
GT
500
QUICKSILVER

QUICKSILVER GT–500

The pioneer in the Primary category

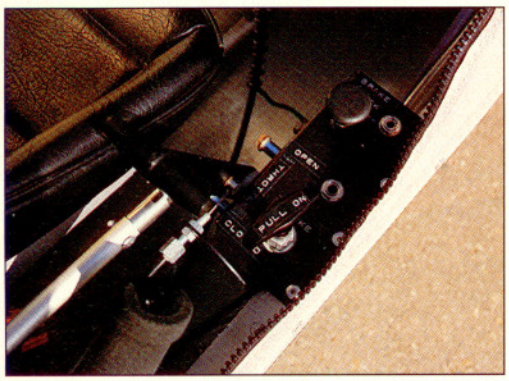
BY THOMAS A. HORNE

Twelve short years ago, ultralights hit the aviation scene with a vengeance. At the time, this batch of eccentric and eclectic aircraft was viewed with hope—in spite of the more outrageous designs. Their low cost, coupled with a lenient regulatory atmosphere, offered the promise of replenishing a sagging pilot population. ■ In those days, I literally had a front-row seat on the ultralight phenomenon. I was the editor of *Ultralight Pilot*, the magazine published for members of AOPA's ultralight division during its three-year term. The magazine had a consumerist voice. I and my small band of dedicated—and *brave*—writers built and evaluated some 12 ultralights from the perspective of trusting buyer. We flew 20 others, in acts of faith that would impress a saint. There were so many manufacturer claims about ease of construction and safe handling that we had to find out the truth for ourselves, then tell the world. ■ Boy, did we find out.

PHOTOGRAPHY BY LONNA TUCKER

Frankly, we were appalled. Kit parts were missing or didn't fit together properly. Hardware often came in huge bags, unsorted and unidentified. We had one ultralight that used hundreds of stacked washers for engine mounts. Another used plastic tie wraps to keep the ignition coils (powered by four flashlight batteries) from falling into the propeller arc. Another eschewed seat belts and used flimsy shoulder straps as a restraint system. Some used weight shift for pitch and roll inputs. Others used weight shift for pitch and bicycle-style handlebars for roll. You get the idea: Construction was a nightmare, and nearly all the aircraft had serious handling and design problems.

Of all the aircraft we flew, one brand stood out head and shoulders above the rest. These were the Quicksilvers. While not as fast or as sexy looking as its competitors, the Quicksilvers were easy to build, simple and safe to fly, and well supported by the marque's factory and extensive dealer network. In the midst of a chaotic, anything-goes atmosphere that pervaded the infant ultralight industry, Quicksilver's engineering, design, training, and maintenance philosophy was exemplary.



Thanks to these attributes, Quicksilver accomplished two major feats. First of all, the company survived the Great Ultralight Shakeout, which left dozens of other ultralight manufacturers out of business by the end of the 1980s.

The second, more important feat came this past August, at a special ceremony during the Experimental Aircraft Association's annual fly-in at Oshkosh. There, Quicksilver's two-place GT–500 was awarded the nation's first type certificate in the Federal Aviation Administration's newly created Primary category. It was a history-making event, not just for Quicksilver, but for all of general aviation. FAA certification of a new category of low-cost, owner-maintainable aircraft is now a reality, and more designs will certainly follow.

The GT-500 is certified in the Sportplane class of the new Primary category. This class is open to manufacturers with designs having one or two seats, a 1,200-pound maximum gross weight, and a V_{SO} no greater than 39 knots. Type specifications for the Sportplane class can come from a variety of standards. Quicksilver chose to use a combination of standards derived from Canada's strict microlight certification rules and the international community's Joint Airworthiness Regulations applying to very light aircraft—the so-called JAR/VLA rules. Compliance with JAR/VLA can be a pathway to certification under a standard Federal Aviation Regulations Part 23 type certificate, but Quicksilver opted for the Primary category. This limits the GT-500 (and future Sportplane-class aircraft) to day-VFR flying for personal use, rental, and flight instruction. Charter-type flight for hire is strictly prohibited.

