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MARCH 2007

Liberty XL-2: Trainer With A Difference

CROSS-COUNTRY COMFORT AND PERFORMANCE ENTER THE TWO-SEAT, FLIGHT-TRAINING CLASS **BY BILL COX • PHOTOGRAPHY BY JESSICA AMBATS**

Two-seat general aviation airplanes have had a checkered career at best. For every Cessna 150/152 or Citabria that's had a model run of 30 years, there have been a half-dozen other types that only lasted for three or five.

The short-termers may have been no less viable as trainers or fun two-seaters, but they nevertheless failed to survive. Fact is, two-seaters are generally a tough sell, even if statistics prove that most of us rarely use all four seats in our quartet airplanes. (It's been 12 years since I've filled all the seats in my Mooney.)

Truth is, flying with two seats empty is an expensive habit that too many of us simply accept as normal. ("Yeah, but I can carry all the baggage I want, even 100 Swiss Army Knives, large bottles of shampoo and an oxygen bottle.") Four-seaters are inherently more costly for a number of reasons. By definition, they're larger airplanes, with more wetted area and usually greater equivalent flat-plate area, therefore more drag. Similarly, they weigh more than an equivalent two-seater, which means they need more power to preserve acceptable performance, which means increased fuel burn, which demands larger tanks, which adds more weight, which subtracts from payload, which often necessitates a larger wing to support the load, which means...you get the idea.

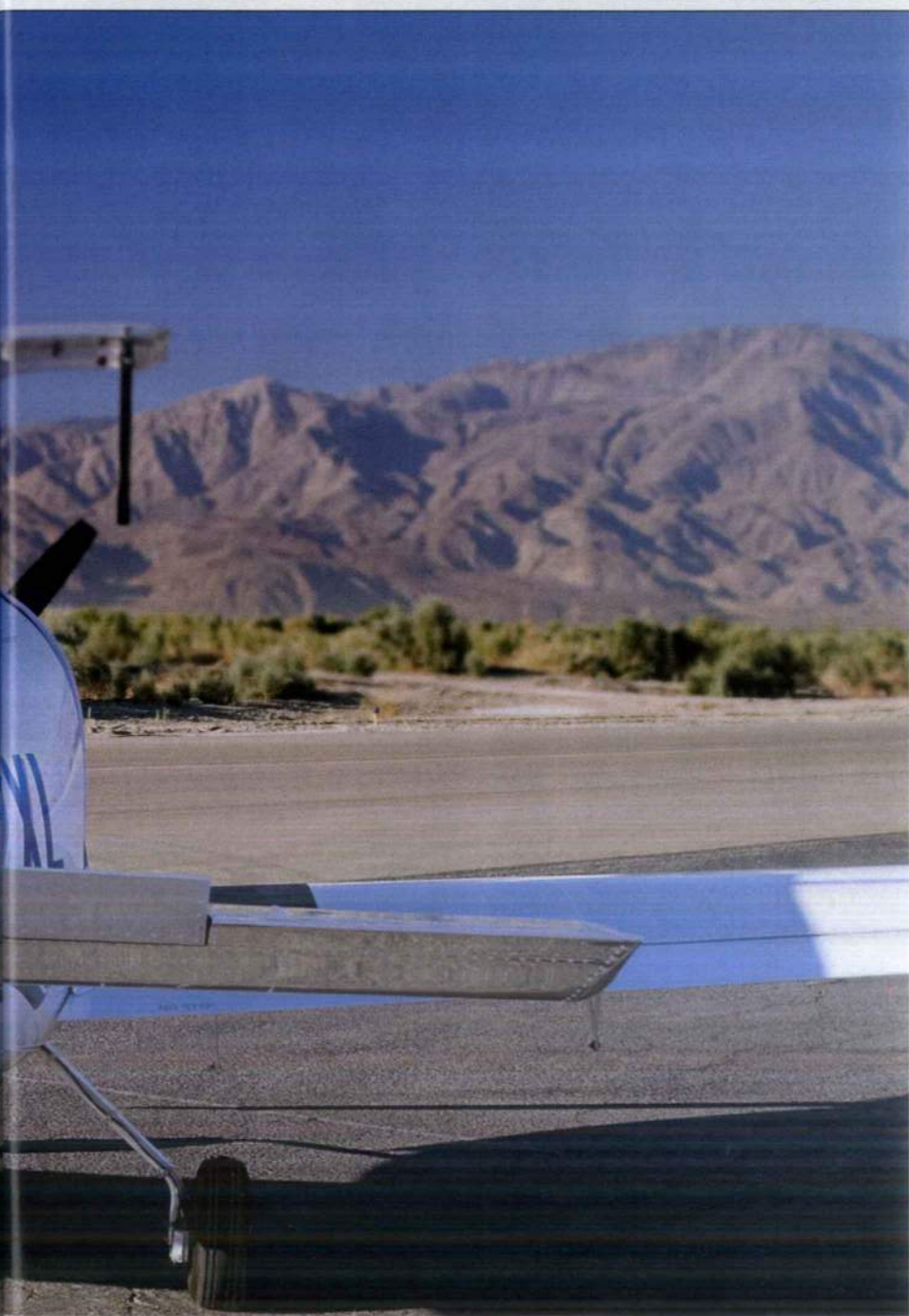
All these factors elevate hourly operating costs and make it impossible to produce a four-seater at anywhere near a two-seat price. The bottom line is that those of us who choose to fly four-place airplanes, with only two of those places occupied, pay for the extra two empty seats anyway—in spades.

