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ALLENGER

D.J. Short's tribute to aviator Bill Watson

BY SPARKY BARNES SARGENT

Like many of its contemporaries, the airfoil of the wing on the KR-31 has undercamber.

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D.J. Short is a soft-spoken, meticulous craftsman with a serious, intent focus on his work. He thrives upon challenges—whether professional or personal—and strives for excellence along the way. His newly restored KR-31 is a fine example of that.

Happenstance

D.J. didn't grow up around aviation, nor did he foster aspirations to fly. His introduction to aviation was quite by happenstance. Immediately after high school, he worked as a truck driver, moving houses across the country. "It was terrible work and no pay. Then I got another 'quality' job pouring concrete walls in Kansas City on commercial structures," reflects D.J.. "And a gentleman I worked with at the time was 64 years old—that was all he'd ever done. That scared me to death; I did not want to do that." As time and income permitted, he enrolled in university courses to better himself. He wanted to learn how to weld, so he took a basic airframe class. After a couple of weeks, the instructor recognized that D.J. had some potential and hired him to start working on airplanes.

"I had never touched an airplane before, and he pretty much mentored me," says D.J. "I stayed at the university for five years, and I got my BS degree. During that time, I learned to fly sailplanes, and then I learned to fly a 40-hp E-2 Cub. Eventually I got all my ratings up through CFI and sailplane CFI. The guys I worked with owned old airplanes, and a J-2 came available, and they decided I needed that. So I bought the project, finished it, and probably logged about 300 hours a year in it—I flew that thing to work every day, and I still have my J-2."

Once D.J. had his degree, his airframe and powerplant certificate, pilot certificate, and ratings, he started his own restoration shop in 1994. Since then, Short Air has specialized in not-so-common projects, including a Nicholas-Beazley NB-3, an Anderson Greenwood AG-14, several Monocoupes, and numerous engine conversions. D.J. sometimes finds time to work on his own projects, as well—such as the KR-31.

Bit o' History

Lewis E. Reisner and Ammon H. "Amos" Kreider formed the Kreider-Reisner Aircraft Company in 1927 in Hagerstown, Maryland. In December that year, they received approved type certificate number 19 for their Challenger C-2 (KR-31) biplane. In the early part of 1929, the company was acquired by Fairchild Aircraft Corporation. "Kreider and Reisner were influenced by Waco, and their KR-31 was very similar to the Waco 9 and 10 ships, but those were very heavy," explains D.J. "So Kreider and Reisner made the KR-31 lighter by routing out the wing spars, and they went with the conventional straight-axle gear, which is much lighter than big oleo struts hanging out in the wind. Now that gear is a weak point, but it is light."

The three-place, OX-5-powered Challenger had an upper wingspan of 30 feet 1 inch, a lower wingspan of 29 feet 2 inches, and four ailerons. It measured 23 feet 9 inches from nose to tailskid, and tipped the scales at 1,236 pounds empty. Its useful load was 842 pounds with a gross weight of 2,078 pounds, and it carried 33 gallons of fuel and 4

The OX-5-powered KR-31 has four ailerons, which are activated by push-pull tubes.

gallons of oil to feed and lubricate its 90-hp engine. The Challenger would cruise at 85 mph for a range of 340 miles and land at a slow and easy speed of 37 mph. Its construction was simple yet sturdy, with a welded steel tube fuselage and wings of spruce spars and wood ribs.

According to aviation historian Joseph Juptner (*U.S. Civil Aircraft*, Vol. 1), "a 'Challenger' model C-2, powered with an OX-5 engine, was flown in the Air Derby from New York to Los Angeles in the latter part of 1928 by Amos Kreider. He finished in 17th place after a grueling contest with most of the country's finest. There was a good

Modern Cleveland brakes have been installed.

There's no mistaking the rounded tail of the KR-31. D.J. Short modified the tailskid to make it steerable.

The lower cowling is opened during preflight to permit access to the fuel drains.

The instrument panel, circa 1930.

number of these C-2 (KR-31) type built during a production period that lasted through the best part of 3 years." Today, there are 14 KR-31s listed on the FAA Registry, with "maybe only four that are still together," according to D.J.

In the April 1928 issue of *Aero Digest,* Kreider-Reisner advertised their biplane as "A Light Weight, High Speed Plane for Commercial Service—Embodied in the 'Challenger'. . . are all the recognized improvements in the design and construction of modern aircraft. Its remarkably light weight…is made possible by the use of chrome molybdenum steel, duralumin and welded steel tubing—a distinct advance over the heavier types of construction."