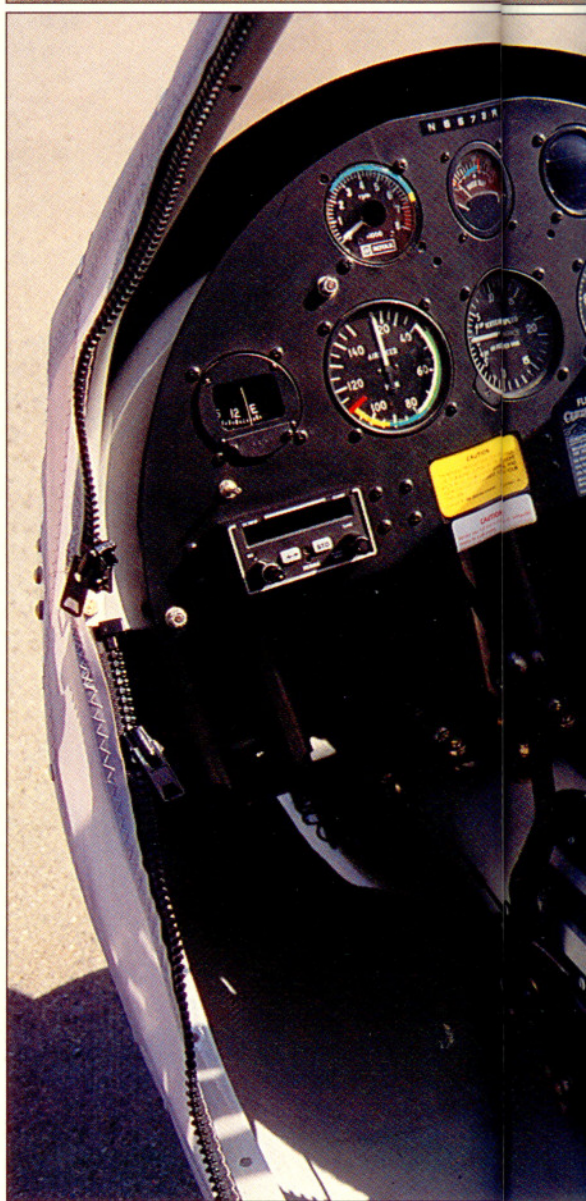
Both the Primary category's Sportplane class and the JAR/VLA rules allow manufacturers to pursue far less expensive cerification alternatives than traditional, standard methods of airworthiness certification. Hopefully, this will result in a new crop of small aircraft.

Now it's possible for a pilot with construction smarts to buy a GT–500 kit for approximately $25,100, assemble it, have it checked by an authorized Quicksilver distributor and an FAA flight standards district office, and fly it as an FAA-certified airplane.

Once Quicksilver receives its production certificate, which the company expects this month, you'll be able to buy a fully assembled and certified GT–500 for about $29,000. That's a very low price for a brand-new airplane that meets federal safety, handling, and performance standards.

To check out the GT–500, I visited Quicksilver Enterprises, Incorporated's headquarters in Temecula, California, and flew the airplane out of the nearby French Valley Airport.

There was a bit of déjà vu strapping into the GT–500. The *Ultralight Pilot* staff had flown the GT–500's predecessor—the GT–400—10 years ago. The GT–400 was a single-seat ultralight intended as a step-up design for those

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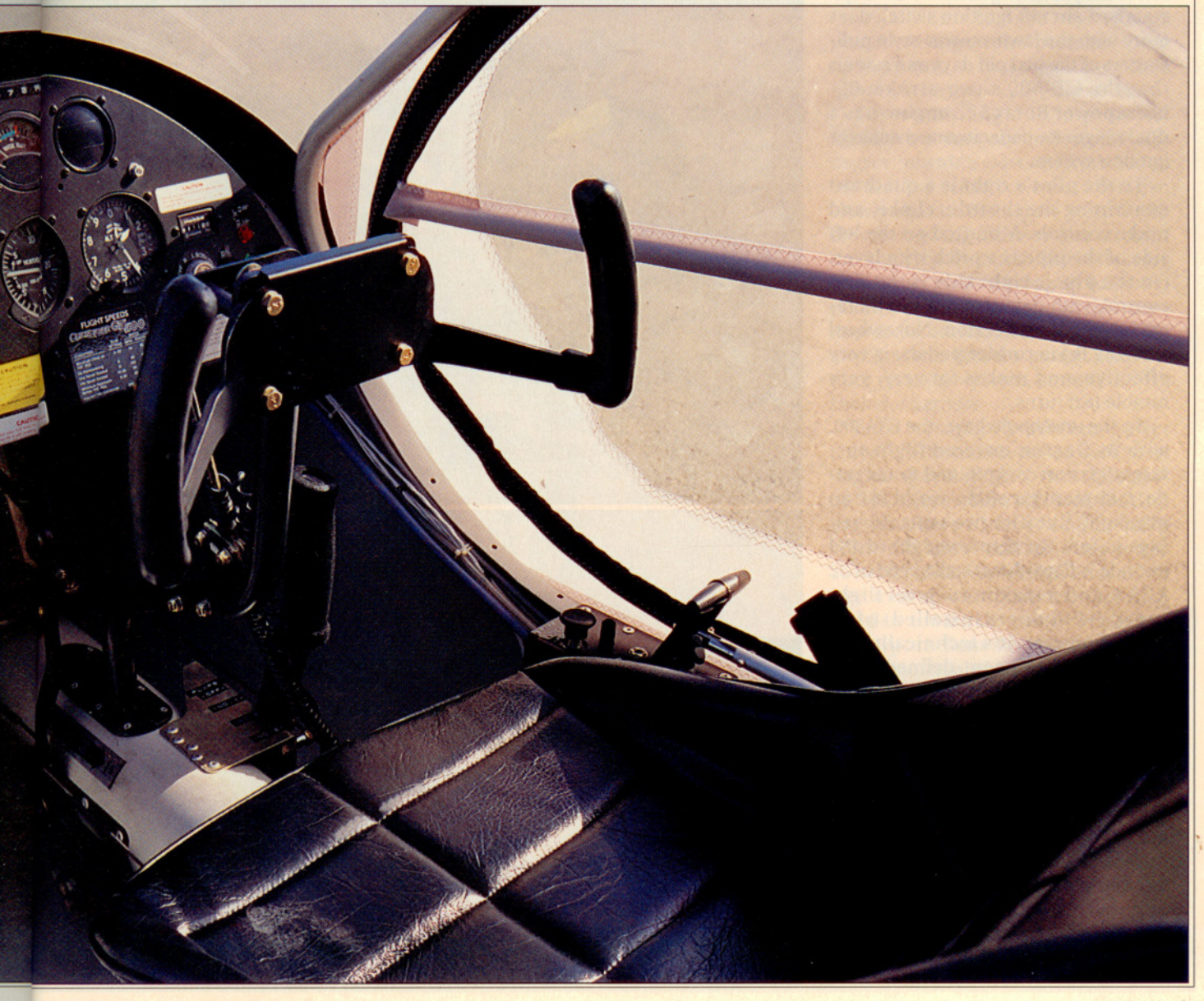


