Uncompromised performance

Going fast—no fuss, no muss

BY THOMAS B. HAINES

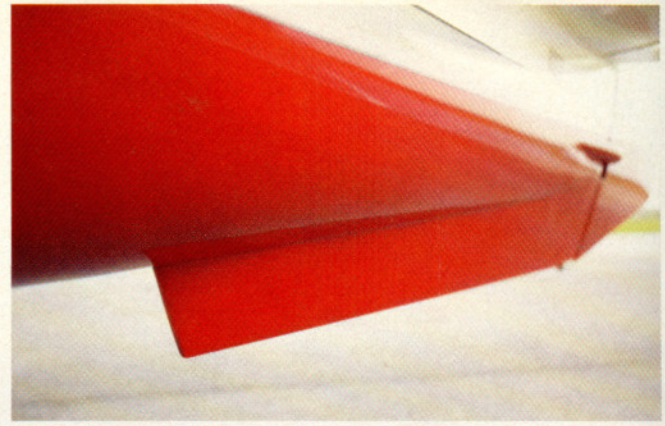
PHOTOGRAPHY BY MIKE FIZER

There's no fooling Mother Nature. To go fast, you have to give up something—usually cabin size or parasitic drag. But when cruising in a Lancair Columbia 400 at speeds of more than 230 knots in a wide, comfortable cabin with the landing gear hanging in the breeze, it sure seems as if Lancair has at least bent the laws of aerodynamics if not broken them outright.

A suggestion to readers: Don't stand next to Lance Neibauer, designer of the Lancair products, during a thunderstorm.

Lance, my guess is Mother Nature has her eye on you!

The Lancair Company delivered its first Columbia 400 in April, moments after receiving the certification documents from the FAA at the EAA Sun 'n Fun Fly-In. Owner Paul Duckett accepted the keys from Lancair President Bing Lantis after a five-year wait. Duckett first put his money down on a Columbia 300, the normally aspirated version of the sleek four-place composite airplane. But when Lancair announced it was working on the turbocharged Columbia 400, Duckett signed up to be customer number one. A dealer in heavy trucks and a racecar aficionado, Duckett understands turbochargers and the kick they can give an airplane.



