

TAMING THE “WOODEN WONDER”



Mike Spalding flies the Military Aviation Museum's DeHavilland DH-98 Mosquito

BY JAN TEGLER | PHOTOS BY BRADLEY WENTZEL

Mike Spalding, the chief pilot of the Military Aviation Museum (MAM), has more time flying DeHavilland's Mosquito than any current warbird pilot. Just four of the twin, Merlin V-12-powered, wood airframe "Mossies" are airworthy today. The MAM's DH-98, which first flew in 2012, has accumulated more flight time than any of the survivors, and 100 of those hours belong to Spalding.

Mike Spalding at the controls of KA114, the Military Aviation Museum's DH-98 DeHavilland Mosquito. Originally built in Canada as an FB-26 fighter-bomber version of the Mosquito for the RCAF, the aircraft never saw combat.

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Known as one of the fastest fighters/ bombers of WW II, the "Wooden Wonder" as it was nicknamed is thought by many to be so speedy because its spruce, birch plywood, and balsa construction yielded what they assume is a lightweight airplane.

"No way," says Spalding. "People think they're much lighter but actually it's the other way around. It takes a lot of wood to make a strong airframe. There are quite a few layers that are pretty thick, and the combat versions weighed over 20,000 pounds!"

RENOWNED EX-RCAF MOSQUITO PILOT GEORGE STEWART. STEWART HAD FLOWN THE MOSSIE DURING WW II. THE HIGHEST-TIME MOSQUITO DRIVER ALIVE GAVE SPALDING VERY VALUABLE TIPS.

Contrast that with fast fighters like the P-51, F4U Corsair, and Fw-190, all of which have a takeoff weight roughly half that of the Mosquito's.

Acquired by MAM founder and owner Jerry Yagen in 2004 from the Museum of Flight and Transportation in British Columbia, the museum's DH-98 was built in Canada in 1945 as an FB26 fighter-bomber version and served briefly in the RCAF, never seeing combat. Sporting two Packard-Merlin 225s, as the Canadians designated them, operational examples could weigh as much as 21,473 pounds.

AvSpecs Ltd. near Auckland, New Zealand did a painstaking eight-year restoration/recreation of the Canadian relic made possible by the work of the late Kiwi restorer Glyn Powell, who built the molds needed for the fighter-version's wooden fuselage, wings, and tail sections and used parts donated from as far away as Australia. Its first flight in New Zealand in 2012 was followed by a debut at its home near Virginia Beach, Virginia in 2013.

Since then, Spalding has been the man at the controls of KA114. Flying it is an honor he relishes.

Surviving knowledge

Exactly 7,781 Mosquitos were built but just 30 survive. It had been 14 years since a Mosquito last flew when KA114's initial test flights were undertaken in New Zealand by warbird pilots Dave Phillips and Keith Skilling.

In the background was the dramatic end of the last airworthy Mosquito, lost during an aerobatic display at Barton Aerodrome, England on July 21, 1996 when one of its V-12s stalled as the aircraft rolled inverted while climbing after a high-speed pass. The aircraft entered a flat spin at low altitude which the pilot couldn't fully recover from.

During WW II, float-controlled, carbureted Merlins were notorious for experiencing fuel starvation during negative-G inducing maneuvers like

inverted flight. An investigation by the U.K.'s Air Accidents Investigation Branch concluded that had occurred at Barton.

But Phillips and Skilling completed a very successful test program, so Spalding reached out to them to gain any knowledge he could before he took KA114 for its first flight in America. Spalding says he simply emailed back and forth with Phillips and Skilling, carefully reading the aircraft manual in which they'd made notes that detailed their observations about flying the airplane.

"I took them to heart, and [KA114] did exactly what they said it would with the little nuances they noted when I flew it. It couldn't have worked out better."

He also relied on the same walking store of knowledge the Kiwi pilots had used: renowned ex-RCAF Mosquito pilot George Stewart. Stewart had flown the Mossie during WW II and after the war served as an instructor for Chinese pilots learning to fly the Wooden Wonder. The highest-time Mosquito driver alive gave Spalding very valuable tips.

"He had a lot of knowledge, was very excited about it and more than willing to offer all the help he could," Spalding recalls. "He gave me a lot of little insights from the real world back when he was teaching."

Ultimately Spalding just got to know the airplane and taxied it around a little bit. "There was nothing left to do but go fly."



A rare view of KA114 from above, showing the clean aerodynamic profile of the Mosquito.

Preflight

The Mosquito's landing gear is one of its chief weak points, Spalding says.

