ZENAIR • CH 2000

ZEN AND THE ART OF NEW TRAINERS

Does the Zenair CH 2000 mark the new age of trainers?

BY MARC E. COOK

In the philosophies of Zen, the absolute beginner is the most pure, free from preconception and bias. Neophytes are believed to look at the world through a child's eyes, unassuming and untainted. From the rank amateurs come the freshest ideas, the greatest leaps, the most magic. ■ And so it may be in general aviation. Revised certification rules have opened the passage for fresh designs, forward thinking, and unfamiliar companies to provide us with the next generation of light aircraft.

PHOTOGRAPHY BY MIKE FIZER

Flight instructors will appreciate the easy access to the Zenair through its two gull-wing doors and the good visibility out the large windows.

These makers represent not the grizzled veterans of the Cessna and Piper ilk, but companies that have toiled in what has been considered the fringe of general aviation: the experimental class.

We have seen and flown the first of the new breed to achieve the remarkable affirmation of certification, the Quicksilver GT–500—its roots are deep as an ultralight and a kit airplane. And we have lived the moment, as Zen practitioners might say, with another potential production model, the Zenith Aircraft CH 2000. This airplane is undergoing certification according to Canadian Joint Airworthiness Regulations—Very Light Aircraft (JAR—VLA) rules, an endeavor that should be complete by the end of the year, according to Zenith. Concurrent paperwork shuffling is taking place with the Federal Aviation Administration so that once Canadian approval is granted, the U.S. certificate will quickly follow.

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As with the Quicksilver, the Zenith's previous (and continuing) life embraces homebuilts and ultralights; unlike the GT–500, its production-hopeful CH 2000 will not be offered now or ever as a kit. In fact, while the CH 2000 shares many design concepts with Zenith's kit offerings, there's little hardware in common.

What the CH 2000 does share with Zenith's current Zodiac series kits, the CH 601 and the CH 701, is Chris Heintz. An aeronautical engineer by education, Heintz worked with Aerospatiale during development of the Concorde and became chief engineer for Avions Pierre Robin in France during the 1960s. Like many who would go on to design homebuilts, Heintz tired of the day-to-day corporate grind and began fantasizing about a light, simple sport airplane. That fantasy would emerge in 1970 as the CH 200 Zenith, a low-wing two-place runabout. It entered kit production


VENT
NO SMOKING
MIXTURE PULL LEAN
TRIM
THROTTLE PULL CLOSED
CARB HEAT PULL ON
VOLTS
AMPS
FLAPS BKR.
AUXILIARY FUEL PUMP BKR.

four years later when Heintz and family moved to the Toronto area; the first kits flowed from modest beginnings in Heintz's garage. Today, the company has two facilities totaling 40,000 square feet, located in Midland, Ontario, Canada, and Mexico, Missouri. Heintz's son, Sebastian, runs the Missouri facility, where some of the production is expected to take place. Final assembly will likely occur at the Midland plant once production gets under way early in 1994.

Heintz senior admits to having been more an engineer than a tools-and-metal man in the beginning, so his designs' hallmarks are simplicity of construction and modest tool requirements—the vast majority of rivets in the Zenith airplanes are of the Avex blind variety, installed with a common "pop" rivet gun. Heintz's airplanes have displayed common design themes, like thick, lift-rich airfoils, most often in labor-sparing constant-chord form. Zenith's distinctive all-flying vertical tail has served as a Heintz signature for some time, too. You might wonder where the yaw-damping characteristics normally gained from the traditional vertical stabilizer emanate. Heintz says a tall empennage with squared-off lower corners contributes to yaw stability, and the all-flying rudder provides more control authority with a smaller surface and lower weight.

Although the CH 2000 shares all these Zodiac-inspired themes, it was, according to Heintz, designed from the start as a trainer—he refers to the other current kit offerings as either sportsters or utility types—and, just as important, as a production model. For example, where the kit airplanes make extensive use of predrilled skins and self-aligning construction, the CH 2000 was intended to use hard jigs and custom-made tools.

During the building of most kits, parts are constructed and fitted in a particular order. You might build a stabilizer, for example, and fit it to the airplane, drilling its mounting holes so that it fits the fuselage correctly. The exact location of those mounting points, within reason, is unimportant. In series production, however, the mounting locations must be in the same place for every airplane. This way, you can pull a stabilizer off the shelf, its locating holes already drilled in a jig, and have it fit any airplane on

WHAT'S YOUR SIGN?

