

The Aviation Consumer®



Three Cubs

The Cub idea endures in LSAs. How do they compare to the original?... page 4



Going up ... page 8



Not afraid of the ice ... page 12



Cool your stack ... page 15

8 SOFT MARKET ENDS
Insurance rates seem to have bottomed. Modest rises ahead

12 TKS REPORT CARD
Owners tell us it works, and is worth the cost and mess

19 PRIVATE PILOT TEST PREP
Sporty's and Gleim are our top picks

11 GROUND POWER UNIT
They're a must for avionics training; start power is a plus

16 AVIONICS COOLING
Don't believe anyone who tells you fans aren't needed

22 VIRTUAL HUD WINGMAN
We're not sure a portable EFIS is useful, but it does the job

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FIRST WORD

LSA: Still Falling Short

When the nuns were futilely trying to educate me at Saint John's Academy for the Perpetually Misguided, the monthly report card had a blank section for comments. These were meant to be well-intentioned encouragement for depressed parents who, upon seeing columns of Ds and Fs, understandably veered toward alcoholism, if not suicide. For my monthly dispatches of despair, Sister Salisha may as well have had a rubber stamp since she wrote the same thing: Paul's grades continue to fall short of his potential. (If you came of age during the 1960s, your report card said the same thing, unless you were one of those curve-busting nerds who ruined the academic careers of those of us who were too busy teaching ourselves to smoke behind the rectory to actually study.)

I think I feel the same way about the budding light sport industry.

There's so much potential there but it is, thus far, unrealized. When we set off to cover the U.S. Sport Aviation Expo in Sebring in January, the one

word that came to mind was stasis. There's just not much progress in this market and 2010, the hoped-to-be turnaround year, was actually worse than the dismal 2009. How can this be? What's wrong here? What is the industry doing wrong?

I'm not sure I can put my finger on it, but part of the problem is that there continues to be too many aircraft options for too few buyers. My theory is that this alone clips off some percentage of sales because would-be owners look at the field and find it too chaotic and fractured to make much sense of, so they do what buyers always do: They dither. I get a trickle of e-mail about this, asking me what I think of this design or that company. My guess is that these buyers are on the verge of writing the check, but decide to wait a while to see what's going to happen. (I believe the money is out there; the confidence is not.)

I doubt if there is a one-size-fits-all solution to this dilemma. Before it breaks loose, the economy will have to not just resume growth—it has already done that—but create employment, too. It's not that potential aircraft buyers are unemployed, but stories about persistent high unemployment erode the confidence some buyers need to feel comfortable spending north of \$100,000 for an LSA, or any other airplane, for that matter. It may be awhile before we see that, so the smart LSA companies are simply going to have to hold on until market conditions improve and until there are maybe half as many manufacturers as there are now. Personally, if I'm buying an LSA, I want the company selling it to be placing at least two or three a month into the market, or to have some other business mix that appears to make them viable. Only a handful of companies meet this acid test. Some of them are well-established with either allied kit businesses, or a diverse enough product line to constitute a real business plan.

I think the best potential exists in the training market. Last year, Tecnam's Phil Solomon told me that critical mass may occur when there are enough LSAs out there to populate dying airports with a real training fleet. His view—and I think he's right—is that there's no long-term potential for the industry if new customers show up only to be squired to a 30-year-old Cessna 150 with shabby plastic and faded paint. Starting students simply aren't going to be impressed by that. I'm certainly not and I grew up with it.

I don't think the perceived high prices of LSAs are an issue and, in any case, it's a pipe dream to believe the manufacturers are going to reduce them. At Sebring, I saw some sub-\$70,000 airframes and those companies have fewer orders than those selling models costing twice as much.

Conclusion: It will be a slow, long haul to LSA market growth. When it reaches 1200 to 1500 units a year in the U.S., call that boom times. —Paul Bertorelli





CubCrafters Sport Cub



Legend Cub



Three Cubs: New LSAs vs. the J-3

Other than being faster, safer, more comfortable and with a way better panel and engine than the J-3, Cubs from Legend and Cub Crafters are just like the original.

by Paul Bertorelli

This thought experiment is irresistible: What if the clock were wound back 50 years and William T. Piper got a look at the modern crop of light sport

FLIGHT TRIALS

airplanes that bear the name of his beloved Cub? Would he be pleased? Our guess is that he would not be, although Walter Jamouneau would be. Jamouneau was the engineer responsible for improving the Taylor E-2 and evolving it, eventually, into the J-3.