"You want to check them over really well. If they get any kind of side load on them, they can collapse. For instance, if anyone had taxied and maybe pivoted on a tire it can damage the gear to the point where it might fail on takeoff or landing. That's something George told me [and] one of the things you really watch for."

Otherwise, the Mosquito doesn't differ too much from other aircraft of the period in terms components that need inspecting.

"There are a lot of cables to check and doors to close," Spalding notes.

The DH-98's flight controls come with three types of actuations. Landing gear and flaps are hydraulic. Ailerons, rudder, and elevators are cable-operated, and pneumatics power the brakes.

Not everything is made of wood, Spalding adds. Metal parts are included in the engine nacelles, radiator sections, ailerons, rudder, elevators, landing gear, and engine mounts. Wood parts are fabric-covered.

"You want to check the hydraulic lines and make sure nothing's leaking," Spalding says. "Walking around, there's not much more, other than inspecting the airplane for any damage or anything abnormal."

One more thing on the preflight checklist is opening the valve on the air tank mounted near the Mossie's tail section.

"You open it from the outside. Like a Spitfire, it has a stored-air tank. It has plenty of air pressure for the brakes."

Mount up and start up

Entry to and exit from the cockpit is via a door in the lower right-hand section behind the Mosquito's nose. Remove the door/hatch and an integral telescoping aluminum ladder can be extended to allow the pilot and navigator to climb inside.

"They're very long steps, designed for very young guys," Spalding laughs. At the MAM, he usually uses an external step ladder to save wear and tear on the airplane's finicky integral ladder.

"You have to be careful when you're in the airplane extending it, because if you don't extend it properly it will come apart."

On the way into the cockpit, Spalding reaches back between the armor-plated pilot and navigator seats and turns two fuel selectors to the "On" position, then slides into the left seat.

There are several checks to perform, including confirming that the doors for the wing root-mounted radiators are open. "The airplane will overheat fairly quickly on the ground, kind of like a Spitfire," Spalding explains. "So, you make sure you're getting all the cooling you can get on the ground, especially if it's a hot day."

The handles for the Merlin's cowl flaps are on the far side of the cockpit to the right of the navigator's seat, but "you can reach the handles from pilot's seat pretty easily," Spalding says.

"For something like feathering an engine, which is done from the forward instrument panel on the right as well, you would think it would be nice to have someone in the right seat. But the navigator's seat sits aft of the pilot's seat, so they can't even reach the panel. From that standpoint it is a single pilot airplane. Still, it's nice to have somebody who knows the airplane in the cockpit with you. You can tell them to open or close the radiator doors or watch engine temperatures."



MAM chief pilot Mike Spalding has 100 hours of flight time at KA114's controls and has flown most the museum's aircraft. MAM's Mossie is one of only four airworthy Mosquitos and has been the most active.



ABOVE: The Mosquito's tail wheel doesn't lock, Spalding says. But it does have a self-centering action that helps the twin engine fighter-bomber to track straight on the ground.

BELOW: The main gear must be inspected carefully before flight and taxied with care, Spalding notes. Side loads imparted by turning the aircraft too abruptly can damage the mains. (Photos by Justin Fortier)

Spalding says the float-controlled carbureted Merlins do have one advantage over later versions with pressure carburetors and injection carburetors.

"They're so easy to start." Flip on the magnetos for both engines and then it's a matter of priming them.

"You don't have to hold your tongue a certain way to get them to start right or anything." Spalding chuckles. "You just have to make sure you prime them enough. You have a prime button and a start button. That's it. Turn the mags on and prime, depending on how cold it is, for around 11 seconds. You get the throttle cracked, hit the start button, it'll turn a couple blades and you'll see the engine quiver a little bit. Then you see the third blade and you know it's going to start. It catches and fires right up. There's no magic to it or bringing the mixture up because there is no mixture control. It's all done with what's basically a cutoff lever."

Taxi and takeoff

With the Merlins running, Mosquito pilots couldn't afford to sit on the ground for long. Tightly cowled and with less-than-optimal radiators for warm weather plus oil coolers mounted behind them away from fresh air, the V-12s can heat up fast.

"If it's hot out in the summer you want to get going pretty quick." Spalding says. "Typically, when I taxi out, I want to be ready to go almost immediately. I'll line up on the runway to do my engine run-ups. Basically, I can go straight to takeoff from there. I don't even bring the throttles back once I've run the engines up because when you go to higher power, the temperatures come up pretty quick. You don't want to do your run-up until you're ready to go."