In fact, we all know two seats would work just fine for the vast majority of general aviation missions. In some instances, even business travelers could utilize two-seaters. Years ago, the National Business Aircraft Association surveyed its members on how they use their air-





The Liberty offers clamshell doors and a true natural laminar flow airfoil wing, which spans 28 feet and 9 inches. The slick wing, reasonable horsepower and light weight make the XL-2 a compact and efficient machine.



planes and determined that the average stage length was less than 400 nm, typically carrying only 2.54 passengers.

Liberty Aerospace of Melbourne, Fla., hopes to capitalize on those numbers with an airplane that's very different in several important respects. It brings to the two-seater market an uncommonly large cabin, along with near four-seat/fixed-gear performance and a level of fail-safe design that would be the envy of a NASA engineer.

First, the XL-2 isn't a one-trick pony. True, it's designed to carry only two folks, but those two aren't confined to instructor and student. They can as easily be husband and wife on vacation, two buddies in search of the \$50 breakfast or possibly two business associates making the rounds.

The Liberty XL-2 is loosely based on the Europa design born in the U.K. in 1992. In this case, "loosely based" is an exercise in understatement. Park the two aircraft side by side, and you'd note a myriad of differences. Despite the Europa's acknowledged innovations, the Liberty design is light years ahead in virtually every area.

Ivan Shaw designed the Europa, and his concept was to produce a "light touring aircraft." The Europa was Shaw's experimental, Rotax-powered kitplane, essentially a motorglider that balanced on a single wheel with outrigger wheels to keep the wingtips from dragging on the ground. Some 1,000 kits were sold in 32 countries during the 1990s. The Europa was a revelation for the time and won a number of awards in Europe.

The Liberty was launched at the turn of the century and developed over the last half-dozen years in search of its FAA certificate. The Feds issued that authorization last spring, making the Liberty XL-2 the first two-seat piston aircraft certified in the United States since the Piper Tomahawk. (Before Diamond fans object, consider that the C1 was first certified in Austria, then, approved in America under reciprocal agreement.) The Liberty also has the distinction of being the first piston aircraft fully approved for

FADEC (full authority digital engine control) operation.

The XL-2's structure is about as 21st century as Liberty could make it. Its fuselage is pre-preg carbon fiber, and the 4130 tube-steel frame absorbs loads from the engine, nosegear, main gear and wing attach points. The XL-2's wing is also a little unusual. Designed by the former Chief Engineer for Airbus, Don Dykins, who had a hand in choosing sections for the Concorde wing, the Liberty's relatively small 112-square-foot airfoil provides a cruise of more like Mach .20 than Mach 2.0. (As partial compensation, the XL-2 burns only about 6 gph, compared to about 8,000 gph on the Concorde.)

The XL-2's wing is a true natural laminar flow (NLF) airfoil, maintaining attached laminar flow far back on the chord. Dykins also fitted the XL-2 with multiple sets of vortex generators on the outer wing to help preserve aileron



WAYPOINT

NLF airfoils achieve high levels of efficiency by maintaining attached airflow far aft on the wing.

response at high angles of attack, providing better roll control when approaching, and actually in, the stall.

Motive force on the Liberty is a four-cylinder, Continental IOF-240B engine driving a fixed-pitch Sensenich prop. You'll notice the letter "I" at the beginning of the model number, designating fuel injection. That's an unusual technology for such a small engine. Fuel injection is a relatively expensive feature, normally applied only to engines of 160 hp or more. The overriding benefit of fuel injection is that it allows very precise fuel distribution between cylinders, and that translates directly to reduced fuel burn. Injection in place of carburetion was necessary to accommodate the Continental's PowerLink FADEC system.

