



EXPERIMENTER
FEATURE



BITTEN BY THE BUG

MOSQUITO SCRATCHES THAT
HELICOPTER ITCH

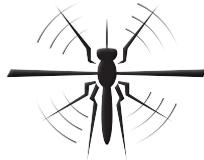


BY BETH E. STANTON



THEY DIDN'T MEAN TO START A KIT HELICOPTER COMPANY.

Dwight Junkin and his best friend, George Boynton, had worked together for years in the marine industry, building boats and tinkering with projects. When they made a homemade turbine engine, of course, they needed a machine to put it in. Helicopters had fascinated Dwight from a young age so they decided to build one.



WHEN THEY READ AN ARTICLE about John Uptigrove, an oil and gas engineer in Alberta, Canada, who had designed the single-seat Mosquito Air ultralight helicopter. John's wife had dubbed it "Mosquito" for its buzzing sound. Dwight and George had zero experience fabricating aircraft and were intrigued by John's novel cog belt drivetrain system, so they approached him about buying a set of plans. He answered no; he had built the Mosquito simply for himself.

Although he turned them down, the trio became friends. In 2000, John joined Dwight and George at SUN 'n FUN International Fly-In & Expo. He asked about their interest in using his drivetrain system.

"We told him that we wanted to build a helicopter but didn't want to build one like his because we thought it was ugly," Dwight said. "We wanted it to look like a real helicopter with a fuselage."

Dwight and George knew a thing or two about composite since they'd been working with it for decades. They cut a deal. They would build John a body. In return, he would let them use his plans.

"At that point, it was not a business proposition at all," Dwight said. "It was okay, you get one, we get one, and that's the deal."

HUGE HIT

JOHN SENT THEM the drivetrains, and they built his helicopter first. The complete helicopter minus the flight control rods was sent to him in January 2003. He had it flying in two weeks. John recorded a VHS video of its maiden voyage and sent it to the guys in Florida. They watched the video huddled around a 13-inch color TV in the shop.

"We were giggling like a bunch of little kids on Christmas morning," Dwight said. "George and I had never built an aircraft before in our lives. We thought it was so cool that we had built this aircraft knowing nothing about aircraft and this guy is out flying the crap out of this thing."

Excited for their own helicopter to fly, they scrambled and finished it the night before leaving for Bensen Days, a rotorcraft event held in Florida. John came down from Canada and flew the helicopter at the show. It was a huge hit with the crowd.

"That was our very first experience at an air show, but we were just going there to show it off," Dwight said.

SNOWBALL EFFECT

JOHN ASKED if they could make a few more helicopters since some of his neighbors wanted one.

"I had already built the molds so it was not a big deal," Dwight said.

Demand began to snowball. The following year they sold seven kits at the first air show where it was offered for sale. They realized they were onto something.

"Guys like me were bitten by the helicopter bug when they were young, but had never done anything about it because helicopters are very expensive to buy and operate because they are a very complex piece of machinery," Dwight said. "But then the Mosquito came around, and, holy cow, now you can own a helicopter for the price of a pickup truck."

MULTIPLE MOSQUITOS

A FEW YEARS LATER, John quit his day job, and he and Dwight partnered to build kits full time. John's company, Innovator Technologies, was based in Canada, while Dwight's company, Composite-FX, is based in Trenton, Florida.

The first offering was the XEL ultralight helicopter, followed by the experimental category XE series of kit helicopters. All are based on the drivetrain system that John designed for his original open-framed Mosquito Air. The public began referring to the kits as Mosquitos.

The first XE kit was sold in 2004. Since then, hundreds have been produced and sold in more than a dozen countries. The XE series helicopters have the same airframe but different powerplants. The price difference between XE models is based on the chosen engine (two-cylinder or turbine) and avionics.

DAVE STOREY BUILDING HIS MOSQUITO



Slightly nervously drilling the first holes in the fuselage for the fuel tank sight level gauge.



Closely following the manual while installing the swashplate anti-torque bracket. Access to the swashplate area was made easier by turning the helicopter fuselage on its back.



Installing the Solar T62 engine.



“When you get in the Mosquito, it’s like a roller coaster with no tracks. You feel like you’ve strapped the helicopter on and go for a ride. It’s just you and this little machine. You can just have all the fun you can stand with your clothes on.”