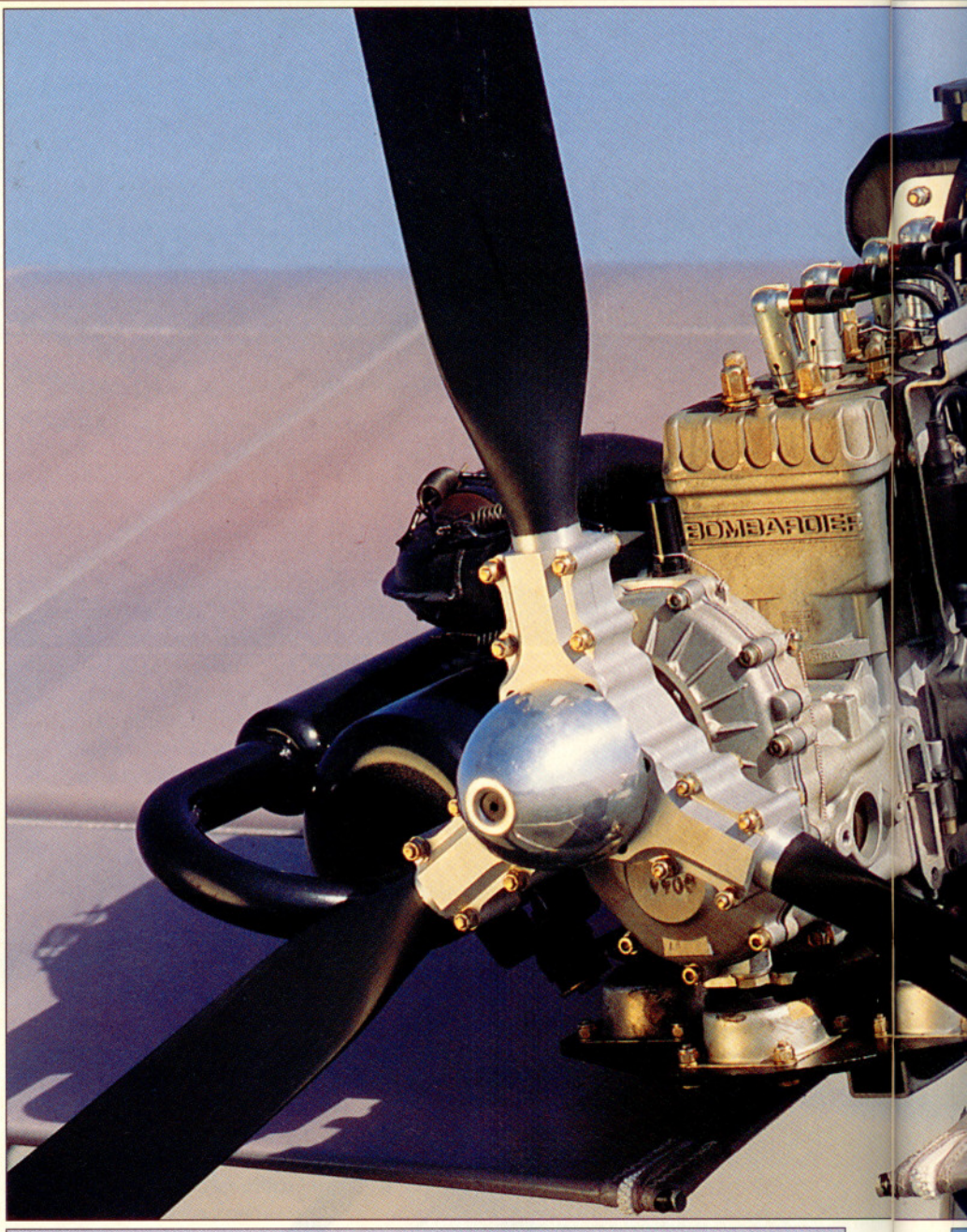
not enchanted by Quicksilver's traditional ultralight models. It was a conventional airplane in that it had three-axis controls, flaps, and tricycle gear, but the similarities ended there. The pilot's seat straddled a 5-inch-diameter pipe and was perched ahead of the wing. With the wing behind the limits of peripheral vision, the only visual pitch reference was the small pod that graced the front of the pipe and served as a sort of cockpit enclosure. This open-air seating made takeoffs breathtaking and every steep bank or healthy shot of turbulence a very special event indeed. We called it "riding the pipe."