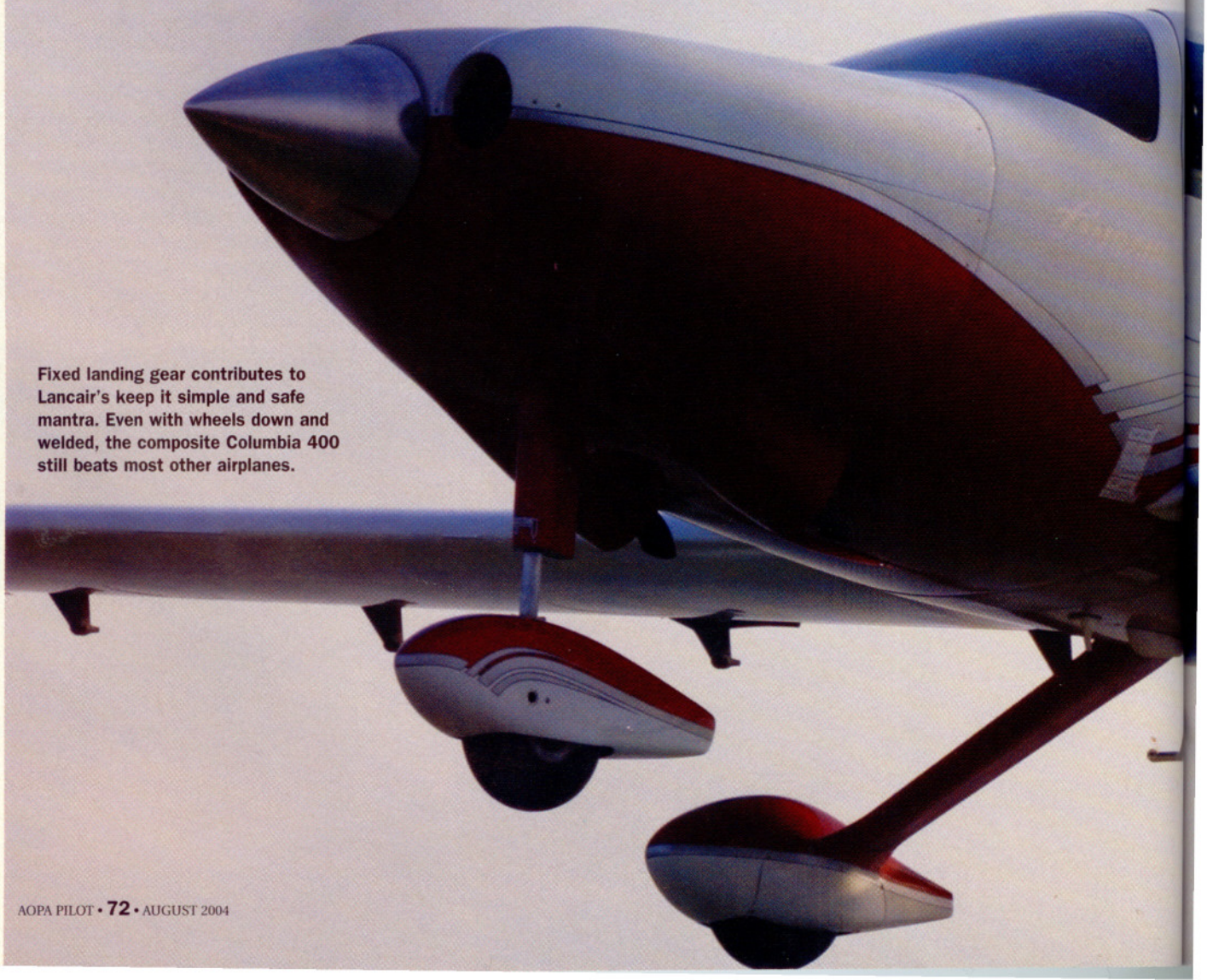
A larger rudder and a new ventral fin with a carefully raked leading edge improve the 400's high-altitude handling.

While Duckett accepted the keys at the ceremony, he agreed to allow Lancair to use the airplane as a demonstrator for a few weeks while he made time in his busy schedule to complete the training course provided with each airplane purchase. And thus, a few days later, I was introduced to N48PD.

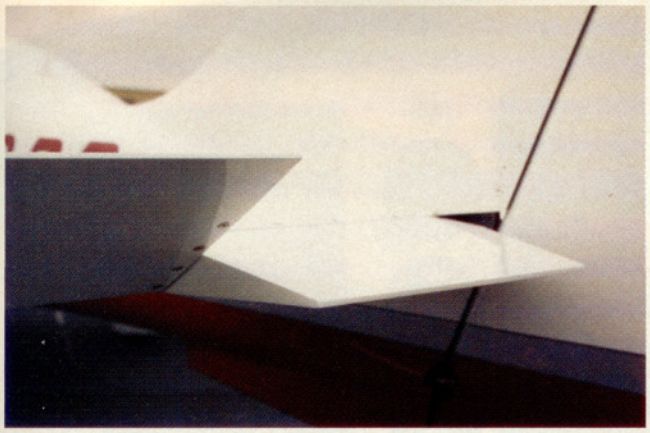
Nice tail

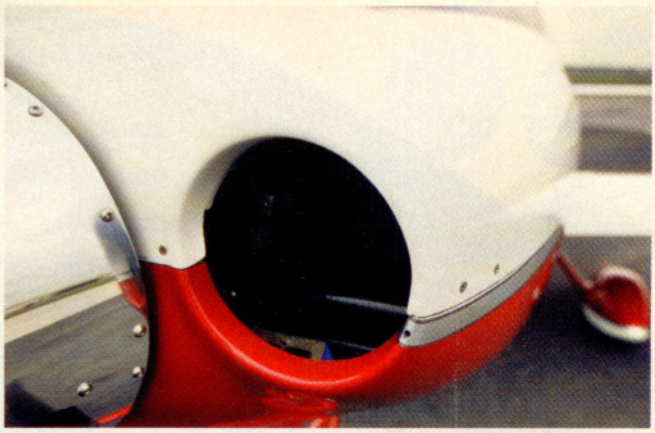
Mark Cahill, cofounder and vice president of sales for The Lancair Company, pointed out the changes made to the Columbia airframe to ready it for the high-altitude flight that is possible when you strap dual turbochargers and intercoolers onto a big-bore Continental engine. The TSIO-550 engine cranks out 310 horsepower for takeoff. It can maintain its maximum cruise output of 85-percent power (264 horsepower) all the way up to 25,000 feet where, according to the pilot's operating handbook (POH), the 400 will dash through the air at 235 knots true airspeed on 25 gallons per hour. At that rate, the range charts show you can put more than 700 nautical miles behind you before you'll tap into the standard 45-minute fuel reserve.

