

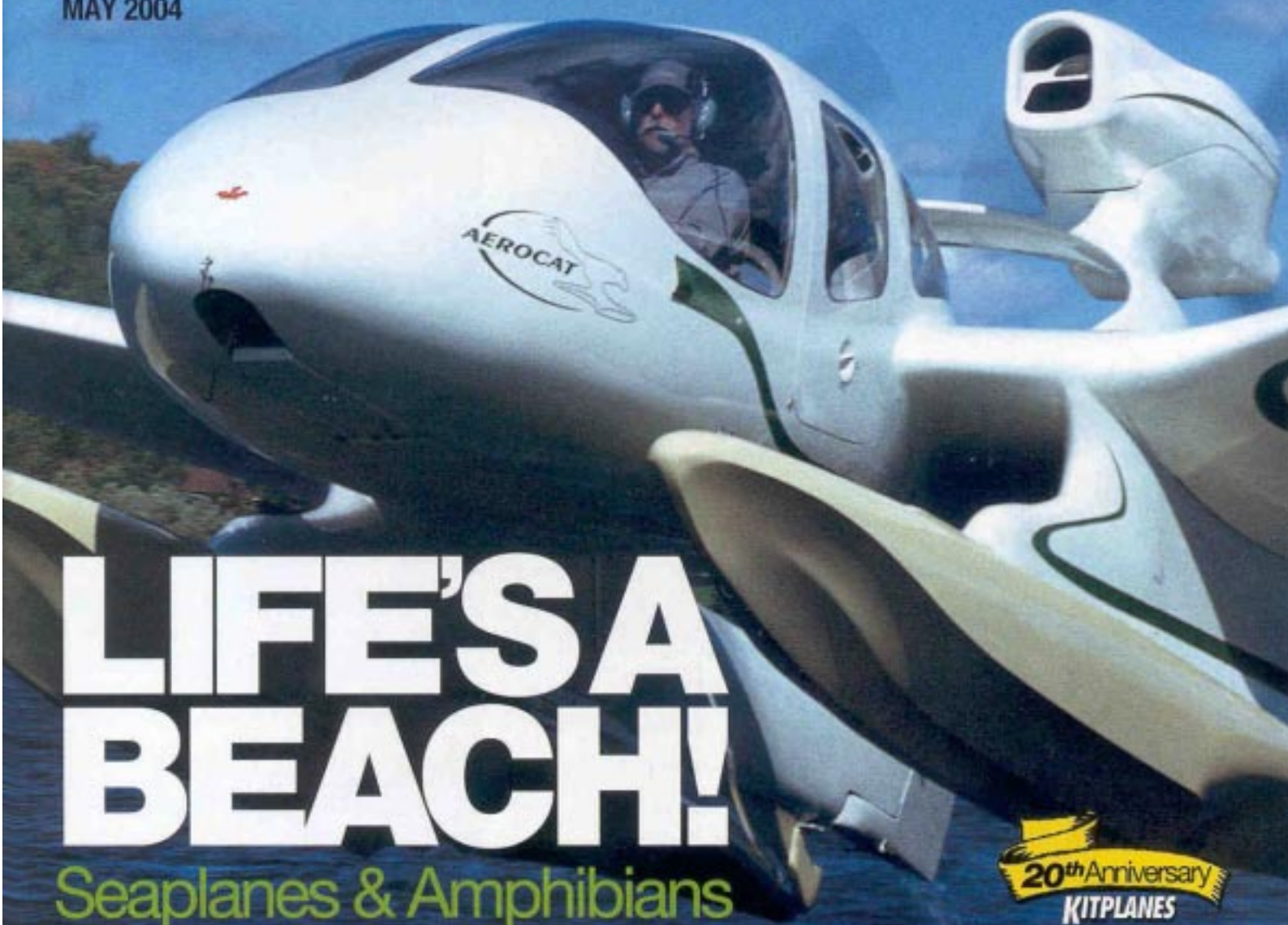
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Flying the Mosquito:

## Maximum fun at minimal cost.

**H**ere's a bold statement to begin an article: Flying the refined Mosquito ultralight was the most fun I've ever had with a helicopter! In this case, smaller is better. A flight in the minuscule Mosquito is convincing—it's as close as you can come to real flying with almost no means of support, and the view is at least as good as a bird's.