It's not that Piper was a purist and would be offended by what the likes of Legend and Cub Crafters

have done to his classic everyman's airplane. It's because Piper was, above all else, a salesman and in his day, the \$1325 price was what would make the thing sell (and did) and thus become the iconic conception of light aircraft. The J-3 was not the perfect airplane. It was compromised to

Cubs do asphalt, but they belong on grass. In addition to LSAs, Cub Crafters makes the Top Cub, right, essentially a modern Super Cub.

be affordable, not be the best that could be built. Piper could not have imagined that seven decades later, his J-3s would still be competing with new airplanes as they most assuredly do. But the Legend Cub and Cub Crafters S2 Sport Cub are closer to what Piper might have wanted but wouldn't have built.

Both are less compromised purely for price and both represent the Cub idea executed as well as it can be. Despite the advent of LSA, the days of an airplane for every man are gone and neither the Legend nor the SportCub can pretend to be one, in our view. Of the two, the Legend is closer, given its lower cost. Although it hasn't ignited the market explosion many have hoped



J-3: WOOD
LEGEND: WOOD, METAL,
COMPOSITE
SPORT CUB: WOOD, METAL,
COMPOSITE

J-3: 22 FT. 3 IN.
LEGEND: 22 FT. 5 IN.
SPORT CUB: 23 FT. 4 IN.

J-3: 5 FT. 5 IN.
LEGEND: 5 FT. 8 IN.
SPORT CUB: 5 FT 7 IN

J-3: 65-HP CONT.
LEGEND: 100-HP CONT. ; 120-HP JABIRU
SPORT CUB: 100-HP CONT.

J-3: EXPANDER TUBE HEEL BRAKES
LEGEND: GROVE DISC HEEL BRAKES
SPORT CUB: GROVE DISC TOE BRAKES

J-3: IRISH LINEN
LEGEND: POLY FIBER
SPORT CUB: POLY FIBER

J-3: 8.00 X 4.0
LEGEND: 8.00 X 6, 26-IN. TUNDRA
SPORT CUB: 8.00 X 6, 26-IN, 39-IN TUNDRA

J-3: 35 FT. 3 IN.
LEGEND: 35 FT. 6 IN.
SPORT CUB: 34 FT 3 IN

J-3: 24.5 IN.
LEGEND: 28.5 IN
SPORT CUB: 28.5

Drawing courtesy
www.schemedesigners.com

	J-3	LEGEND	SPORT CUB
NEW PRICE	\$1325	\$113,895 (BASE)	\$139,950 (BASE)
TYPICAL USED PRICE	\$28,000 TO \$35,000	\$68,000 TO \$118,000	\$99,500 TO \$127,500
USEFUL LOAD	470 LBS	480 LBS	488 LBS
FUEL CAPACITY	12 GAL	20 GAL	24 GAL
CRUISE SPEED	65 MPH	90 TO 115 MPH	90 TO 115 MPH
RATE OF CLIMB	300 FPM	700-900 FPM FPM	700 TO 800 FPM

for, the light sport rule has focused attention on new airplanes that cost less than half of what new conventional aircraft do.

Further, because no medical is required to fly light sport, many certificated pilots who can't hold a medical are staying in the game and others who wouldn't have otherwise considered owning an airplane are kicking tires. And some of those are the 8.00 X 4s on J-3s, other legacy light sport options and new LSA models from more than a dozen manufacturers. The fact that one in six LSAs sold is a Cub-type taildragger illustrates the enduring appeal of Piper's design.

But do 60- or 70-year-old J-3 Cubs really compete with new Legends and Sport Cubs? To a degree, we think they do and for at least some buyers, the competition is direct. Buyers shopping LSAs who are put off by prices north of \$120,000, often seek refuge in the legacy list. This will inevitably lead them to J-3s.

As legacy aircraft go, the words "cheap" and "Cub," don't belong in the same sentence. Cubs have evolved to cult status and are priced accordingly. An early J-3 with a premium restoration job might command as much as \$40,000, although realistically, \$25,000 to \$35,000 is more likely.

are sometimes listed in the high teens and low 20s, although these prices have escalated recently. Any legacy LSA you'd be willing to fly will, realistically, cost at least \$20,000.

