STODDARD-HAMILTON GLASTAR

SOMETHING COMPLETELY DIFFERENT

Stoddard-Hamilton breaks the Glasair mold

BY MARC E. COOK

Like a Monty Python's Flying Circus skit that promises a political satire but veers into visual farce—"The penguin on your television will now explode," for instance—Stoddard-Hamilton has abruptly careened off the expected path. For more than 15 years, the company has cranked out composite kit airplanes famous for ever-increasing speed and big-airplane features.

But with the GlaStar, the company has plotted a new course. The company that made its name on fast two-placers has launched a high-wing utility airplane in which ability to rip through the skies has been sacrificed for prowess in hauling the catch of the day.

Turning a performance cheek has its roots in fiscal realities. These days the high-performance two-place market can be accurately described as saturated. Not only is there a broad range of new kits available, but the stock of high-quality pre-built versions

PHOTOGRAPHY BY MIKE FIZER

has begun to compete directly with new sales. In addition, modern kit builders have come to expect ever-decreasing build times and more work to be completed by the factory. And finally, kit buyers are far more status-conscious than those on the production side, so a model line that is merely mature in factory-built parlance becomes yesterday's news to the kit crowd. All of these elements have ganged up on the high-performance kitplanes, the Glasair series included.

In this climate, Stoddard-Hamilton founder Tom Hamilton began to realize that his longstanding desire to build swift utility models might be bolstered by timeliness. In due course, the backwoods airplane was penned and built by a handful of Glasair faithful and presented to the kit world at last year's Oshkosh mêlée.

It appeared to be an immediate success, and a real eye-opener to the Stoddard-Hamilton competition that believed the company would do little more than evolve the Glasair. In the time since, Stoddard-Hamilton has worked vigorously to turn a one-off developmental prototype into a template for production bits and pieces. It hasn't been an easy path; but when we visited the factory in the weeks just before the great Wisconsin crush, GlaStar kits appeared to be on course for delivery by year's end.

You might think that a new design from such old hands as the Stoddard crew wouldn't so much as cause a sweat. But the company had grand plans for the GlaStar. At the outset, Hamilton and ex-Stoddard chief Ted Setzer decided that any new model would have to set new standards in build time and simplicity. These wishes called for significantly different ways of thinking. The GlaStar, it was decreed, would not be just a high-wing Glasair.

Rather than using fiberglass for most of its construction—à la Glasair—the GlaStar is a true composite airplane. In it you'll find conventional aluminum structures, fiberglass, and a steel-tube main backbone reminiscent of tube-and-fabric steeds. Why this combination? The company says each material was chosen for the areas in which it makes sense.

Take the GlaStar's fuselage. Fiberglass toilers will tell you that the ability to make complex, curvaceous shapes ranks high in that material's list of strengths. Wanting an aerodynamically clean and sculpted look, Stoddard-Hamilton decided to use a fiberglass main fuselage shell. It carries little in the way of structural loads, becoming a monocoque only behind the large baggage bay, with the intent of supporting the tail surfaces. Stoddard-Hamilton spent considerable time on the molds for these fuselage pieces, and the results are impressive. The prototype GlaStar fuselage is not painted; quite literally what you see is what ought to emerge from the large crate in your driveway.

Beneath that two-piece fuselage—the two major portions are split vertically—lies a chrome-molybdenum steel tube frame. It was Hamilton's belief all along that the GlaStar should be versatile; and a steel-tube backbone would allow fitting tricycle or conventional gear, as well as simplify attachment of floats. Moreover, the tube frame creates a sturdy roll-over cage and greatly eases the build process. In a composite aircraft, structural components mated to the fuselage shell must be attached by internal reinforcements. Usually, the beefing up is left to the builder; because of concern about building differences, the factory incorporates a few hard points into composite structures. At


GlaStar
N824G
GlaStar


N824G
MAN
RPM
VERTICAL SPEED
GlaStar
PASSENGER WARNING
CABIN HEAT
FUEL ON
FUEL OFF

the home workshop, mistakes can be made in placing the so-called hard points for structural members, and the entire process is time-consuming. So the GlaStar uses a Mooney-style steel frame, employing the composite fuselage mainly as a way for the pilots to keep dry in the rain.

