SON OF TOMAHAWK

The second time around, the T-tail gets the ax.

BY MARK TWOMBLY

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Just about every Tomahawk pilot has been through the drill: Reduce power, bring the nose up, then crane your neck around and peer through the canopy at the tail. As the airplane begins to buffet in advance of the stall, the horizontal stabilizer starts chattering. Roily air washing off the steeply angled wings cascades over the stabilizer perched at the top of the vertical fin, and the tail rattles and shakes in the turbid flow. Although there has never been an in-flight failure of a Tomahawk tail, the sight of one vibrating can be an unnerving spectacle for a first-time Tomahawk pilot.

A flexible tail is one of several foibles that distinguish an otherwise inspired design. Piper introduced the Tomahawk in 1977 after a decade of research which included soliciting wish lists from several thousand flight instructors. The Tomahawk was expressly designed for modern flight instruction, which means preparation for bigger, more complex equipment. Its large bubble canopy affords superb visibility; the center console power controls have that heavy-iron panache; some parts, including cabin doors, ailerons, elevator sections and tires, are interchangeable for easier, cheaper repair; and the aggressive stall behavior of the laminar flow, NASA-designed General Aviation Wing-1 (GAW) is an effective tool for exploring stall recognition and recovery.

Topping off all these virtues in attractive fashion is the T-tail. Unfortunately, the tail's aesthetic qualities far surpass its performance, which has given rise to the belief that Piper's marketing department dictated a T-tail for the Tomahawk.

The practical consequences of a T-tail on a low-power trainer soon became obvious following the Tomahawk's introduction. The T-tail is awkward to preflight and service. Since it is above the propwash, the elevator is ineffective in lifting the nose to increase propeller-arc ground clearance for taxiing. Soft-field takeoff performance suffers, and normal takeoffs require higher rotation speeds and extra care in pitch control. When the wings stall, the tail shakes. Perhaps most distressing to Tomahawk owners and operators, the aircraft's T-tail is papered in airworthiness directives and service bulletins.

It was for these reasons that Calypso Airways decided to take the T out of the Tomahawk tail.

Calypso Airways is a small FBO at Easton Municipal airport in Easton, Maryland, on the eastern shore of Chesapeake Bay. The region is known for its poultry farms and millionaire hideaways hidden among the bay's spidery inlets and coves. Calypso survives on charters, twice-a-day scheduled service to nearby Baltimore-Washington International and Washington National airports, and flight instruction in a pair of Tomahawks and a weath-

ART DAVIS

ered Cessna 150, all of which bear the names of Calypso family and friends.

Underneath Calypso's homespun facade, grand plans are gestating, and they center on the Tomahawk. "I think the Tomahawk basically is a good aircraft," said Philemon K. Platt, an aeronautical/mechanical engineer and owner of Calypso. "I think it's the beginning of an excellent aircraft."

Platt's idea of an excellent Tomahawk is one with a conventional tail, Fowler-type flaps and a better flap actuating mechanism, a shimmy damper for the nosewheel, longer-lasting brakes, improved door hinges and latches, more soundproofing and a thicker windshield, relocated primer knob, dual microphone jacks and a cuff on the leading edge of the wing for predictable stall characteristics.

Calypso surveyed several hundred Tomahawk owners to gauge their interest in Platt's list of modifications. The company also founded the Tomahawk Owners and Operators of North America (Toona) and a newsletter, the *Toona Times*, through which Calypso will introduce and promote its Tomahawk improvements.

They start with the tail. The Tomahawk's one-piece horizontal stabilizer is attached to the vertical stabilizer spars near the top of the fin. Calypso riveted skin doublers on the inside of the tailcone, then attached a mounting plate and stiffeners to a rear fuselage bulkhead and the double-thick tailcone skin. The stabilizer is secured to the mounting plate with long bolts. The bolts then pass through spacers to distribute the compression loads across the stabilizer spars.

The relocated stabilizer is nine inches forward of its former T-tail position. The elevator control system is simpler because several pulleys and a length of cable can be removed. A large inspection plate has been cut in the lower tailcone for examining the stabilizer mounting hardware.