But before taking the runway, you have to taxi. Unlike single engine fighters, visibility is good over the short, blunt nose of the Mossie, he reports. No weaving back and forth is necessary. But caution is necessary when using the airplane's pneumatic brakes, Spalding stresses.

Actuated by its rudder pedals but modulated by a bicycle brake lever-type grip mounted vertically on the KA114's control stick, the Mosquito's binders are "very powerful," he says.

"It's very easy to put this airplane up on its nose. You never pull the brake lever and hold it. You're constantly using it in brief applications. If you see a video of me or anyone else taxiing a Mosquito, it just sounds like a Mack truck with air going ffffft, ffffft, ffffft!"

Quick stabs of the brake are all that's necessary to help bring the airplane back into line if it strays one way or the other.

"The brake lever also has a little delay. So, if you hold it until you feel the brakes, it's too late. You already have way too much brake. With some airplanes you might not



ABOVE: Spalding's "office." The Mossie is effectively a single pilot airplane. Flight controls and most of the engine management controls fall easily to hand but certain actions, like feathering an engine or opening/closing the Merlin's cowl flaps, require the pilot to reach across to the right side of the instrument panel.

LEFT: The fighter-bomber's bomb bay.

BELOW: Entry to KA114 is through the door that opens on the lower right side of the Mosquito's nose. The airplane's fragile integral ladder is extended here. Up on the nose are two rows of guns: four .303 Browning machine guns above with four 20 mm Hispano Mk. II cannon in the chin. (Photos by Justin Fortier)



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always have enough brakes. With this one, it's the other way around."

With engine run-ups complete, it's time to push the throttles to the left of the stick forward. Spalding says take off power is 14 pounds (the British use boost pressure instead of manifold pressure) or about 58 inches of manifold and 3,000 rpm for the props.

During WW II, takeoff accidents weren't uncommon due to the tendency of the Mosquito's Merlins to pull the airplane to the left. Many pilots developed the habit of advancing the throttle for the left side Merlin slightly in advance of the throttle for the starboard engine. But that didn't prevent some accidents.

One of the best tips Stewart gave Spalding was to advance the throttles equally.

"George figured out that the airplane has enough power to get the tail up off the ground but not pull itself one way or another. So, he started training pilots to

[from wheels/gear] it doesn't really want to accelerate. It kind of feels like it wants to fly, but you want to make it stay there because it's not really ready to fly."

It takes discipline to hold the airplane on the runway, but when it lifts off it flies away well enough, he says.

A split personality

Spalding quips that the Mosquito has what amounts to "a split personality." Below 200 mph, it behaves a bit sluggishly, "like a bomber." Above 200, "it's more like a fighter."

"After you lift off, the first thing you want to do is get the gear up. That's really a bad spot in the takeoff sequence if an engine quit. You don't have enough of anything to stay flying—not enough speed and not enough runway to stop."

Spalding explains that the Mossie's Vmc—the speed necessary to maintain directional control of the aircraft with one engine feathered and the other at full

BELOW 200 MPH, THE MOSQUITO'SAILERONS, RUDDER AND ELEVATORS ARE NOT AS EFFECTIVE. "IT TAKES A LOT OF CONTROL INPUT TO MAKE IT MOVE AROUND," SPALDING AFFIRMS. "BUT OVER 200 MPH, IT TAKES VERY SMALL AMOUNTS OF CONTROL MOVEMENT TO MAKE IT RESPOND."

hold the brakes and bring the engines up to zero pounds boost [30 inches], have everything set, release the brakes, and take the throttles right on up to 14 pounds, to the stops within a couple lengths of the airplane moving. That makes a big difference."

Spalding says KA114 accelerates to 70 mph "before you know it" with the tail coming off the ground. With full right rudder, the Mosquito usually tracks straight, but if it drifts left, a quick application of the brake on the right main gear will pull it back to center.

One hundred mph arrives shortly after passing 70 mph, Spalding notes. "The book says you rotate at 125 mph. But it takes as long to get from 100 to 125 as it did to 100, if not longer. There's just so much drag

power—is an eye-popping 190 mph. The B-26 Marauder, maligned for its engine-out takeoff performance had a Vmc of 160 mph.

"For us it's not quite that high because we're not flying the airplane at 20,000 pounds like they were. But that's the number you want to get to be safe if something did quit. It's slow to accelerate to that number because the gear is slow to come up. If the engine quits below that speed, it's going to roll you over pretty quick if you can't get the engine back."