True to its promised "full authority," FADEC operates through a computerized electronic ignition system. The FADEC scans all aspects of engine operation several times a second, evaluating temperature, air pressure, CHT, EGT, fuel and manifold pressure, the

SPECIFICATIONS

Base price:	\$159,900
Engine make/model:	Continental IOF-240
TBO (hrs.):	2000
Horsepower:	125
Fuel type:	100/100LL
Propeller type:	2-blade, FP Sensenich
Landing gear type:	Tri./Fixed
Max ramp weight (lbs.):	1653
Gross weight (lbs.):	1653
Landing weight (lbs.):	1653
Empty weight, std. (lbs.):	1065
Useful load, std. (lbs.):	588
Usable fuel, std. (gals.):	28
Payload, full std. fuel (lbs.):	420
Wingspan:	28 ft. 9 in.
Overall length:	20 ft. 4 in.
Height:	7 ft. 5 in.
Wing area (sq. ft.):	112
Wing loading (lbs./sq. ft.):	14.8
Power loading (lbs./hp):	13.3
Seating capacity:	2
Cabin doors:	2
Cabin width (in.):	48
Cabin height (in.):	46
Wheel track (in.):	70.3
Wheel base (in.):	57.2
Baggage capacity (lbs.):	100

PERFORMANCE

CRUISE SPEED (kts.):

75% power: 132

60% power: 120

MAX RANGE (nm):

75% power: 450

55% power: 500

FUEL CONSUMPTION (gph):

75% power: 6.0

60% power: 5.3

Estimated endurance, 60% (hrs.): 4.0

Stall speed, flaps up (kts.): 50

Stall speed, flaps down (kts.): 43

Best rate of climb (fpm): 682

Service ceiling (ft.): 14,000

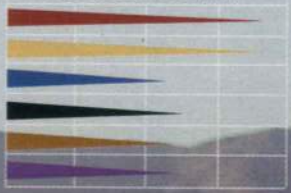
Takeoff ground roll (ft.): 750

Takeoff over 50 ft. obstacle (ft.): 1250

Landing ground roll (ft.): 750

Source: *Manufacturer's Website*

CRUISE SPEED, 75% (kts.)



STALL SPEED, DIRTY (kts.)



GROSS WEIGHT (lbs.)



ENGINE HORSEPOWER



PILOT REPORT

2006 LIBERTY XL-2

phase of the moon and your astrological sign; then, it automatically adjusts mag timing and mixture for all stages of flight, from takeoff and climb to cruise, descent and landing.

From the pilot's perspective, FADEC is totally transparent. Once you start the engine, you merely push forward to go and pull back to stop. FADEC does the rest.

Engine health reads out through a Vision Microsystems VM1000 that serves as an EICAS—airline speak for Engine Instrument Crew Alerting System. The system reads power in percentages, and it automatically warns the pilots if any parameter approaches tolerance limits.

Climb into the cabin through the twin gull-wing doors, and you'll find a space that's surprisingly roomy for what we've come to expect from a two-place machine. Old-generation two-seaters, such as the Skipper, 152 and Tomahawk, made do with internal cross sections of 40 inches or less. In stark contrast, the Liberty offers a



WAYPOINT

The XL-2 features a cabin that's almost exactly as large as that of the old Piper Navajo twin.

comparatively huge cabin that measures 48 inches at the elbows. Cabin height also is a generous 46 inches. Liberty claims the cabin can accommodate a pilot and passenger as tall as six feet, six inches. The idea was to offer more than just barely enough room. This is, after all, supposed to be a "sport touring" airplane rather than strictly a trainer, so you should be able to sit in it for longer than an hour without feeling claustrophobic.

Control and panel layout is reasonably conventional—a stick for roll and pitch and the usual pedals for yaw control. One interesting variation for ground control is finger brakes. The nosewheel is full-castering, but rather than mounting toe brakes for differential braking, the Liberty utilizes two small levers on the center console that work exactly like toe brakes except with the first two fingers of the pilots' inboard hand. There's nothing especially difficult about the system, but you can't help wondering what was wrong with the more conventional toe brakes. The



The computerized electronic ignition FADEC system eases a pilot's workload, allowing one to concentrate on the task of flying.



Finger brakes, the two small levers on the center console, function like conventional toe brakes.



throttle is center-mounted, so it's not a major trick to have your outboard hand on the stick and control both brakes and power with the inboard hand. Still...

With FADEC on the job, engine starts are nearly guaranteed the first time every time. Taxi is similarly simple, and the airplane is ready to fly nearly as soon as you are. Push power full forward for take-off, and acceleration is better than you might have expected. That's partially a simple function of power loading. The XL-2 sports 125 hp to lift only about 1,650 pounds; the Skipper, 152 and Tomahawk all employed 115 hp or less to do roughly the same job.