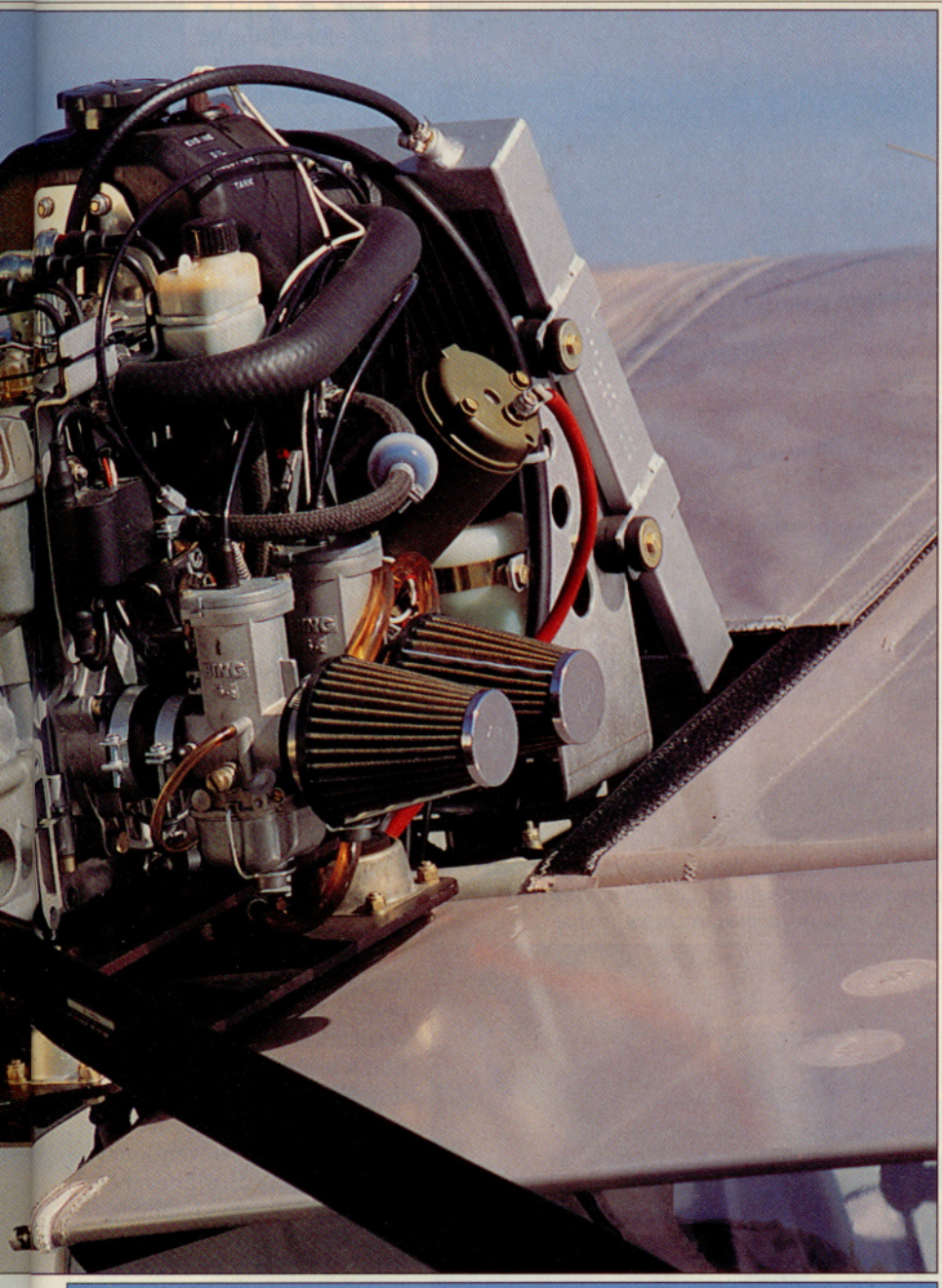
The pipe's still there with the GT–500, but now the pilot and passenger are enclosed by a pod with doors that can be zipped shut, left halfway down, or removed completely. There's an instrument panel, too, with all the necessary day-VFR instruments. A standard aircraft ignition switch does away with the lawn-mower-style pull-starters of the bad old days and reveals that the GT–500's two-stroke, 65-horsepower Rotax 582 engine has a dual magneto, capacitance discharge ignition system.