The Legend and Cub Crafters Sport Cub sell for multiples of that number. The base price on the Continental O-200-D-powered Legend is \$113,895 and tricked out with typical avionics, the invoice will come to \$120,000. A float model (see April 2010 *Aviation Consumer*) will cost as much as \$159,000.

The Cub Crafters Sport Cub occupies near the top tier for LSAs, at a base price of \$134,950 for a Continental-powered airplane, plus another \$10,500 for a basic VFR panel

Aeronca Champs, by comparison,

(Garmin aera 550 GPS, navcom and transponder) and \$19,900 for a max panel, with a Garmin GDU 370 and a Dynon D180.

BASIC AIRFRAMES

Doing the simple math here, adjusting for inflation, the new Cubs are six to seven times the cost of the original Cub and a multiple of four to five over a restored legacy model. What justifies this? Nearly everything, in our view. Other than being yellow—and maybe not even that since you can customize the color scheme—these airplanes are barely in the same universe as the J-3. As a point of reference, the



Legend, near photo, stuck with a conventionally hinged elevator while Cub Crafters' S2 has a counterweight design. Both use the jackscrew trim method found in the J-3, inset.





A J-3's panel, top, is 1930s minimalist. But for both the Legend, (center) and the Sport Cub, avionics choices are considerable, ranging from Garmin portables to Dynon's top-of-the-line EFIS units. The Sport Cub's design (lower) tends toward the more colorful and stylish.

more apt comparison might be to the Super Cub, since these new airplanes are closer to that paradigm. But Super Cubs don't qualify for LSA; the J-3 does. There is a philosophical point of departure between Legend and Cub Crafters. Legend has exercised more

restraint in hewing to the original Cub while improving it at every turn. Cub Crafters' approach is more conceptual; it has all but retooled the Cub idea from the ground up.

Both airplanes have the same welded tubular steel frame that Piper used, although the dimensions and construction have more in common with the Super Cub than the J-3. Legend beefed up the overhead structure in the cabin to improve crashworthiness and where Piper gas welded the frame, Legend TIG welds parts that are cut via CNC milling to improve precision. Cub Crafters uses MIG welding. Cub Crafters also points out that its higher price is due in part to adhering to Part 23 standards rather than ASTM standards. On the other hand, LSA standards went the ASTM route to provide less expensive airplanes.

Cub Crafters has made more extensive changes to the basic frame, including re-jiggering the aft longe-

ron and reducing the overall frame parts count to simplify construction. Both the Legend and Sport Cub have improved corrosion proofing and gone is the Cub's spruce spar, replaced by aluminum.

Modern designers would gasp at the original Cub's inclusion of the gas tank inside the passenger cabin, so as a safety factor, both new Cubs have the tanks in the wing roots and both carry more fuel than the J-3—24 gallons usable in the Sport Cub, 20 in the Legend.

Where the old Cub had a coat-hanger wire on a cork for a gas gauge, the new ones have sight gauges in the wing roots. The fuel system is left/right/both in both the new Cubs. It's on or off in the old one.

With its closer adherence to the original, the Legend has the same tail-feathers as the J-3 and also the same landing gear dimensions, but in place of the Piper's bungees, Legend has a pair of beefy die springs instead.

These soak up the bounces better and require less maintenance. Legend also stuck with Piper's original jack-screw trim system, but doubled up the cordage to prevent slipping so it works well against air loads. Legend parted company with Piper on the brakes; rather than the old expander tubes, it has Grove disc-type brakes, although in a bow to the original, they're activated by heel rather than toe pedals.

Cub Crafters took a different tack. It modified the elevator to include a more modern counterweight design and although it has the jackscrew, the Sport Cub has electrically activated trim only. The gear is similar in concept but has a step welded to the front gear leg to help ingress. (The Legend does, too.) Cub Crafters uses Grove brakes, too, but with toe pedals rather than the Legend's heel brakes.

Like the Super Cub, but unlike the Legend, the Sport Cub has flaps—big ones. They're manually operated by a

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AC TV



For a video demonstration of all three Cubs, log onto www.avweb.com and click the video index in the upper right home page, then scroll down to the Three Cubs video.

ratcheting lever mounted to the wing root on the pilot's left side.