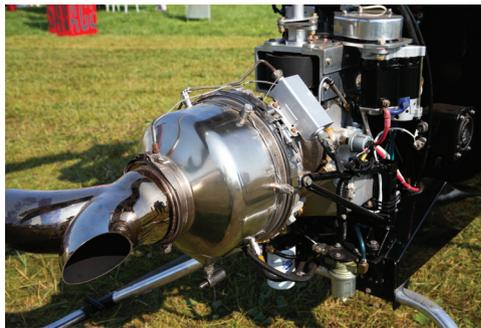
— DWIGHT JUNKIN

UNIQUE FEATURES

UNIQUE FEATURES make Mosquito helicopters affordable and lightweight. In most helicopters, transmission gear reductions drive the rotors. In the Mosquito, a simple cogged belt that is strong and inexpensive to maintain performs the reductions. The cogged belt eliminates the need for a transmission, the most complex and expensive equipment on the aircraft.

The 100 percent composite single-seat airframe is light yet durable. Each helicopter balances to the weight of the pilot. The addition of lead shot or placement of components custom-balances the center of gravity. It is a thrill to fly a helicopter with a single seat on the center of gravity, according to Dwight.

“When you get in the Mosquito, it’s like a roller coaster with no tracks,” he said. “You feel like you’ve strapped the helicopter on and go for a ride. It’s just you and this little machine. You can just have all the fun you can stand with your clothes on.”



Above: T62 turbine engine repurposed from a military helicopter.

Right: Tail rotor 90-degree gearbox, hub, and pitch change linkage.

The popular Robinson 22 trainer is regarded universally as a “squirrely” helicopter. Its tricky handling characteristics are sometimes attributed to its small size, rather than the sensitivity of its controls. While the Mosquito is smaller than an R22, it has more docile handling characteristics. Flying the reciprocating engine versions has been compared to a Hughes 269, Schweizer 300, or Enstrom, and the turbine-powered XET to a Jet Ranger.





Top: Dash panel MGL EFIS and military grip on the cyclic.

Bottom: A unique feature of Mosquito helicopters is that primary and secondary reduction are performed by clogged belts, eliminating the need for an expensive transmission.

CLOSE UP WITH THE MOSQUITO

BUY OR BUILD

THE XEL ULTRALIGHT falls under FAA Part 103 and may be purchased turnkey from the factory in the United States. The XEL has floats, one of the features that allows it into the ultralight category (amphibious aircraft are allowed an additional 60 pounds of empty weight). Pilot training is not legally required to fly an ultralight, but common sense makes it mandatory. A \$2,000 incentive is built into the price — a prospective buyer with a minimum of 10 logged hours of dual instruction receives a \$2,000 discount.

Customers may build experimental category XE models on their own or through a factory-assist program, and the average build time is 400-500 hours. When he was looking for a project after retirement, Army helicopter maintenance test pilot Mike Messex built his XE 285 in 2006 as the first factory-assist customer. He has since worked with Composite-FX, providing maintenance, technical support, customer assistance, prebuy inspections, and test flights, as well as monitoring the online forums.

Mike explained that Mosquito helicopters are not high-maintenance machines.

“It’s a misperception that okay, you fly it for an hour and fix it for 10,” Mike said. “It’s not like that. You look at it, and if it’s good, leave it alone and keep going. It’s not as severe as it is built to be on the reputation of helicopters.”

Normal maintenance includes the usual tasks, such as oil changes and visual inspections, with major maintenance at the 500-hour phase limit inspection for bearings, belts, blades, etc.

MULTIPLE MISSIONS

MIKE COMPARED flying Mosquito missions to motorcycle riding.

“You go out on a weekend and have a fun flight to a pancake breakfast and scratch your itch for flying,” he said.

In Australia and New Zealand, Mosquitos are used for herding sheep and cattle.

“You can get right down there and get right on top of them and get them moving,” Mike said.

Quarter-scale model helicopters that carry about 70 pounds have been used for the past decade in unmanned aerial vehicle (UAV) applications. Customers now want a bigger payload capacity, and Mosquito just happened to be the perfect platform to jump up to the next size.

Composite-FX has been producing UAV military-application XE models for the past eight years and is now working with the civilian market.

“We never built it for the UAV niche, because at the time we built it, the niche never existed,” Dwight said. “We just happened to be there when this market was created and fell into it.”

A two-place XE helicopter had been designed but is on the back burner due to the high demand for the UAV application machines. There are plans to introduce it to the market within two years.



