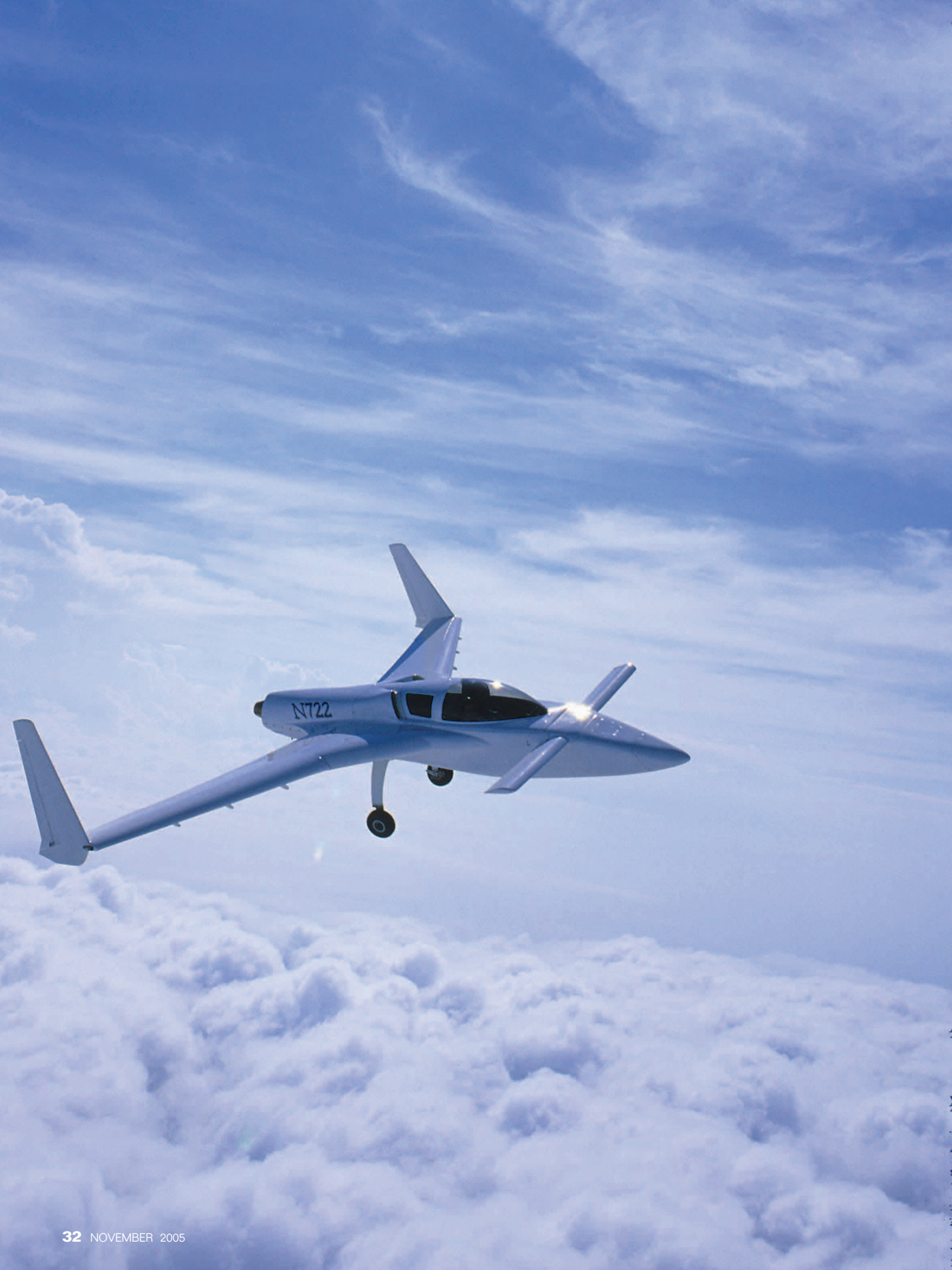

N722

photography by Jim Koepnick

speed jacket

What happens when you REALLY change engines on a Cozy?

