Neico Aviation's two-seat Lancair exemplifies the highly-prefabricated, relatively-easy-to-build composite aircraft.


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LANCAIR 200 AND 235

Portrait of a new composite airplane.

Lance A. Neibauer, 36, is a young man whose knowledge of aeronautical engineering is self-taught, and whose avocation as an artist is visible in every sensuous line of his design, the Lancair 200. It is a two-seat, retractable-gear, kit-built airplane capable of cruising at 165 knots while its Continental O-200 engine sips a miserly six gallons of gas per hour.

The Lancair is a very new airplane, making its first long flight in the summer of 1985 to Oshkosh, Wisconsin, for the Experimental Aircraft Association's annual fly-in. The prototype has about 300 hours on it. It took two years to build and went through extensive modifications. The span and aspect ratio of the wing, for example, were changed several times before the final configuration was settled upon. Since Oshkosh '85, Neibauer's

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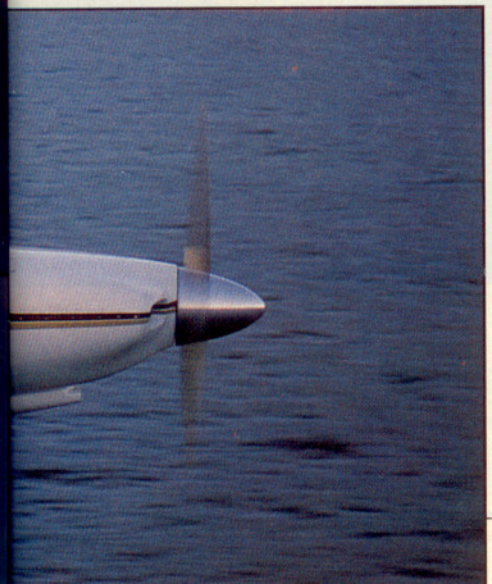
company, Neico Aviation, has shipped 96 complete airframe kits—an average of three per week—and 50 sets of plans.

A second prototype, the Lancair 235, powered by a 125-horsepower Lycoming O-235, has been flying since mid-April and has accumulated about 50 hours. Preliminary performance figures show a top speed of 198 knots, a cruise speed of 182 knots at 75-percent power and a rate of climb of 1,300 feet per minute at maximum gross weight.



The Lancair's speed and economy of operation, according to Neibauer, are due in large measure to the airplane's NLF-0215-F wing (based on the same National Aeronautics and Space Administration-designed airfoil as the Swearingen SX-300's NLF-0216 wing), a configuration so new that NASA's Ames Research Laboratory wants to flight-test Neibauer's prototype. As Neibauer explains it, the natural-laminar-flow (NLF) wing is unique in that no loss of lift occurs where laminar flow is interrupted, though drag increases to a level typical of a conventional wing. The 12.5-foot-span electrically actuated flaps reflex upward about five degrees, yielding a five- to eight-mile-per-hour increase in cruise speed.

The wholly composite airplane is assembled like a giant plastic model, with upper and lower, right-hand and left-hand components. No welding, machining or contouring work is required. Neibauer estimates total construction time at 800 to 1,000 hours. The kit is approved under the FAA's 51-percent rule (see "Kitregs," p. 58).

Neibauer has loaded two wings to the failure point, which occurred in excess of nine Gs positive. Airframe limit loads (the maximum loads expected in approved flight maneuvers) have been set at 4.4 Gs positive and 2.3 Gs negative. A consultant was retained to perform finite element analyses of the wing and canopy to determine pressure distribution. Finite element analysis consists of analyzing a solid structure (or fluid) in discrete sections rather than as a whole. By constructing a mathematical model of a physical object, the structure can be analyzed for specific stress, strain and thermal characteristics. These characteristics can be established for each node in the "mesh" that results from the mathematical breakdown of the structure. Neibauer believes this is the first time such an analysis has been performed on a kit airplane.

According to Neibauer, the Lancair kit contains all components needed to complete the airplane, except engine, instruments, battery and paint. A fiberglass instrument panel is optional. The current kit price is $15,975.

Last February, Neibauer dispatched a factory inspector to call on every Lancair builder to perform a one-time spot check on construction progress. At last report, the inspector had returned to Santa Paula with information that is being used to confirm ease of construction and customer satisfaction. In a segment of aviation sometimes derided for its fly-by-night entrepreneurs, this is an encouraging sign of commitment to the notion of customer support. —*Seth B. Golbey*