To the pilot's right is a quadrant containing the throttle, choke, and brake controls. Mounted on the left side of the pipe is a pitch trim lever. On the pipe's right side is the flap control, with detents for three increments of flap deflection. Nosewheel steering is via rudder pedals, is very effective, and makes for very, very nimble taxi turns.

To the unschooled eye, the GT–500, with its Dacron-covered flight surfaces, Spartan cockpit, and Rotax rattle, may seem for all the world like an ultralight. But with two seats, 16 gallons of fuel, an empty weight of 430 pounds, a flaps-down stall speed of 32 KCAS, and a maximum level flight speed (with doors installed) of 77 KCAS, however, it's technically way out of the government-defined ultralight envelope. FAR Part 103, the rules that deal with ultralights, limit them to a single seat, 5 gallons of fuel, an empty weight of no more than 254 pounds, a 24-KCAS stall, and a 55-KCAS maximum level flight speed.

For the already-certified pilot, the interior surroundings become very familiar and airplane-like after just a little acclimatization. The real-airplane aspect is further reinforced if the optional Terra TX-760 communica-





tions radio and intercom system is installed. The GT–500's electrical system will even permit the installation of an altitude-encoding transponder and a VOR radio.

Takeoff performance is a real rush. With Quicksilver's Paul Mather and 10 gallons of fuel aboard, we were right at the airplane's 1,000-pound maximum takeoff weight. After a no-frills runup to check the magnetos, tachometer, and temperature of the Rotax's liquid coolant, we made a radio call and took the active at French Valley.

Normal takeoffs call for one notch of flaps, full power, and rotation at 44 KIAS. Acceleration is swift thanks to the Rotax 582's 65 hp, and rotation speed came in just a few seconds. A tug on the yoke and the airplane leaps off the ground. Pitch attitude is adjusted for a climb speed of 52 KIAS, which is V_Y. Due to its high thrust line, the GT–500 wants to nose over at high power settings. It helps to set some nose-up trim so that the proper climb speed can be more easily maintained.

The climb angle is impressive. Though our rate of climb on that 75-degree morning wavered from 500 to 600 feet per minute, we were flying so slowly that it seemed we were on an elevator, going more or less straight up. The view from that lonesome, airy (the doors were unzipped halfway) perch out front made it all the more impressive and fun. Still, I was glad the airplane was fitted out with a heavy-duty restraint system, complete with shoulder harness.

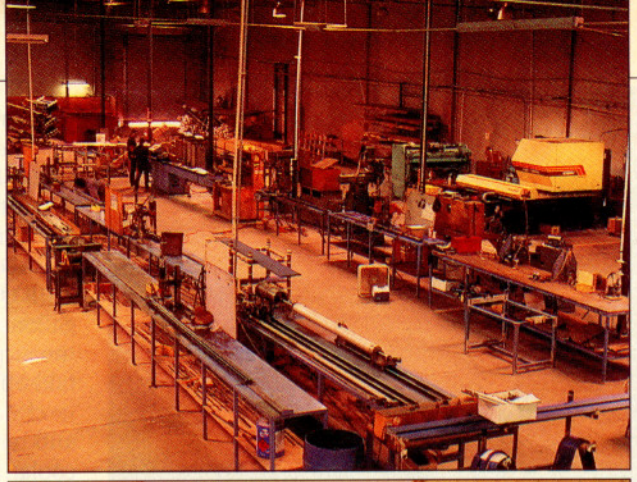
For a normal, 75-percent-power cruise, the throttle is pulled back to an engine speed of 5,800 rpm. The propeller, driven through a reduction gearbox, then turns at a quiet 1,670 rpm, and the resultant airspeed is about 65 KIAS. We leveled off at 2,500 feet, took up a northwesterly heading, and flew toward the nearby Perris Valley Airport. Beneath us was the arid valley, punctuated here and there with boulder-strewn hills and ridges.

