

Diamond C1 Eclipse

Delivery for

How often does the average general aviation pilot get to ferry a trainer aircraft to the U.S. Air Force Academy? Circumstances made that possible when *Pilot* needed a story on Diamond Aircraft's two-passenger DA20-C1 Eclipse, and Diamond needed to deliver two trainers to the U.S. Air Force Academy in Colorado Springs, Colorado. Modifications place the student

on the right side of the cockpit—that puts the throttle, mounted between the seats in both versions, in the student's left hand and the stick in the right, like in a fighter. You can buy this modified version if you so desire, or purchase the more conventional but otherwise identical civilian C1 Eclipse.

Speaking of models, let's clear up some confusion. You may think that any composite two-place piston-engine trainer

BY ALTON K. MARSH

Diamond's revamped trainer goes to the U.S. Air Force Academy

the Air Force

made by Diamond's plant in London, Ontario, Canada, is a Katana. Not anymore. The C1 Eclipse replaced the Katana in 1998 and has few parts (maybe two) in common with it—even the entry step is different.

Diamond, with corporate headquarters in Wiener Neustadt, Austria, introduced the Katana, powered by a Rotax engine, in the early 1990s. That engine was slow to catch on

among American pilots more comfortable with beefier Lycoming or Continental powerplants. So the Katana began a metamorphosis. The most important change was the switch to the 125-horsepower Continental IO-240-B engine. For a while it was marketed as the Katana Eclipse, but that designation has been dropped in favor of the current name, C1 Eclipse. While you may see a true Katana out there with a Rotax

PHOTOGRAPHY BY MIKE FIZER



The Eclipse (bottom) is spiffed up a little compared to the Evolution, the stripped-down model intended for flight schools for example. It has a back window.

A primary feature that makes the Eclipse fun to fly is the jet-fighter-style canopy (below). A sunscreen is painted on the top. Visibility can't be beat.





engine, it won't be a new aircraft: They aren't made anymore.

Diamond and Embry-Riddle Aeronautical University teamed to win a contract to provide pilot training for the U.S. Air Force Academy, and Diamond is providing 35 aircraft. (A Diamond official and I delivered aircraft 21 and 22 to the academy.) That arrangement resulted in an all-civilian powered-flight operation (glider training is provided in a separate program) at the academy airport that is overseen by Air Force officers. The aircraft are leased through Boeing Capital Corporation and manned by civilian flight instructors. Thus, without military ownership, the aircraft are ineligible to be chosen for display on the academy grounds. (All those on display are

additionally required to have once been flown by an academy graduate.)

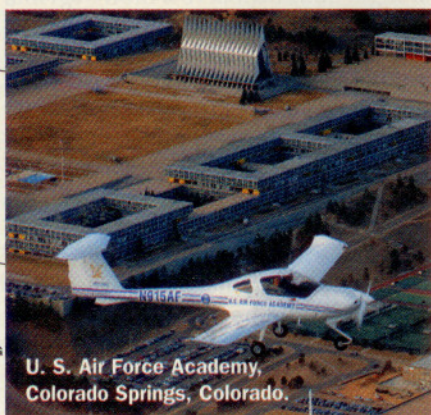
There's one more model to talk about, as long as we are sorting out Diamond trainer variants: the Evolution. The DA20-C1 Evolution is the scaled-down version of the C1 Eclipse. The absence of a back window in the Evolution distinguishes it from the C1 Eclipse; it has a less elaborate avionics package, less interior trim, and is intended as a low-cost aircraft for flight schools. The price is \$14,000 less than that for the spiffed-up Eclipse. DA20-C1 aircraft can be used for IFR training but are not IFR certified.

The trip

Diamond official John Gauch, vice presi-

dent of sales and marketing, and I were issued a C1 Eclipse apiece in London, Ontario, and after a thorough checkout we were ready to launch—but Federal Express wasn't. Each C1 Eclipse departs Canadian territory with an FAA airworthiness certificate, but because of a mix-up the certificates our aircraft needed were touring the East Coast of the United States aboard a FedEx jet. When they finally arrived in Canada, Transport Canada official Phil Lindner could then approve the factory paperwork.

The weather forecast indicated that if we could leave on Friday morning we might beat a snowstorm set to clobber Colorado Springs on Saturday evening. Fortunately, the forecast was wrong. But it



U. S. Air Force Academy, Colorado Springs, Colorado.

London to Colorado Springs

It was a long trip to deliver two trainers to the U.S. Air Force Academy, yet the weather was good every step of the way. The aircraft passed through Customs in Michigan by borrowing a U.S. Customs officer from a nearby bridge between the United States and Canada. Pilots remained in their Eclipse aircraft on the ramp until the officer arrived.





was Friday noon before we left on what was to be a two-day journey, since company rules prohibit aircraft from being ferried at night. That prevents get-there-itis.