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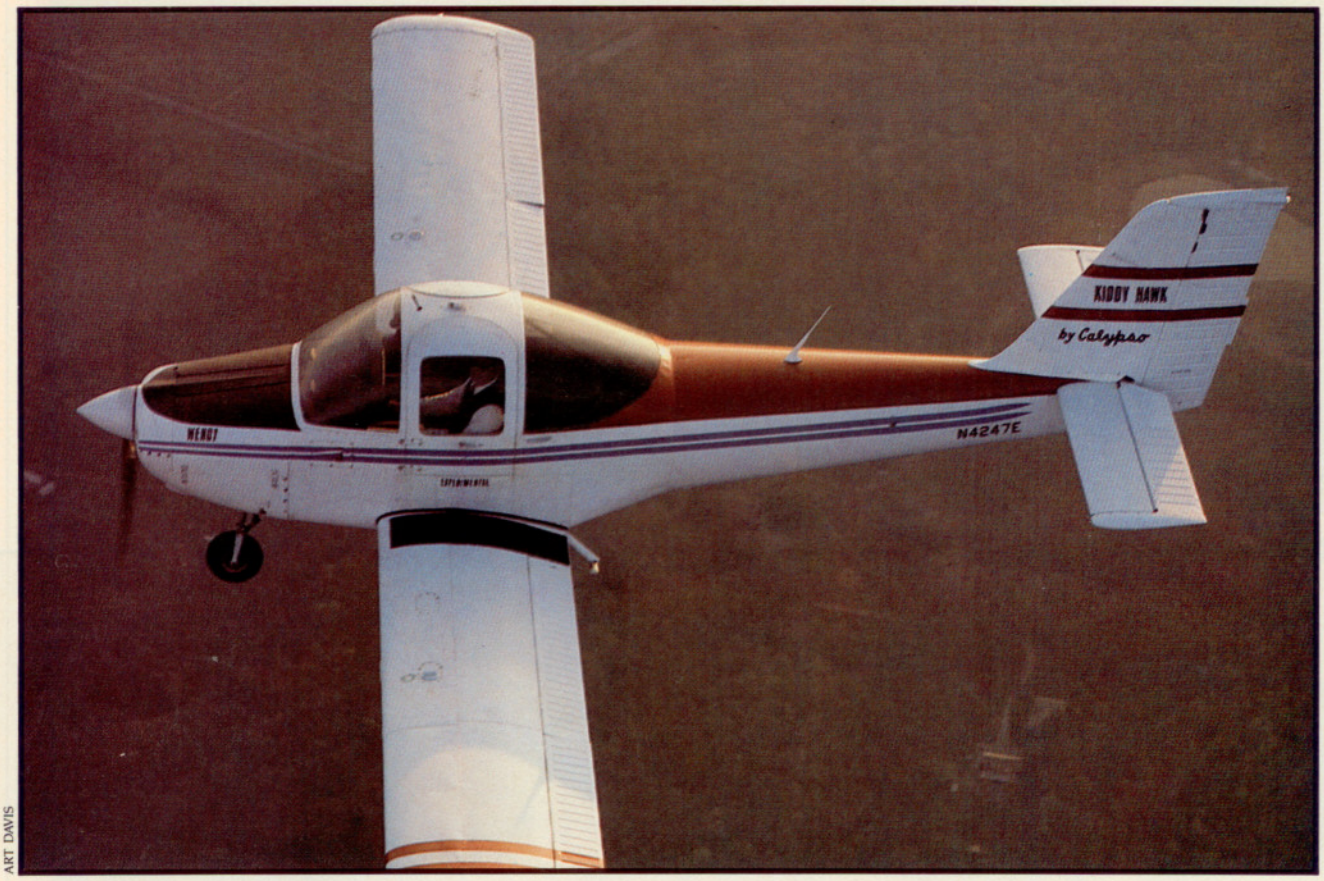
SON OF TOMAHAWK



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At cruise, the change in tails becomes a matter of aesthetics.

Calypso's version of a properly configured Tomahawk is the creation of Platt; Casper Behr, director of maintenance; and Joseph J. Hitchings, a safety engineer who holds the auspicious title of Calypso's director of special projects for industrial engineering and design. They call their creation the Kiddyhawk, a name intended to stir images of the Wright brothers flight in Kitty Hawk and the airplane's status as an entry level machine.

One of Calypso's two Tomahawks has been modified to a conventional tail configuration. Flight tests are underway, but at press time Calypso had not yet arrived at exact performance specifications for the Kiddyhawk, including stall speeds and takeoff and landing distances. Platt is hopeful that supplemental type certification for the tail conversion will be approved late in the year, or at the beginning of 1985.

Early flight tests indicate the conventional tail will cure the Tomahawk's quirky takeoff behavior, especially on soft fields. The accepted technique for soft field takeoffs in most aircraft calls for heavy elevator back pressure from the moment of brake release to get the nosewheel off the ground as quickly as possible. Hauling back on the Tomahawk yoke will have no effect until the airplane has accelerated to about 50 knots, when suddenly the elevator will come to life and the tail will bang down on the ground. The airplane finally will struggle off the sod at about 60 knots with the nose pointed high. Unless the pilot of the Tomahawk is quick to relax the proper amount of back pressure to build up flying speed without losing the precious few feet of altitude, the Tomahawk will wallow out of ground effect and shudder back onto the runway.

The Kiddyhawk behaves better. I performed several soft field takeoffs from Easton in the face of a 10-knot wind and found that, with full elevator from the point of brake release, the modified Tomahawk would rotate between 40 and 45 knots and clear the ground after accelerating another 10 knots. I then climbed into Calypso's unmodified Tomahawk for a comparison and was treated at 50 knots to a banging tail, a labored lift-off at about 60 knots and a less-than-precise transition to climb.

There is little pitch change when flaps are deployed on a Tomahawk, and moving the stabilizer down to the fuselage has had no effect on handling when the flaps are cycled. Tomahawk flaps, which are hinged at the bottom to the trailing edge of the wing, are effective only in slowing the airplane down, not in lowering the stall speed. At full gross weight, the power-off, full-flaps stall speed is 47 knots. With no flaps, it is 48 knots. Although I did not have an opportunity to verify it, Platt said the new tail configuration makes no difference in the power-off stall speed, but the configuration helps lower the power-on stall speed three or four knots.