By Amy Laboda

I HAVE SUNK TO THE ABSOLUTE BOTTOM RUNG, I THINK, as the Cozy's canopy thunks shut around my head and shoulders. I've been relegated to ballast. I must sit in the right seat to keep the aircraft from tipping back off its nose wheel as its tanks fill. "Interesting center of gravity," I jot in my notebook.

speed jacket

The aircraft's pilot/builder Greg Richter negotiates with the fuel truck driver, reassuring him repeatedly that it is fine to put Jet A fuel into this Cozy's tanks. It is, really. You see, Richter, who bought and completed this sweet little canard designed by Nat Puffer over the course of 11 years, recently had it reengined by designated airworthiness representative Robert Harris and his wife, inspection-authorized mechanic Valerie Harris, principals of EZ Jets U.S. in Covington, Tennessee, and Jet A is the go-juice of choice for this aircraft's modified 600-pound-thrust General Electric T58 single-stage jet engine.

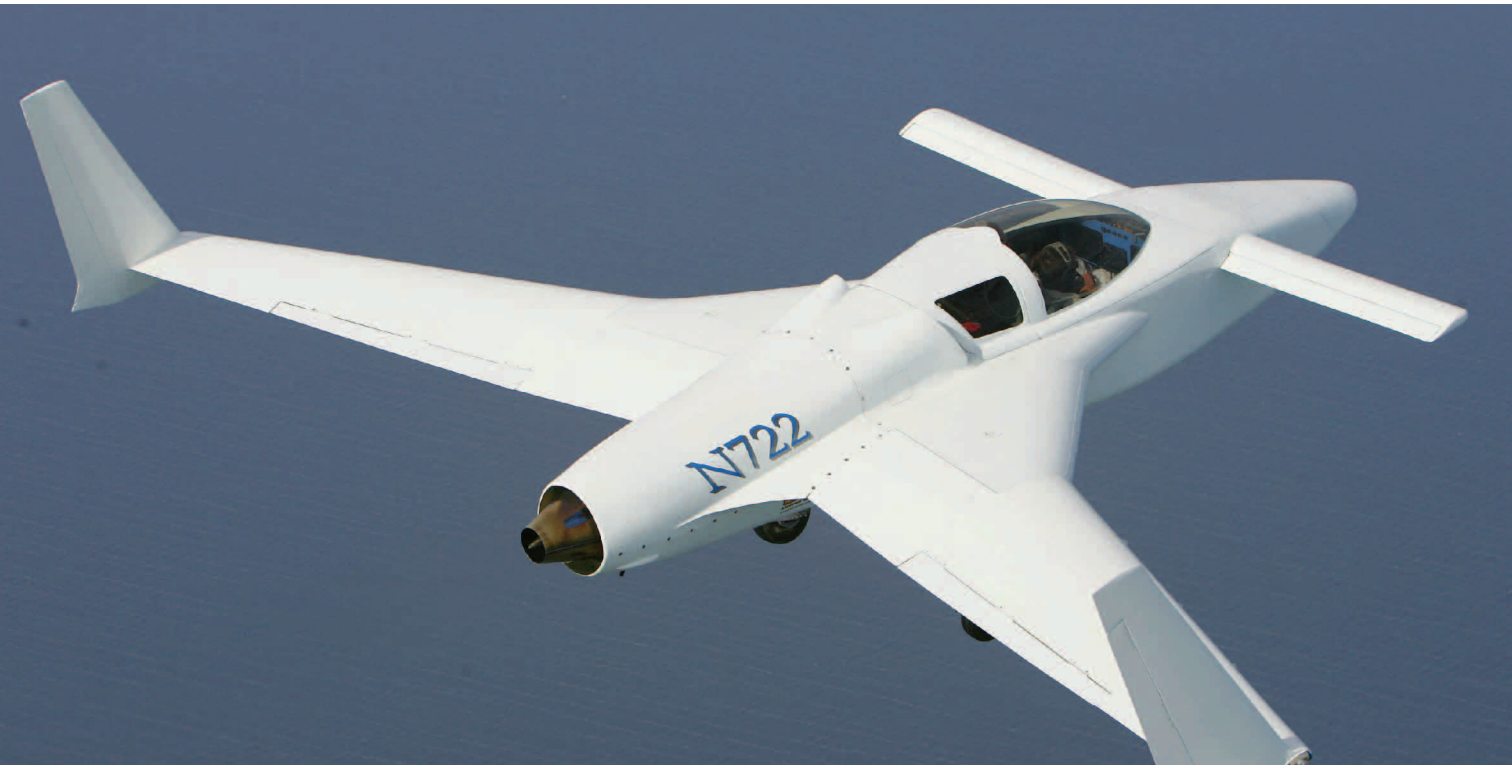
"A jet engine in a Cozy? Why?" I ask.