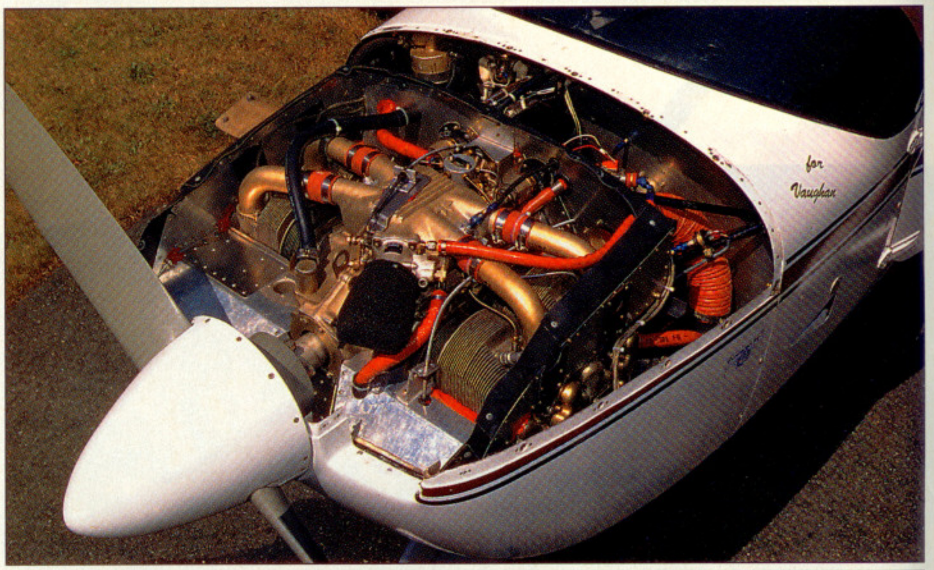
This assemblage of glass and steel hangs from a conventional GAW-2 airfoil rendered in aluminum. In light of the airplane's mission, a tapered planform would offer few benefits. Not only that, but a constant-chord wing could easily be built from metal, using one size of rib, for example, and needing only a simple jig. To further ease the builder's task, the wing uses small semicircular hat sections inside the wing in lieu of more ribs for strength, as you might find inside the wing of a Luscombe.

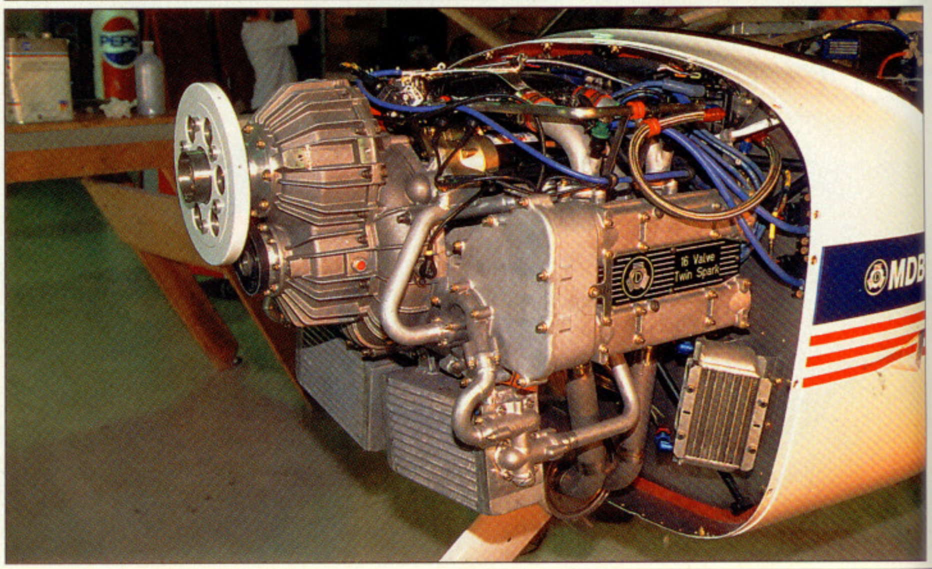
To further help the builder along, the wing skins come with pilot holes already drilled. Though there is some flush riveting and still much preparation work to be done, Stoddard believes that with a bit of practice any builder capable of operating hand tools ought to be able to build this wing with good results. Hung from the wing's trailing edge are semi-Fowler flaps operated by a simple mechanical handle in the cockpit, and Frise-type ailerons reside outboard. Originally, the ailerons were to be cusped, but excessive roll forces called for reconsideration; production models will be flat-bottomed.