By Saturday evening—after 12.3 hours of flying—Gauch and I stood as tourists at mile 16 of the 19-mile road up Pikes Peak overlooking Colorado Springs, known to locals as *The Springs*. (Miles 17 through 19 were still closed by snow.) The average fuel burn for both aircraft was 6 gph. That may be because Gauch and I were in a hurry, but the Air Force found that the C1 Eclipse burns 4.5 gph on a typical training flight—the lowest fuel burn of any of the 13 aircraft entered in competition for the academy training contract. The weather was perfect for 1,100 nm except for turbulence over the last three states—Nebraska, Kansas, and Colorado. The storm held off until Wednesday and then buried not just The Springs but Denver as well—one of the worst in years.

What stands out is the impressive speed of 133 KTAS as calculated on our Garmin GNS 430 GPS/coms (the same

speed as determined during Air Force testing). Yet it does it on only 125 hp—a tribute to the aerodynamically clean design of this all-composite aircraft.

The aircraft had the new Garmin GTX 330 mode S transponder capable of utilizing the FAA traffic information service (TIS). We got numerous voice warnings of traffic along the way when in range of a participating radar site, although Gauch swears his transponder once said, “Chocolate milk unavailable,” instead of the intended, “traffic unavailable.” (Gauch has had counseling since then and is fine now.) The transponders were newly developed and Gauch’s transponder was sometimes reporting one digit off the code set by the pilot. I kept mine at the ready to take over the squawk as we chatted with controllers on our VFR flight. At Des Moines I forgot that the transponder turns itself on automatically when the GPS receiver reports flying speed. When in formation, two transponders in close proximity are confusing to controllers, and the Des Moines Tower had to remind me to shut it off.

Avionics options available for the C1 Eclipse include an S-Tec Thirty two-axis autopilot, a slaved horizontal situation indicator, and a Garmin GNS 420, a slightly scaled-down and less expensive version of the Garmin GNS 430. The GNS 420 costs about \$1,250 less. Adding the 420 would allow redundancy since the 430 is already aboard. The 430 can be upgraded to a Garmin GNS 530.

After two days of travel, I appreciated the comfort of the seat—the Air Force insisted on sheepskin pads. Sure, by the end of a flying day I was aware I had been sitting for several hours. But I feel that if Diamond were to add an extra quarter inch of foam beneath the sheepskin, the comfort formula would be perfect. The leather seat on the model aimed at the civilian market was tested on an earlier flight at the plant and found to be comfortable, but the flight was less than an hour. The C1 Eclipse for the civilian market carries 24 gallons of usable fuel while the Air Force version carries only 20, so we kept legs between two and three hours in order to land with a comfortable fuel reserve.



The Eclipse model intended for the civilian market has the PIC position on the left, but the Eclipse aircraft built for the U.S. Air Force Academy puts the pilot on the right. Thus, the throttle is in the student's left hand, as it would be in a jet fighter.

The C1 is fun to fly. It is entered like a fighter, sits like an F-16, and has a fighter-jet canopy. In fact, one of the officers supervising the program at the academy—a former member of the elite Air Force Thunderbirds demonstration team—emerged from a demonstration flight to declare that it reminded him of an F-16. Yet it is simple to fly, and in aviation, less complexity generally equals greater fun. While it does not have nosewheel steering, I never noticed it and thus, never had to adjust. Differential braking was used only for tight turns during taxi and was never needed on the runway.

It climbs like a rocket: Diamond's claim of 1,000 fpm is no exaggeration. Although the two aircraft being ferried were identically equipped, each is handmade and slight differences were apparent. Gauch could outclimb me, but I could go faster in level flight. The painted sun shield on top of the canopy was much appreciated, as was the panoramic view. Gauch and I used portable slap-on sunscreens as we flew west into the setting sun. Excellent viewing for enjoy-

ment and monitoring other traffic means it is also easy for the sun to heat up the cockpit. I used the pop-out vent windows to stay comfortable when we encountered unseasonably warm temperatures in the 70s along the route.

Also appreciated was the aircraft's behavior in crosswinds: There's no flat aft-fuselage cross section for saber-tooth crosswinds to sink their jaws into.

As for flying characteristics, stalls are a nonevent. It wants to fly, not stall, and mashes forward quietly when held in a full stall. It comes down short final at 55 KIAS, a speed that gives a student pilot plenty of time to react. The flaps are small but effective in shortening the takeoff roll and controlling the descent rate at busy airports. A three-position flap switch moves the electric flaps to takeoff, full flap, and retracted positions.

Another strong impression came not from the aircraft but from the friendly and efficient FBO system that supports general aviation around the country. (Even the U.S. Customs Service, while not an FBO, deserves praise for the

friendly but no-nonsense efficiency shown at Port Huron, Michigan, where the aircraft entered the United States.) After Port Huron it was 265 nm to Kankakee, Illinois, with its clean and well-run facilities; followed by the big-city efficiency of the Elliott Aviation FBO at Des Moines; the super-enthusiastic and attentive lineman named Jason at Hastings, Nebraska, who took picture after picture of the trainers; and Butterfly Aviation at Goodland, Kansas, remembered by pilots across several states for its little sacks of complimentary candy. "We've done that for 30 years," said Marilyn Collett who runs the FBO with her husband, John. The candy bags are labeled "Nectar Kits" (a butterfly reference); business cards carry this slogan: "Don't flutter by; stop at Butterfly."