Richter loves when people do that. A software engineer who owns Blue Mountain Avionics in Copperhill, Tennessee, he is always looking for better ways to, well, make things work. The new-wave design of the Long-EZ originally caught his eye, not long after he got his private ticket back in the late 1980s.

"I actually flew one and thought, yes, this will work great," he recalls. "I wanted to build because I wanted a machine I could both fly and maintain myself." He just wasn't enamored with the tandem seating arrangement of the Long-EZ. Then he saw the Cozy on the back of an Aircraft Spruce & Specialty catalog. "That's it!" he remembers thinking. Not long after he owned Plans No. 400.

An ad led him to a builder in California who'd completed the wings and a little more, and Richter, looking for a quicker build, bought that a few months later. "In the end that might have saved me six months," he quips, well aware that life, as well as his penchant for constantly retrofitting with newer and better was a large part of why the airplane took so long to build. He went with a forward-hinged canopy, like the Classic Cozy, and attached his entire instrument panel to it, making it possible to quickly slide his size 12 feet and 6-foot-plus frame into and out of the left seat. He went with an electric landing gear system, too.

Somewhere in the process Richter decided that he wanted a sleek glass cockpit to go along with his sleek ca-



THEY KNEW IT WAS AN OVER-THE-TOP KIND OF IDEA. BUT, THEN, SO WAS PUTTING A GLASS COCKPIT IN A COZY, 10 YEARS AGO.

nard machine, but couldn't find anything off the shelf that met his price point or his needs. So of course, he invented the EFIS/One, a 10.4-inch LCD display with split screens that replaces the classic six aircraft instruments and all the engine and fuel gauges and also provides GPS and moving map navigation.

The original powerplant, a Richter-modified Mazda 13B engine from a 1992 RX7 car, was part of the problem, too. "I'd flown the Cozy with the O-235, and well, it was doggy," he says. "I tried the O-320 engine and realized that I wanted more," he admits. "I'd driven behind the Mazda rotaries and knew they were simple: two bangs, six seals, and nothing to mess up. I thought I could get 300 hp out of the Mazda, and with a lot of modifications I did eventually end up with an engine that was smooth and fast."

He completed the machine in 2001 and flew it to Oshkosh. There he noted that, though his engine received lots of attention, it was his avionics package that people wanted to put deposits on. That convinced him to stay in the computer/avionics business, and leave the engines to the mechanical engineers.