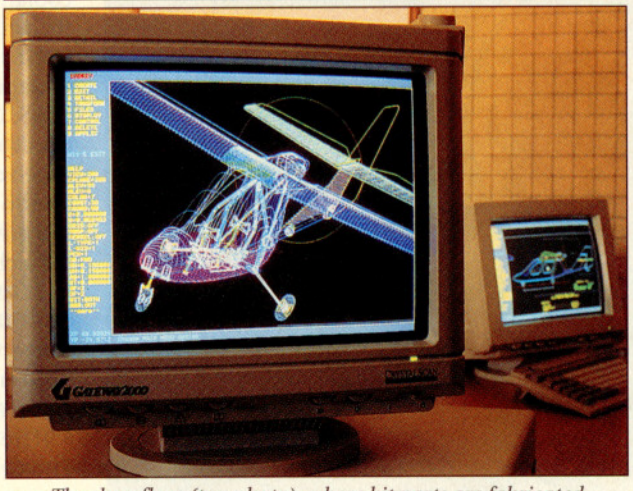
The Rotax thrummed along smoothly, its coolant temperature settled at approximately 160 degrees Fahrenheit. Redline on the coolant gauge is 180 degrees. Owners can opt for a 50-hp, air-cooled Rotax 503, but most of the 220 GT–500s sold to date (as amateur-built kits in the FAA's Experimental category) have the more powerful liquid-cooled engine. The Rotax has an oil injection system that

automatically mixes oil with fuel. You just fill an engine-mounted 2-quart reservoir tank with two-stroke oil, then fill the fuel tanks with gasoline. At full power, the oil injection system mixes fuel with oil in the proper, 50:1 ratio. At cruise, that ratio is leaned out to 75:1; at idle, it's 100:1. There's a red warning light on the panel that signals when the oil reservoir is running low. By the way, at 75-percent power, the Rotax burns fuel at approximately 5.5 gallons per hour. This gives it a range of about 113 statute miles/98 nautical miles.

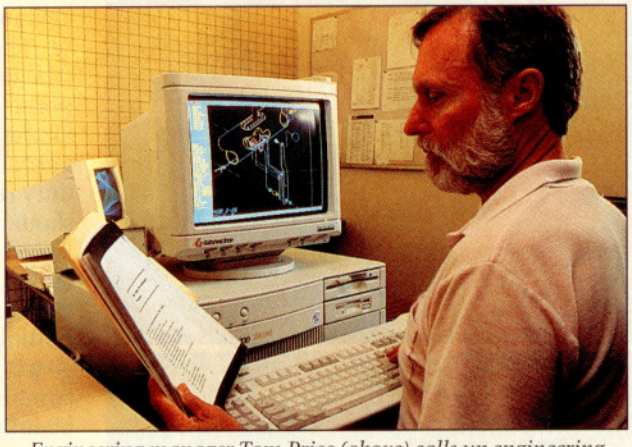
Perris is home to a busy ultralight fixed-base operation, as well as a center of skydiving activity. We landed on a short dirt strip that paralleled the main runway, which made for a convincing short-field-landing demonstration. Using the recommended local procedure, we descended to 200 feet agl, zigged and zagged to avoid the noise-sensitive areas, then slowed to 50 miles per hour/44 KIAS with three notches of flaps. At this speed, we still had plenty of margin against the stall—a 15-KIAS margin, to be exact. Reducing power, we held that airspeed until just before the flare. Our landing distance was well under a third of the 1,000-foot-long strip. Mather's only caution was against a premature or too-aggressive flare. Raise the nose too high, and the GT–500's drag will cause the airplane to sink mightily.

For the takeoff at Perris, we used an even shorter dirt strip. It was about 600 feet long, so we used the short-field takeoff procedure: Apply brakes, put down two notches of flaps, add full power, release brakes, and accelerate to 50 mph/44 KIAS. At that point, you haul back on the yoke and hold 50 mph—V_X—in the initial climb-out. We consumed about half the runway before lifting off.

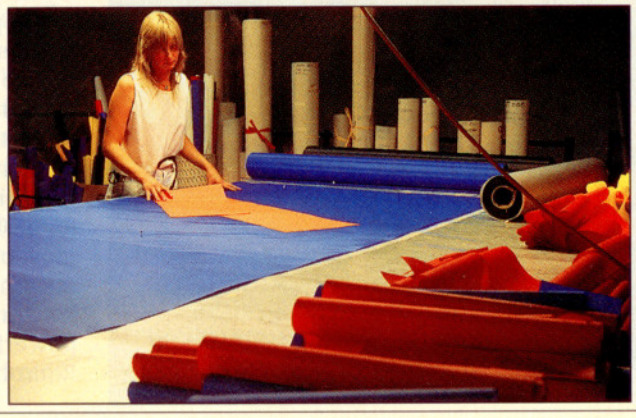




The shop floor (top photo), where kit parts are fabricated and packaged, also includes a quality control unit. CAD software (above) sees extensive use.



Engineering manager Tom Price (above) calls up engineering specs from Quicksilver's database. Dacron for the GT–500's wings and tail are cut to size in the sail loft (below).