Stoddard-Hamilton gave the GlaStar a relatively narrow-chord wing for a variety of reasons. For one, span loading improves climb and cruise performance; the wing, with a reasonably generous area of 128 square feet, stretches a full 35 feet. More important than sheer aerodynamics, however, was the company's desire to move the wing aft far enough to improve visibility in turns, thus eliminating a common high-wing aircraft shortcoming. It was an easier task with a long, thin wing.

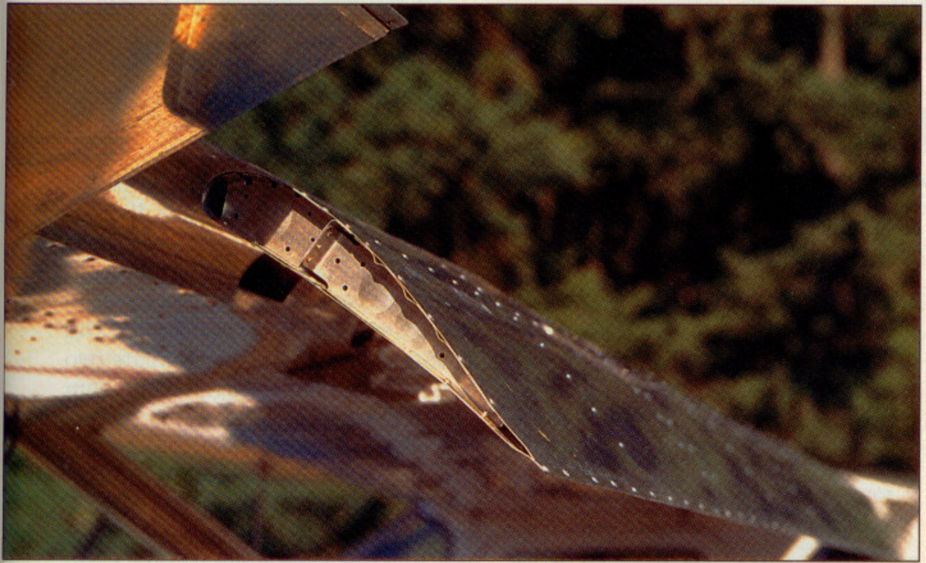
Of course, an aft-placed airfoil forces other compromises. Look at the tail section of the GlaStar and you first wonder, "Why are the vertical tail and rudder so huge?" Simple. As you move the wing aft, the moment arm of the tail feathers is reduced, thereby trimming their effectiveness. Rather than produce a new, longer tailcone, Stoddard simply increased the areas of the

Folding wings (above) make trailering possible. A Continental IO-240-B (below) currently resides in the GlaStar's engine compartment. The GlaStar is also a testbed for the new, high-tech MDB engine (bottom); Daetwyler is pondering its market potential.