A typically equipped 400 weighs in at about 2,500 pounds; max takeoff weight is 3,600 lb. Add in the full 98 gal-



Fixed landing gear contributes to Lancair's keep it simple and safe mantra. Even with wheels down and welded, the composite Columbia 400 still beats most other airplanes.



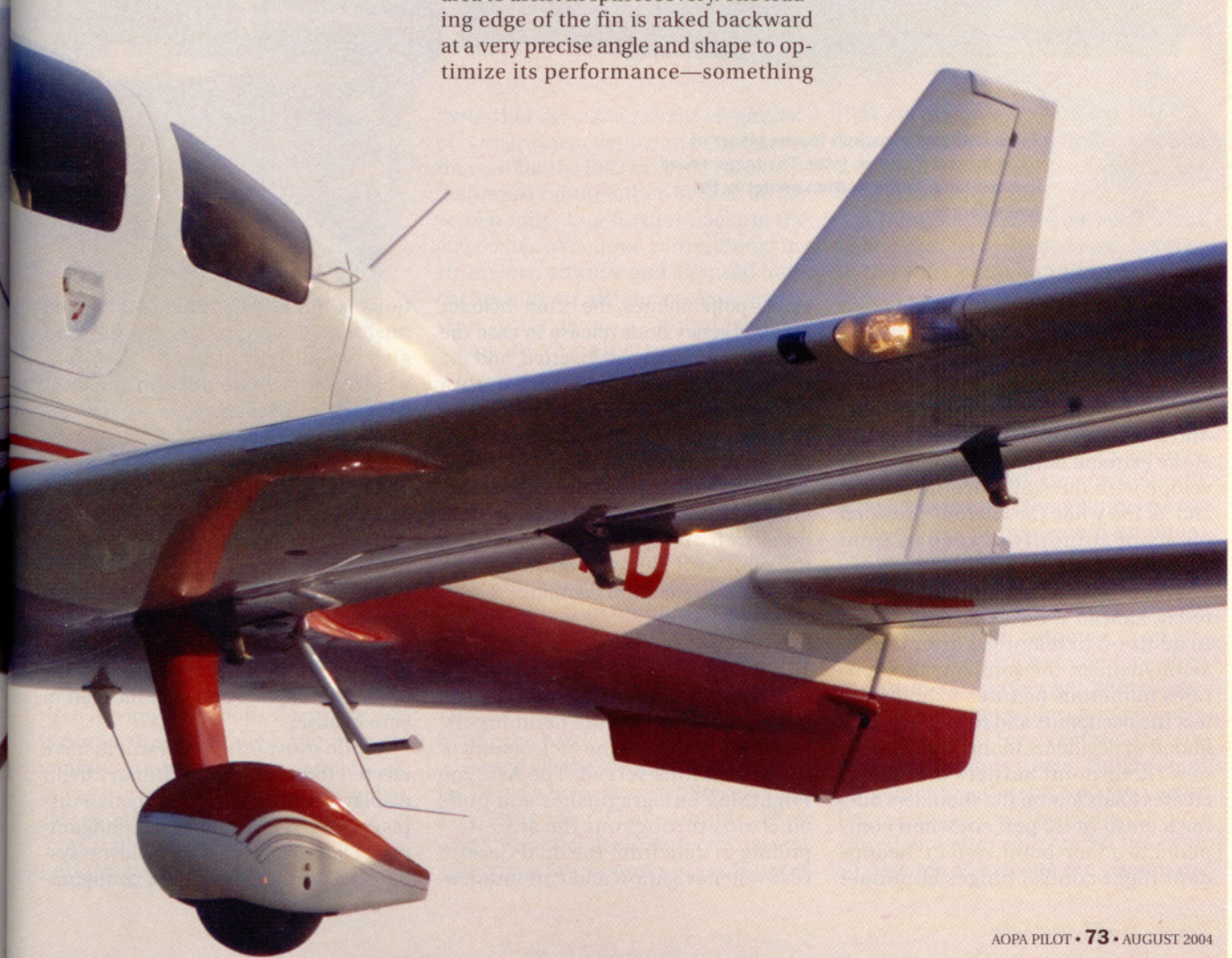


lons of fuel, and you're left with payload for three adults. With the sophisticated fuel gauges, it's easy to accurately trade fuel for more passengers and baggage.

At first glance, you might assume that to bring out the 400, Lancair just bolted the turbochargers and intercoolers onto a Columbia 350, the current normally aspirated model. But you'd be wrong, says Cahill. The company engineers went to considerable effort to make sure the 350's polite handling characteristics were preserved even at Flight Level 250. As a result, the 400 has several aerodynamic changes. Most noticeable is the significantly wider chord on the rudder, improving yaw characteristics at altitude. A split elevator with a stationary section inboard provides more authority. Finally, a new ventral fin provides more surface area to assist in spin recovery. The leading edge of the fin is raked backward at a very precise angle and shape to optimize its performance—something that it took the engineers many flights to perfect.

A fixed inboard elevator section and larger engine inlets set the Columbia 400 apart from the normally aspirated 350.

To satisfy the FAA that the 400 could recover from any configuration, Lancair put the airplane through some 1,200 spins—a comforting thought if you ever manage to get it into a spin. Good luck on that one. To keep you from unintentionally going there, the company adapted the same wing design as that of the 350, which sports extensions on the outer third of the wing



The pilot-friendly cockpit leaves plenty of room for new features later. The large, round wooden knob in the bottom center is the fuel selector.

leading edges. As a result, the wing root will stall well before the wing tips, effectively creating a wing with spin-resistant yaw control and giving the pilot positive control through the stall cycle. And it works. Cahill and I flew around at the extreme bottom of the flight envelope with the stall warning blaring and all the while the ailerons provided plenty of authority to keep us from stumbling into a spin.