Flying back to French Valley, we took the scenic route, flying low and slow over desolate terrain. It reminded me of flying a Cub, what with the windows down and the breeze through the cockpit, but the view was much better, thanks to the pilot's IMAX-like perspective of the world.

At altitude, stalls, slow flight, and steep turns were sampled. I'd have to say that the GT–500's ailerons were ponderous and its rudder extremely sensitive. Pitch forces seemed just about right. All this is to the good if you're learning to fly. The GT–500 will definitely teach you about rudder control and coordinated flight, and this should be an important element in any pilot training curriculum. Even so, company officials said they were aware of the rudder's sensitivity and planned to perhaps extend the vertical stabilizer to help tone down the responsiveness. A great deal of the problem, however, is design induced. The propeller's blast is so close to the vertical stabilizer and rudder that it's very effective in batting the rudder around.

How would a pilot accustomed to flying conventional single-engine airplanes feel about the GT–500's handling? The lack of control harmony would certainly be noticed, and most wouldn't like it a bit. But if a cynic were to fly it for an hour, he'd be sure to get the hang of the GT–500's different ways. Remember: The airplane meets FAA certification standards, and that includes control responsiveness and stability criteria.

Stalls were basically non-events. The airplane simply shudders a bit, then the nose bobs up and down in a mushing descent.

Back at French Valley, it was time for some touch and goes. Two trips around the pattern and pilots of average experience should have the

procedure nailed. The magic number is 52 KIAS, or 60 mph. That's the speed to hold on climb-out and also during the descent to the runway. Two notches of flap are plenty (the airplane doesn't really need flaps except for the shortest of runways), and remember to land in what appears to be a flat attitude. As a rough guideline, keep the horizon about halfway up the windshield at the moment of touchdown. In this attitude, you'll still be a few degrees nose up because the airplane has a slight nose-down rake with all wheels on the ground.

A close look at the airplane shows the same kind of quality and attention to detail that made Quicksilver ultralights such successes. From raw materials to fabrication of parts to delivery, assembly, first flight, and periodic maintenance inspections and procedures, Quicksilver insists on adherence to check lists designed to help assure quality and safety.

As for the design and manufacture of the airplane, it's fully documented according to accepted industry standards. In large part, this is due to Quicksilver's director of engineering, Tom Price. Price, an aeronautical engineer who served a lengthy stint with McDonnell Douglas, knows the ropes when it comes to conforming with government specifications. This skill was vital in securing the GT–500's certification. When it came time to submit the GT–500's engineering documentation to the FAA, all Price had to do was box up the GT–500's 2-foot-deep pile of drawings, manuals, and other documents and hand them over. For Price and Quicksilver, preparing to apply for the GT–500's Primary certificate was not an earthshaking endeavor. "We've always used the same procedures and processes for all our products," Price said. "So we had established and documented accepted methods of compliance for many years."

A great deal of that documentation is in the form of reams of mechanical drawings, each meticulously showing every part's dimensions and composition, along with any revisions to the part's design or structure over the years. Computer-aided-design software plays another big part in Quicksilver's designing of parts and assemblies.

Quicksilver's way of designing and documenting doesn't come cheap. "We've put over $400,000 into the design and certification of the GT–500, if you count all the preliminary work of earlier designs like the GT and the GT–400," said Quicksilver President Lyle Byrum. "The actual, final steps toward certification in the Primary category weren't all that expensive—$15,000, I think—but because of the way we design and document, numbers add up over the years."

They add up, all right, but nothing like the costs involved in certifying a single-engine airplane to standard, increasingly complex FAR Part 23 standards. Those costs can run in the tens of millions.

The whole intent of the Primary category is to let manufacturers certify their aircraft to Part 23 standards but under vastly simplified methods of compliance that reflect the simplicity of the designs. Quicksilver's experience shows that the intent of the rules can work. Safe, small airplanes can be certified—and therefore sold—at comparatively low prices. Quicksilver's approach was to use the JAR/VLA certification rules and certify the GT–500 in the Pri-

QUICKSILVER'S RISE

Transitioning from hang gliders to certification.

With sales of more than 30,000 plans, kits, and completed airplanes, Quicksilver Enterprises ranks among the most successful of all general aviation manufacturers. And yet many without hang glider or ultralight familiarity have never heard of the company. How did Quicksilver come about?

It all started in 1971, when six hang-gliding enthusiasts in Torrance, California, joined together to form a company that built hang-glider kits. The six were: Dick Eipper, Bob Lovejoy, Steve Wilson, Dave Muehl, Mike Huetter, and Dave Cronk. Eipper and Wilson threw all the money they had into starting up the operation. Lovejoy, whose day job was at toymaker Mattel (he designed the "Hot Wheels" miniature racetrack cars), and Cronk, a very well known and experienced hang-glider pilot, were the designers. Dave Muehl made the wings because he was an experienced sailmaker.