Accordingly, the XL-2 records the short-



WAYPOINT

FADEC eliminates the mixture control and allows the pilot to manage power as simply as in a car.

est takeoff distance in the class, 750 feet. Climb typically settles in at about 700 fpm, and the little wing keeps on keeping on to a service ceiling of 14,000 feet.

On the way uphill, you can't help but notice the XL-2's excellent visibility. The windshield is wide and tall, and side windows in the clamshell doors wrap well back past the pilot and copilot shoulders, opening up the view to the top and through at least the front 240 degrees. It's not quite as open as a bubble canopy, but that's probably just as well. The overhead and side post structure provides shade that's sometimes missing with a sliding hatch.

Put together a small, slick, efficient, NLF wing, reasonable horsepower and a lightweight airplane, and you have the makings of a quick machine for the horsepower. Sure enough, the XL-2 offers cruise more appropriate to the four-seat Cessna Skyhawk and Piper Archer. The company suggests 132 knots with everything optimized, but even 125 knots would be excellent performance with only 125 hp under the bonnet.

With 28 usable gallons in the tanks and a burn of around 6 gph at max cruise, you could reasonably expect to linger aloft for 3.5 hours and cover nearly 450 nm in the process. For those strange people who enjoy flying slow, the XL-2 will reach out to more than 500 nm at 55%. This is more than enough for training purposes, VFR or IFR, and private owners should be pleased with the combi-



nation of economy and range.

Whatever the stage length, the XL-2 makes a comfortable conveyance—roomy, modestly quiet and well ventilated. Vibration is modest with the FADEC-controlled Continental out front, and the combination of reasonable speed, good visibility and high wing loading for a better ride in turbulence contribute to a pleasant in-flight experience.

At the opposite end of the trip, the Liberty's wide track and low CG contribute to good manners during landing. Stall with the full 30 degrees of flaps deployed is only 43 knots, so approaches as slow as 55 knots present no great challenge. Landing ground roll is less than 850 feet, which is reassuring if you fly into a short strip.

Prospective buyers are sometimes a little apprehensive about dealing with a single-product, start-up company—there's often a greater feeling of security buying from Piper/Cessna/Beech/Cirrus/etc.—but Liberty's backing is about as solid as it can be. While the company doesn't have unlimited funding, it's backed by the Kuwait Finance House of Bahrain, which owns 75% of the assets. Such solid ownership suggests reasonable financial staying power.

Base price for the XL-2 is \$159,000 before avionics and other options. Liberty has embraced Garmin International's line of radios, with the top options being the GNS530 and Mode S 330 transponder, with the GNS430 and 327 transponder as less-

expensive alternatives. Plan to spend about \$168,045 for a reasonably equipped VFR airplane, \$180,000s for a full-on IFR machine.

The recent AOPA Convention in Palm Springs, Calif., suggested a new optimism among general aviation pilots, and the Liberty XL-2 is ideally placed to benefit from the resurgence. It's a trainer, it's a cross-country traveler, it's two planes in one.

P&P

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FACTORY COMPARISON	2006 LIBERTY XL-2	2006 DIAMOND C-1	1981 BEECH SKIPPER	1986 CESSNA 152	1982 PIPER TOMAHAWK	1978 GRUMMAN AMERICAN LYNX
Cruise Speed, 75% (kts.):	132	132	105	110	108	108
Stall Speed, Dirty (kts.):	45	34	47	43	49	51
Fuel Burn, 75% (gph):	6.0	6.2	5.8	5.8	5.7	5.7
Climb Rate (fpm):	1150	1105	720	715	725	765
Service Ceiling (ft.):	14,000	13,000	12,900	14,700	13,000	13,750
Takeoff Distance (ft.):	750	952	780	725	805	725
Landing Distance (ft.):	750	550	670	425	707	395
Gross Weight (lbs.):	1653	1653	1675	1670	1670	1500
Useful Load (lbs.):	588	487	573	529	542	493
Power Loading (lbs./hp):	13.3	12.8	14.6	15.1	14.9	13.9
Wing Loading (lbs./sq. ft.):	14.8	13.2	NA	10.6	13.4	10.7
Engine Horsepower:	125	125	115	110	112	108
Cabin Width (in.):	48	42	40	39	40	41
Fuel Capacity (gal.):	28	25	29	26	30	24

SOURCE: Jane's All The World's Aircraft, Aircraft Bluebook Price Digest, and Manufacturer's Website