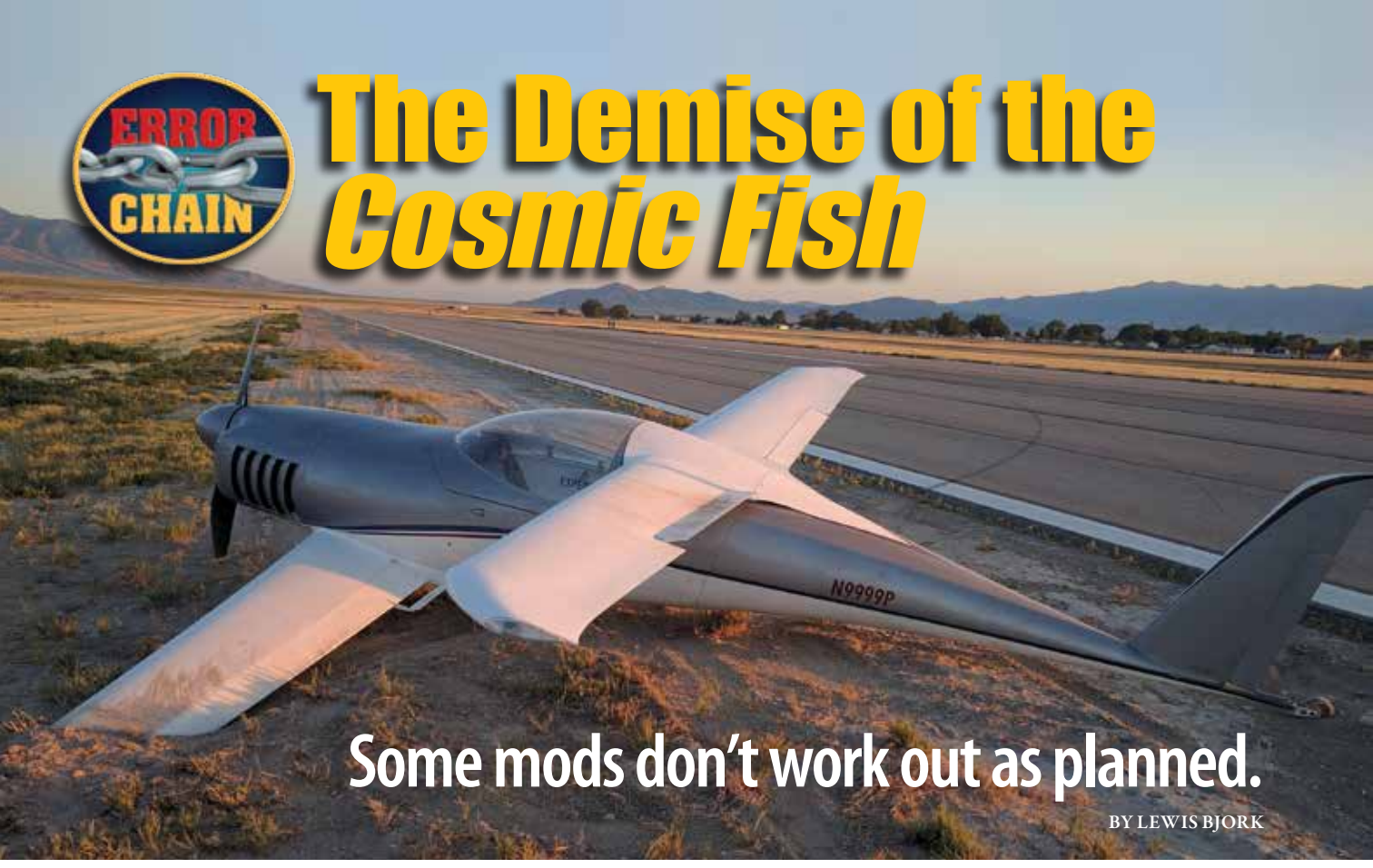

The Demise of the *Cosmic Fish*

Some mods don't work out as planned.