Like many airframe companies today, Lancair is obsessed with safety. In addition to relentless attention to aerodynamics, the company incorporates numerous features to help protect the occupants and reduce the likelihood of accidents in the first place. A new three-point harness design decreases loads low on the shoulders during a crash by 12 percent when compared to a four-point system. Redundant flight control hinges eliminate single-point failures, the cabin includes an emergency door release in case the airplane comes to rest inverted, and the cabin roll cage is rated to three Gs. An automatic load-shedding system leaves the pilot with essential equipment in the unlikely event of an electrical failure. The 400 comes with dual alternators and dual batteries—all driving dual buses with a cross-tie system, providing the pilot with plenty of options when dealing with electrical gremlins.

Mr. Edison's airplane

You'll appreciate that sophisticated electrical system when you see the panel. If electrons were hamburgers, this thing would be the McDonald's of the air, billions served. The Avidyne FlightMax Entegra pushes and pulls electrons throughout the aircraft—pulling in data from the dual Garmin GNS 430 navigation and communications radios and the transponder, and pushing out data to other systems to give the pilot a complete picture of what's going on around him and elsewhere in the airplane.

Fuel running low? You'll hear about it from the Entegra. Terrain nearby? The multifunction display will show it. Threatening weather ahead? The datalinked weather system will depict it. One cylinder running cool? The optional Emax engine instrumentation system will show it for you. Traffic too close for comfort? Look for a TIS alert from the Garmin transponder to show up on the displays and hear the alert in your headset.

While most other airframers have elected to present their primary flight displays (PFDs) and multifunction displays (MFDs) in a horizontal configuration, Lancair presents the Avidyne system in a portrait, or vertical, configura-

The svelte wooden stick invites yanking and banking. In flight, the view through the large windows is almost as inviting as that of the panel.

tion. Having flown both, I can't say one is better than the other. The portrait configuration makes the panel taller, but also leaves plenty of room on either side of the displays for other gear.