Below 200 mph, the Mosquito's ailerons, rudder and elevators are not as effective. "It takes a lot of control input to make it move around," Spalding affirms. "It'll do it and it flies fine. But over 200 mph, it takes very small amounts of control movement to



Spalding banks KA114 away from the camera plane over the Back Bay Wildlife Refuge on Virginia's southern coastline.

make it respond."

With altitude and speed, Spalding says KA114 flies well but isn't as nimble as single-engine fighters like the Spitfire.

"You can bank it around, but it's going to do that a little slower because it is a bigger, heavier airplane. You have to push it around a little more. But even all the single-engine fighters are a little different. A P-51 is a very heavy airplane to push around, but a Corsair—it's like you can do it with your fingers."

The Mosquito needs little trimming, remaining stable in most circumstances, including engine-out flight.

"I've done single-engine work in it to get my rating," Spalding says. "I shut one down and feathered it, then restarted it. You fly at

140 mph and it'll fly around happily enough. After you're up and going, it's not the end of the world if you lose one."

Cruise power is usually around 2 pounds of boost (approximately 34 inches of manifold) and 2,200 rpm.

"We don't push it hard but it has a little faster cruise than a standard fighter. On the airshow circuit we run more power, like 2400 rpm and four to six pounds of boost [38 inches to 42 inches]. It's a good cross-country airplane, and it's got good range."

Overall, Spalding says the Mosquito's best attribute is its speed, even if it's not an airplane you'd readily dogfight.

"It's comfortable at speed and maneuvers well for what you'd do with it, but you wouldn't really fly it like a fighter."



SPALDING'S FAVORITE THING ABOUT KA114 IS SHARING THE AIRCRAFT WITH OTHERS, DISPLAYING IT BEFORE CROWDS THAT MOST FREQUENTLY HAVE NEVER SEEN A MOSQUITO IN FLIGHT.

Point the Mossie's nose down and speed builds quickly, Spalding attests. "It accelerates, even more than I realized. I was flying at Geneseo [the National Warplane Museum airshow] one time in the Mosquito with a guy flying a P-38. He was hanging right there with me but he said, 'As soon as you dropped the nose, I had nothing left. You were gone!'"

While speed is the fighter-bomber's forte, going slow isn't. In fact, it can bite inattentive pilots.

"The big thing is not getting slow," he stresses. "When you have everything up [gear, flaps, etc.] and you're banking, the stall speed goes up quite a bit. You have to be really careful in doing photo flights and things like that. If a photographer asks you to bank the airplane, there are times when you just have to say 'no'."

Landing

Landing the twin-engine British fighter-bomber requires attention and discipline, Spalding says. With the airplane in clean configuration, it doesn't slow down easily. MAM's chief pilot starts managing the airplane's speed and levels off well before entering the landing pattern.

At 200 mph, he selects flaps to the quarter-down position and watches for speed to drop to 170 mph. "But it doesn't really want to slow down, so you have to pull the power back some."

Dropping the landing gear makes a huge difference, he notes. The drag they induce forces the pilot to add throttle. "Now it takes a lot of power to keep it flying because it really wants to slow down."

Spalding doesn't like to turn to the runway on final, preferring to fly the last stage of the approach more like you would in a bomber, straight and level.

"I go full flaps at 500 feet and a mile or so out. You want to pretty much have the

field made because you're not going to go around at that point if you're single engine. So, you're committed to land. You don't have to worry about being high and fast in this airplane!

"You'd rather it be high. You can use the altitude and let it drop in. You come across the fence at 120 mph."

Wheel landings are standard, and the Mosquito tracks well during rollout until its brakes need to be applied.

"You have to have your feet where they need to be on the rudder pedals and not move them while you're holding the brakes," he says.

"That's what's hard for some people. Moving your feet is normal to keep the airplane in line but now you're applying a lot of brake on one side maybe that you didn't have and you've released it from the other side. It's ok if you're just quickly stabbing the brakes, but when you're holding the brake a bit you can't move your feet or something's going to happen to the left or right."

Sharing the Mosquito

Spalding's favorite thing about KA114 is sharing the aircraft with others, displaying it before crowds that most frequently have never seen a Mosquito in flight.

He says the "coolest" performance he's given was during the finale of the Hamilton, Canada airshow in 2013 where during the "Merlin Flight," Spalding flew KA114—at the time the only airworthy Mosquito—in formation with the only Lancaster flying in North America, a Supermarine Spitfire, and two Hawker Hurricanes.

But given the rarity of flying Mossies, it's even more special to tell anyone who flies with him in MAM's Mosquito what a unique experience they're having.

"I can look at them and say, 'We're doing something right now that nobody else in the world is doing!'" →

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