BY LEWIS BJORK

Long projects, like long journeys, eventually come to an end. After nine years in the shop, countless rebuilds, unspeakable money, and an entire thesaurus of creative expletives, the *Cosmic Fish* completed a fateful journey to the airport. Tooelle Valley Airport (KTVY) is located well away from population centers and is surrounded by many square miles of flat, mostly unobstructed land. With the approval and blessing of the FAA, it promised to bear witness to the first flight attempt of this unusual airplane. I hoped the flight test would go smoothly, despite numerous setbacks and minor frustrations. Indeed, the plane had made the airport journey a few times already: once to test the trailer itself, the next for taxi tests. The trailer worked pretty well. Taxi tests revealed several problems.

The Quickie Q200 is a beautiful design. I've always admired the simplicity of its landing gear. Downturned wingtips house a small tire and brake assembly, presenting a wide, very stable stance on the ramp. The wing itself is fairly springy—almost alarmingly so, as it allows the fuselage to bounce six inches up and down as though on a trampoline. The wing boasts a generous carbon spar, so the movement does not threaten the wing structure. Prop clearance is another story altogether.

The *Cosmic Fish* is a mostly stock Q200 with a rotary engine. The engine presented the lion's share of problems during construction and is, by far, the most satisfying part of the project. From the very beginning, the engine seemed too large. Not that a Mazda rotary is particularly large itself—it isn't. In fact, from a power-to-weight and size perspective, it's positively miniscule. Trouble was, this rotary barely fit in the space designed for a much smaller Revmaster engine. Although offering much greater power and theoretically better reliability, the rotary was dimensionally larger and significantly heavier from the get go.

When first mounting the engine to the firewall, I could see prop ground clearance becoming a problem. The Volkswagen-based engines are compact and relatively flat. The distance from the crankshaft to the top of the engine is fairly small, similar to the geometry of most flat, boxer-style aircraft engines.

When the right brake locked up, the *Cosmic Fish* departed the runway and hit a runway light.

The rotary, by comparison, is shaped more like a big can, with the crank centered in the middle. If I mounted the engine high enough to match the Revmaster thrust line, I'd have difficulty seeing over the engine from the cockpit. If I centered the engine on the firewall, only a very short propeller could work, unless I wanted to redesign the entire canard and landing gear arrangement. I found a compromise, of course. Mounting the engine as high as I could, while redesigning the cowl and forward fuselage, presented an acceptable solution that could swing a 62-inch propeller, but suggested only three-point landings to maintain adequate ground clearance. This seemed like less of a solution when the airplane began to bounce on the taxiway.

After several bounces, much sweating and puckering, it appeared the prop had adequate ground clearance after all. The steering, on the other hand, felt squishy. This was my own doing. The Q200 rudder and ground steering control

circuit was not intended for dual controls. I wanted dual rudder pedals and extended the torque tubes accordingly. They seemed stiff enough during construction, but taxiing around the airport revealed a sort of play, felt as softness in steering response, when making a right turn. I reasoned the torque tubes were too small in diameter, and thus allowed for some play, when faced with the load of an active tailwheel. I wondered if the tailwheel could be improved with bearings to lighten its resistance to control inputs. Higher-speed taxiing on the runway showed directional problems when decelerating, which I attributed to the soft steering. The plane was easy enough to control when gaining speed, but very difficult when slowing down. Lastly, the brakes didn't work very well. They could bring the plane to a stop, but barely. A slow and gentle stop required maximum braking effort on the handle. So we packed the plane back on its trailer and made a return journey to the shop with a small list of details to fix:

- Bleed the brakes.
- Install new rudder pedals.
- Add ball bearings to the tailwheel.

More Tests

Weeks later, we headed back to TVY with renewed enthusiasm. The tailwheel moved freely. Rudder pedal torque tubes were doubled in diameter, and the brakes were bled thoroughly. I planned on attempting a flight after taxiing around a bit more. Initial taxi went as expected. The soft feel had gone away, and overall control pressures felt lighter. The brakes showed improvement, but still seemed weak. I headed for the runway to try a little more speed.

