A new trainer: looking for students to take their fledgling steps in a Piper

■■ It had been a long time between Piper's last trainer and this one.

The last real two-seat trainer Piper made was a high-wing, fabric-covered bird called the Colt. In the early 1960s Colt production ended, and Piper operators began training flight students in a "modern" low-wing metal airplane, the Cherokee 140. It offered 140 horsepower and four seats, if desired. But it didn't offer the same operating economies found with the Colt or the increasingly popular two-seat trainer offered by Cessna.

Piper embarked on a trainer design project, a decade-long effort that culminated in the Tomahawk. It was first introduced last fall, and is now finding homes at flight schools around the country. Piper dealers and distributors ordered almost 1,200 of them after production plans were first announced.

The airplane, obviously, looks different from any other lightplane currently available. And the differences in appearance offer perceptive clues about the way it flies. Its laminar-flow wing and T-tail alone give it manners totally uncharacteristic of other Piper airplanes—and most other light aircraft for that matter.

Differences should not be interpreted as difficulties, however. But a new pilot of a Tomahawk, and particularly a flight instructor teaching in one, should be aware of the craft's unique flight characteristics. Instructors must assure they are training students to properly deal with them.

Most noticeable are the effects of the T-tail, which are pronounced at takeoff and landing. The T-tail gives a greater degree of pitch sensitivity—enough that on a rollout after landing, at a speed of 20 knots or so, an additional touch of up-elevator brought the tail tiedown ring to the pavement.

Placement of the tail makes for unusual softfield performance also. Since no propwash moves over the elevators, full back pressure won't lighten the nose during initial stages of the takeoff roll. Suddenly, however, the elevators will be "flying," and will push the tail down quickly, demanding a high level of attentiveness on the part of the pilot.

In flight, the Tomahawk's stall characteristics bear utterly no resemblance to those of the Cherokee. The Tomahawk will really stall. It will even give you a fast-breaking secondary stall if recovery from the first one is timid or tenuous. With flaps down, the stall was preceded by a loud horn and noticeable buffeting. The stall, depending on rate of entry, arrived at 47 to 45 knots. A break to the left was characteristic of the craft used for this check flight. However, during one lax recovery a secondary stall resulted in a break to the right.

The horn and buffet provide good warning, however, of the impending activity. Full power and nose-down elevator pressure result in quick restoration of normal flying.

Spins are approved in the Tomahawk. They, also, are different from spins you may have encountered in a Cessna 150. The Tomahawk will drop effortlessly from a full stall into a spin either left or right with full application of rudder in the desired direction. The nose drops abruptly and the craft assumes a steep, nose-down attitude. Mere relaxation of back pressure on the yoke, with opposite rudder, will not break the spin. Sharp forward pressure on the yoke is required. With that and opposite rudder the spin ends, and the steep dive is all that's left. A 1½-turn spin, with recovery, started at 8,500 feet and chewed up over 1,000 feet of altitude.

Spins in either direction are equally easy to enter and recover from, once the technique is developed. Because of the sharp elevator pressure required for recovery, and the elevator sensitivity, beware of any stray objects in the Tomahawk's 100-pound capacity baggage area. Spins, as with stalls, require active participation on the part of the pilot.

Piper says the sensitivity and responsiveness of its trainer will make students more aware of their command over the aircraft, and will create more adept pilots.