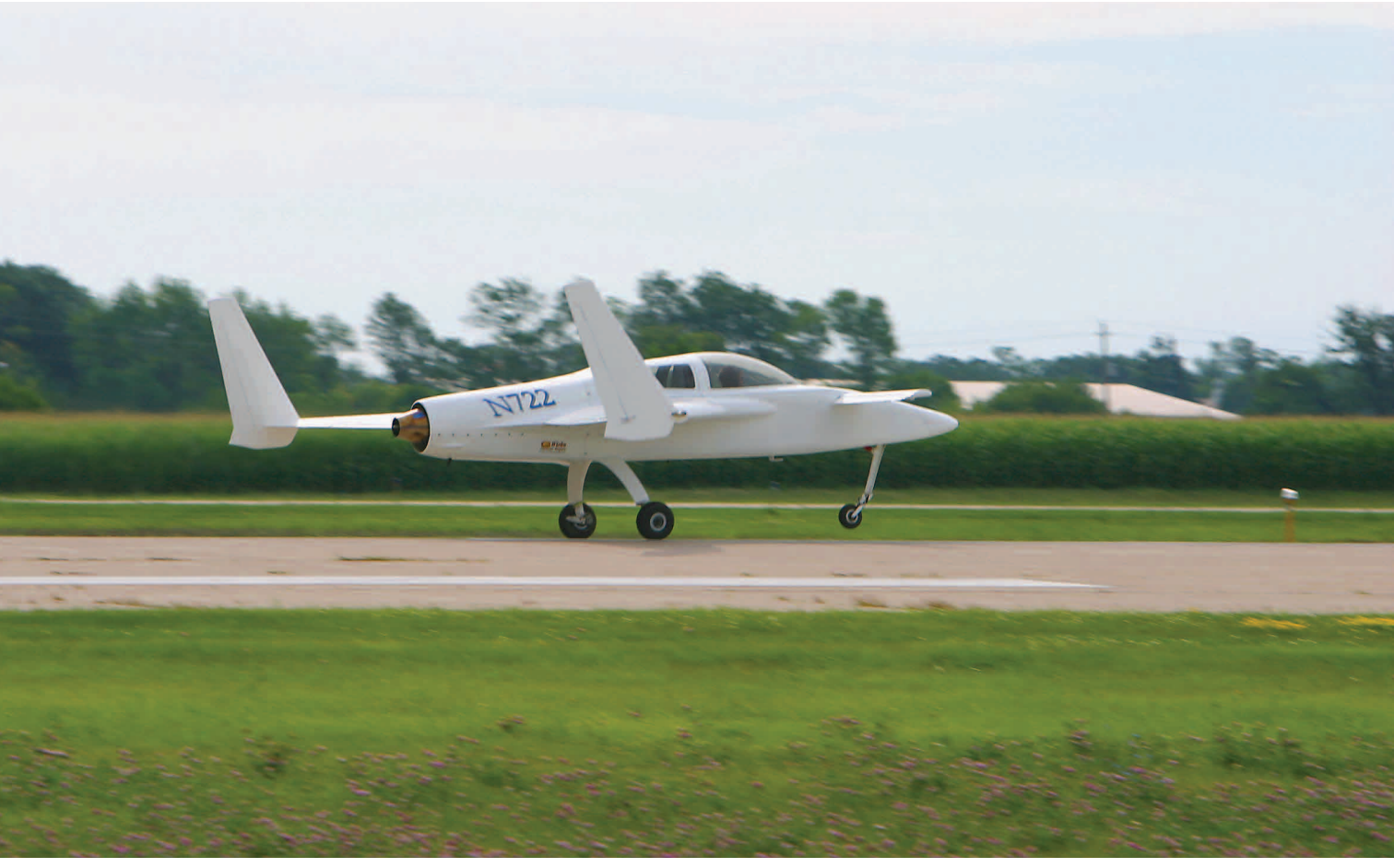
In the end, Richter says, his Mazda engine just wasn't practical, and some of the problem was in how he had modified it. "For every hour I flew, I'd have to spend an hour on the ground wrenching on it. One day I realized it'd sat on the ground for nearly a year. I wasn't flying it because the engine was too much work."

So now, instead of the three-blade wooden fixed-pitch propeller there is a jet nozzle "hushed" with a tail cone meant to keep the engine's signature screech down to, well, a tolerable roar. Instead of a rear seat there is a hat shelf built for light bags, and above that part of the canopy rise two ominous nostril-like air intakes that are carefully S'ed to knock down the sound, too.

"People actually come up on the flightline before I start up and ask me, where's the prop?" chuckles Richter, ever playful, his long salt and pepper locks dancing in the smart morning breeze. "I say to them, you don't see it? Oh man…."

He's finished the preflight and fueling and settled into the left seat next to me. It is tight. Richter tells me

speed jacket



The CozyJet has an appetite for runway, with Greg generally sticking to runways longer than 4,000 feet. Takeoff is easy, landing less so.

that his original copilot, his ex-wife, was smaller than I am. "Uh huh," I mutter. He's already asked my weight and used me for ballast. Humph. I scoot my hip hard against the external cockpit gunwale, trying to make a little extra room for his hand to reach the throttle, a T-handle that slides between the seats.

The panel is sparse, holding two Blue Mountain Avionics EFIS/One LCD displays, a PS Engineering PMA7000 audio panel with CD player, an Apollo SL30 comm radio, a Garmin GTX 327 transponder, and just in case, a whiskey magnetic compass tucked low and off to the left. There are only five buttons: Master, EFIS, Pitot Heat, Landing, and Igniter. The electric retractable nose gear switch and speed brake switches rest on a center console below the panel, next to a wooden auxiliary throttle knob, and the side sticks bristle with colored buttons, including a green one for the engine start, a blue one for the strobes, a red trigger (the push-to-talk, another bow to Richter's whimsy), and a hat switch for trim.

Richter nudges the throttle forward past my hip as he squeezes the start switch on his stick. He adjusts the aux throttle knob, and then, once the fan spins fast enough and the EFIS/One engine instrumentation shows fuel flow, he reaches up and pushes the igniter switch, carefully watching the EGT. From under the Bose X headset the engine lighting sounds like a whoosh, only slightly louder. "Look out behind," I think. We are blowing some hot air now.