A March 1929 ad in *Aviation* touted the KR-31's comfort and performance: "Challenger! Comet—OX5—Warner: Take your pick—step into the comfortably upholstered, roomy cockpit. Notice the complete instrument equipment and how conveniently they're placed. See how the controls respond to the slightest touch. Give her just a short run, then up and away. Watch how swiftly and steadily she climbs—how quickly she obeys. Loop her and roll her—get all the fun that flying provides. Then put her down slowly—surely into the smallest field. Trim of line—graceful as a bird—easily controlled—strong, sturdy, safe—the ship of ships for commerce or sport."

The "naked" KR-31 before fabric covering.

Kreider-Reisner employees building wings in the late 1920s.

Caretakers

NC10290's date of manufacture was June 9, 1930. Fairchild Airplane Manufacturing Corporation (a Division of Fairchild Aviation Corporation) sold the spiffy new Challenger to flight instructor Arthur C. Pottorff, who operated the nearby Waynesboro, Pennsylvania, airport. His was a familiar face at Kreider-Reisner, and by the following summer, he was also working at their flying field. Pottorff kept the KR-31 in his care for four years before selling it.

It went from owner to owner through the decades, and then in 1957, Charles E. Woerner of Geneva, Ohio, acquired NC10290. The biplane went through an extensive rebuilding process in the three years it was in his care, and a Curtiss OXX-6 was installed in place of the 90-hp OX-5. By October 1970, serial number 358 landed in the hands of Sid Hess, who added it to his antique fleet. He owned it for about eight years.

Fast-forward another decade or so to June 1998. That's when D.J. heard that Roger Freeman of Texas had a KR-31 for sale. D.J. and his father, Jackson, took a road trip to look at the disassembled project. D.J. made the decision—which was really more of a personal commitment to himself (as you'll read later)—to purchase the Kreider-Reisner and restore it. Father and son hauled the project back to Warrensburg, Missouri, and work commenced one step at a time.

Restoration

You won't find expensive, state-of-the-art equipment in D.J.'s restoration shop—primarily because he likes to do things the way they were done back in the day. While he worked on myriad parts, his father spent numerous hours working on the wings. "He's not an airplane guy, but he's a good listener, and he spent a lot of time dry-rigging it," says D.J. with a proud smile. "You can look at the ailerons and the trailing edges of the wings and see how well they line up compared to other old airplanes."

Some pieces had to be reverse-engineered by enlarging factory photos to glean specific details and measurements. But the most challenging aspect of the project was

Profile of the OX-5-powered C-2 Challenger (KR-31).

finding time to continue working on it. The work itself, says D.J., "is not really hard. It's all a piece at a time, and most everything was hand-built back then, except for certain castings. There were a lot of original parts, but most of them needed to be redone. The top cowl over the engine is original and was good enough to use after I did a little patch work on it."

D.J. covered the airframe with Ceconite fabric and used Randolph nitrate butyrate dope. Color selection was easy, he says, since "there was a little piece of fabric on one of the lower wing attach points when we got the project, and I cleaned it up to get the true color. I used that as my paint chip and then called the manufacturer and had them send the pigments—I enjoy blending and mixing the colors myself. It's an old plane, and I tried to keep it looking like one—it's so easy to make them look new."

Venerable OX-5

Fortunately, D.J. had an OX-5 engine core to start with—even if it did have three loose wrist pins and only two cylinders. "So I had to find some cylinders and make my own guides and seats—but to me, that's the normal fun part of it," says D.J. "Those engine castings are very porous and difficult to weld, but I got it in the oven and annealed it and got everything lined up and tight, with new bearings for the crankshaft. The oil comes through the camshaft first and then to the crankshaft, and all the overhead oiling is external on that engine."

The water-cooled OX-5 has its own special protocol for starting. "You have to flood the carburetor because it's 2-1/2 feet below the engine. So you turn the fuel valve on, and sometimes the carburetor will flood itself, but sometimes you have to flood it. So when I pull the fuel valve open after turning the prop through a couple of times, I take the cover off the float and pull the seat off to flood the carburetor myself," explains D.J. "Then it gets enough through the wells that it can draw the fuel up to the height that it needs to get to, so it'll start—and then I pull it through with the choke on. When you get it set up just right, it fires off and does wonderful. The whole thing's a process, so I'm still figuring that out, too."

Up in the Air

D.J. is pleased with the KR-31's performance, especially since he anticipated that it might be rather sluggish on takeoff and climb-out. "It's wonderful, better than I expected! It took off the ground a lot quicker than I thought it would. It rolled down the runway, and in a couple of hundred feet it was in the air," he says happily. "It runs great and has a fuel burn of 7 gph at 1400 rpm, which I think is fabulous. It is a little heavy on the ailerons, but that's the way they were. [The cockpit] isn't real comfortable, but there's lots of room in there, and I wanted it to be how it used to be, because that's part of it."

