and I did all the buildup.”

By January 2008, the Boeing was nearly complete. Its 525-hp Pratt & Whitney (overhauled by Covington Aircraft Engines Inc.) was hung, and with the installation of the impressive 16-foot-long polished exhaust stacks (fabricated by Acorn Welding LTD of Canada), it was time to hear the Boeing come to life. Pemberton says that on February 11, his son Ryan climbed into the cockpit and “engaged the inertia starter for the first time in 80 years. He ran it through six blades, hit the mags, and the 1340 Pratt lit off strong and smooth, before he could even get to the booster coil on the first try.”



PHOTOS COURTESY ADDISON PEMBERTON

While the wings are built up using wood spars and ribs, there’s plenty of metal used in the structure. Here are the metal parts ready for final fabrication and installation.



One of the four wing panels built for the Boeing.



Wendy Pemberton was in charge of covering the massive airframe. She also took on the task of feeding the regular Wednesday night volunteer corps.

FLIGHT PREP

After N5339 received its standard airworthiness certificate and the snow had melted from the runway, it was time for the test flight. Pemberton had previously taken steps to make sure that he was personally ready to fly it. Having accumulated 10,000 hours of flying “mostly the old stuff,” he was especially grateful for an opportunity that was generously bestowed upon him in August 2007. His friend Glenn Peck kindly arranged a visit to Creve Coeur, Missouri, where Pemberton was invited to solo Al Stix’s Liberty-powered 1919 de Havilland DH4-M2 mailplane. “The vision of looking down that long DH nose at Lambert Field from 1,000 feet over St. Louis is burned into my brain for the rest of my life,” says Pemberton, adding, “I had ‘flashbacks’ to Lindbergh, Jack Knight, Dean Smith, and ‘Wild’ Bill Hopson flying these aircraft cross-county on daily mail runs. I do not think that any other aircraft could have prepared me better for my pending Boeing 40C test flight.”

Additionally, having logged 1,000 hours in an AT-6, he was able to borrow one from a friend and flew it from the back seat, with the seat lowered almost to the floorboard so that his head was below the instrument panel—and then he shot landing after landing. Later, knowing how well that had prepared him for



Addison works on the massive landing gear. All of the parts of this biplane are big!

PHOTOS COURTESY ADDISON PEMBERTON



Addison's son Ryan was an integral part of the restoration team. Like his brother Jay, they literally grew up around the project.



The wingtip's hand grip is neatly trimmed with cord to reduce wear and give a ground handler a good grip.

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CRAIG VANDERKOLK

The Boeing's fuel gauges are located in the inboard section of each wing.



Pemberton's attention to detail is visible even on the wheel covers. The wheels were built up by Don McMakin.



SPARKY BARNES SARGENT PHOTOS

Close-up view of the flare tubes.

the lack of visibility during Boeing landings, he had his son Jay practice the same routine before letting him solo the big biplane.

FLYING THE 40C

The scent of aviation restoration productivity is such a sweet fragrance—nearly inebriating in and of itself, and overwhelming in

its heady final test, when airplane and pilot burst into the sky, home at long last. That final test took place on February 17, 2008, when the Boeing flew for the first time in 80 years. Pemberton's sons flew chase in the family's Cessna 185, with camera and video to record the 20-minute flight. They were as pleasantly surprised as Pemberton himself to discover just how stable the Boeing was. Afterward, Pemberton shared that he "had the feeling

that I could have crawled out of the cockpit and walked around the wings for a while if I had wanted to—then returned to the cockpit when it was time to land!"

The Boeing's powerful performance was also notable—and is evident even to those who watch it eagerly thrust itself from the runway into the air. "The acceleration is pretty impressive, I mean better than an AT-6—when you give the thing the needle, it sinks you in the seat. It came off on the very first flight in under 10 seconds, which I wasn't ready for. And it's just a pretty flat, levitating feeling—then you pull the nose up and the thing climbs over 1,000 fpm. Within a minute of flight, I was able to fly hands-off, so that was really amazing. The ailerons are heavy, but very powerful—the biggest surprise was that the rudder forces are enormous. On takeoff, you've got 50 to 70 pounds of rudder force, but once you're in cruise, it loves to go straight. The control forces

Specifications	
Empty Weight	4,080 pounds
Gross Weight	6,075 pounds
Length	34 feet
Height	13 feet
Wing Span	44-1/2 feet
Wing Loading	10 pounds/square feet
Power Loading	10 pounds/horsepower
Cruise	115 mph with fuel burn of 28 gph
Fuel Capacity	120 gallons in three tanks



The airframe is nearly complete. Addison refers to the Boeing construction as “hobbyist” in the sense that since it uses few castings or forgings, the airplane can be hand built. Given its size, that means there were a lot of hands! Sixty-one volunteers were logged by the Pembertons, 10 of whom hardly ever missed a Wednesday night restoration session.

