



**KATANA ECLIPSE**

# Eclipsing the trainers

**P**ut yourself in the shoes of an aircraft-company executive. Your firm has been spun off from a successful European sailplane and motorglider company to build a derivative two-seater mainly for the Canadian and U.S. markets. You have succeeded in bringing the airplane to life, developing a production facility, and maturing the airplane as field experience and natural growing pains dictate. All in all, a successful launch.

Your core customers have, perhaps not unexpectedly, emerged as flight schools

## **Diamond sends its trainer on another mission**

**BY MARC E. COOK**  
PHOTOGRAPHY BY MIKE FIZER



and training-oriented FBOs. Missing from the mix are the so-called private customers—pilots who want a tidy two-seater for pleasure flying. You check the sales reports, and these customers are almost nowhere to be found. What do you do?

If you're Diamond Aircraft and you are working overtime just to get your factory up to speed after launching a new model (following the discontinuation of the old), the immediate answer is: nothing. Eventually, however, a hard-working company catches up with its backlog. So now Diamond's attentions have moved from just filling the pipeline to looking at ways to spur future demand. That's why it built a prototype of a potential new model called the Eclipse. This is the short-term solution to selling to individuals rather

## Diamond's Eclipse was built to see what could be done with the C1.



*The prototype's electric propeller control allows fingertip adjustment of engine rpm or the option of manual pitch adjustment.*

than just schools. Long term, of course, customers wanting a simple four-place single will cast longing gazes at the upcoming DA40.

In the time since Diamond began flying the Eclipse, it has decided to refocus its marketing efforts. Rather than produce the Eclipse as a standalone model, the company has decided to make many of the options loaded onto the Eclipse available on the standard DA20-C1 Katana. Items not on the previous option sheet include an S-Tec System Thirty two-axis autopilot, advanced avionics packages, side windows aft of the canopy, a larger glareshield that is attached to the canopy instead of the instrument panel, and a five-gallon-larger fuel tank.

Otherwise, the prototype Eclipse is for all intents and purposes a gussied-up C1 Katana. Introduced in 1998, the

C1 uses an air-cooled Continental IO-240 engine to provide 125 horsepower in place of the original Katana's 80-hp liquid-cooled Rotax 912. With the C1 comes a fixed-pitch prop in place of the Rotax's constant-speed unit and a mixture control where previously there was none. The C1 Katana also has a fuel-injected engine, more fuel capacity, and a higher maximum gross weight than the Rotax-powered progenitor. With a recent boost of 57 pounds to the max-gross figure, the upgraded Katana has a 379-pound payload with full fuel.

But where the standard C1 Katana is pleasant if sparsely optioned, the Eclipse became a veritable showcase for every item Diamond could conceivably implant into a 1,700-pound two-seater. A stack of desirable avionics graces the