Zenair's Zodiac, the foundation from within

Simple, metal construction is the hallmark of the Zenair airplanes. Kit parts are individually numbered and tracked.

Amid the hoopla surrounding Chris Heintz's production hopeful, the CH 2000, the kits in the Zenair line stand the risk of being eclipsed. Which would be unfortunate because these are the airplanes that have allowed the company to flourish and have provided Zenith Aircraft the resources to consider producing a certified trainer for the 1990s. During our visit to Zenair's Midland, Ontario, Canada, base, we had the chance to briefly sample one of its most popular kits, the CH 601 HDS, better known as the Super Zodiac.

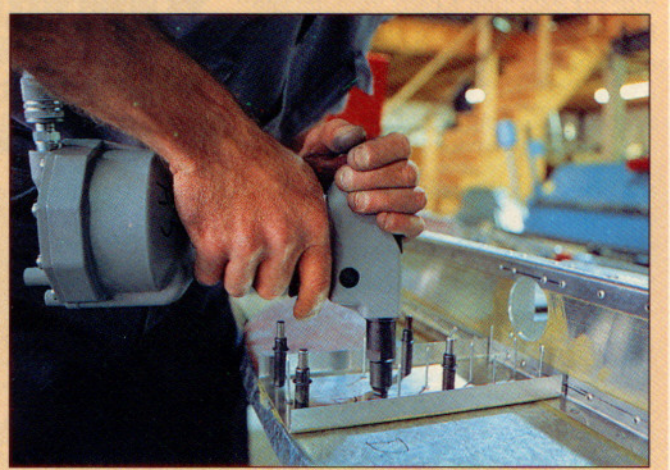
The HDS suffix denotes a tapered, shorter wing attached to the familiar low-wing Zodiac fuselage. In search of extra performance, the standard 601's thick, constant-chord airfoil has been recontoured into a shapely thing, sporting full-span ailerons. Heintz's trademark all-flying rudder adorns the Zodiac, although the horizontal tail is a conventional stabilizer/elevator combo rather than the CH 2000's stabilator.

Inside, the 601 offers a surprisingly wide cabin—listed at 44 inches between the sidewalls—but it comes up short on leg- and headroom, even for my 5-foot-9 frame. The seat back is a structural member, meaning that any additional legroom has to come from rudder pedals mounted farther forward than in the factory's airplane.

Shorter, tapered wings and full-span ailerons set this CH 601 HDS Zodiac apart from the standard 601.

The HDS's in-flight characteristics accurately reflect its main mission: to be a fun aerial playmate.

Tight though this cockpit might be, it is not claustrophobic, thanks to a generous canopy and a pleasantly low cowling that all but falls from view in cruise flight. We took a brief low-altitude flight, and so cannot verify Heintz's claimed 122-knot cruise speed. Down low, with the 80-hp Rotax 912 pulled back to 4,800 rpm—an estimated 62-percent power—the 601 indicated 85 knots, for about 95 knots true. The Zodiac's climb performance at low weight—one 180-pound pilot and half of the 16 gallons usable fuel aboard—is spectacular, easily maintaining 1,200 fpm from near sea level.



Though it's definitely a lightweight—the 601 HDS weighs just about 570 pounds empty—it possesses decidedly solid and stable handling characteristics. You manipulate the pitch and roll surfaces through a center-mounted, Y-shaped stick; it looks a bit odd but works quite well. Aileron response is superb, with the forces reasonably light and the roll rate high. The stick's fore-and-aft travel is unusually long, which makes pitch control far from hair-trigger and means you're less likely to overcontrol. In all, the HDS's in-flight characteristics accurately reflect its main mission: to be a fun—but not demanding—aerial playmate.

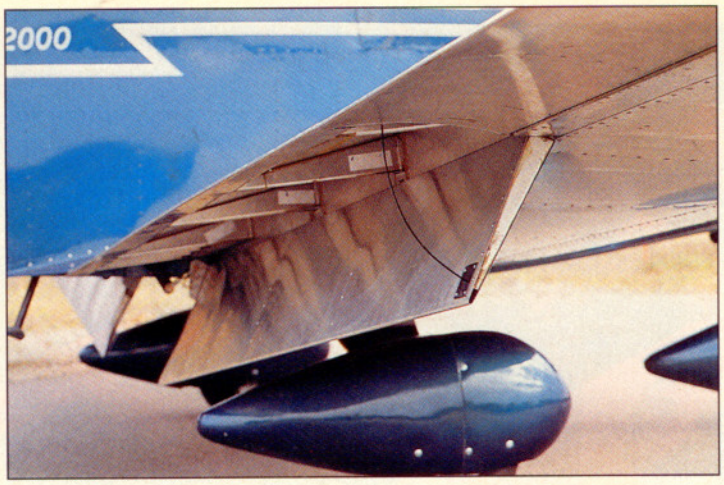
Several engine options exist for the HDS, but the most popular has been the Rotax 912. Unfortunately, the four-stroke significantly raises the financial ante. Zenair charges $13,640 for the basic Super Zodiac airframe kit, said to go together in about 400 hours. Engine and flight instruments, avionics, paint, and interior furnishings are all extra. Another $10,595 buys the firewall-forward kit including the 912. Opting for the two-stroke, 65-hp Rotax 582 will bring the engine kit's price down to $6,140.