Another tick on the throttle past 50 percent has heads all over the homebuilt ramp snapping around to see what's making the disproportionate racket. Richter smiles and gives a little wave, acknowledging that he's the sound source.

We roll past the crowd and out toward Runway 9R at Lakeland Linder Regional Airport. All the gauges check good, the controls and electrical system check out, and the man in the Day-Glo orange vest waves us off with his batons just as the departure tower clears us to go. Richter advances the throttle slowly to 102 percent power in a vain attempt to keep from outrunning the Piper Comanche stag-

gered on the roll ahead and to the right of us. It does not take much. We simultaneously out climb and outrun the Comanche before reaching 1,000 MSL, even after pulling back to 80 percent power some 15 seconds into the climb.

Suddenly the best part about this undeniably cozy Cozyjet hits me—the ride is smooth as butter. I know the Bose X headset is keeping the noise down, but only a jet can give the sense of simply sliding through the choppy late morning air.

AGGRESSIVE PERFORMANCE

At 2,700 MSL we maneuver, and the Star Wars-looking winged creature, with its elongated composite snout and engine nacelle (done for both weight and balance and looks), behaves like any Cozy, except that it is clear that this Cozy really likes to be in two modes of flight: tearing skyward at 3,200 fpm and 150 knots or screaming cross-country near the flight levels at or close to its airframe-limited never exceed speed of 210 knots. (Officially the normal operating speed is 190 knots at 15,000 feet, on a burn of roughly 25-30 gph.) Anything in between is just inefficient. And in either case the General Electric T58 turboshaft engine is just loping along.

After about 15 minutes of steep turns and exploring the machine's low speed regime, Richter shoehorns the bird back into the standard Sun 'n Fun pattern, in line with the GlaStars, Cessnas, and RVs on downwind for the airport. The airplane mushes along between 95 and 100 knots while Richter S-turns and deftly jockeys the throttle, gear, and belly brake down. He is reluctant to use his newly installed wing-mounted speed brakes because they are not yet tested below 120 knots. They are designed to augment the belly brake so Richter can keep his power up in the slow speed regime and minimize the throttle command-to-power lag time that is typical of any jet engine.

Richter squeezes the PTT trigger, "Cozyjet needs 9R for landing," he barks out. Canards in general need room to roll, and with an over-the-fence final approach speed around 95 knots this jet definitely needs more than what the multiple landing points on 9L offer.

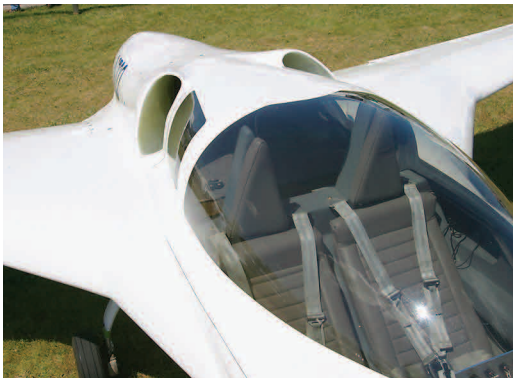
There's a pause, and then the tower comes back, "Ah, Cozyjet, continue base leg and line up for Runway 9R. You are clear to land full-length on 9R—Cozy JET only!" We touch down just beyond the displaced threshold and roll the full-length with minimal braking.

In the one-half hour of flying we burn off 25 gallons of that precious Jet A. That's a typical burn, according to EZ Jets' Valerie Harris, who did most of the fiberglass lay-ups for the Cozyjet conversion.

"Under 10,000 MSL the fuel consumption on this engine is high, near 45 gph," she explains. But up where the Cozyjet is meant to cruise, the modified GE T58 engine burns closer to 25-30 gph. The left, right, and center fuel tanks hold a combined 92 gallons of Jet A (usable), giving Richter roughly three hours of airtime to play with on each hop, when full.