Also noticeable—and in keeping with its cutting-edge ethos—is Cub Crafters' use of carbon fiber throughout the Sport Cub, molded with a vacuum bagging method. The cowl-ing, interior panels, the cabin floor and other components are carbon fiber, a light and durable solution.

SYSTEMS, ENGINE

To apply the word systems to the J-3 is to overstate the case. If a valve and a bit of tubing is a system, well, ok. The original Cub is tractor-like in its design, with everything made as close to the earth—or shop floor—as possible. Both the Legend and Sport Cub are more sophisticated, obviously.

First, electric systems and starters. Both the Legend and Sport Cub have giant 40-amp alternators to run the electrics and charge a small starting battery. While we like charm as much as the next guy, it wears thin while hand propping a J-3 through the 30th blade on a warm day. Given the choice, we'll take the starter.

Some J-3s have slipstream generators, but we haven't seen many, so if an electrical system is a must, a newer LSA might be the better choice. Further, an electrical system begets radios and transponders, which opens up airspace not available in non-electrical system J-3s with a portable radio.

Perusing the optional equipment list for both the Legend and the Sport Cub, Bill Piper might just be convinced to roll over on his unwavering devotion to cheap. Both companies offer generous choices for panels, ranging from a basic Garmin aera to the top-of-the-line Dynon and Garmin 696 if you're so inclined. The fact that some of these devices are primarily battery powered is a nice plus for backup, in our view.

Both the Legend and Sport Cub are somewhat unique for having Continental O-200s in a segment dominated by the Rotax 912ULS. While the Rotax is undeniably a more modern engine and has features we like—electronic ignition, mainly—the O-200 is no slouch. We think its



HOW 'BOUT THE CARBON CUB?

If the Sport Cub is the J-3 (or Super Cub) writ without compromise, the Carbon Cub is the same airplane writ completely around the bend. Cub Crafters made a ripple when it introduced this airplane in 2009. The company enjoys taking the airplane to Alaska and embarrassing Super Cub drivers by pulling the Carbon Cub off the ground in less than its own length.

This is made possible by the 180-HP CC340 which is, as far as we know, the first purely ASTM-approved engine. Its basis is the OX-340 Stroker ECI developed for the experimental market, an engine that's in turn loosely based on the Lycoming O-320.

From the firewall aft, the Carbon Cub is essentially the same as the Sport Cub. The empty weight of the Carbon we flew was 895 pounds compared to 886 pounds for the S2. While the S2 had 26-inch tundra tires, the Carbon had 8.60 X 6s. Despite the additional drag, these don't impact performance much, but the big wheels soak up bounces and make an average tail-dragger pilot look like an expert.

But takeoffs are what the Carbon Cub excels at and, as expected,

with all that thrust, the airplane bolts into the air in dozens, not hundreds of feet. At a 50-MPH indicated speed, the deck angle and climb rate are stupid high. (We saw a 1500 FPM initial rate.)

But Cub is another word for drag, so the airplane's cruise is Super Cub-like. At 4000 feet, we estimated a 114 MPH true airspeed on about 8.5 GPH. Throttling back to a quieter 2000 RPM yields a bit less than 100 MPH on 4 to 5 gallons.

Compared to the S2, the Carbon Cub climbs better, and cruises a little faster, but it's also kind of brutish. The noise level is higher by a couple of dB and it's more vibey than the Continental-powered S2. Apart from the blistering climb and STOL capability, it flies like the S2.

Does it belong in this comparison? It is a Cub and it is an LSA. But it's also out on the alien edge of what this market segment is likely to be. The base price is \$163,280 and typically equipped, it would be closer to \$180,000. Frankly, given what the thing is capable of and its ramp appeal, we don't think that price is out of line for an airplane that's at the opposite end of the universe from Bill Piper's original cheap airplane idea. Lacking a better description, it's really a custom hotrod and hotrods don't come cheap. For a complete review, see the June 2009 issue of *Aviation Consumer*.

more conventional, smoother throttle response makes it more flyable than the Rotax. Cub Crafters offers the O-200-A, while Legend has the O-200-D lightened version. Even with metal or composite props, we found both of these to be exceptionally smooth runners.