—MEC

the line. Such a fundamental shift in the way the airplane is constructed means that it's almost easier to start with a clean sheet of paper than to attempt redesign of a kit-built airplane.

Drafting pencil in hand, Heintz took elements of the Zodiac series and tweaked them into something that would yield a good trainer. In listening to the flight schools, he learned that conventional construction methods and materials would warm the check-writers' hearts. That's what they'll get—the CH 2000's main structure is aluminum, and it employs cable controls attached to yokes and traditional nosewheel steering. Cleveland wheels and brakes are part of the package, and electric split flaps are standard.

School owners might also be expected to show a preference for a conventional powerplant, especially if it's one with which they are familiar, like the Lycoming O-235. In the 2000, the little Lycoming produces 116 horsepower and provides enough motivation to make the airplane a match for any of the familiar trainers. Certain other parameters dictated the presence of the Lycoming, in particular climb rate and a sufficiently great performance margin that a model loaded with avionics wouldn't be terribly underpowered.



A wire (foreground) attached to the split flaps pokes through the wing to indicate flap position to the pilot.

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Performance is not something the CH 2000 lacks, considering its primary mission as a trainer. We flew the airplane at the company's Midland facility, which is located on the Huronia Airport. With two aboard and three-quarters fuel, the CH 2000 weighed about 100 pounds under its 1,600-pound maximum gross weight. Runway performance is good; the Zenair consumes about 1,000 feet of runway to become airborne, and initial climb is strong. We witnessed an average of 700 feet per minute from the near-sea-level airport on a 50-degree-Fahrenheit morning; preliminary factory figures call for the CH 2000 to perform a 720-fpm climb at maximum gross weight. At a best-rate climb speed of 61 knots, the CH 2000 displays a decently steep climb gradient—points sure to win accolades from students and flight instructors alike.

Prior to our visit, Heintz added 3 feet 9 inches of wingspan and about an inch in chord, which boosted total area 14 percent, to 137 square feet. Increasing the maximum weight by 50 pounds from the original estimate pushed the stall speed above the VLA's limit of 43 knots, hence the need for the change. The stabilator's span grew as well, but little else changed, and there were a few bugs left to exterminate when we flew the airplane. Most prominent among them: a marked pitch up just following rotation. A few production airplanes, notably the Cessna T303 Crusader, have similar traits. As the airplane reaches rotation speed, you must exert more elevator back-pressure to raise the nose than is required to hold it there for the initial climb. The first takeoff usually results in a quick pitch up followed by a too-vigorous pitch down initiated by the pilot at the sight of the cowling filling the windshield. After a handful of takeoffs, you soon realize that the airplane wants a slight pull at rotation and then relaxation of back-pressure; you need not push the nose back down to hit the correct climb attitude.

Zenair CH 2000
Base price: $59,900

Specifications

Powerplant	Textron Lycoming O-235-N2C, 116 hp @ 2,800 rpm
Recommended TBO	2,200 hr
Propeller	Sensenich fixed-pitch, 72-in diameter
Length	23 ft
Height	6 ft 11 in
Wingspan	28 ft 10 in
Wing area	137 sq ft
Wing loading	11.7 lb/sq ft
Power loading	13.8 lb/hp
Seats	2
Cabin length	5 ft 9 in
Cabin width	3 ft 10 in
Cabin height	4 ft 4 in
Empty weight	1,010 lb
Max ramp weight	1,600 lb
Gross weight	1,600 lb
Useful load	590 lb
Payload w/full fuel	422 lb
Fuel capacity, std	28 gal (28 gal usable) 168 lb (168 lb usable)
Oil capacity	6 qt