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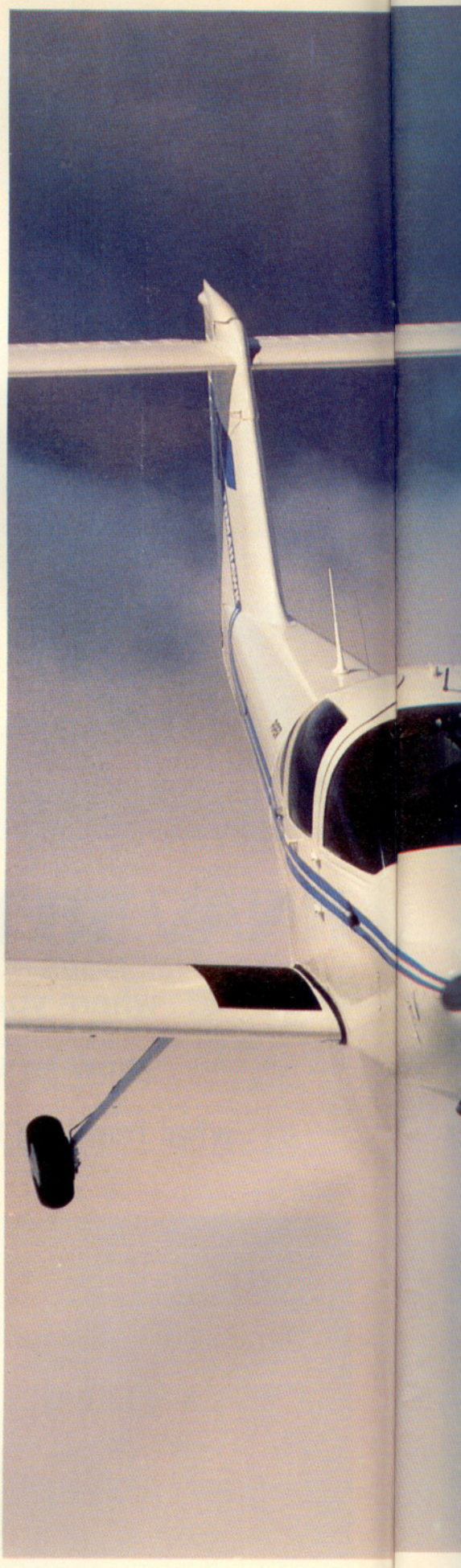
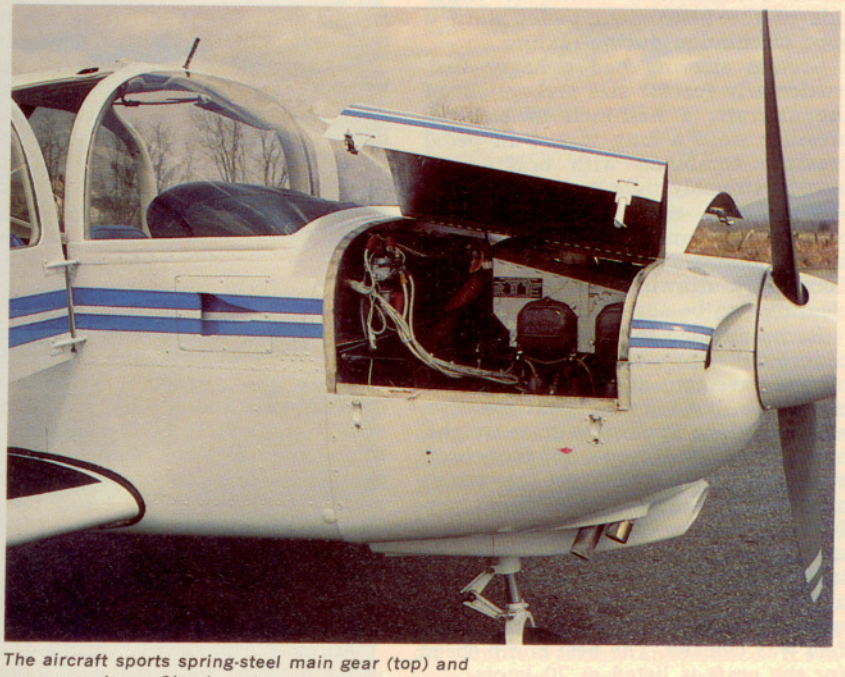


Tomahawk's T-tail and expansive window area: two of the new trainer's distinguishing features. Photos by the author.

PILOT FLIGHT CHECK

Piper's TOMAHAWK

by Berl Brechner/AOPA 466558



The aircraft sports spring-steel main gear (top) and wrap-over doors. Simple access to either side of the engine (above) will allow more complete preflights.

These different characteristics come concurrent with other features that are new—and very welcome—in flight trainers. Plexiglas abounds all around, and visibility in any direction is excellent. With its short-chord wing, and low-slung side and rear windows, visual tracking of a plane passing below and behind the Tomahawk proved a simple task.

On the ground, there isn't a whole lot to preflight on Piper's trainer. Each of the two fuel tanks has a drain to check, along with a sump drain on the lower left side of the engine compartment. Access to the 112-hp Lycoming is through hinged doors on either side of the nose that raise to expose most of the engine and its accessories. The powerplant is rated for 100 or 100LL fuel.

Maintenance people may have an easier time with this craft than some other airplanes. Its three tires are all the same size. The main landing gears are interchangeable left and right. Ailerons are interchangeable, and so are the elevators. Piper says, also, that the cowling is designed in such a way that the engine can be removed without having to pull off the propeller.

Most unusual inside the Tomahawk cockpit is the unique placement of the fuel selector and gauges. Either left or right tank may be chosen (there is no "both" position), and the selector points to the gauge in use. The gauge/selector combination is set into the throttle quadrant, between throttle and mixture levers—hard to miss.

At Piper's Lock Haven, Pa. plant, where the Tomahawks are being assembled, the temperature was 47°F at the beginning of the flight check, so the air was comfortable inside the airplane. Nonetheless, vents on either side of the instrument panel allowed good circulation during taxiing.

Ground steering had a heavy feel, particularly for the size and weight of the aircraft; a half-inch of steering pressure went a long way. Full pedal pressure combined with braking allowed extremely tight turns.

When the nose strut was compressed, clearance between prop tip and ground was about three inches. Tomahawk drawings showed normal clearance to be seven inches.

Recommended shortfield takeoff procedure calls for a notch of flaps, nose off the pavement at 53 knots, and initial climb at 61 knots. That exercise, with the plane at close to gross weight, had us off Lock Haven's 555-foot-elevation strip in about 650 feet into winds of about 10 knots. Better climb performance can be obtained without flap use, although ground roll is slightly increased. On a takeoff without flaps a 1,012-fpm climb rate from the runway surface through the first 1,000 feet was clocked. The best climb speed for the craft is listed at 70 knots.