FLYING THEM

Yes, the new-age Cubs depart substantially from the original in design and construction, but do they fly the same? No, they don't. Not quite night and day, but maybe dusk to noon.

First, egress and creature comfort. With its larger wheels, the Sport Cub

is higher than the J-3, but easier to get into, thanks to the step and higher seats. And, oh, those seats, especially the front. Both the Legend and Sport Cub can be soloed from either seat and this is a huge plus. The front seat in a J-3 is a rack, with little leg room, the gas tank banging against your knees and no hope of improving the seating position.

Also, the cabins in both the new Cubs are four inches wider than the J-3 and it might as well be four feet given the improved comfort. Further, both of the new Cubs have a proper baggage compartment, not the canvas breadbox found in the original. Solo-

ing from the backseat of a J-3 is like being in a hole, so S-turns during taxi are a must. Not so flying from the front seat of the Legend or S2. You can just see over the top of the cowl and/or peek around the glareshield during taxi, a huge improvement over the J-3. Taxi turns in both the new airplanes are tight and precise, thanks to good brakes, compared to slightly sloppy in the J-3.

While a C-90-powered J-3 would compare more favorably to the Legend and S2, a C-65 doesn't. The additional 35 horsepower in the new airplanes make for a spirited hop off the runway and enough climb rate to actually reach pattern altitude by mid-downwind. In a J-3, you wouldn't bother trying. We did notice that our C-65 J-3 requires less effort to raise the tail, but we flew with a passenger in the rear, which may account for that.

Handling wise, the new Cubs have the same pronounced adverse yaw as the original, so they require deft footwork to keep the ball centered. Both the S2 and Legend feel more precise than our old J-3, probably because they're new and tightly rigged. We found that the Sport Cub's perceived roll forces were higher than either the J-3 or the Legend and because the stick is shorter, it's not quite as comfortable to rest a wrist on a knee while flying. If we had a choice, we would prefer a stick two inches longer. Cub Crafters has heard the complaint and is considering a longer stick.

Cockpit visibility from the front of the S2 is excellent, almost like sitting in a fishbowl and better than the J-3. Legend offers two cowl types, a traditional design with the cylinders exposed and a Super Cub-type pressure cowl. Legend's Darin Hart told us the pressure cowl design opens up the forward view even more.

The S2 and Legend cruise fast enough to actually go somewhere. We saw about 94 MPH indicated in the S2 at high cruise, burning about 5 to 6 gallons. At 2000 RPM and 4 GPH, we saw about 80 MPH indicated. By comparison, our C-65 J-3 dawdles along at 65 to 70 MPH indicated.

The Legend did a little better, probably due to its ground adjustable prop, also an option on the Sport Cub. We recorded 98 MPH indicated, again on a little more than 5 GPH. But the reality is both airplanes cruise at the same speeds. Both of the Legend's doors

open and the windows have blast vents, so cabin comfort is excellent. The S2 has a single door, but has vents in the overhead skylight.

CONCLUSION

In our view, these two aircraft are among the top quality offerings on the LSA market. Not for nothing has the Cub idea endured and it's not all nostalgia—these airplanes are both fun and challenging to fly, with none of the quirks of other light sports we've tried. Build quality on both is top drawer, especially Cub Crafter's incorporation of carbon fiber. The work is flawless.

Which to choose and why choose one over the original J-3, of which there are many available? The main driver is money, we suspect, given the aforementioned price multiple. Second, if you really want to go anywhere, 65 MPH won't cut it unless you have absolutely no time schedule. Another 30 MPH makes an impossible trip doable.

Between the S2 and the Legend, the two are nearly equal in performance and capability, in our view. The S2's flaps give it a little edge in short field work. On the other hand, the Legend has lighter control forces. They are not equal in price, however. The S2 carries a 23 percent premium over the Legend. What you get for that is some nicer build details, such as milled aluminum fittings where the Legend has steel, beefy rods to interconnect the pedals while the Legend uses traditional cables, the aforementioned flaps and other nice-to-haves, including a convertible rear seat for cargo carrying.

For the traditionalist who wants a safer, faster, updated Cub, the Legend is the value leader, in our view. If budget is less of an issue and you can afford a polished jewel with exceptional detailing, the S2's features make for an uncompromised product for those who prefer the newest technology applied to an old idea. We would be happy with either, frankly.