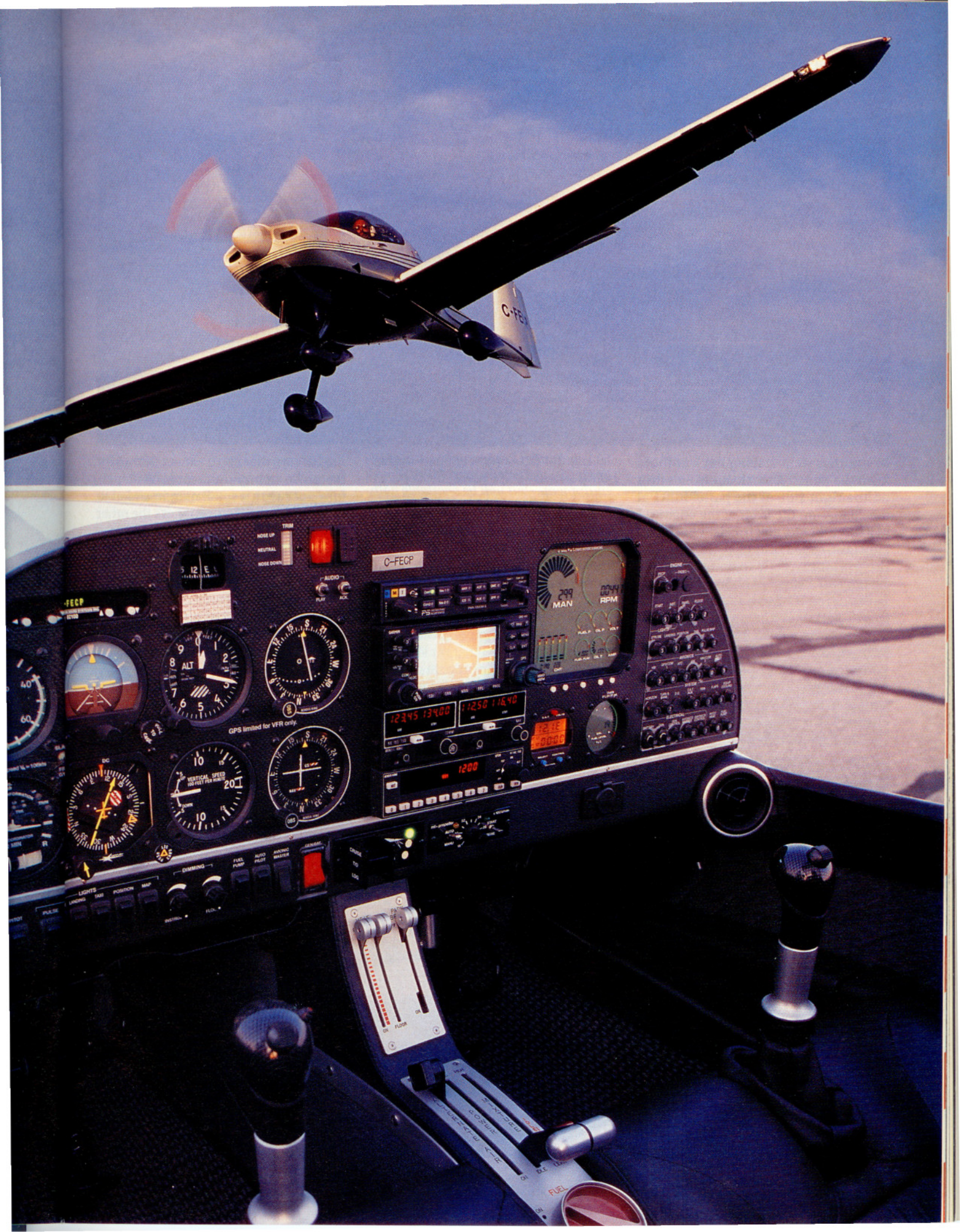
panel, as do a horizontal situation indicator (HSI) and the aforementioned S-Tec two-axis autopilot. Vision Microsystems' VM-1000 gauge package eliminates the normal smattering of analog gauges. Using a liquid-crystal display and a remote microprocessor, the VM-1000 provides full engine monitoring but also keeps tabs on fuel level, quantity, and consumption. In the Eclipse demonstrator there are also a prized Garmin GNS

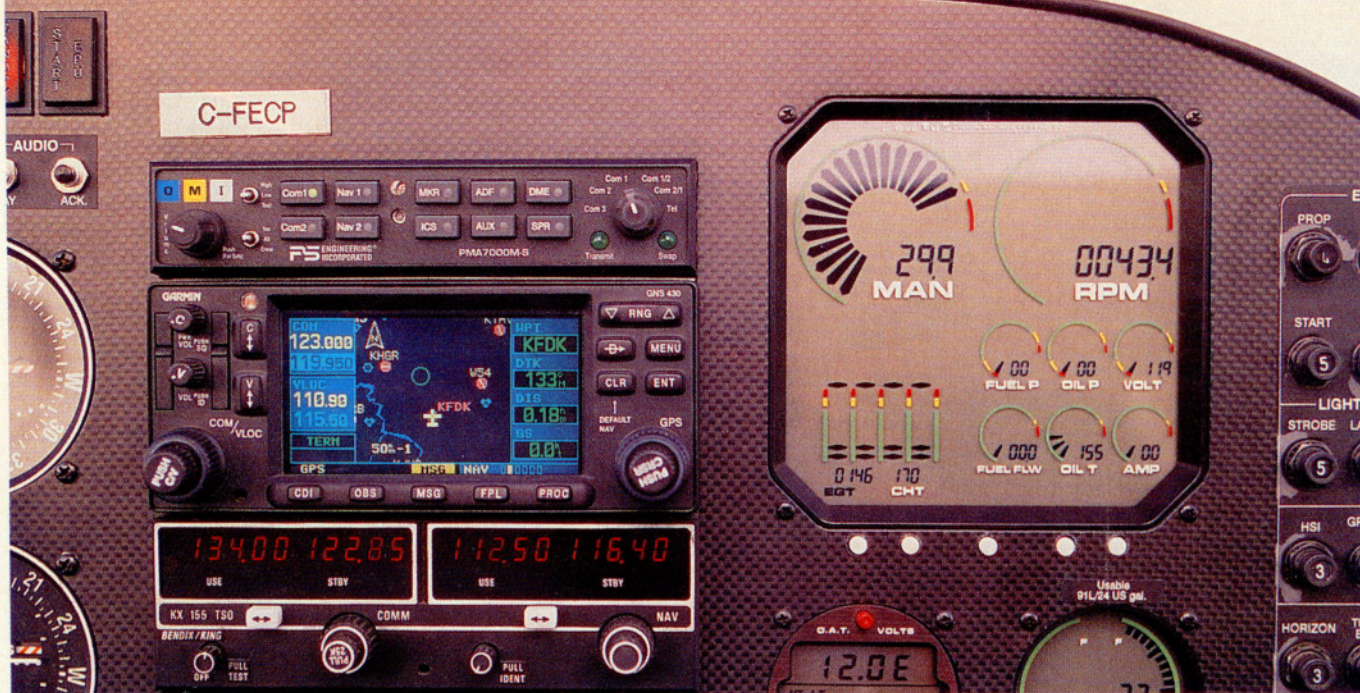
430 navigator/communicator and a PS Engineering PMA 7000 audio panel/intercom with the company's innovative DRAWS aural alert system. (It provides audio annunciation of anomalies noted by the VM-1000 or Garmin 430.)