Climb rates of around 600 to 700 fpm were more common several thousand feet above the ground. Cruise checks at 6,000 feet (temperature 37°F) at 65% (2,380 rpm) and 75% (2,500 rpm) power, showed indicated airspeeds of 91 and 95 knots. Conversion for temperature and altitude offered true airspeeds of 99 and 104 knots. The craft's handbook says true airspeeds for those power settings at that altitude should have been 96 and 107 knots.

The sensitivity of the elevators matched fairly well with rudder control. Ailerons, however, were spring-loaded and had the feel of a much heavier aircraft. Flaps are operated by a short handle extending from a console between the seats; unlike the flap handle in the Cherokees, this one is angled upward somewhat even when flaps are up. It proved quite difficult to pull on the first notch of flaps, a problem resulting from the short handle's lack of mechanical advantage, according to Piper. The company was working on an "engineering modification" to correct the situation.

In flight the Tomahawk handled nicely. It responded well to control input, maintained its coordination in turns, and had adequate power for maneuvering. In steep 50- or 60-degree banks carrying 2,500 rpm, however, the stall horn would sound in turns either direction. The craft did not feel on the verge of a stall.

From the right seat, where I flew the Tomahawk for a good part of this flight check, all engine and power gauges are clearly visible. None of the flight instruments were blocked, and the master and magneto switches could be easily reached from the instructor position. The Tomahawk's long, straight, wing leading edge, which is aligned with the forward part of the cabin, makes it easy to visualize the aircraft's position in relation to the ground. And there is a convenient rivet line down the length of the wing that makes a perfect pylon reference.

Landings, flaps up or down, would be as gentle as the pilot could deliver. A critical eye on approach speed is helpful, though, to prevent undue float. In the flare, elevator sensitivity again proves apparent: too sharp a movement can give unwanted ballooning instead of a smooth round-out. Spring steel main gears offer ever-so-gentle matings with the asphalt.

The Tomahawk used for this check, N384PT, was a simply equipped trainer: addition of the Special Training Package No. 1 gave it gyros, lights, dual brakes, and a King nav/com. It also contained an ELT, a heated pitot tube, and a King transponder. As equipped, its price came to $19,730, and it weighed in at 1,165 pounds. That basic empty weight, plus full fuel (30 usable gallons, 180 pounds) and two 170-pound passengers, would put the aircraft 15 pounds over its maximum allowable gross weight of 1,670.

Another Tomahawk with a Collins radio package installed was found to have a similar basic empty weight. Of course, training airplanes are topped off when fuel runs low, so pilots who rent and instructors who teach in Tomahawks should be aware of this tight loading margin.

Tomahawk flyers will need to familiarize themselves with the door arrangement of the airplane, as well. Its two doors are small and the tops curve inward to form the cabin roof. That curved portion of each door extends back over the wing walk when the door is open, and could be an obstacle for those not used to the Tomahawk. Each door has a side latch; another, overhead, secures the top of both doors.

This early production model showed some rough edges that hopefully will

Long, spatula-like wing is a new NASA-technology airfoil, offering flight characteristics unlike Piper's previous trainers.

Fuel gauges and selector handle are quadrant-mounted, between mixture and throttle levers. Microphone, trim wheel, and flap lever are all located in a relatively wide space between the seats.

PA 38-112 TOMAHAWK

Basic price $15,840

Specifications

Engine	Lycoming O-235-L2C, 112 hp @ 2,600 rpm
Propeller	Sensenich 72 in FP
Wing span	34 ft
Length	23 ft 1 in
Height	8 ft 8 in
Wing area	125 sq ft
Wing loading	13.4 lb/sq ft
Passengers and crew	2
Cabin length	5 ft 8 in
Cabin width	3 ft 6 in
Cabin height	4 ft 2 in
Empty weight	1,064 lb
Useful load	606 lb
Gross weight	1,670 lb
Power loading	14.9 lb/hp
Fuel capacity (standard)	32 gal (30 usable)
Oil capacity	6 qt
Baggage capacity	100 lb (20 cu ft)

Performance

Takeoff distance (ground roll)	945 ft
Takeoff over 50 ft	1,400 ft
Rate of climb	700 fpm
Maximum level speed	113 kt
Normal cruise speed (75% power, 8,800 ft)	109 kt
Economy cruise speed (65% power, 11,500 ft)	102 kt
Range at normal cruise (with 45-min reserve)	402 nm
Range at economy cruise (with 45-min reserve)	436 nm
Service ceiling	12,850 ft
Stall speed—CAS (clean)	46 kt
Stall speed—CAS (flaps down)	48 kt
Landing distance (ground roll)	642 ft
Landing over 50 ft	1,374 ft

disappear with later models. A door stop was chafing against the frame and vent controls were bare metal rods extending from the panel.

Despite this roughness and a few early flaws, Piper has introduced a plane designed for training. The Tomahawk's provision of visibility for its pilots, and maintainability for its mechanics, should be attractive. Also, the factory-installed radio packages carry a two-year or 2,000-hour warranty.

It's a simple airplane, and projects an almost Spartan appearance. It's a trainer: one that is asking for a chance to be proven in the rough-and-tumble world of flight education. □