The Mosquito was designed and built by Calgarian John Uptigrove in Alberta with the production rights initially belonging to Rotorlite of North Carolina. That relationship didn't work out, so Uptigrove regained the production rights and is now producing kits prodigiously. Twenty-one have been sold to date as this sprightly freedom machine won over those who have dreamed of rotary wing flight but fell short of their goal due to financial constraints. At \$18,995 for the advanced fastbuild kit, almost any aviator in North America can afford to fly vertically.

In the May 2002 issue of *KITPLANES*®, we introduced the Mosquito and its capabilities and promised a flight evaluation at our first opportunity.

### The Essentials

The Mosquito includes a building manual, operation manual, 11x18-inch construction photos, six exploded-view drawings, 33 large CAD-created assembly drawings and access to an online builders' discussion forum.

To meet the 254-pound ultralight weight limit, the Mosquito employs a carbon-fiber tailboom, 6061-T6 aluminum structure and no cockpit enclosure.

You'll truly hang out when you fly this zippy aerial sports car.

It helps that Uptigrove is a mechanical engineer and handy with machining equipment. To meet demand, he farms out all of the work to three local shops that have his complete confidence. The quality of materials, beefiness of the dynamic components and quality of workmanship on the prototype were excellent. I was also impressed with Uptigrove's honesty and openness as we discussed the development and other aspects of the helicopter's evolution.

### Fling Wing Operations

The preflight inspection was accomplished in detail to preclude any

technical or pilot-induced problems. I was impressed with the quality of the construction.

Because the Mosquito is a single-place helicopter, I asked Uptigrove to fly a full spectrum of operations to give me an idea of the machine's capabilities. These included all the standard flight parameters plus high out-of-ground-effect hovers, quick stops and autorotations. Because the landing gear is essentially a tripod, the autos were flown to power recovery rather than touchdown. Still, the glide angle was shallow with a minimal rate of descent, similar to a steep descent in a fixed-wing aircraft. It was obvious that the 3-pound rotor blade tip weights provided lots of inertia to cushion emergency landings. In my opinion, excellent autorotational characteristics are important when flying with a two-stroke engine as they are more prone to failure.

With the Mosquito's small skid pads on the end of the tripod legs, it is important not to touch down with any sideways speed in an emergency to avoid rollover. The pads are bent up to allow the helicopter to slide somewhat, but movement during contact with uneven ground could cause the helicopter to tip over. Granted, this may be considered a minor observation because any skid-gear-equipped helicopter can roll over with lateral motion during touchdown.

After Uptigrove landed, a 2-pound weight was bolted to the aft tailboom to balance the 30-pound differential between Uptigrove and me. The austere fiberglass seat and forward strut of the tripod with the pedals for a footrest seemed minimal, but proved to be quite comfortable. The seatbelt gave me a feeling of minimal security; an optional shoulder harness could be added to increase comfort. I felt very much out in the open; in the past this has caused some anxiety in fixed-wing ultralights, especially during the nosedrop associated with stall evaluations.

At 3800 feet above sea level on a cool fall day, a ski jacket was called for, and the recommended motorcycle helmet was donned. This left me a relatively limited field of vision, adding somewhat to my anxiety.