As it does in other installations, the Entegra system includes solid-state gyros that drive the primary flight display instrument depictions. Depictions from either the PFD or the MFD can be displayed on the other in case either screen fails. As a further backup, the 400 comes with three conventional instruments, attitude and airspeed indicators and an altimeter. As a result, your worst day in a Columbia 400—when all the electrons go out to lunch—is about on par with a regular day in conventional airplanes.

The panel is certainly no yawner, but with such integrated flight deck systems showing up on more and more new airplanes, the most unusual aspect of the Lancair cockpit is now the sidestick. Replacing the conventional yoke with a sidestick frees up space in front of the pilot and passenger, improves visibility of the instrumentation and switches, and increases safety. Unfortunately, many a pilot has received serious injuries during a crash when hitting the yoke.

Best of all, the sidestick is just cool to fly. Those who have never flown a stick may think they'll have trouble. They won't. The stick feels perfectly natural after just a few minutes of taxiing and flight. The Lancairs feature swoopy wooden sticks, which add a touch of warmth to the cockpit among all the hard-edged, crisp displays.

Undoubtedly, the stick adds to the fighterlike feel of the airplane. Because of the 400's crisp handling, it's great fun to yank and bank the airplane around with the short stick. A round omnidirectional switch on the top of the yoke controls pitch and roll trim. The position of the trim tabs is indicated on a plus-shape indicator on the lower panel. Master, avionics, lighting, and other switches are conveniently arrayed in front of the pilot below the PFD—positions that would traditionally be hidden by a yoke.

While you might usually associate "yanking and banking" to be in some steamy, cramped, hothouse of an airplane, you'll do such in comfort when you are in a Columbia 400. With a cabin that is six inches wider than a Beechcraft Bonanza, for example, the 400 provides copious space. Unlike stepping up into a Cessna, you step down into a Lancair. Pull the gull-wing door closed and after start-up hit the Door Seal switch to activate the pneumatic

door seal, which helps keep wind noise out. The Columbia includes a cabin air circulation fan that works better than most to keep passengers comfortable during the taxi to the runway. Lancair is working on an air-conditioning system that should be available later this year.

When it's cold outside, pilots will appreciate another skunk works project—a thermal wing anti-icing system. Lancair is working to certificate the system, which uses a large capacity alternator to heat leading-edge, flush-mounted panels, which will protect the wing and tail from ice accumulation. That system too is expected to be available later this year.

Prices for those options remain to be set. Base price for the well-equipped airplane is $475,000, which includes the Avidyne Entegra system, the dual Garmin 430s, and the S-Tec Fifty Five X autopilot. Among the popular options already available are the built-in oxygen system, speed brakes, and traffic information system. An airplane such as the one shown will sell for about $505,000.

Lancair has delivered 10 Columbia 400s and has more than 120 on order. The company expects to be delivering one airplane a day by early 2005—60 percent of them 400s; the balance 350s.

Cruisemaster

Cahill and I, with photographer Mike Fizer in the back snapping in-flight panel photos, flew the 400 up to 14,500 feet for a speed test. On the way up, the airplane maintained an easy 1,000 fpm the entire time while climbing at 125 KIAS and burning about 28.5 gph. Engine temperatures remained comfortably in the green despite the warmer-than-standard day. Like most modern turbocharging systems, the one on the Columbia is a set-and-forget affair. Choose the manifold pressure you want for the climb—31 inches in this case—and the system will maintain it all the way up—or until the turbocharger reaches its critical altitude.

At 14,500 feet I engaged the Emax's "lean assist," which monitors the engine and turbine inlet temperatures and fuel flows during the leaning process and shows when you have reached the desired percent of power and fuel setting. Running at 81-percent power—not unusual when cruising in a

As Lancair's Mark Cahill demonstrates, two gull-wing doors and a large baggage door make loading and unloading a breeze.

turbocharged airplane—the indicated airspeed settled on 164 knots while burning 25.5 gph. Despite the temperature being about 10 degrees warmer than standard, the true airspeed worked out to be 210 to 212 knots, in line with the POH's standard-day projection. However, the fuel burn was about two gallons per hour higher than book.