Fired on arrival

Embry-Riddle doesn't allow its instructors or students to enter the traffic pattern at the academy in formation, so two instructors watching from the ground were startled as I tucked in on Gauch on



SPECSHEET

Diamond DA20-C1 Eclipse

Base price: \$139,990

Price as tested: \$159,112

Specifications

Powerplant	.....Continental IO-240-B, 125 hp
Recommended TBO	.....2,000 hr
Propeller	.....Sensenich two-blade, fixed-pitch, 69-in dia
Length	.....23 ft 6 in
Height	.....7 ft 2 in
Wingspan	.....35 ft 8 in
Wing area	.....125 sq ft
Wing loading	.....14.1 lb/sq ft
Seats	.....2
Cabin length	.....3 ft 8 in
Cabin width	.....3 ft 5 in
Cabin height	.....3 ft 4 in
Standard empty weight	.....1,180 lb
Empty weight, as tested	.....1,159 lb
Max gross weight	.....1,764 lb
Max useful load	.....584 lb
Max useful load, as tested	.....605 lb
Fuel capacity, std	.....24.5 gal
	(24 gal usable)
	147 lb (144 lb usable)
Baggage capacity	.....44 lb

Performance

Takeoff distance, ground roll	.....1,106 ft
Takeoff distance over 50-ft obstacle	.....1,470 ft
Max demonstrated crosswind component	.....20 kt
Rate of climb, sea level	.....1,000 fpm

Cruise speed/endurance w/45-min rsv, std fuel (fuel consumption)	@ 75% power, best economy, 4,000 ft
	.....125 kt/2 hr (45 pph/7.5 gph)
Landing distance over 50-ft obstacle	.....1,280 ft
Landing distance, ground roll	.....581 ft

Limiting and Recommended Airspeeds

V _R (rotation)	.....44 KIAS
V _X (best angle of climb)	.....60 KIAS
V _Y (best rate of climb)	.....75 KIAS
V _A (design maneuvering)	.....106 KIAS
V _{FE} (max flap extended)	.....78 KIAS
V _{NO} (max structural cruising)	.....118 KIAS
V _{NE} (never exceed)	.....164 KIAS
V _{S1} (stall, clean)	.....42 KIAS
V _{SO} (stall, in landing configuration)	.....34 KIAS

For more information, contact Diamond Aircraft Industries, 1560 Crumlin Sideroad, London, Ontario, Canada; 888/FLY-DA20 or 519/457-4000; e-mail sales@diamondair.com; or visit the Web site (www.diamondair.com).

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.

downwind. "They are so fired," one told the other. A couple of cadets, I am told, seemed to enjoy the forbidden arrival. The academy tower, observing the formation, immediately offered permission to land in formation, but I applied full flaps on the base leg and quickly dropped back several hundred feet. Landing at KAFF, the academy airport (elevation 6,572 ft, where the C1 Eclipse still climbs at 600 fpm), was a rare treat for a couple of civilian pilots.

Thanks to the courtesy of Embry-Riddle instructors I was allowed to watch a preflight briefing. After the weather briefing is given by a cadet and critiqued by instructors, each cadet is asked to stand at attention and recite from memory a portion of a checklist or academy training procedure, such as the route to the practice area. Such routes must be flown precisely to avoid noise-sensitive areas. Correct answers allow the cadet to be seated; an error means the hapless student remains standing to be called upon later. Another student is then expected to pick up the answer, provide the correct information, and continue describing the procedure or checklist.

Although the academy grounds were closed to visitors because of the security threat level, I was able to tour the campus in the company of Diamond representatives and academy public affairs officials. Though built decades ago, the architecture of the academy chapel would fit in nicely on the campus of *Star*

Trek's fictional Star Fleet Academy. Other highlights include the mess hall where a single open room covering two acres allows the school's 4,000 cadets to eat at one time.

Scholars are aware of the precious collections of rare books, photographs, and drawings in the Air Force Academy's library. The Colonel Richard Gimbel Aeronautical Library includes the entire history of flight, from the time that it was just a dream through today's reality. Eight of the books were printed before 1501, and one-fourth of the 6,000 books were printed before 1850. Also included are photographs

and drawings made by World War II prisoners of war at the risk of punishment.

Not a bad home for an aircraft that may not be a fighting Falcon (that would be the F-16) but fulfills its role well as a fledgling Falcon.

i Links to additional information about the Diamond C1 Eclipse may be found on AOPA Online (www.aopa.org/pilot/links.shtml). Keyword search: Diamond.

AOPA

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