COMPARING THE SERIES

COMPOSITE-FX XE SERIES

XEL AMPHIBIOUS ULTRALIGHT KIT

ENGINE: MZ202 two-stroke, air-cooled carburetor

EMPTY WEIGHT: 314 pounds

MAX GROSS: 610 pounds

MAX AIRSPEED: 70 mph

CLIMB RATE: 900 fpm

FUEL CAPACITY: 5 gallons

FUEL BURN: 5 gph

XE EXPERIMENTAL KIT

ENGINE: MZ202 two-stroke, air-cooled carburetor

EMPTY WEIGHT: 298 pounds

MAX GROSS: 610 pounds

MAX AIRSPEED: 80 mph

CLIMB RATE: 900 fpm

FUEL CAPACITY: 12 gallons

FUEL BURN: 5 gph

XE 285 EXPERIMENTAL KIT

ENGINE: Innovative 800 two-stroke, water-cooled EFI fuel system

EMPTY WEIGHT: 360 pounds

MAX GROSS: 720 pounds

MAX AIRSPEED: 95 mph

CLIMB RATE: 1,200 fpm

FUEL CAPACITY: 12 gallons

FUEL BURN: 6 gph

XET TURBINE KIT

ENGINE: T62 turbine radial inflow cycle, MFI fuel system

EMPTY WEIGHT: 420 pounds

MAX GROSS: 820 pounds

MAX AIRSPEED: 100 mph

CLIMB RATE: 1,200 fpm

FUEL CAPACITY: 12 gallons

FUEL BURN: 10.5 gph

A MOSQUITO BY ANY OTHER NAME

WHILE TESTING THE helicopter he was to bring to Oshkosh the weekend before EAA AirVenture Oshkosh 2018, John died in an accident after hitting power lines.

“We scrambled to throw some kind of show together,” Dwight said. “We’d been going to Oshkosh 14 years straight. It was really a sad moment for everybody.”

John’s company, Innovator Technologies, shut down, and Composite-FX assumed the brand. It took the better part of a year to consolidate the businesses and move the contents of John’s shop from Canada to Florida.

“We never missed a beat,” Dwight said. “We were still producing kits.”

Two companies in two countries producing a series of helicopters nicknamed Mosquito sometimes results in confusion.

“We try to explain to people who assume John was Mosquito,” Dwight said. “That was the name of the original open-air model that he had come out with way back.”

Plans were already in the works to discontinue the Mosquito Air prior to John’s death. The kit took twice as many hours to build as the XE models and was not a big seller.

“So, technically we don’t even make a Mosquito model anymore,” Dwight said. “But we can’t run away from the name Mosquito, because that’s how everybody refers to us.”

STOREY’S STORY

IN HIGH SCHOOL, a passion for helicopters sparked for Dave Storey when he saw ads for RotorWay kits in *Popular Mechanics* magazine. Unable to dedicate resources for helicopters, he went the fixed-wing route. He learned to fly in a Cessna 172 and then went on to build a Challenger, Kitfox, and Sonex.

“Helicopters intimidated me a little bit because they’re so expensive to operate, and it’s one thing after another,” he said.

He scratched his rotorcraft itch by flying RC helicopters. He was a team USA alternate for the 1997 FAI F3CN World Championships for Model

Helicopters and assisted his sponsors with research and development. Now semiretired, he began researching a helicopter kit to build.

He learned about the Composite-FX XE series and was impressed with the mechanics. Familiar with the design of helicopters, he realized it was an oversized, overbuilt RC helicopter.

“It’s a new design with CAD and CNC, not something that’s a takeoff from the 1950s or ’60s,” he said.

Searching NTSB reports, he didn’t find any incidents related to catastrophic design failure. \$38 an hour for fuel sealed the deal for the purchase of the XET turbine kit.

In the spring of 2019, his turbine kit was the first one out the door that was not a factory-assist build. He built it in 450 hours over 10 weeks.

“When you put pieces together, there is very little modification that you’ve got to do to make them work,” he said.

Only general tools, a grinder, a sander, files, a cordless drill, and a press were required.

His favorite day was when he installed and sat in the seat.

“It was like, ‘Oh my gosh, this is real; it’s finally happening;’” he said. “I went and got my helmet and took a picture.”

Dave has been giddy about his helicopter since the day he opened the box.

“I truly believe it is the best kit made here in the States on the market today in terms of its design, its ergonomics, its simplicity, its safety, and now that I’ve been around it, its looks,” he said.

His lifetime dream of owning and flying a helicopter is on the brink of coming true. The first hover test happened on September 16, 2019.

“My excitement and energy for the XE series of helicopters has just been ramping up,” he said. “I am more excited now about having this thing than I ever have been.” *EAA*

Beth E. Stanton, EAA 1076326, majored in English because it involved the least amount of math. She finds it hilarious that now she is a pilot and writes stories about airplanes and technical stuff. She can be reached at bethstanton@gmail.com.