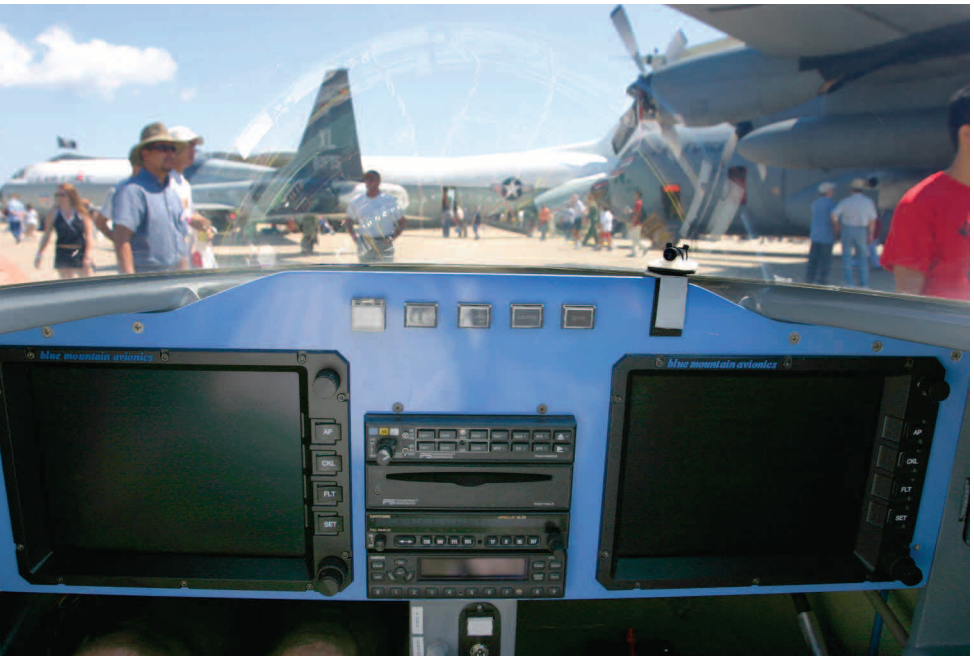
Is it efficient? Not really. Is it a load hauler? Definitely not. So why exactly did Richter do it? Reliability, he says, for one. The Mazda engine that originally pushed his Cozy through the sky may have been efficient and fast, but its finicky disposition frightened Richter more than one time while

speed jacket



Integrated scoops (above and opposite page) feed air to the the GE T58 turbine engine.

The panel shows off the glass panel Richter designed that's produced by his company, Blue Mountain Avionics.



he operated in and out of his home strip in mountainous eastern Tennessee. Even nearby Andrews-Murphy, North Carolina, with its longer strip of asphalt, lies in the bottom of a box canyon. With his business growing, he simply did not have time to work on the airplane's engine constantly to keep it running smoothly and safely. And then there's that little problem he's had all along with constantly searching for a better way to do, well, anything.

"We came up with the idea on the proverbial napkin, and Val and Rob and I kicked it around for about three months before we realized we were serious about putting the jet engine in the Cozy," recalls Richter. They knew it was an over-the-top kind of idea. But, then, so was putting a glass cockpit in a Cozy, 10 years ago. The more they thought about it, the more it seemed possible. They started researching engines and found the ubiquitous General Electric T58 turboshaft engine, and it showed promise.

And where, exactly, do spare T58 engines come from? "The military," says Valerie Harris, without much elaboration. The T58 was the first turboshaft engine to power a helicopter, and even though GE stopped production in 1984, more than 2,500 of the powerplants are still in service today, pulling everything from Kaman Seasprites to Marine One into the air with nearly unfailing reliability. Upgrades and lighter alloys infused over the years have resulted in an engine that can weigh as little as 250 pounds while producing 800 pounds of thrust. The engine powering the Cozyjet, without accessories, according to Valerie, weighs as much as an O-235 with all its accessories.

The Harris' got Richter's engine and immediately discarded the N2 section—essentially the gearbox and everything with it. They then added an alternator where the fuel swirler once attached and built in an oil tank, custom fabricated to fit in the handmade 4130 steel engine mount.

About the time they tried the engine mount on it was clear to see that the Cozy, from the rear, at least, was getting longer. So, Valerie and Robert decided to give the girl a nose job to balance things out.

"Actually, the extended engine cowling and new, elongated nose helped widen the Cozy's CG," says Richter. In front he now stows the remote-mounted avionics in a neat bay, while behind the front seats sit two Concorde batteries (jet engines require substantial juice for starting). This allows Richter to fly solo with 70 gallons of fuel and only 50 pounds of ballast in the nose.