Accelerating through 32 knots, I cut the power and applied brakes. Directional control to that point was light, but positive. Slowing down, however, made my hair stand up. The fish began to fight, darting left and right with small oscillations that kept me busy tapping on the new pedals. I felt surprise that the difficulty increased after making the modifications to the steering system.

The oscillations increased in amplitude until I made a scary transition from pilot to passenger as the plane swung aggressively to the right, with me standing hard on the left rudder and pulling the brake lever to its limit. Skid marks on the runway told the story. The right brake had locked up. With the wheel located at the wingtip, it easily overpowered steering commands from the tailwheel and sent the plane off the runway and through a runway light. Interestingly, the wide stance did not allow the plane to flip, but the locked wheel assumed the role of an anchor and caused the plane to slide sideways until the wheel on the left wingtip gave way to the heavy side loading and ripped free of the wing. The whole shebang came to rest, just off the runway, in a big cloud of dust.

At that point, I realized that prop clearance had become a problem. The engine continued to idle, but suffered a mild prop strike, breaking the outer few inches of each wooden propeller blade. Although not hurt, my heart broke. I felt a heaviness that has weighed on me for quite a while since. The little airplane that showed such potential now sat, fairly ruined, in the dust of a distant airport. It's an image I won't forget.

Authorities came soon after. The local police wanted a report. The airport representatives documented the damage. The FAA spoke with me on the phone. We conference called the NTSB. During their questioning they asked, "Was this a flight?"

"No."

"Was it intended to be a flight?"

"No, just a taxi test."

"Then we're done. Have a nice day."

That ended it. It was nice for the authorities to walk away, but "a nice day?" Nope.

The *Fish* could be repaired. I began to compile the damage and consider the cost. New prop, engine teardown (again), wing inspection/repair, landing gear, brakes, etc.

For sure, single lever brakes, as suggested in the plans, were a bad idea. Individually controlled brakes might have prevented the mishap, in hindsight. Looking forward, however, I lost sight of the journey's end, and I felt weary. The engine sold very quickly to a gentleman in

Damage included a prop strike and the left wingtip and wheel were ripped from the wing.

Photos: Lewis Bjork

(Left) The Mazda Rotary engine isn't particularly large, but it barely fit in the *Cosmic Fish*. (Right) The engine sold very quickly and was shipped to a builder in New Zealand.

New Zealand. Another builder claimed the airframe and panel, and trailered it to New Mexico. Both have plans to fly their own, similar projects.

Why Do It?

With a little cash in hand—far less than I'd spent on the project—I considered the costs and benefits of building a homebuilt airplane. This is a moment of cold, clear, reality. Experimental airplane projects can fail, and often do, sometimes with very serious results. It begs the question, "Why mess around with Experimental airplanes, at all?"

For me, it's a fascination with possibilities. When considering a Q200 project, I went right past the idea of building the plane strictly to plans. Most builders of the type, in fact, recommend several important modifications to enhance its safety and utility. This suggests that many homebuilt designs are far from perfect—they often lack the benefit of intense testing and proving that certified airplanes endure. If the words "some assembly required" were printed in block letters under the "Experimental" placard, it could qualify as the understatement of the century.

That said, Experimental airplanes are also malleable—the builder is free to modify and customize at his or her own risk. This is not possible with a certified design, and one of the primary attractions of the do-it-yourself airplane. The *Cosmic Fish* was my seventh homebuilt airplane, and I took full creative license. Unfortunately, some of that assumed risk did not pay off.