Flying behind an OX-5 in an open-cockpit biplane is an experience with which few pilots are intimately acquainted. D.J. has cultivated his own philosophy about flying the KR-31. "I don't know airspeeds; I fly everything by feel. I don't look at altimeters or tachs, and I don't have a GPS. I just look at the little map and figure it out—that's part of the process," he declares. "You can punch a waypoint in a GPS and go—but if you're not looking outside, why are you flying? In the Kreider-Reisner, you're looking through the radiator when you're flying, and then looking off to either side to see if all of your cylinders are firing. The separate exhaust stacks on that aren't original, because I learned from one of the old-timers that if you have the straight stacks, you can see which cylinder is having issues."

On the Ground

The first flight after restoration went pretty well . . . until the third landing. The KR-31's original swiveling tailskid, along with its straight-axle gear, exerted combined torsional forces to create a bit of havoc during that ill-fated landing.

The first hop around the patch was successful, so D.J. landed and his father climbed in the front cockpit. That circuit went smoothly, as well. After his father climbed out, D.J. just couldn't resist going around one more time. "During the landing, the wheels started to give way, and the skid swiveled and continued to let me go around. I saw it coming and shut the engine and fuel off real quick," describes D.J., reliving the experience. "Then I started hearing spokes break, 'twang, twang, twang!' And then *boom*—it dropped down to the ground. When the spokes gave way, the wheel broke in half, and that piece made a wonderful ski—

"You can punch a waypoint in a GPS and go—but if you're not looking outside, why are you flying?"

—D.J. Short

D.J. Short taxies the 1930 KR-31.

it didn't dig in. It didn't break a gear leg, thank heaven. I got out and had a look—there was no fire, and everything else looked okay. I cussed at myself a couple of times, then put my hand underneath the wing—no mud, no grass, so woo-hoo! I'm good to go."

Understandably, D.J. decided some changes were in order. He installed a Cleveland disc brake system, modifying it a bit, and installed bellcranks (interconnected with the rudder cables) to allow the tailskid to be steered. "The rudder bar pivots back and forth—there are no rudder pedals—and as I run out of rudder, it pulls the tailskid to the side to keep it straight, and then it also starts applying the brake just a little bit," explains D.J. "It took six months to find a good clincher-bead wheel, and I also had some better spokes made. The original spokes and nipples were nickel-plated brass with cut threads and were very soft, so I had a friend make stainless steel spokes and nipples with rolled threads—they're a lot better now."

Inspiration

D.J.'s personal inspiration and ensuing commitment to restore the Kreider-Reisner stemmed from his admiration of one particular aviator he met early on in his aviation career.

"A hero of mine was Bill Watson; he had an OX-5 Kreider-Reisner [1928 KR-31, NC7780] that he flew—he was the nicest guy in the world, and I just wanted to be like him. Not because I knew him that well, but it was just what I perceived when I saw him—how he acted, how he behaved, and how he treated everybody. I was still young when I was watching him, and he'd fly the Kreider-Reisner to fly-ins and haul rides in that thing all day long with a smile on his face. I can't imagine how many people's lives were altered because he gave them that ride. And unfortunately, we were at Bartlesville when they had the midair—he was killed and we saw it off the end of the runway," says D.J. in a reflective tone. "So that set me to thinking, 'Well, he's gone now...maybe I need to work a little harder to be like him,' so I dropped some of my attitude. Then this Kreider-Reisner came up for sale. I decided to buy it and restore it in memory of Bill, and to remind myself to lighten up a little bit and be more like Bill. That's how I came to get the airplane; that's the underlying cause."

For D.J. there has been a direct and fulfilling parallel of simultaneously working on the KR-31 and working on himself—his attitude and outlook, that is. He continually pushes himself to grow by seeking new challenges—whether aviation-related or not. "I'm a battalion chief for my fire district, and I'm also a medic—that's fun for me," he says and smiles. "I like helping people when they're at their worst. I enjoy doing that; it's my monotony breaker."

Through these experiences, he wants to be a positive role model within his family and his community. His wife, Margie, is supportive of his endeavors, and their young sons, 5-year-old Warner, 3-year-old Lambert, and 1-year-old Velie, are already showing an interest in aviation. "I don't push them," says D.J. "They just come and ask me to go flying in the 40-horse Cub. As for their names, there is a Monocoupe theme there, but we just liked the names because they all have history behind them, and I just don't want to follow the norm."

The Challenger is perhaps the most aptly named of D.J.'s personal projects because the element of restoration that is most satisfying to him is not the end result. "It's the process," he explains. "You think of a project as a complex thing, but an airplane's a bridge—you build one piece, build another piece...and as long as all the pieces are together and properly in their place, you have a strong bridge. That's what I love doing; that's the fun part."

NC10290 received several awards during the Antique Airplane Association's national fly-in in September 2009. It was selected as the Antique Pre-1936 Grand Champion and received the Fairchild Club's Open Cockpit Award as well as the Lyle Hoselton Memorial Award for "best workmanship by owner."