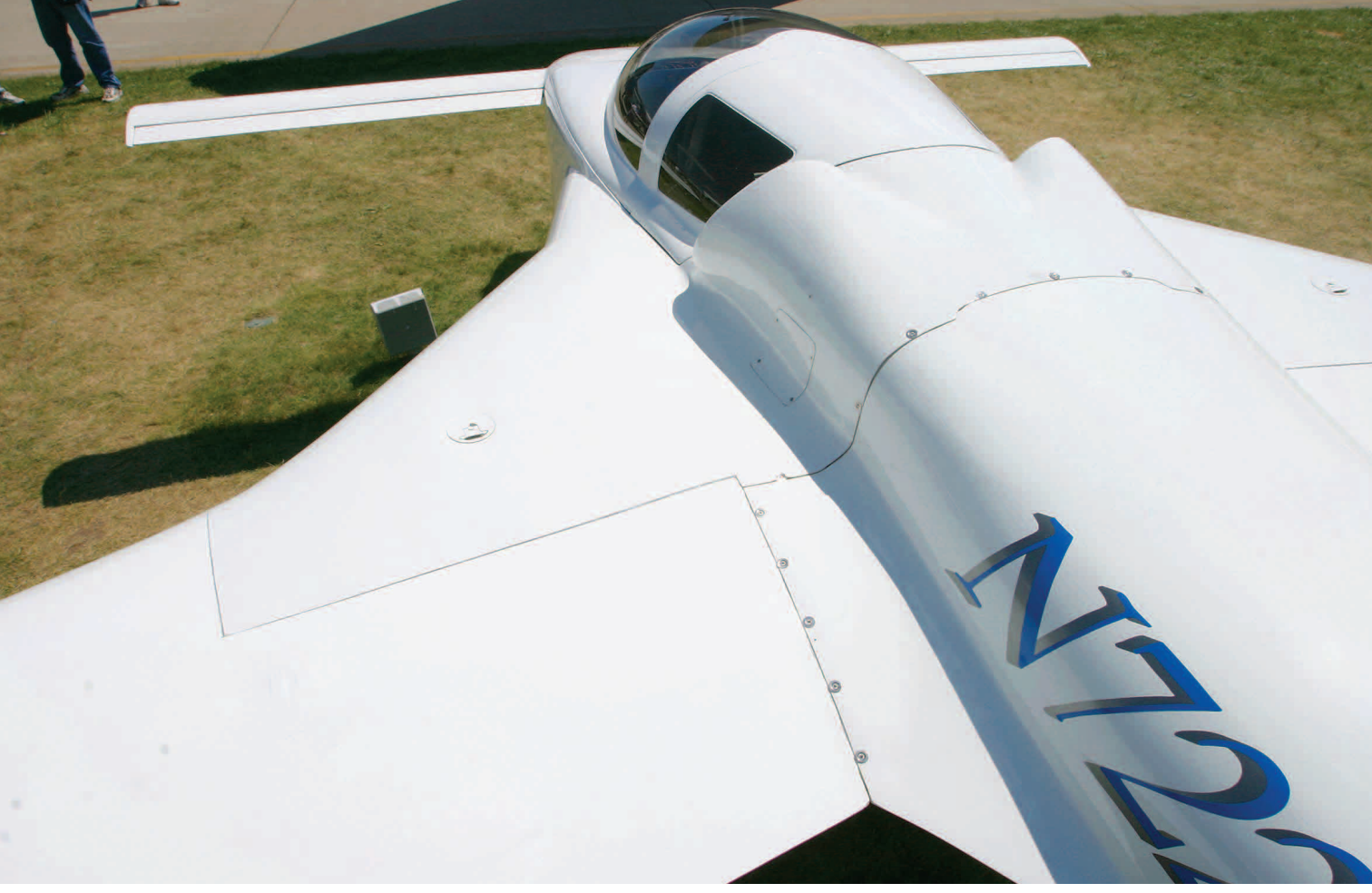
TAMING THE NOISE

Once the machine was reassembled and the engine lit for the first time, Richter knew immediately that he'd have to do something about the noise. Robert Harris had tried to take down the decibel level of the compressor sounds, but the screech of the exhaust was overwhelming. You know, kind of like a little dog with a tenor that doesn't stop.