Performance

Takeoff distance, ground roll	700 ft
Takeoff distance over 50-ft obstacle	1,050 ft
Max demonstrated crosswind component	25 kt
Rate of climb, sea level	780 fpm
Max level speed, sea level	125 kt
Cruise speed/endurance w/45-min rsv, std fuel (fuel consumption)	
@ 75% power, best economy 7,500 ft	100 kt/3.5 hr (39 pph/6.5 gph)
Service ceiling	12,500 ft
Landing distance over 50-ft obstacle	950 ft
Landing distance, ground roll	600 ft

Limiting and Recommended Airspeeds

V_X (best angle of climb)	60 KIAS
V_Y (best rate of climb)	68 KIAS
V_A (design maneuvering)	104 KIAS
V_{FE} (max flap extended)	80 KIAS
V_{NO} (max structural cruising)	104 KIAS
V_{NE} (never exceed)	139 KIAS
V_{S1} (stall, clean)	48 KIAS
V_{SO} (stall, in landing configuration)	44 KIAS

For more information, contact Zenith Aircraft Company, Mexico Memorial Airport, Mexico, Missouri 65265-0650; telephone 314/581-9000.

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted.

This characteristic usually results from a design's main landing gear being too far aft. Likely, the CH 2000's gear was placed with the thought of 168 pounds of fuel in the baggage bay; with the main gear in the ideal location, the airplane might have a tendency to sit back on its tail when the crew exits. Another minor annoyance was the too-fast action of the electric flaps, which is something, says Heintz, easily fixed.

Beyond these glitches, which are hardly surprising given the airplane is still in flight test and in no way damning, the 2000 handles predictably and honestly. Overall, control forces are reasonably light, about midway between a Cessna 152 and 172, with classical harmony—the ailerons are the lightest, followed by slightly heftier pitch and heavier rudder response. Control authority is excellent, particularly in yaw; in the CH 2000, steep forward slips are possible and give the airplane the glide ratio of a Ford Explorer. Given the 2000's tendency to overrotate, one might expect the nosewheel to come crashing to the pavement after touchdown. Fortunately, sufficient stabilator authority exists at low landing speeds to keep the third wheel in the air as well as on any traditional trainer. Landings themselves are simple affairs—using an approach speed of 56 knots, the airplane's controls remain crisp and pitch response is linear and natural, so putting the 2000 down on the numbers is a cinch from the start. No-flap landings call for another 5 knots' airspeed on approach and slight compensation for the more nose-high attitude, but that's about it.

In performing the textbook tasks asked of a trainer, the 2000 ought to do well. Stalls are straightforward; with power off, the nose merely bobs a few degrees above the horizon and the airplane mushes earthward—very much like a Cherokee. Aileron control remains good throughout the stall. Some flight instructors might wish for a brisker stall and definitive break for educational value.

Few CFIs will complain about the 2000's roomy cabin, though. With a claimed 46 inches between the sidewalls and tall, broad windows, the 2000 feels far airier than a 152 and worlds more comfortable.

Blazing speed is really not high on the flight instructor's or fixed-base operator's list, but the CH 2000 acquits itself well. We made a two-way speed run at 7,500 feet and 75-percent power, to which the GPS displayed an average of 106 knots. That's better than the predicted 100-knot cruise but not untoward considering the airplane was about 270 pounds under maximum gross weight at the time. Total fuel capacity is slated to be 28 gallons in a single tank behind the seats. But a few prospective customers have expressed concern about fuel in the cabin. Zenair is considering using twin wing tanks—currently slated as an option—for a total of 44 gallons.

The CH 2000's conventional materials and many off-the-shelf items should make the airplane easily maintainable.

Zenith has set the CH 2000's basic price at $59,900, and for this, you get the airplane with a basic nav/com, intercom, emergency locator transmitter, and VFR instrumentation. Options include the aforementioned long-range tanks, wheelpants, an IFR gyro panel, larger Cleveland wheels and brakes, and landing lights.

Heintz is quick to point out that the CH 2000's conventional materials and many off-the-shelf items should make the airplane easily maintainable. The stalwart Lycoming will be familiar to many flight-school mechanics. These are two items that will help overcome a flight school's reluctance to buy something not from Wichita or Vero Beach, Florida.

On top of it all, the CH 2000 just happens to be a good airplane, with performance that meets or exceeds its maker's claims and a kind of no-frills honesty that will endear it to first-flight students and seen-it-all instructors alike. If this airplane reaches production on schedule and arrives on flight lines early in 1994 as promised, we might be tempted to revisit the 2000 with this question: Was it crafty, Zen-like contemplation of the trainer market or just beginner's luck? Don't discount the former. □