An equipment list this extensive definitely slides onto the overkill side of the scale in an airplane not approved for actual IFR flight. Because it's based on the basic Katana certification—and lacks lightning protection—the Eclipse remains VFR-only. Diamond's rationalization is that the Eclipse is still a good IFR trainer (done in VFR conditions) and needs to have the basic navigation equipment for which most pilots clamor.

Pilots cutting their teeth on the Katana as a primary trainer might not recognize the Eclipse's high level of equipment, so they too will be surprised







by another item staring back at them from the panel. A small controller over on the right side of the panel hints at the change on the front of the engine. A MT three-blade, electrically controlled constant-speed propeller was fitted to the prototype Eclipse, managed by a switch and a small knob in the cockpit. Because the IO-240 has a solid crankshaft—and therefore no simple way to route pressurized engine oil to the prop hub—the Eclipse may not use a conventional hydraulically operated prop. (The Rotax was fitted with an external oiling system to drive its hydraulic prop.) The electric MT is quite similar to constant-speed props used in motorgliders pow-

*This upmarket Katana uses a mix of PS Engineering, Garmin, and AlliedSignal equipment—but will be available with a variety of packages.*

ered by Volkswagen-derived and other solid-crank engines.

Reminiscent of the early Beech Bonanzas, the Eclipse's prop can be run in either a manual or automatic mode; in auto, the dial selects the approximate engine rpm. Commanding an engine-speed change does not result in an instant shift, as it does with a hydraulic prop. Instead, the MT ambles over to the desired speed and pretty much stays there.

Performance improves noticeably with the fiberglass-over-wood prop, although

not in ways that you'd expect. Normally, there'd be an improvement in climb performance with a small margin added to cruise. With the C1/Eclipse, it's the other way around. Climbout is much like in the C1—a sustained 1,000 feet per minute (fpm) is possible at 70 KIAS at the maximum gross weight. Even though the engine is turning some 250 to 300 rpm faster than in the fixed-pitch version, the overall climb rate is not much different. (The fixed-pitch prop's diameter is slightly greater than the MT's.)

Push the nose over for cruise, and it's a different game altogether. Where the C1 is definitely rpm-limited by its climb-oriented prop, the Eclipse surges ahead and



## Improved wheel fairings and a constant-speed prop improve the Katana's performance.

picks up impressive speed. We noted 145 knots true at 6,000 feet on just 7.1 gph leaned to peak EGT, at full throttle and 2,500 rpm—that's about 77-percent power. The highest cylinder-head temp was just 365 degrees. At this speed, the constant-speed-equipped airplane is nearly 12 kt faster than the best book speed of the C1.

Moreover, the small Continental's mechanical fuel-injection system seems much happier with a constant-speed prop out front. Remember, part of the fuel flow is determined by engine speed;

with the speed constantly changing in a fixed-pitch-prop installation, the EGT tends to wander. Not so with the variable MT up front. With the IO-240's tuned induction system, it's possible for pilots concerned about fuel consumption to run lean of peak EGT.

Costs associated with highly equipped airplanes can be daunting, which is why Diamond has ultimately decided not to include the constant-speed prop on the options sheet for the enhanced C1. The explanation is simple: money. Certifying the prop/engine combination would be





costly, and the option would add about \$10,000 to the cost of the C1. It's Diamond's belief that the market won't jump that dollar gap for the new prop. Too bad. The Katana C1 takes a definite step up in performance and actually becomes slightly easier to fly with the MT propeller inside the spinner.