Generous flap area gives low stalling speeds and backwoods utility to the GlaStar (below). A baggage bay large enough for all the salmon you could catch graces the aft cabin (bottom); there is room for a child's seat.



horizontal and vertical components. Initially, the company wanted to capitalize on the GlaStar's folding wings by having a horizontal stabilizer and elevator narrower than eight feet to improve trailerability. Flight tests showed that the target longitudinal stability would not be met in that configuration, especially with larger engines in the GlaStar's future. So the horizontals grew by two feet in span and gained a mounting scheme that allows for quick removal. Other changes that have been made to the wing to improve its torsional rigidity include a change to an extruded main spar in place of the planned built-up unit. Incidentally, these alterations can be considered normal in the early evolution of a new design.

Propulsion for the GlaStar comes from a four-cylinder Continental IO-240 engine of 125 horsepower. It uses familiar parts—IO-360 cylinder assemblies, for example—to provide a powerplant between the 100-hp O-200 and the 210-hp IO-360. (In piecing together the IO-240, Continental sought to stem the Lycoming-blue tide in homebuilts calling for this class of engine.) The GlaStar gets the engine because it makes sense. With the aircraft's good aerodynamics and a modest 1,900-pound maximum gross weight, the 125-hp engine seemed ideal. Also, since it costs $13,397 from Stoddard-Hamilton, the IO-240 would not be stratospherically priced.

We sampled the GlaStar with two versions of the IO-240. Initially, the company had the IO-240-A on board, but recent flight tests with the B model disclose significant improvements in torque below the engine's 2,800-rpm redline. Better midrange power comes from a revised, tuned induction system—the A used the conventional log-type intake runners—and other detail refinements. Stoddard-Hamilton officials estimate that the B will cost slightly more than the A.

With the IO-240-A, we thought the GlaStar's climb performance was adequate but not thrilling. Two people, full fuel (33 gallons), and a smidgen of baggage—bringing the load to within 200 pounds of maximum—left the A-powered GlaStar climbing at about 600 fpm from near sea level at a speed about 12 percent faster than best rate, necessary to see over the cowling. In the initial climb, the engine was turning about 2,300 rpm, well below the

maximum. Yet with the throttle dialed up for cruise, it became clear that the prop was not chosen for high-Mach cruise speeds.

Now with the B model on hand, the GlaStar is significantly sprightlier. We noted climb performance of 900 fpm at the same speeds and weights, with the engine spinning 2,440 rpm; all on the same prop. Set up in cruise at a density altitude of 5,000 feet and 2,500 rpm (approximately 65 percent power), the GlaStar posted a GPS-verified true airspeed of 117 knots. Applying a bit more locomotion—2,700 rpm, or about 75 percent power—at the same altitude netted 126 knots true. Projecting for the normal gains with altitude, the GlaStar's claimed optimum speed of 131 knots true at 8,000 feet seems perfectly plausible. Fuel consumption should be about 7 gph at 75 percent power and 6 gph at 65 percent.

At the other end of the speed range, we sampled a variety of simple unaccelerated stalls and can say that the GlaStar showed no untoward manners. (It had not been spin tested at the time of our flight, so wild cross-controlled stalls and other sweaty-palmed maneuvers will have to wait.) The stall gives plenty of warning, and there's ample roll control through the ailerons at low speed. Listed stall speed clean is 47 knots, 39 knots in the landing configuration. These snail-like stall velocities should help the airplane's short-field and float operations.

In the flight regimes we sampled, the GlaStar handled with a pleasant honesty. Control forces are conventional, and there's sufficient longitudinal stability to allow for easy look-out-the-window flying. Landings, flaps up or at one of their two settings—20 or 40 degrees—proved remarkably simple affairs. In fact, we really had to work at getting the airplane slowed to its ideal approach speed—about 65 knots—for short landings.