PHOTO COURTESY ADDISON PEMBERTON

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This 40C is powered by a 525-hp Pratt & Whitney 1340.

are about three times that of a PT Stearman with half of its control response. In smooth air, it's a joy and very relaxing to fly; in turbulence, it's a workout!"

It didn't take long for Pemberton to learn that slipping approaches to landing are, quite simply, a requirement. He'll slip it to within 5 feet of the ground before kicking it out; otherwise, he completely loses sight of the runway. The oleo gear has nearly a foot of travel, which, Pemberton says, make touchdowns “imperceptible at times. It's a real weird feeling—you just feel you must be on the ground, because you're going slow. I wheeled it in the beginning to learn where the wheels were, and now I'll three-point it, because it just does the Cub thing and settles on.” Once on the ground, the Boeing tracks

as straight as an arrow, with excellent control responsiveness, even in healthy crosswinds.

Only one minor change was re-

quired after the first flight; they moved the vertical fin over one hole to alleviate rudder force. Pemberton continued testing the flight charac-



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The luxuriously detailed cabin interior, with brown leather seats complementing natural wood and an engraved Boeing logo on the forward bulkhead. The cabin interior is handsomely detailed, right down to the cabin phone, which allows a passenger to communicate with the pilot in the rear open cockpit.



SPARKY BARNES SARGENT

The original throttle quadrant.



SPARKY BARNES SARGENT

The neatly laid-out instrument panel and cockpit—note the Boeing logo on the rudder pedals.



CRAIG VANDERKOLK

The Boeing's voluminous mail pit and the leather straps securing it.



teristics and experienced an interesting tendency. "We put the airplane into a 75 percent power climb at altitude and lowered the left wing 20 degrees and tried to pick the wing up with rudder. But with the wing held down, it will rudder lock—the rudder just snaps over and locks. You can put both feet on the opposite rudder, and you still can't move it," ex-

plains Pemberton, "but you can raise the wing, and the rudder pops back. We also determined that at about 34 percent mean aerodynamic chord, it started to lose its longitudinal stability—so we've reduced the CG envelope to about 32 percent max. We fly it between 28 and 32 percent, and the airplane's wonderful. To safely carry four passengers, we have to

throw 200 pounds in the mail pit, and it does fine."

BIT O' HISTORY

Through the project, Pemberton became well-acquainted with Bill Boeing Jr., and gained a special appreciation of the early air-mail industry from him. "Prior to 1926, all the air mail in this country was carried



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by post office-employed pilots flying DH-4s. In 1925, the post office went to several aircraft manufacturers for a replacement for the de Havilland DH-4. So Douglas submitted an airplane, as did Boeing, Curtiss, and a couple of others. Boeing lost that first bid; they had built a wooden-fuselage Liberty-powered Boeing 40 that was not very successful," Pemberton recounts, adding, "A year later, Congress decided to let contractors haul the mail, which meant they had to come up with their own airplane. Bill Boeing came back with a concept in January of 1927, and by July, he had to build 25 airplanes, train 50 pilots, place them from Chicago to San Francisco, and have an operating airline. And he did that. Even in today's terms, that's pretty overwhelming. That's when he came up with the steel-tube Pratt & Whitney-powered version of the Boeing 40 that was successful. The other part of that whole story was when Pratt & Whitney came out with their engines in May of that year, they didn't see any assembled airplanes yet! Boe-

ing assured them that in six weeks, the airplanes would be assembled. They assembled them outside, test flew them, and then logistically placed them on the CAM 18 San Francisco to Chicago 1,200-mile airmail route and began making money right away. So with that, Bill Boeing shares the feeling that this is the first successful airliner in the U.S. and is as historically significant as a tri-motor, a DC-3, and a 707."

SHINING SUCCESS

The following lyrics seem somehow appropriate when describing the newly restored Boeing 40C, though it's likely that Paul Simon wasn't thinking about an antique biplane when he wrote them: "Sail on, silver girl; sail on by; your time has come to shine; all your dreams are on their way." Indeed, it's time for this Boeing to shine once more, sunlight glinting from her silver wings to the delight of not only those who witness her sailing by in the sky, but for pilot and passengers as well. A few fortunate people were invited

to fly back into time as passengers in the comfortable and handsomely outfitted enclosed cabin, where they were able to communicate via phone with Pemberton, who was piloting from the rear open cockpit. It was truly a treasured experience for this author, who gazed out the Boeing's window into the living past to behold the de Havilland DH-4 and Stearman 4DM mailplanes snuggled alongside the 40C as the late evening sun cast a peach-colored glow over velvety green fields.

N5339's 2008 debut has been virtually as authentic as her precision restoration, for she proudly carried the mail just as gracefully as she did so many years ago. And this queenly "silver girl" is making dreams come true for Pemberton and his "village of volunteers." The Boeing 40C was awarded Antique Grand Champion Gold Lindy at AirVenture, and the 2008 AAA/APM Fly-In's People's Choice and Jack Knight award—Best Air-Mail Carrier. Surely the spirit of air-mail pioneer Jack Knight has been cheering Pemberton on along the way. 