### Specifications

|                                       |                         |
|---------------------------------------|-------------------------|
| <b>Kit price</b>                      | <b>\$18,995*</b>        |
| <b>Length</b>                         | <b>20 ft.</b>           |
| <b>Width</b>                          | <b>72 in.</b>           |
| <b>Height</b>                         | <b>83 in.</b>           |
| <b>Rotor diameter</b>                 | <b>18 ft.</b>           |
| <b>Main rotor rpm</b>                 | <b>500 rpm</b>          |
| <b>Tailrotor diameter</b>             | <b>40 in.</b>           |
| <b>Tailrotor rpm</b>                  | <b>2500 rpm</b>         |
| <b>Empty weight</b>                   | <b>254 lb.</b>          |
| <b>Gross weight</b>                   | <b>530 lb.</b>          |
| <b>Maximum fuel</b>                   | <b>5 gal.</b>           |
| <b>Maximum pilot weight</b>           | <b>250 lb.</b>          |
| <b>Engine</b>                         | <b>Zanzottera MZ202</b> |
| <b>Rated horsepower (6200 rpm)</b>    | <b>60 hp</b>            |
| <b>Fuel flow at cruise (6000 rpm)</b> | <b>4 gph</b>            |
| <b>Flight duration</b>                | <b>50-60 min.</b>       |
| <b>Hover in ground effect</b>         | <b>8000 ft.**</b>       |
| <b>Hover out of ground effect</b>     | <b>6000 ft.**</b>       |

\*with proof of flight training

\*\*estimated

With a warm engine, startup requires leaving only the battery master on and flicking the start switch momentarily. This switch is located below the pilot's seat and would not be available for an in-flight engine restart, as the pilot would not be able to take his or her hands off the collective or cyclic. Uptigrove installed the start system this way so a pilot would concentrate on the subsequent autorotation rather than an attempted restart. While I understand his concern, I believe that the all-important start switch should be mounted on customer machines in a convenient location on the cyclic or collective as is typical on almost all helicopters. Uptigrove has since advised that a push button will be available for kits.

With a centrifugal clutch and belt drive, there is no complexity to accelerating the blades to operational rpm, and no primary control input is necessary as the clutch smoothly brings the rotor rpm up to match the engine rpm needle. This type of engagement is much easier and less critical than on most piston-powered helicopters. While the helicopter is small, its rotary dynamics are quite beefy. After 140 hours on his machine, Uptigrove is satisfied with the Zanzottera engine—it has no fan belt to fail as was the case with the Hirth he originally used.

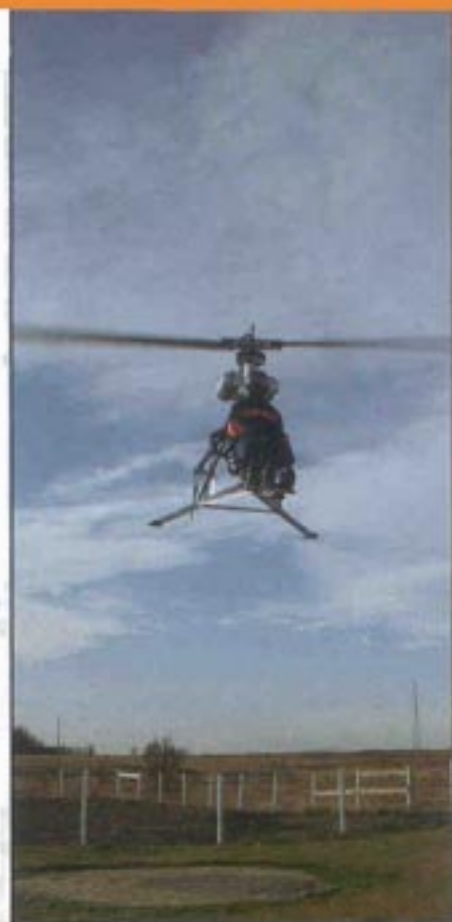
Once the rotor reaches the 96-104% operating range, the throttle is typically closed so that the one-way Sprague clutch allows an engine/rotor rpm split, allowing autorotation with-

out the engine being engaged. The optional engine-throttle governor system is typically engaged at 105%. The governor is armed with a button on the collective and another that is depressed momentarily on the collective to lock in the desired rotor rpm when it is reached. This ensures that the rotor rpm remains within limits throughout a broad throttle authority.

The governor system is not critical as the engine isn't as peaky as other two-stroke helicopters. In fact, because I didn't depress the button long enough, my first flight was flown without the governor engaged. The fact that there were only minor rotor rpm fluctuations is a testament to the agreeable nature of the system—not my rpm finesse. On my second flight, when I engaged the system correctly, a slight power twitch indicated the governor was engaged.