Although the external dimensions of the GlaStar aren't radically dissimilar from a Cessna 150's, the cabin represents a voluminous departure from the Wichitonian's. Claimed to be 46 inches wide and nearly as tall, the GlaStar cabin will accommodate two large adults, with enough elbow room to put many production four-seaters to shame. Behind the seats is a 32-cubic-foot baggage bay that's supposed to be up to holding 250 pounds of stuff. Such a grand cargo hold begs the question of additional seats. Stoddard-Hamilton is coy on the topic, saying that if an enterprising builder wants to put a small chair back there, well, that's just fine—but the airplane's officially a two-seater. Visibility from the front of the cabin is good, thanks to a tall windshield and an excellent view outward from just about any angle. You soon get used to the two steel-tube members criss-crossing the windscreen.

Right now, the company intends to continue development of the kit components and work on fitting floats. A power increase is planned, as well. Tom Hamilton explains that all the load testing was done accounting for the weight and mass of a 180-hp

Stoddard-Hamilton GlaStar
Base kit price: $19,900

Specifications	
Powerplant	Teledyne Continental IO-240-A or IO-240-B
Recommended TBO	2,000 hr
Propeller	Sensenich fixed-pitch, 72-inch diameter
Length	22 ft 2 in
Height	9 ft 1 in
Wingspan	35 ft
Wing area	128 sq ft
Wing loading	14.8 lb/sq ft
Power loading	15.2 lb/hp
Seats	2
Cabin width	46 in
Empty weight, typical	1,100 lb
Maximum gross weight	1,900 lb
Useful load	800 lb
Payload w/full fuel	602 lb
Fuel capacity, std	33 gal (33 gal usable) 198 lb (198 lb usable)
Fuel capacity, w/opt tanks	53 gal (53 gal usable) 318 lb (318 lb usable)
Oil capacity	6 qt
Baggage capacity	250 lb, 32 cu ft
Performance	
Rate of climb, sea level	1,000 fpm
Cruise speed/fuel consumption	
75 percent power @ 8,000 feet	131 knots/6.8 gph
65 percent power @ 8,000 feet	122 knots/5.8 gph
Service ceiling	17,000 ft (estimated)
Limiting and Recommended Airspeeds	
V_X (best angle of climb)	52 KIAS
V_Y (best rate of climb)	70 KIAS
V_A (design maneuvering)	77 KIAS
V_{FE} (max flap extended)	80 KIAS
V_{S1} (stall, clean)	47 KIAS
V_{SO} (stall, in landing configuration)	39 KIAS

For more information, contact Stoddard-Hamilton Aircraft, Inc., 18701 58th Avenue N.E., Arlington, Washington 98223; telephone 360/435-8533, facsimile 360/435-9525.

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted.

Lycoming swinging a Hartzell constant-speed prop. Several of the early GlaStar builders have signaled their intent to install powerplants more robust than the small Continental, including 150-hp and 160-hp O-320 Lycomings and Subaru auto-engine conversions. In addition, while in Stoddard-Hamilton's own hangar, we saw the new MDB/Daetwyler scratch-built aero engine being fitted to another GlaStar. This liquid-cooled, double-overhead-cam four, working through a 2.5:1 reduction drive, supposedly puts out nearly 170 hp from 2.6 liters at a lazy prop speed of 1,700 rpm.

Stoddard-Hamilton has worked diligently to keep the introductory price of $19,900 intact. Unfortunately, the extensive flight and load testing, as

Good payload and STOL performance make the GlaStar a rough-country contender.

well as changes in materials and processes, have really bloated Stoddard-Hamilton's up-front costs. At press time, the company was considering the possibility of making the engine mount an additional-cost item, on the order of $300 or so. (In part, this makes sense because there will probably be a number of different engines hung on the front of this airplane.) A reasonable rule of thumb says a completed airplane will cost about double that of the kit itself. This leaves GlaStar builders flying for around $40,000. And while the official build time estimate will have to wait until a few of the GlaStars are flying, the company is hoping the project will come in at around 1,000 hours.

That being the case, in the GlaStar Stoddard-Hamilton will have fulfilled the major portions of its designs. The airplane itself represents creative thinking and flies and performs according to plan. It may well be something completely different from the maker of all things Glasair, but it's likely to be welcome among homebuilders and Monty Python fans alike. □