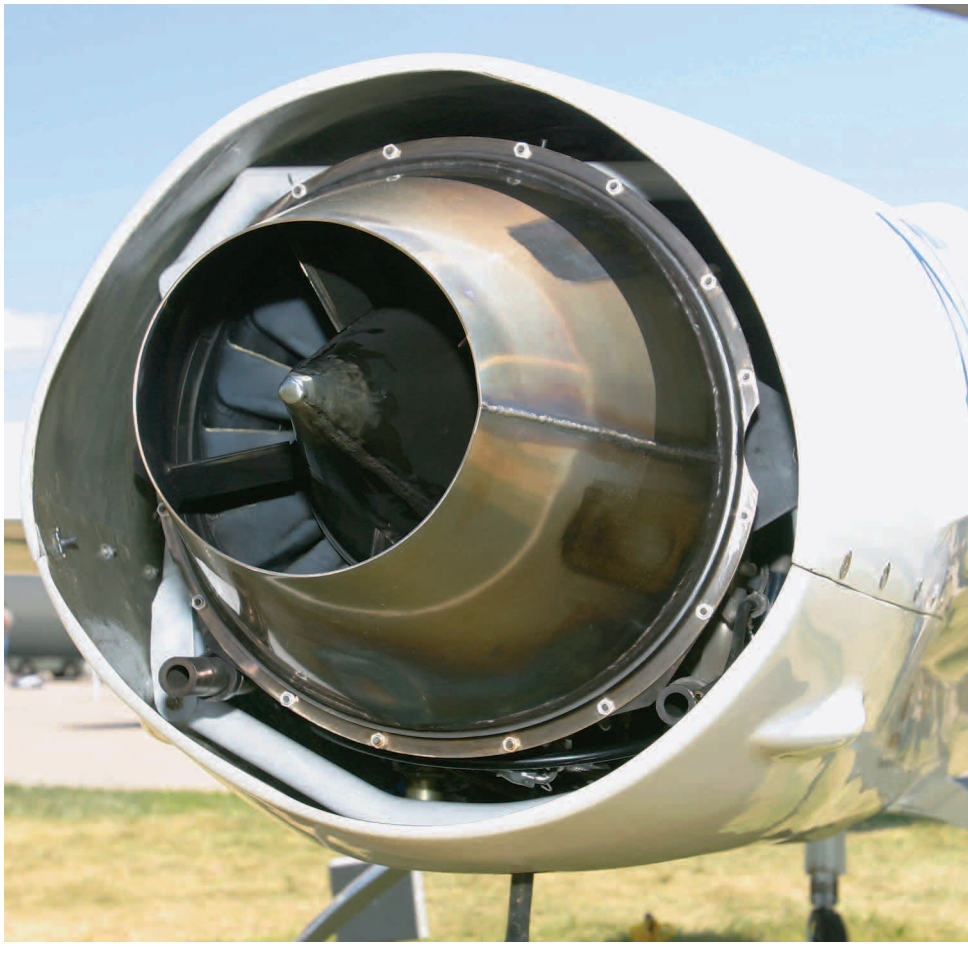
Richter went to Brad Snodgrass in Indianapolis, a friend who specializes in exotic metals, and asked him to weld up a fix. It wasn't long before they'd settled on a material (Hastex) and a shape for a nozzle cone in the tail that squelched some of that annoying exhaust noise.

"Hastex is a high-temperature stainless steel material that sits right where the temperature and price lines cross on the chart," says Richter. "It did the trick."

The Hastex cone stands up to the



speed jacket



The jet's exhaust nozzle is designed to squelch the jet's usual shriek into a more tolerable roar, which is still rather loud.

maximum continuous EGT of nearly 700 degrees, plus it makes the Cozy sound more like a Citation than the beefy military helicopters its engine once powered.

Officially the aircraft picked up about 40 knots with the engine swap. But the climb—that's where the Cozyjet shows off, especially at the mountain airports Richter likes to operate from. Where the Mazda engine got the job done—when it was running right—the admittedly overpowered Cozyjet leaps off the runway and away from hostile terrain time after time with nearly 50 years of military-tested reliability. Is it durable? With proper care—you bet.

As far as altitude is concerned, on May 5, 1996, Jim Price set a record flying to 35,027 feet with his Long-EZ, which has a similar wing and canard to the Cozy, and Aircraft Spruce & Specialty specs show the Cozy ceiling as above 20,000 MSL, so Richter knows that his airframe is good to operate where the T58 engine is most efficient. Sure, he needs to tuck an oxygen bottle in back, but those are small and light enough these days, and with only three hours of usable fuel he doesn't need a lot.

The extra speed—and panache—his Cozyjet picked up with the engine change is but a bonus, really. But it's a bonus that suits Richter just fine.