With the turbochargers' ability to deliver 85-percent power all the way up to 25,000 feet, there's no reason to doubt Lancair's claim and its certificated POH data that shows a maximum cruise of 235 KTAS at that altitude while burning 25 gph—a figure that the company uses to lay claim to the title of "fastest certified piston-powered aircraft in production."

Fast is great, right up until you need to descend in a hurry to help some harried controller. Then you deploy the optional speed brakes, which allow a fast 1,500-fpm descent with minimal change in engine power. For more help, slow to 127 knots indicated where you can throw out the approach flaps.

I'd regale you with the details of the fabulous landings I made, but, hey, you can make them too because the Columbia lands very conventionally. We've already discussed the slow-speed handling and you can put it to good use when finessing the airplane just over the runway for a satisfying chirp, chirp on the pavement.

It's easy to ohhh and ahhh over the many components that make up the Columbia 400—the new-think aerodynamics, the glowing panel, the comfortable cabin, the throaty-sounding, turbocharged engine. But what's most impressive is the way they all come together to form the complete package. You can go very fast in comfort and safety with terrific visibility flying behind a state-of-the-art panel that provides unprecedented situational awareness in all types of weather. Uncompromised performance. AOPA

i Links to additional information about the Lancair Columbia 400 may be found on AOPA Online (www.aopa.org/pilot/links.shtml). Keyword search: Lancair.

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SPECSHEET

Lancair Columbia 400

Base price: $475,000
Price as tested: $504,500

Specifications

Powerplant	310-hp Continental TSIO-550C
Recommended TBO	2,000 hr
Propeller	Hartzell constant-speed, three-blade, 78-in.
Length	25 ft 5 in
Height	9 ft
Wingspan	35 ft 10 in
Wing area	141.2 sq ft
Wing loading	25.5 lb/sq ft
Power loading	11.6 lb/hp
Seats	4
Cabin length	11 ft 7 in
Cabin width	4 ft
Cabin height	4 ft 1 in
Empty weight	2,500 lb
Empty weight, as tested	2,505 lb
Max gross weight	3,600 lb
Useful load	1,100 lb
Useful load, as tested	1,095 lb
Payload w/full fuel	512 lb
Payload w/full fuel, as tested	507 lb
Max landing weight	3,420 lb
Fuel capacity, std	106 gal (98 gal usable) 636 lb (588 lb usable)
Oil capacity	10 qt
Baggage capacity	120 lb

Performance

Takeoff distance, ground roll	1,300 ft
Takeoff distance over 50-ft obstacle	1,900 ft
Max dem. crosswind component	23 KIAS
Rate of climb, sea level	1,500 fpm
Max level speed, 25,000 ft @ 85% max cruise	235 KTAS
Cruise speed/endurance w/45-min rsv, std fuel (fuel consumption), 25,000 ft	
@ 75% power, best economy	215 KTAS/5.2 hr (99 pph/16.5 gph)
@ 65% power, best economy, 25,000 ft	202 KTAS/6.2 hr (90 pph/14 gph)
Max operating altitude	25,000 ft
Landing distance over 50-ft obstacle	2,600 ft
Landing distance, ground roll	1,250 ft

Limiting and Recommended Airspeeds

V_X (best angle of climb) at sea level	82 KIAS
V_Y (best rate of climb)	110 KIAS
V_A (design maneuvering) 3,600 lbs	158 KIAS
V_{FE} (max flap extended)	119 KIAS
V_{NO} (max structural cruising)	181 KIAS
V_{NE} (never exceed)	230 KIAS
V_R (rotation) 3,600 lbs.	73 KIAS
V_{S1} (stall, clean) 3,600 lbs.	69 KIAS
V_{SO} (stall, landing config) 3,600 lbs	59 KIAS

For more information, contact The Lancair Company, 22550 Nelson Road, Bend, Oregon 97710; telephone 541/318-1144; fax 541/318-1177; e-mail customer service@lancair.com or visit the Web site (www.lancair.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.