From a practical perspective, the Experimental airplane has mixed results. If you enjoy the creative process, like I do, the project offers years of fun in the shop from the very beginning, but not a single bit of transportation value during that time. Once completed, the practical value depends on what you built. Many homebuilts are terrific traveling machines—often with great efficiencies over certified designs—but most others fit a recreational niche. My Pitts Model 12 is a good illustration. I loved building it, spending seven years worth of creative energy in the shop. The benefits of building that airplane go way beyond the benefits of owning it. I acquired several tools, a myriad of skills, and confidence that enabled me to build my own house, including everything in it, where I now live. Scrounging ability and penny-pinching skills developed with airplane projects translated into a house that was paid for soon after we moved in. My family has lived debt free ever since, partly due to the skills attained by building an airplane. Now I build everything, and count time in the shop the way some folks assess fishing—it doesn't subtract from your life.

The completed Pitts 12 is a different animal when no longer a shop project. It is a fire-breathing thrill ride in the air and easily my favorite airplane to fly, but it's not terribly practical. I have flown it on a few cross country trips, all less than 300 miles, and found it noisy, a little uncomfortable, hard to see out of, and a bit expensive. My plane has no tie-down rings (to save weight), so must be hangared when visiting other airports. Although a wonderful airplane for a local aerobatic flight, it was never intended for efficient cross-country travel. The Lancair IV, by contrast, carries twice as many people in pressurized comfort, almost 130 mph faster on less power.

The *Cosmic Fish* showed theoretical promise in the cross-country department. It was designed for efficiency at a single point on its operating envelope—cross country cruise. Had it flown, I expected 200-mph cruise speeds, burning car gas at little more than 6 gph—then trailering it home for zero fixed ownership costs. Quite an accomplishment in itself, but it was hampered by a tiny cockpit, very limited runway capability—and bad brakes. Don't forget the brakes.

Do Sweat the Details

Perhaps the most annoying aspect of any project, but particularly Experimental airplanes, are the devilish little details. The *Fish* ended in a dust cloud probably due to a bubble in a brake line—a bubble I tried hard to round up and flush from the system. Other airplanes might

After the demise of the *Fish*, my next project was a lightweight canoe.

fall out of the sky due to a missing cotter pin or a poor-quality glue joint. I had the misfortune of a seat belt letting go while flying upside down, at low altitude, in a Cri-Cri several years ago. I fell about three inches until the secondary lap belt caught me—a detail I installed only a few days before. It was still far enough to pop the canopy open and send my heart to my throat. We're on our own out there. Like a rock climber on the face of a cliff, our well-being is quite up to us alone and directly affected by our attention to the smallest details.

There is an implied responsibility here that feels deeply satisfying. I am responsible for me. I cannot sue somebody if the plane slides off the runway. I cannot blame anything but whatever the hell it was that caused the problem—ultimately my own inattention. This personal stance is why I enjoy building airplanes. I suppose it's why some of my ancestors traveled west to build a life in the mountains. They wanted self-sufficiency. They carved a life out of the desert, found a way to thrive, and enjoyed the thrill of it, I suppose. Anyway, they did it themselves. This is the essence of an airplane project. The risks are real, but the benefits are deep and long lasting.

What's Next?

I'm not content to sit still. Although somewhat shell shocked by the demise of the *Fish*, I returned to the shop to build a lightweight canoe—very nice to start and end a project in the same season. Now I'm in the middle of a hovercraft project, probably for the better part of a year.

There is another airplane stirring in me though. After years of building someone else's designs, I intend to create one of my own. I bought several textbooks, a computer program, and a delightful little book by Daniel P. Raymer—*Simplified Aircraft Design for Homebuilders*. I'm at the conceptual stage right now—my absolute favorite part—no real details, yet, just broad ideas and general considerations fleshing out an airplane that will be mine from start to finish. Not much to describe, yet, as I'm still getting an education, but it will be powered by rotary engines (got that education, already) and will be called *The Cosmic Ray*.

I'll keep you posted.

LEWIS BJORK

Lewis Bjork has constructed many airplanes, authored a few books and numerous articles. He enjoyed flying for SkyWest Airlines the last twenty years, and is married to Linda, a very patient wife. They are the parents of five children.