In other ways, the Eclipse is standard-issue Katana. The seats are new with the C1—and covered in leather for the Eclipse—and are comfortable enough for all but the longest journeys. Airframe modifi-

## **The Katana's large canopy provides excellent visibility.**

cations that came to the C1 make for a better-handling airplane, with improved balance and harmony. Don't let the Katana's trainer-first mission fool you: The

airplane is pleasurable and rewarding to fly, light enough to be nimble but no kite.

In an effort to distance these special-edition C1s from the flight-line pounders, Diamond has made available several personalizing options. For example, you can order your C1 with almost any combination of modern avionics. Previously, there were a couple of packages based on AlliedSignal equipment, but market demand has put Garmin products in the Katana's instrument panel as well. What's more, the new breed of Katana can be

ordered with backlighted instruments.

Although visibility is generally good in the C1, the optional rear windows really open up the cabin and eliminate a slightly annoying blind spot to the rear quarters. No longer are right-hand patterns a hunt-and-peek affair for the pilot.

Another attempt to increase performance focused on new wheel fairings, which were fitted to the Eclipse. Without flying the airplane with just one or the other, it's hard to say whether the pants or the prop helped to boost the Eclipse's sprint over the standard C1.

Of course, the big question that Diamond hopes the market will answer in the affirmative is this: Will customers flock to a revised trainer as a personal-

## The airplane is pleasurable to fly and light enough to be nimble but no kite.

ized, sport-flying airplane? The Eclipse-packaged C1's desirability depends an awful lot on how you intend to use the airplane. As a long-range transport, the airplane comes up short—it's not quite comfortable enough for multiple-leg jaunts and its VFR limitation could mean plenty of nights in a hotel if the weather turns ugly. In its favor, the better-than-130-kt cruise—on the fixed-pitch-prop model—means that crossing the country doesn't require a box of sectionals and a wall calendar to mark your progress.

If you've been watching the industry, you know that many supposedly ideal two-place personal traveling machines have come and gone as buyers opt for less-sexy but more utilitarian four-seat models instead. Diamond would appear to have the right solution here—offer an upscale version of an existing product that can be made without creating a lot of fuss on the factory floor. If it works, you've got an economical gap-filler between the basic airplane and the soon-to-arrive four-place; and if it doesn't, so be it. After all, as any airplane-company CEO knows, nothing ventured is truly nothing gained. □

**i** Links to additional information about the Diamond Katana may be found on AOPA Online ([www.aopa.org/pilot/links.shtml](http://www.aopa.org/pilot/links.shtml)). E-mail the author at [marc.cook@aopa.org](mailto:marc.cook@aopa.org)



<b>Diamond C1 Katana Eclipse</b>		Rate of climb, sea level	1,105 fpm
Base price: \$119,575		Cruise speed/endurance w/45-min rsv, std fuel (fuel consumption)	
Price as tested (estimated): \$150,000		@ 75% power, best economy	132 kt/3.4 hr (42 pph/7 gph)
<b>Specifications</b>		6,000 ft	
Powerplant	Teledyne Continental IO-240-B	Maximum operating altitude	13,123 ft
	125 hp @ 2,800 rpm	Landing distance over 50-ft obstacle	1,235 ft
Recommended TBO	2,000 hr	Landing distance, ground roll	550 ft
Propeller	Hoffman two-blade, 69-in dia, fixed pitch	<b>Limiting and Recommended Airspeeds</b>	
Length	23 ft 6 in	V <sub>X</sub> (best angle of climb)	60 KIAS
Height	7 ft 2 in	V <sub>Y</sub> (best rate of climb)	75 KIAS
Wingspan	35 ft 8 in	V <sub>A</sub> (design maneuvering)	106 KIAS
Wing area	125 sq ft	V <sub>FE</sub> (max flap extended)	78 KIAS
Wing loading	13.2 lb/sq ft	V <sub>NE</sub> (never exceed)	164 KIAS
Power loading	13.2 lb/hp	V <sub>S1</sub> (stall, clean)	42 KIAS
Seats	2	V <sub>SO</sub> (stall, in landing configuration)	34 KIAS
Empty weight (typical)	1,166 lb	<i>For more information, contact Diamond Aircraft Industries Inc., 1560 Crumlin Sideroad, London, Ontario, Canada N5V 1S2; telephone 519/457-4000, fax 519/457-4021, or visit the Web site (<a href="http://www.diamondair.com">www.diamondair.com</a>).</i>	
Maximum gross weight	1,719 lb	<i>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.</i>	
Useful load	553 lb		
Payload w/full fuel	379 lb		
Fuel capacity, std	29.5 gal (29 gal usable)		
	177 lb (174 lb usable)		
Oil capacity	6 qt		
<b>Performance</b>			
Takeoff distance, ground roll	952 ft		
Takeoff distance over 50-ft obstacle	1,263 ft		
Max. demonstrated crosswind component	15 kt		