Tomahawks are not subject to pitch changes with changes in power since the stabilizer rides above the

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SON OF TOMAHAWK

propwash, but, as expected, the Kiddyhawk is pitch sensitive to power adjustments. Preliminary flight tests indicate spin and spin recovery characteristics appear to be the same in a Tomahawk and Kiddyhawk, Platt noted. Calypso claims no top speed or cruise advantage with the new tail.

The Kiddyhawk can boast of better terrestrial performance. Calypso's two Tomahawks have amassed a poor ground-based accident record: six prop strikes in 1,800 hours. The reason, according to Platt: two inches of clearance between the propeller tip and ground when the nosewheel strut is fully depressed. Applying full back pressure while taxiing a Tomahawk is wasted energy; in the Kiddyhawk, it will push the tail down and nose up several inches.

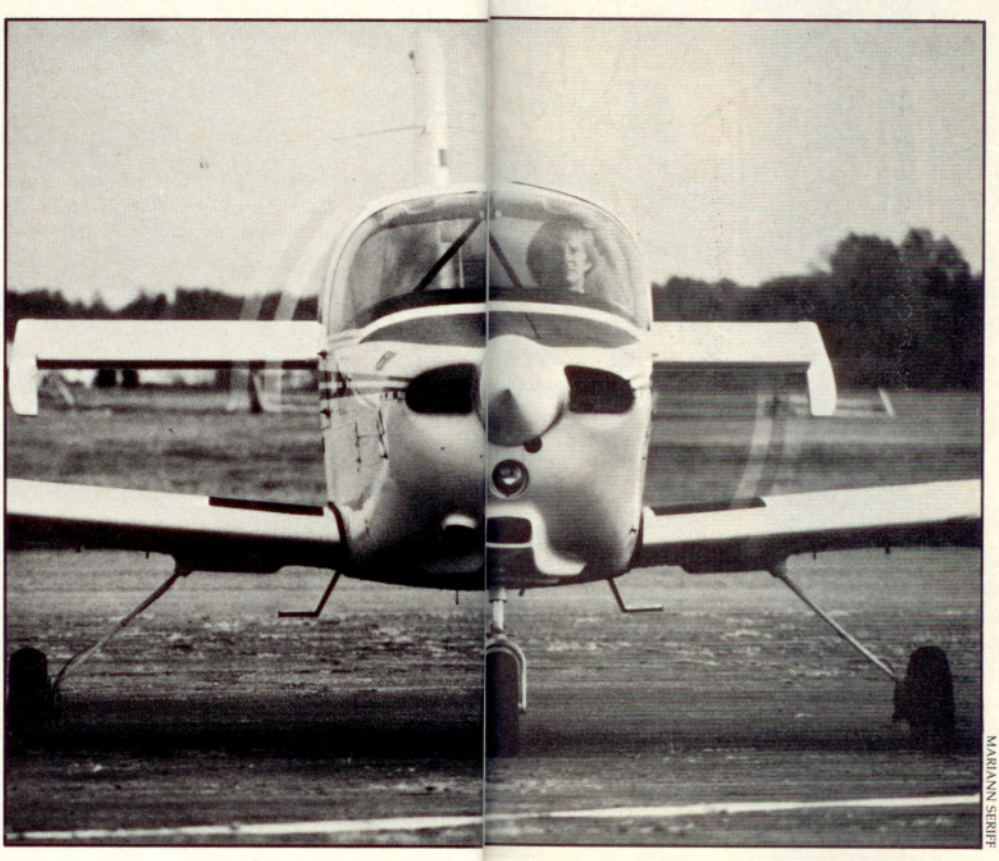
One final but noteworthy attribute of the Kiddyhawk, according to Platt, is that the tail does not shake. He is hopeful the supplemental type certificate for the stabilizer modification will obviate existing tail airworthiness directives and service bulletins.

Plans for marketing the tail modification are not yet firm, but Platt may set up a small network of authorized service centers across the country. Calypso also will perform the work at Easton. Estimated price of the week-long modification is $3,500. The modification could be done in conjunction with a complete refurbishment of a customer's Tomahawk.

Platt has visions of building an industry around the Kiddyhawk. Piper shut down Tomahawk production in 1982, and, by the end of 1983, it had delivered 2,513 PA-38s. Those airplanes have amassed a lot of student hours, and many are getting tired. Meanwhile, FBOs and flight schools have a continuing need for trainers. Why not offer them a Kiddyhawk with a conventional tail, zero-time engine and refurbished interior for a total price of about $22,000?

Then there is Calypso's ultimate business plan: buy the Tomahawk type certificate along with Piper's mothballed tooling and start producing the new, improved Kiddyhawk.

The prospects are dizzying. Build a better tail and wait for Tomahawks to taxi up to your door. Says Platt: "We can become the gurus of the bottom end of aviation." □



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