I should note that Uptigrove has designed the throttle linkage and engine idle speeds to optimize power recoveries during autorotation, as well as procedures during *stuck pedal* operations. This foresight was most impressive.

With the two-stroke engine, the EGT provides the only method of monitoring the power output. I found the small gauge between my feet difficult to read at times, and accurate exhaust temperatures typically lag reality as the probe must be heated for its reading. Knowing this, I simply used as much power as I wanted and waited for the rotor rpm to start to droop when the engine was maxed-out.



The author felt immediately comfortable in the hover and believes the Mosquito possesses excellent harmony in all axes.

## Pilot Impressions

My initial liftoff was the typical slow increase in collective pitch while sensitively feeling the first tendency to twitch; adequate rudder was necessary to prevent the helicopter from yawing. This proved quite simple as I entered a steady hover with very little workload. The day before I had been flying a modified version of a popular amateur-built helicopter and found it much more difficult to hover steadily due to stiff but sensitive pedals—a bad combination in terms of control harmony.

However, the Mosquito is rock-solid and possesses excellent harmony in all axes. Immediately comfortable with the hover, I increased power and the helicopter hauled my 210 pounds to approximately 30 feet above ground. The ability to hover so high out of ground effect attests to the excess power of the helicopter's Zanzottera 60-hp engine. Weighing only 69 pounds, the engine features an electric start and a 180-watt alternator to run your electrics.

Acceleration into translational lift



The Mosquito is not designed for cross-country helicopter flight, but the author calls it the ultimate low-cost, above-ground all-terrain vehicle.



The view from below. Not much support is offered in terms of protection from the elements!

provided some light vibration that continued through the full-speed range. Uptigrove had just installed a set of new production blades and hadn't yet had an opportunity to fine-tune them. When I discussed my observation with Uptigrove he was surprised as he felt the machine flew very smoothly. Perhaps it was a difference in perception.

The helicopter felt quite stable and easy to fly in the 10 mph wind regardless of the direction in which I hovered. This and other tests proved the tail rotor is extremely powerful; it's unlikely that pilots will get into situations where they lose tailrotor effectiveness (LTE).

Cyclic and collective response was

very high, and in no time I was doing moderate quick stops and flying fairly aggressively to search for undesirable characteristics. There were none. In fact the Mosquito was so pleasurable to fly, I forgot to be nervous about sitting out on an aluminum leg in copious airflow with no visible means of support.

Acceleration to cruising speeds in the 65-75 mph range was quick, as were transitions to the hover as accomplished in quick stops. I imagine that most pilots would feel very comfortable very quickly in this helicopter—not that this is an endorsement to attempt to fly it without the appropriate training and license. It should be noted that in Canada the helicopter may only be flown as an amateur-built aircraft, and the pilot must have a full helicopter rating.

## In Summary

Once the assessment of the Mosquito's capabilities was complete I was loathe to land and give it back to Uptigrove, but we had run out of film in both cameras so I had no excuse to continue.

As a rule, helicopters are expensive to buy, operate and maintain due to their complexity, high fuel use and constant dynamic component replacement requirements. The Mosquito is an exception to this rule.

With 1 hour of fuel on board due to the 5-gallon maximum fuel capacity of Part-103 ultralights, this helicopter is not primarily a cross-country machine but rather the ultimate in a low-cost, above-ground all-terrain vehicle. Helicopters are more challenging to fly than fixed-wing aircraft; however, they are more fun and their broad range of abilities can provide owners with previously unimagined capabilities.

The Mosquito's low kit price of \$18,995 will open up possibilities for many. Whether you patrol property, provide surveillance services, muster cattle or just want personal freedom and the ability to cavort at will, the Mosquito warrants serious consideration. †

FOR MORE INFORMATION on the Mosquito, contact Innovator Technologies at 403/669-3101 or visit the web at [www.innovatortech.ca](http://www.innovatortech.ca).

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