They called the company Eipper-Formance, a play on the words "high performance." Most just called it Eipper, for short.

Cronk and Lovejoy designed a delta-wing hang glider based on a classic design

invented by Francis Rogallo, a NASA engineer tasked with devising a recovery system for reentering Apollo space capsules. This was the Flexi-Flyer, and after an advertisement was run in *Popular Science*, orders for some 10,000 sets of plans came rolling in. The company was off and running.

A rigid-wing hang glider, the Quicksilver B, was next. Cronk and Lovejoy used a wing with parallel leading and trailing edges and a weight-shift control system. Plans for another 10,000 Quicksilver Bs were sold, along with 500 kits.

After the introduction of the Quicksilver

mary category's sportplane class.

For all of the GT–500's success in certification, some serious questions remain. With prices pushing the $30,000 mark, a new GT–500 competes with good used trainers like the Cessna 150/152 and other older two- and four-place singles. Will buyers spring for what looks like an ultralight? In addition, the GT–500's maintenance requirements can be high. The Rotax has a 300-hour recommended time between overhauls. Also, Quicksilver recommends the replacement of many of the airplane's parts on a regular basis. That's not an indictment of the design, but a reflection of Quicksilver's responsibility in recognizing the way its products wear. But some may interpret this incorrectly as an admission of the airplane's frailty.

These negatives are balanced by strong points. A factory-remanufactured engine costs just $1,200. After about 2,000 hours of flying, you'd pay approximately $8,000 for overhauls—about the same as a 150-hp Lycoming O-320. Replacement of the crankshaft bearings, pistons, rings, connecting rods and gaskets costs just $650.

Parts costs are also low, as are hourly operating costs. And if a pilot takes the necessary training, he or she can perform much of the GT–500's maintenance. Quicksilver is currently working on courses for training pilots in GT–500 maintenance procedures. The courses would be held at the facilities of each of the company's four U.S. distributors.

At the very least, the GT–500 has paved the way for a new generation of low-cost, simple airplanes that can help rejuvenate general aviation. At most, it proves that Quicksilver has taken the high ground as a remarkable, standard-setting example of how a small but ambitious manufacturer can climb the path to certification.

Maybe the promise of ultralight flying didn't die after all. How ironic that for a sport that was once declared dead and buried, its leading manufacturer was the first to claim a place in the Primary category. □

Quicksilver Enterprises, Incorporated, 27495 Diaz Road, Temecula, California 92590; 909/676-6886.

C in 1974, plan sales were discontinued. Eipper was now in the kit-sales business. What's more, hang gliders soon took a back seat to the company's first ultralight models.

The Quicksilver C could accommodate a small engine and pusher propeller between its tail booms—for those who wanted to experiment with installing their own powerplants.

In 1978, Eipper's first ultralight—the Quicksilver CM—was introduced. It used a weight-shift control system and a crude, 12-hp Chrysler West Bend engine (in normal life, the West Bend engine saw duty as an earth-tamper) that drove a 48-inch-diameter pusher propeller. The Chrysler's reliability was awful, so subsequent ultralight designs used Cuyuna and Rotax engines, which had proven track records as snowmobile engines.

In 1980, Lyle Byrum, a former fixed-base operator, Cessna dealer, and A&P mechanic, bought Eipper-Formance. The designs that followed set sales records during the ultralight glory days. By far, the most successful was the Quicksilver MX, which had pedal-operated spoilers and three-axis controls. More than 5,000 MXs were sold, and two-place MXs, which serve as ultralight trainers, were almost as successful.

Other designs—all of them based on the wing design first conceived by Cronk and Lovejoy—were soon in coming. Some had double-surface wings, some had ailerons for roll control, some were two-seaters, and others were 50-hp hot rods. Nearly all of them were powered by Rotax engines, and none of them used weight shift. They were true small airplanes, quite conventional, and quite unlike some of the other, truly weird competing aircraft.

The real-airplane theme was boosted in 1983, with the introduction of the GT series. First was the GT–400, a single-seater with a 28-hp Rotax engine. This grew into the company's current design, the two-seat GT–500. You can still buy many of the single-seat Quicksilver ultralights, but with the GT–500's newly earned certification in the Primary category, it's clear that the company's direction is becoming more and more mainstream.

With four U.S. distributorships, 75 domestic and 50 overseas dealers, and annual sales in the $4 million range, Quicksilver has come a long, long way in just 22 years.

What happened to the original six? Eipper left the company in 1973, sailed the Caribbean, but died of complications that arose from a boating accident. Lovejoy died in the crash of another ultralight he was helping design. Wilson became a farmer. Muehl took up jewelry making. Heutter went into business making water-powered generators. Of the original founders, only Cronk remains. He still serves as the company's designer. —*TAH*